RADIO ANCESTORS

BY

ROBERT H. MARRIOTT

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CHAPTER II

THE WIRELESS IDEA WAS OLD IN 1897.

For one student alone to study wireless seemed difficult because, for example, there were two parts to be operated or watched in a considerable portion of the study. One might watch carefully what was going on at a transmitter while the other did the same at a receiver as far away from the transmitter as the receiver would respond.[0] In '97 and later I inquired of some of my fellow students at Ohio State University in an attempt to get one to specialize in Wireless with me. To be my partner he would have to do as I was doing - that is, take the General Science Course, major in Physics and specialize in Wireless under Prof. Benjamin Franklin Thomas, Ph.D., Asst. Prof. James Elsworth Boyd, M.Sc. (Jimmie) and Instructor Frederick E. Koster, E.E. (Fred). So far as Wireless was concerned, the students contacted did not remember reading about any wireless or they had not been impressed by what they had read. As to majoring in Physics they were fearful. So many former students had failed in Sophomore Physics that they were fearful of making Physics a major study.

The fear of Physics seemed to stem from the predominate precision of Prof. Thomas, particularly from his lectures to the Sophomore Physics classes. Students said they could not pass "old dad" Thomas. While lecturing he sat back of a long physics laboratory table. The students knew at what place he would sit because at that place the table was cut away to fit his ample belly. Some students found places in seats where he could not see them unless

he moved out of the concave socket that fitted his convex surface. Those students decided they could not follow his lectures and went to sleep, hoping to pass quizzes and examinations by studying the textbook. Outside of sophomore Physics I was a one-student class in Physics in which capacity I only received instructions as to what I should read, try to find or do. During the Sophomore Physics lectures I could not keep my mind on what Prof. Thomas said or understand it most of the time. Thomas spoke in what I assumed to be nearly perfect Scientific English in an almost perfect monotone. I did not go to sleep but I had other prescribed college subjects to think about plus such not-prescribed subjects as ways to make some money, football, girls and college politics. Usually my thoughts drifted to subjects that he did mention. That was the year 1898, I increased my income by publishing the first football score card and raised the money to take the OSU 14-piece band on its first trip to Oberlin to help score one touchdown against Oberlin's zero. I can still see Daddy Thomas on a nice day after lunch, returning to the Physics Department following his cigar, chin whiskers and belly with measured step and dignity - a well tailored parade - the belly leading.

College professors like Dr. Thomas knew that Wireless was fairly old then, in 1897, but not one of the wireless schemes had been developed to the point where it had rendered a continuous public service.

Thomas did not approve the reading of popular science or propaganda types of articles. He wanted accurate honest information.

I found repeatedly that I could not avoid reading rehashes of old articles, and inaccurate statements. Years later it became evident that popular science articles and stock selling propaganda had helped to develop Radio because they attracted youthful workers to the field. The famous Radio Amateurs were attracted by popular science articles and to some extent by stock selling propaganda.

The University Physics laboratory included in its equipment devices of the type used by Hertz in his 1887 experiments in which he demonstrated that the theory first advanced by Maxwell in 1867 was correct. They were a theory for wireless and a wireless demonstration. By starting in 1897 I became a Radio Pioneer, ten years after Hertz, 30 years after Maxwell. '67 and '87 were early dates. However, I listed many other early dates of wireless proposals and of wireless devices, some of which were actually tested over short distances. Maxwell and Hertz did not apply for patents - others did apply for patents. My investigations were confined to wireless that used electricity and part of my time was spent in reading about what a number of men had done. I stuck to wireless that used electricity but, of course, there were wireless communications before a wire was ever made. Smoke signals and native drums or other sound transmitting devices served to transmit communications quickly over greater distances than were spanned by the early forms of electrical wireless. But it is Radio that we are leading up to and Radio has spanned greater distances in less time than any other method of communication.

Not only did the development of workable theories about elec-

tricity and magnetism help to build up to wireless but so did some incorrect theories and impractical wireless schemes.

Before we try to explain the four kinds of electrical wireless that could be demonstrated in 1895, by sticking to proven theories, it may be well to consider the electrical Wireless scheme suggested by Salva in 1795.

Salva was a Spanish physicist. First he proposed running an insulated telegraph wire under the ocean. Later he said such a long wire was not necessary, it could be Wireless from shore to shore with only a couple of short wires on the beaches. His theory was that an area of land on one side of the ocean could be given a positive charge of electricity and be connected to the ocean through a short wire containing a telegraph key. Also an area of land on the other side of the ocean could be given a negative charge of electricity and be connected to the ocean by a wire in which there was a tiny break or spark gap. When the key was closed the electricity was supposed to flow from the positive area into and across the ocean to the negative area and jump the little spark gap on the way. When the key was closed the receiving operator was to see a spark but not when the key was open. With such results, signals or telegraph codes could have been feasible. That is a boiled down, free Brief of what I read about Salva's schemes more than one hundred years after he suggested them. The electrical wireless he suggested probably put the idea of an electrical wireless into the heads of subsequent investigators. Ninety-two years later Hertz demonstrated a wireless in which a tiny spark gap indicated the reception of the electromagnetic wave sent by a somewhat distant transmitter. Keying

wireless and wire telegraph transmitters had continued to the present. Attempting to make one point positive and another point negative on the Earth without connecting them to the same battery may have led to one or more kinds of wireless that actually worked.

About 1880 Professor Dolbear of Tufts College made a wireless that could work as a telegraph or as a telephone. He patented it in 1882. Dolbear put great stress on giving the ground under his transmitter a positive charge and the ground under his receiver a negative charge. It is quite possible that his attempts to get a positive charge in the ground under his transmitter and a negative charge in the ground under his receiver were what led him to the transmitter and receiver combination that worked.

The electrical wireless schemes that were based upon proven theories and which could be demonstrated for short distances by simply sticking to the theories can be designated by such brief names as Selenium, Conduction, Induction and Radiation Wireless.

Selenium becomes a better conductor of electricity if light hits it. Therefore, experimenters flashed beams of light on Selenium to send signals or code. The transmitter was any kind of strong light that could be flashed on and off. The Selenium passed more or less battery current to an indicator like a galvanometer in which a pointer moved when the Selenium passed enough current.

Conduction wireless had a number of advocates up to about 1900. It was frequently demonstrated and was used practically on at least one occasion when a cable across a river was broken. In this scheme

water and earth are used to conduct signals across a place where a wire cannot be used.

To send electric signals across a river a half mile in width an insulated wire two miles long could be laid along each of the opposite banks of a river. Bared ends of the wires would dip into the river. If a key and suitable battery were connected into the wire on the sending side and a suitable electric current indicator was connected into the wire on the receiving side of the river, the arrangement could be used to transmit signals across the river. When the key in the transmitter wire was closed, the electric current flowed from one terminal of the battery through the wire to the river water and back through that water to the other end of the transmitter wire, but all of the electric current did not flow straight back along the river bank. It wandered and some of the current crossed the river to travel along the receiving wire to its end and recrossed to the transmitter wire. When electricity passes through water or earth it will spread out over a wide number of paths. More direct current will flow through the path of least resistance than through any other path. If the receiving wire and the current indicator in it are of comparatively low resistance, the receiver may get a large proportion of the current. The wires used along the banks of the river or other body of water were usually longer than the distance across the river. Professor Morse of wire telegraph fame used this Conduction Wireless scheme in 1842 and Sir William Preece was one of its advocates from 1882 to the late nineties.

Inductive Wireless was accomplished, for example, by passing

an alternating current through one coil of wire and placing a second coil, containing a telephone receiver, by the side of the first coil. The alternating magnetism produced about the first coil would pass back and forth in and out of the second coil and cause an alternating current to flow in the second coil and from that coil through the little coils in the telephone receiver to produce a sound signal. A telegraph key in the first coil could be used to send dots and dashes. If a microphone and battery were used on the first coil, a Wireless Telephone was the result.

By using larger coils or more power on both, greater distances could be spanned. There were several modifications of the scheme. Sir William Crooke had a scheme which he said combined Conductive and Inductive Wireless. Some electro-static Inductive wireless schemes were suggested. As late as about 1908 Inductive Wireless Telephones were used for several feet, between rooms, to sell Wireless Telephone Stock.

Radiation Wireless was, theoretically, started by James Clerk-Maxwell (1867-1873) who made the statement based on mathematical considerations that Electro-Magnetic waves would radiate like light waves. Heinrich Rudolph Hertz (1887) assembled devices that produced, reflected, refracted and detected short Electromagnetic waves. Alternating current was needed to produce electromagnetic waves. If the waves were to be reflected, refracted and measured inside the walls of a physics laboratory, the waves should be shorter than the available laboratory space, which meant the current had to alternate say, more than a hundred million times a second. Professor Henry had stated in 1840 that the discharge of an electric condenser is oscillatory. Such an oscillatory discharge is an alternating current

that gets weaker with each successive alternation - it peters out. Hertz made a condenser consisting of two metal rods end to end but separated by an air gap across which the discharge took place. Apparently in some tests he used rods only about twelve inches long while in other tests he used rods about three inches long with metal plates or wings sixteen inches square at the outer ends of the rods. Condensers of such small dimensions and in that form were suitable for the production and radiation of short electromagnetic waves. A little loop of wire with a minute spark gap in it was used to detect those waves at ~~the~~ a convincing distance from the transmitter. He reflected the waves with sheets of metal and refracted them with a prism made of pitch. Hertz used wave lengths as short as 30 centimeters (about a foot).

Radiation Wireless acted very much like light. Therefore, it was argued while I was in Ohio State University ('97 to '01) that Radiation Wireless would be limited to the same distance that a beam of light could be seen. However, that wireless would work through fog and light would not. Before 1901 there was evidence that wireless using longer waves would work beyond the "line of sight", "over the horizon" or around the curvature of the earth. However, in early 1902 when I picked the locations for the first public service stations in the United States, I located them so high above water that one station could be seen from the other on a clear day by using a telescope. That Radiation Wireless became very useful and was given the name of Radio. Now we know that some short waves will only give service within distances above the horizon while others could give service to any place on earth. We did not know that there was something around the earth that won't reflect

some wave lengths to distant points.

There follows a list of contributors to early Wireless with the approximate dates of their contributions. I am a pre-Radio pioneer but most of them were dead when I started. Some demonstrated a Wireless, some suggested Wireless schemes, some developed better parts, some proved useful theories, and some patented a wireless. Some of the famous men did not contribute a scheme or device of practical value to Wireless, yet they had an encouraging or publicity effect that may have attracted others to the wireless field.

Wireless contributors from 1795 to 1895: Salva, 1795; Sommering, 1811; Faraday, 1831; Steinheil, 1838; Davy, 1838; Henry 1840; Morse, 1842; Lindsay, 1843-45; Wilkins, 1845-48; Varley, 1852; E. and H. Highton, 1852-72; Dering, 1853; Haworth, 1862; Maxwell, 1867; Mower, 1868; Bourbouze, 1870; Loomis, 1872; Hughes, 1879; Trowbridge, 1880; Dolbear, 1882; Bell, 1882; Smith, 1883; Hertz, 1883-87; Edison, 1885; Heaviside, 1887; Melhuish, 1890; Stevenson, 1892; Branly, 1892; Preece, 1892-95; Tesla, 1893; Rathenan, 1894; Popoff, 1895; Marconi, 1895.

To tell what each of these contributors did would mean writing a book. A book was written that includes records of nearly all I mention. The book is - "A History of Wireless Telegraphy" by J. J. ~~Fairie~~ Fahie, first edition 1899, or better, the second edition, January 1901 - 348 pages.

Magazines in the late nineties carried an increasing number of articles about Wireless. This chapter will end with a list of

such magazines and a list of articles I read. I read parts of some French publications only to find that English publications covered all of the Wireless stories, some of which were scientific and some were propaganda. After 1900 I usually was too busy to even attempt to keep a list of what I read. Professor Thomas said the "Electrician" published in London, was the best. I subscribed for it after I left college until about 1907. I thought Wireless was going to amount of a lot and that there should be a publication specializing in accurate wireless articles. That idea stuck with me and was one of the ideas leading up to the forming of the Institute of Radio Engineers.

PERIODICALS

Century - Cent.

Chamber's Journal - Chamb. J.

Chautauquan - Chaut.

Cosmopolitan - Cosmopol.

Dublin Review - Dub.R.

Electrical Engineering (Chicago) - Elec. Engin.

Electrician (London) - Elect.

Engineering Magazine (New York) - Engin.M.

Engineering (London) - Engin.

Engineering and Mining Journal (New York) - Engin.& M.J.

Harpers Weekly - Harp.W.

Illustrated American (- Il.Am.

J. Franklin Institute - J. Frankl. Inst,

Living Age - Liv. Age

Lippincotts - Lippinc.

McClure's Magazine - McClure

Nature - Nature

North Am. Review - No.Am.

Public Opinion - Pub. Opin.

Quarterly Review - Quar.

Review of Reviews - R of Rs.

Saturday Review - Sat. R.

Science (New York) - Science ns.

Scientific American - Sci.Am.

Scientific American Supplement - Sci.Am.S.

The Engineer (London) - The Engin.

WIRELESS TELEGRAPHY

Coast telegraphs and space telegraphy (R. Appleyard)
Sci.Am.S 47:19528-9 (F-11-'99)

Communication with Lightships Elect 41:345 (98)

Control of Wireless Telegraphy Elect 42:852,886 (99)

Coherer, Bose's Study of the, Elect 45:802,828 (1900)

Coherer, Proposed new names for, Elect 45:878 (1900)

Coherers, Theory and Fact of, Elect. 45:938, 972 (1900)

Coherer Mechanism Elect 44:919 (00)

Coherer, a self-receiving and the Study of the Cohering Action of Different Metals Elect 43:441,446 (99)

Coherers (Broca, Blondel and Lodge) Elect 43:145,204,277 (99)

Coherers, Action of Elect 42:852,886 (99)

Coherers and use of interfermeter Elect 40:357 (98)

Coherer Elect 40:86,133,166,247 (97)

Coherence and De-Coherence Elect 43:446 (99)

Cuba Elect 44:69 (99)

Cross-Signalling, Eliminating of Elect 43:1 (99)

Destruction of Fleets Elect 43:144

Dover-Ostend Steamers Elect 45:505 (1900)

Earth Connections Elect 45:879

Effect of a Solid Conducting Sphere in a Variable Magnetic Field on the Magnetic Induction of a point Outside.
Elect 43:55 (99)

Effect of mast wires in space telegraphy Sci.Am.S.50:20697 (0,20) (00)

Electric Touch and the Molecular Changes Produced in Matter by Electric Waves Elect 44:626,649,713 (00)

Electric Tel. by Hertz Waves Elect 40:397

Electric Signalling without wires (O.Lodge) Nature 57:334 (F8) '98

English Channel, Experiments on the Elect 43:1,6,291 (99)

Ether, Nationalization of the Elect 43:71 (99)

Etheric Telegraphy - Engin M. 16:64304 (Ja-(99)

Etheral telegraphy Edin R. 188:297-319 (O) (98)
Same five Age 819:619-28 (D.3 '98)
R of Rs - 18:715 (D '98)

Exhibits at Royal Society Elect 41:71 (98)

Experiments in Hertzian Telegraphy Elect 41:658

Experiments in telegraphy on Mount Blanc in 1899 Ath 1900 1:244 (F 24)

Fessenden's Recent Experiments Elect 43:87

Fire Station, Streatham Elect 44:885,911

First steps in wireless telegraphy (J. Trowbridge)
Chaut 29:375-8 (JL '99)

First International Press Message Elect 42:785 (99)

First International Message Elect 42:852

Fleming's Lecture Apparatus Elect 45:222, 309, 487 (1900)

France, The Wireless Telegraphy to, Elect 42:747,785,819,827,851,886,

French Coast, Practical Applications on, Elect 43:828,864 (98)

French Naval Maneuvers Elect 45:505 (00)

French Navy Elect 45:243 (00)

Germany Elect 45:68, 205, 488, 662 (1900)

Government Experiments Elect 45:355 (00)

Guarini's W. T. Repeater Elect 45:224 (00)

Hawaii, W. T. in, Elect 43:573 (99)

Harwick, Proposed Experiments at Elect 43:291 (99)

Hertzian Telegraphy Elect 42:724 (99)

Hughes' Researches Elect 43:35, 40 (99)

Ilfracombe, Experiments at Elect 45:275 (00)

Imponderable Jokes Elect 42:821 (99)

Improvements in Magnetic Space Telegraphy Elect 42:251,269,305,366,
402,442,385,445 '98 & 99

Interference, Mitigation of Elect 43:793 (99)

Interception of Messages, Prevention of Elect 43:218 (99)

Interference, Mitigation of Elect 43:793 (99)

Natal, W. J. in Elect. 43:513 (99)

Navy Estimates Elect. 45:488

Navy, W. T. in the Elect. 45:204, 488, 505, 691

Navy, W. T. Elect. 44:174 (99)

Navy Elect. 44:423

Naval Maneuvers, Wireless T. at the Elect. 43:434, 473, 589, 663 (99)

New Application of Hertzian Waves Elect. 41:577 (98)

New Kind of Wireless Telegraphy Sci.Am.S. 47:19365 (F25) (99)

Nengschwender's Ware Detector Elect. 42:732 (99)

Oetheric Telegraphy Elect. 42:325, 405, 442 (99)

Origin and Development of Wireless Telegraphy (G. Marconi)
No. Am. 168:625-9 (My '99)

Page's (Major S. Flood) Letter to the Times Elect 45:438

Page's (Major Flood) Speech Elect. 44:647, 704

Patents, Some Recent Elect. 43:847 (99)

Physical Society, Hertzian Telegraphy Elect. 40:452 (98)

Physics of the Coherer Engin.M. 19:430-1 (Je'00)

Pollck and Virag Telegraph Sci.Am. 82:293 (My 12'00)

Progress in Space Telegraphy EnginlM. 19:111 (Ap'00)

Progress in Space Telegraphy Engin.M. 18:116-7 (O'99)

Present Position of W. T. Elect. 44:704

Progress, Recent Elect. 44:552, 555

Preece's Lecture Elect. 43:35 (99)

Preece's Experiments Elect. 43:720 (99)

Receiver, Simple, for W.T. Elect. 40:697, 845 (98)

Recent Developments in Wireless Telegraphy (1900) Sci.Am.83:297 (N 10)

Russian Navy Elect. 45:120

Sandwich Islands Elect. 45:3, 614

Scientific History and Future Uses of Wireless Telegraphy (J.A.Fleming)
No.Am. 168:630-40 (My '99)

Telegraphing without Wires
(S.F.Walker) Sat.R. 84:195 (Ag.21'97)
Chamb. J. 74:655-6 (O-9'97)
Science ns. 6:862 (O-29'97)

Telegraphing without Wires J.Frank Inst. 144:463-4 (D'97)

Telegraphy without Wires (F.J.Jervis-Smith) Nature 56:223 (Jl.8'97)

Telegraphy Across Space Engin.M. 15:487-8 (J'98)

Telegraphy by Magnetic Induction Elect. 42:330, 442, 497 (99)

Telegraphy by Means of Ultry Violet Light Elect. 42:271 (98)

Telegraphy by Means of Ultra-Violet Light Elect. 41:720 (98)

Tesla on W. T. Elect. 40:442 (98)

Tesla and the Ether Elect. 43:144 (99)

Tesla Patent Elect. 44:919

Test of the Marconi Wireless Telegraphy in the U. S. Navy
Sci.Am.S. 48:19974 (N 18'99)

Theory of the Marconi Telegraph Elect. 43:22, 57, 145 (99)

Theory of the Marconi Telegraph Elect. 42:766, 9 8 (99)

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Tommasina's Experiments Elect. 45:427

Torpedo Steering by Ether Waves Elect. 43:112 (99)

Trinided to Tobago Project Elect. 43:291

Trinity House & W.T. Elect. 44:540

Trinity House and W. T. Eletc. 42:821 (99)

Trial of the Marconi Telegraph at Spezia Sci.Am.S. 44:18071-2 (S 4'97)

Turpain's Work Elect. 44:175 (99)

U. S. Government Elect. 45:355

U. S. Government and Mr. Marconi Eletc. 44:34, 106, 137, 411 (99)

U. S. Navy Tests Elect: 44: 106, 137, 210, 212, 411, 423 (99)

Ushant Coast Elect. 43: 828, 864 (99)

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Wireless Telegraphy and Brain Waves (J.T.Knowles) 19th Cent. 45:857-64 (My'99)

Wireless Telegraphy and Brain Waves (J.T.Knowles) Liv.Age 222:100-6 (Je-8'99)

Wireless Telegraphy Apparatus Pub.Opin. 26:464 (Ap13'99)

Wireless Telegraphy - for Preventing Collision at Sea Pub. Opin. 27:16 (J1-6'99)

W.T. through Scientific Eyes (F.G.Bodser) Lippinc.64:301-11 (Ag'99)

W.T., Who Originated? Public Opin. 27:496 (O 19-99)

W.T. at Yacht Races Public Opin. 27:559 (N 2,99)

W.T. in Our Navy (J.B.Murdock) Harp.W. 43:1148 (N.11'99)

W.T.,Improvements Pub.Opin. 24:306 (Mr.10'98)

Marconi's Patent 624 (99) 65:548 (98)

W.T. in Victoria Elect. 44:688

W.T.Companies Experiments Elect. 42:286, 428, 744, 819, 887 (99)

W.T. in Japan Elect. 41:712 (98)

W.T.Correspondence on Elect. 40:22, 28, 138 (97)

W.T. Correspondence on Elect. 40:562, 832 (98)

W.T. Improvements Engin.M. 16:825 6(F) '99

W.T. (N.Tesla) Cent. 60:205-7 (Je) Sci.Am. 83:4 (J1.7 1900)

W.T. (G.Marconi) Sci.Am.S. 47:19452-4 (Ap.1'99), 19514 (Ap.29'99), (L.de Montarlot) 19538-9 (My 13'99), Cosmopol. 27:111-2 (My'99), Pub. Opin. 26:591 (my-99), (J.J.Greene) Ind. 51:1345-6 (My 18'99), Harp.W. 43:508 (My20'99) (Il.494).

W.T. (J.Trowbridge) Pop.Sci. No. 56:59-73 (N'99) (il) (G.Marconi) Ind. 51:2930-2 (N-2'99). (J.Trowbridge) Munsey 22:354-60 (D'99) (il)por)

W.T. (E.Mancini) Chaut. 26:511-5 (F-98), Dub.R. 123:159-63 (J1-98), Sci.Am.S. 46:18874 (J1.23-98), Science ns. 7:791-3 (Je 10-98) Nature 58:398 (Ag.25-98)

W.T. Quar. 188:494-503 (O'98), Chamb.J. 75:778-80 (N'98)

W.T.-1900 68:3, 73 (99) 67:80, 237, 376, 436, 703

W.T. Engin. 70:413, 423, 436, 476 (1900), Engin. 68: 535, 764 (99)
Engin. 67: 321, 356, 356, 260, 449, 585, 31, 94, 124, (99)
65: 602, 733, The Engineer 90:637, 611, 218, 213, 32, 83, 218,
388, 544 (1900) 89:618, 140, 645, 540, 145, 618, 39 (1900)
The Engineer 88: 266, 323, 473, 495, 519, 569, 645 (99),
87: 445, 413, 621, 197, 373, 120, 170, 193, 197, 33, 84, 111,
498, 655 (99) 86:139, 137 (98) 85: 500 (98) 84:222 (97)
83: 546 (97)

W.T. (Marconi) Elect. 42:660, 674, 690, 724, 726, 758, 766 (99)

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Zickler's Experiments Elect. 42: 251, 271 (98)

Radio Ancestors

This has not been edited. No part of it is to be published without my consent in writing.

Robt Marriott
Sept. 18, 1957

There is some IRE history on the following pages:

Chapter III opposite page 2. XII pages 4, 5, 6.

XIII p 4, 10, 11, 12 XIV p 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16.

XV p 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17.

XVII p 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15.

XVIII p 11 XIX p 8, 14, XX p 10, 11. XXI p 5, 6.

XXII p 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. XXIII p 3, 11.

XXIV p 1, 3, 4, 5, 6, 7, 8. XXV p 11. XXVII p 1, 4, 6, 8, 9.

XXVIII p 1, 2, 3, 4, 6, 8, 9, 10, 11, 12. XXIX p 5

XXX p 4, 5, 8, XXXI p 1, 4, 8, 9, 10. XXXII p 5, 6, 7.

XXXV p 8 also in long hand under lives coupling.

XXXVI under # 9 and # 18

CHAPTER I

BECOMING A RADIO PIONEER.

Radio Pioneers could be classified under several headings. At this time I will mention two classes of Radio Pioneers. They are: Radio Pioneers and Pre-radio Radio Pioneers. Some of the Pre-radio Radio Pioneers went into Wireless that included Radio when it was only a prospect.

Later when Radio sounded like a howling success to the boy and his friends and relatives, it seemed to be a great opportunity for the boy just starting out in life and some who went in then are classed as Radio Pioneers.

The Pre-radio Radio Pioneers are given that title here because they were working with that member of the Wireless Family which became important and was later officially called Radio by the U.S. Congress, the Department of Commerce and the Institute of Radio Engineers. The early Pre-radio Radio Pioneers went into Wireless before it rendered a service that people would pay for.

All kinds of Radio Pioneers are asked about the past, present and future of Radio but those who went into it when that seemed to be the best opportunity for a boy are not asked about their background or why they went into it. They possibly might be called early settlers in Radio instead of Radio Pioneers.

The Pre-radio Radio Pioneers are asked the same questions as the Radio Pioneers and more if he obviously went into Wireless before there seemed to be any money in it. One who left

an established paying business to go into the Wireless of the Gay Nineties should, it seems, have his ancestors examined back to Adam and his environment overhauled to find out why he did it. Does a pioneer inherit pioneering or does he inherit a sort of a hound-like nose that enables him to smell pioneering opportunities? Or is pioneering something one is steered into by his environment? Is he naturally so bright in some lines that he has great foresight, or is he so dumb that he goes into things which sensible folks avoid? In the case of Wireless, was the study of science an ~~infirm~~ inborn trait of the boys who became pioneers? As a starter, I will talk about my ancestors, myself and my environment. I am the sample of pre-radio radio pioneers that I know the most about.

Marriotts were pioneers even in the matter of getting a family name. The family may not have had a thought about adding a family name to the names they already had but three of them did the thing that gave them a family name soon after the idea of giving people family names began to be put in effect. Three brothers named Augustine, Guilemus and Rudolphus, over 900 years ago, went to William, the Duke of Normandy, and asked to be permitted to enlist in his army. The Duke wanted his soldiers to have family names, probably so he could keep better records. He asked the brothers where they came from. They told him they came from a locality in Normandy which was at that time called Marriott. Therefore, he took them into his army under the family name of Marriott.

Later the Duke became William, the Conqueror, King of England, and presumably gave land in England to those three

Marriotts. The Marriotts seem to have been prolific and although some families have dropped some of the letters out of the name, there seem to be plenty of Marriotts in England and some in other parts of the world.

Lots of people have avoided having descendents but none of us can avoid having so many ancestors that we may not be able to find their records or calculate how many of them we had within the previous years since family names have been required by law. It should be easy to have a lot of eminent or notorious ancestors and not know about any of them.

While I think ~~analyses~~ analogies are mostly undesirable, there is enough similarity so we can say that developments such as Wireless all had ancestors many of which could not be traced, yet they did not all have descendents. One branch of the Wireless family had many descendents called Radio, radar, television, electronics etc. all are radio but electronics and radio precipitated the large development of electronics.

The Marriotts began coming to North America in the sixteen hundreds. They settled in Massachusetts, New Jersey, Pennsylvania, Maryland and Virginia. The records fairly clear histories indicate ~~that most~~ of my ancestors ~~came to what are now the United States~~ before 1700. All came here before 1800 and all came from the British Isles. They were early settlers or pioneers.

My great-grandfather, Captain William Marriott, fought the British in the War of 1812 and was wounded. He and my great-grandfather, Joshua Penn III, who was defending his plantation against Indians in 1812, did not believe in slavery and moved from Maryland to Ohio, an anti-slave state, after the 1812 war. Captain Marriott freed his slaves by selling them at a reduced

price with a contract which gave them their freedom within a few years. Joshua Penn III freed his slaves and all but one died. That one would not leave him and lived to be old. When he died he was buried in the Penn family plot near Utica, Ohio.

My Marriott ancestors were land owners for over nine hundred years after Willian, the Conqueror, gave them land in the British Isles, but I suspect that they avoided most of the hard farm work by having tenants, slaves, hired men or a flock of children. The family story says my grandfather had so many children that he didn't have to do much farm work after he was about forty. Twelve of his and a nephew I suspect that few of the Marriotts like agriculture. Maybe they only liked to own land and get returns from it. That may be part of the explanation why I left a first class farm and went into Wireless. When I was a boy, there were seven Marriott farms, several other pieces of real estate and twenty Marriotts about Richwood. Now there are no Marriotts or Marriott owned real estate. All of my Marriott cousins in my generation left the ~~farms~~ farms. While the Marriotts and Penns were chiefly land owners, some of them were in other businesses at the same time.

My mother was Minerva Ann Woodruff and on that side of the family my great-grandfather was a Collier and my great-great-grandfather was a Ford. Some of the Woodruffs, Colliers and Fords were mechanics, such as, coopers, carpenters, cabinet makers, stove makers and harness makers. The Fords may have been a bit Irish, Colliers mabe Welch, Nobody mentioned Scotch.

While on both sides of the family in this country and in England there were preachers, lawyers and physicians, none seemingly went in for engineering or science down to my father.

My father was Franklin Waters Marriott. My great-grandmother, nee Edith Waters, was the wife of Captain William Marriott. The names Frank, Frances, Francis and William have been very often used in naming Marriotts. My father was a student. He completed the course at Richwood, Ohio schools, attended Ohio Wesleyan University for a while. He taught school near Richwood. He studied medicine with Dr. King in Richwood. He took correspondence courses with Chatauqua and bought many special books for home study. He studied architecture and designed and built buildings. He patented a horsedrawn corn planter on May 26, 1868, number 78,303. He was a pioneer in the reclaiming of land by the use of fertilizer. He took fields that had been used by my grandfather to make brick and applied fertilizer to them until they produced good crops. At that time town livery stables paid him to haul the horse manure from their barns. He established fertizer-making stock pens. As is always the case in pioneer work, the passers-by laughed at the man who, as they said, was trying to grow crops from brick dust and manure. Since then thousands of tons of farm products have grown on those ex-brickyards.

My father was sickly, something wrong with his digestive system. When he was young he became sick every few weeks. He worked too hard when he felt well. Later in life he went to sanitariums several times where rest and diet put him back on his feet but away from the sanitariums he worked too hard and violated the diets. Late in life he bought an old church in Columbus, Ohio and made it into a cabinet shop. He equipped it with machine tools. If his rhumatism would let him walk, he went to his shop every day. He and my mother lived by North

High School and the sho p was 1000 feet away on East 5th Avenue.

Some who have seen the epitaph of Robert Marriott on a pillar in St. Stephens, Walbrook, London, ask if my first name was for him. He was rector there in 1700 and was buried under the church. I was not named for him but for Robert Smith, a neighbor. My middle name, Henry, is for my grandfather, Henry Thomas Marriott.

I was born in Richwood, Ohio, February 19, 1879. Wood crops up frequently among my ancestors. Several were cappenters or csbinet makers. They chose wood localities to live in. My mother was a Woodruff and one of my ancestors on father's side was a Homewood. There still were some plots of hard woods when I was a boy. I liked to play in them. The town streets were wide and lined with maple trees. It was not a manufacturing place but just a supply center for surrounding farms. The farmers were all Protestants. There were a few Irish Catholics who worked on the railroad or ran saloons. About three Jewish merchants. One joined the Methodists. A few German mechanics; some negroes. Over 80 percent. were probably of English, Scotch and Welch descent.

The house in which I was born was located at the southeast corner of West Ottawa Street and a short cross street that ended at Ottawa. When we moved from there to the farm I was about four. All I remember of the days before we moved are my little white dog and how I liked to hack the doorsill of the woodhouse with a hatchet and the drilling and testing of a fire well at the south-west corner of Ottawa and the cross street. Drilling that artesian well required a derrick and a lot of pounding, followed later by a smoking fire engine and hose that squirted much water. As a re-sult a well-drilling derrick and fire engines were mixed into one

thing in my mind. For some time thereafter if I saw a fire engine, I looked for a derrick.

As a rule people want to know whether or not the human specimen under examination made any bright remarks at an early age. I only made one remark that I have been told about by people who said it was bright. My mother and I were calling on a lady and I was sticking close to my mother, several feet from where the lady was sitting. The lady said, "Come here, Robbie, and be a pretty boy". I said, "No, I would rather be a pretty boy where I am". I do not remember saying that but I have heard the story for years.

I was not a handsome boy, not with my bony legs and big ears. Just a fair complected, thin-skinned, undersized brat that might be shy, dumb or independent was probably a good description of me. About a dozen years later the sentiment about my looks changed but I was still so small that my nicknames were Brownie and Reggie. A Brownie was a trim little elf and a small dude was called Reggie.

One of my first experiences on the farm was getting lost. I probably would have shown up when I got hungry.. They found me in a hog pen about three hundred feet from the house playing with the pigs that the sow had given birth to a few days before. The general impression seemed to be that the mama hog should have eaten me for entering her household and patting her babies. Possibly even the fleas did not bite me. She probably only grunted. Not long afterward I was in one of the farmyards with several animals. A lady came along and said to our hired man: "Ain't his folks afraid to let him go in with the animals?" The

hired man said, "No, mam, the animals think he is one of them."

When not much over 4, I took apart a grandfather clock. Nobody put it together.

In fifteen years I contacted many animals. They were nearly always friendly but sometimes I surprised them or did something wrong so I was kicked, struck and bitten by horses; kicked by a cow and treed by a boar and I had to side-step a steer and hit him on the forehead with a stick. I was chambermaid and waiter for mules but they never hurt me. I was careful not to approach them unexpectedly.

My first work on the farm was not with animals but was carrying cookstove wood about thirty feet from the woodhouse to the wood-box in the kitchen. Wood was still used for fuel. Fences were often made of black walnut rails.

I liked dogs, pigs and girls before I was five. Later I handled horses and cattle and liked them. At fourteen I named a colt after the girl that was then uppermost in my mind. I fed sheep, helped them when they had trouble giving birth to lambs. I gave them medicine when they were sick and if they died I waited until they were decayed and then pulled out their wool and buried them. Full length pulled wood was more valuable than shorter sheared wool. Pulling wool out of a rotten sheep was easy but it was the most stinking job on the farm. Stinks did not nauseate me. Therefore, all stinking jobs came to me in time. I liked a dog or pig or horse. My right arm is a quarter of an inch longer than my left because for years I carried a heavy bucket of water to the woolies with my right and a lighter bucket with my left. Both arms were probably lengthened because I found in boxing that I had a longer reach than others of my height.

Due to my indifference to foul odors, I was soon made a handler of fertilizer. We used all of the animal manure for fertilizer after it had been more or less rotted with corn stalks or straw. I took it from the barns and put it in the manure yards. I took it from the manure yards, loaded it in a horse-drawn wagon and broadcast it with a four-tined fork from the wagon on the fields, usually during my late fall or winter Saturdays. I was a fair broadcaster and could sling it in more than a half circle.

I failed to die when others did from a diphtheria epidemic that I don't remember as I was about two years old. I guess it removed the lining of my throat and killed most of the other children who had it at that time. Possibly that was one of the reasons why I was short and skinny.

Before I weighed 100 pounds my job was to handle the wheat sacks at threshing time and that included shouldering sacks of wheat that weighed 120 pounds. At eighteen I weighed 107 pounds. I could load hay but could not keep my end up at pitching hay from the ground to the top of a load. From the first primary school through high school I was the smallest boy in my class and younger as a rule than the others. Older and larger boys in lower classes licked me frequently. The boys in my own class did not bother me. One boy in a lower class who was about a half size larger than I, licked me so many times that I bought a book on boxing and boxing gloves. That was fortunate because after I was older I had to handle or contact many that were larger than I was. Some liked to pick on a little fellow. The mere fact that I could fight a bigger fellow if necessary, had more effect on them than anything else and was mainly because a

fellow much larger than I was jumped me and got the worst of it. I don't believe he knew a thing about fighting but relied entirely on his size.

Farm work was more or less athletic drudgery. I had more interesting athletic facilities: a horizontal bar and a sawdust covered place for jumping and tumbling, with a trapeze in the haymow. Swimming was learned in a hole about 20 x ten by four feet deep. We wore nothing and hid under the water when an Erie Railroad passenger train went by. In spring freshets, the water was swift and deep and at one time carried me so far away from my clothes that I had difficulty in hiding from folks at road crossings and in fields on my way back. Sometimes leaches attached themselves. I was blistered by the sun and whipped by father frequently just for the sake of going swimming.

My grandfather, Henry Thomas Marriott, had been an early settler in that section and owned what later became the west portion of Richwood. His home (a log cabin) was burned. They built another log house about a quarter of a mile west, selling the intervening land in small pieces or lots. That section is known as the Marriott addition. The west town limit was the west end of West Ottawa Street. There, barely within the town, was the house my father built for my grandmother and beside it, but out of town, was the private road that led up to the house my Grandfather had built after the fire.

Our farm was west and north of that house. ~~The~~ Our house and garden were in town but the farm was not. That arrangement made me part town boy and part country boy. The house I lived in was in town but it was farm country four feet from our sit-

ting room wall. All town facilities were within easy walking distance. We had the advantages of a farm and the comforts of a town. Excess butter and eggs which were more or less of a by-product were exchanged for groceries.

I had to go to the Methodist Episcopal Sunday School and some other church affairs. Sometimes we had to recite pieces. I won a medal by reciting a speech about Prohibition. Many were very strong for prohibition. However, they bought a great deal of Peruna which was said to be Ethyl alcohol diluted with rain-water and oil of cubebes. It was so alcoholic that a table-spoonful had a lot of the kick that an aching or tired prohibi-tionist could use. People who could not walk on the side of the street where a saloon was located, would use such patent medicines. We were supposed to sing in church but I never succeeded in doing that. We boys attended other night services we did not want to attend but not until after were about fifteen. We attended those services of our own accord, so we could take girls home from church.

At that time, in the Gay Nineties, it was naughty to read Nick Carter, play cards or look at a girl's ankle. I did not read Nick Carter but we played cards in the haymow and in other out of the way places until we formed the "Unum Multi Club" (One of Many Club.) and rented rooms over a store. There were no residences nearby so townsfolk were not kept awake by our guitars, mandolins, falling indian clubs, singing and other incidental noises. I was the first president of the club. It survived for several years, even moved into the city hall next to the jail at one time. My uncle owned a comfortable corner, occupied by a drugstore where boys could sit on stair steps or

window sills and inspect ankles as girls tried to avoid mud or dust at street crossings. Maybe that added to the druggist and the doctor upstairs business and brought uncle more rent. If so, I should not complain. When his son died I was one of several next of kin to receive a minor inheritance.

I contacted scientific, engineering and technical devices and theories to some extent. The papers I read were usually of the Popular Science type. I was a Scientific American subscriber. My father took me to the Centennial in Cincinnati, Ohio where I saw my first electric street car and became so muddled in wondering how something powerful enough to run a street car could come from a little trolley wire through a little wheel that I did not remember much else about the Centennial. Later with the financial aid of George Hunt, a boy who live across West Ottawa Street from us, we bought a direct current motor and I learned how it worked. George was only interested in helping me to get what I wanted. He simply wanted to help a playmate. I imagine he has had many motors in his flour mill since then but has never been interested in the theory of their working.

My cousin, Francis Irvin Marriott, was interested in the mechanics of railway trains. We went to the Chicago World's Fair in 1893 and spent most of our time at engineering exhibits. I was interested in the several kinds of third rail and trolley exhibits, particularly the various kinds of electric elevated trains. When Irvin graduated from High School he went to work in the Big Four Railroad shops in Delaware, Ohio. For several years he designed high speed steam passenger locomotives for the Chesapeake and Ohio and still is doing railroad work. George

Marriott went to railroading also with the Chesapeake and Ohio and became a freight engine designer. I had another boy playmate who was mechanically inclined. Murray Truesdale was my chum in High School and had a nice little shop equipped chiefly with metal working tools. He did not go to college. Later he became an electrician.

My father had a workshop all the years I remember of his life. He could find a way to fix any farm machinery until a new part was obtained. Machinery did not break down as frequently for him as for the neighbors because he took care of machinery. Every machine we had was either in a house protected from the weather or it had a place under cover that it was moved to when it was not being used in the fields. Machinery was always well oiled. His tools were always put in their place and cutting tools were kept shappened. I turned the grind-stone. Once in a while he would let me get a shop tool and use it. If he let me or others use his tools, he could not know what condition he might find them in when he wanted to use them.

I wanted to use tools and do things in a shop. He told me if I could tear down a large sign made of wide boards, two by fours and four by fours, that had been placed on our land some years before and for which the contract had expired, he and I would build me a shop. I tore the sign down and brought it, a few pieces at a time on my bicycle from the road location to a spot back of our garden and we built a shop and work bench. In that shop I made windmills, flower boxes, furniture, little boats, gas, a wood turning lathe, wet batteries, and nearly built a dynamo. One of my contraptions included a windmil that

would mix nitric acid and glycerine and then drop a heavy stone on the mixture. The outfit was set up on a stump in the middle of a ten acre field and timed to explode after I was a hundred yards away. We did not want the stump. It failed to explode. Another device I had in this shop made gas which I used for heat and light - it fortunately did not explode.

A large part of the population in that locality believe that going to school beyond lower grades was highhat, sissy, foolish or something questionable that was approved of by snooty folks they did not like. Going to school might be all right for bothersome brats but after the brats learned to behave and were able to do housework ~~or~~ and have babies or do part of a man's job, they should quit school. Many did quit school because they could, because they received no encouragement from their parents to continue school or because their parents pulled them out.

As I have said, my father was a perpetual student. My mother, after a common school education, took some Chatauqua courses. They said I would go to school and if I misbehaved the teacher should lick me and let my father know and he would give me another one. I liked to go to school even though I did get a good many lickings. (~~They~~ Teachers and I did not let my father know.) Later my parents began talking about college for me. I could not go to one that demanded a large tuition but otherwise the college and course I was to take was left to me. I looked over Ohio Wesleyan and visited Ohio State several times and asked various graduates about their colleges. My work was not more than passable in school except in geography and arithmetic in the lower grades, and in algebra, geometry, trigonometry and physics in the higher grades. At graduation I was Class

Historian which meant that I simply told class history and did not have to attempt much oratory with gestures. Our Valedictorian was an out of town farm boy who drove into town and drove home and studied. He did not play around evenings with the town boys and girls. He was not against our playing habits but had not acquired such habits himself. He probably did homework when we played. We all liked him and agreed that he averaged higher than anyone else in our class.

During the summer before my Senior year at High School, my father's health became so bad that I had to stay out of school a short time and cut cornl During the year our relatives concluded that my father never would be able to return to the running of the farm. One of my uncles told me I should not think of going to college but should stick to the farm and run it. I presume nearly all our relatives and the townsfolks were of the same opinion. However, my father, my mother and I still held to the idea of my going to college. That meant that we would sell the farm if I could get along at Ohio State. I came back one summer vacation and worked on the farm until we completed the sale.

In all of my reading and nosing around from about 1890, I looked for new things in Science. During the early nineties I had read a newspaper report of an interview with Tesla in which he claimed to be able to send electrical messages between mountains, miles apart, without using wire between the mountain stations. Early in 1897 I began hearing about Marconi sending messages electrically without connecting wires between stations. I imagined that sending messages without wires was something new with great possibilities.

Before graduating from Richwood High School early in 1897, our class was invited by Ohio State University to see their laboratories and exhibits and arrange, if we could, to take a course. I accepted their invitation and told them I wanted to take a course in "Wireless". They looked surprised and referred me to Prof. B. F. Thomas. He seemed to be at a loss as to what to say. Finally he said, "There is no such thing as a course in 'Wireless' but you can take a General Science Course, majoring in Physics and specializing in 'Wireless'." That is the wireless course I took beginning in the Fall of 1897.

I did not check to find whether or not William was a commissioned captain. Captain is a title that seems to have an affinity for Marriotts. I was addressed as Captain on naval vessels when the navigator wanted to know where we would go next. That was heard by lawyers, who later so addressed me in court. As a result I am called Captain in Washington by some and appear as such in Department of Justice records of trials.

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Various Marriotts have tackled our past. This record is probably correct as far as it goes:

*1. Augustine Marriott, born about 1665, in Yorkshire, Engl. Married Sarah Tooke, Daughter of Peter Tooke, wealthy merchant.

2. Son - Randolph Marriott, born 1705, Rector of Deerfield, married Lady Diana Fielding, daughter of the 4th Earl of Denbigh about 1730.

3. Son -(Rev.) John Marriott, born between 1732 and '36, came to America between 1755 and '60. Visited in Pennsylvania, settled in Ann Arundel County, Md. Married Ann Homewood (b. about 1734) Ellicotts Mills, Md.

4. Son - Thomas Marriott, b. 1757, married Margaret Sapington, Dec.11, 1780. Many children.

5. Son - William Marriott (1781-1843) married April 29, 1804 Edith Waters (1784-1864). Moved to Utica Ohio vicinity after war of 1812.

6. Son - Henry Thomas Marriott (1807-1875) married Jan. 8, 1828, Rebecca Penn (1807-1884). Moved to Richwood, Ohio.

7. Son - Franklin Waters Marriott (1849-1928) married Jan. 24, 1874 Minerva Ann Woodruff (1857-) Richwood, Ohio.

8. Son - Robert Henry Marriott (2-19-1879-).

CHAPTER III.

ACADEMIC WIRELESS TO PROFESSIONAL WIRELESS

Not only the college course but some of the extra-curricular or student-side-issue affairs helped me in my professional endeavors. Through the vacation between freshman and sophomore years I worked on our farm. My father sold the farm and we moved to Columbus where I could continue my course and he could work at cabinet work. Such work agreed with him better than farming. That left me between the sophomore and junior years looking for jobs. One of the jobs I picked up gave me ideas about scientific and engineering societies that I used later.

The job was the handling of the transportation and the guiding of the members of the American Association for the Advancement of Science during their convention at Ohio State University and on side trips to places of scientific interest. Prof. Thomas gave me that job.

Members of the Association were largely college professors. They had brought along many women - not that any one of the profs had more than one wife, but probably some in-laws and blood relations took advantage of the reduced rates and complimentary meals. People like those could not be permitted to run around loose. Alone I was able to take care of their transportation and paper work but to look after trains and so many more or less absent-minded professors was too much so I called for assistance from Cagy and some other boys. King, K. G., and Cagy were abbreviations for King Gibson Thompson. Cagy was the name I liked best but after

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The badge I wore, is a souvenier of my first-experience with a scientific society

Later I saw that a society for the advancement of wireless was needed and set about starting such a society. The Wireless Institute was the result. After about three years its name was changed to The Institute of Radio Engineers.

The badge has a big pin on its back. This thin aluminum was pressed on the bronze disc of the badge to show the lettering. The M.C. Lilley Co made the badge.

he was married his wife seemed to be perturbed when I called him that and she is a good friend of mine, too, so we will call him King.

The convention lasted several days. One of the trips was to Kelly's Island in Lake Erie to see the glacial grooves. We did not look long at those big scratches the glacier had plowed out and which had changed to stone. The reason we did not prolong our looking was that somebody looked around the corner of a barn and saw a sign bearing the words: "Native Wines 5 cents". A college professor guided us, student guides, and the others into the wine hall, a big room with a counter at the back and an aisle to the front door between tables. The ~~male~~ male guides assumed their regular Friday night stances at the counter-like bar. The profs and their women sat around the tables.

The wine was a natural wine, maybe 12% alcohol, but each five cent goblet held about a pint and our stomachs were empty. As a result the 1899 type of professional and Mrs. professional decorum almost vanished. We students were quiet but pleased with the wine effect on the profs.

From the wine hall we climbed a hill to a house which was not only up but it was called "Mr. Ups". At Ups we were served an Ohio fried chicken dinner. That dinner included mashed potatoes, gravy, all local edibles in season, coffee, ice cream, cake and watermelon. When all were filled we left for Put-in-Bay on the small steamer that brought up to Kelly's Island. While we were on our way to Put-in-Bay one of those unpopular lake Erie storms caught

up with us and kicked our little steamer around. My fellow guides turned greenish and I felt sickish but we did not lose anything. We played cards on ~~the~~ a coil of hawser rope a deck below the professors. From what we heard and saw, we thought most of them lost all they had picked up at Mr. Ups.

My several experiences with the college professors at that convention changed my opinion of profs as a class. I came to think that they were nearly human and sometimes might be practical or even very practical and that none should be regarded with awe. They read papers and held discussions at their meetings which sounded useful and they became fairly congenial occasionally. Ever since then I have believed scientific and engineering societies, associations and institutes are very great contributors to the developments of the lines in which the members specialize and to other developments in which they are not specialists.

Other extra-curricular affairs taught me things I used later. At the first freshman class meeting I met King Thompson and a group of boys who were talking up their choice for the class presidency. I joined them and we elected our candidate. The next year we elected King to the presidency of the sophomore class. The next year I was elected president of the junior class. I joined Alcyone Literary Society and listened many times in four years to parliamentary practice, debates, oratory, essays, stories and educational society politics. Later in my course I became a member of the Republican Club and tried to see that the right students voted. All of that political atmosphere was a help because, believe it or not, engineering and scientific society members play politics.

In the fall when students' trunks were coming in, I operated a transfer business, charging 25¢ per trunk, and gave away a directory of boarding and rooming places. I published the YMCA student directory. I designed and published the first football score card - a gray four-page folder printed in scarlet with a small space for scoring and considerable space for college yells and songs. In everything I published, advertising space was sold to pay me, my helpers, the printers and the YMCA. Those publications gave me some insight into what to do if I wanted to publish something and I used that information later. On the other hand, I am quite sure I never made any use of some curricular subjects I had to take and passed more or less creditably. The general science course included all of the sciences and some unscientific subjects.

My wireless work at Ohio State included the reading of what had been published about different and allegedly different kinds of wireless and duplicating Hertz's demonstrations and duplicating some modifications of the Hertz arrangements as made by Branly, Popoff, Marconi and others. The Selenium, Conduction and Induction Wireless schemes were not given much experimental consideration by me while in college. I believed they would only be useful in special cases and only over short distances. Later I experimented with Induction and Conduction schemes for train control.

The Maxwell theory and the Hertz demonstrations seemed to indicate that the Maxwell-Hertz or Electro-magnetic-waves Wireless might be expected to operate between stations that were separated no farther than one could see a light or semaphore signal under ideal conditions. Also the Hertz demonstrations proved that

electro-magnetic waves would pass through some things that light waves would not go through. For example, electro-magnetic waves were not noticeably obstructed by fog, rain, dry wood, brick or stone buildings or by dry sand hills, but like light waves, the electro-magnetic waves were not expected to pass beyond the horizon or not far beyond the horizon. However, they were not exactly like light waves and light waves did not all behave alike. At that time there was no proven theory that invisible clouds existed which would reflect some electro-magnetic waves back to earth repeatedly to reach points far beyond the horizon.

Maxwell and Hertz had been interested in the production and propagation of electro-magnetic waves. They left it to others to find uses for the waves. After a lag of about five years a famous man prophesied that electro-magnetic waves would be used for communication. According to the Fortnightly Review, published in February, 1892, a discussion of the Hertz demonstrations and their value to communications had been given in a paper by Sir William Crooks in which he said, "Here is revealed the bewildering possibility of telegraphy without wires, posts, cables, or any of our present costly appliances". Also his paper contained statements to the effect that waves of any desired length can be produced, reflectors and lenses can be used to concentrate waves into a beam, Morse code can be used, beams or tuning can prevent interference, and that there remains to be discovered simpler and more certain means for generating desired wave lengths and more sensitive receivers that will only respond to certain wave lengths. Also he said, "All the requisites needed to bring it within the grasp of daily life are well within the possibilities of discovery and are

so reasonable and so clearly in the path of researches which are now being actively prosecuted in every capitol of Europe".

Many scientists, professors and students probably repeated the Hertz experiments but did not have the time, facilities or money to expand what Hertz had done or they were too shy or conservative to make their improvements known to the public. At least two detectors that were more practical than the Hertz minute gap had been used before 1892. They were the then fairly well known Branly coherer which dated back to the Varley cohesion experiments of 1866 and the microphone used by Hughes in 1879 to detect wireless signals at a demonstration attended by Sir William Crooks, Mr. W. H. Preece and others. David E. Hughes was a too sensitive or conservative professor with a reputation and because Prof. G. Stokes, a secretary of the Royal Society, to whom he demonstrated his wireless in 1880, would not believe his theory of why the Hughes wireless worked, Prof. Hughes refused to write a paper describing his wireless devices and accomplishments. Sir William Crooks and J. J. ~~Fairie~~ Fahie persuaded Professor Hughes to make a public disclosure in the Electrician (London), May 5, 1899.

The persuasive talking of Sir William Crooks bore fruits in 1895 and at later dates. His words may have contributed to the later efforts of others to produce more nearly continuous electromagnetic waves than those produced by the Hertz transmitter. Crooks advocated improved tuning, which may have suggested continuous waves to those who were experienced in any kind of tuning. Continuous waves had not been used although Hertz would probably

have used continuous waves if suitable equipment had been available and Maxwell must have had continuous waves in mind when he wrote his theory. Crooks was more than a prophet. He said his prophecy was not an idle dream and he suggested ways to make the dream come true and all of his suggestions were followed.

In 1895 Professor Popoff used a coherer detector to record such electro-magnetic waves and surges in the ether as are produced by lightning. In that way the approach or proximity of storms could be detected. One end of the coherer was connected to a vertical conductor like a lightning rod and the other end was connected to ground. A coherer is a lot of very, very minute spark gaps that close up when a surge of electricity strikes the coherer - the tiny electrodes (metal filings) stick together (cohere) and let a lower battery voltage send current through them and a relay to operate a recorder and tapper (decoherer) that knocks the filings apart. Professor Dolbear in 1886 had used an elevated conductor and ground connection at his transmitter and at his receiver in the wireless arrangement which he patented. Tesla had proposed elevated conductors and ground connections for wireless in 1893 but had not demonstrated them prior to 1895. He used such connections in about 1899. The Hertz dipole could be used either as a transmitter or as a receiver. The dipoles could be used horizontally or vertically. When used vertically (preferably) a connection to ground could be substituted for the lower half of the dipole. Prof. Popoff may have ~~had~~ taken, consciously or subconsciously, the idea of a vertical conductor and ground from Hertz, Dolbear, Tesla, Loomis or from Benjamin Franklin.

Up to this time nearly all of the men who had been recorded

as prominent in the development of wireless had been professors or scientists with reputations. Beginning about 1896, boys began taking a hand in wireless development. Boys and young men without reputations that they were afraid of losing and without such profound knowledge of established theories and facts as might bar them from wishful thinking and other foolishnesses. Usually they were willing to try most anything - borrow credit for what others had done, enjoy laudatory publicity and take any or as much money as they could get.

In other words, up to the later gay nineties, professors and scientists who were elderly or conservative and probably honest in most respects, developed wireless step by step, in dignified waltz time, with soft music. Then the boys cut in to take wireless out for two-stepping with plenty of brass. In addition to the boys there came promotors and stock salesmen who stretched the truth and used substitutes for truth, with the result that some of them did stretches in penitentiaries. They tried in several ways to monopolize Wireless, usually by claiming they had invented Wireless or some necessary part. But since Wireless had been developed step by step before they took a hand, they could not patent Wireless and rival wireless companies were successful in dodging or countering each others' allegedly necessary patents. When a would-be monopolist sued a rival, the rival could usually dig up enough Wireless history to defend the case, file or threaten to file a counter suit or substitute another instrument. No company was able to obtain a Wireless monopoly in the United States.

The electro-magnetic type of wireless began to change from the

stage - the development of serviceable
all experimental stage to a partially serviceable/instruments and wireless service companies required more and more money. The money was obtained in some cases from one or two persons (angels) but usually from the sale of stocks to the public. Those were the only effective ways to raise money for that purpose in the United States then. Some of the boys and promotors who lived to see the time when all sorts of people made big money out of radio, felt that they had not been fully compensated for their work. The professors who preceeded the boys, probably received little or nothing for their wireless work. Nearly all of them died early enough to avoid seeing others collect dividends on their efforts.

Marconi became interested in wireless in 1895 when he was 21 years old. His first trials were made on a small scale at Bologna, Italy. In 1896 he went to England and interested Sir William H. Preece, chief electrical engineer of the British Post Office. At the post office he operated wireless a hundred yards and later at Salisbury Plain, a distance of a mile and three quarters. The arrangements of apparatus Marconi used were similar to those previously used by Hertz and Popoff. He kept trying to interest people, to get greater distances, to get backing, to make the instruments more practical, and to get publicity. By late July, 1897, Marconi had obtained a lot of publicity, had operated wireless ten miles and the Wireless Telegraph and Signal Company, Limited, capitalized at one hundred thousand pounds, had been formed to develop wireless.

Nearly all of those steps in wireless development were taken before I commenced my course at O.S.U. and began a more or less first hand acquaintance with what went on in wireless. I did not personally know the professors who brought wireless up to where it

could be plucked by boys, but I knew the boys who plucked it - I was one of them. Some of the boys claimed they invented what the professors developed. Some boys made many useless inventions and a good one or two by the harum-scarum method of trying any handy thing or by making mistakes that careful men would not make or by carful scientific research using expensive facilities and many assistants or by careful plodding with makeshifts and no help.

Also there were odd experiences with waves, vibrations, frequences, radiation and measurements that had some effects on my future work. For example, I engineered an extra-curricular accident that benefited me but was harmful to physics laboratory equipment. Because an eclipse of the sun was advertized as coming to Columbus, Ohio, I neglected some of the prescribed college work to build a temporary camera about ten feet in length and which included the largest and most expensive lens in the Physics laboratory. Due to the size of the camera I had to carry it up a little-at-a time and put it together on the roof of University Hall before eclipse day. Although I did take courses in photography and astronomy, photographing the sun, whether it was mostly covered or in the nude, was not any part of my wireless specialty. The big lens was held in place by set screws; a wind came up; the camera structure I had engineered vibrated; the set screws unscrewed; the lens fell to the metal roof; and the lens broke. The break occurred the day before the eclipse during a preliminary trial. I do not feel at all sad about that now but I was very worried and sad that day. The break was one clean straight crack through the center. That crack did not misdirect light waves noticeably so the photograph of the eclipsewas fairly good and I did not have to pay for the lens. It was a fine object lesson which caused me to be more careful in avoiding

destructive mechanical vibrations and loose screws in my later engineering.

The X-ray was one kind of radiation that I did not have as much to do with in college as I had expected. The only time Dr. Thomas let me try the X-ray was when I went there early in 1897 to arrange for a college course. Shortly thereafter Dr. Thomas exposed himself so long to the rays in trying to get a picture through his middle, that he was seriously burned. However, I learned how to build X-ray induction coils because one used the same for wireless. As a side issure after the college course, I manufactured such coils and X-ray equipment, using the most powerful X-ray tubes we could get. The serious burning of Dr. Thomas caused me to specialize in intense quick exposures that did not have the burning effect and screens and remote controls that protected the operators.

We measured potentials and currents in the Physics laboratory but nearly everything had to be figured out. Slide rules and reference were not permitted. Volt and ampere meters were not provided. A standard battery cell, galvanometer, standard resistance and variable resistances could be found in various cabinets and used to make up suitable meters. Such methods probably resulted in more mental arithmetic, algebra, geometry and trigonometry than are now used by students. But far more experiments can be made per hour with present methods.

The frequency of the alternating current coming from our power house was measured by a method which years later was given a fancy name in wireless. In the gay nineties we called it the "beat method".

In the nineteen hundreds a wireless man rechristened it "Heterodyne". On the wall of the laboratory was an electro-magnet with a spring-supported armature that would vibrate when the alternating current was switched into the winding of the magnet. That vibrating armature produced a sound or note at twice the frequency of the alternating current. By vibrating a tuning fork in the vicinity, the armature sound and the tuning fork sound would beat together to produce two sets of beats or sound frequencies, one of which was equal to the sum and the other to the difference of the armature and fork sound frequencies. We had numerous calibrated tuning forks and adjustable tuning forks. The simplest way was to select a fork that vibrated only two or three times more often or less often in a second than the armature of the wall magnet in which case the beats could be easily counted and substitutions or adjustments made to find whether the fork was slower or faster than the armature. A "superheterodyne" wireless receiver could be called a "super-beater" but the frequency of sales would probably be decreased.

My attempts to duplicate the classical Hertz demonstrations were all made over distances measured in feet and inches. Several sizes of dipoles were used from time to time at the transmitter. For those indoor experiments a static machine was generally used to charge the dipoles and the transmitter spark was continuous throughout the experiment.

Loop antenna and dipole antenna were used to receive the waves. Receiver dipoles were tuned to the frequencies radiated from the transmitter by adjusting them to about the same size as the transmitter dipole. The loop antennae most frequently used were

rectangular with one side arranged to slide in contact with two sides so the rectangular loop could be made larger or smaller until the spark at the micrometer gap in the other side of the loop indicated resonance. By revolving either a loop or dipole receiver the direction in which the waves were traveling was indicated. Direction, tuning and wave length measurements were not accurate, largely because the transmitter produced infrequent groups of waves that petered out rapidly and the tiny spark at the receiver was changeable due to changes in the atmosphere in the gap and changes on or in the sparking surfaces.

There was a stampede of boys into wireless but it did not occur immediately after the stories of Marconi's efforts were given wide circulation. The boys who came in the stampede were called "wireless boys" but I was a pre-bug of the horse and buggy days and will have to use a lot of words to reach the famous bugs. The boys sifted in gradually for a while. The first flare of publicity about the demonstrations of wireless as made by Marconi came to my attention during the high school-to-college moment when I was all set to pick something in science for my work and I chose wireless. About two years later, magazine articles and other stories indicated that wireless might take a message an unexpectedly long distance in one hop. More boys came into wireless then and some hung on. But at OSU I did not find a boy who would join me in wireless. Going it alone looked like it might be impossible, part of the time, because for example, there are two ends to a wireless communication circuit and how was I to be at both ends at the same time.

Repeating the Hertz experiments in the laboratory was not necessarily a two-person job. One could watch both ends, sometimes

regulating the transmitter with the left hand while adjusting the receiver with the right. When sending to distant points on the campus some kind of robot substitutes were needed because I could not operate the transmitter key and attend the receiver at the same time. For the robot receiver it was only necessary to copy what Popoff had done. In doing so, I used a device that my cousin had helped to replace before I was born and that I helped to replace in 1901. The device in modified forms still remains in service.

Popoff had used a tape machine to record the behavior of coherer, receiver and Marconi had adopted a similar arrangement as his standard receiver. Tape recorders made long or short ink marks on a paper strip for dashes or dots of the Morse code. They were used universally on wire lines for years and until after operators learned to read the clicking sounds they made. My cousin owed, at least as a starter, his successes, including the presidency of a railroad, to his having learned to read a tape machine by the sounds it made. George W. Stevens was my cousin, one generation removed. His mother, Julia Penn Stevens, was a sister of my Grandmother Rebecca Penn Marriott. When quite young, George was hired to drive a horse around and around to turn a shaft that operated a pump supplying water for railroad locomotives at ~~Attica~~ Utica, Ohio. When the tank was full he gave a hand at other "railroadin'" work. In the station he learned to read the telegraph tape but a good part of the time he was not where he could see the tape. Therefore, he learned to read by the sounds the recorder made. Due to his ability to read the clicks, he became an operator and then a train dispatcher very quickly. At about 45 he became president of the Chesapeake and Ohio. When he died at 73 he was president of that road, chairman of steamship transportation organizations and a stockholder in railroad, steamship and

trucking companies. He was one of the first to drop tape reception in wire telegraphy and a generation later I was one of the first to take up wireless as a profession and one of the first to use a tape recorder and to drop the coherer and the tape recorder ~~that~~ because it could not be used with what was substituted for the contrary, cantankerous coherer.

Some of the early Radio men have said, directly or indirectly, that they went into wireless to get rich. George W. Stevens provided the environment for me that reduced my desire to get rich, if I ever had such a tendency in that direction. For the vacation between my Junior and Senior years, he gave me a job with the C & O to which were added railway and steamship passes up the Atlantic coast and back through the eastern states. That tour included some time on a private car, some at his Blue Ridge Mountain home and some at his Richmond, Virginia residence. I was suddenly waited upon and kowtowed to so much more than I was used to that I did not like it and acquired a doubt about the desirability of wealth. It may have made me lazier than I would have been - at any rate, I have not been inclined to exert myself to get rich.

The tape recorder used in my wireless course was part of the regular laboratory equipment. The coherer, relay and decoherer were purchased particularly for my use from Stanley and Patterson of New York City. They were mounted on a board that bore the nameplate of the United States Electric Co. I mounted all of the receiver equipment including dry cells, in a plain pine box that opened at one side. The box was about one foot square by one and a half long. With a rope for a handle and some wire for the antenna and ground connection, I had a receiver that would record wireless signals at

some places on the campus - sometimes. I found later I had not done so badly for that was the way wireless worked for years: that is it worked maybe, sometimes and with promises for better behavior in the future.

A "grandfather's clock" operated the wireless transmitter for me. Sometime before my time in the Physics laboratory, the pendulum of that clock had been arranged to touch a pool of mercury in passing from side to side and that touch was enough to close a weak electric circuit. I used it to operate a relay that took the place of a key for closing and opening the fairly powerful battery circuit through the vibrator and primary of an induction coil. The antenna was charged from the secondary of the coil and discharged across a spark gap producing wireless waves.

The robot or automatic transmitter was in the basement of the west wing of University hall. The antenna came through a front window and up to the roof level where it was supported by a timber away from the building, to insulate it. Students could have touched it, particularly law students who loafed, before classes, on the steps near it. As much as fifty thousand volts was handy t those students for a small fraction of every second when the transmitter was working but the watts were only about enough to make a male undergraduate fuss or a co-ed talk to the Gab Room girls in the east wing and such gossip might have been forwarded to the Executive Office in the middle of the university hall and then land heavily in Prof. Thomas in the west wing. Although I left that transmitter shooting sparks as much as two hours at a time, it never stopped working and nobody reported me for shocking them.

There was trouble with the receiver every time I tried to use

it. Once it was what might be called "girl trouble". Our gymnasium, drill hall and armory were built like a castle with a flag pole on the largest tower. I put the wireless receiver on the flat roof of the tower within the battlements and used the flag pole as a support for the antenna. My girl with some of her Pi Beta Phi sisters (~~not Phi Beta Kappa~~) came up to see the wireless. In trying to show off, I told my girl to take hold of the halyard to which the antenna was attached and I would lift her when I pulled the antenna down. She did, I pulled, the halyard broke, the rope and wire fell, my girl and I staggered and all the girls giggled. My report to Prof. Thomas was very brief. I simply stated that I had put the antenna up on the gym flag pole and broke the flag rope. The University sent to Cleveland for a sailor who put a new rope on the flag pole. I transferred my receiving to the agriculture building where I did some organic chemistry lab work and did not invite any male or female organisms to observe my wireless receiving efforts.

The real or worst essence of my troubles with the receiver was the coherer. It was publicized as wonderful and it was wonderfully erratic and bad. I became more and more determined to avoid the use of that thing. My attitude toward the coherer was of no benefit to me in college but it helped in less than a year after I left college. The coherer would not work when it should and would work overtime when it shouldn't. Before I left college I knew about microphonic contacts and telephone receiver arrangements that had been used by Hughes and others for receiving wireless signals but with the equipment I tried, I did not succeed in getting anything worth mentioning. After leaving college I had the opportunity to spend some money on equipment and then I bought telephone receivers like

the "hello" girls wore and rewound those watchcase receivers with the finest wire I could buy (#40B and S). These receivers gave fair results with several kinds of microphonic contacts and I abandoned coherers.

The news we received about wireless was more or less propaganda inspired by promotors. The unreliable coherer plus the xx unreliable news helped to make wireless quite confusing. Some of what I thought sounded all right was not half true and some that Prof. Thomas gravely doubted was true. The stories about wireless kept getting bigger. In trying to get bigger distances various things were made bigger. With the kind of transmitter designed by Hertz, the length of the wave depended on the size of the antenna. Marconi kept making the antenna bigger. A large low area of sheet metal or wires for antenna would give the same wave length as a taller single wire but with the taller vertical wire the waves would not peter out so quickly. The tall antenna was more effective, both for tuning and distance. Also by making longer waves, waves were obtained that did not fly away into space and stay away from the earth. Marconi and his associates made antenna so big they could not afford the very large reflectors that would have been required if the reflectors had been proportioned as they were for the very short waves! Several years elapsed before satisfactory explanations were offerred as to why those longer wave lengths behaved as they did and many more years before the very short wireless waves were written up as the more superior and up-to-date manifestations in the ether. With the available equipment when wireless began giving service, the short waves were not applicable where wireless services were needed.

Stories to the effect that the Marconi people had transmitted

over the curvature of the earth and other obstacles worried Prof. Thomas. He had used some good theories for so long that he was addicted to theories. The Maxwell theory had not yet been fully applied and thoroughly explored in connection with some other useful theories and facts. Offhand the Maxwell theory had been construed to mean that all wireless waves behaved just like light waves, except for obvious differences that were to be expected, but all of the differences were not obvious. As Prof. Thomas put it, the wireless waves should not go around the earth to points beyond the horizon unless there was something above us to reflect or refract those waves back to earth and he did not know of any such reflecting or refracting something around the earth. However, the something was there. We could not see it because short light waves passed through it. The longer wireless waves did not pass through it. If our eyes were sensitive to longer waves, we could see the reflecting ionized portions of the space around the world. On the other hand, if we had wireless eyes we could see through walls which are opaque to light waves. Also if longer waves had not automatically resulted from using bigger antennae, the horizon might have been the wireless limit until some other trend of events gave like results.

Not understanding why wireless went beyond the horizon, if it did, did not worry or embarrass me greatly as I had not been using theories very long and felt sure there were a lot of facts I did not know about. Also my worries as to whether or not I could pass all of my examinations and get a paying wireless job were about all I had time for.

Passing of all the examinations would, I believe, have prevented me from stepping into the only wireless engineering opening at that

time. My lucky failure dated back to the Richwood high school course which had not included all of what OSU profs had said were the right subjects for entrance to the Science course, and they further specified that one might enter OSU without a few of the required subjects but those subjects must be made up in addition to regular college subjects before one could graduate.

Part of my high school deficiencies were made up by summer study and part by taking extra college subjects. To make up one of my deficiencies I took German as an extra in my senior year and failed to pass an examination in that German a few days before graduation time. I had slipped on part of the orthodox curriculum. My friend, King (Thompson), had been my closest associate in extra-curricular matters before he ran out of funds and had to go into business. Shortly before my final examinations, King saw publicity in an out-of-town paper about the newly formed American Wireless Telephone and Telegraph Company and the wonderful wireless stations they were going to build. King gave me the paper and I wrote to that company asking for a job, telling of the course I had taken and saying I could report in Philadelphia after graduation on June 19.

The report about my failure in German and a letter from the president of the A.W.T. & T. Co. reached me at bout the same time. The letter said I could have a ten dollar a week job if I came to Philadelphia promptly but not if I waited until after June 19. Since I could not graduate on June 19, 1901, as intended, I had no reason to stay around Ohio State except to take my girl to the senior ball and King Thompson said he would take her for me. I hurried to Philadelphia and took that wireless job.

I went to work for Dr. Gehring, a German, after Prof. Mesloh, a German, had said I did not know enough German. Gehring's office was above the German Title and Trust Co. at Arch and Broad in Philadelphia. Four or five with the A.W.T. & T. Co. had German names but I do not recall seeing or hearing any other German words while I was with that company. In later years I had considerable to do with German commercial and government interests but they did not expect me to speak or read German. My work with wireless did not require a knowledge of German and my first work with that wireless company did not require a knowledge of wireless. The president of the wireless company had miscalculated, which I learned in time was sort of characteristic of heads of wireless organizations.

I never did make up the OSU german, however the BSc sheepskin of OSU had been made out for me and dated June 19 1901. It was not wasted or changed. A couple of papers I wrote about Wireless were accepted as a substitute for the german. Some years later when I was back in Columbus on a visit president W. O. Thompson signed that diploma and threw it across his desk to me.

CHAPTER IV

STOCK CERTIFICATES, STATIC AND MESSAGELESS WIRELESS

When I reported to Dr. Gehring, above the German,American Title and Trust Co., he did not know what to do with me. His chief engineer, Mr. Shoemaker, had been expected at that time but had been detained out of town. Such delays and miscalculations were to be expected, I soon learned. The fact that they had seldom, if ever, carried out such wireless projects before and that wireless seldom came up to expectations, were two of the reasons why even the more capable and best intentioned wireless people were so frequently unreliable.

Dr. Gehring told me to find a room and gave me an address on Tenth Street near Locust. There I found an Irish Catholic landlady who rented me a little back bedroom and told me the doctor (Gehring) had occupied the front rooms on the first floor when he was practicing medicine. She said the doctor had taken up the buying and selling of Atlantic City lots, had sold out very profitably and then had gone into this wireless business.

Tenth Street was fairly quiet - the roomers and landlady were very quiet, but back of the house and small yard was an alley on the other side of which, starting at the corner, was a poolroom patronized by negroes and from there along the alley were little houses that seemed to be occupied by colored men and white women. About nine at night a colored man came through the alley selling hot sandwiches and southern cooking that boys like. Another roomer and I patronized him quite regularly. One evening the other roomer did not patronize him because I had not come in after dinner. I

had been on a long streetcar ride away in West Philadelphia. Coming back late, some of the passengers were talking about a violent explosion. They said an engine had blown up in the railroad yards. On Market and on Chestnut Streets sidewalks there were broken plate-glass windows. At a late night lunchstand while paying my check, one customer asked another if he had heard about the explosion at Tenth and Locust. Hurrying toward my room I heard the noise of fire engines. A half block from my room I could not see the building at the corner of Tenth and Locust. Passing through the smoke I found the corner building with broken windows and next door where I roomed everything was normal, including the windows. Across the back alley the block was blown up. Timbers had been blown across Locust Street and stuck into brick walls like pins in a cushion. Many had been killed, more had been injured. Near the middle of the worst part of it a baby was found asleep under debris that had fallen right to protect the youngster. Nothing was injured where I roomed because our windows were open and a little brick building at the back of the lot protected our quarters. The explosive was gasoline vapor that had evaporated from a barrel in a grocery basement two or three doors from the poolroom on Locust. About nine o'clock the grocer went to the basement and lit a match. My roomer friend said the explosion occurred at the time we usually patronized the colored man in the alley where bricks and timbers had fallen. I did not learn whether or not he was one of the two or three hundred casualties.

After renting the room from the doctor's former landlady and transferring my baggage from the hotel and railway station to that room, I returned to Dr. Gehring. The doctor turned me over to Miss Molly saying he wanted me to help with office work while we waited for Shoemaker to come back. I was thereby added to an office staff

that included Molly who was efficient but not a Venus, a handsome big girl, a pretty little girl and a friendly boy, all under eighteen - except Molly. I knew much less about office work than they did and was younger than Molly - I was 22. These, the main offices, of the AWT Co. were in two rooms. Inside the entrance was a railing with a gate in it. On the far side of the room hidden by a roll top desk was the president, part of the time. During sotto-voce conferences the conferees huddled as compactly as possible about the president. A wireless receiver occupied a place of honor at the president's left in the corner. It was like the Popoff receiver with modifications, such as, for example, the decohering was presumably accomplished by rolling the coherer over instead of tapping it. Looking at that dumb receiver was the nearest I came to doing anything with wireless apparatus in the main offices of the AWT and T Co.

Those offices seemed to be nearly one hundred percent. stock selling offices. I bought twenty-five dollars worth of A.W.T.& T.Co. stock from the doctor. That is, I paid twenty-five dollars in cash for Certificate No. 4957. The doctor looked puzzled.

Molly and the doctor seemed to think I could handle filing such as book filing and could look like a receptionist or informationist and sit at a desk by the entrance railing when there was no filing to do. Office work, both academic and practical, were strangers to me. In college I received high grades in an Economics course dealing with theories about stocks and under a professor who was over enthusiastic about stock companies. Despite that I was almost innocent of knowledge of press agents, promotors, stock jobbers and manipulators. As I learned some about the promotion methods

used by those chaps, I felt I had pronounced inability in that line and did not try to sell stock although stock selling was a large part of wireless development. Often the most conspicuous or necessary part. I have never tried to sell anything when I could avoid it although I learned to appreciate the fact that stock-jobbing promotion and similar promotion to angels and smaller fry was a very important part of early wireless development. Various kinds of selling became important parts later. There seemed to be a conspicuous lack of honesty in early and some in later wireless promotion. Occasionally someone came to the AWT&T Co. to ask for stock promotion pamphlets referred to in literature or to see the doctor.

When there was nothing to do, I tried to analyze existing patents or think up inventions. Their book type of filing was considerable. The other of the two rooms was occupied largely by stacks of book shelves loaded with stockbooks and stock-stub books. The stock certificates were pretty fancy or artistic and so was the Spencerian penmanship that the girls in the front room added. Fortunately my writing was not pretty or easy to read so my scribe work was limited to printing the large file letters and numerals, Arabic and Roman, for the backs of the books. I could print better than the girls but my writing was definitely bad, probably because I did not like to write. I was the poorest at writing in high school and the only one that could draw pictures. Twelve years after I left college I found one of my freehand pen drawings was on the wall as an exhibit at Ohio State. Drawing has never been my business but to convey my ideas to installers or draftsmen, I frequently made sketches. From that bent I developed the ability to retain a mental picture of what I had seen. I liked to get mental pictures and sometimes they were both a pleasant memory and quite practical. For

At first, Gehring seemingly thought he could sell stocks and build profitable wireless stations simply by telling people about the wonders of wireless. The stock stopped selling. He put out advertisements and prospectuses which said that those who had bought early wireless telephone stock had made fortunes and such early buyers of AW T+T Co stock would do the same.

Later he added subsidiary companies, some of which had names similar to subsidiaries of AT+T. Stock of one subsidiary after another was given to AW T+T stock holders to encourage them to buy more stock. Still later he tried to merge the subsidiaries and AW T+T into one company.

There, I heard stories about the beginning of the American Wireless Telephone and Telegraph Co. and why it was so named. The stories added up about as follows:

Dr Gehring, while practicing medicine near the corner of 10th and Locust in Philadelphia, sold Atlantic City real estate for a large sum which he wanted to expand in some other business.

Mr. Collins a brother of Mrs Gehring interested Gehring in Wireless. Gehring learned that Wireless was old before Marconi experimented with it in 1896 and that U.S. wireless patents issued to R.J. Dolbear of Tufts College, in the 1880s could be purchased. They were purchased and the AWT+T Co was formed.

Prof. Dolbears patents, experiments and lectures included operating wireless either by a telephone microphone for speech or by a key for code. Therefore both, Telephone and Telegraph were included in the company name. American was added to emphasize that this was not a British controlled company as the Marconi companies were believed to be.

About this time the AWT+T Co was being worked up, the American Telephone and Telegraph Co. (AT+T) replaced the American Bell Telephone Co. as the controlling company of the wire telephone companies. The name may have influenced the choice of a name for the Wireless company.

example, mental pictures of what I had seen enabled me to design radio devices and stations, choose locations, testify as an expert in patent suits and find my way in the big timber forests of Washington and Alaska and getting back to the vicinity of 1877 U. Penn in Philadelphia, I can still see the little well rounded president of AWT&T hurrying through the office wagging his fat behind and cutaway coat tails. At that time a gold watchchain over a prominent belly and a cutaway coat presumably indicated superiority.

Some of those who purchased wireless stock might be dassified as simple but the books of the AWT&T were not simple. In June and July, 1901 when I was eddied into the back room of AWT&T, with the stock books, hats, coats and rubbers, there were one or more stock books for each letter of the alphabet for each company and there were a lot of companies. AWT&T was only a parent company. It had subsidiaries. Only the one parent was mentioned but that one had a lot of babies. The parent and babies should have been wearing diapers. The parent was born in 1900 - its babies were born in 1901. The names of the subsidiaries indicated that the parent company had a roving disposition. The babies were given such names as New England, Atlantic, Federal, Southern, Gulf, Central, Middle, Western, Great Lakes, Northwestern, Southwestern, Continental and Pacific. The AWT&T subcompanies had pretty stock certificates that came to the office in book form and the book backs with stub records were filed like books. Not the stock records of one young company but of more than a dozen companies. The promoters incorporated their companies under the laws of states that did not charge much or were lax in their restrictions.

Years later I asked Harry Shoemaker why the promotors of

AWT&T had concocted such a complicated scheme that embodied a parent company and subsidiary companies for slices of the U.S. and its possessions. His answer was that by such corporate complications it was easier for the officers to "pull crooked work" without being caught. I suspect the promotors of AWT&T were influenced from the example set by the Marconi crowd who were pushing a parent company with subsidiaries. The Marconi Wireless Telegraph Co. of America was one of the subsidiaries.

At the time I became a member of the clerical staff of the President of AWT&T, they were issuing dividends, - not cash dividends but stock dividends. An AWT&T stock holder received, for example, a dividend consisting of some shares of stock in the New England Wireless Telephone and Telegraph Company. After enough time had elapsed to desseminate the gossip about that dividend in the grocery stores, poker games, livery stables, ladies aid societies, bar rooms and sporting houses, a dividend consisting of stock in another subsidiary was delivered to the AWT&T stock holder. As a result of that procedure, there were many books to be filed at the main office of AWT&T.

These stock books were something like check books but very much larger. Three of them were about all a girl would carry across the room. The certificate like a check was torn out and sent to Mr. X, the stub end of that certificate remained in the book and was a partial record of the transaction. Subsequent wireless companies copied much of the stock selling talk in the "literature" put out by AWT&T but none came out with such a long list of subsidiaries.

When Harry Shoemaker, the chief engineer, arrived, he had nothing for me to do as the mast had not been erected at the first

place he wanted me to install wireless equipment. Shoemaker was a convivial soul and evidently had more money to spend then he was accustomed to. He had an automobile, at least so he said, but I never saw it. He would show up at the office at lunch time and if the doctor was not present he would take all of us out to lunch. He took me to his laboratory where I saw some work benches and tools. He said he had taken the Electrical Engineering course at Pennsylvania State College, which at that time I believe was a three year course. His father owned and operated a flour mill and Harry was helping him out financially. I presume he was Pennsylvania Dutch - that is, descended from German pioneers. Like many German instrument and die makers, I have encountered, he was a stickler for fine workmanship when it came to fashioning metal parts. He wrote many applications for patents and apparently James Sawyer, a boyhood friend, came into the laboratory frequently to prepare the drawings. At one time I believe, he had taken out more patents on wireless devices than any other person. Non one of the patents seemed to be important but the large number of them was impressive for stock promotion purposes or because some of them might be unintentionally and unnecessarily infringed. Most of the wireless patents were like that. Shoemaker said I was too dumb to be a Wireless Engineer, I should be a college professor.

When somebody brings out a new device or a patent in wireless or another line, professional inventors try to write a patent application that will protect a substitute for the other fellows new device or patent or an improvement on the other fellow's production. Shoemaker and most of the other wireless inventors did that stunt of trying to do something as good or one better. Shoemaker was one of the first quantity production wireless patent inventors in the U.S. Harry probably obtained a considerable sum of mongy once or twice and spent it on fine machine tools and the hiring of very

skillful machinists and bench men. At that time he probably would have been classed more often as a promotor or professional inventor than as an engineer.

The AWT&T Co. claimed ownership of the oldest wireless patent - the Dolbear patent. Professor Dolbear patents dated back to 1882 and 1886, all before Hertz had made the demonstrations based on the Maxwell theory. The Maxwell theory apparently was not mentioned by Dolbear although it is possible that his device did work according to that theory. The Scientific American Supplement of December 6, 1884 indicates that Dolbear may have "worked his apparatus up to a distance of thirteen miles". But the Dolbear patent was due to expire in 1903 and nobody proved in court whether or not it covered the basic principle on which 20th century wireless worked. It looked to those who had studied the history of wireless like the invention of the kind of wireless we were using in 1901 and still use was not a one-man affair and nobody owned a patent that would prevent others from operating wireless. Nobody had a right to patent what the professors had developed and thereby monopolize wireless. Although that was tried, it did not succeed in the U.S.

Numerous wireless companies sprang up and operated more or less from time to time. For many years if one person made money in wireless it was usually in the last analysis, because somebody had lost money. Misrepresentation to get money was common - sometimes it was self-salesmanship and sometimes stock was sold. The pot calling the kettle black was practiced by companies and individuals. At least one wireless company that had indulged in stock jobbing waited until they were protected by the statute of limitations and concealed stock promotions before they stirred up prosecution that ruined its more serviceable and successful rival. The publicity, literature and

prospectuses put out by wireless promotors were pretty much alike for several years. The following are excerpts from the publicity put out by the AWT&T and its subsidiaries in 1900 and 1901.

"Professor Dolbear discovered that electro-etheric waves could be made a medium of communication, and received basic patents for wave telegraphy. Since that time, science and capital have worked unceasingly for the perfect sender and receiver, with the remarkable success that wireless telegraphy is no longer a visionary hope, a dream, a theory; but a demonstrated fact, ready for practical every-day business use."

"Professor Shoemaker's patents were granted April 2nd and 9th, 1901.

It is unnecessary to go further over the ground of invention, which has brought the wonder of the Twentieth Century to its present stage of perfection. Therefore, not as a history of the invention, but as a prospectus of its value as a safe, rapid, money-making investment, is this booklet submitted to you.

The first point considered is safety. The history of finances shows that no class of investment is so safe as an important invention protected by patent, of which we shall mention, but one - The Bell Telephone.

The second point considered is possible profit, and in this connection, once more the important commercial invention, protected by patents, heads the list, as illustrated in Bell Telephone, the stock of which sold for 23 cents per share and is now worth more than $4,000.00 per share."

"The navies of all countries are either equipped or being equipped with wireless telegraphy. Our own Navy Department commenced to seriously investigate the question in March 1900. It then addressed the following letter to the Parent Company:

Bureau of Equipment,
Navy Department,
Washington, D. C.
March 15, 1900

Gentlemen:

The Bureau would be pleased to receive from you a full description of your apparatus, accompanied by photographs and such data regarding its speed, range of transmission, price, royalties, etc. as you may care to furnish.

Very respectfully,
R. B. Bradford,
Chief of Bureau

To the American Wireless Telephone and Telegraph Company, Philadelphia."

"In Japan machines made at the Philadelphia Workshop are working daily at a distance of 200 miles. The United States Government is now working wireless telegraphy under the supervision and direction of Professor Moore, Chief of the Weather Bureau, and Professor Fessenden, Government Electrician."

"Plans are being perfected for the transmission of messages across the ocean in the near future."

"In other words, all wireless telegraph and telephone messages sent by electro-etheric waves, if not sent by the American Wireless Telephone and Telegraph Company or one of its tributary companies, such as the Pacific and Continental, must pay toll to it."

"$25.00 is the smallest subscription to the capital stock of either company, that will be honored with certificates, and all subscriptions must be accompanied with postoffice order, express

order, certified check, or New York Draft."

"We believe this stock, either for investment or speculation, the best purchase in the world today."

"Wonderful inventors and trained business minds have laid a perfect foundation on which to build our future."

"Taking a stretch of say 50 miles, we find 50 miles:

Cost by the old system per mile, $3,000 -- $150,000.
Cost by Wireless system per mile, $150. -- 7,500.
$142.500.

---saving in first cost $142,000.00 -----"

"History will ever repeat but opportunity, like stock in Bell Telephone and Wireless Telegraphy, below par, is the opportunity of a lifetime, if not a century."

"We believe in Wireless Telegraphy; we have backed our judgment by liberal investment in the enterprise. You now have a rare opportunity which may not last long."

Stock order blanks were attached or enclosed with such statements when they were sent out as literature. Similar statements were included in newspaper stories. Many of those statements were repeated, it was the type of sales talk used for years by various promotors for successive and contemporary wireless companies.

Promotors habitually put the word professor ahead of the names of technical men at that time. Harry Shoemaker was not a professor. Fessenden mentioned in one of the above quotations had been a teacher but had left that work to take a government job and later became a prominent factor in wireless development. After a year after the foregoing promotion paragraphs were published, Fessenden sent glowing

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Shoemaker and Mitchell claimed they experimented with Wireless before Marconi. Marconi promoters tried to belittle their claim by stressing he was only 16 when Marconi started. Marconi was 21.

I believe Shoemaker was born a month or two after I was and I read about Tesla's wireless before Marconi claims, or having become interested in the subject. I might have tried to make a wireless then if I had not, at that time, been so intrigued by motors, batteries, dynamos, a turning lathe and making [illegible] from [illegible]. I could have made a wireless, with my facilities, more easily than the dynamo I struggled to make. At that I was only 2 months over 18 when I went in for wireless. Ten years later, boys who [illegible] young aspirant were going in for wireless. Those boys in short pants made communica[illegible]

I never learned exactly what Shoemaker played with at 15 or 16 but from what he and Mitchell said I suspect it was a sort of mixture of Hertz, Dolbear, [illegible] wireless discoveries, brought out by Tesla's flare for publicity.

accounts about wireless and great improvements he said he could make, through a patent attorney, to Given and Walker of Pittsburgh and as a result they became his angels. While angel is the name usually limited to the backer of a theatrical program, in wireless gossip it was the name I heard applied to Given and Walker.

According to our observations and the book written by Mrs. Fessenden, those angels did not make a heaven for Reginald Fessenden. The book by Helen M. Fessenden is "Fessenden, Builder of Tomorrows", published by Coward-McCann, Inc. (1940). Fessenden and his two investors of cash, but big ones, had some characteristics in common with the usual type of wireless company. Every wireless development of that period included imagination, exaggeration and failures. In the usual type of promotion companies the stockholders who supplied the cash, frequently cursed the promotors and alleged inventors. In this inventor-with-angels organization the cursing seemed to oscillate back and forth between the inventor and angels. Those who put up the money did so because they were led to believe they were making a good investment or gamble for big profits. Probably all of the money went to promotors in some organizations, in others various percentages were fairly spent for wireless development. Some exceptional organizations came along gradually.

Most of my working time in Philadelphia was spent in the main office where, until Shoemaker was ready for me to go to Brielle, New Jersey, I probably came closer to seeing the inside workings of stock companies than at any other time. I continued to see more or less of promotors and their tricks, some of which were amusing, until about a dozen years later when I left the Marconi Wireless Telegraph Company of America to become a U.S. Radio Inspector under the

Department of Commerce.

In the above quotations reference is made to wireless working two hundred miles in Japan, using Philadelphia built apparatus. Also Shoemaker told me he had sent two wireless-controlled torpedoes to China. From what I saw of the coherer type of wireless built in Philadelphia at that time I doubt if it worked twenty miles and then not reliably. The torpedoes probably could not have been guided reliably more than two hundred feet and although I inquired several times, I never heard that the Chinese had been able to work them at all.

In July 1901 I was sent to Brielle. I looked for a hotel, found one, registered, went out to find Shoemaker, found I was in Manasquan and found Shoemaker and his boyhood friend, Fred Midgley, were also in Manasquan. I was not surprised because by that time I had learned that any information the main office gave me would prove to be incorrect. In this case my instructions were not far off. It was but a short walk from the Brielle station to any part of Manasquan.

Shoemaker and Midgley with his wife had rooms in a private house. The following day I moved to that house and went with Fred and Harry to the wireless station. The wireless station was on a sand dune just above high water about a hundred feet north of where the Manasquan River emptied into the ocean. The nearest town was Point Pleasant just across the river but to cross the river in that locality was very dangerous at times. One could go to Manasquan by walking along the beach toward Sea Girt to a bathing beach and from there along a road to Manasquan. The easiest way was to sail in a catboat on the Manasquan River to and from Bart Pierces' landing in Brielle. The sand on which our station was located was within the

corporate limits of Brielle. With Pierces' small centerboard catboat one person could handle the sail and rudder even in a stiff breeze and dock at Brielle or beach the craft near the wireless station. There were no motorboats available for our use. A few years later Bart Pierce built a motorboat that won the international motorboat races in France, with Bart at the wheel. Bart was both an expert builder and operator.

The transmitter was a Queen and Co. (of Philadelphia) induction coil with one end of its spark gap connected to a single wire antenna which was supported by a mast about a hundred feet high and the other end connected to a piece of copper in the beach sand. Power was obtained from storage batteries. The interrupter was separately excited and was not supposed to stick but it did and caused me to use another design at my first opportunity. This coil was called a twenty-five inch coil. At that time induction coils were rated according to the length of spark they could produce across their spark gap. When nothing else was connected to the gap. They usually broke down soon if operated with the rated length of spark gap. At this station about a one inch gap was used when the antenna was connected to one end of the gap and the ground to the other. The customary erratic coherer receiver was installed with a tape recorder.

We slowly tapped out dots, dashes, words and sentences. As the words seldom were picked up, dirty words were used sometimes. Later one of the rival companies brought charges against Shoemaker for using nasty wireless words. Shoemaker said we needed a better ground connection. I suggested a channel shaped copper plate that required a lot of digging to get down to where the sand was always very wet. Shoemaker said the station worked better after I installed that ground. I thought he meant it had been received better at Gallilee

or Gallilee at Brielle while I was there. I was at one or the other station for about eight weeks in July, August and September when the static was very strong. Shoemaker was a practical joker and probably agreed to my ground plate because that was a hard job and I had to do it.

The electro-magnetic disturbance produced by those transmitters and as indicated by the coherer and tape recorder or telegraph sounder was a weak imitation of static. At Brielle I received thousands of Morse code letters, if I believed what I saw on the tape, but I checked them when no wireless transmitter was operating. A single dot is a letter "e", two dots are "i", three dots are "s", four dots are "h". The tape said "e" more often than any other letter, "i" was next, "s" next, "h" next, through "p" with its five dots and sometimes when the static discharges were close enough together to be continuous, the relay would operate slowly enough to produce dashes. The coherer did not know the difference between static and a wireless telegraph signal.

I thought I would find people who would discuss wireless subjects with me in the AWT&T Co. Shoemaker would talk to me on almost any any subject but wireless. He was especially fond of dinners and parties. He would take me to dinner in places where I could not afford to go. He would insist that Midgley and I should go on parties with him when we told him we were broke and he would pay for everything but when it came to wireless, he confined himself to indefinite generalities. He was the first sample of secretive wireless engineers that I contacted. Shoemaker loosened up for some exchanges of wireless information about seven years later.

When I went to the Gallilee station I found what I wanted to find - a wireless engineer who could and would talk. He was and still is a

walking encyclopedia. I soon learned how to get an interesting lecture on almost any scientific subject from Greenleaf Whittier Pickard. His talks were a pleasure and he contributed a relief for I gathered from what he said that he did not know much more about wireless than I did and that the reason why Shoemaker would not talk was partly because, being Chief Engineer, he did not want to say things that would indicate his limitations. That was one of the difficulties I had later in organizing an institute - technical men were afraid to talk for fear they would show their ignorance. Also Gehring probably told Shoemaker not to talk. Promotors as a class seemed to feel that technical people might be too frank in discussions and expose the weakness of their company or give away technical secrets.

Wireless companies a few years later objected to their men joining the Wireless Institute and its successor, the Institute of Radio Engineers. John Bottomly, an Englishman and the active head of the Marconi Wireless Telegraph Company of America, argued that any talking before technical or other societies should be done by him. He could look you over with a monocle; he probably knew quite a bit of law; he spent hours with stock salesmen, but so far as I ever saw or heard, he did not know anything about the technical side of wireless. His general attitude before outsiders was that the company he was with was almost unbelievably wonderful in every way and that any other wireless device or company was an unmentionable. He was like that - otherwise, he seemed to be a nice old chap who liked to eat chicken and his favorite portion was that part of the chicken which goes over the fence last.

The receiver at Gallilee was probably somewhat better than the one at Brielle in that it was shielded by a metal box. That

shielding protected the coherer from the station transmitter better than simply opening a switch. I doubt if that did much good in the season of heavy static which rapidly decreased the sensitivity of a coherer when it was connected for reception. Spare coherers were often kept in metal boxes. I still have two, each in its metal box.

Gallilee was to be our receiving station that fall of 1901 for reporting the yacht races between the Columbia and Shamrock. In 1899 the Marconi crowd from England claimed they had reported the yacht races using a receiver at the Heights of Navasink and the rumor was that they were going to use that same site for the 1901 races. Also there was promotion publicity in the papers to the effect that DeForest would report the races by wireless to a station between Gallilee and the Heights of Navasink. The transmitter would presumably be on boats that followed the yachts. It looked like a dog-eat-dog fight because two wireless outfits could not operate at the same time without interference. We could not tune out contemporaries and they could not tune us out. While we were not hungry, we hoped we had sufficient capacity to put away a French sounding dish like DeForest and an Italian-Irish dish like Marconi. Shoemaker told me to look over the DeForest and Marconi receiving stations to see what could be done to keep them from receiving.

On examining the DeForest station I found another sample of unreliable publicity. There was nothing in the little house and the mast that looked like a gibbet did not have an antenna hanging from it. I was told years later that Doc DeForest who was his own promotor at that time had not been able to build a transmitter that would not burn up or collect financial fuel fast enough to buy one. At the Heights of Navasink there was apparently a station equipped with both receiver and transmitter but it was vulnerable, because there was a

hotel very close to the station where it would be easy to rent a room and operate a small portable induction coil with battery that would operate the Marconi receiver but would be too weak to bother our more distant receiver at Gallilee. After telling Shoemaker that DeForest was not equipped and how Marconi could be interfered with, I went back to another job which was the preparation for the erection of another station at Barnegat by the entrance of Barnegat Bay and I was not near enough to AWT&T stations used in the races to see what happened.

According to the story as I heard it, some from Shoemaker but chiefly from Pickard, the Maid-of-the-Mist bore the AWT&T wireless transmitter. The Maid was chosen because she was a schooner with two high masts suitable for sustaining a high antenna. She was not fast, in fact she had to be towed by a tug around the legs of the course and she required some extra copper covering on her bottom, to provide a sufficient ground connection for the wireless. Knowing Shoemaker as I did, my suspicion is that he chose that two master because of her name. He was in favor of anything that even approximated a maid.

The Maid was built to be a windjammer but with bare masts on the first day of those races she was a wireless jammer. At that time and even up to recently if it was desirable to keep your enemy or objectionable contemporary from receiving messages, you held down your key. That maneuver was known as putting-a-brick-on-the-key. Pickard ~~Shoemaker~~ did that on the Maid but with variations. The tape of our competitor at the Navasink station came out marked with long dashes that looked like plain simple jamming. But it was fancy jamming that Shoemaker ~~Pickard~~ at Gallilee translated into messages. The dashes were long, much longer than a Morse code dash or longer than several words would be in Morse

Packard read this in the summer of 1949 and wrote: "I should say, rather, that after the first two days the two companies began to divide time, principally because Gerring was scared by threats of litigation. I am quite sure that the AWT&T did not like any of the Marconi messages; one reason for this suspicion is that I know there was no operator in the AWT&T who could read Continental, as they were all old telegraph men, using only American Morse. And Gehring actually had no reason to worry about litigation, for the yacht races were four years before the first attempt to regulate wireless, the 1906 Berlin Conference. So we actually had the whip hand, and could if we wished entirely bewilder Marconi. I did so wish, and on occasion broke "radio silence" during our off the air periods, to the horror of Gehring. One of these violations happened just as the Columbia crossed the finish line, when in some way or other the Maid of the Mist boys got jammed down and staid down until we reached our anchorage, some hour or two away. Probably this was a record-breaking length for a dash."

code. It was the break between dashes that counted. A dash, no matter how long but with a one second break ahead of it and after it was one dash. Two dashes were separated by a break of only a fraction of a second. To ~~Pickard~~ Shoemaker, one dash meant the Yacht Columbia. Two dashes meant Shamrock. One and two meant the start of the race. Three meant the first "stake" or turn. One repeated meant Columbia leading. If there was no unexpected turn of events, not many dashes were required to report a race. The AWT&T Co. put their message through. The English controlled Marconi crowd asked for a division of time. After the first day the two companies divided the time and read each other's messages for mutual advantage. The Britons lost the yacht race but we are still buying from the Liptons.

The British crowd made many attempts to monopolize wireless in Yankeeland without success but finally succeeded in being bought off through the formation of the Radio Corporation of America, eighteen years later. When Pickard laughs (he still does) he puts his hand over his mouth and shakes like Santa Claus. I'll bet all two hundred pounds of him shook the first day of those 1901 yacht races.

In the scheme of the AWT&T Co. were provisions for the welfare of its babies. It would stand ready to supply wireless instruments and chief engineers for subsidiary companies. Two of the subsidiaries were officered by the same people. They were the Continental Co. and The Pacific Co. They wanted action quickly. When it came to providing a chief engineer for the west, the request sounded bad to easterners. Those companies included the wild and woolly Rocky Mountains, Sierra Nevadas, Coast Range, Olympics and Alaska; where a chief engineer would not only have to know wireless but should, according to novels, feel right at home when it came to sleeping out at forty below, driving nails across the street with a forty-five and fighting a Kodiak bear

with a hunting knife. I talked sort of western and had come from west of Pittsburgh and had sort of fooled around, at least as far west as Chicago, and nonn of the others wanted to go way out west, therefore, with my consent President Gehring suggested to the Pacific and Continental that I might take the job but the Pacific and Continental would have to negotiate directly with me. The AWT&T Co. had given me a fifty percent. raise, instead of receiving ten dollars per week as at the start, they now paid me fifteen and when they began having me flit around, they paid all expenses away from what was supposed to be my headquarters. A. L. New wrote to me for the Pacific and Continental Wireless Telephone and Telegraph Co. asking if I would take the chief engineer's job for their company and how much I would want. Fifty dollars a week and expenses was what I asked for and New tried to jew me down. While that was going on I had to hurry the Barnegat job because AWT&T wanted me to finish as much as possible before going to a job in a subsidiary.

Pickard was about due to leave also. He was expected to become chief engineer of the New England W.T.&T. Co. I believe he operated a wireless station later for one of the companies that succeeded the AWT&T subsidiary. Shoemaker said Pickard had a beautiful Philadelphia girl that he wanted to marry and take back to his home as soon as he could. His home was in Amesbury, Mass. Part of the house was kept as it was when Pickard's greatuncle, John Greenleaf Whittier, died. Pickard's father was also one who knew how to handle words. He was for many years the editor of a Portland, Maine paper. Several times in later years I was at that home. Once for a day and night. There on the ground floor were Whittier's rooms, about the house was the fine old father Pickard, up in low ceilinged third floor rooms were G.W's receiving instruments, piles of ore from which he selected crystals and synthetic crystals he had made for detectors, and with me was G.W. explaining things and telling stories

and somewhere in the house his wife was being slowly killed by tuberculosis, the bride he brought from Philadelphia. She left him with no children. A few years later after her death, he met a school teacher on a coastwise vessel coming up from Texas. When they married we had three children but the Pickards caught up and passed us without loss of much time. The last I heard the score was five to three in favor of Pickard. The last time I saw him he was lively despite his weight, sixty-eight years, typhoid fever and two or three operations.

For delivering the wireless mast timbers to Barnegat we used a two-masted schooner. I don't remember her name. Bart Pierce was handling the mast erection except that I was to tell him where to put the mast and how to arrange the guys and rigging to fit our wireless conditions. The AWT&T used tarred hemp guys because metal guys connected to the ground would absorb much of the energy radiated from the antenna. Those rope guys stretched and had to be watched, so I put them on my list of pitfalls to avoid when I could select the materials to be used. The guy arrangements I put to use about six months later were wire with short block and ~~hail~~ fall rope insulators near the ground.

Bart Pierce was a hard worker. To save time he arranged to sail down to Barnegat at night. Bart at the wheel, his helper at the aft sail boom and I at the forward sail boom left Bayhead to sail down Barnegat Bay to Barnegat. Barnegat Bay is not very wide so we at the booms were to push them over as quickly as possible when Bart changed his tack. To do that you have to keep your mind on the job. When the wheel is thrown over for a tack and the wind is strong, the boom can come around fast and hard because it is heavy. That boom seemed

to

to know that I was not paying close attention about nine o'clock and with hardly any hesitation batted me toward Bermuda. If I had not hit an unused boat davit I would have hit the bay and because of the darkness Bart would not have known I was gone for some time. The boom did not get a chance to kick me again and knowing Bart believed landlubbers just chronically had no sense - my bruises and what caused them were not mentioned to Bart.

For the Barnegat station house we used a furnished dwelling. It had the most mosquito netting I have ever seen. The beds and even some chairs had mosquito canopies over them. Word from Gehring awaited me saying to set up the instruments, get the mast erection started and come to Philadelphia as the Pacific and Continental were in a hurry to have me in Denver, which meant the P & C W T & T Co. would pay what I asked. It was another hurry-up case of an executive who did not know his job or did not control when he was supposed to control.

I do not know why the AWT&T chose to put stations where they did. After I left they installed others at Navsink, Atlantic City and Cape May. Those stations with the stations at Gallilee, Brielle and Barnegat were close to the lane used by vessels to and from the south, which looks like they hoped to equip vessels. Such a hope was laudable but did not prove to be practical at that time. Except for the little service Gallilee may have contributed in reporting the yacht races, I did not hear of any service performed by those stations. Some of them probably never received a message even from their nearest neighboring station. The wireless was not the only weak part of the ship-to-shore idea. The steamship owners and particularly the captains of ships were against wireless. Owners did not want to pay for wireless. Captains were kings who could do as

they pleased when at sea, but with wireless they might have to report to or receive orders from the vessel owners. Stations at about the same sites became useful from time to time in later years.

My departure from Barnegat was on a thing that I would not have suspected the existence of at that time in railroading progress. I had been raised in rural Ohio but we did not have such transportation there and this was in New Jersey which being farther east was supposed to be more up-to-date than the farther west. Far from it. The outgoing railway transportation from Barnegat was a car with an upright steam engine in one end. The speed was such that I got off and dog-trotted alongside. Near the south end of Barnegat Bay I transferred to a train made up of two coaches and several freight cars that made a last stop at Camden. From Philadelphia to Chicago I was in a Pullman sleeper. From Chicago to Denver I was in a new Burlington train with the nicest combination of railway conveniences I had ever seen. But the dining car waiter was like so many people I knew before and have known since, he could not read my writing very well. I wrote grapenuts on my breakfast slip and he brought me grapefruit. That was my maiden effort at consuming a grapefruit. I had not know such a thing existed. If my writing had been good, I might not have learned about that fruit for some time.

Before arriving in Denver I was given another object lesson in unreliability of promotors. Money had been sent to the Philadelphia AWT&T office to cover all of my expenses to Chicago where A. M. Stevenson, President of the P. & C.W.T.& T.Co. was to meet me and take care of my expenses to Denver. The clerk at the Chicago hotel where I was to encounter the second wireless company president said Stevenson was not there. I went to a bank where my friend Wallace (Wally) Leedon Hunt was doing time. His banker father had sent him there for

training. Checking up with the hotel and railroads the indications were that I would not be able to contact Stevenson before the following day. Therefore, Wally and I started out to see Chicago, particularly the unholy fray gilt about what was known as Custom-house Place.

Stevenson did not show up so I telegraphed New about his absence. For several nights in Chicago, Wally and I looked Chicago over and during parts of the day hours I investigated some cultured Chicago exhibits. Wally and I had been in the same classes during the freshman year at Ohio State so often that we had teamed up. In chemistry we were side by side. Wally was one experiment behind me. He was making carbon-monoxide and I was on the next which was a harmless experiment. Wally asked me to watch his experiment and went to the toilet to smoke a cigarette. Wally's carbon-oxide generator blew up. I grabbed the outfit and ran to the hood, shoved it in and had started to pull the glass sash front of the hood down when somebody grabbed me by the shoulders, rushed me to a window and told me to take long breaths. I did and looked around. It was Prof. McPherson who had me. He said, "How do you feel?" I replied, "All right, I held my breath from the time that thing blew up until you stuck me out of the window." He dropped me like a hot coal. Very disgusting - he had run all the way from his office and a foolish freshman had had sense enough to hold his breath. Why not, McPherson had said CO is fatal.

But getting back to Chicago, Wally and I saw a lot of sights that probably had been copied from the New York and Paris indecent exposures. Wally and I had been separated for some time. Our classes diverged and he left college before our four years were up. We made up somewhat for lost time. Two of the joints we wandered into had outstanding and unusual characteristics.

The "Working Mans Exchange" was, according to gossip, a place controlled by politicians who used the Exchange beneficiaries as repeaters when votes were to be cast. I don't doubt it. Within in last two years I went into a bar next to a bank in Cicero about forty feet and across the street from Chicago, just as aslot machine failed to pay and the nickel depositors started kicking it and the shut-in shield around it to pieces. But getting back to by what later became the "Loop", we entered the Working Mans Exchange and saw a bar on the right, a stove on the left, some men sleeping on the floor at the left, customers buying about twenty ounces of beer in a goblet for five cents which included free lunch privileges. One bought the beer, he and his pal took turns going to the free lunch counter. Later they flopped in the sawdust near the stove for sleep. One beer, two free lunches and a night's lodging for two for five cents. And to think I got turkey sandwiches and champagne for free lunch within the next week for nothing. Wally and I did not buy one beer. Each bought one and drank one. Due to our extra-curricular training at OSU, we were not particularly embarrassed by an extra pint or two of beer. We were told that in returning from the Custom House section men folks were sometimes sandbagged and dragged into driveways where their valuables were removed. Wally and I did not tote any valuables, show cash or talk like we were important. We were only cheap, sight-seeing skum that drifted in and out with or without the profitable suckers.

Hinky-Dinks across the street from the Exchange, was another place that made a hit with Wally and me. There were coins (sleepers) on the bar which gave you a shock when you tried to steal them and they were soldered to rods that went through the bar. The free lunch was a fine indigestible imitation. Metals, rubber, paper and cement

were molded and decorated to resemble the customary free lunch staples. Hinky-Dinks made alterations from time to time. The toilet was downstairs that would fold up when the bartender pressed a button, if you were on the stairs you slid to the toilet. At another time the slide did not end in a toilet but what looked like the unhappy ending many of the customers expected to fall into sometime. The involuntary slider landed in a place surrounded by fire and seemingly inhabited by red bipeds with horns, tails and pitch forks.

Within a few days money was sent me from Denver with instructions to proceed right away to Denver. When I arrived at Denver A. L. New told me that Stevenson was the biggest republican boss in the nation (Mark Hanna was still spry), had made a fortune in the Little Jack Pot mine, drank champagne during his wakeful hours, had been so full of the bubbling, babbling grapejuice when he landed in Chicago from Washington that he forgot me and took a train to Denver where they found him in a turkish bath after I wired them I could not find him in Chicago.

CHAPTER V

WIRELESS MARKET

In Denver my first stop was at the Albany Hotel on the corner of 17th and Stout Sts. Next I found that the P. & C.W.T. & T. Co. had nice offices at 240-242-244 on the second floor of the Coronado Building, 15th and Stout. There I met New, a slender little fellow, probably fifty, who hopped around and looked at you something like a robin, his head ~~was~~ tilted to one side with squinting eyes of washed out blue.

The officers were a political lot. Stevenson (Big Steve), the president, was reputed to be the big republican boss. Dewey C. Bailey, the secretary and Treasurer seemed to be controlled by Big Steve. Bailey was U.S. Marshal, his office was in the post office building where I went to get my check every Saturday. General Irving Hale was the Manager for the General Electric Company in that district, general of the Colorado National Guard and prominent in other activities including church work. His title was Consulting Electrical Engineer for the P. & C.W.T. & T. Co., but he did not take an active part, was not an officer and probably not on the company payroll.

General Albert L. New was first Vice-President and General Manager. Just how he managed to get people to call him general, was a question I frequently asked but nobody seemed to know the answer. He had been a collector of internal revenue in Wyoming and said he had almost killed himself checking up on wine, women and song. He was a teetotaller when I knew him, always took his wife with him and didn't sing. Maybe he conferred the title of general on himself because he had conquerred the wine, women and song habits.

The Denver politicians seemed to be closely connected, sort of a mutual benefit organization. I told New I wanted to find a room in a

boarding house. He sent me to 1339 South 15th Street where I obtained a room and board for a reasonable sum and learned that my landlady was the sister of the county assessor who was giving New a job in the courthouse. New did not seem to spend much time at the courthouse. The assessor was a democrat. New was a republican. My landlady was also on the assessor's payroll and seemingly put in several hours a day at the courthouse. She was a Protestant widow with two Catholic children and two Catholic sisters-in-law, Aunt Mary and Aunt Sue. Aunt Mary did the cooking. Aunt Sue worked at Daniels and Fisher and helped with the housework.

In the course of the first meeting with Gen. New, he talked heatedly about my being delayed in Chicago (at their expense) due to Big Steve's lapse. I told him that had been a pleasant delay to me because I had visited with Wally and we had seen a lot of sights. New promptly said those Chicago sights were not the only sights. I should see the Denver sights. He called up somebody on the telephone and arranged for a fellow to take me down the Denver line that evening. I learned more at Chicago and Denver in one week than I had learned in four years at college, about red light districts, Of course, the fundamentals were like those of Grant Ave. in Columbus but the frills and details were not the same. That fellow was a city detective. We went first to the Inter-Ocean Club where gold coins, silver dollars, blue chips, red chips and white chips were used rapidly in roulette and card gambling. My currency and experience where such any attempt I might make to bet would only indicate my poverty and ignorance.

Seeing that I was not a spending sport, my very agreeable friend, detective Billy Green, steered me to a corner of the room where there was something that one whose gambling education had been neglected could enjoy. It was a free lunch counter, the first and last free

lunch counter at which I have been served turkey sandwiches and champagne. I saw gambling in the west from hotel hallways, from main street thoroughfares, alongside walks, on several floors including subcellars and in ships but not being a noticeable supporter, that was the only time I was fed expensive such things. I did not believe in gambling; when I did gamble I was a piker, only did it for the experience and won more than I lost.

Our next stop was at the "Silver Dollar". There you walked on slippery cold cash. Silver dollars had been inlaid where there would have been corners of flagging, maybe two thousand dollars. Customers had worn down most of the floor blocks and dollars with their shoe leather between the door, the bar and the toilet, but near the walls, dollars still looked like dollars. While looking over the low down dollars, Billy informed me that a city election was coming up which meant he should have a talk with some people on Market Street, who could bring the desired votes to the polls. I felt sympathetic as I had sat on a stool on North High Street near the University to check up on these who came to do their voting duty by the republicans. For Billy's interviews, we visited the north side of Market Street where stalls for vendors were continuous through a block. Box stalls, each containing a rocking chair, a straight chair, a small stove, a bed and washstand equipped with a water pitcher and other accessories. They were not in the class where water was piped for convenience. The rocking chair was next to a large front window. The window and a door took all of the front. On the glass in the door was a name, such as, Belle, Kate, Maggie, etc. Maggie sat in the rocker by the window where she could be looked over and judged from the sidewalk. She wore lowly cut short dresses disclosing plump places, preferably legs and bare upper parts. They were pre-modern in their use of short dresses, decorative stockings,

lipstick, paint and cigarettes. At that time the use of such things and exposures indicated that the user was for rent for a little while or longer. In ~~the~~ three box stalls, called "cribs", the basic standard price was one dollar. Competition may have produced cut rates during slack seasons. Sometimes female tourists and possibly local dames invaded that street on sight seeing trips. Then the vendors would open their doors and scream at the visitors, accusing them of engaging in infair competition. Many of the words they used are not approved by the post office or for radio, near the microphone.

We stopped in two stalls. Billy wanted to stop in another crib but the window shade was down which indicated the occupant was profitably occupied. At the cribs we visited the curtains were not lowered. The occupants wanted others to see Billy who was an important person in the city government that protected them, more or less, in a reservation away from the residentisl districts. My importance was almost zero, at best not worth a dollar. I was only a sightseeing somebody or other that came with Billy. They did not give me more than a passing glance with possibly a hope that I would come back as a customer. Billy bought beer. He told Millie, if that was the name on the door, he wanted beer. Millie stuck her head out of the door and gave an or er. Enough bottled beer for three glasses arrived quickly, for which somebody received two bits - twenty-five cents. Across the street was a saloon and large buildings of the residential type. The street was a market in which distance from freshness, style, shape, and price were outstanding features.

Billy managed to discuss the political situation with Millie and Bertha. They seemed to be block leaders, lieutenants or something, maybe district captains. My knowledge of Denver politics was too limited for me to judge what bearing the talk had on the welfare of

the city or Billy's or of this leader of a political circle that might include only Greg contemporaries on the north side of Market or might include out-of-town customers who could come in from several towns and vote on election day if Market Street would be hospitable.

Billy Green had shown me mile-high Denver's version of a high altitude market which had ascended from prehistoric supplies, demands and markets. But with wireless, the questions were if and where wireless could find a market now. Demonstrations of wireless had been repeated in many places. What wireless needed was to render public services.

Mr. New skittered around like a drop of water on a hot stove and frequently tried to have tomorrow's job done yesterday. He was peeved at Big Steve because I had been delayed in Chicago and Because Mr. Stevenson was not available for a conference at, or soon after, the moment I arrived. When Stevenson did show up he caused me to think of mass times velocity squared and the saying that large bodies move slowly. When sitting on an ordinary chair his very fat seat overflowed the chair seat with a lot of expensively tailored high plaid cloth. He smoked cigarettes continuously, had a tendency to doze at times but when he woke up he made sharp definite remarks. That was the only conference at which Steevenson, New, Bailey, Hale and I were present. I do not recall seeing Stevenson again. Saw Bailey once a week for six months and at other times, saw New frequently and saw Hale in church more than a year later.

At our first conference we took up the matter of obtaining wireless instruments. The officers had thought we were to get our instruments from the parent company. The AWT&T had furnished a small portable transmitter and a coherer receiver. I told them the American

W.T.& T. Co. could not be expected to supply apparatus suitable for our stations without many exchanges of letters and other delays. We could build the instruments in Denver and get away from the impractical storage batteries, induction coil vibrator and coherer receiver used by the AWT&T. Gehring et al would probably argue against any change we wanted and would use delays as a means for getting more money out of the Pacific and Continental W. T. & T. Co. They seemed to think I might be right and agreed that the work should be done in Denver if I could find a shop where such work could be done at reasonable cost.

Next we took up the matter of where the wireless stations were to be located. The popular idea seemed to be that one station should be located in Denver and the other in Golden, about twelve miles away. I disagreed with the idea. My argument was that stations should be located where there was a market for them, where they could give service and get paid for it. The AWT&T stations were, from my point of view, of not much more practical use than the academic stations.I used at Ohio State and that stations at Denver and Golden could not get profitable business in competition with the ample wire communication facilities between those points. Wireless should be installed where there was a demand for communication or quick communication but no facilities. Some mines that were isolated in the winter were suggested but they obviously would not pay enough to support such service. I believe F.W. Armstrong Avalon had suggested Avalon, Catalina Island, California as the place where some kind of communication was needed with the mainlaid. Avalon had an occasional boat and had tried to use carrier pigeons.

General Hale seldom said anything during the conference. He seemed to agree with me on the two points of local manufacture and

sites with a market. Stevenson seemed to favor stations at Denver and Golden. Bailey tagged along after Stevenson. New talked on both sides. Where we would locate stations was laid over for a future meeting. Unless some more serviceable location for public service wireless showed up, I was for the Avalon to mainland circuit. New was not exactly in favor of the California sites but he was in favor of almost any sites that would take us away from the vicinity of Stevenson and Bailey. We did not have another conference at which we were all present but the apparatus was built and assembled in Denver and the stations were built on Catalina and the mainland of California.

The idea for wireless between such telegraphically and telephonically connected points as Denver and Golden was persistent. I suspected the bottom of that idea was a desire to sell stock whether wireless was or was not useful. However, in the next year the Fessenden-Given-Walker crowd tried it between cities in the eastern U.S. They apparently were not selling stock. Those who tried to establish overland wireless were accused of doing it to sell stock. Some of the promotors seemed to believe such wireless could be a paying public service in a short time. Because wire lines existed was a reason why many thought wireless between any two points would pay. The fact was that very many wire telegraph stations did not pay but those stations were established parts on extensive systems that needed such outlets and pickUup points.

Sir William Crooks was probably the first reasonably accurate wireless prophet. Crooks was his name and Sir was his title. Before wireless approached his expectations, a lot of people with various names had a hand in it who should have had the title of crooks.

Some large communities kept their red lights under a bushel

basket. Just because the market for scarlet women was prominent scenery and services in Denver was not an indication of a bull market for wireless communications in the North American areas assigned to the Pacific and Continental. The Pacific WT&T Co. was allotted Colorado, Utah, Nevada, California, New Mexico and Arizona. The Continental embodied, on prospectus paper, North and South Dakota, Wyoming, Montana, Idaho, Oregon, Washington and Alaska. But despite that immodest assumption of spaces and people, nobody seemed to know of a surety of a market for wireless that would pay enough and promptly. In time I found they were repeating the old practice of operating on a shoestring. Pun gossip said New was looking for new projects and had discovered this wireless one. New was the active officer of the P&CWT&T Co. Bailey, a large but not fat man, quiet and agreeable, had a good job as U.S. Marshal. Stories indicated that Stevenson was a successful lawyer, political boss and promotor.

Wireless development included quite an assortment of four flushers. Then and for years they played up various lines of endeavor singly or in combinations. Church deacons, ex-military officers, high pressure sellers, inventors, scientists and professors. While New could hardly put on any dog along ~~some~~ And lines, yet he did produce a lot of atmosphere. When one entered his house the visitors were confronted by the big toothy mouth of a polar bear, just another hide with a toothy skull. Tamen and Bunfils had such things in stock New tried to display evidence of wealth or some kind of superiority. Also he sermonized frequently on his favorite text which was, "Nothing succeeds like success". While that old saying might be used as a text for very different sermons, his talk seemed to mean that all should act like they were super-successful. My landlady was an animated gossip and I gathered from her that New's efforts to magnify the importance of his projects

not alcohol, Acne Rosacea made the red nose.

and of himself were a source of amusement to many Denverites. ~~He~~ New was one of quite a variety of "show-off" wireless promotors. New was generous with friendly gestures, showmanship and propaganda. He gave me pass number B54 of the Trans-Alaskan Railway for 1902 with his Happy New Year card which read: Albert L. New, 1st Vice President, Trans-Alaskan Railway. The pass was attractively printed. With it a printed memorandum said they did not have a railroad but expected to have their own steamship line to Alaska in the spring. So far as I know it was only one of those visions of what might, could, or should be in Alaska. Despite all that has been said against the variegated wireless promotors, wireless did not develop without them.

Bailey and Armstrong were large well proportioned easy-going men. Armstrong wore a handle bar mustache. He was very easy going. However, on one occasion he probably would have killed me if I had not been fast on my feet. Armstrong was nearly always in the offices acting as an assistant secretary and manager. He and I occupied the innermost office where he had a desk and I had some instruments and a drafting board to use when I was not at the shop. A chap from some other office came in very frequently and panhandled the use of the phone on Armstrong's desk. Armstrong asked me if I could shock the chap so he would be afraid of the phone. I connected a small induction coil to a metal part of the phone that he touched and the other high voltage electrode to a piece of copper under the rug where his feet would be. When the telephone parasite tried to put in his next call Armstrong pressed a key located for the purpose under some papers in his desk. There was a jump and a howl from the parasite. Armstrong told him the telephone acted sometimes like the line had touched a high voltage circuit. Armstrong beamed when that shock rid him of

the nuisance but Armstrong received a similar shock a few days later and looked for me with murder in his countenance. I had used remote control from an outside location where I could watch through the door. Armstrong roared and lunged in my direction. I maneuvered to get a large oak director's table between us and sprinted into the hall. By the time he reached the hall door I was in sight but not catchable.

Others had seen that monkey-business and their amusement helped to take the edge off his anger at getting the same dose he had wished on another. Armstrong was a very easy going, handsome, likeable, six-footer with a handle bar mustache recently from Wyoming cow country but born and raised near the Atlantic coast. His father, a gentle, cultured, modenst, apparently well-to-do little old fellow, came to visit him while I was there. Armstrong never mentioned my meanness and I doubt if he tried to take any revenge but one, which was mild. Soon after I arrived in Denver, New had reporters in who asked me questions. The result was that the P&CWT&T Co. and I received noticeable publicity. I don't remember whether it was Patterson's Rocky Mountain News or Tamen & Bonfils Denver Post that called me a "Wireless Wizard" in headlines but someone did. The academic training I was fresh from taught that new developments were achieved by following the laws of nature, not by wizardry. I told Armstrong I did not like the wizard stuff. The comic opera, "Wizard of Oz" was the only wizard I liked. After I so shockingly upset his dignity, all of his notes and letters to me began "Dear Wiz".

The Armstrong, Bailey, Stevenson and New considered here were not people with any noticeable scientific or mechanical schooling or experience, which probably should be mentioned because in later years the s have been prominent radio engineers by the name of Armstrong,

Bailey and Stevenson and a wireless service salesman by the name of Armstrong who persuaded steamship presidents to give wireless a chance.

Mr. Dorman was the P&CWT&T Co. publicity agent. New and Armstrong also tried to get additional publicity. One of those who frequently came around for a story was Walter Juan ~~Davis~~ Davis, a popular reporter, leisurely, friendly, a convivial chap, quite an elbow bender who recited funny poems and rhymes. He was credited with having written some of the poetry. One string of jingles was to be learned by any person who desired to know when he or she was intoxicated. Each verse defined a symptom. I am sorry I do not remember the verses. I really should have memorized them. The decision at the tail end of each symptomatic verse was "You're drunk", By God youre drunk"

We had a portable transmitter and a coherer receiver in the offices. Armstrong or New or his son, Fred, could use them to demonstrate over short distances in the offices and hallways. I was asked to give talks sometimes, for example, to Mrs. Bailey's club, to a meeting in Pueblo and at the University of Colorado in Boulder.

To start production in Denver there were some experiments and designs to be made and a shop to be located. Carstarphen and Wallace had a little electric shop at 313 16th Street, opposite the front of the courthouse. I gave that shop a sketch of an experimental device which Carstarphen made for me on a lathe while I watched and asked questions. As a result, Carstarphen obtained a new partner who bought out Wallace. Carstarphen and his new associate moved to larger store and shop quarters on Court Street, opposite a side of the courthouse. The name of the new refinanced firm was The Carstarphen Electric Company. We had made a deal with them for time and material while

manufacturing part of the equipment for two wireless stations and for some experimental devices I wanted to try out before giving them final plans of what we wanted for the stations. The special equipment was made in their shop almost entirely by their employees. I made a few experimental parts and designed the others. In addition to getting equipment for wireless stations, we caused the formation of the new electric shop called Carstarphen Electric Co. which went into operation for us on October 30, 1901.

Dynamos, motors and meters were purchased from G.E. because they were good and Gen. Hale was our consulting engineer. Belden of Chicago was our source for fine wire. Many of the special materials and devices and chemicals were purchased from the Denver Fire Clay Co. Professor Sabin at Harvard, Ohio State experience and Queen & Co. had given me information about the making of induction coils. The Sabines, Hamiltons and Marriotts owned much of the section where Sabin and I were born. Sabin graduated from Ohio State at about the age I graduated from high school. I visited him in 1900 and spent some time in the subcellar laboratory where the only audible sounds were those produced there. a lot of present around perfuing probably came from him

Fifty a week was good pay in 1901. I arrived at Denver in October 1901 and sent my girl in Wellsville, Ohio a one hundred and fifty dollar diamond engagement ring in a box of roses for Christmas. She took out the almost perfectly wilted roses and was about to throw the rest away when her sister who had not gone beyond high school mathematics said "Here! That box was insured for $150.00." and she began going over the parts of the problem that had been discarded by my girl who had majored in Mathematics under our head professor, ~~McCord~~ Bohanan, at Ohio State. The method of delivery, my assumptions and my girl's assumptions were not flawless and neither was the stone which was blue white,

nearly a carat, would be listed as flawless now and would cost much more now.

Carstarphen was a bald and tall electrician-mechanic while his associate in the newly formed company was a short and bald bookkeeper who had recently married a widow with presumably the funds to buy out Mr. Wallace. Honeymoon and wireless were makings of the Carstarphen Electric Co. I suspect Carstarphen seemingly always had big ideas and not quite enough money. I believe he had worked out practical solutions for a number of electrical predicaments all the way from his home state of Kentucky to Denver. He was praiseworthy but netted more praise than cash. When he did get cash he tried to expand too much. A larger place at Colfax and Broadway was, I believe, his last stop, about ten years later. He did not spend much on himself - a twenty-five cent lunch with beer seemed to be his only personal pampering. He had a patent on a cigar lighter that he tried to perfect and market. His wife spent much of her time buzzing about women's clubs. They had no children, his old father hobbled in to see him two or three times each week.

Maybe somebody did not like Carstarphen but if so, I never heard about it during the six years that I was in fairly close touch with him. To attract trade and capital he talked about his accomplishments. I believe one of his most outstanding jobs had been accomplished by underbidding for a large incandescent lighting contract. He was able to use pressed-in iron wire as a substitute for platinum wire in glass which was patented, later. He was very cooperative, then and in subsequent developments.

For indicating devices to be used in developing a detector, my first move in Denver was to order some Stromberg watchcase telephone

receivers and rewind them with number forty wire, the smallest available wire. At that time the only users of headphones were the "hello" girls. A girl wore one on a headband and kept the other ear open to the bosses and "hello" sisters. The cases of these phones were of nichel plated brass and looked much like a large silver watch-case. I chose Stromberg's because of their overall qualities and because the distance between the diaphragm and magnet could be adjusted in their watchcase phones. The currents available from microphonic wireless detectors were so small that smaller wire and smaller distance between the poles and diaphragm were needed than for the ordinary wire line phones used for talking. I designed a headband to clamp a phone to each ear, to get more of weak signals and to keep out sounds made by bosses, women and others who were nuisances when a weak signal was coming in.

Those were probably the first of the double headphones for wireless to be used. Hughes and others apparently had not used dual telephone receivers that fit on the head. With them I found it possible to use several kinds of microphonic contacts for better results than I had attained with coherers. Two phones that stuck to your ears, finer windings and finer adjustments of the magnets produced far better results than were obtainable by using the ordinary telephone receivers. Also I provided concrete piers in sound proof booths for the receivers at ~~subsequent~~ three stations.

To develop and put to use that detector, it was necessary to overcome opposition, prejudice, jealousy and cussedness. The Marconi and American wireless companies used the coherer and bragged about it. None of the officers or others I needed to convince except Gen. Hale, were technically educated. I gave them some object lessons. Mile high and dry Denver was a good place for sole-made static. Dry-soled babies

taking their primary steps frequently produced high voltages. Soleful discharges were very noticeable in the winter. By scuffing your feet you would build up an electric potential which was so different from that of a nearby male, female, doorknob, radiator or something that you would discharge electricity like the plates of a condenser or of an antenna and ground. You would give and take electricity and produce electromagnetic waves, a la Hertz. When such sparking occurred, if a wireless receiver of the coherer type was nearby, it would produce a dot or more than one dot or maybe a dash on the tape. The coherer was not sure about anything. If you sparked a female that might squeal, a male that might poke you in the nose or an equally large conductor or a little conductor connected to the earth, the coherer would act with as much unbiased inaccuracy as it might act for lightning, trolley sparks, doorbells, spark plugs, stroking a cat and wireless signals.

With more sensitive telephone receiver arrangement and any one of several microphonic detectors I could note differences in the sounds caused by disturbances and telegraph signals and when operators learned to read short and long buzzing sounds as well as the clicks produced by a sounder. They read messages through interference better than could be done with a coherer receiver.

I tried many contacts that gave detector effects somewhat like the microphonic contact of a steel needle and carbon. Steel and aluminum, mercury and aluminum, corroded copper and nickel, and I tried combinations that did not work. The steel and iron oxide combination I chose as the most satisfactory detector resulted from reading about an anti-coherer scheme that Edouard Branley had used. I used it in another way because I wanted to add discrimination to detection.

The coherers used by the American and Marconi companies were known an Branley coherers. Around 1900 Branley had given out publicity about

another device that was intended to pass battery current operating a relay (stopping a tape recorder) when the receivers were not exposed to such electric disturbances as were produced by the Hertz type of wireless signals. That device was called an anti-coherer because its action was the reverse of the coherer action. However, it was to be used with a tape recorder or sounder which meant it would not separate signals from disturbances much better than the arrangement which Popoff had designed to record static and Marconi had appropriated for wireless telegraph. If that was sufficiently self-restoring to operate headphones and let ears and brains discriminate between message disturbances and those produced by other sources, it should be a great improvement. Branley made a sort of Lilliputian three-legged stool as one part of the anti-coherer. The three-legged steel stool rested on an oxidized iron plate.

Starting with what was published about Branley's anti-coherer I tried numerous steel and oxidized iron contacts, as so-called microphones to operate my headphones. For this detector type of reception I found it necessary to select the steel and iron, oxidize the iron carefully, protect the points of contact, avoid vibrations and use a fine screw adjustment to regulate the pressure at the one point of contact which gave best results. For my purpose, I could not use more than one contact at a time. Branley's three-legged contactor idea reminded me of the spherometer I had used to measure the curvature of lenses at OSU. In that device a tripod supported a centrally located fine machine screw arrangement with a large dial head for fine adjustment. The screw was of steel and had a slightly rounded but small point and I bought some for my detector. I did not get as fine adjustment with screws made at Carstarphen's. I had the the three legs of the spherometers threaded and used them to bolt

the device in the top of the detector box that housed the oxidized iron and other parts of the receiver circuit. The most satisfactory oxidized iron was obtained by burning the tin off a can. A small amount of oil on the oxidized iron surface protected it and the the steel point. That device proved to be more reliable than the other microphones. Steel and carbon were sometimes more sensitive and frequently produced louder results but did not hold adjustment like steel and oxidized iron. Years later the device had a bearing on several patents, partly because the oxidized iron arrangement I used could be revolved and moved sidewise so any part could be contacted by the point.

usually in bed before breakfast,

Planning was done in my room, at the office and in the shop. Experimental work at the offices and in the shop. Manufacturing was done in the shop. Our work added to other business was too much for the space and equipment of the Carstarphen and Wallace shop so the new Carstarphen Electric Co. occupied a space maybe a hundred feet long and thirty-five feet wide except at the front where it was narrowed to provide a stairway to rooms above. In front was the small retail electrical salesroom and office. Back of that was the shop. The vice president and a contract man were in the front office section. The contract man was a leg man who dug up jobs, chiefly wiring jobs. The V-P managed the books. Carstarphen, the President, had a drafting table type of desk just inside the shop door. Any one of the three of them, as available, would sell light bulbs, doorbells, wire, flashlights, etc. in the store and Carstarphen would take an order for special equipment and the more expensive services.

only

An Edison type of motor such as now exist in museums or old electrical laboratories of colleges, drove the main power shaft in the shop. It had the two characteristic Edison field windings that

stuck up conspicuously, was amazingly durable and probably was a pet motor that Carstarphen had acquired in Kentucky. Most of the machines were driven from the main shaft directly or through countershafts.

Our winding machine was driven by a small modern type, round frame, multi-poled motor. Similar rheostat controlled small motors and several sizes of belt wheels were available for connecting up a variety of arrangements. 110 and 220 and 500 volt D.C. power connection points were provided. A.C. was also available. They repaired devices that operated on various voltages. Frequencies varied around 30, 60 and 120 ~. Denver & Boulder used different frequencies.

I did not know how to avoid all of the defects with the wireless I had seen. However, I eliminated some. I designed a rotating motor driven interrupter, adjustable up to about 200 breaks per second. I avoided storage batteries by using a one and a half kilowatt dynamo for wireless and lights, driven by a gasoline engine. I designed a special high voltage switch for connecting and disconnecting the high voltage spark gap by remote control. It was a failure three ways - the solenoid that pulled the switch was too weak, the catch with magnetic release was unreliable and the slate used for insulation would not act as a good insulator. Also I made and had made microphonic detectors for use with headphones. Otherwise the equipment was very much like what the American WT&T Co. and Marconi Co. were using except in some minor matters such as finishes and shapes.

Two coherer receivers complete with polarized relays, ordinary relays, decoherers and tape recorders were made because if the stations did not work, somebody would surely say it was because the coherer receivers had not been included in the equipment. The stations did work using the microphonic detectors and headphones.

The coherer receivers were not used. All of the equipment was assembled at the Carstarphen Electric Co. except the Union Gasoline engines which were shipped from San Francisco. Two or more of each of the devices and spares were included, half was shipped to Avalon and half to San Pedro.

Our equipment for the two stations was about complete by March 1902 but there still was some argument between New and Stevenson as to whether the stations would be put up at Denver and Golden or at CAtalina Island and on the California mainland.

A peculiar rock formation with a flat top by Golden hid Golden from the eyes of Denverites and Denver from Goldenites. Otherwise they could have gazed on each other through the frequently clear Colorado air. The clear air deceived many. A boy from Indiana roomed where I did. The morning after he arrived in Denver he got up early and saw that curious rock formation at Golden and started out to walk to it and back before breakfast. The distance was twelve miles.

The rock formation by Golden was conspicuous and its picture was the Coors beer sign but a wireless station on it would not be of value according to my experience. I did not mince many words in telling New what I thought about selecting sites for those two wireless stations. Several men were probably selling stock around Denver and they with equal probability wanted stations where they could show them to prospects and New undoubtedly wanted them to sell stock. But New wanted to get as far away from Stevenson as he could. We decided to go to California.

A. L. New was going to California and would take his son, Fred, but neither knew about the technical part of wireless. New was strong enough for walking and the persuasive talking which was his specialty.

Fred was a play-loving strong boy who did not use up his time and strength at work for the love of the work.

There were two stations to be built at the same time, separated by water navigated by infrequent, not fast and not overly reliable boats. It was evident that I would need help. By talking to him several times I persuaded Gustave T. Swensen to go with me as my assistant. He had watched the making of our equipment and had worked on parts, both as a mechanic and as an electrician. He was a serious minded young man who got along without liquor, tobacco, women, bad words, gambling, bragging, showing off and much talk. I would not have to tell him every detail about installing the apparatus and he could make some things we might need without mechanical conveniences or power tools.

I left the AWT&T Co. in Philadelphia on October 3, 1901. On April 15, 1902 Swensen and I left for Los Angeles via the Royal Gorge, Salt Lake, Ogden and Oakland. The quick drop from monotonous snow to the green and warmth of California is my outstanding recollection of that trip. In Los Angeles we registered at the Hollenbeck Hotel. My instructions were to go to the office of Banning Bros. because they owned Catalina Island and would provide all our accommodations from San Pedro to the Island and on the Island. After registering we went out to a cab and I told the driver to take us to Banning Bros. He drove to the corner, crossed the street and drove back to Banning Bros. whose ground floor office, with a large sign, were across the street from the Hollenbeck Hotel. Swensen never took a drink and I hadn't taken one after leaving Denver. I have found that cab fares were included in our expense account for that date. Whether or not that cab fare was included is not indicated in my notebooks.

Wireless people like to brag about being the first to do this or that. Sometimes it has been because they were a source of supply when the market first existed. At least one principle seems to be in several lines of endeavor. A fellow Ohio State alumnus of mine, a year ahead of me, says he is number one pioneer salesman of electric signs to the kind of sporting houses on Market Street in Denver. He doesn't claim that Ohio State trained him for that distinction and he did not solicit that distinction. The Madam of one of the 3, 5 and ten or maybe 5, 15 and 25, houses on the south side of Market Street did the soliciting. She called up the Denver Gas and Electric Co. on a hot day and asked for more illumination that would cause more men to concentrate on her place. They dispatched K to contact her. She received my Bachelor of Arts friend (K) informally and contracted for a sign without argument or clothes. When my friend graduated in 1900, he thought he was going to die and went to Colorado for tuberculosis. He signed up that first-of-its-kind contract in about 1901. He did not die - far from it. About thirty-five years later he told me that story when we were neighbors in Brooklyn. We were playing bridge and I had probably said I was the first to have done something in radio.

CHAPTER VI

AVALON NEEDED IT

The equipment we had made was simple, static was weaker on the pacific coast and Banning Brothers really wanted wireless service for their island. In winter only two or three hundred people remained on Catalina Island but boats from the mainland were infrequent for emergencies. In summer the boats were more frequent but there were thousands of transients with unexpected and more needs for quick messages. That turned out to be the first place in the U. S. where customers would continue to pay enough for wireless service to keep two wireless stations going. Two wireless stations for that service were kept going for twenty-one years. Changing them from wireless telegraph to wireless telephone stations killed them. What some of the week-end folks said was not proper for amateurs to overhear. Many overheard. I was able to tune them in over 1,000 miles away.

Bannings gave us passes on their boats of the Wilmington Transportation Company, put us up at their Metropole hotel at Avalon, helped us to obtain labor and material at the rates they paid and supplied the site for the Avalon station. The island-to-shore boats did not have many private rooms but when I wanted to try receiving on a boat they let me have a room. While all Californians acted like they were born with advertisements in their systems, the Bannings did not seem to seek the limelight personally, but they plugged their business projects at every opportunity.

Shortly after arriving in my room at the Metropole in Avalon I shaved and for years later when I shaved I remembered that shave. Looking at myself in the Metropole mirror, I felt a great sense of personal responsibility for the building of these stations and making

them work and a fear that we might fail. Actually my shaving on that occasion amounted to very little. It was a matter of trimming and shaving a little to improve a scanty vandyke beard that might help me to look professional enough and old enough to be Chief Engineer of such a high sounding project. Possibly that look gave me fright that I never recovered from. Those whiskers were red brown next to my nose and dark pink over my necktie. Visualizing my responsibility and what I saw in the looking-glass, put a durable dent in my memory machine. The memory was terribly enduring. The whiskers did not last a year. The girl I married about seven months later did not like whiskers. The mustache lingered after marriage but not for long. My wife does not claim credit for the lack of hair on the top of my head. It got barer and barer possibly because my skull became denser.

Because that locality was a more obvious market for wireless than other places was what brought us there and it differed in other ways from places we knew. I had seen several mountains but I had never seen what looked like the top of a mountain sticking up above the surface of an ocean. That is what Catalina looked like. Flying fish, tuna, abalone and glass bottom boats were new to me. Ripe olives and the sandab were a surprise, all the more surprising because they were served at breakfast and were so good. Most of Catalina went more or less straight up from the water's edge. The town of Avalon was squeezed in the largest flatland in a valley a few feet above high tide. San Pedro or Wilmington docks were the nearest coastal points at which a steamer from Avalon could dock. However they were not the nearest points to Avalon and hills intervened and station space was hard to get. Around the coast from San Pedro and toward Avalon was White's Point, the nearest point to Catalina and only twenty-five and one half miles from Avalon. The coastline rose abruptly to various

fairly level and more rolling surfaces. Japanese abalone fishermen worked the water in that locality. Rattlesnakes and skunks were prominent on the level and rolling land. Vertical rock formations rising from the ocean were common. There was a cliff on Catalina that another chap and I frequently climbed. One of us climbed while the other watched in a rowboat about fifty feet from where one would hit the water he if lost his hold or balance or jumped from the face of the vertical rocks. If one fell from a point not far above the water he had to make a feet first dive. Farther up he turned over while falling to make a head first dive. We were surprised at what we could climb and cling to. We knew from experience how to turn quickly in the air and avoid painful whacks on water. Occasionally we jumped, but never fell unintentionally. Maybe doing that made me too cocky. In a few weeks I bumped and cut myself for about fifty feet down a not-so-steep rocky formation when a wire I was taking down a cliff broke. I had to climb back up, splice the wire and redescend. The caution used on the second descent kept me from losing any more hide and clothing. Very disgusting - the little kid who had helped install pitch for tracks hay in Ohio barns where all the hold he needed was a finger or two, had ripped his shoes and clothes and had been sand-papered for fifty feet down a crevice in a cliff - I was it, from cured carelessness.

Because White's Point was nearer to Avalon than any other available space on the mainland, it was chosen as the site for the mainland station. A site on Catalina two hundred and seventy feet above sea level on the stage road just above Avalon and facing White's Point was selected for the Avalon station. Buildings, hills, the curve of the earth and other possible obstructions were avoided. With a telescope or very good eyes you could see White's Point from the Avalon site when the weather was as advertised by California Chambers of

Commerce. According to the statements of the southern Californian promotors, you were sure to be comfortable. If you wore underclothes you would not have to discard them because you would never get too hot. If you were not wearing underwear, you would not have to put-em on because you never would be too cold. If any wireless promotor was less dishonest he is in heaven now.

The Mexican who owned White's Point had tried to start a real estate boom there, unsuccessfully. A considerable area was staked out for lots and streets. A dance pavilion had been built about fifty feet from the tip of the point. A four-room cottage with a roof, a floor and walls without lath and plaster or place for anything but a cookstove was the only other structure. Except for a privy half way between station and cottage. Back of the cottage was a small patch of corn. A. L. New made some kind of a deal with the Mexican whereby we took possession of the cottage, walled up the sides of the dance pavilion for the station house, erected a mast and installed our apparatus. New said the Mexican was going to give a lot to each of us - New, Swenson and me. I saw all of the lots but never saw a deed to one.

One evening I wandered over most of the White's Point vicinity where lot stakes were occasionally noticeable. At one place some skunks led the way. I shot at them five times with a revolver. They stopped, looked me over and continued leisuraly on their way. They did not waste any ammunition on me. It was not a smelly place except from dead fish on the beach and our outdoor toilets, at times. The rattlesnakes did not bite me but the fleas did. When we moved into the cottage a grey hound moved in with us and slept on the foot of my cot, sharing his fleas with me. We had a jap cook who was a stranger to English and those parts. Once when he should have called us for

supper, we found him outside the kitchen door poking a piece of cornstalk at an indignant rattlesnake. The Jap seemed to think it was a nice playmate.

There was a so-called road from San Pedro to White's Point, part of which was only a couple of ruts through fox-tail grass. Even Chambers of Commerce don't claim that California is sunny at night. One night I went from San Pedro to that camp when the fog was so thick that I navigated by the sound of a foghorn below the cliffs and the feel of the ruts. I lost the ruts but steered accurately enough to walk into the cornstalks back of the cottage. All I had to do then was keep in touch with the corn until I hit the cabin.

Promotion publicity retarded and promoted wireless developments. In the construction of these stations and in the proving that they were serviceable, I was helped and hindered by promotion publicity. Annoying, helpful, exasperating, amusing, necessary, criminal, ethical, bad and good were part of the effects of promotors stories and statements. Those of us who made and operated coherers knew their limitations and how unsuitable they were for telegraph service, but the stories put out by the Marconi Companies and the American W.T.&.T.Co. featured the coherer. During December 1901 Marconi claimed he had received across the Atlantic and the supposition by the inexperienced was that he had used the coherer.

The story was that Marconi had received three dots on December 12, 1901 at St. Johns, Newfoundland from Poldlin station, Cornwall - a distance of 1800 miles. Those with coherer experience knew that he might have received three dots in thousands of places without the help of a wireless transmitter. The effect of static and similar electromagnetic disturbances produced numerous dot combinations. I had

spent many hours checking such recordings. Hundreds of the three dot groups recorded by coherer receivers came from nature's wireless transmitters that produce electromagnetic disturbances. When something unloads the static charge it has accumulated onto something else, say one cloud to another or to earth, they to some extent exchange electrical wallops, like those of the early wireless transmitters that featured the sparkings between brass balls. Brass balls were outstanding in wireless when wireless slid from the 19th to the 20th century. Extolling the virtues of size or quantity of brass balls was a feature of wireless development at that time.

Years later it was admitted that Marconi had not succeeded in receiving signals across the ocean with his coherer type of receiver. Marconi had an assistant in his attempts to receive at St. Johns. They gave up the coherer attempts and tried a microphone contact between carbon and mercury with a heavily wound single ~~long~~ hand type of telephone receiver. They had only the one telephone receiver. After passing phone back and forth to take turns at listening, they decided it was ~~Poldlin~~ and not static they heard because it sounded like the ~~Poldlin~~ spark. Insofar as I have found out, Marconi and his assistant, did not know the experimental microphone and telephone had been included with their gear and when they found it they tried it because there was no other straw to try.

But at the time I was trying to provide wireless service between Catalina and the mainland, Promotors like our chief promotor, Mr. New, thought Marconi had received the three dot signal by using a coherer receiver or that the whole story was just another story introduced to sell Marconi stock. I did not expect coherers to work as well as microphones-with-telephone-receivers but I had provided coherer receivers

and microphone receivers and concrete bases for both.

A Marconi Company had tried to operate stations in what were then known as Sandwich Islands (Hawaiian Islands). The stations had failed and Mr. Carrol had reached California looking for a job. New hired him. I think he told New he had coherers that would work satisfactorily. Carrol could send Continental Morse easily and he could send American Morse faster than I could read it. He read tape but I had considerable difficulty in getting him to learn to read the buzzing sounds that wireless messages produced when a detector and telephone receiver were used. Carrol had come from where there was almost no wireless business, few readable messages, Kanaka women, more fruit, more flowers and warmer surroundings, so he said. He was our biggest and strongest man and gladly heaved and lifted our heavy stuff. In every step of wireless development people have had to be converted. He was the only case I encountered where an operator had to be converted from reading short and longer marks on tape to reading short and longer sounds.

In all of the other early cases the operators had used wire telegraph sounders that produced one kind of a click when a dot or dash started and another kind of click when it was finished and they had to be converted to the buzz, buzz where a dot was a short buzz and a dash a longer buzz. All but Carrol were American Morse wire line operators. By the time musical tones or notes replaced the harsh coffee-grinder, rock-crusher and buzzing sounds, there was no need for conversion. When that time was reached, many years later, the available wireless operators as a rule could not read a sounder. To read a tape record of telegraph signals was not difficult. The operator could wait until he was ready to look at the tape and translate it gradually - the marks would not run away - providing the coherer and tapemachine had not recorded too much or too little. With microphonic detectors

and reading by sound, you had to read it as you heard it. False sounds or static might cover up a signal but when they did not you could read the real signals, and you could get signals that the coherer would not record.

The Branley coherer was fairly suitable for Popoff's work of recording static that indicated some weather prospects. If the Hughes microphone had been disclosed before Marconi went in for a receiver like Popoff used, Marconi probably would have used the microphone but he and his promotors tied themselves to the coherer by their publicity. In my personal off-the-records contacts with Marconi, he seemed to prefer plain, simple talk but his promotors (Godfrey Isaacs for example) apparently thought they could jam anything they said down the throats of the world. The Marconi companies insisted on using poorer than other available wireless devices for so long that they built that kind of a reputation. From 1912 to 1915 I found wireless operators were using their own receivers they had made or purchased from stores that supplied amateurs in preference to the receiver supplied in the sets installed by Marconi Companies.

The domineering efforts of the Marconi companies retarded wireless development for at least twenty years. However, we must not lose sight of the fact that the boyish enthusiasm and influencing effort of Marconi was probably the important force that took wireless from the academic side issues or extras of professors to wireless public service. (Altho Marconi did not invent Wireless, the claiming that he did attracted similar promoters and inventors. Some were sane and some were better.)

There were three things necessary to the erecting of those Catalina stations in which I had practically no experience, - installing gasoline engines and cutting a chunk out of the side of the rocky hill above Avalon's sugar loaf rock, to make a flat place for our station house. I designed the two-piece mast and told the men how to raise it

and guy it, based on what I had learned from Bart Pierce. The hill was so steep that the bottom section of the mast was partly raised by dragging the top end up the hillside. Also I sketched the dimensions and special features of the station house. The special features were openings, concrete piers and a sound-proof booth with a special concrete pier that did not touch anything but the rocky hillside on which the station was located. Sound-proof booths were desirable for all sound reception and absence of vibrations was best for most of the detectors. The gas engine and dynamo were on piers not connected with the house.

Banning Brothers' Chief Engineer superintended the moving of the mast sections up and around the hairpin turns of the zigzag stage road; the erection of the mast and dynamiting the chunk out of the hill. A broom stick was used to tamp dirt on dynamite in the holes drilled into the rock. One of the men forgot to take the broom stick out of the last hole he loaded. He remembered after the fuses had been lighted. We were all frightened because the hole was a little cannon. We knew how the hole was slanted and that the broom stick would come down some place near the ocean or in the ocean. Between us and the ocean there were people on a seaside wall and on or around Sugar Loaf rock. In the water there were bathers, small boats, glass-bottom boats and miniature yachts. That broom stick might make a hole in any of them. Some fishermen out there who would like to harpoon a fish might be harpooned from the heavens by the handle of a worn out broom stick. It was a solemn moment. We might be brought up for manslaughter. Several things in my life that have held fire for a year or two do not seem as long as it took that broom stick to show up after the explosion and make a silver streak as it shot down toward the ocean where the little boats were but not into any of the boats. My friend,

the Chief Engineer of Banning Brothers, was fat and probably sweat out the weight of more than one broom stick. I was very frightened for.

I set the dynamos and gasoline engines nicely. The gasoline engine at Avalon would not start. Makers instructions were followed carefully. In those days an electric motor did not start a gasoline engine. To start it you adjusted it, turned it over with a crank and readjusted. I cranked and cranked and sat down to rest, think and talk, repeatedly, obscenely, profanely and scientifically. Down in the Pacific below was an experienced factory trained gasoline engine man from Los Angeles who was trying to persuade a gasoline engine on a small yacht to turn over of its own free will. After a reasonable amount of tickling and not much twisting, admitting my lack of experience with gasoline engines, I consulted with that expert one evening at the Metropole. After hearing my story he said "Yes, but damned if I know why your engine don't work". He then told me a story about an experience he had with one of those engines. He failed repeatedly for ten days. After maybe the thousandth fruitless cranking, he walked away from the engine, getting madder at every step. He saw a Stilsen wrench within reach, grabbed it and threw it at the engine and did not miss. After a cool-off stroll he came back and not knowing what to do, cranked the engine which responded cheerfully with the orthodox and stylish putt-putt of those days.

He sounded truthful and his story checked with others. He put me on the right track. My guess was that his flying wrench had made an adjustment. I went at my engine the next day and tried to make all reasonable combinations of adjustments. After several such treatments the engine ran. After running a while it got too hot. I knew that overheating was my error. In trying to put water pipes where they would look neat, I had not arranged them for best circula-

tion. The engine was coöled by pipes to a barrel of water. My physics training and experience with tools enabled me to correct that mistake quickly.

I traveled back and forth between Avalon, San Pedro and Los Angeles spending most of my time at Avalon. However, I kept my trunk in Swenson's room at the cottage on White's Point. That was the best place because Swenson was there practically all of the time and I had to move around. Among other things that trunk usually contained over two hundred dollars in gold. If Swenson had known the gold or anything else that people would like to steal was there, he would have objected to sleeping in the same room with it. We both knew some who would steal and suspected others. Nobody would suspect Swenson of having valuables. Swenson would not bother other people's property and that the trunk I had bought in 1897 for going to Ohio State University and was so shabby that it did not attract the attention of others. As a rule I did not stay overnight at White's Point but went back to Avalon on the five O'clock boat and because so many people were seasick on that boat, I usually went aft, climbed on top of a pile of lumber and went to sleep. The heaving of the sea or lake and seeing other people heave has always made me feel like I do not like to feel, despite the fact that I never contributed a heave. When I came ashore from several days at sea, I could not walk without staggering about for a number of days. I had been at sea, regardless of what I did or did not eat or drink that might produce staggers. My boyhood training in the plucking of wool from very dead sheep probably prevented me from being healthfully sick when I ate or drank too much and when I was at sea.

At Avalon the station foundation was two hundred and seventy feet above the ocean. I put the stations high enough and where there were no obstructions between but I used high masts to extend the antenna still further above the ocean. Later the White's Point antenna broke

loose and fell so it hung over the cliff. The operator did not know that and kept right on receiving from Avalon. He discovered what had occurred when he tried to send. The antenna lying on the ground short circuited the spark gap so the electricity could flow easily and not go to the trouble of leaping back and forth over a gap to produce wireless waves.

A wireless or radio operator is called "sparks" and spark symbols are used in the ensignia of radio telegraph, radio telephone and radar naval and military services although sparks are no longer a prominent feature in wireless. DeForest was one of wireless' leading sparks so far as women were concerned and so far as 1902 to 1906 wireless was concerned but his causing the introduction of the third electrode in vacuum tubes resulted in wireless without sparks such as we have today.

From my earliest recollection to date, I have thought gambling was something at which I would lose. I gambled then occasionally for entertainment or to be sociable but I carried only the money I was willing to lose for what I might see and hear while gambling. In one case they closed the joint before I lost. Fred New knew many gambling spots. In Los Angeles we went along streets lined with what looked like stores closed for the night. When we opened the door of one and walked in we saw a chinaman reading by candlelight. After some words with Fred's friend, the chink led us to the basement and down again to a sub-basement where another with a yellow complexion and a pigtail was throwing dice on a pool table. We and others put down two bits (25¢) on something and after the dice turned somersaults somebody on our side of the table sometimes received some money. I do not know what spots on the dice won. All I got was a look and a variety of odors.

In San Pedro it was different. The gambling places were not

concealed or at least some were not. After supper at White's Point Fred and I went to gamble at San Pedro. I took some small change and a five dollar gold piece to be lost before I quit. Five dollars was far above small change then. The first place Fred, his friend and I went into was on the main street. It was well lighted. We sat at little tables and bought paddles with numbers on them. After our second purchase I won. After the third purchase we left. At subsequent places we played roulette. About midnight I took us to a restaurant where we ate considerable at my expense, maybe a dollar and a half. Then we gambled until about 2 A.M. when I had lost the last of my five dollars. I spent five dollars for entertainment, food and beers for us but I was told later that Fred had spent about eighty dollars and had overdrawn his checking account. I had fun for several hours, gained some information, lost some sleep, slid some Mexican food and beer into my innards for a gold piece about the size of a cent but which was worth five hundred of them. I was not sporting enough to throw away much cash.

A good lunch with a small bottle of wine cost thirty-five cents; a planked steak, for four, with mushrooms and gravy penned in by a dyke of mashed potatoes with vegatables on the side, preceded by soup and fixings, with a quart of wine and tapered off with dessert and coffee cost a dollar and a half, in Los Angeles. The labor and material for the Avalon station building and mast cost three hundred and sixty-one dollars. We spent thirty-two hundred dollars for the work we had done at the Carstarphen Electric Co. in Denver for both the Avalon and White's Point stations. New fought Bailey and Stevenson with the result that they investigated our expenditures and claimed everything cost too much. Their investigator said I put OK on bills for mercury from the Denver Fire Clay Co. at one dollar per

pound when it only cost eighty cents per pound. I had purchased two five pound jugs for experimenting with detectors, circuit breakers and interrupters. For preliminary experiments I used the purest available materials. The purest available mercury did not cost eighty cents, it was redistilled mercury that cost a dollar a pound. I saw a statement of what New had received as salary, for expenses and as commissions for selling stock, but he probably received more because chaps of ~~that~~ his kind usually sold their own stock.

We had left Denver on April 15, 1902. A piece of hillside had been levelled and was occupied by a carpenter and lumber on May 10, 1902. On May 12 I drove the first spike at 9:30 A.M. The carpenter stood aside while I drove that nail and tourists took turns at spiking together. the foundation frame of our station. A woman pounded the second spike and did not bend it. That carpenter made me a stock salesman, or stock salesman-once-removed. I had the gold and silver in my pockets and wanted to pay him with such but he said no. He wanted me to pay him with stock in the company. Stock was out of my line. I did not have any of the forms used by stock salesmen. New was not on the island and I did not know when he would be. That was on a Saturady afternoon and I expected him to relieve me of a monetary burden, particularly the silver. Silver chafed my legs and stretched my suspenders. Bills were not used. I kept silver in my pants and gold fives, tens and twenties in my coat and vest. He wanted stock, so I kept the money until New came back, when I gave him the money and the carpenter and I told New what the carpenter wanted.

On the next payday the carpenter told me he had received the stock. Later due to the fight between New and the other officers of the company, I was told that New received a salary for being vice-president and general manager and a commission on all stock sold. If he was like some

promotors, he probably sold his own stock to the carpenter. Wireless company officers frequently unloaded some stock they had received for being officers. The carpenter benefited, in some ways, I hope. He said he wanted me to take money then on Saturday because he might not have it next week when New probably would be back. New had a way of disappearing. Maybe that was only part of his shenanigans.

He said he was visiting relatives or friends. Mrs. New was a very quiet, genteel lady and New always took her along. He probably was plugging for money to keep our wireless project going plus his two sons, his wife and himself, and I wouldn't know what else. Because he was not present he frequently missed being in the spotlight at times when we received publicity. He did not know how to build any part of the wireless equipment and was useless around such work but building those stations absorbed money and he went after it elsewhere. Just how he got it or how much of it went for wireless, I never knew and neither did Swenson who associated with him after I did. I have figures on what he received but they might be much too high or low. I do not remember who gave them to me or who was said to have compiled them.

A. L. New's connections were seemingly variegated. He said Indiana Congressman, Harry New, was his brother. He wrote me several times from Indiana. New was always digging up a relative or an old friend of the family and visiting around. I wanted to make some patent applications and he steered me to a Los Angeles lawyer that he described as an old friend of the family. The lawyer was obviously not a patent lawyer but applications were made through him from what I wrote and forwarded to the patent office through Hazard and Harpham, Washington, D. C., Patent Attorneys. The lawyer and his family tried to see that I was entertained when in Los Angeles. There seemed to be a lot of people connected with that family and they were nice to me in several ways, usually food or

food and beer. A daughter of the lawyer invited me to a party that was surprising. In was a knock-out in that the drinks she served were straight whiskies. The party was in his daughter's home and for a young woman who had come back from Chicago to Los Angeles for a visit. The husband of the hostess was not present. They said he was the county sheriff but was out of town to avoid arrest, his arrest. Whiskey straight and an alleged crooked sheriff - I never learned what he had got away with or into, probably a political fight. The other gents seemed to be politicians. They were like a good many westerners - they drank whiskey straight and lots of it. Being a beer drinker, I was at the wrong party and have often wondered about the sheriff.

When attending ~~xxx~~ to patent matters with the Los Angeles lawyer I put up at the Hollenbeck Hotel. During one of my stays at that hotel, the new champion, James J. Jeffries, put up there. One morning he came down in the elevator as I did and he headed for the bar. I followed him. He went to the most inconspicuous part of the bar which was the end farthest away from the door. Maybe he hoped to get a few dog hairs before anybody recognized him. When he anchored his foot on the rail, I was right there and telling him that I had received the result of the Jeffries-Fitzimmons fight by wireless at Avalon before the news reached Avalon any other way. He looked me over three or four times but did not admit he had ever heard of Catalina Island, Avalon, the Pacific WT&T Co. or any other wireless telegraph company. However, he was nice about it and let me buy him a couple of drinks. Ethical drinks of whiskey at that time were as deep as the width of three of the your fingers and for ten cents. I drank a couple of beers. In other words, it cost me or the company I was working for thirty cents to tell him his was the first championship fight reported by wireless. I hope I put it on my expense account.

Professors of the type that colleges would hire in 1900 would not have been suitable for developing wireless service at that time when the money was raised by such promotors as did raise most of the money and under other circumstances of the service development that I bumped into. All of the many promotors in early wireless were not politicians nor were all of the politicians who dabbled in wireless in one way or or the other wireless stock promotors. The 1900 brand of college profs would not have been allergic to everything we encountered. Some were conservative, gentle and even highbrow.

When we first moved into the Metropole at Avalon, New and his wife had a couple of rooms while Fred, Swenson and I had three connecting rooms. When we took possession of the cottage at White's Point, Swenson and Fred moved there, leaving me with three rooms except when Fred came over or New brought a man for something. On one occasion New brought along a man who ran errands for him which probably impressed people with New's importance. New called that chap his man "Friday". I suspect Friday did not receive any pay. He acted like he had plenty of money and had volunteered his services to help along a good cause. Maybe New had sold him stock or was selling him stock at a reduced rate in exchange for his services. I was the only one connected with the company at Avalon a good share of the time and very often was the only young fellow at the Metropole Hotel.

Being the only young fellow there caused me to be invited on short trips to sea by a Jewish family who owned a small yacht. The family included the father and mother and a daughter, about eighteen, who seemed to be frail. An older young lady was their guest. This young lady was very well educated. I presume she had more than one college degree and was four or five years older than I. She probably was the tutor for the girl. Later I believe the daughter became very ill and they used the wireless

to get a doctor from Los Angeles.

The Avalon of 1902 was such that almost everybody went down on the dock to see the evening boat come in. One evening I was idly looking at the incomers when a little old lady and a young woman came along the dock from the gangplank. I was almost certain I had been in a class with that young woman at Ohio State but had not been introduced to her and that her name was Barkus. Her graduating class was a year earlier than mine and she was not a science student and I could not remember what subject we had happened to take at the same time. I did not say anything but watched. She went to the Metropole. Watching until she returned to the lobby, I walked up to her and she recognized me. Even with my added whiskers I still looked like a boy she had seen at Ohio State. Eliza Barkus and her mother were seeing California. They remained at Avalon for a short time and then moved to Long Beach where I saw them again.

On the Sunday following their arrival, we met on the Metropole veranda after breakfast. Eliza wanted to view the ocean from a higher point so she and I walked up the stage road, past the wireless station site from where Avalon, Banning Beach, Moonstone Beach, a lot of rocks, some prairie dogs, boats and much of the Pacific could be seen. We then returned to the hotel by the road and shorter trails that I knew. Miss Barkus met her mother and I went to my room to do some writing. About an hour later I came down to the veranda and seeing signs of excitement near the bathing beach, I walked that way. A girl in a bathing suit came toward me just before I reached the beach. She seemed to stagger which caused me to stop looking toward the beach and pay attention to her. She was Eliza Barkus. I took her arm and helped her up to the hotel. She could hardly talk. Later I learned what had happened. She had gone bathing thinking, of course, that the place was

perfectly safe. It was not safe there because there was a sudden drop to deep water not far out and sometimes there was undertow. Another woman went out beyond the drop off. Eliza whose swimming experience had been in the gymnasium tank at State, tried to save her. The woman pulled Eliza down and climbed on top of her. Some men saw something was wrong and went out in a rowboat and pulled in the woman. As they were rowing away one man saw hair floating up by the boat and he grabbed it and pulled up Miss Barkus. Because I went up to the hotel with her, the story got around that I had saved a life. Eliza saved the woman's life but nearly lost her own. I never saved a life, except possibly my own in some dangerous places where I was cautious.

Miss Barkus was not the only one from Columbus to appear unexpectedly. Just as the Avalon station house was getting its doors and windows, A.W.Kiler walked up to me. Kiler (Doc) was the owner of the drugstore at Eighth Ave. and High Street where I bought stogies and loafed. When we were pepping up football at Ohio State in the fall of 1898, he put up the money to guarantee a special train and I begged the money to take the band to Oberlin, for the game that started State on the up and upper. He had come to California to attend a Shrine convention.

As the fog produced by promotors was clearing, it became apparent that the wireless apparatus we were using was not patented or covered by valid claims of the Marconi, American or any other wireless companies to any great extent, if at all. Fundamentally, everything we used had been appropriated from the professors who had used them singly or collectively for years in connection with their academic pursuits. New was trying to raise money and to get away from the AWT&T Co. and to get away from Stevenson and Bailey and to form another company. I had a more practical receiver and transmitter than the AWT&T Co. had. Also

I had a tuning scheme. We wanted to patent those features, if they were patentable. The detector and induction coil interrupter I used proved to be more practical then. My tuning scheme was not suitable for the longer and longer waves that we used. It would have helped some about thirty-five years later when wireless returned to the very short waves, but of the continuous constant amplitude type. My scheme was based on well known sound wave experiments where the sound was a note of practically constant amplitude. Maxwell had constant amplitude waves in mind and if Hertz had developed them and others had copied him, we might have advanced our wireless condition in some respects about a generation.

Wireless promotors have been classed frequently as crooks, liars, robbers, grafters and under other less than good classifications. I don't know and neither does anybody else know how much the development of wireless service would have been developed if the promotors had not been on the job. The engineers had to buy materials. Operators and engineers had to eat. Promotors dug up money that went to feed the wireless services, the workers and pay for wireless materials. In some of the fly-by-night companies the promotors probably took all. In the companies that actually rendered public service, some promotors may have worked for what they hoped to get when the company paid dividends.

The carpenter who built our Avalon station shocked me when he said he had "A good graft". I had to ask several questions before I learned that "a good graft" was a trade at which one could work profitably whenever one needed some money or felt like working. Whether that was his own definition or a local one, I did not learn. So far as I saw he was a plain spoken, good carpenter and far from what I ~~would think~~ thought was a grafter. Maybe he knew the officers of our company were politicians and promotors and thought I would feel more at home with him if he called himself a grafter.

was the nearest point and located there was a dance pavilion which we made into a station. At Avalon we had to blast off part of the hill and build a station house.

A real, practical and continuous demand existed for telegraphic communication between Avalon, Santa Catalina Island and the mainland of California. The demand for a service that would be more suitable than carrier pigeons and two or three daily boats had existed for some time and the needs for such service were growing. Not only was the demand there but the interfering static was more pacific on that coast than on the Atlantic Coast of the United States, and the distance was short enough for day-and-night, all-the-year wireless service. In addition to those helpful conditions, the wireless apparatus we installed was simple. That apparatus did not contain the erratic coherer or induction coil vibrator and any part or material in it could be bought in the open markets of the United States and repairs could be made by almost any studious electrician. Those are probably the main reasons why wireless became a successful everyday public service between Catalina and the mainland.

Wireless operators did not exist in those days. There were plenty who could receive the signal made by a wire telegraph sounder or read the tape marks as produced with the coherer type of wireless receiver, but they had not learned to recognize the same dots and dashes in the form of short and long buzzes in telephone receivers. The first few messages were sent and received by Mr. Swenson and me although neither of us were operators. To send, we picked the letters out of a printed American Morse code, and to receive we made a mark with a pencil when we

*Some of this was published in Radio Broadcast (Doubleday) Dec 1923 & April 1924

heard a short buzz and other marks or left spaces in proportion to the length of buzzes and spaces and when the sending stopped we compared those marks to a copy of the Morse code and wrote the corresponding letters above the combinations of dots and dashes. Many of the subsequent messages were received in almost that painfully slow way until real operators retrained their minds to give the same translation to buzzes that they had been giving to sounder clicks. After a few operators had set the example, others lost the it-can't-be-done feeling, and learned to receive rapidly.

The transmitter dynamo was driven by a gasoline engine having a spark ignition system and those sparks interfered with receiving. Sometimes the gas engine had to be stopped to receive. Shutting down to receive and starting up the temperamental gas engine to transmit, combined with detector adjusting and undeveloped receiving ability made the early service very slow as compared to a good wire line.

The majority of the public that paid any attention to our efforts during the building and testing of the stations, seemed to be divided in its opinions of wireless experts. They seemed to think the wireless experts were supernatural, crazy, or crooked. These three classes of opinions manifested themselves in ways which were sometimes amusing and sometimes painful to the expert. Where the opinion overrated us, it sometimes caused embarrassment. For example, while we were developing the sound receiving method, a number of sensitive microphones had been made and the Avalon station had been provided with concrete

piers anchored in rock, and a sound proof booth, for delicate microphonic work. Before the station was completed, a visitor asked some question about a carbon-steel microphone that was resting on a piece of paper on a pier and while the microphone was being explained and demonstrated, the visitor wore the telephone receivers attached to it and a fly lit on the paper and walked. The visitor saw and heard the fly light and heard his foot steps in the telephone receiver. The visitor was startled and amazed almost to the point of dragging the microphone off the pier. And I was equally startled and amazed the next day when I read of myself as a scientific wizard of infinite ability occupied on the hill about Avalon with instruments so sensitive that I could hear flies walk in San Pedro. As the distance was twenty five miles, that was an excellent yarn for those days although it could be done with radiophones and receivers of today. An absurdity then absurdly easy now.

At Catalina was a resident who had known and admired my grandfather. He had admired my grandfather so much that he did not want to see the family name dragged in the mire by me. From his remarks, I gathered that he with others were convinced that wireless was all a fake and he was very much afraid that my notably honest and wise grandfather had failed to leave one or both of those notable characteristics to his grandson. He was sincere even to the extent of intimating he would pay my fare out of the country if I was as weak in my finances as I appeared to be weak in honesty or wisdom.

The 1902 Fourth of July fireworks at Avalon were novel in

that they included the burning of a steamship. The old S.S. Hermosa which had served Avalon for years, with transportation and communication, was set on fire and towed around and back and forth in the outer harbor while the band played and rockets ascended from the top of Sugar Loaf Rock, and the wireless station contributed an illuminated star at the top of the wireless mast on the hill above Sugar Loaf. The star was made as big and bright as we could make it by using all the electric power our dynamo would deliver. That noticeable brilliancy on our part had an unexpected effect.

On July ninth I received the first message at Avalon and all it said was "Do you get me". It was answered in the affirmative, but the answer was not received. Mr. Swenson on the mainland had started sending signals to me on June 28th; however, in trying out the various receivers I had not tried to translate what he said, if he did say anything, until I picked the kind of detector that seemed to be the most serviceable. That detector proved to be a contact between a polished steel pip and an oxidized iron plate. The first plate I made in Denver was from a hacksaw blade, but I found I could do better by burning the surface off a piece of tin can using a blowtorch and a little water and then a little oil on the oxidized surface. I used tobacco cans, Prince Albert if I remember rightly. To get fine adjustment I needed a well made steady screw with fine threads and a large dial. The spherometers I had used in college to measure the curvature of lenses were the first thing I thought of, so I went to Los Angeles and bought some and Mr. Swenson made them into detectors that were used for several years.

Adjustments at the two stations followed and the exchanging of test messages began. The statement that test messages were being exchanged brought forth a chorus from "Doubting Thomas". A few days later Jeffries and Fitzsimmons fought in San Francisco and as we wanted early returns and wanted to convince doubters, we arranged to wireless the returns across to Avalon.

The fight returns were laboriously received by me on the hill above Avalon about midnight and written out and taken down to town and posted. Those who were up read the bulletin but did not seem to be inclined to pay any bets on the strength of what it said. However, I was happy because I knew the papers would verify my report next day. The island was owned by the Banning Brothers. One of the brothers was with me in my vigil at the station and bought celebrating drinks. But I had not studied psychology sufficiently for that situation. The verification by the newspapers resulted in a large collection of stories as to how the news had been received, in every way but by wireless. The knocking was epidemic, for nearly everybody broke out with verbal clubs. Carrier pigeons were credited with the feat, a man was said to have been seen bringing me the message in a small boat, good guessing and advance information were discoursed upon and then somebody bobbed up with the story that the ex-Fourth of July star illumination had been used on the mainland station mast and somebody had seen the flashing light. That yarn about the star was damnable. I used all of the plain and fancy epithets learned from the Atlantic to the Pacific.

The gossip and atmosphere of disbelief in the wireless was enough. However it had not stopped at that but was reflected

all of the messages that we said were wireless were wireless. Those who said we sent them some other way called the turn for many future messages. Pioneers of wireless companies told me in later years numerous messages delivered on wireless blanks that came by wire telephone or telegraph, or by cable.

For example, according to the stories I heard, Theodore Roosevelt's message to King Edward VII by wireless from Cape Cod to Poldhu on Jan. 18, 1903 was first sent by cable or the receiving operator at Poldhu had the cable message before him when the wireless message was sent. In that way reasonably prompt delivery of the message was assured. At that time of year the chances are the operator might have been able to figure it out without many repetitions if he had an electrolytic detector or a very sensitive microphonic detector and again he might not. The King received Teddy's message

somewhat in the more durable black and white of the newspapers. Catalina was advertized as a place where one could get scenery, climate, fish, and goats. I enjoyed the scenery, climate, fish, and hospitality of the Banning brothers who owned the Island, but lost my goat to the doubting public and similar newspapers. The Los Angeles Times was one of my goat getters.

The Los Angeles Herald had been friendly and was asked to send men to both stations and exchange messages and tell the public what it found. On August second when the Herald notified me at Avalon that they were on the job at the mainland stations, I was tired and sore from the effects of oral and newspaper clubbing so my message to the Herald was "Rip and Roast the Times for us". The Herald replied "We Will" and patiently sent and received messages over the comparatively slow system and wrote up their work and published it, including my message.

A daughter of a wealthy man was taken sick at Avalon and her mother obtained a specialist from Los Angeles by using the wireless. Those successive demonstrations helped to get more people to believe wireless could give service, but the thing that removed all doubts from everybody's mind was as funny as it was thorough. Two colored men got into the Metropole Hotel Bar on the Island and collected some change, a case of champagne and some miscellaneous drinkables and departed from Avalon with the loot on the five A. M. boat. Such a get-away was old and had been safe for years because there had been no means of communication and the next boat did not go until 11 A.M. But the Bar folks knew the wireless would work and they sent a wireless message to the mainland which caused

the colored men to be very surprisingly and very officially received at the pier in San Pedro. It was a spirited wireless comedy for everybody but the Negroes and it caused a laugh which shook almost all remaining stubborn disbelief out of the public.

That business of putting wireless into common everyday service in the United States occurred in 1902 or ten years after Sir William Crookes had said "Here, then is revealed the bewildering possibility of telegraph without wires, posts, cables, or any of our present costly appliances". (Fortnightly Review, London: February, 1892.) He said those words while discussing the wireless experiments which Hertz had performed in 1886.

After the stations proved themselves, the newspaper reporters and others said they had not intended to belittle wireless and wireless apparatus or wireless engineers, but that they may have unconsciously done so in attacking the stock jobbers who were exaggerating what wireless could do so they might draw big commissions from the sale of doubtful stock.

Several wireless companies were selling stock and had been selling stock by saying or implying that they were about to span the oceans and continents and take all the business away from the telephone, telegraph, and cable companies. Stock salesmen were not telling the truth when they said the wireless of those days could render everyday service across the Atlantic or Pacific or could compete with wire lines. Antidote statements were a natural result, but they were equally untruthful when they said that the wireless we had was not capable of giving everyday useful service across that twenty-five miles

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of ocean where there was no cable to compete with.

After a few months of everyday wireless service, the Los Angeles Times started a little paper called "The Wireless" at Avalon. The contents of that paper consisted of local news and world news as received via wireless.

Since that time, several different organizations have owned and operated and improved that wireless circuit from the mainland to the Island. During those years the island station was shifted about Avalon and the mainland station was shifted about San Pedro, Los Angeles, and Long Beach. The list of owners included the Pacific Wireless Telephone and Telegraph Company, the United Wireless Telegraph Company, the Marconi Wireless Telegraph Company of America, the U. S. Navy, and the Pacific Telephone and Telegraph Company.

The Pacific Telephone and Telegraph Company in late years (1920) made that radio circuit one which could be used for either telephoning or telegraphing and they connected the mainland radio station through repeaters to the whole Bell Telephone System of the United States and they built a local Bell system on the island to serve as an inlet and outlet for the Catalina radio station. Avalon citizens were able to talk by wire to the Catalina radio station and thence by wireless to the mainland and thence by wire to Los Angeles, San Francisco, Chicago or New York. And for the purposes of further demonstration, Deal Beach on the New Jersey shore and the S.S. Gloucester on the Atlantic were equipped with radio phones and conversations were carried on via wire and wireless between

Avalon and the Gloucester.

After the telephone service became a matter of course, many of the Telephone Company's customers talked fluently and freely, not realizing that they were operating a radio telephone circuit between Catalina and the mainland, and a growing number of radio operators, amateurs, and broadcast listeners tuned-in to pick up what was said over that radio telephone circuit. Some of those who used that radio telephone circuit were movie stars and people with no work to do, but with time, money and energy to spend, therefore it is not difficult to imagine their conversations as possessing sufficiently interesting possibilities to tune-in for. To provide secrecy, the telephone company tried experiments at making the radio waves such that only their receivers were capable of changing the scrambled radio waves into intelligible speech. By this method, the telephone company might have kept the speech unintelligible to all but experts and ingenious amateurs, but there were other interfering factors. When the original radio circuit started in 1902 there were no other radio receivers or transmitters to interfere with it. As time went on, radio service circuits multiplied and produced interference, from transmitters and regenerative receivers.

The wireless service family had grown in twenty-one years to include service between land stations, ship stations, ships and shore, submarines, airships, aeroplanes and amateur stations and service from compass stations, fog beacon stations and broadcasting stations and besides that, the radio frequencies and radio apparatus that had been developed for radio service had also been applied for communication over telephone, telegraph, and high and

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low voltage power lines. From serving dozens it had grown to serve millions.

The telephone company could not entirely avoid all of the interference even though they did carefully choose the sites for their stations and use loops, wave-traps and other selective devices. Such interferences to the wireless telegraph circuits had only been a handicap and irritation for the wireless company's operators, but in the radio telephone it handicapped and irritated the customers. And last of all and probably greatest of all, the wave-lengths used by the telephone company were wanted for radio broadcasting.

That first wireless service circuit lived and served the public for twenty-one years. But wireless circuit family had grown so large, ~~there is no longer any room for that first circuit.~~ that even wireless people objected to the use of wireless where wire could be used. The Pacific Telephone and Telegraph Company substituted two cables for ~~it~~ the Avalon to mainland wireless when their radio station licenses expired on August 1, 1923, and quit using the wireless. The argument for advanced doing this was that the cables provide more secrecy, no interference, and connect up better with the wire system and business system of the Pacific Telephone and Telegraph Company.

Later wireless returned to Avalon. Also shorter & shorter waves were used where wires might be used.

CHAPTER VIII

With the wireless circuit handling paid messages between Catalina Island and the California mainland, we had accomplished the first part of what we hoped to do. To do more, we needed more money and less connection with the American W.T.& T. Co. The connection with that company apparently would be a liability. Their only business seemed to be the sale of stock. They had not established any wireless services and neither had any of their sub-companies except ours, and we had built our apparatus and picked our sites without their help or advice.

Our plan was to form a new company with the patent applications I had filed with the Patent Office and the Catalina and mainland stations as a nucleus. The new company was to compensate those who had bought stock in the old companies with stock in the new one. With more freedom and money we might be able to produce many needed improvements, find other places where wireless was needed, compete in some places with wires and establish services for ships at sea. A. L. New had another idea, probably his uppermost thought. It was to sever all connections with Bailey and Stevenson, providing he did not have to lose much income by doing so.

September 8, 1902, Mr. and Mrs. New and I boarded the train at Los Angeles, with reservations to Denver. Car windows were open in those days. I had my head out of my window looking forward. A girl stuck her head out of a window for a backward look at Los Angeles and looked at my face. I snickered. She was the tall Gibson girl type and looked like she might be one of his models. She wasn't - she was a telephone switchboard operator from Indiana and her name was Wickersham. When the News learned that she was from their home state, she was adopted by Mrs. New as a member of our party, making the right number

Promotors, engineers and static were very prominent in Wireless but we believe this is the first and last time that samples of those got together on the same photo film. The lightning (static) which seems to be striking us was caused by rolling the film too fast in the high dry air at Glenwood Springs Colorado.
News, the promotor, Miss Wickersham, the operator (wire telephone), Marriott, the engineer, and George, the chef, waiter, valet, porter, diplomat and custodian. Mrs News took it with my camera. In 1902.

for card games and at meals. A railroad official left his private car near Glenwood Springs, Colorado. It was attached to the rear of our train. His porter asked our group of four if we would like to use it. We moved right in and he fed us in the little dining room.

There was an observation room at the rear of the car where we played cards and viewed such scenery as the Royal Gorge. On the wall were interesting instruments. The train speed indicator became very interesting. Due to illness of the regular passenger train engineer, a freight engineer had been put on our train. He put on so much speed that fountains of sparks squirted up from our rear wheels when we were snapped around the sharp canyon curves. I thought we would be thrown against the rock wall or into the river. The speed dial of the instrument assembly indicated we were making forty-five miles an hour. The conductor rushed in, looked at the sparks and the speed indicator and pulled the signal cord. He said freight engineers always drove too fast the first time they operated a passenger locomotive. At Pueblo we said good-bye to the private car and Miss Nellie Wickersham, the "hello" girl from Kokomo. New, with a grin, told her he would offer her a job when our wireless phones were put in service. She continued east and we went north to Denver. The best picture of Mr. and Mrs. New is one I took of them and Miss Wickersham, who looked like she might be related to Mrs. New. Not bad - we had picked up a nice girl and a nice private car on the same trip. Right out of the clear sky, advertising by Colorado, we had picked up static and made an unique picture.

"Nothing succeeds like Success" (or what looked like it) seemed to be very prominent in New's ethics. Some of his attempts to appear big and successful produced amusement and gossip. For example, the Sunday after our arrival in Denver, he and Mrs. New made calls on County Assessor Alexander and others. He drove up to see those folks in a phaeton drawn by two high stepping white horses. Assessor Alexander told his sister

and his sister, who was my landlady, told me and others. She was one of the best tellers I remember. I suspect New had shown off at least once too often or too much in every project he had gone into. The Sunday calls with white horses from a livery stable may have helped his plans, whatever they were. I suspected that his plans changed very rapidly and that he never was sure of them.

In addition to showing off, New's plan seemed to be to go to Denver and other points east to form a new company. I suspect he had dreams of making it all new (Gen. A. L. New) - no wires, no troubles, no officers - nothing but New. He was trying to get rid of Stevenson, Bailey, American, Pacific and Continental Wireless Telegraph companies and later developments indicated that what he wanted was money, servants and admirers. But that kind of a promotor and several other kinds were required to bring up wireless.

New was one of the early promotors who did not go to Jail. Sending wireless promotors to jail came when ~~unsuccessful trials~~ the earlier promotions had become exempt by the statute of limitations. Promotors became so numerous in later years and the had-been promotors became so envious of later promotors that they helped send later promotors to the penitentiary, after their own similar past performances could not send them to jail because they were had-beens long enough to be protected by the statute of Limitations. New was a bluff. He was afraid. He exhibited fears that I never saw before or since. Captain Baldwin took New and me up in a captive balloon at Los Angeles. New was so frightened when we were fairly high that he dropped to the bottom of the basket and clawed the basket floor like he was trying to dig a hole. After we landed he behaved as usual.

I do not know whether any balloonist had the legal right to call

himself Captain Baldwin. Years later I worked with another Captain Baldwin in connection with reporting the first aeroplane races by wireless. The first Captain Baldwin, my 1902 acquaintance, was a large man; the second one was about my size, which is not much. The first took up passengers in a basket at Los Angeles; the second put up a balloon which was to hold the wireless antennae I was using to report the races and to serve as a stake balloon or turning-point in the course of the aeroplanes. One of the air boys flew from over the vicinity of Jamaica, Long Island, to over the tip of Manhattan (the Battery) and vicinity of the Statue of Liberty and back to the Jamaica race track. I had a station in the grandstand at the track and another at Baldwin's stake balloon. The other station was our New York permanent station at 42 Broadway near Bowling Green, Wall Street and Trinity Church.

Getting back to Denver, I was to leave there and go east for contacts with the Patent attorneys, Patent Office, Navy and other organizations.

The Navy wanted wireless, particularly wireless made and owned by U. S. citizens in the U.S. that could be sold to the Navy at a reasonable price and with no strings attached. One French, two German companies and a company backed by English that called itself the Marconi Wireless Telegraph Co. of America offered equipment. The Navy did not want to buy from wireless companies with foreign roots. I went to see Admiral Bradford, Chief of the Bureau of Equipment. That 1902 Bureau was the predecessor of three naval Bureaus that I worked for between 1914 and 1944 as a student of wireless History, Patent expert, Expert Radio Aide, Radio Engineer and Special Interviewer of radio, radar and submarine-sound applicants. Those succeeding Bureaus were the Bureau of Steam Engineering, Bureau of Engineering and Bureau of Ships.

Admiral Bradford told me what he thought of the Marconi people

who claimed credit for what others had contributed to wireless, who were not only trying to charge the Navy high prices but were demanding annual royalties and refusing to permit the Navy to make any changes or use any other wireless equipment. With less cuss words than I thought were justified, he explained how the Marconi promotors only proposed to rent wireless to the U. S. Navy and they retained the right or tried to dictate to the Navy what the U.S. could do with all of the other apparatus. He added that all of the other makers of wireless they had tried so far had given better results than the Marconi gear they had tried. Even if Marconi equipment was as good as others, no U.S. military organization can ask or tell a foreign organization what it does with or to any part of its equipment, except as an ally.

The Navy was very much annoyed with the wireless situation. It was bad enough for anybody to try to hold up U. S. citizens, worse for a foreign company to try that or for a company, that required foreign support to exist, to try such tricks. The Navy had a Wireless Telegraph board. They were trying to clear things up. Capt. Conway H. Arnold was president of the board.

Admiral Bradford said he would like to buy U. S. wireless equipment and invited me to go to Annapolis where they had three sets of equipment and see if our company could do as good or better. We had no foreign connections and did not want any. Of course, I wanted to go. The Admiral asked Captain Manning to take me to the railway station and direct me to Annapolis. Captain Manning did and I presume he advised the boys at the Annapolis station by telephone for the boys answered all of my questions and let me take photographs. Thirteen years later I went to Bremerton, Washington as Naval Export Radio Aide and moved into the house that Lt. Manning was leaving for sea duty. I believe he was

the son of Capt. Manning.

The boys at Annapolis were in good spirits over the wireless record they had achieved the preceding day. They had received at that Annapolis station a message from the USS Prairie when the Prairie was eighty miles away. Those Navy boys were not selling stock and what they had to say about wireless affairs fitted my experiences. To decipher the messages they may have guessed at words or letters here and there. Communication folks guessed at some letters and words. If they missed a word they filled in what they had read with what they thought probably or possibly might have been intended to go with it. At that time, in the Morse code, "tied" and "lied" could sound and look alike. For example, saying that Admiral Bradford cussed the Marconi promotors hold-up-schemes might be translated to mean that I found Navy men to be among our foremost cussers. Navy men of all classifications from gob to admiral have not used cussing, at least when I was around, as much as people in some other occupations, services, careers and catagories that I have encountered. Not that Navy men did not know how. The old ones knew how in most languages and dialects. Their vocabularies were extensive and applied according to the better needs of the occasions.

I knew several Navy men before they were admirals - most of them are dead now. Admirals Knox Coontz and Gregory and I were friends before, when and after they were admirals. Admiral Hooper and I worked together before and after he became an admiral. Hepburn and Bullard were the powers in wireless when I was employed by the Navy in 1915. My contacts with them were chiefly before I was with the Navy.

The 80 mile record of the Navy on October 24, 1902 was made with Slaby-Arco instruments including a receiver, a tuning coil, mercury turbine interrupter, a coherer for very strong signals and a microphonic

contact (?) with telephone receivers for weaker signals. The instruments had been made by the Algemine Electrostatis Geselsheft. I guessed it was a microphonic contact from what the boys said. I saw the telephone receivers but not what they were connected to. The detector might have been electrolytic.

When I arrived at Annapolis the boys were setting up the Braun instruments in preparation for the next trials. The Braun transmitter included little Leyden jars that looked like overgrown test tubes, one inch in diameter by one foot in length. When properly adjusted this Braun arrangement produced a tuning and longer trains of waves. The receiver did not have a tuning coil but coupling coils (they must have been roughly tuned to work) between the antenna and receiver. The electrolytic interrupter of the induction coil made more racket than the spark of the transmitter. The spark was between the balls in a glass cylinder. They were using 110 volts and putting 20 amperes through that ~~xxxxxxxxxx~~ interrupter. The Braun instruments had been made by Siemens-Halske. At the receiver they included both a coherer and telephone receivers for microphonic reception. I only saw the coherers but there was something else to be used with the telephone receivers.

Schloemilch was an early crystal detector man. At that time, however, I believe he was with Slaby-Arco. The mechanical workmanship on the Slaby-Arco and Braun instruments was finer than any American made instruments I had seen. In many respects the two makes looked alike. Both Braun and Slaby-Arco started making wireless instruments in 1898. Years later they were combined, forming the Telefunken Company. I knew Braun and did some special work for the Telefunken Co. in connection with patents as early as 1915 and as late as 1933. Before that I knew Braun has been much credit for the cathode-ray tube we use in radar & television.

One of the great Radio and Electronic ancestors has been comparatively overlooked or ignored in the U. S. about 40 years before Fleming made the two electrode vacuum tube detector and De Forest topped it with the three electrode tube, Ferdinand Braun made the first Cathode Ray Tube. That is the kind of tube, in the large end of which, you see Television pictures. It also made Radar possible, when it shows graphs or partial pictures that indicate the presence or absence of what the operator may be looking for.

He was the same man who designed the Braun wireless transmitter and receiver I saw at Annapolis in 1902. That transmitter was one of the forerunners of the Telefunken transmitters which I found to be much better than those when as U.S. Radio Inspector I repeatedly tested various makes of transmitters.

In later years, I knew Professor Braun personally and I have his autographed photographs. His tube was used as an oscillograph for many years before it was used for Television. I took part in two patent suits in 1915 and 1916 where it was used to estimate how many radio waves a single transmitting sparks produced. Braun's first paper describing the tube was published in Germany in 1897.

Braun was born in Fulda Germany June 6, 1850. He came to the U.S. two or more times, the last time to appear as an expert and witness during a patent suit in 1915. The war prevented his return to Germany. The U.S. authorities had so much confidence in him that he was not interned like other Germans while shooting arrow in front of his Brooklyn home he fell and broke his hip. He died April 20 1918.

He was the prime science type of inventor and inventor, a theoretical and practical physicist. He made a multiplicity of contributions to science. He set up the Institute of Physics at the University of Tübingen.

He was awarded the Nobel Prize jointly with Marconi in 1909. Both his ability and character have been highly praised by his fellow scientists. I knew of him as early as 1897 and became personally acquainted with him when he was 44. I found him to be an extraordinarily gentle, wise and kindly man.

Jos. Lewis and F. J. Mann write a fine technical story about him in Electrical Communications, Vol 25 #4, Dec 1948 about 5000 words.

about them first as an employee of rival companies and later as U.S. Radio Inspector. In about 1912 the Germans had the best wireless transmitters and U.S. companies had the best receivers.

The other set of wireless instruments at Annapolis for tests was Ducretet. Ducretet had been there and had taken part in their trial. They had not worked very well and Ducretet had gone back to France. The Ducretet instruments were there but I could not see or learn by my questions about how good or bad they were. My impression was that they were weak competition and that Ducretet had gone home in a huff.

From what the boys told me they had not tested any Marconi equipment at Annapolis and did not expect to because of the hold-up characteristics of the Marconi management. The Navy had observed the operation of Marconi instruments at the 1899 yacht races and had been keeping in touch with what that company had been doing.

The German instruments were better than the Marconi instruments and the Navy could buy them outright at reasonable prices but they wanted U.S. instruments. Fessenden had talked about submitting instruments for test but had fallen out with Queen and Co. and had not delivered anything. The American W.T.& T. Co. (our parent company) seemed to have given all of their attention to stock selling and had not submitted instruments to the Navy for trials. They thought the DeForest Company would submit instruments before long but the boy who was in charge said he did not like the DeForest receiver because it did include a coherer. The information was not very encouraging to me. I did not recommend coherers and did not know where I could find a shop that did mechanical jobs as handsome as those submitted by the Germans. In fact I thought the German instruments would prove to be better than I could persuade anybody to make at a saleable price.

The boy who did most of the talking said anyone could make wireless instruments as they were really not covered by patents, which practically was what I had found from reading wireless history. He said Lt. Hudgins, the Chief Radio officer, was of the opinion that Pupin had invented wireless. My studies of wireless history did not confirm that. In later years Pupin arrangements were cited in patent cases as early schemes that could be used in tuning. I knew him and so far as I know he never claimed he invented wireless. From my contact with him at various times, I believe he had a clearer conception of fundamental and harmonic frequencies as they existed in wireless than any other person did in about 1913, when harmonics were coming in for more attention.

The Annapolis boys said they used a capacities ground sometimes when the signals were strong enough because it reduced the interference from static. That arrangement has had several names such as counterpoise and capacity ground. They used antenna wires of various lengths and sometimes three or more, some of which includes cages, i.e., wires connected at the top and bottom but spread apart between the top by barrel hoops.

Those boys gave me the gossip they had heard and which in the long run proved to be quite accurate. They said Fessenden had been working for the government but when he thought he had a detector that was better than others had, he quit the government job for a commercial connection. The supposition was that the government had paid for the time and material for the development of the device that Fessenden hoped to use to monopolize commercial wireless services to the government and the public. The Navy boys felt the Navy should not be held up for high prices on something that had been developed on

government time. From them or others I contacted that fall I learned that the Fessenden folks had been able to operate fairly well between Collingswood and Jersey City, N. J. when the static was not too strong, but they were unable to induce profitable business away from the long-established wire lines. I believe Charlie Pannil was one of the operators. He would have delivered messages when instruments were workable and static was not too bad. Fessenden's backers presumably believed that an ex-college professor could figure things out accurately. It did seem reasonable that if, as Sir William Crooks prophesied, you could get along with stations only - that is, without wire lines, you could provide service for less money and get the business. Fessenden, who was grandiose, assumed he could avoid static and tune stations sharply so they would not interfere. His backers seemingly took his word for these things at first and agreed with him on the assumption that working wireless could take the business away from wire lines. All of the assumptions were wrong. Even if anyone could have made wireless that would avoid the natural and man-made interferences, it would have taken a considerable time to have slid enough paying customers from the wire lines into the wireless. Even ship-to-ship and ship-to-shore wireless was handicapped by other financial interests, maritime privileges and powers of ship captains, and mental inertia. Our Catalina to the mainland wireless effort was in a class by itself. It has no wire competition and it did not bother ship captins. That circuit could support itself but not much executive or engineering overhead. Our superiority consisted almost entirely in that we had picked the best place. Our transmitter with its reliable motor driven and dependable break interrupter was more reliable than the vibrator-types of transmitter used by American W.T. & T. Co., Marconi, Fessenden and others or the mercury turbine and electrolytic types of transmitters used by

the Germans. Our detector was better than the coherers but probably not as good as the electrolytic detector that Fessenden was using. Our patent situation had possibilities if we had enough money to fight nuisance patents. Some were applying for patents on everything they could think of, presumably as a basis for stock sales and to bluff out other inventors, such patents were valuable as nuisances and as padding for stock sales.

For many years it was said over and over again: "Wireless is only in its infancy". Also from time to time various statements and acts by others indicated that wireless had reached its limit or nearly so. During this trip Shoemaker took the attitude when I talked to him that everything had been covered, including the filing of claims that would anticipate the efforts of others in the future. Being too pessimistic or too optimistic was a common characteristic of wireless hopes and attempts. He said Cornelius D. Ehret, who had been an examiner of wireless cases in the U.S. Patent Office, had made a thorough study of all wireless patents and literature and had applied for patents that would cover everything that other applicants had overlooked and that would cover future improvements. He said Ehret had resigned from his government position to engage in private practice and he would be their attorney. Ehret was prominent in the handling of wireless applications and patents for many years but so far as his having covered what other inventors had failed to cover or what other inventors would fail to cover was apparently of little or no importance. All of the wishful thinking possibilities of fifty years ago have not been fulfilled yet but considerable unprophesied wireless has become effective. Many of the ways that wireless has worked into other fields of usefulness were not prophesied a few years ago.

At our September 1902 meeting in Denver when I was present with New, Bailey, Stevenson and Hale, we seemed to agree upon another company to get away from the American Wireless Telephone and Telegraph Company or its successor and that the name of the replacement company should be the Pacific Wireless Telegraph Co. We thought the west coast and Pacific would be our field. This Pacific company was to issue stock to those who had purchased stock in the Pacific and Continental W.T.& T. Co. and to New, Bailey and Stewwnson, who held stock in those companies and to Swenson and me for assigning patent applications to the company and the remaining stock was to be sold and the funds used for company development. New, Bailey, Stevenson and I were to receive the same number of shares and be directors. Swenson was to receive about one fourth as much, as I recall it. We five would have a majority of the capital stock. My share was to be about fourteen per cent. I had assigned my patent applications to the company. Swenson was to assign if and when he applied and I was to do the same as long as employed by the company.

I was to go to Washington, D.C. and work with Sturtevant and Greeley, patent attorneys, and the Patent Office on our patent applications. I had already filed some covering devices we used and expected to get together more schemes and one or more of Swensons. Also I was to contact the Navy Department and prospects particularly around Washington and Philadelphia. On my way back to Denver I was to have a few days of stop-over to get married, and if other arrangements could not be made, my bride and I were to pick up Swenson's fiance between Chicago and Denver and escort her via Denver to Swensen at Whites Point or Los Angeles, California, for a ceremony. Swenson wrote saying he appreciated my offer to help him get his girl but he indicated by a sketch that he would punch me in the nose if I made any passes at her. To intimate that I would make passes at another's girl while I was on a honeymoon was a

gesture that I have not translated.

My observations in the east did not indicate opportunities for quick successes in wireless. I could not see any great money making possibilities for the immediate future in competing with wire companies in serving the public or in competing with other wireless companies in attempts to sell wireless equipment to the government. Marconi, the Germans and Fessenden seemed to have considerable financial backing. The Navy probably would not consider the Marconi crowd because they were backed by interests in England; their monopolistic demands could not be complied with; and their instruments probably were not as good as those offered by Germany or those made and offered by citizens of the U.S.

The German-made equipment exhibited outstanding mechanical workmanship and it might be offered at a low figure by German capital or the German government to get into the U.S. market. The Fessenden detector with the backing of Pittsburgh monied men was said to be good. However, Fessenden might not be able to keep others from using it, particularly in wireless sold to the Navy or any other Federal department because Fessenden had presumably worked it out as a part of the work the Weather Bureau had employed him for. Also there was a rumor that DeForest had substituted alternating current for interrupted current and had thereby done away with the irregularities, complete stops and power limitations of interrupters.

To sell to the Navy we would have to build stock equipment, demonstrate it, bid in competition with the others and I had no idea of how much the Navy would be allowed by Congress for its maintenance and new projects or how much of that the Navy would set aside for buying weak and wobbly wireless babies. So far the wireless had not proved practical

much farther than wig-wag and only one wireless could operate at a time because of interference.

The Gehring-Shoemaker crowd operating under several wireless names had set up several stations along the coast but apparently had not rendered any overland or ship-to-shore wireless service or sold any equipment to the Navy or other government departments. Stock was seemingly about all they had sold and stock sales had fallen off so that they were trying to change their corporate structures into something that would revive stock sales. Shoemaker had moved his laboratory from north of the Philadelphia park where Independence Hall is located, to west of that park - one flight up in both cases. He was fond of practical jokes that varied from plain and fancy lies that might embarrass the victim or tricks that might be very harmful. He knew I was in Philadelphia and would be in to see him sooner or later. He was loaded for me.

When I entered his machine shop type of laboratory, he promptly gave me a cigar, even before I had shaken hands with Midgley and Rick. Midgley and Rick stuck with Shoemaker apparently as long as he was in a position where they could work for him. When the United Wireless was going out of business in 1911 Midgley said he was going with the Corning Glass Co. but I was not told where Rick went. Shoemaker went with the Marconi W.T. Co. of America.

The Shoemaker gift cigar began to stand out as the main point of interest, particularly after I lit it and more particularly when while puffing it I came very close to Shoemaker. He retreated and in that way warned me that I had a loaded cigar. I took it from my mouth and pointed the butt end toward him. The cigar was not loaded with powder that would flame at him as I hoped. There was a hairpin spring in it that

simply ripped the cigar when a string burned away releasing the spring. Shoemaker then said his practical jokes had not been working out well recently. He had employed a neighborhood halfwit to clean for quite a while. One day he connected an induction coil that produced long sparks to the doorknob. When the halfwit reached for the knob sparks jumped to meet him. He yelled and ran out of the building and never came back. Police searched for the halfwit but found no trace.

Shoemaker in the laboratory and at meals we had together told me a number of things. The only thing that I recorded as probably being important was his story that the patents that were supposedly xx owned by the American W.T. & T. Co. were controlled by Shoemaker and Gehring. He said he never assigned more than a half interest in his patent applications.

In the laboratory Midgely and Rick talked about the wireless stations they had along the Atlantic coast from Cape May to the Heights of Navasink. The list included one at Atlantic City which they called the Atlantic station. Probably they talked of it the most because they had more fun there. They said the stations were all working fine and handling business. This being in November I thought the static might be weaker which would help but I had my doubts about the amount of business that could be picked up at their summer resort location in November. I did not mention it to them but I took the short ride to Atlantic City and photographed their station. It had no antenna, boards were nailed over the windows of the little stationhouse and the door was locked. The gossip I had heard was probably right. The gossip said that crowd had not delivered wireless service to the public or wireless equipment to the Navy - their business was stock selling.

Of course, it could have been expected that the American gang might tell me nothing or various stories because I was Chief Engineer of the Pacific and Continental subsidiaries of the Gehring-Shoemaker, et al company and had not bought anything from the American, but had established an island-to-shore wireless service that actually collected money for wireless telegrams daily and had not responded to Gehring's efforts to combine with the American and the other subsidiaries that had only succeeded more or less in selling stock. If Pacific and Continental had written for advice about the locating of stations with delays that seemed to be unavoidable, followed by letters to and from Denver and Philadelphia about equipment to suit the circumstances, the opinions of our engineer and the absences of our engineer; followed by telegrams and letters stating the shortage in certain superior materials or a rush of orders that will make it necessary to add extra charges for overtime work if the instruments which are the best that have ever been made can be forwarded soon. However, the Pacific & Continental W.T.& T. Co. had not asked for advice or equipment but had built equipment and stations and were operating and if Gehring stopped to think, he might find or remember (according to my letters to him when I applied for a job) that I had taken up the study of wireless in 1897 and had built and operated experimental wireless sets before his American Co. had built and operated experimental wireless sets. Maybe Gehring did not want to see me. At any rate, all of the time I was in Philadelphia his office said he was out of town.

Many people believed that political pull could get anything and I suspect New believed we could get patents and Navy contracts by political pull. Stevenson was supposed to be the big Republican boss; Bailey was a U.S.Marshal and New's brother was in Congress. I contacted the Patent Office and the Navy Department but apparently only due to my

own rights as a citizen who wanted to talk about something the Navy wanted and as an inventor who had filed patent applications. I saw no effects of their political influence. So far as I could see Stevenson's political influence was the alcoholic influence that he received from the sale of wireless stocks. The chaps that New sent me to see seemingly were clerks in government departments who were nice but could only help in ways where I knew how to proceed.

In those days it was difficult to foresee what wireless would do (static or no static) or what a wireless officer would do (drunk or sober). During my sojourn in the east I had been receiving letters and telegrams from New, Bailey, Swenson and Armstrong. The remainder of this chapter is largely based upon letters and telegrams from them. In the letters "B" refers to U.S.Marshal Bailey, Secretary and Treasurer of both the Pacific and the Continental Wireless Telephone and Telegraph Companies; "S" or Stevenson means Stevenson, President of the company; "H" probably means "hell" and "D" probably means "darn" or something that sounds like that. In later years some wireless promoters that I expect to mention, were called SBs but so far as I know without any reference to Stevenson and Bailey.

New and Stevenson were supposed to join me in the east. New and Mrs. New got as far east as his or her relatives in Indiana. On September 27, 1902 he wrote from Greenfield, Indiana: "Can't say when I will start for the east-------" and wound up with "in haste, Always yours". I think he claimed to be "in haste" more often than anybody I ever heard of. I had been present when he wrote such letters and then hastened to the hotel veranda to sit in a rocking chair with his heels on the porch railing.

On Oct. 2nd he wrote, "I was surprised --- to know you had heard nothing from Steve or B. I have not heard a word from either myself and have just written B a red hot letter". Oct. 3rd, Bailey telegraphed me: "Mr. Stevenson will be at New Willard Hotel Washington Monday morning". It was like all of his telegrams to me, sent from Denver via Western Union, dead head. I took a room at the Willard. Oct. 2, New wrote, "push things --- you know S failing." I knew he was supposed to get drunk frequently and disappear. I never saw him take a drink but I know Zhunted for him without success several times. He did not show up at the Willard. Oct. 7 New wired me "Stevenson at Arlington waiting for you report there at once". I did not find him. Oct. 16, Bailey wired me: "Stevenson just returned says everything will be attended to there in good time no need of your waiting longer". He was supposed to contact Sturtevant and Greeley, the Patent Office and the Navy with me. I contacted them several times but they had not seen him. New did not arrive in Washington either. Oct. 18 New wired me from the Union depot, Chicago: "Wire Bailey for what funds you need have none here". Stevenson was to have delivered funds to me in Washington. The chances are they had failed to let New have enough funds to get to Washington. Stevenson probably drank up what I was to receive.

A thousand dollars was important in 1902. Altogether Stevenson must have drawn over a thousand dollars expense money plus salary and expense money for me that he spent principally for champagne and Turkish baths during the days he was supposed to meet me in Chicago and Washington. I collected most of my salary and expense money later. For champagne and Turkish baths, I was a gift from the gods, or devils, to Stevenson who never bought me a drink. So far in my life (I am sixty-six and may reform) I have not consumed a gallon of champagne and have never taken a Turkish bath. Beer has been my preference. Accidents, some

through ice, have contributed to my cold baths on the exterior. For my insides I have avoided ice drinks. Warm baths if they were convenient or I felt that they might be necessary, have been taken more or less. When my wife was getting ready to have the first baby, the rules called for cold baths. I took them with her, in a room with the windows open at Denver winter temperatures and with the sponge wet by wather from the cold tap. I have not intentionally taken a cold bath since. We got another girl and boy without including cold baths in our preliminaries. The second girl did not look as much like me as the first but that did not hurt her. The American Legion picked her for "Miss America" about 18 years later.

On Oct. 16 Bailey had wired that there was no need of my waiting longer in Washington. On Oct. 22, New wrote me, on reaching the Denver office: "I have arranged things while in Chicago so we are OK so I want you to remain there until everything is done. Get out our applications for foreign patents". In the same letter he said: "When you go to Philadelphia --- tell him (Gehring) that Gen. New has the matter of going into the Consolidated Co. all in his own hands and that you believe if they -- will make the right kind of proposal New might consider it. I mean this, Marriott - if we can work anything out of them you and I will divide". I had heard that New was continually doublecrossing people but that was the first time he had asked me to do it for him. Probably because he could not get to Philadelphia himself. Gehrng was trying to get the American and its subsidiaries all in to one company called Consolidated and sell more stock. Although all our arrangements were made to keep clear of the Consolidated, New wanted to apparently sell out to Gehring but pocket anything Gehring would give. Or if Gehring would pay enough, maybe he really wanted to sell out to Gehring. I did not tell Gehring anything. New wrote me

again the same day saying: "Have not seen B or S yet --- you should go to Philadelphia and New York".

In reply to an inquiry from me, Armstrong wrote from the same Denver office at the same time saying the witnesses were available who had seen the demonstration of my microphone detectors in 1901. He added regarding our plans to form a company free from Gehring, "--- I have matters in such shape that we will have some of the biggest and best men in the state behind us, which will with those that the Gen. has on the carpet, place us at the top of the heap with unlimited wealth at our back".

But the next day the letters from that office were very different. New wrote, "Bailey-- just returned from Kansas----. He told me the finances were getting low.----I asked him why he and Steve did not try to raise money, he made no reply. ---I am sick and tired of such support ---. I will have to pull out for the coast to raise money---. They are not worth 2 whoops in H---. ---as you need money call on B for it and when he fails then I will come to the front." Bailey wired me dead head the same day, "Have been out of state since Saturday. I will pay your draft for one hundred and fifty dollars". New wrote again the same day: "We must have other men at the head than S & B and I propose to get them".

The communications from that office were like some winds I had encountered on the west coast. The breezes changed from day to day. Sometimes it bore the perfume of roses. At other times it might smell like a dead rodent or like the spray from a very lively skunk.

Oct. 28 New wrote from the Denver office saying: "I have just found out that S & B have no standing (financially) with the First

National Bank. They would not accept their combined notes for a small loan. They have not, nor can they, raise one dollar for the company. --- you, Swenson and I will elect our own officers and the president will be a man who can and will do something forus. B, S and myself had a meeting Sunday and S was full and went to sleep right in his chair. --- Prepare applications for patents in all 26 foreign countries. ---Draw on Bailey for the funds necessary---- S said better have them in all the 26 so go right at it. --- I may leave for the coast in a day or two".

Oct. 29 New wrote at length repeating to me to keep after US and foreign patents, the Navy and information about other wireless companies, and said: "B & S are not worth one cent to me and I have to get out now and raise some coin". Oct. 31 New wired me at Philadelphia dead head Western Union. When away from Denver he had to pay for telegrams. I had given him letter reports on what had been done up to the time I had reached Philadelphia and my Philadelphia address. However, he wired: "How are you progressing and what have you to report wire me results up to present". In addition to what I had reported by letter, I had nothing to report except whom I had seen and whom I would have to wait to see. Queen & Co., Leeds and Northrup and Biddle, American Laboratory and Atlantic stations were visited.

Inquiries and observations were made to get a line on available materials and on what the Gehring-Shoemaker crowd and other wireless people were doing. Gehring or Shoemaker had not been seen as they had not been in Philadelphia during the few days I had been there. The results of the work in Washington had been reported by letter to New and he had said he was pleased with the reports. I told him in

my telegram there were no new patent results as the Patent Office had not taken any further action in our cases and that I had not seen Gehing or Shoemaker yet as they were out of town. I could not understand why New sent that telegram and when I received a letter dated Nov. 1, I could not understand part of it either. He said, "When you write or wire me, I want results. I don't care who you see or who is out of town". Previously he was continually suggesting that I see people and wanting to know whom I had seen. His letter went on to say: "I am getting ready to leave for the Coast. --- Write Bailey about salary --- ask if he prefers you draw on him. S said there was no use in your remaining there. --- I know they will kick on paying you while you are getting ready to get married --- the company now has no funds. I am getting D--- tired of it. B & S will do nothing. --- The boys at the stations have not been paid since I left". From what Swenson's letters had said and from later information, I think they had received some money, but Carrol had quit and had been replaced by Howell which indicated some dissatisfaction.

Nov. 4 Armstrong wired me from the Denver office, collect: "Bailey here you will hear from him. I start California Saturday". Nov. 10 somebody signing D.C.Bailey wrote me in unfamiliar long hand: "--- New has not said anything about the matter you refer to in the letter. He left for the coast on Saturday morning and will not return for a period of three weeks. According to your account it is overdrawn already". My account was not overdrawn. After I arrived in Washington my salary and expenses were never paid up to date. The letter sounded more like Stevenson. He probably told some clerk to write it and sign Bailey's name - per S was written under the signature. To keep down expenses I stopped at residences where board and room were provided at a low rate. At 1323 M Street NW in Washington and

1329 Spring Garden Street in Philadelphia. Except when I put up at the New Willard to meet Stevenson according to Bailey's instructions.

On Nov. 24 New wrote me from Los Angeles. I was then at Wellsville preparing to get married. He wrote: "-39 just received notification of interference from Patent Office --- Claims 1, 2 and 3. Presume you have copy. ---Suggest you communicate with Sturtevant and Greeley and while you are so near, look after the matter. Suppose everything is going all right with you. Do not return until all matters are adjusted there. Communicate freely with Mr. Bailey and Mr. Stevenson, and let me hear from you often. In haste, very truly yours, A. L. New".

The Gehring-Shoemaker folks had apparently slipped in some applications to go into interference with patents they thought we were applying for. Armstrong had written to me about a chap who said his name was Mason who had been making inquiries about our equipment in Denver and I had heard of him in other places. At that stage of proceedings I could do no more by returning to Washington than I could by writing to Sturtevant and Greeley. What we did depended on whether or not our company had money to finance interference contests. I was in Wellsville, Ohio on my way west. I was following the agreed-upon plan and schedule that was to bring me back to Denver about December 1st. I was getting ready to get married.

CHAPTER IX

MORE WIRELESS AND LESS MONEY

"Getting ready to get married" had been repeated so frequently by me and others in our wireless company that it sounded difficult and Stevenson seemed to put "getting ready to get married" in the status of a major crime.

To get married it was necessary for me to drop off at Wellsville, Ohio on my way to Denver. In Wellsville I did nothing out of the ordinary in preparation, except to help my father-in-law carry out our trunk the night before our wedding so the house guests could not decorate it. Later we discovered they had attended to the interior by filling the trunk lining spaces with rice. The rice came out a little at a time. There was still some rice in it when I threw the trunk away forty-two years later, after it had crossed the U.S. several times and had been stored in attics, warehouses, basements and a garage.

I loafed and talked and got Sam Durbin who was teaching in that part of Ohio to come and be my best man. He had conservatively associated with the same crowd I preferred at Ohio State. We indulged cooperatively in literary and political efforts at which he surpassed me and most of the crowd. But when it came to stealing milk from window ledges in the University district, fish from Mirror Lake, food from outdoor coolers, campus signs and such illegal devilment, he rated zero while I got a passing rate despite my small size and small courage. The best roast turkey we ever stole should go partly to my credit or discredit. I was the only one small enough to crawl through the University cafe window and open a large window for the big boys. Sam was a debator and orator. I never debated and although I made so-called speeches, I doubt if anybody thought I orated. Sam supported me while I was being

married. Sometime after the ceremony, when I had revived enough to realize it, I thought Sam acted like he had enjoyed the occasion. We did not have any alcoholic liquids at the wedding but the turkey dinner almost brought me back to ordinary comprehension.

Although getting ready to get married was a vacation for me, it was tough on my fiance. It broke her financially and in almost every other way. She was teaching Greek and Mathematics and coaching the girls basket-ball team in Wellsville High School. The plans of the P & C. W.T. & T. Co. scheduled me to be in Denver on December first. Therefore, she had resigned to take effect at the Thanksgiving vacation and we were to be married on Thanksgiving Day. Her mother had taught the parents of some of her students there more than a generation before. The High School students organized to have fun with their about-to-be-married teacher. Something happened frequently. On one occasion the room in which she was to hear afternoon classes, was decorated during lunch hour. The decorations hung from the ceiling. The festoons were overall, trousers and shoes. Also they had to be examined and graded before their transition from the school marm I claimed to another teacher or teachers. I doubt if there was another young feminine college graduate who could teach Greek, mathematics and basketball. My girl played on the Ohio State co-ed basketball team. Not big but half Irish.

I did not know or hear of her before I went to O.S.U. Before I visited State I thought of it as a place to get acquainted with science and engineering. I had heard about the Monnette Hall girls of Ohio Wesleyan University which I regarded as a sort of girls and preachers school. I did not care much for preachers. I wanted a science and engineering school. Ohio State University had failed to include in its catalog or sales talk everything that could be acquired by going to that University! I got some science and

engineering there and a girl, too. This girl was the same one who had been too heavy when I tried to lift her from the O.S.U. armory tower by pulling on one end of the flag lanyard while she hung onto the other end (chaperoned by Pi Beta Philsisters). One of her Pi Phi sisters that I had known in college, Margret Arnold, lived in Wellsville. She, Sam and my father and mother were the folks at my wedding I had known for quite a while. The rest were my girl's family, including uncles, aunts, cousins, schoolmates and neighbors, father, mother and sister. Blanche Woodruff Butler was what was important. I was the fractional plus or minus quantity that was stealing ~~had taken~~ one of Wellsville's best girls and had balled up their High School program.

I think we were married. We were there before and after the ceremony was to take place. I remember seeing my bride-to-be coming down the stairs toward my level where I waited with a plain gold wedding ring with "Mizpah" and "November 27, 1902" on the inside that cost nine dollars in Philadelphia, and a room-full of folks. The first lucid moment I had after seeing the young lady stepping downstairs to music was when we were seated at a long table for a Thanksgiving dinner. Mrs. Butler had said the turkey weighed twenty-four pounds. Possibly I came to to look at the biggest turkey I had heard of. I recall hazes of faces and a large edible on a platter.

So far as I know there were no indiscretions except that we let the preacher take our marriage certificate. He wanted to do something about it - put it on a more artistic form - have artistic script used or something. His scheme may have been good for couples who continued to live in the town where they could see him every day. We left Wellsville within about three hours and went to Denver as bride and groom, crossed the U.S. a couple of times as papa and mamma and were grandparents before

our marriage certificate was returned to us.

With a lot of rice, we were driven to the railway station in a decorated carriage that sounded like cowbells, sheep bells and tin cans. High school students popped up here and there. They crowded the station platform and tried to detach my bride from me. On the train and seated we found there was a "just married" sign above us. Nothing quiet about it. Many of the disturbances and decorations were engineered by Fred Robinson who had married some distant relative of my mother-in-law. Fred was a traveling salesman with a long upper lip and such funny ideas and blarney as come from Ireland. Both he and my father-in-law were American born Protestant Irish. Fred was a talkative salesman.. My father-in-law, Tom Butler, was not a blarney. He was a quiet broad, two-fisted one, so well balanced that only his name and Irish face would cause you to think of the Emerald Islanders. He was a railroad engineer for the Pennsylvania, GAR veteran and Wellsville postmaster under his friend, William McKinley, until he tired of that and returned to "railroadin'". There must be something very magnetic about "railroadin'". My close cousins, further removed cousins, father-in-law, son-in-law and son went in for it. But there was not much "railroadin'" in our getting married, honeymoon or subsequent events. We rode two Pennsylvania and one Burlington trains to Denver.

I recall that we visited Will Truesdale between trains in Chicago. Will was a wire-telegraph manager and a relative of ~~my~~ one of my schoolmates in Richmond, and his wife was relative to my wife. The only written record of our honeymoon I find is that we had lower berth number 5, car 1 on the Burlington Chicago to Denver on Nov. 30, 1902. Berth cost $6.00. I must have omitted the getting married session and honeymoon to Denver from my expense accounts.

In Denver we stopped at the Albany Hotel as I supposed we would go on to Los Angeles in a day or two. But in a day or two I began to find out that going to Los Angeles would at least be temporarily delayed. Nobody was occupying the Denver office of the P & CWT & T Co. after New and Armstrong left. Bailey said the treasury was almost bare of funds. We left the Albany and went to room and board at Coughlins where I had roomed before. Bailey paid me fifty dollars on December 8th and on the 16th. After that I was unable to get money or definite information out of Bailey or New.

Mr. Livsay, a lawyer, and his son, Dowel, were rooming at Coughlins. As the P&CWT&T Co. still owed me money, I talked to Mr. Livsay about attaching their office furniture. We talked where Mrs. Couglin could hear us. I had a key to the office and went there the next day to check up. There was nothing in the office, although the furniture was there the day before. Interparty grapevine was presumably the reason for that quick move. Mrs. C. had probably talked promptly to her brother Democrat, who as promptly told the information by telephone to the Republican contact who would do him a favor sometime. Actually the Couglin residence where one could obtain a room and meals was cared for chiefly by Aunt Mary Coughlin and Aunt Sue Coughlin. Their brother had married an Alexander and had become the father of Alice and Joe who called them Aunt Mary and Aunt Sue and so did I. Mr. Coughlin had died two or three years before I met his family.

The widow Coughlin was on the assessor's office payroll because her brother, Mr. Alexander, was the assessor. Sue and Mary were maiden ladies. All three women were probably in their forties. Sue worked in the Daniels and Fisher department store basement. Aunt Mary spent all her time with cooking and housework and Sue as much time as she could except when they were to mass or some other church obligation. Mrs.

Coughlin was a Protestant and church did not take her time. She attended to her political job, Joe, Alice and some of the housework. She was a natural, overflowing gossip. She found out that New's household goods were stored in Wilson's warehouse and told me. That information was not of much good to me according to lawyer Livsey because I made no claim against New personally and although he was an officer, it was a matter of question as to whether it could be proven that he actually owned anything attachable. According to New's stories about Stevenson and Bailey and other people's stories about New, it looked like nothing could be collected from them. Bailey was seemingly an unusually fine man, but dominated by Boss Stevenson.

While I was in Washington, D. C. Stevenson, New and Bailey had held a meeting in Denver and Bailey had attended a meeting in Pierre, South Dakota with second vice-president Hipple to ratify several procedures, including the sale of the California stations for $5,000.00 which was listed as indebtedness. That was done for both companies and may have meant five plus five thousand dollars. I had not heard of any indebtedness that would total more than about one thousand. There were two companies, the Pacific and the Continental. For Argument, they may have stated that White's Point station being on the mainland belonged to the Continental Co. and that the Avalon station being on Catalina in the Pacific and loose from the continent by twenty-five miles, belonged to the Pacific Co. Both stations were within the State of California which was supposed to be under the sovereignty of the Pacific Co.

Letters from Swenson to me were interesting and foreshadowed future probabilities for the Pacific Co. On September 2 he wrote that atmospheric disturbances were decreasing. We gave those interferences more nearly the right name then. Later they were called "static". Static

was probably as incorrently applied as any of our words after the gay nineties. Before and during the "gay nineties" it was inserted with other words to mean something that was standing still - not anything that was hopping around, kicking up a disturbance, ruining wireless and producing profanity.

In that letter he also said they (the Whites Point crew) almost lost the cottage to a black man. New was supposed to have obtained rights to that cottage at Whites Point from Sepulvida, the Mexican owner. Swenson was figuring on living in that cottage with the little wife he hoped to get soon. He rented the cottage by telegraph before the black man could reach Sepulvida. "Business continues fair (good considering the few people on the island)". The summer vacationers were leaving.

Sept. 21 Swenson wrote from Avalon; "Atmospherics not bothering much now --- kept coming in earlier every day, when it started in, --- we were able to get business through before day ended. --- sufficient at times to burn out the spot (sensitive spot on the iron oxide). Tried shunt resistances, inductive and non-inductive, but didn't prove to be the pill. --- I am going east after my better half." Previously he had thought he might be able to get her by some other way, such as our picking her up some place on the main line in Iowa. But he said she was very small and timid. Therefore, he had to go for her.

Sept. 29 Swenson wrote; "Atmospheric trouble ended gradually --- receiver working fine. --- Business no good now though for there is nobody at the island. --- Fred (New) is here at Point now where he says the feed is best. --- Primary of induction coil gave out --- and put in spare". F. New was forced on us by his father. We did not need him. As I was preparing some plans and specifications I asked Swenson for

his ideas. In this letter he said, "A gas engine is a gas engine the world over and cannot be depended on like steam". Of three gas engines that had been delivered to us on a two engine purchase, one was reliable, one was taken back by the maker as not meeting the guarantee and the one that replaced it was bothering Swenson. That was in 1902.

"The Swenson home is not at the Sepulvida mansion yet. I crawled under the house and got twenty dead animals - squirrels, rats, rabbits and one skunk --- Don't stay too long --- my little girl says she only weighs 89 lbs. now and I want to get back before she gets so small that I'll ha e to keep her in a bottle. (As it is, I will have to shake the quilt to find her)." "P.S. Just got contract. Thanks for your efforts in my behalf." The contract he mentioned was the one in which he was to get a stock share in the future Pacific Company. Swenson was the one I regarded as my closest assistant. He was as he said, a Swede, but he was born in the U.S., a high school graduate and a correspondent school student. He could do nice jobs in metal on a lathe and by hand. The last I saw of him, several years ago, he was repairing watches when he was not looking after the maintenance of an office building. That was when I collected some testimony from him for the Department of Justice.

We saw and spent a little time with Swenson and his bride in Denver. He went to Fonda, Iowa and brought his bride back through Denver. Later I received a letter from Armstrong and later from a man whom Armstrong had presumably influenced to put money into buying the stations or in the formation of another wireless company to succeed the P&CWT&T Co.

The Pacific and Continental Wireless Telephone and Telegraph Companies' treasuries had allegedly and seemingly gone dry. Provision had been made to sell the stations; Armstrong had interested other capital which had helped New to rid himself of Bailey and Stevenson and the new capital had apparently been influenced by the wireless tolls collected

during the first month or two of service. With the end of the summer season when vacationists returned to school and business - the paid business - fell way down and the slump apparently so discouraged the new angels, they would not contribute any more than was necessary to keep the stations going. Two operators were necessary and Swenson was needed to make repairs. According to Armstrong's letter, he had to get a job in real estate work to keep himself and family and he was very sorry he had interested the new capital. He said there was talk about going ahead with wireless but that was all and that New was disappointed. Also the patent attorneys indicated by their letters to me that they had not been paid for what they had done.

That wireless circuit from Catalina to the mainland continued with a lot of changes. The location at Avalon changed. The locations on the mainland changed over only a small portion of what Los Angeles has dominated. The equipment was what I designed, then De Forest, United, Marconi, USN finally AT&T and Western Electric. It was owned by P&CT&T Co., PWT Co., De Forest Co., United Wireless, American Marconi, U.S.Navy and AT&T or the local phone company.

About late 1903 or 1904 Pacific Wireless obtained some financial stimulant and built a station on Russian Hill in San Francisco and another at Friday Harbor in Washington. Those stations did not render profitable service, if any service. As I recall it, Swenson left them at Friday Harbor and moved to Spokane where I found him and obtained an affidavit for the Department of Justice. The U.S. had been served for infringement relating to detectors. I had used some of the devices before the patents in suit had been applied for. By getting Swenson's testimony we proved that those devices were used in paid commercial service in 1903. Such service takes priority when it precedes a patent applicant's invention date. Despite the fact that my applications relative to those cases were never issued as patents because the company failed to pay me

and the patent attorneys, yet the use of those detectors in public service gave them priority insofar as defending the U.S. government case was concerned.

The wireless circuit between Catalina and the mainland continued from the 1902 opening to 1923. The equipment changed and the locations of the stations changed at Avalon from the hill above Avalon to about the level of Avalon. The mainland station shifted to San Pedro, Los Angeles and Long Beach. While I was with the American DeForest, the United Wireless and Marconi Wireless Telegraph Co., these companies took over the Avalon station and mainland station. During the war (1917) while I was with the Navy, the Navy took over the stations. Later Francis Ryan, one of my ex-associates with the Navy and two other young men (Clement and Martin) made that a two-way wireless telephone arrangement for the AT&T, that could be plugged in by long distance operators to the private home phones in Avalon and at many placed on the mainland. The week-ending boys and girls (16 to 60) at Catalina and their co-talkers on the mainland said such naughty things that listening to them became west coast entertainment. Amateurs, military and commercial wireless folks listened from Mexico to Canada and on Pacific ships. I listened to their talking at Puget Sound Navy Yard in Bremerton, Washington. I had equipment that could tune to anything from 60 cycles to 60,000,000 cycles and was making experiments at fifty million cycles. I found the Catalina to the mainland signals were good at times and what they said was not bad most of the time.

That Catalina to the mainland wireless circuit was apparently self-sustaining from the start on a year around basis but it looked like it would not sustain any more personnel than a maintenance man and two operators, and it did not attract capital then to be spent in the development of better wireless and more stations. We provided the wireless

service but our customers walked out on us for the winter. We thought we would get more money when we provided wireless service but we got less money. Successful production of wireless service decreased our financial resources.

Seventeen years later, when the AT&T took that circuit over, they apparently used it as a guinea pig for testing several wireless telephone schemes. The amount of money the AT&T had to experiment with was very great compared to all that had been previously used over that stretch of wireless water. What AT&T spent then was only mere change compared to what they spent for wireless experiements twenty-five years later in the limited field of wireless that they could later operate.

I remained in Denver and went to work at a lower salary for the Carstarphen Electric Co., where we had built the wireless. Captain Ives of the Army Signal Corps wanted to make some wireless experiements; doctors wanted X-ray equipment that used coils like we used for wireless; I had some experiements I wanted to try; Carstarphen picked up a contract with Charles Ashley who wanted to make a wireless telephone for which he wanted special induction coils; a company that was making nitric acid from air and water wanted high voltage induction coils like we used in wireless; and, Professor Lucien I. Blake wanted some high voltage equipment for use in the electrostatic separation of zinc ore from dirt. Carstarphen's schooling had been limited but the latest in electrical science was most interesting to him and he wanted associates who could understand new devices and help him always make them.

Ashley took the coils we made for his wireless telephone. He went to Chicago. I got the impression that he would go ahead with the wireless telephone work there. I went to Chicago later and looked him up. He was working as an artist retouching photographs for making half-tones. He seemed to have abandoned the wireless telephone scheme entirely. I never

I received an odd offer in 1902 or 1903. A man investigated the California wireless stations and followed me to Denver. The job was supposed to be wireless in China. I was to get $2500 per year, the rank of colonel in the Chinese Imperial Army, quarters, rations, food for all of us, transportation and my uniforms. Presumably all we would have to buy would be some clothing for my wife and such children as we might accumulate.

In later years there were several opportunities that I did not accept. Among them were two more odd ones. In 1907 while waiting to get on a train for Seattle, I was talking to the telegraph operator at Gobel Oregon about the wireless station I was building at Astoria. The operator later became the wireless operator at Astoria. We were overheard by a chap who followed me into the train and offered me twice what I was getting to go to Alaska and build some wireless stations for a railroad that was trying to go from the mouth of the Copper river up the river into the Copper district. They did not succeed, and this railroad starting at Cordova beat them up the river. Again I oddly went over that territory later when I was Naval Radio Aid in charge of maintenance of stations including one a mile 7 and 14 on the Copper River railroad.

In about 1910 I got another odd opportunity. This time south. A chap who was in wireless and to whom the job had probably been offerd came to me and said he could get that job for me. It was for supervising the construction, maintainance and operation of stations tapping the rubber district in South America. This was to pay me a little more than twice what I was getting as salary. Added to that I was to have access to all rubber reports before they were transmitted to New York and with such information I could play the rubber market and make three times as much in addition to my salary. My answer was that I already had experienced the mountain fever and did not want to add a South American fever to my ailments.

was sure just what his scheme was. I think he expected to produce very high spark frequencies. High spark frequencies were produced from time to time and used to transmit partically intelligible speech. I made some induction coil plans for M. O. Nelson in Chicago, investigated some possible sources of material and returned to Carstarphen's in Denver. Years later Nelson became shop superintendent for a United Wireless factory we had in Seattle.

I tried giving myself a company name to sell wireless instruments. In Denver a new office building had been erected and given the name Majestic. I called myself the Majestic Electric Co. and gave the Majestic building as my address. I had a simple little transmitter and used the steel and oxide of iron contact for a detector. Telephone receivers on a head band were connected to the detector. The messages were sent by moving a pencil across a rough file-like surface like marking dots and dashes on paper (.- -..), ~~xxxxxxx~~ Every time the pencil point touched a metal bump, one or more sparks were produced between the point and bump. The rough metal surface was connected to ground and the pencil point (an insulated metal point, wire) was connected to the antenna. A drycell and choke coil completed the outfit. It would work several hundred feet. I thought younger boys could have fun with it in their homes or between adjacent homes. It worked particularly well when the transmitter and receiver were grounded to water pipes or steam pipes.

In a little more elaborate form, roughened contact strips were placed beneath the letters of the alphabet. If the space below the letter "A" was scratched with the sending pencil, the listener heard a scratchy dot and dash in his phone. If the sender drew his pencil across the space below "B", a dash and three dots were heard in the phone.

I did not have money enough to stock equipment, print a catalog or say much in ads. I bought an inch of space ($3.75 per wk.) that ran

five weeks, beginning May 23, 1903, in the Electrical World and Engineer, 114 Liberty Street, New York City. The Ad read: "Wireless Telegraph apparatus of all kinds. Majestic Electric Co., 819 Majestic Bldg., Denver, Colo." On June 1, 1903 I sent the Saturday Evening Post, $11.88 for a five line space, once. It read: "Wireless $5.00 up. Telegraph and Telephone Instruments. Majestic Electric Co., Denver, Colo." I received a few inquiries which I tried to handle by typewritten letters and form descriptions. I didn't sell anything.

Other wireless folks visited Denver from time to time. Marconi representatives arrived in Denver. They gave wireless demonstrations from the stage to conspicuous places in the aisles of the Orpheum vaudeville house, and Marconi stock was offered about town. There was some grumbling about wireless stock salesmen and one of the Marconi demonstrators became so frightened when his coherer receiver failed to work in an Arizona demonstration that he telegraphed theoffice. "The buzzer won't buzz. What will I do?" Receiving no answer, he headed for New York leaving the buzzless receiver behind.

The Fessendon crowd had abandoned their attempts to handle business between New York and Philadelphia by wireless. The Gehring-Shoemaker schemes slid from the name of American W.T&T Co. to the Consolidated Wireless Telegraph & Telephone Co., then to the International Wireless Telegraph Co. and then to the American DeForest WT Co. Gehring had apparently been unable to revive stock selling by changing company names. A company called the Greater N. Y. Security Co. was a part of this last move.

On one occasion a man brought us a wireless transmitter coil or transformer that was marked DEForest Wireless Telegraph Co. It must have been one of the early few bearing the name of DeForest. The others

I saw were marked American DeForest. The man who had it was rather mysterious. The primary of the transformer was short-circuited. If he had been a practical electrical man, he should have known that and could have fixed it quickly. We supposed he was on a stock selling mission but we did not notice any DEForest stock salesmen in those parts at that time.

I kept some other wireless schemes going and had a number of other interesting jobs. Wireless and other stunts gave us (Carstarphen Co.) the reputation for knowing how to do things with electricity that other people did not know how to do. I repaired the first ~~telephones~~ telegraphone (wire recorder) that came to this country from Denmark. Stock jobbing seemed to be the main feature of their use for years.

The experience that was the greatest surprise to me was connected with an automatic blue printing machine, chiefly because I knew so very little about labor unions. The Denver Union Water Co. bought an automatic blue printing machine. They could not get it to work. Carstarphen told me that several people had tried. He told me to tackle it and see what I could do. I had made blue prints but had never seen a machine that would automatically direct the light from an arc lamp through a large tracing evenly for a definite time of exposure. At the water company office I was shown a vertical cylindrical device. It took up considerable floor space, was taller than I and occupied a room by itself. Also I was shown the instructions that came with it and then left alone. Nobody looked in at me, I thought. Examining the instructions and machine caused me to believe it should work if properly connected. Mechanical parts worked freely and no magnetic switches were damaged. A power line came up through the floor. One side of a switch was connected to it. All necessary wires were available but some were not properly connected. I connected wires and adjusted parts as

the makers instructed and the appearance of the machine seemed to indicate they should be. When the power was switched on everything worked properly during several trials. The main power switch was not on the wall where it should be mounted. It was lying on the floor. I picked it up, fastened it to the wall and was connecting one of the power feed wires to it when somebody said: "Have you a card?" I looked around at five husky chaps. I said I did not carry my cards in my work clothes. I thought they meant my calling card. They went out and came back with the man who seemed to have charge of the equipment in that building. He said for me to stop until after we called up Carstarphen. Carstarphen sent over a man who did not work in the shop but did house wiring. When he came the Water Company employees seemed to vanish again. The wireman explained to me that all the union employees in the building had threatened to strike if I completed that three or four feet of unfinished wiring. Then I realized that what the husky boys were asking me for was a union card. I was that dumb about unions. Our union outside wireman completed the half of the wiring that I had not completed. The union boys They must have been watching me all of the time to see that I only did what they did not know how to do.

It was characteristic of the early wireless men that they were not alike. They were not unionized, standardized, organized or orthodox. I believe it has been said of each of the early wireless men that he was the only one of his kind. Early operators were not alike but they were the first wireless folk to show common characteristics. Up until the time wireless became a service of such extent that there were numerous applicants and some one person hired operators only after the applicants had answered questions the way that examiner thought they should be answered, did wireless operators begin to be much alike. They became sort of standardized or sifted by the questions and later they were unionized.

Early engineers and inventors were probably the least alike. Early promotors differed in many ways. I sometimes encountered promotors' performances. Personally I never had a promotor except myself and relatives or friends, temporarily and briefly. Relativity was a subject that Einstein and I studied at the same time. We probably worked the same problems. He went in for what is called pure science. I went in for science and its practical applications to present needs, which is usually called engineering.

After the St. Louis Fair, publicity in Denver papers boosted DeForest and White. White had discovered in Denver and had him photographed (with White) his old friend Colonel C. C. Wilson. Their pictures and Abe's stories took prominent places in the papers and were to the effect that Wilson would work with President White of the DeForest Company. Wonderful wireless stations would be built and wonderful ground floor opportunities would be afforded to those who read the Rocky Mountain News, the Denver Post and to other special selectees. A rare opportunity for the people of that rarefied atmosphere.

White's name was Schwartz. Changing his name from Abraham Schwartz to Abraham White produced, after Abe became prominent or notorious, a lot of comments. From what I heard and saw of Abe, I suspect he was influenced by more than the usual reasons for name changing. Maybe he changed his name from Schwartz to White because he wanted to be colorful and as black is the absence of color, he changed to White which is all colors. The last time I talked to Abe which was in 1942 or 43 at a banquet of the Veteran Wireless Operators Association, our conversation was largely about people he and I were associated with. We talked about DeForest's numerous marriages. We thought DeForest had been married once before the time the Saturday Evening Post article by Samuel Lubell had started him from scratch in their account of his matrimonial successions. His recollections corresponded to mine. We thought Doc started his

marriage certificates in collaboration with a beautiful brunette. Abe in 1942 was old but still colorful and he talked easily about DeForest and his (Abe's) latest fireproofing solutions. Abe served a term in the penitentiary after his wireless days. I believe some of his fireproofing promoting was what put him in the pen.

The most prominent story about Abe at the time he was getting people to invest in DeForest wireless stock was to the effect that he had made many thousands of dollars in a few days on an investment of two cents. The government had advertised for bids on an issue of U.S. securities. Abe wrote a bid, put it in a suitably addressed envelope, put a two cent stamp on the envelope, xxx and mailed it to Washington. His claim was that he paid two cents for the stamp. Some hotel lobby may have contributed the writing materials. He was low bidder and awarded the securities. He had no money to pay for them. He went to Russell Sage, told Sage the story and so fascinated Sage with his cleverness that Sage put up the money, resold the securities and split the profit with Abe. That was about what happened according to the published stories and what White and his secretary, Robbins, told me. Robbins was an executive office employee of the United Wireless that I bowled with frequently between 1907 and 1911.

Abe did not hide his White light under anything. He teamed up with DeForest, publicized his investing ability and recommended DeForest stock as an investment. He and DeForest put on a big show in 1904 at the St. Louis Exposition in which DeForest was a big white light. DeForest's name shown from a high tower and DeForest said he reclined on a couch high in that tower and looked down on the world. I believe he then regarded the world below his as his oyster. There were electric automobiles bearing DeForest signs, equipped with wireless transmitters and receivers. I believe they were first used in New York, then at the St.Louis World's

Fair and late in 1904 in Denver. I saw one or two of them but from the outside only. When I asked DeForest about them, he did not seem to know much about them and said they were Abe's idea. I heard them called - Abe White's showcases.

Col. C. C. Wilson had a building and loan office on the second floor of the Mining Exchange building at 15th and Champa Streets. The large conspicuous windows of his office bore gold lettered words about the DeForest Company. Mr. Wilson's initials xxxxxxx came from his name of Christopher Columbus. The Colonel title probably came from his being a Texan and having been an confederate soldier. He was a remarkably clean looking old fellow, always showing a lot of white shirt, except, of course, he did not look so nice if you happened to meet him while he was on the way home after an all night poker game. When he was listening and thinking closely, he picked at his left hand with his right. Some Yank had shot through his left hand and a finger or two did not work well.

They installed a wireless set in Wilson's office and another at the site of the old Grant smelter in northeast Denver where the antenna was supported from a brick smoke stack 352 feet in height. Then they put one in a room back of a bank in Boulder. It burned out the lighting companies power transformer and a length of lamp cord on a bank partition flashed, flamed and smoked. Very disconcerting to bankers and their customers. All hands wanted those fireworks stopped so the inquiry came to Carstarphen for somebody who knew about such things. Carstarphen turned them over to me and from what they said, I thought I knew what their trouble was and agreed to go to Boulder the next day. The trouble was what I expected. The wireless transmitter antenna was near lighting and power lines. Those lines were not shielded from the electro-magnetic waves produced by the wireless. Being so close to the transmitter

antenna a very high voltage was induced between the light or power lines to ground. That high voltage jumped to ground and power line current followed until something burned or melted away. I knew about that and had condensers that would carry off the high voltages caused by the wireless but would not let power current follow. I had encountered such trouble before and continued to encounter them for many years. I corrected that trouble temporarily. The trouble at Boulder occurred again later, probably because somebody changed a power circuit or disconnected a protective device. Several years later Dreamland, a Coney Island Park, where we had a station, burned down. I believe because somebody changed the wiring or removed some of the protective devices I had installed. The same troubles occurred on steamships when somebody added another connection or disconnected the protective devices. After lighting and power circuits were installed in metal covered conductors, those troubles decreased.

The chap who had started to put in the stations for the DeForest Co in Colorado was Charlie Cooper. Charlie was not an engineer or electrician and did not want to be. He was a Canadian telegraph operator who had taken a job as operator when the DeForest Company put in a station at Toronto in 1903. During the fair in 1904 he was at a DeForest station in Springfield, Illinois. After the fair he was sent to Denver to get things started there. Charlie loved to talk people into doing things and wanted to be the DeForest advance agent who would talk folks into giving free sites for our stations in the various towns and cities of the proposed DeForest overland wireless chain. I believe he talked To the then governor and later Senator Warren of Wyoming out of a free site in the water works grounds at Cheyenne. To build the station I had to contact Warren (The father-in-law of Black Jack Pershing) and gathered from what he said that Cooper had obtained the concession. Cooper probably was the one who got the free site at the college in

Colorado Springs, the swell site at Minequa Park in Pueblo from the city dads and other sites. At Astoria, Oregon he got one free site that, if we had used it, might have disturbed some of the earliest settlers of the Northwest and some ex-employees of the Hudson Bay Co.

To erect masts we buried lengths of timber about the size of railroad ties in the ground to use as anchors for the mast guys. We called those timbers "dead men". I did not like the first site Charlie found in Astoria. It was in an old cemetary. We did not put the station there but on the eminence where we could look down on Youngs, Lewis and Clark and the Columbia Rivers and in the evening a thousand salmon fishing vessels with their sails in the sunset. Astoria was where the Century Club drank whiskey straight before lunch. They were from 79 to 103 years old.

After the Boulder station incident Charlie Cooper talked his company into putting me on the payroll to build and maintain stations while he went about other things. Their plan was to go into overland wireless on an extensive scale plus stations on ships and sales of high powered stations to the government. Their plan for building a chain of stations from Wyoming to Texas would alone require considerable engineering that Cooper did not like and salesman-like work that Cooper liked. So I was hired as a superintendent of construction and maintenance.

One of the DeForest operators was the kind of man who tries to make people believe he is superior because he is taller and weighs more than his associates. This one was very large with a large streak of meanness and a lot of ignorance. His name was Penn. He said he came from Boston and seemed to think nobody, at least nobody west of New York City, could know as much as he did. At the Grant smelter station he managed to snarl

1 X P 21

Life magazine March 13, 1950 shows photographs of the demolition Feb 25 1950 of the Grant smelter 350 foot brick smoke stacks. It was such a land mark that an estimated 350,000 Denverites and others came to see the stacks fall. Built in 1892 it had become a sentimental landmark. It was not used as a smoke stack after 1902. We used it to support wireless antenna in 1903.

The first demolition blast blew out one side exposing two flues and the space between the outside and inside walls. The ladder to the top was between the inner and outer wall, it was rock & iron set in the outer wall. When I climbed it to fix the antenna, I could not see them and near the top the space was so narrow that my back scraped the inner wall near the top. It did not bother me as much as climbing where I could see. But even there where I could not see down as I up I was not strictly relaxed and peaceful. I did not climb enough smelter stacks and towers to feel at ease in such high places.

the antenna so badly that I had to climb to the top of the 352 foot stack to unsnarl it. The walls were double and you climbed a ladder on one wall with your back scraping the other, if you were not too fat. On the top of the stack, I sat on a sloping iron surface about three feet wide and held onto a lightning rod with one hand while the other hand worked on the antenna. That operator started the transmitter and sparks jumped all around me. Cooper and Reynolds stopped him and wanted to know why he did it. He said he wanted to see what I would do. The likely thing for me to do was to jump when a spark hit me and fall off the stack. Sparks hit all around me but did not hit me.

Penn

~~He~~ was sent up to Altman, Colorado, two miles above sea level where the winter temperature hit forty below. The operating room contained a round stove with one hole on top where things could be cooked. The walls were thin and it was warm by the stove only. The operator lived there. The other room was oversize for a three quarter bed. In the winter operators dropped any reasonably solid toilet contribution on a newspaper and shoved it under the bed. Quick freezing that was not advertised but it was very convenient, efficient, odorless and sanitary. Half a dozen sheets of the Rocky Mountain News or Denver Post were large enough for over-the-winter commodes for one. About April they were still rocklike and were thrown out to mingle with the more substantial rocks, some of which contained gold. I panned gold from rock taken from the road in front of that station.

After some months Penn made a report saying the station had been struck by lightning. He was returned to Denver. I went to Altman and found the receiving tuner had been burned out as he said. I found something else - he had not left the antenna where it was but had pulled it around at a right angle to where it was. In that position the antenna was above a high tension power line where if the guys sagged, the

antenna could touch the power line and send enough current through the tuner to burn up much more than the coil in the tuner, but when the tuner coil burned there was nothing else connected that was not insulated. It is a wonder he had not killed himself.

We had a young Canadian boy operator who was too young, too generous, too conscientious and did not have enough meanness in his system to take care of himself. Charlie Cooper tried to look out for him and so did most of us occasionally. When I was completing a station he usually showed up to help and be the first operator. He was not a fast worker but fast enough and he broke in the first permanent operators without friction. Penn "burnt him up" at every opportunity, which means Penn sent the Morse code to Reynolds so fast that Reynolds could not read the code. Reynolds was so young and anxious that he would cry when he failed to read the messages.

We also had Blakney who was the fastest operator I had heard about. He was a Holy Roller and got drunk at intervals on half-and-half (half porter and half ale). One story was that he could be so drunk that he could not navigate through the tables in a wireline office but when they led him to a telegraph table and put his hand on the key, he could out send and out receive any of the other operators. Blakney was older than any of us but Col. Wilson. He was a very likeable chap and very useful except after a drunk or when the Holy Rollers were active. The Rollers worked themselves into a state of excitement that they celebrated by rolling in the street. Streets at that time were not concrete and they usually carried a fairly soft surface of unclassified dirt and horse manure. There were a few automobiles which make noises and bad odors.

Blakney did not brag about his speed and I doubt if some of the operators had heard how fast he was. Penn was quite unpopular and probably had not been told about Blakney's ability. Penn was then doing

the telegraph trick in the Mining Exchange offices which was used mainly for demonstration. Reynolds was with me at CW, the station west of Denver that we were trying to make powerful enough to work with Kansas City. We could talk to the Mining Exchange office by our wireless and by wire telephone. Reynolds was receiving at C.W. from Penn. Penn started burning him up. We expected it and Blakney took the phones to receive from Penn. I called ~~Treasurer~~ Archer Diboll on the telephone and told him what was happening and asked him to watch Penn which he could do from his desk. Penn thought Reynolds was the only operator at C.W. When Penn finished, Blakney wireless'ed receipts OK and said I have seven for you. He imitated Reynolds sending. Penn after an amazed hesitation telegraphed GA (go ahead). Blakney started the seven messages at Reynolds speed and increased to a speed that was far beyond Penn's receiving ability. Diboll said Penn wrote, then fast, then furiously, then took off the telephone receivers and looked at them. I do not know when Penn left but I do not recall seeing or hearing about him after that.

Since leaving the P&CWT&T, my wife and I had accumulated some things. We remained at Coughlins until we obtained a room at Mark Nicol's house. Mark was outside contract man for Carstarphen. Mr. and Mrs. Nicols rented us a room. We furnished it with a couch, gas plate, frying pan, some photographs and a minimum of other eating, sleeping and scenic features. From there we had shifted to successively larger or more convenient places until at the time I joined up with DeForest we had three rooms on one floor, a front and a back porch, a basement and a dog (until the streetcar motorman failed to slow up for him). He was probably of German descent, - long and low and his name was Budge. After a little delay we had added a daughter, Ethel Butler Marriott. She was born almost two hundred and ninety-five days after we were

married. Blanche went back to Wellsville, Ohio to have her. I remained in Denver and had a severe case of toothache the night she was born.

For some time before I went to work for the American DeForest Wireless Telegraph Co., Charlie Lewis and I had been planning to start a little shop to be called The Denver Electrical Laboratory. My going with the DeForest Company kept me out of that. Lewis went ahead with the Denver Electrical Laboratory. He was a member of the Lewis family who had owned the Lewis department store in Denver. Some of his relatives still owned the store at that time. Also I had cans and material for a dry fire extinguisher that I sold to Lewis. The trademark on the extinguisher was a Swastika. The old meaning of that emblem was something like "good luck". The idea being that it would be lucky if one had one of those extinguishers handy in case of fire. The dry powder was not injurious to electrical devices. I had some special equipment made for the DeForest Company at the Denver Electrical Laboratory and some at the Carstarphen Electric Co. at different times. I believe Lewis gave up the electrical laboratory project within two or three years to market a bucking-bronco toy he had patented. Carstarphen expanded, adding an automobile shop to his electrical business and closed up in about five or six years. I lost track of them. Denver was my headquarters and we bought a six-room house at 566 High Street, but I was away more and more and was not in Denver at all after 1907 except for a day or two in 1915.

CHAPTER X

DE FOREST WAS NOT AS ADVERTISED

Wireless theorists, scientists, inventors and engineers did not know much about wireless. The promotors and officers knew much less. The assistant to an officer and a promotor of the De Forest Co. were looking at the electrolytic detector in the Denver (DV) station when one asked what the liquid was in the detector. Somebody replied: "It is a secret fluid which only De Forest can produce". That caused me to say: "Oh, hell, any acid or alkaline solution will work more or less in that detector and anybody can produce a solution that will work if he can urinate". That is a translation from the nastier words I used. Later I learned I had shocked some one or more of those who heard my comment, not because I used vulgar words, but because I evidently did not regard De Forest as a super-mentality, and what I said was reported to Col. Wilson. Whether or not the tale was carried to Wilson to get me in trouble, it had the opposite effect when the De Forest Company had to stop using the electrolytic detector because a court decided De Forest had not invented it. After that Wilson would stop me frequently to ask for my explanation of some technical feature of wireless in general or about what we had to use.

Wilson and others had been led to believe the De Forest antenna were super-mysterious. I demonstrated one day that messages from the Denver Grant Smelter station could be received in Wilson's Mining Exchange Building office by using the iron framework of that building in place of the usual antenna. Wilson went to a lawyer and wanted him to get Wilson a patent on using copper roofing of buildings as antenna. The attorney broke this news that I suspect the kid not file the case.

American De Forest Wireless Telephone and Telegraph Co. sets comprising a transmitter and receiver were rugged, simple and standardized.

Nothing outstandingly new, but sensible. Clyd Marshal, an electrical engineer, who joined the company at the St. Louis Exposition, was an advocate of simplicity, rugged construction, standardization and everything else that contributed to economy. He seemed to be of Scotch descent. He belonged to the spend-thriftily or don't spend class. Those rugged, simple and standardized characteristics continued from 1914 through the De Forest, United Wireless and Marconi Wireless Telegraph Company of American companies, fading out after about 1922 when the latter company came into power. Marshal evidently was against applying for a patent on every idea that a patent attorney could get a patent on. To some extent he was right. I once said I could prepare for attorneys a different patentable wireless idea for them to put through every working day for a year. But I did not say they would be satisfactory ones. The art was not so big then and I knew it fairly well. I presume Marshal had a great deal to do with slowing up De Forest's efforts to patent everything he could think of.

One of the early ideas in the De Forest Company for standardized wireless sets; that is, sets that were all alike, was to fix it so operators could install the sets and keep them in working order! To some extent that was practical. Usually operators could, with the help of local electricians, install a set that would work if the installation was made in a place where the wireless would not induce destructive voltages on nearby lighting circuits or in a place where wireless waves were not absorbed or undesirably reflected by the surroundings. But if the equipment delivered to an operator for installation did not look on the outside like the standard equipment he was used to, he might get into difficulties.

A chap whose only knowledge of electricity was what he picked up as an operator had been trying unsuccessfully for some time to install a station at Trinidad, Colorado when the head office told me to go to

Trinidad and see what I could do. I went there and the operator, who was and maybe still is a friend of mine, and I looked the scenery over. Gambling was customary or rampant. Anyhow it was located conveniently. Below the station was a saloon where we played a slot machine. At the hotel was Keno, Roulette, Poker and some gyp entertainments that I did not know by name. The station was on an elevation out of town. We looked the gamblers over the evening I arrived and the station the following day. He had done a neat job that would have worked if he had not connected the transformer backwards. The transformerswas not built in the shape of a De Forest transformer but like a power or light transformer. The terminals on one side were bigger (thicker) than those on the other. The operator had not studied electricity but had heard that what produced the spark was high voltage. To him high voltage meant big, so he connected the big terminals to the condenser and spark gap and the little ones to the key and power line. That transmitter was probably the best in the De Forest system, but it was in a location where there was little use for it.

The American De Forest W.T.Co. apparatus tuned better than the wireless devices I had previously used. In 1899 Marconi had told the U.S.Navy he could tune in and out stations at will in New York Harbor but he didn't. In 1901 the American Wireless Telephone and Telegraph Co. and the Marconi Wireless Telegraph Co. of America could not report the yacht races at the same time because they could not tune each other out! In 1903 Fessenden claimed he could tune out undesired stations under similar conditions in about the same places in New York harbor and tried to demonstrate to the Navy that his apparatus and operators could do it. The boys worked hard at lugging around a tuner and at keeping it secret but De Forest transmissions broke up their receiving. The boy operators were good enough but the wireless transmitters of that time did not produce what could be tuned to like present day

transmitters do. The stations we had around Denver in 1905 differed enough so that we could receive from a desired station if some undesired station was not too near or too powerful. Even so and considering that we controlled all stations within fifteen hundred or more miles of Denver, we did sometimes lose messages due to station interference. The promotors knew that and sometimes their prospective customers had heard about it and asked them how we could avoid such station interferences. Those questions were frequently put up to me and I told them a general theory of how it should be done, was done to some extent and would probably be done better in the future as wireless improved.

One of the promotors who came to Denver about the time White (ex Schwartz) arrived was half Jewish and half Irish, according to his own remarks. He was Koperl and was a promotor but he may or may not have sold any stock. He seemed to be a lawyer and investigator who majored in wine, women and song. He couldn't sing. He wasn't young and would call himself grandpa while he tried to pick up acquaintance with some woman. After he established diplomatic relations with her she would be introduced to the young wireless operator at his table. That took care of the women and operators. Grandpa could take care of any and all drinks, shrewd remarks and snappy stories. He was red, round and rheumatic. When he and I had adjoining rooms in the Oriental Hotel in Dallas, Texas, I had to spend about fifteen minutes every night rubbing his shoulders with horse liniment.

Shortly after I joined the De Forest Co., Koperl asked me how fast wireless waves went and how one station was prevented from interfering with another. I said they went 186,000 miles in a second and that interference was prevented by tuning something like what could be demonstrated with pianos. For example, if two similar pianos were placed in

the same room and the dampers removed from the wires of both pianos and a wire on the first piano was struck, the corresponding wire on the second piano would vibrate because those two wires were tuned to the same sound wave lengths. Other wires in the second piano might also vibrate but not so loudly. Koperl opened his mouth, inhaled the cigarette smoke in it, squinted his eyes at me, finished his drink and ordered another one. I did not see him again for several days. Then he had something to tell me. He said: "A fellow asked me how we could get our messages through when several wireless stations were sending. I said our messages travel 186,000 miles a second and I don't see how the hell anybody else's messages could catch them."

Early in 1905 Dr. De Forest came out from New York to see us. He looked at stations. By the bank and almost in front of the Boulder station E. N. Pickerell took his picture. That picture was not posed. It looks to me like the picture of a rollicking young man that could and would take the girls and was not "ugly" or "homely" as he has been so frequently described. According to stories he was voted the nerviest and ugliest in his class at Yale. Most of the pictures I have seen of De Forest were posed to make him look like a deep, almost dead, but far seeing scientist or something else that he did not look like to me.

Cooper and Koperl went about providing Doc with entertainment. Among the women with whom Koperl had become acquainted was a widow or grass widow who was referred to an Agnes. Reynolds frequently mentioned her. Koperl and Reynolds said she was a very attractive person they had met in one of the Denver night-life restaurants.

After De Forest visited Boulder I received word to meet Col. Wilson, Cooper and De Forest at Denver Union Station the next morning at 4:30 to go to Pueblo. I came in on a milk wagon, Cooper had a room downtown and Wilson also lived within walking distance of the station. We met with

time to spare but De Forest did not show up. I wondered where he was and so apparently did Wilson. When Cooper had me aside he said Doc went out the afternoon before with Agnes. Wilson led us to the smoking car of the train and went inside. Cooper and I stood outside to signal Doc if he showed up. The train started to move, I went in the car and found Wilson had turned over a seat and was next to the window riding backwards. I sat beside him. Cooper came in and sat by the window facing Wilson. Cooper looked worried. Wilson wore his usual calm, dignified, old poker-face. About the time I expected Cooper to start a talk on losing Doc, that long legged individual walked in and folded into the seat by Cooper. He glanced at Wilson, then turned to Cooper and said: "Cooper, she has a godgiven gift." Cooper cast a startled glance at Wilson who turned his face toward the window - his shoulders shook. Doc went to sleep. After a drink and a meal in Pueblo, Doc was chipper again.

I never found out why De Forest came to Denver. He seemed to think everything we were doing was all right. I did not get any information from him. His object seemed to be to have a good time and be agreeable to each of us. Any of the ideas the others of our organization may have gathered from his advertising, about his being a super-intellect, scientist, engineer or businessman were probably reduced or nearly obliterated by his visit. White had inflated himself and De Forest during the World's Fair in 1904 but cooling off and deflation had apparently set in.

To me De Forest advertising has never been too convincing since 1901 when he or his associates advertized that he was going to report the yacht races by wireless and I went to his advertized station to find only a little unoccupied house and mast and that he did not report the yacht races. He has always amused me in my contacts with him and I liked him

Note to Geo. Clark May 4 1950

Re galley proof of "Father of Radio" by DeForest.

Chap 24 p 8 says Abe White died in the early 40s. I think it was at a VWOA banquet in 1942 shortly after the Sat Eve Post article on DeForest came out that I talked about it with Abe White. I said I thought DeForest had married the first time late in 1905 (or early 1906). White said he did and that he (White) was at the wedding. As I heard the story he married a beautiful brunette just before leaving for England. He says in Chap 18 p 2 that he left for England in Feb 1906. It was an unexpected whirl-wind affair as I got the story in C.C. Wilsons office in Denver. Considering other affairs he tells about I dont see why he omits that! Maybe you could ask him. He has claimed 2 - much why not claim 4 wives. Why not? He was Harem scarem and harum scarum. As I heard it, he met Mayo on a weekend and married her on monday; isnt that harum-scarum? I may have a news clipping about that latter.

Chap 10 p 8

Chap 12 p 6 says re Nome and St Michael: "this was the first wireless system in the world operated regularly as part of a telegraph system handling commercial traffic" How about the wireless circuit between Catalina Isle and the California mainland, it went into service more than a year before and was connected with the Western Union at Whites Point near San Pedro. That combined commercial wireless and wire service lasted 21 years. It also was point to point in California. And a little paper "The Wireless" was printed at Avalon from wireless messages received from the Los Angeles Times. That publication began March 25 1903. After 21 years two cables were substituted for the wireless but since then they have been augmented by wireless. I sent a message from Avalon via wireless that was delivered in Columbus Ohio, on a Western Union blank, in 1902. I have that telegram.

and still do. However, he was an outstanding example of the wireless wizard who was not as advertized. But he, a few months later, had the third electrode put into the vacuum tube and that started a big wireless family with many cousins. As I was told the story, the first and third electrodes were too straight or too fat. When they were made thin and crooked, they worked better. Oh, well, De Forest was thin and prosecuting attorneys said he was crooked and I was one of those who tried to keep him out of the pen, several years later.

De Forest was in Pueblo a few hours. I remained there as I was supervising the building of the station in Minnequa Park. That became our handsomest station. It had a picturesque setting in the park. The park people built a nice station house and the mast used there was an imposing structure; a guyed tower over 200 feet high, made of fairly large timbers.

The next I heard about De Forest, he had reached New York, met a very wonderful, beautiful brunette and married her within a few hours and was gone on another trip to Europe or some distant place. The word came from White. He may have colored the events a la White. In the Saturday Evening Post article that wife was not listed. The article only gave him credit for three wives and an indefinite number of promotors. Doc slipped from wireless to women, in increasing numbers.

Minnequa Hospital of the Colorado Fuel and Iron Company was in a parked section opposite our location. Dr. Corwin, who was in charge of the hospital, visited us and was much interested in the atmospheric electricity that flashed from our antenna to ground. Before a thunder storm sparks over two inches long were obtainable. He said women suffered more from hysteria and nervousness before those violent Colorado thunderstorms than at other times. He tried to check with me to find if he had the most or worst nervous women when I noted the most or worst

I checked with wireless and he checked the woman. static. Some static was almost as noisy as a hen party. Also- static curves are irregular.

The lightning storms were very bad there. On one occasion I left the station because I thought lightning from a storm I could see approaching would strike our antenna. I watched closely. Lightning did not hit our antenna. The storm passed over without any discharges to earth that I could see until it reached a one story wooden house a half a mile away. The lightning hit the front of that and ripped off half of the door casing. No fire, nobody home, nobody injured and I was apparently the first to know what had happened to the house although there were houses close by. Those folks were so used to lightning that they were not frightened or inquisitive about it.

Blakney operated the Pueblo station for a while. He did not claim to be a researcher, inventor or wizard but everybody was trying to get rid of interference from static. He wrote a letter to, or telephoned the Denver office, saying he had found how to cure static but he wanted to keep it secret until he had patent protection. Col. Wilson or Mr. Divoll told him that I was on the way to Pueblo and would investigate but would keep it secret and help him prepare a patent if it was patentable. I listened to the receiver and heard no static. I tried to tune in a station but heard none so I asked Blakney to call Colorado Springs and ask Pickerell to call us for five minutes. Blakney did, but we heard nothing from Colorado Springs (CS). Blakney repeated - we heard nothing. He said he thought Pickerell had not been xxxxxxxxxxxxxxxxxxxx in recently as he had not worked with him for a couple of days. I said I knew he had been there the day before and according to my experience "Pick" was on the job when I expected him to be there. Therefore, I called the Colorado Springs wireless station on the wireless telephone. Pick answered and said he had heard Pueblo and had sent his call signal repeatedly as requested. I told Blakney and

asked him to let me see what he had connected to the tuner. His connections were numerous and among them they provided a short circuit for the receiver which short-circuited static and signals to ground without bothering the detector. Blakney had been so spellbound by the thought of eliminating static and so secretive in his desire to protect his wonder baby that he did not use his usual horse sense. Blakney was not the only one who did that or almost that for many years. However, his was the only case I encountered where the hopeful worker at static subjugation did cut out all signals to cut out static. Thousands probably suffered similar disappointments when they fought static and probably some are still similar results in the form of less static but with more or less decrease in satisfactory signals.

The Pueblo station was nicely painted, had a porch, front room and back room. The front room contained a counter for customers to use in writing telegrams, an operating table and a stove. The back room was for the transmitter and a couch. The transmitter made a noise like a gattling gun. I think I was the only person who ever slept on that couch when the transmitter was being used. I felt very sick and sought the couch. The operator looked in after he had been sending. He said I was asleep. I revived enough to return to Cripple Creek where I felt very sick again and went to the doctor who said I was traveling around with a temperature about one hundred and four or maybe more. He said I had what was locally known as Mountain Fever which really was a form of typhoid fever. I told him I had heard that one with mountain fever would die at that altitude and asked if I had not better go down to Denver. He said he thought I had. Within an hour I caught a train to Denver where I lived with my fever on a diet of intestinal antiseptic and water. If I laid down I coughed so I reclined in a rocking chair. The fever lasted about three weeks but I gradually picked up on my eating after a couple of weeks. I probably had the fever several days before I knew it. He sort of

hurried things up because we were going to have another baby and my wife wanted to carry out some of her part of the transaction in Wellsville, Ohio. She went to Ohio and I returned to building and mending the wireless stations. For some time I had difficulty in getting up out of a chair if it did not have arms. Our first baby had been told Santa was coming at Christmas. Our second is still called Santa because she was born a week before Christmas and the first called her Santa. I was in Leadville when she was born. In Leadville we had to thaw the ground with a bonfire to scratch it and Tom and Jerries were part of the daily diet.

I was curious to know how I had contracted the fever. After attending to some work at the Fort Collins wireless station I returned to Cripple Creek and went to see the doctors. They, too, had wondered where I got the germ but had said when they told me what I had that a mine superintendent had come in the day before with the same thing. This time they told me the mine superintendent had not gone to a lower altitude and had died about two days after I left. Also that we were the only cases and that he was superintendent of a mine near Altman where I had been working. We put twos and twos together and I went back over the ground for a check up. The drinking water in Altman was expensive. Except for rainwater from roofs, the water was hauled up there two barrels at a time by a Rocky Mountain Canary (burro) supervised by a negro. At Altman there were two merchants, one was a grocer and postmaster. The other was a saloon keeper who sold a barrel whiskey and a beer. The nearest place I could get a drink was the saloon. The beer was so sour from an unclean pipe that on one thirsty occasion, I asked for a drink of water. The Saloon-keeper had bestirred himself to wait on me. He only collected a dime for three fingers of whiskey or a nickel for a schooner of beer or a dime for a bucket of beer. Water cost him about as much as beer. He sourly motioned toward the back room and said

"In a barrel". I found a tin cup on a barrel, dipped into the barrel darkness and drank what came up in the cup. On my after-the-fever investigation I re-enacted my performance and found I had drunk from the wrong barrel. The water in the barrel next to it was said to be good but the barrel I drank out of was only to accommodate left-over-water and the tin cup on its wooden cover. I have heard that it is very wrong to drink anything in a barroom. We drank water in the bar room back of a saloon, the other chap died quickly and I have had after effects for forty years.

Referring to the back room of wireless stations was what sidetracked us into the saloons. I should not know about it but there was, I found while working on the Pueblo station, a saloon in a church. It was a couple of blocks from where I put up at Lusteaus in Pueblo. A back room in what had been the preacher and choir section, of the church with a partition about where the pulpit had been. That left room in the back for a complete bar, food counter and the office of the management. The back side entrance led directly into the standing room, footrail and spitoons before the bar. The space in front of the partition contained numerous short pews with tables and a main isle that led from the front door to the door in the partition leading to the bar.

An ex-warden of the Colorado penitentiary ran the place. Back of the bar on the partition wall were handcuffs, knives, firearems and ropes that had been used by the warden to hold and to hang well publicized killers. The former warden gave lectures free with drinks in the back room during prescribed evening office hours. The bartender was a man. Women customers did not go into the back room. Girls took orders at the pew tables in the front room and brought the food and drinks from the back room bar to the seated customers. One cash register bell did not indicate sales. A lot of bells were used to indicate sales. The sale of a soft drink rang a

sleigh bell, a beer rang a sheep bell, a whiskey rang a cowbell. A bottle of champagne rang the church bell in the steeple.

How the Pueblo church quarters happened to be converted into a saloon, I do not know. From my personal experience the use of a church building for other purposes might occur frequently. My father bought a church after it was vacated. He used it for a cabinet shop. I inherited it and rented it for a cabinet shop for years, then sold it to a church on a little-at-a-time basis! Gossip filtered through to me that the cabinet maker I rented it to made bootleg liquor in it during prohibition. A newspaper clipping I saw said the church people found the skeleton of a baby under the building when they enlarged the basement.

The back rooms in wireless stations were provided in most cases to give the operator a place to sleep. Operators were not paid very much. If they could sleep at the station and cook on the station stove, more operators might be willing to take the wireless jobs. Some of the station buildings had been used for other purposes. The smallest one was at the Grant smelter site. It was a watchman's shack. If anybody ~~xxx~~ slept in it he must have slept in the chair or put the chair out and used the floor. To reduce cost I designed the Cheyenne station so the space that was necessary for the operator's chair and to walk in during the day could be used to sleep in at night. Sash cord and pulleys were used to hoist a cot to the ceiling. One brass pounder liked that station because he did not have to get out of bed to operate wireless and other things. By rolling over he could put coal on the fire and set the coffee pot on the stove, fry an egg or call a girl. The telephone and light were handy too. Possibly there was maid service at times. Women, young and old, liked Harry Reynolds and sewed on buttons for him.

All of the stations we built along the Rocky Mountains were not

limited to a single mast or other single antenna support and a small station house. The power used at the stations was usually two kilowatts. One station used two masts 200 feet high, quite a sizeable plot of ground, a transformer and switch house, a special switching arrangement to take 11,000 volts from a high tension line and to deliver lower useable voltages underground and in screened circuits to the devices in the station house, a commodious four-room station house, a very deep artesian well with a motor driven pump. This station had a standard two kilowatt transmitter and a thirty kilowatt transmitter. The big transmitter was for working out of the Rocky Mountains section at a later date.

The two kilowatt transmitter in this station was intended for working Cheyenne, Fort Collins and Boulder to the north and Colorado Springs, Pueblo and Trinidad to the south. Leadville and Altman were supposed to be relayed via Colorado Springs. Both Altman and Leadville were nearly two miles above sea level. Altman was the relay station for Cripple Creek. The town of Cripple Creek is so situated within mountain barriers that wireless signals from Cripple Creek were not heard in Colorado Springs or Pueblo and vice versa. Therefore, a relay station was installed at Altman, above Cripple Creek, partly back of Bull hill but not enough of the hill to keep Altman from working both ways.

Bull Hill is a sort of rounded eminence from which striking miners could watch the officers of the law and shoot them if they tried to climb the hill. Striking miners had done that while I was in Denver but before we came there with a wireless. Our station was on the site of the Union Hall that had been burned down.

While I was working on the Altman station an agreeable, quiet, heavy set man frequently came around and exchanged a few works. After a day or so I asked somebody who he was. I was informed that he was

the sheriff and the best gunman in the Cripple Creek district. During the strike he captured two of the worst men and took them into a high line car. The high line was an electric inter-station line connecting mines, villages, Independence and Cripple Creek towns. He handcuffed his captives to seats and lowered the car shades. There was nobody else in that car. At the first stop below Bull Hill a mob of miners waited for him. He stuck his head out the car window and told them he had the men and that if anybody tried to enter the car door he would shoot him. Just as the cars were starting to move, the gang rushed. Two men got through the car door each with a bullet in a vital spot. The sheriff only fired twice. The rest of the gang left the train.

The next time the sheriff came near me I told him what I had heard and asked him where he carried his guns. He showed me that he carried one in his right hand hip pocket. If he wanted to enter a place with a gun in his hand, he pulled that one out of his pocket. Another gun rested in a spring holster under his coat on the left side! He could reach that quickly and the pressure of his hand would cause the spring to push the gun into his hand. In his vest pocket was a little handle and a tube with a cartridge in it. He could slip the tube between his fingers and press on the handle firing the cartridge into whoever was pressing against him. He would not say how accurate he could shoot or much else. He did admit that he had taken the two bad men off Bull Hill and put them in jail. He was a chunky chap about five feet and a half who seemed to be very gentle, quiet and deliberate.

The effect of the altitude brought some surprises. To reach our station we had to follow a trail over part of Bull Hill. From where we got off the high line car we had to go up hill for several hundred feet. We all found ourselves incapable of moving very fast. Some would stop and rest frequently. When I took Harry Reynolds over Bull Hill the

first time, I was leading on the narrow trail. A little way up I realized I did not hear Harry following me. Looking back I saw him slumped down on the uphill side of the path. I went back and asked him what was the matter and pulled him up. He helped some. After a few moments we proceeded slowly up the trails with our arms around each other like a couple of lovers. Harry had not been in Colorado very long and he was the type who overdid things frequently. When I was finishing building or altering a station, he would show up to help with the work and take over operating for a while until a permanent operator was assigned and broken in. He was paid on Saturday and would begin borrowing money from me Tuesday evening or Wednesday morning. Saturday he would return what he had borrowed and insist on taking me to a show or dinner or buying a meal or cigars for me. Those were the days when I was on a diet of four variable meals and thirteen large cigars per day. Harry continued wireless operating. On the Pacific ships he was at times both operator and freight clerk or purser. In 1916 he came ashore and visited Cooper in Seattle and me at the Puget Sound Navy Yard. He said he was returning to his birthplace in Canada for a visit. Cooper thinks he went into the first World War and was lost. Previous to that time he had been in touch with Cooper occasionally.

Although walking slowly uphill at that altitude was strenuous, yet I could run downhill and beat the high line car line into Cripple Creek so easily that I frequently did. Zigzagging and leaning with a side toward the hill took care of the steeper places and served to avoid obstructions and holes. Laced leather boots and tough clothes prevented abrasions. Running with the knees bent prevented the bruising of joints.

We had another experience with the effect of the altitude at Pueblo. A chap who said he was used to swimming long distances in the Atlantic, nearly drowned, when he tried to swim across the small lake by our

Minnequa Park station.

Stories have said that Cripple Creek country was very dangerous, wild, tough and rugged. I looked around but did not see anything very startling. On one occasion when Cooper and I were there, the announcement was made that gambling was about to be closed. There was a gambling room in the National Hotel where we were stopping. Also, of course, there was a bar occupying the most prominent space on the first floor. Cooper was ambitious to beat slot machines and any other gambling games. He knew the odds were against the player but he tried to figure out ways to overcome those odds. He would talk to me about schemes at meals and steal my butter.

Presumably the nearness to the closing of gambling was what brought up the opportunity to take a little from a slot machine and from a roulette layout. A new slot machine had been moved into the middle of wide space in front of the hotel bar. It was not like the ordinary Mills machine, some of which are probably still in use. It was built like a roulette wheel and paid a "jack pot" of ten dollars instead of five. The thing excited Cooper so much that he could not hold his sales talk to dinnertime when he could steal my butter and I could try to digest his proposals while I ate. He led me to the bar and bought a drink. He drank beer the same as I did, then I knew he was very serious. When he was frivolous he drank Canadian Club whiskey which meant that I would have to argue, push, pull, steer and maybe drag to get him to his room and be cussed for doing it. The slot machine roulette wheel had holes in its feet so it could be screwed to the floor, but the bar floor in our hotel was stone flagging. The machine was not anchored - it was removable and tipable. We played it and I picked up one side and jiggled the machine while Cooper screened me from the bartender and customers. I had some control over the behavior

of the routlette ball.

That slot machine was not a normal slot machine. Cooper and I were very different from the normal residents of the Cripple Creek district. We were more liable to do the unexpected. We went into executive session. Cooper, a salesman, was continually picking up acquaintances. One he had acquired in Cripple Creek was a husky young fellow about our size and age. We collected him, patronized the National bar and the slot machine for his information and retired to playing pool until about ten minutes before the National bar would lock its doors and only attend to the customers who remained inside. After the doors were locked we had a drink, buying one for the bartender with whom, of course, Cooper had been exchanging friendly remarks all the time he had been a hotel guest. We walked over to the slot machine, slipped a nickel in the slot and tilted the machine to make the ball roll into a pay slot. We took what it had, divided with the bartender, went out and let the bartender close up and go his way.

As gambling like that in the gambling room of the hotel was to be stopped, we visited that room a night or two before the closing. Watching the roulette I noticed the fellow who spun the ball and whirled the wheel also squeezed the table with his right hand at some time before the ball left the rim and started toward the revolving pockets. I knew that meant the ball was partly controlled by magnetism. A chap had come to me in Denver to find out how to prevent noise resulting from opening a switch. I could not understand him so he showed me. It was a roulette wheel with many little electromagnets in the wood rim back of the groove the ball rolled in. The ball was not solid ivory- it was a hollow iron ball with a celluloid cover made to weigh and look like an ivory ball. Squeezing the table top where the operators right hand

held the edge of the table, closed a switch connecting storage batteries with the magnets to produce a magnetic field that held the ball to the rim. The ball would roll around the rim until the operator quit squeezing the table top. The ball was released so it would fall into the section of the wheel where the bets were smallest or farthest from any extremely large bet. We guessed where the operator would drop the ball and put our little bets there.

On the last night of gambling we played a little and won a little. According to the rumors we heard the other players lost a large amount. Cooper, who salesmanlike always got acquainted with the hotel force, including the manager, bartender, waiters, chambermaids, and others, used some of his connections to find where the storage batteries were located. They were located two floors below the roulette wheel in the basement. Gambling was not a part of our business and only occasionally an amusement, yet the gambling spirit helped the development of wireless.

The original miners, that is, the prospectors, were gamblers. They did not work for a guaranteed return. Their work and sometimes their money was gambled on the prospect of getting from nothing up to a fortune. By 1905 most of the miners worked for wages. Only a few prospected occasionally. Many early wireless men worked for prospects, for promised pay and prospects or for small pay and prospects. Some who probably would not play penny-ante, gamgled on the future of wireless.

Despite the popularity of gun duels, murders and lynchings in stories of those parts, I did not see any. Weapons, if any, were concealed. On a Fourth of July I was going from Cripple Creek to Colorado Springs. The cars were full of folks going out of the district for the 4th. Shortly before reaching the highest part of the road, the train stalled. The delay became tiresome. A few climbed out and stretched their legs. One fellow pulled a gun and shot at the end of an empty

spike keg lying about two hundred feet down the mountain. He had competition - shots were fired from the windows of all five cars of the train. I had read stories about people in that district being able to hit nail heads across the street with a six gun. Very few of those shooters hit the head of the spike keg.

In Cripple Creek there was a De Forest stock salesman about fifty years old. I do not remember his name. It began with "B" so I will call him Mr. Bee. Stock salesmen could find blossoming bank rolls and sip some times. Mr. Bee said he had been a prospector but had reformed into a distributor of mining stocks and now was down or up to selling wireless stock. He did not use those words put together that way but that was the impression I gathered from what he and others told me.

Bee told me a story of how Independence came into the Cripple Creek district. One 4th of July, years before, the prospectors in the district had gone to places where they could mingle with others and celebrate. Where they went depended usually on how much money, gold or credit, they had. Some went to Denver, some to Colorado Springs and some to Cripple Creek town. Nobody went to Independence - there was no such town. There were prospectors at and around wheme the town would be but they left for Cripple Creek and the larger places. That is, they all left but Stratton - just Stratton, or a less dignified name - not Mr. Stratton to anybody. He was broke. There are various degrees in the broke fraternity but in this case it meant he had no money, no nuggets, no credit, no burro and no extra grub or duffel to sell and nobody took him along as a companion.

Late on the 4th he rolled out, started a fire, put on coffee, flipped the flapjacks, ate and drank and stayed there looking at the embers. No plans, nobody to suggest anything, nothing to do. He picked up a piece of rock that outcropped there. It had silvery streaks

in it. They said the streaks were partly silver but the streaks were so small that nobody could afford to carry it to a smelter for all the silver they might get out of it. He put an ember from his fire by the piece of rock and with his blow pipe he directed a little blast of burning ember on a silvery streak. A tiny golden egg oozed out. Like a baffled inventor who did not know what to do next, he had automatically tried something. The egg did not make much of an impression on Stratton. It was hardly noticeable and Stratton was not thinking much, if he ever did. But he turned the heat on another silvery streak which also produced a little globule. He did it some more. He looked the rocks over and decided to what space was best to stake out for a mine that would get the vein of rock with the silvery streaks.

He staked out the space and because the day was the 4th, he called it the Independence Mine. It became one of Colorado's richest mines and the town of Independence was a necessary by-product. The ore was Sylvanite. That is the story as I recall it from what Mr. Bee told me and he gave me samples of the ore. Now I remember Mr. Bee's name was Baron.

Those samples were delicate silvery trees inlaid in ugly pieces of rock. Others have told me that ore looking much like the Independence Mine ore was not rich in gold. Streaks that varied from gray to a bright silvery appearance contained gold, silver and tellurium. In some cases the streaks were mainly gold and in other cases they were mainly silver with the tellurium. When Stratton's prospector associates left him to celebrate, he was not in their class. When they returned, Mr. Stratton was not in their class. With such examples, it was not surprising that people grubstaked bums and bought bum mining stocks.

Considering there was a relatively small amount of telegraphic business to be obtained from the Cripple Creek district, it seemed very

strange that not only one but two stations were maintained in that district to get the messages in and out. Also why were overland circuits attempted through any of that midwestern territory after the Gehring-Shoemaker failure and the Fessenden failure to make such overland circuits begin to pay costs in the east. I thought linking larger places might be reasonable on the prospect that wireless strides might be made which could make continuous wireless communication profitable. But the Cripple Creek district was a small field and Leadville that required another station was a village. Stratton had made fortunes in one place and Tabor had in the other, but they were not supporting the wireless projects.

E. N. Pickerell said White wanted to establish stations through the Rocky Mountains section because the people there were in the habit of buying mining stocks and, therefore, they would take flyers in his wireless stock. White expounded his ideas frequently and Pickerell was probably present when White was discoursing on that idea. White, Cooper, Pickerell and Reynolds came to Denver after the De Forest exhibits closed at the St. Louis World's Fair. Pickerell operated in Colorado, at Boulder, Colorado Springs and Denver (CW). He has been a wireless communications man in many places. I left an Ingersol watch in my work pants in the Denver (CW) station when I left it in 1907. In 1909 I found the watch in front of Pickerell at the Manhattan Beach station in New York. He had salvaged it and taken it on several transatlantic trips. He stuck with wireless operating and was supervising Radio Communications work for RCA at 66 Broad St., New York the last time I encountered him which was at a dinner for De Forest in July, 1944.

The New Denver station (CW) was not only to work with the Rocky Mountain chain but with Kansas City. The thirty kilowatt transmitter was to reach Kansas City where a transmitter of about the same power was

located. A station similar to CW was being completed at Manhattan Beach, N. Y. (DF). The site for the new station (CW) was at a stop called Bee Hive on the Denver and Golden R.R. about half way between Denver and Golden which were the terminals of the road. It was a single track road with a locomotive, flat cars, passenger cars and boxcars, about two of each.

During our preliminary work on the new station I mentioned to Dibol that the name of the railway station stop was being changed from Bee Hive to De Forest. By his expression and remarks I gathered that he did not think the name was appropriate. He did not say so but White and De Forest were on their way out. New people in the company had not found White, De Forest, the equipment or patent rights as advertized or at least as they expected; was the story that gradually reached my ears.

CHAPTER XI

DETECTORLESS DE FOREST

The leading wireless service company in the United States was de-Deforested and changed its name to United Wireless. Dees both large and small were applied to Doc De Forest in complimentary and uncomplimentary measure, from damn to dames including degrees deflated and debunked. The derogatory remarks I heard were to the effect that he was a liability that caused his associates to use devices which infringed patents. The name "United" was characteristic; wireless promotors have repeatedly disunited, united and disunited to sell stock and to keep out of jail or something. This "United" might have claimed it was the fourth union after the first disunion. But we can't go into that here. There were more unions and disunions to follow.

Wireless development was step by step a rather disorderly jumble of steps. Apparently useless baby steps were forefathers of big things. Changing from the electrolytic detector that De Forest had claimed but for the use of which the Fessenden-Given-~~Wilson~~ Walker crowd (National Electric Signaling Co.) would have put De Forest in jail if he had not fled to Canada; turned out to be an improvement. The electrolytic that Fessenden thought he could use to give him a monopoly, faced as a detector when others provided more useful detectors in their self defense against Fessenden et al. Fessenden made De Forest detectorless and without a company for awhile. Parts of this situation filtered to us in 1905 to 1907.

Neither Doc or his name seem to have ever been standardized or orthodox. It is spelled de Forest, De Forest and Deforest. He gave it to several women and projects. In his next company name he substituted Radio for Wireless and Telephone for Telegraph. What's in a

name so why not change it. White, Doc's promoter changed his, Butcher Lee operator changed his. deForest probably was the older version.

In 1905 while with the Deforest Co., I began a series of observations on how far wireless messages could be received under various conditions such as day and night, winter and summer. Daily and nightly recordings that also included the strength of the signals, temperature, wind velocity, vapor pressure and precipitation, dust storms (alkali dust in Colorado), hail storms, sleet and fine snow also came in for observations. Moonlight was included, too. The best of those observations were recorded in a paper entitled "Radio Range Variation" and published in the Proceedings of The Institute of Radio Engineers, Vol. 2, pages 37 to 58, 1914.

In Colorado we were not expected to work directly with the Atlantic and Gulf territory. However, early in 1905 Galveston's messages were read in Denver. In the winters of 1905-'06 and '06-'07 the shore and ship stations of our company were read in Denver, from Manhattan Beach, New York to Galveston, Texas, including a station in the West Indies. The ships were mostly Standard Oil boats. Some English Marconi boats were presumably entering New York harbor, but try as we did, we never heard one, nor did we hear a German boat. Standard Oil boats were frequently heard when they were working with Cape Hatteras. We did not hear anything from the Pacific coast. Brant Rock, the Fessenden station, was heard at times. Brant Rock (BO) was the only station we heard that did not belong to our company. About 1800 miles was as far as we received. The smallest stations (one kilowatt) were on ships and we received them as far as the most powerful stations on shore. From October first to April first it was not difficult to handle all gettable paid traffic in Colorado and to Kansas City and Texas sometimes at night. But from the middle of June to the first of September it was difficult to handle messages between Colorado

stations. They could frequently be worried through between 2 A.M. and 10 A.M.

People who financed wireless and some of those stock-sellers who promoted wireless with other people's money were led to wrong conclusions by the distances attained during winter nights. They would not believe that summer daytime wireless service distances would be almost nothing. If they were told of the great differences between seasons by somebody they were almost persuaded to believe, they would say it was the fault of the apparatus or operators and that changes could be made that would correct that situation. They put money into wireless believing, I suspect, that the main trouble was personnel. We who had gone through the wireless seasons and variety of equipment knew the trouble was not due to personnel and we believed apparatus could be improved to get around nature's tendency to make wireless a winter night-owl and give it long summer vacations. Operators did partially lie down on the job in the summer because they felt that listening-in was useless. Nearly all old time commercial operators and engineers and amateurs habitually stayed up til one or more hours after midnight to get long distances.

It was next to impossible to receive wireless signals over any distance in Colorado at times because the static was so bad. The southern Rockies seemed to me to be the worst static factory in the U.S. At Altman on summer afternoons I saw lightning flashes in any direction I looked - it seemed to be striking in a circle around me. That was because flashes were visible over great distances at that point. One afternoon the flashes seemed to be getting too close so I left the station and went into the back room of our neighbor saloon from where I could see what happened at the station. Within a few minutes there was a loud crash. Smoke began rising by the station. I hustled to put

I bought a drink of beer but did not sample the typhoid water in the back room.

above

out the fire but found the smoke was from the power company's transformer which was located about six feet from the station. The lightning had hit the power line, not the station. We lost our power for about a day. Those high altitude electric service men were used to such happenings. They could yank out a damaged transformer and insert a repaired one in a hurry.

The Deforest Companies began to change over to what became the United Wireless Telegraph Company about the time the Dunwoody carborundum detector was put in after Deforest's alleged receiver had headed our services toward sudden death. As Deforest and White went out, Wilson and Divoll became more influential in the company. The stock selling continued but they gave an attentive ear to suggestions which might help wireless pay its way from sales of services. By that time there were many employees of which very few saw stock or knew what it sold for and they did not want to work to provide commissions for stock salesmen or grafting officers. At best, most of the employees and some officers only regarded stock selling as a necessary evil. Wilson apparently did not like it. He had not been educated in schools and was a fighting ex-Confederate soldier who did not want to hurt anybody except enemies and would step aside to help others. He and I belonged to the same Lodge, B.P.O.E. No. 17, Denver.

The New York office had our Jersey City factory send us the carborundum detectors and instructions. The things they sent out looked like and were called, fire crackers. Most of them were duds. The carborundum was in a red fibre tube. One connection to the carborundum was a flexible conductor that stuck out of one end of the red tube like a fire cracker fuse. A piece of flat brass on the other end of the cracker was slotted to fit into a binding post and the loose end of the fuse was designed to fit into what had been the support for very fine platinum

electrode of the electrolytic. I suspect Babcock had designed it. It was a sort of standardized, factory-made, simple secret with hard boiled instructions not to open a cracker, such as Bab and Marshall would turn out.

The kind of crystal used in our new detector had been disclosed to me. I had already bought carborundum and tried it. The fire crackers the factory sent failed to work on the first trial or soon gave out. On opening one of the sacred but useless five crackers I found fine copper wire had been wound around one part of a chunk of carborundum crystals and a single contact had been made at another point which contact probably did some detecting when it was selected. Then the parts were sealed in sealing wax. Such contacts did not stay put. Also it happened that in the carborundum I had bought there were crystals that were more sensitive. I substituted adjustable contacts for the operators to use on carborundum and provided the operators with crystals that I had tested. In adding the adjustable contacts for carborundum the electrolytic detector boxes were altered to remove traces of Fessenden, Deforest and sulphuric acid. Each box was provided with four little adjustable carborundum detectors and a switch that could select any one of the four. Static or twoo strong a signal would spoil a detector. With four, the operator could usually manage to have a good one as needed. When there were no messages to be handled the four crystals could be readjusted.

They worked better than the electrolytic, chiefly because the acid in the electrolytic crawled, vaporized or was spilled on places producing a variety of troubles. Also the more sensitive electrolytics were so damaged by heavy signals and static that they required frequent readjustments. I could make an electrolytic that was more sensitive than any other detector I could make at that time or for years afterward but

I could not use it when there was static or nearby man-made interference like sparking wheels on trolleys. A slight overload of disturbance or signal destroyed the very fine platinum wire. The attempt of the Fessenden people to rule wireless through the electrolytic prevented that detector from being brought to a more practical state and brought in the crystal quickie and the long line of electronic devices. Big, red headed Fessenden's superior mistakes helped wireless a lot. He seemed to have more of the prima dona temperament than any of the other wireless contributors.

The shake-up that finally resulted in Deforest's divorce from the Deforest companies and White's divorce from wireless apparently caused our Denver office to be visited by two would-be bosses with conflicting ideas. A Mr. Harris came out and told me we should do several things, none of which seemed to be very sensible as compared to some other things we could do with available material and at much less expense. I told him to write them down and sign them. He did, signing himself as Supt. of Installation and Maintenance. He also told me not to permit any person not employed by the company to enter a station. All of our stations but perhaps three which were not easily accessible were practically wide open to the public. I told him nobody but Wilson could issue such an order. He told me to tell Wilson that Harris said that. Harris went back east. I had never heard of him before and never heard of him afterward.

The plate glass condensers in oil that we used on the 30 KW set broke down frequently but he could not give us any material or suggestions that were helpful.

Another chap I had not heard of came to us. This one was very solemn and dignified, sort of skinny, with glasses and reticent. I don't recall what he said his title was but it was something or other

that was designed to be impressive. Out of him we did not get any contribution or controversy. I visited St. Louis, Kansas City and Chicago about that time and I believe from my notes that we traveled together. One of my notes says that Odell, an operator in Chicago, Kansas City or St. Louis, told me that Harris visited the Cleveland, Ohio station and gave orders to the operators to tear it down shortly after Deforest had given orders to put it in working order. E.E. Butcher, who later changed his name to Bucher, was an operator there at one time. I never heard of Odell again in the company but about eight years later I found him testifying as an expert in a patent case. I was in the same case but could not wait to hear what happened to him. He was saying he could tell the exact frequency of a sound by listening to it. I think they threw him out after he had been asked to state the frequency of a sound produced by a standard device.

The Kansas City station was not as powerful as our Denver station and was not as commodious but would stand up better because there was less strain on the condensers. The St. Louis station was being abandoned. The Chicago station contained burned out transformers and seemed to be impractical. The material might be useful but as it was, it looked like junk and I did not have either the time or equipment for a careful examination.

Operator Harry Reynolds was a very sympathetic soul. He would listen to my complaints about our lack of scientific cooperation, lack of reliable publications and lack of laboratory facilities for wireless development. Harry apparently had not been exposed to any scientific or engineering schooling, but if a friend of his wanted such a thing as a laboratory, he would be pleased to see him get it. One evening while we were passing along Denver's sixteenth street, I said, "See, Harry, the city has built a public lavatory under the alley between the

Post Office and the Tabor Opera House". Harry said, "Isn't that fine! Now you will be able to make all of the experiments you want".

It was frequently my job to tune in weak signals, long distance stations and signals through interference and then turn the receiving over to operators. I had more experience in such things than new operators and my hearing was very good. Often the first clue I picked up was a faint rustle or the impression that the circuit was alive. Working from that rather indefinable sensation, I brought in signals. Of course, the quieter the place, the easier it was to bring in signals. On one occasion at Denver (CW) I listened and listened asking the others to keep quiet. All at once Blakney got up, walked over and slammed the antenna switch into receiving position. I had been trying to receive without an antenna. He was even with me for I had found his invention for cutting out static was a short circuit around the receiver that cut out static and signals. I believe making a supposedly wrong connection made an important wireless invention later, but Blakney's and my mistakes did not work out that way.

Because of some difficulty in getting a station to work in Dallas, Texas and because they wanted me to look over the Galveston station and other stations and sites, I was sent to Dallas, Ft. Worth, Waco, Austin, Huston, Paris and Galveston. Cooper had quit the company temporarily which caused me some extra work in going around with Kopperl looking for sites. The operator at Galveston was Tom Stevens. Tom continued in wireless through De Forest, United, Marconi, RCA and the last I heard of him in 1945, he was in charge of ~~xxxxxx~~ monitoring for the Federal Communications Commission, in California.

The Dallas, Texas wireless station was in the fair grounds. The young operator was so busy with a very young woman who lived near the fair grounds that I had to overhaul the station without his assistance

most of the time. A day or two before the Fair was to open a magician moved in close to our station. That is, he selected a place on the grass and had a packing box moved into it. He demonstrated to some of the Fair officials that he could unlock handcuffs and get out of ropes and out of a packing box after the lid had been nailed on. I witnessed these stunts. He saw that I came from the wireless station and asked me if he could look it over. I showed it to him and answered his questions. He was very attentive and pleased. He told me, as a return favor, how he performed some of his tricks. He said standard handcuff$ locks were made in a limited number of ways. He used little steel rods and hooks, some that he could conceal under his fingernails, to open such locks. A lock that had not been factory made but made by some mechanic with odd ideas was the hardest to pick. When he was being nailed in a packing box he told them to use lots of nails. The more nails they used the more they split the wood. All he had to do to push the boards out was to hump up his back. His name was Houdini.

I received at the Dallas station one of the new Deforest receivers we had heard about. It required special connections to the tuner and special batteries. The vacuum tubes that came with it had three electrodes and were early stages of the audion. I read the directions and connected it up after a day or two of delay caused by attention to other matters and to buy something for it. As I recall it, the filament battery was of wet cells for which I had to buy something. The day I was leaving to visit other points in Texas I tried it. Not until I had increased the filament current so much that the filament was very bright did I hear anything. Then the signals from Galveston came in louder than I had heard them while using the carborundum detector. But the filament promptly burned out. Another tube gave similar results. Only one tube remained to be tried. I put back the carborundum detector arrangement and went on my way expecting to come back and try again.

those tubes were baby steps. They grew in time and in the hands of many nursemaids to step around the world.

At Paris, Texas Kopperl and I looked the town for likely sites on which to locate a station. Valuable long cotton was grown there and one of the cotton market firms had a wire telegraph line to the New York cotton market. Kopperl said he advised the cotton men in the Paris office to get in on the stock of our company at $12.50 per share before it was announced.that Paris was to be in the wireless chains. They told him they would call New York and get the stock market price and invited him to come back later in the day when they expected the quotations. I was not present and am only reporting what Kopperl told me. He said he went back and they showed him a wire which quoted our stock at 1.75. He said he was surprised but he added he could still let them have a few shares at twelve-fifty altho the wire said the New York brokers were asking seventeen-fifty. I suspect he did that, squinted his eyes, opened his mouth like a yawn, sucked down cigarette smoke and sold them some stock at twelve fifty, with maybe the privilege of selling stock to others on a commission basis.

Kopperl probably sold very little stock himself. I suspect he arranged for agents to sell stock and arranged other matters. He seemed to be able to content anybody. In Dallas one afternoon about dinnertime he introduced me to Senator Culbertson at the Oriental Hotel where we were stopping. The senator led us to the bar. The bartender saw us coming and opened a bottle of champagne. The senator took us to dinner and around to see some sights. Kopperl did not explain and I was satisfied to hold down my curiosity with the champagne and food. I did not see Culbertson again until 1929 when I was in Washington with the Federal Radio Commission. Kopperl was listed as a director of a DeForest Company or the subsequent United Wireless Telegraph Co.

I came back to Dallas in a hurry to reach Denver and did nothing about the audion. Those tubes were apparently sent for test by the Jersey City factory without Deforest knowing anything about it. According to what I heard from the officers of the company, all of the tubes, regardless of who tried them, proved to be impractical as compared to carborundum. Carborundum crystals were inexpensive and were operative for anything from hours to months. But the filaments in these tubes frequently did not last long enough to get a call signal, let alone a message. It took about a half dozen years and a number of people, most of whom were amateurs, to get that three electrode vacuum tube developed to where it seemed that it might in time be superior to a hunk of carborundum, silicon, foolsgold, galena or zincite. I did not know it then, but at that Dallas fairground station I contacted the beginnings of one of the most honest, famous and respected magicians and the three electrode tube that has become so famous and super-useful in wireless and electronics.

It was in September 1906 that I left for Dallas after seeing our second daughter (Santa) push her doll buggy along the walk in our backyard about ten days before she was nine months old. Her walking before she was nine months old amazed us. That event and seeing Houdini years before he became the famous magician and burning out two of the first tubes that years later became known as magic bottles, made September 1906 an outstanding month for me.

I had heard that people living in southern territory, like eastern Texas, frequently had what were called "shakes". I do not know whether I contracted the same shakes or not but I did shake violently in Ft. Worth the day I was leaving there for Denver. I was the chilliest I have been although the temperature was above fifty. The next day I woke up in a mountain blizzard that had blown an empty boxcar off a

side track shortly before our train arrived. The temperature was probably around zero but I did not mind it when we stepped off the train for a look around and I didn't shake. I felt good. The shakes did not return.

By early 1907 it was evident to the most optimistic in our company that overland wireless could not pay in those parts of the United States without some drastic improvements which nobody seemed to know how to bring about. Along the Atlantic Coast the company was gaining ground by building up a ship to shore wireless business. The Pacific coast where static was milder, seemed to be a logical field for service.

The company sent us to the Pacific coast! This "us" was seventy-five percent female, one wife, two daughters and I. Cooper, Reynolds and "High Pockets", the Pueblo operator went also, but at other times. A George H. Parker had opened offices in the Arcade Building in Seattle. I had met him in Colorado Springs and had understood he was a stock salesman who had previously been an insurance agent in Denver. At Seattle he had an air of virtue and importance that I did not expect from what I had seen and heard about him. I thought he had been a failure as an insurance agent and was living on the charity of his brother who was in the printing business.

Parker set up a stock selling front that I had not seen before. He objected to smoking, vulgarity, profanity and rough talk. He claimed to be a devout churchman, some one of the Protestant Churches. He dwelt on his fine family. His wife and children were nice looking. Family and religion were part of his showmanship. I remembered that one of Parker's associates in Colorado Springs had talked about a religion of some kind at every opportunity. I suspected it was part of his sales talk. Our operator, Blakney, was a Holy Roller that rolled in the horse manure of the streets, but he never mentioned

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For some time after the United Wireless Telegraph Company was incorporated, stock salesmen said it was the union of wireless companies, U.S. and foreign. Stock advertisements were so worded that they implied such a union by talking about the importance of Deforest and Marconi companies in connection with what was to be gained by uniting wirless companies.

religion or any other irrelevant subject to influence his position in our company. We would have backed him for telegraphic speed against any other operator, standing, sitting, rolling, kneeling, drunk or sober.

George H. Parker received me very enthusiastically and took me into his private office for his oratory about his virtues, church, family, integrity, honesty and sales ability. He told me a lot about his superman sales ability. He told me about the trick that I believe he originated. In fact, he put on an act in which he was the salesman and I was the A-1 investor or sucker, in the act. He told me about that trick at length while talking master salesmanship to me but I was poor material - I did not want to sell.

Parker was deaf (more or less all of the time, but especially when he could make some money out of it). He demonstrated to me how he used his deafness to get a prospect's signature on an order for stock or anything that would pay Parker a commission. At that time desks were not flat but with a high roll top that covered pigeon holes and other spaces. To see a man at his desk you sat at the end of the desk almost at his side. Parker had me sit where he put his prospective buyers. A slide came out of the desk in front of the prospect. Parker's trick was to have the order or application for stock completely made out except for the applicant's signature. With the possible applicant properly seated, Parker would talk big about what he wanted the customer to sign for, after he had repeatedly indicated his deafness. When Parker reached the end of his sales talk, he would drop his pencil on the floor before the probable applicant. Applicant would pick it up and start to say, "Here is your pencil". Parker would seemingly misunderstand him and pushing the application under the lead pencil, would say, "all right, sign right there". The victim was caught with a pencil in his hand and

the dotted line of a contract under it. He had not made up his mind to sign but brother Parker had misunderstood him, so he signed.

Some years later brother Parker's name became a number and he served some time in Prison. The gossip after he was released said the minister of the church he attended, stated from the pulpit that the church was very grateful to brother Parker for an automobile that the church had been able to obtain at a very small cost due to the efforts of Parker. Also gossip said Parker was poor when he left Denver and lived in a fine house at the end of Volunteer Park in Seattle after he served a term for something in connection with stock selling.

My quarters in Seattle were limited to one room in the Butler Hotel with double bed for my wife, myself and the two girls.

There was some material in Seattle for use in the proposed stations along the Pacific coast. I had to check up on what was available and where we were going to use it. Parker led me to a partitioned-off desk and told me use it and his stenographer and telephone. I thought that was fine. It saved me the trouble of paying for such services in the hotel and collecting through my expense account. From what I learned afterward, he probably charged the United Wireless ten times as much for that as I could have put on my expense account. The main office told me months later that he held out sixty-five percent or more from stock sales through lists of alleged expenses and commissions.

The next day after trying to check over the Deforest instruments in a warehouse, I returned to my donated desk in Parker's suite of offices in the Arcade building to make plans and specifications. Parker brought a Mr. Somebody in and introduced us with an assortment of complimentary statements about me. Parker said Mr. S. wanted me to tell him about the stations in Colorado and other points east and south. That was an unforeseen

interruption of my schedule. At that time my main interest in Colorado Springs stations was to get some equipment from them to use on the Pacific coast. It was easier for me to say what had happened at Colorado stations than to try to anticipate what would happen at Pacific coast stations but the company and I were most interested in what I could do with the Pacific coast projects at that time.

Parker's Mr. S. asked me about the Colorado stations and received answers which were as nearly factual as I could think of. I tried to tell him about the day and night and winter and summer differences. Such differences, which I called range variations, were my hobby that I pursued at company expense when I could and on my own time and expense. I talked about my hobby mainly insofar as I remember.

After that day Parker did not send in any more people to ask me questions. Some days later I received a letter from the Denver office of the company saying Parker had demanded of Wilson, President of United Wireless, that I be fired because he had introduced a prospect of his to me and the prospect asked me if the Colorado stations paid, to which I replied: "Hell, no. They didn't take in enough to pay the coal bills". I wrote back to Treasurer Diboll that I did not recall the question or answer but had checked the total of coal bills against the paid business telegrams, so I probably did answer as Parker said I had. Coal bills were one expense of those stations that I knew when I was trying to estimate the relation of costs to receipts.

Wilson and Diboll wanted me to construct, maintain and improve wireless. Insofar as selling stock was concerned, they had never suggested I do that, but Parker apparently figured on using me in his office to help raise his commissions on stock sales or a rake-off on alleged expenses. From what the main office told me, I believe Parker cleaned up more for Parker to keep than any of the wireless stock promotors of

that time cleaned up to keep. Many of the others seemingly put back their surplus into wireless. He seemingly tried to use anything to fatten his take in wireless, including me and religion.

There was to be a station at Astoria to communicate with ships at sea and up the Columbia. Another at Portland was to communicate with Astoria and ships on the Columbia. At that time we had not equipped any ships on the Pacific. Shortly before I left for Astoria the S.S.President came into Seattle. She had been equipped by the Massie company. Arthur Isbell was the operator. I met him and he promptly took me out to lunch. I understood that Massie expected to use the Navy shore stations as his outlet. A year or so later I found Isbell with the United Wireless.

Cooper, whom I last mentioned as having left us in Texas, did not stay away long and was on the Pacific coast looking for station sites. He had investigated site possibilities around Seattle and had moved on to Portland. By some process of reasoning, or hoping, the conclusion had been reached that a station at Astoria, Oregon should be first. Cooper had found three possibly free sites there but was doubtful about them. I arranged for station equipment to be shipped to Astoria and headed there with my wife and little girls. The lower Columbia was not crossed by bridges then. From Kalama, Washington we crossed by ferry to Gobel, Oregon and waited for the train that went from Portland to Astoria (and sometimes to Sea Side). While waiting I talked to the Gobel telegraph operator and told him we were going to install a wireless station at Astoria. He and we were the only people in sight. Not long afterward we hired him as operator for the Astoria station. I met him years later in wireless. I believe his name was Furman. His name will probably show in some of my notes.

At Astoria I found Cooper with the three sites in mind and no

convictions. Astoria then was largely on planks supported over the Columbia River and Pacific Ocean tide land by piles. A hole in the street or a vacant lot was something you could fish in. If you could take the trouble to drop garbage and sewage through a hole in the floor, the Columbia River, Pacific, crabs or fish would take care of your contribution. The place was naturally sanitary in those respects. They missed a lot of diseases. Some of the old boys had what they called the Century Club. They ranged in age from 89 to 104 and met for a drink of whiskey shortly before noon daily at the Occidental Hotel. Wright, who owned and operated the hotel, supplied the whiskey. He was 92. While I was stopping at the hotel I was invited to join them once or twice, although I was in the great-grandson class.

Only one of the free sites Cooper had in prospect was fairly accessible to the business district of Astoria. That site probably contained bones of the Lewis and Clark Expedition and of early Hudson Bay Company men. It was a filled up graveyard. Hills made a screen around three sides of that location.

Another possible site was Tongue Point, a ridge or tongue-like formation that stuck out into the Columbia River east of Astoria. It commanded a clear stretch for a few miles up the Columbia and down to the Pacific.

The other site was on a high elevation above Astoria, above the Columbia River, above the Lewis and Clark River, above Young's river and above the land next to the Pacific Ocean from Tillamook Head to North Head. I chose that site.

Five years later (1913) I shipped equipment from New York to establish a Marconi station on Young's River below that station. In 1915 I was made responsible for the maintenance of the Naval North

Head station and in 1917 for the ex-Marconi station, and in 1919 I went with Admiral Coontz, other officers, five Representatives and one Senator to inspect Astoria sites and gave as my opinion that the Tongue Point site could be used for considerable wireless as well as for a protection to naval craft that could be based in the Columbia behind the tongue-shaped ridge.

While constructing the Astoria station in 1907, I visited the Navy station at North Head. The equipment was German (Slaby-Arco or Braun). When as Expert Radio Aid for the Navy in 1915 I became responsible for maintenance at that station, the equipment was still German (Telefunken Co., which was a merger from Slaby-Arco and Braun).

The North Head station was high above the breakers at the mouth of the Columbia. A windy location where masts were blown down. I was there one night when I thought the wind would blow the house down. However, I was never there when any of the property was blown away. On one occasion, a hot night, an operator was alone in the bachelor house. A growing breeze became a high wind. He had no clothes on but he made a rush for the mast to slack off the antenna and relieve the strain on the mast. About twenty feet from the house door, the wind blew him over. He crawled toward the mast. The wind blew the roof off the bachelor's house and the mast over. The house walls remained but he could not find any clothes or bed clothes. All light stuff had followed the roof. When the wind would let him walk, he went to the building where the married folks lived. All of the papas, mamas and children were up and looking at him when he walked in covered in spots by red hair. That is the way an operator told it to me so it must be true, and it does check up with the winds and what happened to structures at that location.

Operators whose surnames began with "Mc" seemed to be attracted

to that station and returned for second and third or more times after see duty. Some owned profitable cranberry bogs in that vicinity. Ilwaco, Washington was the nearest town, down hill east from North Head and across seventeen miles of the wide Columbia from Astoria, where the Chinooks were common. Chinooks are soft gentle breezes; chinooks are salmon; chinooks are Indians; chinook was a language made up of Indian, French and English, by the Indians and early white settlers.

In the, perhaps, 200 square miles of the Columbia River, frequently in view from our Astoria wireless station, there were fine fish, even Royal Chinook salmon. Sails of salmon boats, maybe a thousand, shared that broad water and reflected the sunset to us. When I hear "Red Sails in the Sunset" I think of those red sails and the other beauty around where the Lewis and Clark River joins Young's River to join the Columbia in meeting the Pacific.

The portion of the top of the observation height above Astoria which that municipality could make available to us was not definite. It had been surveyed some years before but no lot stakes were visible. The fern grew several feet high, slugs that looked like they might be snails who had grown two or three inches too big for shells were squashed as we moved around, squirting slippery yellow and green smears on me and other things. Dead wood like stakes are made of rotted quickly. A surveyor ran a line from a stone marker near the Columbia up the steep but wooded and fern covered ascent to about where we expected to locate our station with its tall mast and spreading guys. He said there should be a stake at that point. We pulled fern away but could not see a stake. In the locality he pointed to I scraped away the dead leaves and twigs. Scratching around I found something different. I called the surveyor who was preparing to check his measurements.

He examined the spot I had found and carefully digging around, removed rotten wood leaving a square stake-size hole. That mold of a stake was one corner of our lot.

In Washington where the rotting vegetation conditions were similar to those in Oregon, I heard a story about one of the survey lines we had to use. According to this story, surveyors had not been able to make some points so they inquired around and found that an inactive old fellow living in a shack in that sparsely inhabited section had made surveys there years before. He said most of the survey marks could have been destroyed but there was a stone marker he had buried and that they could find. He went with them and they followed his instructions, making measurements to a point where he said he had put the stone. Nothing showed on the surface. He told them to drive a stake and they would hit his buried stone marker. They drove the stake but met no rocky opposition. He asked for a shovel and dug around the stake. The stone was there. It was a grindstone and the stake was through a hole in its center. That happened years before Washington went dry.

We - my wife, Ethel, the four year old, Frances, the two year old that Cooper called "boy", and I lodged at Mr. Wright's Occidental Hotel over tide land by the Columbia River in Astoria where an Oriental (from China) was the good chef who put salmon cheeks on his breakfast menu. I, the first day, could do, four salmon cheeks and thought I had found the heavenly breakfast. Next day, could do three salmon cheeks, almost. Next day could do, maybe, one. Next day a white salmon might have blushed red at what I said about salmon cheeks. Quail is wonderful but not too often and salmon cheeks are likewise or moreso.

For part of the summer we moved from the Occidental Hotel in

Astoria to a cottage on the seashore at Sea Side, Oregon. I rented the kitchen half of the cottage of Mr. and Mrs. Detweiler who operated the Sea Side restaurant. Sometimes we ate in their restaurant and sometimes in the cottage we rented from them. Fleas ate us most of the time. At night they nibbled us in the bedroom. When we got up for breakfast they galloped four or so abreast into the kitchen. We tried all the anti-flea dopes I found. The most effective thing was a tonic a young Seattle University district drug clerk had prescribed to prevent the loss of my hair. I am still flea-bitten due to my comradeship with dogs, but never so badly as then. Frances has a mark on her face indicating where she became part of the diet of Sea Side, Oregon fleas. At this writing, 38 years later, she is a dietician at New Haven, Conn., but not for fleas when she can avoid them. She was here yesterday with her dog, Surrey, and flea powder.

Cooper went to points farther south. In a short time I received a letter from him saying he had quit the company again. This time he had gone into the business of making and selling a floor cleaner, expecting to make big money. His determination to sell something was repeatedly cropping up.

In 1907, Success Magazine, Washington Square, New York City, opened up with articles about wireless companies and their stock selling methods. Frank Fayant wrote articles for that magazine that dealt with the schemes and sales talks which had been used by various companies. Also for $1.10 Success would sell a typewritten page about the United Wireless Telegraph Co. et al with a letter signed, "The Investors Department", no personal signature. I spent a dollar ten that way and received a report with such a letter, dated September 19, 1907. According to wireless promotors, such articles and reports were inspired or paid for by competing wireless companies or for blackmail purposes.

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What promised to be a long series of Wireless exposures by Fayant and Success magazine, ended abruptly.
After I arrived in New York, Judge Allen asked me why there was a delay in erecting the Astoria mast and station house. I told him of several reasons. One was that the Success publications frightened the contractor to such an extent that he would not proceed until we put cash in escrow. When I said that, Allen turned to Kippert and said: it has been arranged that Success will not put out any more such articles, hasn't it. Kippert said: yes it was arranged.
I did not learn how or with whom or by whom

Later criminal proceedings may have been started that way. These Success articles were discontinued suddenly. The Marconi Company probably was not the inspiration as they sold stock, too. The Given-Walker-Fessenden groups may have inspired the crusade as they did not sell stock and their monopolistic hopes had been shattered when the United Wireless was found using the crystal detector replacing the electrolytic on which the Fessenden crowd did seem to have monopolistic rights and hopes. United Wireless was the big service company in the U.S. Marconi and Fessenden attempts at patent monopoly had failed. White or Deforest may have inspired the articles as a result of their being divorced from the United.

Success Magazine gave United Wireless a lot of publicity. Despite the telling by Fayant of how wireless stock salesmen put over their sales and that their investment department letter advised against buying United Wireless stock, I suspect they unintentionally promoted the sale of it. They indicated that United Wireless had something new, by virtue of which (claimed virtue) they would take over the Deforest Companies, all of which would have gone out of business in December, 1907, and United would be able to continue in business despite patent suits.

United was doing away with Deforest overland stations and some other liabilities and increasing its ship and shore stations which brought in some revenue, but United could not have continued in business if the sales of stock decreased. I suspect these sales increased.

Success said the officers and directors of United Wireless were: C.C.Wilson, President; S.S.Bogart, Treasurer; C.S.Marshal, Secretary; and on the Board: G.R.Eshelman, W.G.Hubbard, W.W.Tompkins, G.H.Parker, M.A.Kopperl*, C.M.Fickert, which was broad publicity showing that the Deforest Company was out, Deforest was out and White (Schwartz) was out.

* Annie said only one "p" in his name.

CHAPTER XII

FROM ASTORIA TO THE WALDORF ASTORIA AND DF

From Astoria my boss-half, two kids and I went to Portland where I supervised the building of a station house and mast on Council Crest, the high city park. Cooper came back to his wireless job and remained on the west coast with United Wireless. We returned to our Denver home at 566 High Street. The Denver office and Colorado stations were being discontinued. I dismantled stations.

In dismantling stations, one of the jobs was to throw the masts down at almost no cost and sell the remains. The masts were two hundred feet high. At all of the stations but one there was a clear space on some side for the mast to fall on. If one of the guys was in the clear space, I did not need help.

The Altman station, two miles above sea level, gave me more trouble (dead or working) than any other station, both in maintaining it and dismantling it. On one side, miners little homes were within two hundred feet. On one side the station house and high tension line were too close. On one side was our nearest neighbor, the saloon. On one occasion an operator had pulled our antenna across the high tension line so I had to make a special trip there to put the antenna where it belonged and replace the burned receiving instruments. The saloon, next to the station, was where I got mountain fever because there was no water at the station and I drank the saloon keeper's water that he kept in his back room instead of buying the sour beer that he sold in the front room. My excuse for that is that I was not a whiskey drinker and I had tried the beer.

On the fourth side where our mast could fall were telephone and low voltage lines, but they, too, were within striking distance. I

Federal Telegraph Co was using that site for their receiver when I closed Federal for the Navy in 1917.

needed help to make the mast fall in two parts or doubled up. I hired a couple of fellows in Cripple Creek to come up and help me. One of them was probably young Dowel Livsey. I employed him several times at Cripple Creek where his father then lived and at Boulder where Dowell attended the University of Colorado. We had lived at Mrs. Coughlin's on South Fifteenth St. in Denver when I was with the P.&.C.W.T. &.T. Co.

We hoisted one man in a bosun's chair to about a hundred feet. He bored a hole in the mast and stuck into it a stick of dynamite with cap and a fuse that reached the ground. The two then went to the guys on the saloon side where I had inserted ropes to be cut. I lighted the fuse and went over on the opposite side toward the low voltage lines and when the fuse had burned almost to the dynamite, I signaled to the other two to cut the guys. They did and I pulled the top toward me with a rope, expecting the dynamite to break the mast so the top half would fall first. The mast gave way so quickly that I could not run but had to turn and jump into what had been the basement of the miners' union hall. The mast doubled up and fell nicely within unused spaces. The fuse went out. The dynamite did not explode. The bored hole and cutting the guys synchronized with my pull on the halyard, jackknifed the mast. It folded and fell. I was only slightly bruised. Something might have hit me if I had not landed in the cellar of what had been the miners' union hall before it was burned.

President Wilson had moved to New York. Dibol was to close the Denver office and move to New York and become treasurer of the United Wireless. He was Mrs. Wilson's nephew and Wilson's most trusted associate. I was to close the Colorado stations and move to New York. We rented our home at 566 High St. and went to Ohio where the family would visit until I found quarters in New York.

I arrived at New York late in December of 1901 and reported to President Wilson at 42 Broadway. It was the holiday season. From Brooklyn Bridge south to the Custom House the chief sound effect was the "Merry Widow Waltz". Boys with bazoos shrilled the tune and sold sheet music. To me it was the happy note of the occasion. I saw the operetta, liked it and learned it was staged by Frederick Thompson. Within a year I was on the same stage at the Liberty Theatre putting on the wireless part of "Via Wireless" for the same Frederick Thompson. I won Thompson's admiration by installing a horn gap that popped noisy sparks toward heaven from the Liberty Theatre sign, just off Broadway, The same Thompson that built "The Pike" in St. Louis, "The Hippodrome" in New York and "Luna Park" at Coney Island. He drank scotch highballs and I drank beer one door east of the Liberty Theatre at frequent conferences, always standing at the bar and at his expense.

In late 1907 and early 1908, I did not have anything to do with anybody's merry widows, including Franz Lahar, Frederick Thompson and Lee Deforest. I was given a special wireless assignment. The Manhattan Beach (DF) station was to be a sort of laboratory and headquarters for me but I was to report to 42 Broadway frequently to talk over things. In general DF, which took its call from De Forest, was to be used at night for telegraph service and in the day for my experiments. The equipment was under my supervision and half of the station was segregated for my experiments. Also I was to look out for special cases involving experiements, design, installation, construction and maintenance. President Wilson lived at the Waldorf Astoria. A station in a pent house on top of the Waldorf was to be maintained most carefully. It was Wilson's pet. Elmo Neal Pickerell was to operate it. He had operated Boulder, Colorado Springs and Denver (CW). I was to visit the station frequently to see that it was well maintained insofar as electrical and mechanical

features were concerned. I had built the Astoria, Oregon station but instead of staying there to see that it was maintained, I went to New York and kept my eye on the maintenance of the Waldorf-Astoria station among other things. But half of the time my headquarters were at a station built on piles with natural sewage disposal contributed by the Atlantic, just as the Pacific contributed tidal flushing to Astoria, Oregon.

Now that I was in New York where there were a number of wireless people, I set out to put over the argument that there should be a wireless scientific society. Being a member of the American Institute of Electrical Engineers, I talked to their secretary, Mr. Ralph W. Pope, in addition to wireless folk of various kinds. Pickard was very friendly to the idea. Shoemaker who had been secretive and adverse to discussing such technical subjects, seemed to be inclined to help do something about it. The technically inclined operators were for it insofar as they could afford. Technically inclined people were almost invariably handicapped financially. Others in United Wireless felt that they could not understand the technical stuff but they thought it might be a desirable help to wireless development and, therefore, they would join as financial contributors but not to attend meetings or contribute papers. The most popular thought seemed to be that we should have a library with rooms where members could read and get together.

We went over the constitutions of various organizations. I thought the organization should be copied largely from the American Institute of Electrical Engineers but not limited to America as wireless was not limited by national boundaries. Then its greatest value seemed to be on oceans and not so much on continents as between continents. The organization should be world wide and should have a name and constitution to fit that scope. Secretary Pope and others of the AIEE wanted to take

AIEE

us in as a part of that organization but it seemed better that we try to be international and not a minor part of a national organization. Mr. Pope gave us good advice on how to proceed and one of the main reasons we succeeded was that we did our best to follow his advice.

It was doubtful whether the word "engineer" should be included in our name. Of those I contacted or knew about, several had higher education in Science but only two had taken engineering in college and one of those two was antagonistic. My job as a guide and transportation arranger for the American Science Association Convention at Ohio State University in 1899 had brought me in contact with the desirability of science meetings and I thought there should be a Wireless Science Association. However, too few in wireless could be appropriately classed as Engineers or Scientists and others would object to the inference that they were, when they obviously were not. They were interested in wireless and would not mind contributing by becoming a member of a society that would advance wireless. Therefore, broad names like "The Wireless Institute" repeatedly occurred in the naming of the proposed baby. Farnsworth, who was Pickard's patent attorney, and mine at times, and Bissing, who was my patent attorney, helped particularly with the name and constitution. Patent claims are made broader by eliminating qualifying words. The same idea was applied to the institute; we tried to avoid unnecessary words.

Patent lawyers are long winded when they write briefs but in friendly office conferences they use brevity. One lawyer that I frequently associated with in radio cases, Walter Pumphrey, would put on his pince nez with its black ribbon and say: "Get down to the bare bones". That remark made me grin for I knew how fond he was of bones with plenty of chicken meat on them. Studying words about radio caused him to look very tired. Mention of a cocktail and chicken, slipped thirty

years out of his countenance. Pumphrey's greatest defeat was by patent Attorney William H. Davis, who talked himself into trouble about the middle of September 1945. He was accused of saying that employers could pay union men fifty percent more, Before 1929 Davis and others had tried to monopolize loud speakers. In 1929, as a patent expert, I went before the court at Wilmington, Delaware and showed that loud speakers did not work like he said they did!

I thought Davis was about the cleverest patent attorney in about 1927 when the unions started so many strikes.

I was on the same side with him in a case for Telefunken.

It took over a year of preparation before the meeting was held at which we adopted a constitution and elected officers. That meeting was held in Farnsworth's office, room 1909, 42 Broadway. We were employed in wireless work and nearly all had to get the consent of our employers. In United Wireless, the largest company, there were officers who insisted that employees should mind their own job, keep their mouths shut, exchange no ideas and never associate with employees of another wireless organization. We had to win over the United Wireless, prepare constitutions, and take care of our wireless jobs before we could stage an official opening. Several other things occurred in wireless during that time. The starting of the Wireless Institute was extracurricular but here and there it was brought about in connection with sustaining wireless work.

The Manhattan Beach wireless station became a contributor to the Institute, a business collector for United Wireless, the bane of Marconi companies and a broadcaster of the Merry Widow Waltz, plus Yankee Doodle, plus Dixie. With the help of a phonograph that had been used in a "his master's voice" exhibition on Nassau Street. My wife gave the phonograph to Linnie Taylor, who helped with our family at 1488 East 17th Street, Brooklyn. Linnie was the wife of a Sheepshead Bay horse handler. He was partly colored. She was half Indian and the other half partly colored. She had a high school education. Her husband

went to work in Brooklyn Navy Yard, died about thirty years later and was buried with a ceremony at which white folks attended. Linnie is old and fairly independent and we see or hear from her occasionally.

The Manhattan Beach station was not on Manhattan Beach but in the mud and water that separated Coney Island from the mainland. Some of the De Forest Company folks probably called it Manhattan Beach because that beach was rendered more exclusive by entrance fees than other pleasure spots in that vicinity. Mud, water and muskrats were features of our site. The masts were set on concrete piers. The station house with the bridge that connected it to Emmons Avenue via the Long Island R.R. fill was on piles. Any foot work done on the sea level about the station was done in rubber boots when the tide was out. In power and general plan it was like the Denver station (CW) I had built. New York's DF was at sea level and wet. Naturally, Denver was a mile above and usually waterless.

The same transmitters, the same station floor plan and the same antenna height was used in both cases. Our Denver mast design was just as good but much less expensive. Troubles were different at the stations. For example, alkali dust caused insulators to leak sometimes in Colorado, while in New York moisture very frequently caused such leaks.

The station call was DF, named for Deforest who was then considered as the promotor of liabilities and the thirty kilowatt had given much trouble, all of which probably contributed to the belief that the station was a white elephant. I thought it was the best station on the Atlantic coast for wireless night service. Fessenden's Brant Rock station, I believed, could be better but it was not available for wireless service. I had made observations on the wireless sending ranges of the Atlantic coast stations by listening to them in Colorado and

probably knew more about the carrying ability of those stations than Atlantic coast people did. I had heard DF working with stations all the way to and in the West Indies, but the station was not giving good results when I landed in it. I could not understand why at once.

My first observations indicated that the transmitter condenser, spark gap and antenna were not properly insulated. There had been too much covering up for appearances and to smother the racket of the sparks. I improved things electically by eliminating the leaks of mufflers and nice looking but non-insulating mahogany. There was a little room between the operator's room where he manipulated the key, switches and receiver and the bedroom. I put the transmitter in that drier room and skimmed it down to essentials. It made a hell of a racket and did not look nice without the former muffling and frills. In summer the bluish flashes and loud crashes were appreciated by the Coney Island customers on the Brighton line when the station window was open. The station then had a wonderful wireless long range wallop.

DF was not popular with operators, located as it was in the mud between the end of Sheepshead Bay and the Brighton Beach railway. It was in the open for winter winds and in the tide flat for summer mosquitoes and with no close places where mainline or frequent conveyances could be boarded. The Sheepshead Bay race track had closed permanently in the fall of 1907 leaving ex-employees for various kinds of stealing. The nearest saloon was where we bowled and its claim to fame was that a woman and man that bowled there sometimes were Evelyn Nesbit Thaw and a wealthy rubber man.

We moved in with the Johansens who lived between the saloon and the Canoe Club. The lots between Johansens and the club were vacant. The Johansens were two and did not need much room or kitchen in the

winter so we shared most of the house. In summer their kitchen and other parts of the ground floor became a small choice restaurant. The Sheepshead Bay cold winter wind blew off the bed clothes when we opened the windows as was our nightly custom. We looked for another place and I picked the Kings Highway neighborhood because from there I could reach my city contacts on Manhattan Island for five cents or Sheepshead Bay Manhattan Beach station in the opposite direction for five cents. Either way you went an extra nickel was collected at Kings Highway, then, but not now.

We moved into a row of narrow attached houses that had been built between fourteenth and fifteenth streets on the south side of Avenue P. At a real estate office by the Brighton Beach line station at Kings Highway, I contacted a Mr. Lucas who rented the second house from 14th Street to me. Before renting I asked Lucas if I could have it for a year. He said I could have it as long as I wanted it. The transaction was completed by the office man who was taking part in our conversation. In the west if you took a place for a year, the first month's rent was free, your receipt read to the end of the second month. I told the office man I wanted to take the house that way with the first month's rent free and gave him a month's rent.

My wife worked too hard (as usual) in fixing the place up. We had not been in the house quite a month when Lucas stopped me on Kings Highway and told me I would have to get out as he had sold the house. I kicked and he said he would find me another place. He did - on a second floor on Coney Island Avenue several blocks away. I said it was not satisfactory and that if he did find a place, he would have to pay the moving expenses and all other expenses he had or would put us to. He waited until the day my first month was up and had me served with a dispossess notice. When it came into court, the senior

member of a New York legal firm offered a receipt in evidence showing that I had paid the rent. The office had given me the month's rent free. The judge came down from the bench and shook hands with my legal representative, who was the senior member of the firm in which Arthur Stiles, my boyhood schoolmate in Richwood, Ohio, and Kenyon college graduate was a junior lawyer. I was told later by one of the associates of Lucas that he had owned the house and had rented it to us so we would fix it up, occupy it and make it more saleable but that the other man in the firm, who gave the receipt, had thought Lucas really wanted to rent it for a year or more. If Lucas had stopped there, he would have received rent, probably for three years, but he kept trying to put me out with the result that we spent a few dollars in lawyer's fees and were free of rent for several months and could have remained longer but we wanted to move to 1488 East 17th Street, within about 300 feet of where we live now, thirty-seven years later, at 1470 East 18th St. He lost the sale of the house, the rent and what he paid his lawyer. After I had moved, his lawyer came to me and threatened me. After some time the lawyer asked if I would agree to pay the demands of Lucas. I told him I would see Lucas in hell first. I did not have to collect my salary where he could get at it. The lawyer shook hands with me and grinned. He knew real estate men and how some tricked renters into fixing places. Also he didn't mind seeing me win out as he and I were mother Elks.

One of the rooms on the ~~first~~ Third floor of 1488 E. 17th St. I used as an extra laboratory and sub-receiving station to check Manhattan Beach transmission. When I was working with the wireless telephone at DF the instruments in that room talked or played tunes. Sadie, one of the colored girls who worked for my wife and slept in the next room, always ran by the door ~~to~~ of my receiving room. She thought there were ghosts in

there. Sadie had a ghostly time with us. My wife chloroformed a cat and with Sadie's help, buried it in a lot back of the house. Later in the day Sadie opened the side door to go out. She didn't go then because the cat walked in. Maybe the chloroform got one life but there weren't enough dirt to hold down the other eight. A Polish girl who did not speak English occupied the room for awhile. She was not afraid of the wireless but she let out a kind yell when I saw her without any clothes on, I had come up stairs too quietly.

When I arrived at the Manhattan Beach station in late December, 1907, Christie was the operator and Rinehart, who was not employed, was batching with him. Christie was a cook, operator and actor who looked like an illustrator's picture of a Shakespearean actor. Christie liked good food prepared by Christie, and he liked Rinehart. Christie bought from Park and Tillfords, cooked on the station heating stove and served delectables on the operating table. Alligator pears, tuner, salt, squab, guinea fowl, message blanks, meat sauce, antenna switch, artichokes, Mocha and Java, turtle soup, Roquefort, telephone, guava jelly, creme de menth, screw drivers, fuses, beans, pet detector crystals, Benedictine, magazines, tin plates, pliers, eaters tools Rinehart and Christie blended there when they had money. Christie frequently had fresh and preserved fruits I had never tasted until he asked me to sample them. Rinehart was a wireless operator too but he rested most of the time. I hired him by the hour, ocassionally to help make changes in the station. They tired of their two-member gentlemen club life and moved. Other operators who took the job from time to time did not cook and some did not sleep there.

That Rinehart did not get a job amused Christie. He said he had known a good many who only took a job when they were inspired. In one case the only thing that would inspire the chap to go to work was to chew hashish. In one case a chap took a job in a hurry and kept it until he had saved fifteen dollars which he spent for a large piece of black velvet. When asked about his sudden interest in velvet, he said he had a very blond girl and it suddenly occurred to him that she would

look nice when lying on black velvet. I think Christie knew more actors than wireless operators. Rinehart went to work later and became quite well known in wireless, and I heard he married a well-known actress. Thirty years later I heard that Christie was on the stage again in New York.

One DF operator that did not stay very long heard someone come into the room but did not look around until he had finished receiving. He looked at a pistol. The visitor took his watch and money.

A Jewish boy who was not there long enough for me to remember his name, was awakened one night to see a chap going through his clothes. After listening a while the boy got up and pulled a twenty-two rifle from under the bed. The thief was not in the operating room but the boy thought he saw him under the long work table in my room. The door between my room and operating room was largely coarse mesh wire netting. He fired from across the operating room through the netting. What he thought was a thief were experimental tuners. Instead of a bullet the shell was loaded with extremely fine shot. My experimental tuners were well peppered.

One evening I paid off some workmen in the saloon where we bowled. I had bills which the bartender changed for me. In the dusk a few evenings later on my way from the station I saw a man hiding behind the base of what had been a crossing guard when the Long Island Railroad ran through the tide flat. Instead of walking on the old railroad embankment as I usually did I ran down into the tide flat and followed a narrow and broken short-cut that I knew well. The man ran after me but did not step on the right spots and landed in the mud. A few evenings later, two men were hiding next to the water down the embankment but I saw them move and ran out of range on the bank past them before they could climb the side of the bank.

Thieves entered the station between the time the operator left one morning and the time I arrived. Tools and other things were missing. I kept boots and an extra pair of shoes at the station and these were taken. The shoes were unusual in both their tan color and decorative holes about the toe. Shortly afterward I saw them on the pin boy (about 40 years old) in the bowling alley. I told the police who were very much interested because there had been so much stealing. They started with the pin boy and told me they put quite a number in prison. We were not robbed after that.

A two-bottle operator brought about a great improvement in the station. I don't know whether he drank all of two bottles each day. He always had one or two quart bottles marked whiskey. He drank from the bottle, walked stiffly, dignifiedly and straight. spoke only to answer questions, slowly and with dignity, weighed probably two hundred and stood perhaps over six feet. The chief operator at 45 Broadway station (NY) called him on the carpet several times for not handling more business. Finally the chap said my experimental work interferred with him.

That put the operation of the station up to me. Nothing I had done should have interfered with the operating. We were not using the transmitters or receivers during the same hours. I was there during operating hours at times but in another room and did not make noise or electrical interference. I asked DF operators what distance they reached nightly for my range records and I asked them to try experimental tuners but they could always switch to the then standard United Wireless type "D" tuner if they desired. Paul Ware who was operating our wireless at Gallilee, N. J. at that time still loves to call the type "D" the de-tuner.

I asked Henry Hughes, our chief operator or superintendent (he was boss of operators) to remove the two-bottle operator from Manhattan

Beach for three nights and let Pickerell from the Waldorf-Astoria take over. Also I asked for more information on the features of the messages that had been handled for the past few months at DF. Those features indicated the kind of messages, all distances, for whom (e.g., Standard Oil), number of words, ship or shore station and deadhead or paid. Pickerell would not want to leave the Waldorf permanently but he knew as well or better than I did what DF had been able to do up and down the Atlantic coast. We had eavesdropped on the Atlantic from ~~reserved~~ gallery seats in the Rockies. Pick could read all of the readable messages. I concentrated on calls. I was not an operator and could seldom read more than a word or two in the body of a message if I strained.

Hughes made those arrangements. The morning of the day in which Pickerell was to take over at sundown, I met our big two-bottle operator coming from the station with a girl. I don't know what happened but he landed in a hospital that day and died within three days according to the story that later came to me. Pickerell handled many more messages and some of them over greater distances than had been handled for months. In the meantime I made inquiries to find the type of operator who could do what we needed at Manhattan (DF).

I proposed to Henry Hughes that he let me talk to operators with the idea that the operator I selected would be given a bonus by me at DF for special services that would help with my experimental work, range studies and make the Manhattan Beach station more profitable. Henry could only give operators standard wages and DF was not a desirable spot compared to ships and most shore stations. Henry agreed. The bonus I paid them would come from my expense account, not from his operational accounts. Hughes, a lovable character, was the main supervisor of operators and Jack Duffy was his first assistant. When

United Wireless was bought up by the Marconi Company, Henry Hughes went back to Western Union. Jack went along with wireless and died an employee of Radio Marine. I saw Henry last in about 1935 at a Veterans Wireless Operators Banquet and Jack in 1941 at Radio Marine when I was examining for the British radio ~~location~~ locator (radar) men. I hope I had no bad effect on them - they died about a year after I saw them.

I put in effect a special scheme for operators at Manhattan Beach. They tried experimental receivers I gave them and reported all the business to me they did as well as to Hughes and the Accounting Department. I paid them a bonus of so much a word that varied with the distance covered. A bonus on a message handled less than one hundred miles was not noticeable but on a thousand mile message, it was considerable per word and the United Wireless made money on it because long distance messages by wireless saved land line charges.

The operators speeded up, talked business to the others on boats but wasted no time in handling a message. They cut out frills and rag chewing. The average number of paid words handled rose to sixteen times what the station had handled before. It was the most profitable of United stations and although it did not transmit unnecessarily, it was a thorn in the side of the Marconi Companies.

Vessels equipped with United wireless operated along the coast mainly from Eastport, Maine to Sao Paulo, southern Brazil, including Bermuda and the West Indies. When messages could be sent directly to DF instead of to the nearest point on land and along the cost by land line, the United did not have to divide the charges with land wire companies. Also such a station as Cape Hatteras could pick up a nearby ship in the daytime and forward the message to DF after dark.

When DF had a clear interval, he called the 42 Broadway office on the phone and forwarded the messages. To do this I hung a buzzer on the telephone, resting it against the microphone casing. A flexible cord connected the buzzer to a key and dry cell. The operators made less mistakes by code than by talking. Dun White, a very careful and businesslike operator, did the best and made the most money over several months until he had trouble with his ears.

The Marconi Company had a station on Coney Island about a mile from the west end, at the entrance to a residential section called Sea Gate. That was the main New York station for Marconi ship work. Its transmitting and receiving ability were weak compared to DF, about a mile from the east end of the island. Coney Island is about five miles long and originally when the rabbits lived there, was about a mile wide at its widest. When the show barkers and hot dogs with bathers took over the island, they attached it to Flatbush, Flatlands and Brooklyn by roads, railroads, sand, garbage, empty bottles and dirt. SE at one end of Rabbit Island and DF at the other.

Marconi operator, Neil McIntyre, wrote the following about the Manhattan Beach station. It was published by the Wireless Age, December, 1914:

OLD "DF"

Way up mid the Labrador icebergs, workin' a C.P.R. boat,
W'en you think you're free from jammin', doesn't it get your goat?
You've given 'im "G" for twenty, wiv 'is signals weak as bref,
We'en 'es just startin' up wiv 'is third one
You're jammed all to H--- by "DF".

For we all 'ears the bounder a sendin', but the bounder 'e don't 'ear us,
So we just throws the phones on the table and gives vent to an
important cuss.
'Is signals get stronger an' stronger, til they bloomin' nigh
render you deaf;
You may go where you please, from Cape Race to Belize,
But you can't get away from "DF".

They talk about multiple tuners, and valve sets and such sort of guff,

We consign the whole lot to the junk pile, W'n "DF" is 'andlin' the stuff,
'Is percentage of dampin' is awful, and the thing that puzzles me yet,
Is 'ow in the 'ell does 'e do it,
Wiv a simple two kilowatt set?

For we all 'ears the bounder a sendin', but the bounder 'e don't 'ear us,
So we just throws the phones on the table and gives vent to an important cuss.
'Is signals get stronger an' stronger, til they bloomin' nigh render you deaf;
An' you can't get away, from the call of "HA"
Sent out by "PG" and "DF".

Of course, 'e 'as got a big aerial, and an acre of ground plates we know,
But only two kilowatts power, tho' you 'ear 'im wherever you go.
From forty-two degrees right to Sea Gate, 'e follers you up like a ghost.
You can't get away from 'is music,
From Belle Isle to the Mexican coast.

For we all 'ears the bounder a sendin', but the bounder 'e don't 'ear us,
So we just throws the phones on the table and gives vent to an important cuss.
'Is signals get stronger an' stronger, til they bloomin' nigh render you deaf;
You can go where you like, anywhere on the pike,
But you can't get away from "DF".

XII P17

It was the two kilowatt transmitter that made a reputation for DF. The forty kilowatt transmitter was soon abandoned. The condensers and key operated circuit breaker broke down too often, the circuit breaker was slow and the station could not be heard much farther or no farther with the forty than with the two kilowatt.

The verses were published in Wireless Age, December 1914.

CHAPTER XIII.

DOC ASKED BAB TO STICK IN THE THIRD ELECTRODE.

When I reached New York in late 1907, C. D. Babcock was in charge of the United Wireless factory. Cloyd Marshal, secretary of the United at 42 Broadway, went to the factory daily for a conference with Babcock. Their purpose seemed to be the domination of all science and engineering in the company. I was told that Babcock had been a doctor of medicine and Marshal had graduated in electrical engineering. I believe Babcock was the best all around mechanic and shop superintendent in U.S. wireless at that time. Marshal did not do any electrical engineering that I heard of except possibly indirectly in an executive way or as a salesman. Babcock was secretive. Marshal and Bab seemed to enjoy each other. Bab apparently wanted to do shop work and Marshal wanted to talk. In his private affairs, Marshal worked with his boys in caring for his garden, chickens, cow and real estate. I lived in a house near Marshal and owned by Marshal at Dumont about five years later when I was U.S. Radio Inspector. He worked early and late.

Piece by piece between 1906 and 1912, I collected a story of how De Forest brought about the major operation of inserting a third electrode into the two electrode vacuum tube. A number of circumstances led up to it.

It seems that De Forest was a sort of a playboy and irresponsible boss of science, engineering, research, inventing, manufacturing and boss of nearly everybody in the De Forest and United Wireless (Temporarily) company during 1905 and part of 1905, until enough of his mistakes or infringements caught up with him to swamp the prestige Abe White's advertising had given him. Evidently it seemed to Marshal, Babcock and others that De Forest's science, research, engineering and invention efforts had turned out to be liabilities

or definite losses. When De Forest lost his power Marshal and Babcock apparently took over with tough economical and restrictive ideas about such things as might bob up under the title of research, science or invention. They were for cheap, simple wireless instruments.

Others in the company felt that wireless needed much improvement and that things coming under the head of science, research and invention, should be carried on, but they admitted it was not practical to dig up a lot of money suddenly because some chap who was advertised as a genius had another brainstorm, extra drink or indigestion. Babcock had taken the title of Scientific Manager. In addition to being the reserve force for construction and maintenance problems, I was to experiment conservatively at Manhattan Beach (DF) as Assistant Scientific Manager. For testing and experimental work, I had to make my equipment or beg for it. When something went wrong with construction or maintenance, I simply bought what was needed or asked for it and got it promptly, and where I worked with Henry Hughes and his boys of the operating department, I was in another category. My jobs were confusing to others in the company. They called me superintendent, professor, doctor and expert. That is, those were names I heard.

Marshal and Bab were naturally on the sour side and they had been so fed up with alleged improvements and inventions magnified by promoters, that they turned down practically everything. For example, after I was there a while, I proposed to Marshal that the operating key be redesigned to make the parts lighter and that larger silver contact surfaces with larger radiation surfaces be substituted for the very expensive platinum contacts. That key was not as big as Marconi's but it was too big. He did not give me an answer so I wrote my proposal and gave it to him. Sometime later I received a letter from him saying he had taken it up with "our Mr. Babcock" who stated that a lighter key lever and silver contacts were not suitable as the heavy lever and platinum were

necessary for handling the voltage and current we used. I had used large contact surfaces and large radiating surfaces in place of platinum in college and in the apparatus I designed for the P & CWT & T companies. That answer Marshal gave riled me.

I went to the Manhattan Electric Supply Co. on Park Place where A.B.Cole sold wireless to the growing amateurs. Cole was not there but Louis Girard Pacent, his young assistant, was. I asked for an ordinary telegraph key and told Louie how I wanted to change the contacts, insulation and connection to the key lever. I meant to do it myself by hand as my Manhattan Beach laborstory contained no machine tools. Louie said he would get the Manhattan Electric Supply Company shop to do it and that's what he did. I installed the key in 42 Broadway station (NY), literally over Marshal's head which was on the 19th floor, as the station was on the roof. After the key had been used for three months, I obtained a written statement from Henry Hughes who had charge of the station. I wrote a letter stating the entire case, showing that a light key was cheaper and easier to operate. Since the cost of silver contacts for our stations per year at that time would be over a thousand dollars less than for platinum contacts, I asked that my weekly pay be increased.ten dollars or about half the saving in contacts. The directors read the letter and gave me that raise. $500 was not of little value then.

The Jersey City factory was up tiresome stairs in an old building. The receptionist at the factory entrances was a time clock. There was a little window from which you could be scrutinized before being admitted through the shop door or office door. The first office looked unused. The second office was used by Bab and his plump stenographer. Bab was skinny. She seemed to be his helper in everything. When United Wireless failed, Bab married her and as I understood from what he and Farnsworth told me, they moved to the Bowery district of New York where they rented

an apartment that was usable both as a residence and machine shop. Doing special lathe, drill press and hand work there, I believe Bab made more than he did with the United Wireless, until his health failed. He came to see me once at the Marconi shop just before the United failure took his job from him. As I recall it, Shoemaker stepped in and took more or less possession of the Jersey City factory some time before the final closing and pushed Bab around. United Wireless had many receivers at least 26 of which had two legs and were not necessarily rectifiers or tuners. Usually they had a way of messing things up. The 26th receiver had me dropped from the payroll a short time before leaving the office to report to the judge that he had reduced the payroll. He did not know me or what I did but had me stricken off because my pay was the highest on the ~~construction and maintenance list~~ list of salaries that was put before him. At the time he did it, I was finishing up a sixteen hour shift ~~to equip~~ equipping two vessels before sailing time. My boast was that our construction and maintenance department never delayed a vessel.

I went over to William Street and up by elevator to where I got my next job at less money. It was with the Marconi Wireless Telegraph Company of America. John Bottomley, Fred Sammis, George Desousa and Miss Horton ran that main office which included three or four rooms. I became an assistant chief engineer. Fred Sammis was the chief.

Bab and Marshall were both so secretive that they opposed the formation of the Wireless Institute, but Bab liked to tell stories when he had only one for an audience. I was in contact with Bab a good many times and listened to his stories, some of them over and over again. Getting back to the Jersey City factory, there was a large drafting table in the office near the door to the shop. On the wall by the door was a Sprengle Mercury vacuum pump. It was like one I had used in college and one I had used with the P&CWT&T Co. to take most of the air

out of coherers. In the factory were winding machines, wax heaters, benches, lathes, drill presses, grinders, buffers, and electro-plating tanks like we used at the Carsterphen Electric Co. in Denver. The *electroplating was enlarged later because lead foil did not stick to the Leyden jar condensers. That facility was enlarged to plate copper on the jars after they had received a conductive graphite coat.

There seems to be an impression that the Fessenden (NES Co.) suit against DeForest (Am. Def. WTCo.) for using the electrolytic detector was what caused the invention of the audion. That suit did apparently cause the influx of crystal detectors to such an extent that there was little demand for electrolytic detectors. Crystals took over before it was decided whether Fessenden, Vreeland or Schloemilch invented the electrolytic. The suit put the carborundum into Am. Deforest WT Co. and helped put De Forest out of that company. Carborundum was a crystal that was cooked up in electric furnaces at Niagara Falls. Other crystals were dug up from the earth. The suit also put Pickard into a lucrative crystal detector business,- The Wireless Specialty Apparatus Co. Pick cooked up some and used some that had been dug up and which Col. Firth sold for the mutual benefit of Farnsworth, Firth and Pickard.

According to Babcock and others, De Forest had all wireless inventions he heard of copied when he could. Those who sought to improve apparatus and methods have commonly done that. De Forest had the custom applied to the Fleming valve. The valve was like the incandescent lamp Edison had built in trying to find why such light bulbs collected a dark coat on the inside of the bulb. There was the usual filament and a little metal plate near the top of the bulb connected to a platinum wire that passed through the bulb. It was found that current would, according to the way things were said at that time, pass from the cold plate to the hot filament if the positive connection of a battery was made to the cold

*Pickard had been perfecting copper plating in the Wireless Specialty Co.

electrode and the negative connection was made to hot electrode. It was a one-way street for electricity, or as Fleming called it, a valve that passed something one way but not the opposite way. Crystal detectors did that, too, better in some respects and at less expense. Forty years later Fleming valves can be made the more efficient and accurate but with frills that are not required for crystals. Frills cannot be tolerated in so many cases that crystals are still very important. Pickard with his old knowledge of crystals has been very active in our 1941 to 1945 war with Germany and Japan.

Notes on Babcock's stories about the first three electrode vacuum tube cropped up several times in my files and I remember parts without reference to notes, chiefly because Bab repeated them. Altogether it looks like De Forest's connection (via Babcock and others) of the three electrode vacuum tube was not so much due to Fessenden's stopping him from using the electrolytic as it was due to ~~his~~ DeForest's practice of copying what other ~~folks~~ wireless men did, plus the kind of suggestion that a young fellow like Doc might make if he was pressed for time. Many have wondered why anybody would make an extra electrical connection to a vacuum at that time. At that time it was probably another "pain-in-the-neck" to Babcock; judging from what he will one.

Babcock said he was working on a drawing when Doc rushed up and leaning ~~leaving~~ on the drafting table said, "Bab, if two electrodes in a bulb make a detector, maybe more electrodes will make a better one". ~~He~~ Delighted illustrated his remark by making little sketches on the margin of a patent and asked me to make up some vacuum tubes with three or four electrodes; with a flock of electrodes. I made them", Bab said, "and we tried them. Three electrodes gave better results than two, more than three did not do any better." Bab sometimes went through the motions of leaning on a drafting board and making sketches.

That is a boiled down version of about what Bab told me on several occasions. In some cases he dwelt on the impetuous way DeForest leaned on his table and distrubed his work. Also I believe he said or implied

I understood, in recent years, from what Deforest said when we were together at a dinner that it was Babcock who gave the "Audion" that Latin-Greek name.

Also he said during the same exchange of reminiscences that Abe White got somebody to fix up the wireless equipped electric automobiles that wandered about in several cities to advertise Deforest Wireless and so help the sale of stock.

I was in Denver when ~~[illegible]~~ Marconi people put on a somewhat similar stunt at a vaudeville house. The transmitter was on the stage and a tape-recorder-coherer type of receiver worked down the aisle. Sometimes I believe they used a sounder. Whites autos came to Denver a year or so later.

At the Orpheum, was where I worked.

he had already made some copies of the Fleming valve which they had tried. On one occasion I understood the patent referred to was a five cent copy of the Fleming valve patent such as were supplied at that time by our patent office. I gathered that Bab had been irritated at being told to make tubes with more electrodes. He dwelt several times on Doc's saying to put in a flock of electrodes. In later years when the "audion" began to get the amateur reputation of being ~~xxix~~ useful, maybe very useful, Bab referred to the "flock" as the amusing part of Doc's order. By that time Bab had no authority (power or influence) in any wireless company.

If I hazarded a guess at what Doc did my guess would be that he grabbed a copy of a Fleming valve patent and rushed to Bab telling him to put in a flock of electrodes, a hot one and several cold ones, and rushed out to keep a date with a patent lawyer, a promotor or a blonde. No at that time I guess it was a brunette.

Continuous waves were desirable for several reasons - more efficiency, sharper tuning and wireless telephoning, for example. Poulson had come out with an electric arc that produced continuous waves. When DeForest and the De Forest Wireless telegraph companies were divorced, Doc with some promotors formed the Deforest Radio Telephone Co. and made some arc telephones. Teddy Roosevelt sent our Navy around the world in the winter of 1906 and 1907. Before the warships started, De Forest and his boys equipped a few of them with wireless telephones. At least one of these wireless telephone transmitters operated all the way around the world and broadcast phonograph music as well as speeches. Broadcasting went around the world in the winter of 1907-'08. Stock salesmen of this later Deforest project saw to it that those broadcasts were listened to along our Atlantic and Pacific coasts. They did some stock selling business. Teddy also apparently did some business in selling the idea to the Japs that we were more powerful than they had thought. Maybe the voice of the radio helped. Chief Electrician H. J. Mineratti on the battleship Ohio provided daily broadcasts from phonograph records.

Radio had been frequently suggested as a name for the brand of wireless that we used. Radiation was a common word with academic folks when talking about heat, light and X-rays. Therefore, its use as the name for the kind of wireless that Maxwell theorized about and Hertz demonstrated was objected to. As I recall, the chief objectors were people who sold X-ray equipment and some college professors. But De Forest had been forced to get at least a partly new company name. Fessenden, the son of a preacher, had with a platinum point and acid forced De Forest, the son of a preacher, to substitute Radio for Wireless and Telephone for Telegraph.

De Forest's laboratory was not far from the Waldorf-Astoria. Our Waldorf Astoria station received it possibly better than any other station but not enthusiastically when it interferred with business from our Baltimore station. My recollection is that Doc's station was on Madison Square at one time and at 41st and Park Avenue at another in those days. Later it moved to Highbridge. The arc was an interference at the Waldorf when not modulated, as well as when modulated. The program was a repetition of phonograph records and/or somebody saying, "one, two, three, four" interspersed with the very important question, "Do you get me?". I visited the station once with a bunch of prospective stock purchasers. As part of the show Doc hustled in and out clothed in deep thought or mystery and a long linen duster which was presumably the proper raiment for protecting ones vest and pants from the liquids and solids that were a part of radio phones. The liquid used was one that is still used by radio men. It was ethyl alcohol. The electricity flowed between electrodes in an alcohol flame.

Other things were going on in wireless. Amateurs were multiplying rapidly and biting from place to place like fleas. Their importance was considered to be something like the importance of fleas. Commercial and

government wireless services complained. However, I believe Edwin H. Armstrong regards the fact that he was a wireless amateur at an early date as the source of more satisfaction than those academic degrees, medals, and the title of Columbia professor.

Edison's discovery used by Fleming was a stage; DeForest's order or suggestion to Laborde for the multiplication of cold electrodes was a stage in the development of vacuum tubes. De Forest took the vacuum tube along when he went into the radio telephone business. McCandless then made the tubes for him. In time, they, with the help of other characters, changed its vital organs somewhat and increased its intestinal fortitude to where it did not quit working so quickly. The tubes became durable enough for amateurs to take a chance at buying. The amateurs added stages to the development of the tubes. They nursed quantities of tubes. Sat up with them at night. Used them on shorter waves. Connected them up the wrong way which turned out to give better results than the right way. Professional and academic wireless people were not paying much attention to the Audion. They had tried on lower frequencies and with orthodox connections and without enthusiasm.

After my experience with the three electrode tube at Dallas, Texas I did not try it. United Wireless would not pay for them. However, my work at DF in 1908 was partly like what De Forest was doing. I, too, made arc wireless telephones and broadcast. I broadcast my voice and phonograph records. In my pre-false teeth days, I could say 1, 2, 3, 4 as plainly as anybody. My favorite records were Yankee Doodle, Dixie and the Merry Widow Waltz. While I frequently heard Doc's station, I don't remember whether he broadcast the widow or not. That is about the time he collected a wife to be his second widow. The arc phone at DF was heard as far south as ships off Atlantic City, probably about one hundred miles. Later I added another phone station at Coney Island in the Prospect Hotel. We talked back and forth between DF and the hotel.

We did not make any phones for sale or try to sell any.

At DF I also tried copies of Von Lepel and quenched gap transmitters. We tried more loosely coupled transmitters and receiving tuners to get better tuning. In that, one of our obstacles was human nature. When an operator called, he wanted to be heard. He might not be heard if his signals could only be picked up by more than customary attention to the tuning of the receiver. Also receiving operators preferred to set their tuners where they would pick up most any call. That way the operator could read a book, play cards or let a chicken perch on his knee. All he had to do was wear the headphones. Some laid the phones on the table and hoped they could hear their call. Others slept with the phones on and hoped their call would wake them up. Efforts to concoct apparatus and methods that would provide sharper tuning and less interference were regarded by many of the operating boys as infringements on their rights that were promulgated by people who suffered from academic and highbrow disorders. Some of them evidently thought that even if some of us were not professors, we ought to be called that or worse.

In addition to the work I was being paid for doing, my self-imposed extracurricular job was being continued at damp DF, home, the Waldorf-Astoria wireless penthouse, and on ships at sea via wireless, ~~to antagonistic wireless folks in our company and other companies, to folks who tried to write letters that would kill the project but seemed to be like high priced honey.~~ In addition, several of my friends and some others talked it up. Among other things I circulated the following form letter which was frequently accompanied by a personal letter from me. I suppose Miss Parker made the letters for me. Jimmy Parker was one of the first three amateurs who grew in Brooklyn. Thirty-seven years later those three primary amateur Brooklyn operators were James Parker, U.S.Navy Dept.; Lloyd Espenschield, A.T.& T.; and Frank Hart, I.T. & T. When I was around

New York Miss Parker did nearly all of the mimeograph and other clerical work I had to pay for out of my own pocket. When I first met her and Jimmy, her office was on the 19th floor of 42 Broadway near the United Wireless. She gave up business in the 1920's. My habit was to call at her office once in a while and pay what I owed her. The last time I called, the office was vacant so I still owe her a dollar for some Christmas cards she had supplied to my wife. I did not know her first name. I saw Jimmy several times at the Bureau of Ships, Navy Department in 1943.

The following was copied from one of the form letters that had been returned to me marked "Good C.C.G.". That was C. C. Galbraith. At that time he was the General Manager of United Wireless. He was very well liked by operators who called him CCG and steamship men with whom he made contracts to equip their vessels with wireless. They called him Charley. He and Bob Armstrong had been salesmen for Armour and Co. They sold weenies alias Frankfurters alias Hot Dogs to Coney Island by the ton in the early nineteen hundreds. Bob Armstrong tried to get ships on the Pacific and in Europe to use wireless.

"New York, May 14, 1908.

Dear Sir:-

You have often thought no doubt that Wireless Telegraphy would be developed faster if those engaged in it would work together more.

The Electrical Engineers have come together in the United States by forming the American Institute of Electrical Engineers. This institution has helped to make better Electrical Engineering, better Electrical Engineers and better feeling between competitive firms.

Why should not we form the Institute of Wireless Engineers and pattern it after the American Institute of Electrical Engineers. The American Institute of Electrical Engineers' plan as applied to Wireless people would be briefly as follows:-

First: Any person interested in Wireless with proper recommendations, etc., would be eligible to associate membership.

Second: Any person having done valuable, original work in Wireless would be eligible to associate membership.

Third: Any person whom the Society by vote, should decide upon, would be eligible to honorary membership.

Fourth: Meetings would be held once a month, at which papers on Wirelesss subjects would be read and criticized.

Fifth: Every member and associate would receive a copy of the papers read, together with the criticisms, thus giving absent members

the same information as those present.

Sixth: A library of Wireless publications would be accumulated as rapidly as the funds of the Institute would permit. Each member or associate member would have access to this library.

Seventh: The Officers and Committees would be about as follows: President, Vice-President, Manager, Treasurer and Secretary. Committees:- Executive Committee, Committee on Finances, Committee on Papers, Board of Examiners, Library Committee, Editing Committee, and necessary special committees appointed from time to time.

Eighth: The dues would be possibly about $10.00 per year.

I believe an organization formed on a plan similar to the above would materially improve Wireless, increase the knowledge and ability of members, avoid friction between employees, between employees and employers, and to some extent between Wireless companies.

Would you join such an organization as outlined? If so, please write me and give full expression of your views in regard to the matter in order that an organization may be formed on the right lines. Also such an organization might contemplate the establishment of a beneficiary association in connection with the Institute.

Yours very truly,

R. H. Marriott,
Ass't., Scientific Manager,
United Wireless Telegraph Co.
42 Broadway, New York."

CHAPTER XIV

THE MERRY WIDOW, VIA WIRELESS and A FOOL THERE WAS

Maybe Dox Deforest or Abe White's Wireless Show inspired Fred Thompson to put on "The Merry Widow", "Via Wireless" and "A Fool There Was" at the Liberty Theatre successively in 1907, 1908 and 1909. Also it can be assumed that Jack Binns and I had nothing to do with "The Merry Widow" but we might have been the inspiration for "A Fool There Was" because we were both mixed up in "Via Wireless".

Frederick Thompson was an inventor or hatcher-up or promotor of new schemes in the show business. He put on "The Pike" at the St. Louis Exposition in 1904. It was something like "The Midway" of the Chicago World's Fair of ~~1903~~ 1893. The Midway at Coney Island has been a more or less perpetual imitation of the ~~1903~~ 1893 midway. While Thompson was putting on his 1904 shows, Abe White was putting on a Wireless show at the same fair with Deforest as the leading man, together with a big tower, big electric signs and noise. Abe White, ex-schwartz, did his best to make everybody pay attention to wireless.

After the fair Thompson came to New York and built the big spectacular theatre where a circus could be accommodated, the Hippodrome. Also he and Dundy built Luna Park at Coney which was probably the prettiest spectacular summer show place at that time. He was a follower of new ideas, an inventor who classified himself as a showman. With him was Hugh Thomas, a very large and agreeable inventor, who could think of many ways to accomplish mechanical and electrical effects that sightseers and vacationers had not seen before. A Standard right hand associate for Thompson at a conference was a scotch

highball; with Hughie Thomas it was a glass of beer.

Frederick Thompson's choice of titles for the 1907, 1908 and 1909 shows fitted early wireless in several ways. The widows not only fitted in with the more or less amusing remarks that are made when Deforest xxixxd was talked about, but that is not all. Widows helped to almost send Deforest to prison and did send some wireless men there. When wireless men were prosecuted for misrepresentation in connection with the sale of stock, the prosecuting attorneys frequently brought out that widows had bought the stock. Widows were favorites with prosecutors. A prosecutor with a widowed witness and an onion could make a tearful appeal to the jury. If I remember correctly, one widow was brought a couple of thousand miles to say she had bought wireless stock. No claim was made that their children were related to the wireless men who were being prosecuted. They had probably never seen the widows, but their representatives or agents had.

People who believed in wireless were called fools and so were people who didn't believe in it. Any young fellow who went into wireless when I did, was classed as foolish, at least by some. Amateurs who sat up late at night with wireless from 1908 to as late amateurs as the 1941 boys were classed as foolish frequently. People who tried to get steamships to carry adequate wireless and operators for safety of life at sea were called damned fools by steamship captains and as foolish visionaries by less salty objectors.

The play "Via Wireless" was a romance in which the sweet actress was rescued from death with other folks by her lover and wireless. The scenery was very spectacular, including hot steel and ship drummers. A room on the ship was the scene. The room was balanced on a large steel ball. Stage hands rocked the room to simulate the rolling and pitching of a ship. At one side of

the room was a regular United Wireless transmitter with the muffler removed ~~xmx~~ so the spark was very bright and noisy. Also there were switches, receiver and head phones. ~~That~~ The instruments were wireless, ~~was~~ the part of the show I put on. During the first week I was back of the rolling room by the sweet young thing and her lover. They necked to get in humor before coming in view of the audience. If the wireless failed to work the hero was to yell in a speaking tube and ask for the Chief Engineer. If he did that I was to put on an officer's cap and come up and fix it. Our wireless always worked so I did not do any acting at the Liberty Theatre. The show was good, helpful propaganda for wireless as a life saver on seas and lakes. It lasted the fall winter and spring.

To start with Thompson contacted United Wireless about putting actual wireless equipment on the stage. Howard Mason, a contract assistant, went to see Thompson and reported back to Galbraith who took it up with Wilson and others. I was told that some of them regarded it as foolishness. I was called in and told that if I could do what Thompson seemed to want done, I was to tell him United Wireless would do it. They arranged a date when I was to see him at the box office of the Liberty Theatre. I saw him there and he led me to the first door east, a saloon. I was asked the usual question and said beer. The man behind the bar did not ask any more. I was served beer, Thompson was served a scotch with soda outfit. Thompson wanted to know if we could put a regular working wireless in his props. I said we could providing he furnished anyone of two or three kinds of electric power, and he could. Then he wanted to know if a spark could be made in front of the theatre before shows, something like that noisy blue or green spark at Manhattan Beach station (DF). My answer was that it could and more so. All accomplished on my absorption of two beers and his dose of twin scotches.

After physics laboratory, electrical shop practice and Rocky Mountain spark stunts that occurred between tin cans and between one thing and another in every direction, I knew some things about sparks, theoretically and theatrically. So New York got its first noisy sparks that climbed upward in front of the Liberty Theatre. Young voltages jumped a small gap and kept jumping bigger ones as they climbed upward to where the gap was too wide. The next generation of sparks started at the bottom and went up, spectacular climbing sparks that attracted people to our wireless show effort just off Times Square. Ever upward and stretching until it pictured out.

"Via Wireless" started in the fall of 1908 and was continuing with scheduled pitches and rolls when the SS Florida sank the SS Republic. United Wireless received no pay for the use of our equipment but it was a continuous argument to help Galbraith, Bob Armstrong, Mason and the others who were trying to persuade all of those having a say in seagoing business to put on wireless for the sake of humans and materials. Those who were interested in the sale of stock probably were also satisfied with "Via Wireless". We had turned our attentions almost entirely to other things by late January 1909 when the steamships Republic and Florida collided. The Republic sank but Jack Binns, the wireless operator, sent out the distress call CQD and got help that saved all passengers before she sank. That call meant something like: "Please listed (CQ) I am in distress (D)" or "Help". The official distress call now is three dots, three dashes and three dots. I suspect the 3-2-3 it comes from very old signals for help that include three repetitions of a sound, movement or other three things, or multiples of threes, such as three times three. 3 short 3 long 3 short It happens to also be SOS in international code and 5 five S in American code.

Jack Binns, the Republic operator, was a much publicized hero.

Frederick Thompson wanted him for "Via Wireless". Binns had done, in fact, what "Via Wireless" was teaching in theory, added by romance, spectacular effects and imagination. Binns was an Englishman and was on an English boat equipped by the English Marconi Company. To get Binns Thompson had to take Marconi equipment. That brought Binns and I together. I took the United equipment off when Binns was ready to go on. Jack came out before the curtain between acts to let the audience see and hear a real wireless hero, the Marconi instruments were used in the rolling and pitching spot where our United instruments had been. Binns and I were friends from the minute we met.

A notice calling for a meeting to form a wireless society had been sent out and posted on January 21. On January 23, 1909 we held the first meeting of the Wireless Institute in Room 1909 of 42 Broadway, New York. Later the same day, January 23, Jack Binns sent his CQD and helped to save the shipload of passengers and crew. Binns and I became acquainted and he became the first Marconi man to take a friendly interest in the Wireless Institute and wrote a paper for us. On June 2, 1909 at 33 W. 39th St. the paper entitled "How Business Can Best Be Handled in Case of Distress" was read before the Wireless Institute. Binns was not present to read it. I read it for him. The paper and discussion were published in The Wireless Institute Proceedings and was used in making and enforcing U.S.Radio Laws that were put in effect about three years later. Jack is another ancestor who changed his name. Jack was the name of our hero. John R. is the name of the business man.

Years after United and Marconi of America had gone out of business Jack Binns used room 1909 of 42 Broadway as part of his office. At that time in 1909 wireless used was not as good as we could make. One reason why we could not make better was that the people who should use it for protecting lives at sea opposed it. A captain was a king between ports if he did not have wireless. Some companies would only use if if they

got it free, which I think they did. Of course, there were exceptions. Captain Maxon had a wireless set (United) and a house that was shifted for him to the boats he captained. He operated the set part of the time. He was an American with ideas of his own.

Many of the suggestions made during the formation of the Wireless Institute were carried out by it or its successor, the Institute of Radio Engineers. The library idea was carried out, in a way, by arrangements with the United Engineers library. There were club or reading or conference room ideas, rather indefinite ideas that have only been carried out to a minor extent, but the half million recently subscribed may bring in more. One idea, that of S.S.Bogart, Vice President of United Wireless, was not carried out. It was to include a beneficiary department that would provide insurance or an old age pension for wireless men. The idea was thought to be good but not within the limits of what we thought we should be able to do in connection with more impersonal science and engineering. Wm S. Fitzpatrick carried on many negotiations. In the Institute, WWV and later room 9 Marconi Companies.

The working up to what is now known as The Institute of Radio Engineers goes back to early persistence, preparation and people that only a few knew about after thirty-six years of meetings. The first paper to be read before the Wireless Institute was by R. H. Marriott and its title is "The Wireless Institute". It was printed in the first of the published proceedings. The meeting was called to order at 8:40 PM on April 7, 1909 at 53 W. 39th St., New York where IRE meetings are now held. That meeting was held in a small room in the southeast corner, on the balcony floor.

The first proceedings contained the paper by Marriott, letter by Pickard and address by Ralph W. Pope which was taken in shorthand by Sidney L. Williams, our secretary. Pickard's and all of Pope's recom-

mendations became part of the religion of the Wireless Institute and the succeeding I.R.E. and Pope was remarkably prophetic in his anticipation of inventions by Wireless amateurs. The first proceedings also contained the Constitution and a loose pink page, an application blank. Twenty-four pages, six by nine, very neatly printed on white paper, with no ~~mx~~ advertising. Subsequent proceedings bore the emblem on the front cover. The emblem was a Hertz oscillator within a ~~xixxix~~ circular Hertz receiving loop with the name The Wireless Institute around the outside. Altogether a half-inch in diameter. This was also made in a gold membership pin. The following is a copy of a portion of the first proceeding Vol. 1, No. 1.

"THE WIRELESS INSTITUTE"

"Various experiences in wireless during a period of some nine years frequently impressed the writer with the thought that there should be some organization of wireless men for the purpose of discussing wireless subjects.

"The first idea was for the formation of a society of wireless engineers of the company with which the writer was connected, but after considerable consideration of the needs of wireless, it was concluded that an organization should be founded, having as it fundamental purpose, "To bring together wireless workers that they may help each other toward making wireless of the greatest benefit to mankind.'

"As wireless workers, i.e., persons who are trying to improve wireless and make it more serviceable to mankind, are included in lines other than that covered by the term Wireless Engineer, and as there are wireless workers who are helping to develop wireless in each and every one of the wireless companies, in Government service, and in independent work, therefore, an institute based in the purpose stated above should include practically everybody interested in the development

of wireless, whether as a Wireless Operator, a member of the business department of a wireless company, an independent experimenter, a stockholder in a wireless company, a statesmen or officer upon whom it falls to make or enforce laws pertaining to wireless, an employee of a boat company which uses wireless, or a person using wireless as a means of communication. In fact, there are many people who are helping to make wireless of greater service or are willing to make it of greater service.

"On May 14, 1908, the writer sent out some two hundred letters to persons interested in wireless, asking their opinions regarding the formation of such an institute. Answers were received from about sixty, and with one or two exceptions, were in favor of forming an institute on the lines indicated. On January 23, 1909, a temporary organization was formed by Messrs. John S. Murphy, R. A. Somerville, Joseph D. Fountain, R. B. Respess, R. A. Cleva, John Gregg, E. Barnwell, Philip FarnsWorth, Sidney L. Williams and R. H. Marriott, in room 1909, 42 Broadway, New York City. The purpose of this organization was to draw up a constitution and make the necessary arrangements for the formation of a permanent organization.

"On March 10, 1909, a meeting was held at the United Engineers' Building, New York City, at which were present Messrs. R. A. Somerville, Joseph D. Fountain, John C. Gregg, Roland B. Respess, A. R. Sharples, E. M. Thurston, B. P. Martin, W. M. Jones, J. A. Bryan, Arthur C. Fike, Francis X. Butler, Wm. F. Bissing, Sidney L. Williams, and R. H. Marriott - and others represented by proxy. At this meeting a constitution was read, discussed, amended and adopted - resolutions were passed whereby any properly recommended person joining the Institute before April 10, 1909, would be considered a charter member and would not be required to pay the entrance fee. It being necessary that the offices of President

and Vice-President be held by Members, Messrs. Greenleaf W. Pickard, Harry Shoemaker and Robert H. Marriott were unanimously elected to Membership, and Mr. Marriott was elected President, Mr. Shoemaker, Vice-President, to serve one year, and Mr. Pickard, Vice-President, to serve two years.

"Referring to some of the main points in the Constitution adopted at this meeting:

"In the name, "The Wireless Institute", the word "Wireless" was used because it was believed that this work would convey the desired meaning to a greater number of people than any other one word.

"Regarding the object, "To advance Wireless Telegraphy, Wireless Telephony, and kindred arts", Wireless Telegraphy is already of benefit to mankind, and the object is to make it of greater benefit; Wireless Telephony shows possibilities, and the object is to help make it beneficial; in Kindred Arts are included such other lines of work wherein the experience and knowledge of the members of the Institute would make the Institute of particular benefit.

"Under Membership: The Associate grade makes it possible for any person interested in Wireless to enjoy the benefits of the Institute when properly recommended. The grades of Member, and Honorary Member, serve to give distinction to persons who have done exceptionally good work in the development of Wireless.

"The entrance fees and annual dues are made as low as possible so that no person will be prevented from being a member owing to the cost.

"The requirements for President, Vice-President, and the Board of Direction, put the management of the Institute, mainly in the hands of the older and more experienced members.

"Meetings are held as specified by the Board of Direction. The present plan is to hold meetings for the reading and discussion of papers on the first Wednesday of each month, except during July and August, at the United Engineers' Building, 37 West Thirty-ninth Street, New York City. Wednesday has been chosen because of the number of wireless operators in port on that day. The United Engineers' Building furnishes, apparently, the best accommodations in the United States for societies of this nature, including a large mechanical and electrical engineering library. And New York is probably the only American city, at present, where a sufficient number of wireless men could be brought together to make the Institute of any great benefit.

"Papers and valuable parts of discussions will be published from time to time, and copies will be mailed to members of all grades. Also, copies will be sold or given to persons or institutions when it is considered adviseable.

"Any Member or Associate may write a paper and submit the same to the Board of Direction, which will decide regarding when it is to be read, the necessary amendments, etc.

"When possible, members whose work gives them a different view from that of the author of a paper, will be given copies of the paper in advance of the reading, so that they may prepare discussions from their point of view.

"It is the desire of the Institute to obtain members from all wireless companies and branches of wireless, as stated in the first part of this paper, so that papers may be written and discussed from all standpoints and without prejudice for or against any department, company or system. Papers, although on different wireless subjects, will, of course, overlap to some extent, owning to the fact that they

will be on the one general subject of wireless; and we all desire that wireless will improve fast enough so that new papers will have to be written frequently on the same subject.

"The following is a list of subjects on which the writer believes valuable papers can be written, and it is hoped that they will suggest to you a subject on which you will write a paper for the Institute.

"Suggested subjects:

1. "The Recent Wireless Bills Before Congress."
2. "The Berlin Congress."
3. "The Regulation of Amateur Stations."
4. "Unnecessary Interference."
5. "Static".
6. "How to get Business on the Boat."
7. "How to Handle Messages Rapidly."
8. "The Present Field for Wireless."
9. "How Business can Best Be Handled in Case of Distress".
10. "How to Prevent Wireless Stations from Damaging Property."
11. "The Care of the Motor-Generator."
12. "The Care of the Storage Battery."
13. "The Key, Vibrator, and Switches."
14. "The Induction Coil and Transformer."
15. "The Condenser."
16. "The Helix; Coupling and Tuning."
17. "Aerials."
18. "Receivers."
19. "Tuners, Jiggers, Syntonizers, Selectors, etc."
20. "Wireless Waves."
21. "The Wireless Telephone."
22. "How to Make the Wireless Institute of the Greatest Benefit".
23. "How and What Wireless Operators Should be Taught."
24. "How Weather Conditions Effect Wireless."
25. "Simple Methods for the Operator to Test and Repair Instruments."
26. "Telephone Receivers."

"A paper on any of these or other wireless subjects that gives information useful to our members, is what the Wireless Institute wants, no matter whether it requires only one hundred words or ten thousand words.

"There are at least two ways in which each member can be of benefit to the Institute, and these are by writing valuable papers, and by getting members. Any of you can do both."

"The following letter from Vice-President Greenleaf W. Pickard was then read:

Amesbury, Mass., April 2, 1909.

Mr. R. H. Marriott, 1483 East Seventeenth St., Brooklyn, N. Y.

'Dear Mr. Marriott: - I am returning herewith your paper on "The Wireless Institute". I have very little comment to make on this as it seems to cover admirably the various points you wish to bring out. I would suggest, however, that you add a paragraph or so on the importance and value of discussion.

'I have had a certain amount of experience in addressing non-technical audiences on technical subjects, and I have found that it is one of the most difficult things in the world to start a suitable discussion following the paper. While in many cases there are people present who could add materially to the value of the paper by bringing out or questioning certain points, yet it is the exception rather than the rule when this is done.

'It is certainly true, that to be of the greatest benefit to the Institute, all papers should be freely discussed. While oral discussion adds greatly to the interest at the meeting, yet this is often impossible for certain members deeply interested and fully prepared as they may be. Copies of certain papers should therefore be sent to members even when these cannot be present, and they should be encouraged to communicate their views by letters which may be read at the meeting. It is often useful to allow written communications arriving after the meeting but in time to be embodied in the transactions. This, as you know, is often the case in the American Institute of Electrical Engineers.

Sincerely yours,

(Signed) Greenleaf W. Pickard'

Mr. Ralph W. Pope, Secretary of the American Institute of Electrical Engineers, addressed the meeting as follows:

"I have been through pretty nearly all of the stages of societies of this kind and I feel that you have this advantage that I did not have in my early days, and that is that you have the experiences of other societies to guide you. I especially appreciate what Mr. Pickard has said in regard to the value of discussions, and I am sure all of you must have or will have experienced that they are not only of great valuwe, but will add interest to your meetings.

"I might say ~~xxxx~~ for the benefit of your officers that one of the first principles of organization, which I have followed in my connection with the American Institute of Electrical Engineers, is to give each member the value received, so that when he is paying his dues, whether five dollars or ten, or fifteen, he will feel that he is getting the worth of his money. I have always labored with that end in view. It is quite true that no organization that tries to cover a single State, the United States, or the world, can hope to have present at a meeting any large proposition of its membership. Therefore, as soon as possible, one of the things that ought to be done is to notify all members of what has been done.

"Another important point which you will appreciate as the Institute grows, as I trust it will, is the necessity for preserving complete records of your work, so that hereafter they will be available for printing in permanent form. The printing of transactions is, of course, pretty expensive work, and to start on them too early might be a strain on your resources. It is said that printers' ink is a good investment, but you must have the money to invest in order to get results.

"Every society, I have always felt, is like the human being; as a

baby it does not amount to much for a few years, but everybody may have a good deal of respect for it after it has reached maturity.

'At the outset, when I became Secretary of the American Institute of Electrical Engineers, the office of Secretary had been organized for a year, disorganized I should say, for the records included the names of men who were not interested in the work, and I had to wipe out a lot of names and start anew. Since then we have gone forward, and have kept going. If you begin right you certainly feel a good deal more satisfaction with what you are doing, than if you do not give matters proper attention.

'I have had some business experience, and I made it one of my first duties to send out bills and statements with clock-like regularity. And while I have had occasional kicks, saying that "this is the first time it has been brought to my notice", I know that they had received statements. As your society grows you must expect a proportionate number of kicks, but they should be kept down as far as possible. Try to have a general good feeling and have every member feel personally interested in what you are doing.

'I feel that there is a great need for the art of Wireless telegraphy. I see no reason why it should not be installed on every kind of marine craft, especially on steam vessels that carry cargoes running into the hundreds of thousands of dollars in value. This is one of the things that must appear to those who are interested commercially in the merchant marine. I was quite interested in the splendid work of wireless during the sinking of the steamship "Republic", and it occurred to me at once when I learned that S.S. "Florida" had no wireless outfit that if both vessels had been equipped and had experienced operators there would have been no collision. They would have been

aware of each other's presence in the fog. There is nothing more terrible on sea than fog. It is one of the worst dangers of ocean travel.

"I am, of course, interested in wireless in a general way. I see that you have with you the amateur, as all new electrical industries have had. He has followed the Morse telegraph, the motor and the telephone, and he is now turning his attention to wireless. It is rather strange that some of the greatest inventions have been brought out by these amateurs. All of you, of course, know the case of Prof. Alexander Graham Bell, inventor of the art of telephony, who became interested in deaf people, and through his efforts a great many of the deaf have been helped and the dumb have been taught to speak. It was while experimenting on instruments for this work that he invented the telephone. There are other instances of this kind that I will not take your time to recall.

"As far as the technique of wireless is concerned, I am not at all familiar with it, but I know the principles in a general way, and listened to the signals with considerable interest when I went abroad two years ago, on the S.S. "Majestic". It was interesting to learn that the purser of the ship could communicate with the wharf and make arrangements for landing.

"Every year the American Institute of Electrical Engineers has a convention with sessions devoted to different subjects. It occurred to me that your Institute might make arrangements with the Electrical Engineers for a wireless session, when some very important papers on wireless subjects could be read and discussed. This possibly could not be done this year, as our next convention will be in June, a little too soon for you; but you might arrange it for 1910. This would have to be

worked up by your own members. The proceedings of this session would be printed as a part of the A.I.E.E. proceedings, and distributed to our members and yours, all over the world. I recall that during the convention at Atlantic City, N. J. in 1908, Professor Fessenden's paper on wireless was one of the most important of the whole convention. This is, of course, a mere suggestion, but I may call attention to it later as a possibility of the future."

"Upon motion duly made, seconded and carried,

IT WAS RESOLVED, That the payment of initiation fees be suspended for one month from April 10 to May 10, 1909.

"The next regular meeting of The Wireless Institute will be held in the United Engineers' Building, 33 West Thirty-ninth Street, New York City, Wednesday evening, May 5, at 8 P.M. Mr. Greenleaf W. Pickard will present a paper on "Antennae". A general discussion will follow the reading of the paper."

CHAPTER XV

CONTACTS

When I returned to New York in late 1907, I had at least one contact in the east who would be a reliable worker in the organization and maintenance of a wireless society. When we were together with the American W.T. and T. Co. in 1901 he had always been willing to discuss scientific and engineering subjects. In fact, he seemed to be able to give a talk on almost any subject. He loved jokes. When he heard one he would put his hand over his mouth and shake like Santa Claus, only more so because he was larger. He presented the first paper before the Wireless Institute that included an explanation of theory. Also it included practice, engineering and history. The title of the paper was "Antennae". It was by Greenleaf Whittier Pickard and was delivered May 5, 1909 at the United Engineers Bldg., 33 West 39th St., New York. Pickard was my first wireless friend. If he reads this he may damn me. He lived in the John Greenleaf Whittier home part of which was maintained as Whittier left it. That was in Amesbury, Mass. Later he lived in Newton Centre but for years he came to New York to attend Institute meetings. Wireless Institute words and titles were directed more toward what could be seen. I.R.E. titles smack more of the unseen. Pickard's paper could have been entitled "Electro-magnetic Waves". The Wireless Institute emblem was a Hertz Dipole antenna in a Hertz Loop antenna. The I.R.E. emblem is a vertical arrow within a bent-around arrow which in this case is intended to represent an electro-magnetic wave in space. The Wireless Institute emblem was the dipole antenna and loop antenna while Hertz used it to prove that electro-magnetic waves radiated (Radio)

I believe Pickard tried to tackle all of the then recognized problems of wireless in a theoretical way and in a practical way when he could. Tackling problems in a theoretical way took time and ability. Tackling problems in a practical way always took somebody's money.

During that decade the United States developed the outstanding detectors and other parts of receivers but the Germans developed the outstanding transmitters. Funds for wireless development in Germany were furnished or arranged for by the German government and German instruments were offerred at relatively reasonable prices to the rest of the world.

Antenna, Detectors, receiving tuners and the effect of wave lengths and trains of waves could be tested to a considerable extent practically without spending large sums by one who could and would do most of the work himself. Those were the things Pickard went in for. Thirty-five years later Pickard maintained the same Santa Claus hospitality, his desire to give presents, his shape, and his laugh. At that later time his son and my son were in the U.S. Ski Troups, the only mountain division in the U.S. As the Tenth Mountain Division, that ski troup spearheaded the attack through mountains and into the Po Valley which resulted in the German surrender in Italy. As yet I have not heard about Pick's boy. They trained at Camp Hale, Colorado, named after Gen. Irving Hale with whom I was associated in the P & CWT & T Co. Hale was the consulting engineer My boy, who is over 35 and has had more than two years service, is out, without a purple heart but with a bronze star for meritorious service. He repaired telephone and telegraph instruments under fire in the Signal Corps for about thirty days, with any material that would serve. Why not, His grandfather and father fixed most anything with wire, or had to.

Pick has been a continuous proposition in wireless since about 1898 when he chaperoned a coherer detector and tried to make it tell the truth about weather. The lightning discharges and coherers were unreliable by reputation and factually. Pick had a job at his receiving spot in the Blue Hill observatory. It was similar to the work of the Russian Popoff who adopted the coherer and vertical antenna for making such observations in about 1895. Such experiences naturally made a chap want

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Checking with Pickard in early 1949 I learned the story beginning in the last paragraph on page 2 should have been more like the following. Pickard is a preserved preradio pioneer who did not premeditate his first wireless act. In 1898 while a student at MIT he did summer work at Blue Hill Observatory by showing a groupe of meteorologists how to set up for and take measurements of atmospheric potential gradients. There is voltage between places in the air and ground, sometimes a lot of volts. Meteorologists were awfully dumb about electrical matters, then.

While peacefully electrometering on the summit of Blue Hill, the Smithsonian Institute informed that meteorological gang that it had been given a grant under the Hodgkins Fund for an investigation of the effect of very long antenna wires for wireless telegraphy, and that the Blue Hill bunch was a natural for that sort of thing because they had a steam driven reel with about ten miles of steel wire and many big box kites. The meteorologists did not know about such things so they told Pick to do something about it.

Pick picked up a ten inch induction coil, an ancient Western Union polarized relay a coherer and some other usables, mostly at MIT which was practically deserted that summer.

With the coherer he could not tell whether he was getting summer static or the induction coil. He changed to a carbon-steel microphone with phones. The induction coil did not produce quite the same racket that static produced. Later his wireless was hearable between Blue Hill and Mt. Chickatawbut and still later, probably as summer static decreased, Blue Hill to Memorial Hall tower a distance of ten miles.

Of course still could be suspected that the ten mile long antenna on kites might have been blown from Blue Hill to Cambridge. From my experience I would guess the decrease in static made the 10 miles possible.

Pick was, the last I heard, still in radio and associated with MITs' Cosmic Terrestrial Research. Most of the cosmic stuff is higher than a kite and is investigated by radio waves.

a good detector. Coherer receivers would pop off when they shouldn't and wouldn't when they should.

Pickard was best known in his second decade in wireless for an audibility meter, a tuner and his crystal detectors. I have the number one audibility meter. It is a variable shunt resistance for use as a shunt to the headphones to measure the strength of received wireless signals. One authority had claimed the variations in signal strength were due to variations in the ground connection. That was only true under some circumstances and usually only over a considerable range of time, which we knew. However, to be emphatic about it, I recorded the strength of DF signals at my house, 1488 E. 17th Street, Brooklyn, two miles from DF and Pick did the same in Amesbury, Mass. My records showed no variation from hour to hour. Pick's records indicated rapid variations, wide changes within a few minutes.

Pickard's audibility meter, tuner and crystal detectors were popular with the Navy. They with copper plated Leyden jars were sold by the Wireless Specialty Apparatus Co. which company consisted of Pickard, Col. Firth, the salesman, Farnsworth, the patent attorney and fifteen dollars capital. That is, they started on the price of a pair of shoes a piece. A few years later I believe they sold out for about forty thousand. Foote Pierson Co. made the instruments. Liebman, for whom the I.R.E. Liebman memorial prize is named, was the shop foreman. The $10,000 endowment for the prize was given by Emil J. Simon who also had instruments made under Liebman's supervision beginning a few years later.

The tuner that the Navy first liked was marked 1P76. Somebody in the Navy, possibly George Davis, one of the operating staff at the Brooklyn Navy Yard station, changed that to IP76. Pickard changed and augmented the tuners they sold to the Navy as time went on but they all

went by the name IP76. In Pickard's instruments he was always particular about the contacts. To prevent tarnishing he used both gold and silver. He used laminated wiping contacts. He used decade switch arrangements instead of trying to make a slider touch one little wire as others did.

Pickard came to the front with a variety of crystals that were used singly or in combination to detect wireless signals. Galena, Silicon, foolsgold, Bornite and Zincite that had been dug up from where nature produced them and some others that he cooked up from chemical laboratory stocks were used. All of the detectors he sold were good. Some users preferred Galena, some Silicon. I preferred a Bornite-Zincite combination or my pet carborundum crystals that I had picked from thousands over a period of about four years.

Detectors that were described as microphonic were usually noisy contacts because they were not very constant in the amount of current they passed, even when they were not being subjected to the changing voltages produced by signals. Pickard's crystals were not so noisy. He and Farnsworth and Firth called them perfect contacts. They cooked up a trade abbreviation of Perfect Contact. They called the detectors Perikon detectors. The "i" was to make it sound good and the "k" when spelling it, in place of "c" was to make it look better. But other people did not bother with the "k" when spelling it. They made it "Pericon". Inventor Pickard, attorney Farnsworth and super-salesman Firth thought they had invented a new name, and so did we.

Despite the fact that Greenleaf Whittier Pickard, grandnephew of John Greenleaf Whittier and the son of an famous newspaper editor, was a great reader, he did not discover for several years that the word "Pericon" was invented by Giovanni Boccaccio, and what's more, that the very early

"Pericon" detected a vessel in distress and rescued passengers. To get all of the story in correct detail one should read Noval VII, the second Day of The Decameron. Very briefly, the story is this:

The Sultan of Babylon, for services rendered, dispatched his most beautiful daughter, Alatiel, by sailing vessel to be married to the King of Algarve. They sailed into a storm and thought the craft would sink. The men deserted in a small boat that did sink. Beautiful Alathel and her women remained on the ship because that's where the men deserted them. The ship was blown on a sandy shore. A gentleman whose name was Pericon came along the beach and detecting the distress of the vessel, rescued the beautiful bride-to-be and the other approximately beautiful women. Boccaccio continues for a page or two in telling about Pericon and the princess and ten more pages in telling on the princess and seven or eight other fellows, before she caught up with and married the king she set sail for.

In the business of inventing and patenting one of the obstacles is "prior art" and is sometimes translated as "prior rot". Boccaccio's prior art was not cited against Pickard's "Pericon" art for several years. I heard a story or two about the later discovery that Perikon had been pre-invented by Boccaccio. I did not remember that Boccaccio story but before writing this, I looked it up. Also found American boy contact girls in a dance called "Pericon"

Finding the whole story resulted from a sequence of contacts. I will start with the sequence of Bertha Paterson at Ohio State University. She and my wife and I were in the same class, that is, the class of 1901, not exactly the same class - she was a city gal and I was a small-town boy. We took some of the same subjects. My wife took arts majoring in mathematics; I took science subjects, majoring in Physics in the basement at the west end of University Hall; Bertha took arts subjects, majoring

in "Gab". The Gab room was on the second floor at the east end of that building. Bertha got an M in Gab which means 1,000 or ten times one hundred percent.

A law student that looked like a first baseman, sat on the steps by the Physics laboratory but not out of earshot from the gab room. Anywhere on the campus was probably within earshot. Bertha married him. His name is Charles Grosvenor Bond. They settled in places south of Kings Highway in Brooklyn. For quite a while Charley seemed to be perpetual president of the O.S.U. alumni association of New York. After the first World War folks were so disgusted with the democrats that a republican could be elected even in Brooklyn, so Charley became a Congressman until Republicans returned to their normal Brooklyn minority.

When Howard Thomas Lockwood, Civil Engineer from Ohio State, wanted to sell his house next door to us, the word was passed to the Bonds. Charley's sister, Nelle Bond Smith, and her mother, mother-in-law, husband and daughter took over Tommy Lockwood's house. The daughter, Helen, went to Packer. Packer is quite an educational institution designed to be of advanced benefit to girls. There Helen met Beanie (for short, because she was so long) Burroughs. Helen also took stenography, typewriting and our only son Woodruff B. Marriott. At present the family next door consists of Nelle, Helen, W.B. and the most important member. He has black hair and a more famous pedigree then the other members. Also he is very bright. His name is Shadow. He is the great-great grandson of "My Own Brucie", the Cocker Spaniel that won so many prizes. Also they have fleas in summer. Helen Smith Marriott has been writing this stuff. That is, I write with a pencil and errors and she translates to produce typewritten copy, When I wanted to check up the Pericon story before writing this, I asked where

a copy of Boccaccio was to be found. Helen asked Beanie, who had married Henry Piscicelli of Italian descent. He had the Decameron. Helen borrowed and I read the Pericon story. It all goes back to Bertha but don't tell her I said so because Charley is still practicing law and Bertha would sue me for my tracing the reading of that naughty classic back to her. I doubt if she had overheard yet.

One of the difficulties in the Institute was that the workers did not get paid for what they did, time off for it or prestige for it. In fact, they might get fired from their wireless job if their bosses found they were associating in any way with the Institute or the boys of another company. Paying wireless jobs were hard to get. Speakers, audiences and regular continuous workers were necessary to maintain the institute. They could not be hired; there was nothing to hire them with. I was one who could not always be regular in my habits of attending to institute matters. My work in equipping ships kept me busy night and day at times. Also my location shifted, during 1909, 1910 and 1911. I was located at Cape Hatteras, Baltimore, Atlantic City, Montauk, Boston and Eastport, Maine, part of the time.

Circumstances completely or partially eliminated some workers. I thought Lloyd Espenshield was going to be one who could take part in Wireless Institute work in any capacity at any time. But Lloyd went to work for Pfund who had station TWT on Broadway and sold the best transmitters at that time. I guess Pfund was naturalized then but nevertheless he was what is now called a "sour kraut". Pfund objected to Espenshied even looking across the street at the 42 Broadway boys or other wireless boys who were not employed by Pfund. Espenshied helped institute work but we all had to be quiet about him and he could not tell us about Telefunken instruments. Despite quite a number of bosses with Pfund ideas, the boys with engineering leanings continued

to increase their contacts and interchanges of information. At its start and years later, the Institute was referred to as a United Wireless organization. Pickard was not a United Wireless man. Shoemaker and his associates in the International Telegraph Construction Co. were not U.W.T. men when the preliminary arrangements for the Institute were made but they came into U.W.T. to some extent later. Those who contributed to the Wireless Institute in its first years were from several sources as may be seen from a list of the membership at the end of this chapter.

In A.B.Cole we had a worker. He was not a U.W.T. man. Whether he was a professional or amateur or both, we did not decide. He had an amateur station. He was a booster for amateurs and professionals. He was in charge of the Wireless sales of the Manhattan Electrical Supply Company and designed some of their products. He sold to amateurs, colleges, professional wireless operators or anybody else regardless of their self-estimates, color, creed, nationality, degrees, ethics, height of brow, sex, intentions, reputations, uniform, rags or beauty. His contacts covered the lands, waterfronts and seas. Operators bought what he sold and substituted it for what their companies furnished them when their companies did not know it. Cole, our regular attending and helping ABC, was the son of Professor of Mathematics Cole at Columbia. When we found strenuous economy would be required to print more of our Wireless Institute Proceedings, Cole told us how we could use a Fayerwether Hall lecture room free for meetings if we paid a dollar for a janitor to clean up after us. We smoked and left the blackboard covered with marks and the lights on, so protecting the next day's classes was necessary. The W.I. went to Fayerwether Hall and the I.R.E. followed for years, until it could pay the price for lecture halls in the United Engineering building. The Columbia lecture halls were better in some

respects. For example, they have large lecture tables and long black boards. We had some speakers who liked to write mathematics thirty feet long. Only about five percent of the audience could understand more than a foot or two of the math but they could suffer some mathematicus to develop wireless.

We had a few amateurs in the Institute but at that time amateurs were as a rule interested in wireless in ways somewhat different than we planned for the Institute. Many of the amateurs wore short pants. They seemed to be chiefly interested in ethereal gabfests that they could accomplish by using a little induction coil, a pair of headphones and a detector. What they could not make, they had been buying, for example, from Hugo Gernsbachs' Electro Importing Company that sold the least expensive parts. Hugo's Modern Electrics Magazine was the advertising medium. They formed neighborhood clubs, meeting at their homes in trying to get better results. Such clubs usually were soon abandoned like their short pants. Club members who stuck to wireless for a while and aimed at making it their profession, came into the Institute sooner or later. Some attended Institute meetings quite a while before they became members. Many amateurs thought the Institute members were antagonistically inclined toward the amateurs. Many professional wireless people in both commercial and government employ were antagonistic, sometimes bitterly antagonistic, but they did not get control of the Institute. Some of our first members had been amateurs and some, who continued to attend Institute meetings off and on for many years, remained amateurs so far as wireless was concerned but were professional communication men or writers. While a portion of those who attended meetings did not pay dues or help with the work, they contributed to the size of the audiences and they talked about the Institute to others. In the early days, the rooms we used were too big for the

audience. It became a habit for the chairman to leave the platform after he introduced the speaker. By so doing, he increased the audience noticeably. While some xxxx attended meetings without paying dues but who later became radio engineers, there were others who paid dues, never attended meetings and never received information from the Institute that they could use. Wm. H. Tuck, for example, did not use wireless. He was efficiency engineer for the Saturday Evening Post.

The amateur clubs started quickly and died quickly as a rule. The Junior Aero Club of U.S. changed its name to the Junior Wireless Club, Limited, in 1909. In 1911 they changed their name to the Radio Club of America. It still meets. Short pants, grammar school boys have gone in those clubs to short-of-breath gray heads. When the laws regulating wireless were being prepared and in their early enforcement, that club did more to preserve the standing of amateurs then any other organization. More is to follow about the amateurs and their clubs. For many years, members of the Radio Club of America have all or nearly all been members of The Institute of Radio Engineers. IRE and R Club ~~Their~~ meetings are usually a week apart but sometimes they are held together. AIEE and IRE also get together, sometimes.

In the first year of its life, The Wireless Institute received about $400.00 from the 125 members who paid dues. The work donated by members is not estimated. They helped make The Institute. Ten meetings were held; notices and proceedings were mailed; Proceedings Vol. 1, Nos. 1 to 6, averaging twenty pages each, were printed in addition to application forms and stationery. Everything but printing, postage and hall rent was the work of members. Not much money but help that gave the Institute its carry-on momentum. It is impossible to say who all of the helpers were and what they did but there should be space in subsequent chapters for some.

Here is a list of those who paid dues to the Wireless Institute corrected to December 1, 1909. Those marked with * were still listed as members of the subsequent I.R.E. in 1932. Probably an equal number are members now as some dropped out in the depression around 1930, but came back a few years later.

The Wireless Institute Members, December 1, 1909.

Athearn, Harry E., New York, N.Y.
Installing Engineer, United Wireless Telegraph Company.

Almour, George W., c/o Postmaster, New York
Chief Electrician U.S.S. Connecticut.

Bissing, William F., New York City
Attorney at Law

Bogart, Samuel S., New York, N. Y.
Vice President, United Wireless Telegraph Company.

Butler, Francis X., New York, N.Y.
Attorney at Law

*Butcher, Elmer E., New York, N. Y.
Installing Engineer, United Wireless Telegraph Company.

Baun, H. R., Galilee, N.J.
Wireless Operator, United Wireless Telegraph Company.

Beardsley, Don C., Albany, N.Y.
Wireless Operator, U.W.T. Co., Ten Eyck Park.

Buchenberger, Francis C., Brooklyn, N.Y.
Second Co. Signal Corps, N.G., N.Y.

*Browne, Walram S., Brooklyn, N.Y.
Amateur Wireless Operator

Bates, Louis W., Brooklyn, N.Y.
Wireless Operator

Barnwell, E., New York, N.Y.
United Wireless Operator, S.S. Antilles.

Baskerville, U.M., Chicago, Ill.
Chief Operator, Great Lakes Div., U.W.T. Co.

Brownlie, H.L, Tangier Island, Va.
United Wireless Operator.

Bryan, J. A., New York, N.Y.
United Wireless Operator, S.S. Saratoga.

Bowen, Paul, New York, N.Y.
United Wireless Operator, Manhattan Beach Station (DF).

Beckerman, Benjamin, New York, N.Y.
U.W.T. Operator, S.S. Hamilton.

Brodhead, E.F., New York, N.Y.
U.W.T. Operator, S.S. Merida.

Chapman, Corwin C., Southampton, England.
United Installer and Operator, Royal Mail SS Line.

Chase, Stacy Reeves, Jersey City, N.J.
Engineering Department, U.W.T. Company.

Cleva, R.A., New York, N.Y.
Construction Department, U.W.T. Co.

Cole, Arthur B., Montclair, N.J.
Wireless Department, Manhattan Electrical Supply Company.

Collins, Daniel, New York, N.Y.
U.W.T. Co. Operator, SS Cherokee.

Cornwell, J.H., Brooklyn, N.Y.
Wireless Telegraph Operator.

Duffy, J.B., New York, N.Y.
Chief Operator, Marine Dept., U.W.T.Co.

Davidson, James E., Montpelier, Vt.
President, Consolidated Lighting Co.

*Dolbear, Benjamin L., Tufts College, Mass.

Dibol, W. A., New York, N.Y.
Treasurer, U.W.T. Co.

Drace, I.H., Brooklyn, N.Y.
Wireless Telegraph Operator.

English, William P., Jr., Boston, Mass.
Manager, U.W.T. Co.

*Ehret, Cornelius D., Philadelphia, Pa.
Attorney at Law

*Espenschied, Lloyd, Brooklyn, N.Y.
Wireless Telegraph Operator.

Earle, C. L., New York, N.Y.
Wireless Telegraph Operator.

Farnsworth, Philip, New York, N.Y.
Attorney at Law.

Ferrick, W.J., New York, N.Y.
U.W.T. Operator, Manhattan Beach Station (DF).

Frasse, William H., Brooklyn, N.Y.
Pratt Institute.

Fountain, Joseph D., Cleveland, Ohio.
Construction Dept., Great Lakes Div., U.W.T. Co.

Fay, Frank H., New York, N.Y.
Asst. to Special Agent in Charge of Leased Wires, A.T.& T.Co.

Fike, Arthur C., Jersey City, N.J.
U.W.T. Co.

Fitzpatrick, W.S., New York, N.Y.

Finkelstein, I.C., New York, N.Y.
U.W.T. Co., Operator SS Morrow Castle.

Ford, H.G., New York, N.Y.
U.W.T. Co., Operator SS Alliancia.

Ferguson, F. H., Charleston, S.C.
U.W.T. Co., Operator SN Station.

Galbraith, C.C., New York, N.Y.
General Manager, U.W.T. Co.

Ginsberg, Louis M., New York, N.Y.
U.W.T. Co., Operator SS Bermudian.

Gnau, G. F., Brooklyn, N.Y.

Gleason, Louis R., Elmhurst, L.I.
Late with R.A. Fessenden, Brant Rock, Mass.

*Goldsmith, Alfred N., New York, N.Y.
Instructor in Physics, College of the City of New York.

Gregg, John C., New York, N.Y.
Construction Dept., U.W.T. Co.

Gillen, W.H., New York, N.Y.
U.W.T. Co., Operator SS Prinz Joachim.

Horton, Harry M., Mansfield, Pa.
Wireless Telegraph Engineer.

Hughes, H.J., New York, N.Y.
Superintendent, Marine Service, U.W.T.Co.

Heintze, E.H., Alpena, Mich.
U.W.T. Operator.

Haslett, Crowell M., Jersey City, N.J.
International Telegraph Construction Co.

Haslett, Oscar S., Jersey City, N.J.
International Telegraph Construction Co.

*Hart, Frank A., Brooklyn, N.Y.
U.W.T. Operator, 42 Broadway Station (NY)

Hance, S.W., Tampa, Fla.
U.W.T. Operator, PD Station.

Henderson, G. E., New York, N.Y.
U.W.T. Co., Operator SS Thames.

Hilken, A.H.
U.W.T. Operator Cape Hatteras Station (HA)

Jackson, Arthur B., Cleveland, Ohio.
U.W.T. Operator

Jones, Marvin, New York, N.Y.

Jones, Clifford M., New York, N.Y.
U.W.T. Operator, SS Caesar.

Kendrick, G.O.K., Buxton, N.C.
Operator, U.W.T. Cape Hatteras Station (HA).

Latta, Edward G., New York, N.Y.
Auditor, Marine Dept., U.W.T. Co.

Lemieux, Oscar, New York, N.Y.
U.W.T. Operator, Royal Mail Line.

*Marriott, Robert H., Brooklyn, N.Y.
Engineering Dept., U.W.T.Co.

Murphy, John S., New York, N.Y.
Superintendent Construction, Atlantic Div., U.W.T.Co.

Midgley, Frederick W., Jersey City, N.J.
Engineering Dept., U.W.T.Co.

Maxson, C. P., New York, N.Y.
Capt. SS Comus, So. Pacific SS Co.

Miles, Cecil, New York, N.Y.
Operator, U.W.T. SS Atrato.

Mowat, A., New York, N.Y.
U.W.T.Co. Operator, SS Colorado.

Mandle, Henry H., New York, N.Y.

Miller, Robert F., Atlantic City, N.J.
U.W.T. Operator.

Mason, F. Howard, New York, N.Y.

Morse, Arthur H., Seattle, Wash.
Construction Department, U.W.T. Co.

McCullough, H.F., Wilkinsburg, Pa.
Designer, Westinghouse Electric and Manufacturing Co.

Martin, Benjamin F., New York, N.Y.
U.W.T. Co., Operator, SS Iroquois.

Noe, Fred O., Duluth, Minn.
Manager, U.W.T.Co.

Murphy, Thomas, New York, N.Y.
Construction Dept., U.W.T. Co.

McGivern, Joseph P., New York, N.Y.
Wireless Telegraph Operator.

Nall, Ellison, Charleston, S.C.
Wireless Operator, U.S. Naval Station.

Nelson, N. Oliver, Seattle, Wash.
Factory Superintendent, U.W.T. Co.

*Pickard, Greenleaf W., Amesbury, Mass.
Consulting Electrical Expert.

Payne, M. H., Brooklyn, N.Y.
U.W.T. Co. Operator, 42 Broadway Station (NY)

Peck, Joseph A., E.Orange, N.J.
Engineering Department, U.W.T. Co.

Pickerill, E.N., New York, N.Y.
Manager Waldorf Astoria Hotel Station (WA) U.W.T.Co.

Parker, James B.,Brooklyn, N.Y.
Wireless Telegraph Operator.

Pike, Louis F., Seattle Wash.
Construction Dept., U.W.T.Co.

Perry, W.W., Norfolk, Va.
U.W.T. Co. Operator.

Pearse, William C., New York, N.Y.
Wireless Telegraph Operator.

Proctor, J. Albert, Revere, Mass.
Wireless Telegraph Operator.

Robinson, George A., New York, N.Y.
Construction Dept., U.W.T.Co.

Respess, Roland B., Chicago, Ill.
Respess and Co.

Reick, Louis F., Jersey City, N.J.
International Telegraph Construction Co.

Roberts, H.S.,Albany, N.Y.
U.W.T. Co. Operator.

Rushworth, F.B., New York, N.Y.
U.W.T. Co., Operator, SS San Jacinto.

Robinson, George N., New York, N.Y.
U.W.T. Operator, SS Florida.

Shoemaker, Harry, Jersey City, N.J.
Chief Engineer, U.W.T. Co.

*Sharpless, A. R., Jersey City, N.J.
Engineering Dept., U.W.T. Co.

Smith, William E., New York, N.Y.
N.Y.S. Naval Reserve, SS Granite State.

Sheedy, Joseph A. Seattle, Wash.
Lieutenant of Engineers, U.S.Revenue Cutter Service, USRC Thetis.

Strehl, William, Brooklyn, N.Y.
Second Co., Signal Corps, N.G. N.Y.

Sawyer, James M., Jersey City, N.J.
Factory Supt., International Telegraph Construction Co.

*Smith, J.O., New York, N.Y.
Hill Publishing Co.

Stevens, Y. M. Boston, Mass.
U.W.T. Co. Operator.

Schmitt, F. J., New York, N.Y.
U.W.T. Operator, SS San Juan.

Somerville, Richard A., New York, N.Y.
Construction Engineer, U.W.T. Co.

Sheehan, Jas. J., New York, N.Y.
Wireless Telegraph Operator.

Smith, Eugene B., San Juan, P.R.
Wireless Operator U.S. Naval Station.

Thurston, Eugene M., New York, N.Y.
Inspector, U.W.T. Co.

Tuck, William H. Brooklyn, N.Y. See other side and page 10
Expert in Factory Economics.

Townsend, L. T., New York, N.Y.
U.W.T. Operator, SS Havana.

Toms, R. W., New York, N.Y.
U.W.T. Operator, SS Ligonier.

Vosburgh, R. J., Buxton, N.C.
U.W.T. Operator, Cape Hatteras Station (HA)

Wilson, C. C., New York, N.Y.
President, United Wireless Telegraph Co.

Williams, Sidney L., New York City
U.W.T. Co.

White, D. B., New York, N.Y.
Inspector, U.W.T. Co.

Wallace, L. C., New York, N.Y.
Assistant Treasurer, U.W.T. Co.

Tuck had nothing to do with wireless facts he thought the principle of the Institute was good, therefore he contributed to it, with dues. He commuted to Philadelphia part of the time. He was trying to improve the efficiency of the Saturday Evening Post. He said men had to pick up bundles of loose pages and carry them to a place where they were connected up to make magazines. (1909)

With inefficiency the Post got out a magazine for a nickel then. When this note was made (1951) the magazine seems to be efficient and for 15¢

*Wolf, Benjamin E., New York, N.Y.
Chief Electrician, U.S. Navy Yard.

Walley, G.P., Elizabeth City, N.J.
U.W.T. Operator, MD Station.

*Ware, Paul E., E.Orange, N.J.
Wireless Telegraph Operator.

Wheeler, Harry A., New York, N.Y.
Construction Dept., U.W.T. Co.

Watkins, Harold E., Jersey City, N.J.

CHAPTER XVI

WIRELESS WAS LAWLESS

Wireless was not one hundred percent wireless or one hundred percent lawless. No wires were used between stations but wires were conspicuously festooned above stations. Wireless was supposed to be so patented that its use was restricted by law to the owner of a patent, but the patents only legally covered unnecessary features. Insofar as law was concerned anybody could use wireless in almost any way they wanted to use it.

Wireless was obviously valuable for adding to the protection of life and property at sea, but steamship companies could take it or leave it to any extent they chose. Also a company or any youngster could send wireless signals that might interfere with the distress signals from a ship.

How laws did, could and should apply to wireless had come to and were coming to recognition between 1909 and 1912. Patents had shown their lack of much legal value, old methods used in stock selling were judged illegal, steamship companies should be compelled to protect lives and property by using wireless, wireless commercial companies should be regulated, and the amateur wireless stations that were increasing like rats should be regulated or could be prohibited. Congress, who had not taken a hand in wireless since 1872 had to pass laws to help straighten things out. Mahlon Loomis obtained a U.S. wireless patent dated July 30, 1872. According to the New York Journal of Commerce of February 5, 1873, a bill passed Congress incorporating a company to carry out his scheme. That was the first time Congress dipped into wireless.

A decade of increasing wireless had indicated that the wireless

patents and alleged inventions did not have much legal value. Patents, pending patents, patent applications and alleged inventions were the touted assets that had been used to get money from angels or from the ~~pu~~ public through sale of stock. Patents had turned out to be a snare and delusion, whether the promoters who touted them thought they were or not. Patent infringement suits against competitors had demonstrated the lack of value of their patents and had not done away with competition.

In August of 1902 the Marconi Wireless Telegraph Co. of America sued the Deforest Wireless Telegraph Co. for infringement of re-issue patent number 11,913. In April 1905 the judge held that two of Marconi's claims were infringed. That did not benefit the Marconi interests because the Deforest W.T.Co. was a company of the past and the decision caused all companies to avoid those two claims. The Marconi Co. brought suit again on one of the claims (No.3) in 1906 against the American Deforest Co. and lost, before the same Judge Townsend.

The National Electric Signaling Co. sued for infringement of a Fessenden patent on an electrolytic detector. With the result that crystal detectors came into use and proved to be more practical than any electrolytic detector.

The suits failed to destroy competitors or get any money from them. But they advanced wireless because they exposed the frail skeleton of the European dominated interested conducted under the name of Marconi.

Fessenden's stab with patent litigation hurried up the crystal detectors and probably the vacuum tube detectors, amplifiers and generators. Defendants advanced wireless by trying to avoid paying toll to Fessenden and his angels.

I have a little induction coil that was marked to be used as an exhibit in the

1902 case between American Marconi Co. and Deforest Co. and a coherer made by the Marconi Company in about 1900. Also I have an electrolytic like American Deforest was sued for using and another one I changed to use carborundum crystals. Also I have some of Pickard's Perikons.

Up to 1914 no company or inventor obtained a profitable U.S. court decision in a suit for infringement of a wireless patent although about 1100 wireless patents had been issued in the U.S. That is, patents of the kind that wireless companies listed as assets. When United Wireless was during from other causes the Marconi Co obtained a decision against it in about 1912. That probably helped the Marconi people sell stock.

Ancient patents and disclosures weakened the claims of later day patentees. For example, Loomis disclosed in 1872 an antenna with a spark gap and ground. Nature charged his transmitter antenna so it sparked to ground. I have no Loomis souvenirs but I did use his scheme. I was curious about how much of and what kind of a charge a vertical wire would pick up. I installed a wire with a spark gap between it and ground a short distance from the laboratory rooms where I worked and always had some radio receiver where I could hear it. When nature charged up the Loomis antenna so it sparked to ground my receiver picked up the disturbance. That was my call to go to the test wire and measure its voltage with an electrostatic voltmeter or a calibrated spark gap.

The Statements about the value of wireless patents had proven to be extravagant exaggerations. Promotors had talked in big ways about them even before they started to sell stock in the U.S. around 1900. One company after another and companies simultaneously exaggerated the value of their patents and hoped-for patents. Misrepresentations of the value of patents were one of the characteristics of the promotors talk, prospectus and statement of assets. It was an outstanding characteristic of wireless companies.

All wireless patents were valuable but not in the way that promotors

We must distinguish between early inventions that were highly exploited, but had little merit, and other inventions, most of them later, which were genuine contributions to the progress of the art.

The improved audion, amplifiers, using the beat or heterodyne principle, ways to make vacuum tubes [illegible] and ways to keep them from oscillating at high frequencies; became patents that were very valuable contributions to radio and other arts.

talked about. Every person who applied for a patent and everybody who helped him had to study wireless more or less and every patent that was issued was considered by others. Patenting was an educational process that brought practical wireless development. As a rule there were no worthwhile direct cash returns to the inventor, but there were indirect returns and I guess inventors are glad that they invented.

The United Wireless Co., successors to the De Forest Companies, came along after the suits for patent infringement had demonstrated that a patent monopoly of wireless was probably impossible. United was not bothered by patent suits and it did not sue others, practically speaking. It did away with inland wireless stations that had been started under the De Forest Company plans and concentrated on equipping ships. Galbraith, Armstrong, Parnil, Stevens, Cooper, Isbell, Mason and others kept trying to persuade ship owners. The company had a large collection of patents it had obtained from predecessor companies, including numerous Shoemaker and De Forest patents and it was adding others but its principal effort was toward expanding its ship service.

Out of what seemed to be a clear sky, action was started against the officers of United Wireless Telegraph Company for sending misrepresentations through the mail to sell stock. The people around the United office said that attack would not amount to anything and that it was only another effort of competitors to obtain a wireless monopoly.

Considering the circumstances at that time and the number of years that stock had been sold in that way, it is probably true that such an attack on the company would not have amounted to anything if it had not been backed by interests that could profit by ruining the United Co.

Of course, competitors did not like the United's growth and prospects. The public wanted more wireless on ships and laws might be passed that

would force more steamship companies to use wireless and United was getting U.S. and other ships. United was operating on both the Atlantic and Pacific. Bob Armstrong had gone over to England and established an office under the nose of the British Marconi Co. We had built a station at Eastport, Maine which was aimed at England and the North Atlantic. Also we had so increased the efficiency of our maintenance system and equipment that the monthly cost of maintaining ship equipment had been reduced from $14 to $4 and we could install a deck, house equipped with a wireless and connections on a steamship in eight hours at docks and dry docks in the Port of New York. It was the wireless service company of the western hemisphere.

The gossip among the United employees was to the effect that every company and individual who might be suspected of being back of the prosecution had used misrepresentations to get money for wireless schemes. That gossip seemed to be reasonable in view of the fact that part of my education had been in the seeing and hearing of misrepresentations of one kind or another in connection with the advancement of wireless, since my start on the subject in 1897. I was beginning to classify inventors, promotors, corporations and stocks as variable unknowns. My college professor, who taught me about corporations and stocks, committed suicide because he was a sucker when he came to buying stock with his savings. He did not buy ~~either~~ stock like futuristic wireless, he bought the stock of the local earth bound clanking street car company that transported his wife, fellow profs, students, hoi polloi, market baskets and him. I knew some of the presidents of wireless companies that were conspicuous in the way they sold stock. I knew Dr. Gehring in 1901. He was president of the American Wireless Telephone and Telegraph Co. His associates said he was a medical doctor of German descent who had made a lot of money in Atlantic City real estate and got the idea of going into wireless, to make another financial

killing from his wife's brother, a Mr. Collins. He apparently formed one company after another and simultaneously. Stock selling seemed to be his object. Stock salesmen are seldom doctors but they do have a medals and an easy-operation-will-be-a-success manner.

A. M. Stevenson, President of the Pacific and Continental Wireless Telephone and Telegraph Companies had apparently been brought into that situation by A. L. New, who thought Stevenson had great influence and wealth. Stevenson was supposed to have made a fortune out of the "Little Jack Pot" mine and to be a republican boss who could make presidents. He acted like he regarded wireless as something he could get some money out of without doing much for it. He seemed to contain more champagne than ideas. While the company sold stock like earlier and later wireless companies, nobody prosecuted them for that. Anyhow Stevenson probably would have been safe, he was a lawyer and his right-hand man was Dewey C. Bailey, U.S.Marshal and treasurer of the Wireless Co. Big Steve was very fat and New, the vice president and chief promotor, was very skinny. New's brother was a U.S. senator.

Abreham who changed his name from Schwartz to White, was a later president of wireless companies. Promotion stories went around to the effect that he was a Wall Street financial wizard. A story that he bought a large issue of U.S. bonds for the price of a few postage stamps was told for years. He did not have the money but he could mail a bid and did. He was the highest bidder and was awarded the bonds. In Wall Street he raised more money than he had bid by showing the award and he received much publicity. Part of the money went into a fine house in New Jersey and DeForest interested him in promoting wireless. The indications seem to be that Abe did not put in much of his own money before he succeeded in selling enough stock to put on a big show of wireless, particularly at the St. Louis Exposition in 1904. Then he invaded the Rocky Mountain section. One of his associates later said he did that because he thought

people there were in the habit of buying mining stocks that were sold by using the same style of representations and misrepresentations as were used in selling wireless stocks. Denver papers published stories about Abe, Wireless, Deforest and Abe meeting his old friend Colonel C.C.Wilson in Denver. Wilson's building and loan office became the mid-western headquarters of the American Deforest W.T.Co. I met Wilson there.

Wilson was not a young man. He had been a confederate soldier and sat for long intervals quietly caressing an old wound in his left hand with his right while apparently in deep thought. He had grown children, they were by his first wife. His second wife who was living at this time, was of the very proper old-maid school teacher type. Every morning the Colonel looked like he had passed her inspection. Very clean and pink, in a very white collar and shirt contrasting with dark clothing, correct in every respect including the broad brimmed hat like many westerners wore. Not every morning - I did meet him one morning after he had sat up with an all night poker game. To what extent Abe had misrepresented or Wilson had misunderstood, I don't know, but the Colonel became irritated with the way things were going and began making trips to New York. After a time, and I thought much to his surprise, Wilson became President of the United Wireless Telegraph Company. Wilson and the United succeeded Abe and the De Forest companies.

When I came to New York after starting the building of stations on the Pacific coast and doing away with the non-paying Rocky Mountain chain, Wilson told me he wanted to do away with the stock selling feature of United Wireless but until ship wireless services, other services and the sale of equipment paid the company's expenses, stock would have to be sold to pay our salaries and other expenses. I think he wanted to explain that to me because of an incident that occurred on the Pacific coast.

The year before when I arrived at Seattle, Parker who I believe was a vice president and the company's chief stock salesman, told a man to ask me about the Colorado stations. Later I heard from my friends in the Denver office that Parker had asked Wilson to fire me because I had said those stations did not get enough paid business to cover the coal bill, and that had ruined a stock sale for him (Parker). Parker was one of those who claimed to be a devout churchman, what we called "bible backs" in the west. They hated the truth like Hell if it kept them from getting commissions.

It should not have been surprising that Wilson wanted to get away from stock selling. His wife did not like things that involved any misrepresentation and her nephew, Archer Diboll, the treasurer of the company and Wilson's right hand man, did not like the suspected tricks of stock salesmen. Also office employees had told me what Wilson said about stock selling and stock salesmen when Parker sold stock and held out sixty-five percent of the sale price for commissions and alleged expenses.

When Wilson came up for trial, several things did not help him any. Some of the things would have helped him in the west but he was tried in New York. His broad-brimmed hat and other western clothing characteristics and his insistence that the wireless stock selling methods were like Wall Street stock promotions were out of place in New York. Other things he did that were talked about might have been for or against him in any part of the U.S.

The Colonel seemed to think I knew even less about money and stocks than I did. One afternoon he called me to one side on the ground floor of 42 Broadway saying, "Do you want to see something?" He pulled a one thousand dollar bill out of his vest pocket. The boys in the office said

he went down Broadway to a saloon between Beaver and Stone Streets on Whitehall for three drinks of whiskey one or more times every afternoon. Maybe they inspired him to use ~~a~~ that big bill for a pocketpiece.

The Wilsons lived at the Waldorf Astoria at the site where the Empire State building is now. We had a wireless station on the roof that worked with a hotel station in Philadelphia (The Ten Eyke) with Baltimore and ships at sea. There were two bars in the Waldorf. The Colonel stopped in the one on the north side on his way from the office. (I liked the one on 5th Ave. better, it served a fine free lunch.) He was inspired to step into the toilet between appetizers. While there somebody in the next booth reached over the marble partition and lifted his coat and vest. He reported the loss of a valuable watch and important papers. Then I suspected he had been showing the bill too much. Later events indicated that somebody may have been after information to be used in prosecuting him. I had heard before that a would-be blackmailer had tried to contact Wilson at the Waldorf and had been met not by Wilson but by a lawyer.

The Wilsons moved from the Waldorf to a house at Long Beach that may have been valued their at about ten thousand, maybe more ~~than~~ more, and we put a station on the hotel Nassau partly because the colonel always wanted a convenient wireless station and because it might do to pick up coast vessels better or to replace Manhattan Beach (DF). Mrs. Wilson who had seemed to be frail, died soon after they moved to Long Beach.

Later and after action had been started against Wilson and other officers of the company for the methods they used in selling stock, Wilson married a young natural-color rosy cheeked boxom Jewish girl. I suspect she was young enough to have been his granddaughter. She had a baby promptly. Not too soon. He bought (second-hand) a nice forty foot

petite yacht where some of us were entertained on Saturday afternoons without liquor or indiscretions!

Of all of those who were punished, Wilson received the heaviest fine and longest penitentiary sentence. In a way he seemed to be suddenly the goat for all that previous and contemporary promotors of wireless stocks had done. He was found in the Atlanta penitentiary apparently reading. He wasn't reading - he was dead. C.C. Wilson's full name was Christopher Columbus Wilson.

After the ruination of United Wireless seemed to be assured, the Marconi Wireless Telegraph Co. of America raised its capitalization and the public apparently spent about $6,000,000 for Marconi's wireless stock. That sum was probably more than had been spent for wireless stock in all the preceding years in the U.S. Marconi stock jumped from about $12 per share to fantastic prices. One Marconi employee told me he sold his stock for $360 per share. Employees of another wireless frequently told how the president of their company would entertain people at a late breakfast in a club near his office and as a favor sell them some of his stock at a good profit (for the president) over its price on the curb. He replaced his stock by buying on the curb. That was practised ten years after Wilson's time. Later the stock selling of broadcasters and makers of broadcast receivers came along to make previous promotors look like conservatives.

But of all the lawless, I guess you could say the amateurs were the ~~most~~ or ~~soon~~ would have been the most, at least so far as numbers were concerned. They multiplied faster than rabbits or guinea pigs. More like rats. Later they became what might be called guinea pigs or rats in the wireless wave length clinic. A number of men who will probably be recorded as benefactors in history, started as simple disturbances. They

wore short pants. The law that came kicked those short pants into the short waves. They developed short waves that service people and pure scientific highbrows did not have the incentive, time or money to develop. About the time the laws were coming in, the amateurs began coming in with stories about great wireless distances they received last night by using an audion. We thought they were lying. They were not. They were getting the unexpected out of the audion. Probably due to mistakes in making haywire connections.

Static was the worst kind of wireless disturbance and interference. Next came the Marconi ten inch coil transmitter. Most of the amateur transmitters were like that Marconi arrangement only not so powerful, usually. But the amateur transmitters were bobbing up everywhere. They did not care how much they interfered with commercial or navy wireless. Some of them delighted in that. There was no law to prevent them. None of them would have wanted to interfere with a distress signal but few would have known a distress signal if they had heard it. Most of them could only read very slow sending and some could read only a few letters. Very cheap equipment was on the market for amateurs to buy. For example, Hugo Girnsbach in New York through his Electro-Importing Co. and Modern Electrics Magazine sold a large amount. He even advertized static machines for $3.75 to be used as wireless transmitters.

I was told that some amateurs who could send and receive well, interfered with the United station at 42 Broadway and then told the United chief operator that they would stop if he would promise them a job and that they got jobs.

One amateur claimed his transmitter reached great distances. If his claims were correct he could have interfered over the entire north Atlantic during a winter night. It is probably true that a Navy Admiral

said, "Hell! Our wireless don't get messages through in the summer time because of interference from static or in the wintertime because of interference from amateurs".

Several of the amateurs I knew were Catholics. I have often wondered if some of them hadn't been choir boys before their voices changed from soprano or alto. Choir boys look so innocent in pictures and I have read that they were called cherubs. Radio amateurs were never referred to as cherubs by commercial or Navy wireless people. They did not even approve of amateurs who received only, such amateurs were regarded as eavesdroppers, and the transmitting stations, the Radio Amateur Telegraph Stations (RATS), commercial and Navy bosses wanted them exterminated.

Insofar as making proper use of wireless and contributing to its cost, steamship companies were lawless too. I was told by members of the office ~~of~~ force that United Wireless had to equip some steamships free of charge to get that service started and had up to 1911 only been able to get as much as $62.50 per month for the rent of equipment and the services of an operator. There was no law to make them use it so they did not use it, or use it enough, or pay what it was worth. Captains of vessels were against wireless because as long as they were out of communication with their bosses or authorities, they were virtually kings. When they got wireless they had to make reports and take orders.

Captain Maxon was an outstanding exception. He became a floating wireless amateur. When he changed ships he took his wireless with him and reinstalled it. That equipment became, in time, a United Wireless outfit in a cabin. Cabin and all were shifted from ship to ship and Maxon did the operating until the Southern Pacific S.S. Co. put permanent stations on their ships and hired operators. I guess even then he fre-

quently relieved the operators while they went to look over the girl passengers or something.

But, of course, the S.S. Co. could not get away with murder forever in face of the publicized object lessons. There had been several before the "Florida" rammed and sank the "Republic". The "Republic" carried wireless. If the Florida had carried wireless she probably would have know the Republic was near. If the Standard Oil Company's "City of Everette" and "Barge 88" had not been equipped with wireless a large number of the Republics passengers and crew probably would have drowned because no other nearby vessels were equipped to hear Jack Binns wireless cries from the Republic that brought the help directly to the sinking vessel.

The "Titanic" rammed an iceberg and sank slowly but about 1500 many were drowned. The belief was that most of them would have been taken off or picked up if she had sent a wireless distress call and her location promptly and if the ships within steaming distance had been listening for distress calls. It emphasized that wireless and one operator who only listened part of the time were not enough. Wealthy and otherwise influential lives were lost or jeopardized. That catastrophe was very effective.

When the Titanic sank the United Wireless had failed and I was with the Marconi Co. of America. The Carpathia was coming to New York with survivors. But according to reports nobody was getting messages from the Carpathia. The New York World wanted a wireless equipped tug to get near the ship and get news. A Marconi Company operator and I met a tug at Hartford Connecticut on which we installed a Marconi wireless while she went to sea. The Carpathia would not answer our calls. We turned then and came in ahead of her. She caught up with us at the Pilot ship.* Her rails were lined with silent, white faces. They stared down and we stared up. I did not hear a voice. A

* I had equipped that ship for United Wireless, I don't remember whether at the New York

man in the small boat that delivered the pilot to the ship's ladder was knocked down by another man. I felt that we were silent observers of a very large silent funeral procession. Later I was told that the knocked down chap was a reporter who tried to ask questions. Passengers who left England for New York in a medley of gay sounds on the Titanic came into New York harbor on the Carpathia in white faced silence. Others and the Titanic remained in the Atlantic.

Careless navigation, killing people and improper wireless service. Suppression of information. I was told that the chap I saw knocked down was a reporter trying to get information. We were unable to get information from the Carpathia by wireless. When I reached shore I was told that the Marconi company or steamships companies had told the Carpathia by wireless to not give out any news or other information. All was so bad that laws were passed to make steamships people and wireless people, behave better.

CHAPTER XVII

THE INSTITUTE ACQUIRED CONTINUOUS WORKERS

Operators did not go on duty at Manhattan Beach station (DF) until evening. I sometimes left the station before the operator arrived. Operator Frank Hart, an ex-amateur who was studying to be an engineer, arrived at the station unusually early one afternoon in May 1909. He came early to tell me about a physics instructor at the College of the City of New York. Frank had told the instructor about DF station and about the arc wireless telephones, Von Lepel gaps, other special gaps and tuners I was making and trying in part of the station building. The instructor wanted to see the station and the experimental instruments. The experimental part was only open when I was there. I was agreeable so Hart arranged to have the visit occur the next afternoon. Wireless needed Continuous Waves (CW) for better tuning and efficiency. I was able to experimentally produce them more or less with the arc and some gaps at DF. Our baby Institute needed Continuous Workers (CW). Frank Hart delivered one C.W. that afternoon. I installed him in the Institute and he maintained himself. that continuity for over forty years. The Institute name changed but his name has not changed.

When Hart brought the tall young fellow along the walk above the mud and water of our surroundings, I saw them and wondered at what age that fellow had started the study of physics, maybe in kindergarten. When I shook hands with him I wanted to look behind his ears to see if he was dry there. Most of my contacts had been with elderly physics professors.

I showed our visitor what we had. He was very enthusiastic. His expressions of enthusiasm may have been partly due to an intensive training in how to be polite but it made me think he was what we were

looking for and I enthusiastically proceeded to sell him on the idea of attending our next Wireless Institute meeting. He did and became such a worker that on November 3, 1909 he read us a paper on Wireless Telephony at the Institute. He was specializing in color photography but we converted him to wireless. That is how we acquired a willing, capable, free and fresh physics instructor with fresh theories and ideas. It was his business to keep fresh. He spelled correctly and usually produced correct grammatical combinations, which chaps of the engineer type usually did not do. He was almost always available in New York at the hours when The Institute needed him. Also he did homework for the Institute. He could do most everything we needed, even a little shorthand and two or three-fingered typing. The Institute was an educational organization that elaborated several parts of the physics he taught. We needed him and we got him. Five years later on his return from Europe, I met him on the dock. He then said he would stick with the Institute as editor of our proceedings. He did that and more. He has had and has used what it took: ability, money and location. Thirty-seven years ago Frank Hart found for I.R.E.: Alfred Norton Goldsmith. That part was inserted in 1946. Forty two years now (1951)

Goldsmith was taking post-graduate work at Colombia. He contacted Columbia's famous Professor Pupin. The first result for us was that Pupin gave us a paper (a stenographically recorded talk that was published) in the Lecture room of the Department of Physics at the College of the City of New York on April 6, 1910. We did not have to pay for the room (you don't know how important this was) and Pupin kept in touch with us from then on. We saved money and made another valuable contact. Famous Pupin was an old, experienced educator and inventor. He had a lot of boyish spirit. Boys pushed wireless and occasionally an old boy, who was not entirely old, added to and mingled with us.

Edwin H. Armstrong was our outstanding sample of Pupin's coaching. It was Pupin in his late years who said: "Come up to the farm for the week-end. You can have milk or champagne, preferably champagne. It don't cost me so much". "Audion is a bastard word, part Latin, part Greek" and "The Goldschmidt radio alternator is lousy with frequencies". It was Pupin who put Armstrong on the way to make money out of a self-tickling Audion.

The Wireless Institute emblem was round, about the size of a half dime. The next emblem (IRE) was three cornered like diapers. Both had safety pins on them. There were a good many committee meetings relating to the nursing of the baby Institute. A lot of nurses were required. The nursing fluid was beer in one popular place and tea in another. Goldsmith and I liked Chow Mein and tea at the Oriental in the Bowery but frequently others did not approve of that diet. In those cases we went to Sweets restaurant at #2 Fulton at South Street for beer and the food that market men (like Al Smith) chose for Fulton Market men. Plenty of pork, beef, poultry, pie, fruit, vegetables and sea food. Big beers. I thought Goldsmith looked just as good with his nose in a half litre of beer as he did in the open. We were all poor at that time. Goldsmith thought I spent too much for lunch when I spent thirty-five cents and he was right. Thirty-five cents were enough at Sweets for a modest dinner without beer or other extras. Sweets was crowded in midday but not in the evening. If we notified them in advance, Sweets would reserve enough tables together to accommodate ten or a hundred. The quality, variety and prices were so attractive that the boys came from upper Manhattan to Institute dinners and then went back uptto Colombia University to hold the less convivial proceedings, high-brow papers and discussions.

For one dollar at Columbia we had the use of a large lecture room

gas, water and electrical connections, a thirty-foot blackboard and a picture screen. A. B. Cole obtained that privilege for us in 1909. His father taught mathematics at Columbia. We did not go to the Columbia campus or to the Fulton Market district for the atmosphere. We went to those places because we got the most for our money there. To get the Institute going it was necessary to get as much as possible for our money or for nothing.

James A. Parker printed our postcard meeting notices at a low cost. He and his sister were in the printing business and Jimmy was in Wireless.

C. M. Haslett suggested the Hertz loop for the Wireless Institute emblem design. Harry Shoemaker suggested the Hertz Dipole within the loop. After about three meetings that design was adopted. I worked with them. Haslett arranged for their manufacture in gold pins.

Hogan and Goldsmith suggested the IRE emblem. I made several designs in tin foil. P. B. Collison had the design that we decided on made up in gold and enamel as they are now, except that there are more colors used now for the different grades of membership.

Until Goldsmith had been elected secretary and treasurer, Sydney Williams had been secretary. He could take down meeting notes rapidly in shorthand. He was a loyal, hard worker. And up to that time Gene Thurston carefully cared for our money. Sydney and Thurston were not inclined to study science and engineering but they believed in our cause and carried on until we could get other help. Sydney was a secretary and Thurston was an operator for the United Wireless at 42 Broadway.

We were helped by people who were not members of our organization

or profession. One of the practices that Ralph W. Pope recommended after his years of experience as secretary of the American Institute of Electrical Engineers, and of which he told us at our meeting on April 7, 1909, was the recording of Institute papers, speeches and transactions. He gave excellent advice that we tried to follow. He was very sincere. We heard what he said (Sydney Williams recorded what he said) and he dictated what he said to an AIEE stenographer and mailed it to us and we printed it in Vol.1, No. 1 of the Wireless Institute Proceedings.

We of the beginning Wireless Institute were not exclusive. We were more than willing to get help from anybody. In fact, we asked for it. Some who helped us had no alleged understanding of wireless theory or practice but they believed that wireless would prove to be more and more useful and an Institute to develop it was worthy of support. William H. Tuck was one of that kind. He was Efficiency Engineer for the Saturday Evening Post. He lived on the top floor of the two-family house where I lived in Brooklyn. He owned the house and spent part of his time in Philadelphia with the Post. From what he said it seemed evident that the Post needed an efficiency engineer then. Strong men had been gathering an armful of pages here and there about the plant and lugging them to a table where others connected them to make a magazine.

In 1910 we were at a point where we could get enough members to support the publication of Institute proceedings if we published enough proceedings to be convincing. We had the unpaid talent who could edit proceedings and prospective authors of useful papers if the papers would be published. Typesetters were probably our worst obstruction. We had to pay more for printing than we could scrape together for

several issues. If we failed to publish some papers, their authors would become our enemies. Jimmy Parker could set type and print but his sister's printing plant was not arranged for printing material in book form. When they printed our brief meeting notices, we were imposing on them. The printing of our proceedings was the main thing we did not know how to get for almost no expenditure of cash.

Although the attendance at Wireless Institute meetings increased, the number who paid dues and the alacrity with which they paid decreased, anybody could come to our meetings whether they paid or not. Some who helped with Institute work were hard up and put off paying dues. The prosecution of the officers of United Wireless caused others to lose confidence in wireless and as the prosecution went on more and more lost their jobs or shifted to more promising work in other lines at the first opportunity. When we did not print our proceedings, only those who attended meetings could benefit directly or see that we were doing some good. With the exception of Jack Binns, the Marconi companies did not have any employees who took a beneficial interest in the Institute until after the United Wireless was on its last legs. After about four years work on the Wireless Institute, it was still a weak brother. There were others scattered about who had not joined the Institute although they wanted to contact and cooperate at least to some extent with some of the other people who were interested in wireless science, engineering, business and laws. Many of them had exclusive ideas which did not fit perfectly with the all-inclusive, open house, workdwide idea of the Wireless Institute.

The troubles of the United Wireless Telegraph Company took support away from the Institute but the troubles of other wireless organizations brought support to it. The Stone Telephone and Telegraph Company's going out of business, the National Electric Signalling Company changes and

the troubles the government had encountered in getting desirable wireless apparatus and in trying to regulate wireless, brought support.

John Stone Stone of Boston, bachelor gentleman, member of exclusive clubs, well-to-do mathematical scientist and producer of the largest number of U. S. mathematical wireless patents, had been trying to design, manufacture and sell the best in wireless apparatus. In 1907 he began inviting employees of his company to his home for evenings devoted to the reading and discussions of papers pertaining to the wireless problems in which they were interested. After the papers, refreshments were served. In 1908, Stone had the group incorporated as the Society of Wireless Telegraph Engineers (SWTE). Stone gave up trying to design, manufacture and sell wireless instruments. His employees scattered. In the later years the SWTE became less exclusive and added some who lived in New York, for example, Hogan, Deforest and Lowenstein. Stone moved to New York and some of his former young employees were in New York off and on.

Some of them attended our meetings and some contributed to our meetings by presenting papers. However, we were unable to get any of them to contribute financially by paying membership dues. One day Jack Hogan, who had been continuously helpful, remarked to me that he thought Stone and his crowd would come in with us if we would make it a combination of the SWTE and WI under a new name. I had never thought of that. We of the WI talked it over and proposed a marger to SWTE. Goldsmith typed our proposal. We agreed to make it a marriage under the name: "Institute of Wireless Engineers" and at the last minute changed it to: "THE INSTITUTE OF RADIO ENGINEERS". The members were to consist of those who had paid their dues in the WI and in the SWTE. Most of our WI's had not paid and Stone told me he paid for some of the SWTE's who had not paid, to bring things up to a fifty-fifty basis. I suspect he

contributed financially to the IRE several times that were not mentioned. For committee meetings, in which he took part, he asked us to join him at the National Arts Club for conference and very good refreshments, at his expense.

Changes occurred in the National Electric Signalling Co. They had tried overland, transatlantic and sales of wireless equipment to the government. Now They were trying to get into the ship-to-ship and to shore wireless service. S.M. Kintner was taking a management position in the company replacing Fessenden and some personnel was moving to Brooklyn where they had station and ~~ship~~ shop facilities in a Bush Terminal dock building. Also they had some personnel on Long Island Sound boats. This brought some active members - for example, Roy Weagant, - to the Wireless Institute and John V. L. Hogan of SWTE and both thence to IRE.

At meetings of the Society of Wireless Telegraph Engineers they had read and discussed papers on the following subjects:

Alternating Current Algebra.
A new method for solving problems connected with the propagation of waves along an infinite line.
A method for obtaining unity power-factor in the supply circuits of wireless telegraph stations.
The periodicities and damping coefficients of coupled oscillators.
by John Stone Stone
Harmonics in arc circuits.
by E. D. Forbes
Tubular condensers
by O. C. Roos
An experimental verification of Oliver Heaviside's theory of the induction of currents in cores.
by Roy T. Wells
Experimental observations on the audion with special reference to applying a positive potential to the grid.
by Sewall Cabot
Experimental observations on the loss of energy in the dielectrics of coils in oscillating circuits.
by Ernest R. Cram

Also it will be seen from the following that Hogan, Kolster, Lowenstein and Stone who belonged to the SWTE contributed papers to the W.I.

The Wireless Institute held about ten meetings per year. A letter written in December 1910 says "as a rule there are not over nine meetings in a year." The plan as stated in Vol. 1, No. 1 was to hold meetings on the first Wednesday of each month except July and August at the United Engineers building, 33 West 39th Street.

The following is the list of meetings of which I have found a record: January 23, 1909, 8:30 P.M. in Room 1909 at 42 Broadway, New York City, the first Wireless Institute meeting was held. A temporary organization was formed by Messrs. John S. Murphy, R. A. Somerville, Joseph D. Fountain, R. B. Respes, E. A. Cleva, John Gregg, E. Barnwell, Philip Farnsworth, Sidney L. Williams, and R. H. Marriott. The purpose of this organization was to draw up a constitution and make the necessary arrangements for the formation of a permanent organization. Mr. Marriott was elected chairman. Mr. Sidney L. Williams was elected secretary. Various phases were discussed, motions passed and a Committee on Organization consisting of Respes, Somerville, Murphy and the chairman and secretary ex officio, was appointed.

Wednesday, February 3, 1909, Room 1909, 42 Broadway, at 8:00 P.M. Second meeting of the Wireless Institute. Temporary organization preparing constitution and plans.

March 10, 1909, 8:00 P.M. at the United Engineers Building, 33 W. 39th Street, New York City. In the small room at the southeast corner of the building on the balcony floor. There were present Messrs. R. A. Somerville, Joseph D. Fountain, John C. Gregg, Roland B. Respes, A. R. Sharpless, E. M. Thurston, B. P. Martin, W. M. Jones, J. A. Bryan, Arthur C. Fike, Francis X. Butler, Wm. F. Bissing, Sidney L. Williams, and R. H. Marriott and others represented by proxy. A constitution was read, amended and adopted. Mr. Marriott was elected

president, Mr. Harry Shoemaker, Vice President to serve for one year and Mr. Pickard Vice President to serve two years. Directors: John B. Murphy and Richard A. Somerville. Sidney L. Williams, Secretary. Eugene M. Thurston, Treasurer. Entrance Fees: $5.00 for Members, $2.00 for Associates. Dues: Members $5.00, Associates $3.00.

April 7, 1909, 33 W. 39th Street, New York City. President Marriott called the meeting to order at 8:40 P.M. and presented a paper entitled "The Wireless Institute" which explained the reasons for this Institute, the constitution and the plans for the future. This was followed by reading a letter from Greenleaf W. Pickard discussing the paper, Mr. Ralph W. Pope, Secretary of the American Institute of Electrical Engineers then addressed the meeting, discussed the paper, gave the Wireless Institute the benefit of his experience and suggested that the Wireless Institute might arrange for a wireless session at the convention of the American Institute of Electrical Engineers in June 1910. (We remembered his advices and used them in both the Wireless Institute and IRE.)

A printed record of the January 23, March 10, and April 7, meetings and the constitution as adopted are contained in Volume 1, Number 1, of the Wireless Institute Proceedings. Printed applications for admission were also issued.

May 5, 1909, 8:45 P.M., 33 W. 39th St., New York City. Greenleaf W. Pickard presented a paper entitled "Antennae". A lively discussion followed, lasting until 11:15 P.M. Thirty-two members and guests were present. Committees on Papers, Membership and Emblem were appointed. This paper and account of the meeting is printed in Vol. 1, No. 2 of the Wireless Institute Proceedings.

Wednesday, June 2, 1909, 33 W. 39th St., New York City. Meeting

called to order at 8:45 P.M. A paper on "How Business Can Best Be Handled in Case of Distress" by Jack R. Binns was read and discussed at length. Committee on Standardization was appointed. This paper, etc. was published in Vol. 1, No. 3 of the Wireless Institute Proceedings.

Wednesday, September 1st, at 8 P.M., 33 W. 39th Street, New York City. "The Production of High Frequency Oscillations" by Mr. Harry Shoemaker.

Wednesday, October 6, 1909, at 8:45 P.M., 33 W. 39th St., New York City. Mr. Frederick W. Midgley presented a paper entitled "Proportioning the Transmitter to the Aerial".

The Wireless Institute emblem was exhibited in the form of a pin. To sell for $2.00 with owner's name engraved on the back. A gold disc with a Hertz oscillator in the center encircled by a Hertz receiving loop. The paper and transaction of this meeting were published in Vol. 1, No. 5 of the Wireless Institute Proceedings. This number of the Proceedings bears the Wireless Institute emblem.

Wednesday, November 3, 1909, 8:45 P.M. at 33 W. 39th St., New York City. Mr. Alfred Norton Goldsmith, B.S., presented a paper entitled "Radio-Telephony" illustrated by lantern slides. The papers to be presented in December, January, February and March were announced. The November paper and transactions were published in Vol. 1, No. 6 of the Proceedings of the Wireless Institute.

December 1909. "Conversion of Electric Oscillations into Continuous Current by Means of a Vacuum Valve", by Wm. E. Smith.

January 5, 1910, "Measuring Instruments and Measurements in Wireless Telegraphy" by Louis R. Gleason. A half dozen copies were sent to members

in advance and most of them were prepared for discussion.

February 1910 - "Resistance in an Oscillating Current Circuit" by A. R. Sharpless.

March 2, 1910, 33 W. 39th St., at 8:30 P.M. "Wireless Legislation, and the Statiens of the Individual Operator" by Harold Zeamans. He is Status still the legal adviser of I.R.E.

April 6, 1910, Wednesday, 8:30 P.M. Wireless Institute meeting at the Lecture Room of the Department of Physics, College of the City of New York. A discussion on "Experimental Tests of the Radiation Law for Wireless Oscillators" opended by Professor M. I. Pupin of Columbia University. Published in Vol. 1, Part 1 of the Proceedings of the Institute of Radio Engineers.

May 4, 1910, Wednesday, 8:30 P.M., 33 W. 39th St., New York City. A paper entitled "High Insulators". A comparison of high insulators as to electrical resistance, resistance of heat, chemicals, etc. by Stanley M. Hills. Published in Vol. 1, Part 1 of the Proceedings of the Institute of Radio Engineers.

June 1, 1910, Wednesday, 8:30 P.M., 33 W. 39th St., New York City. "The Obtaining and Influence of a Good Ground in Wireless Telegraphy" by Frederick W. Midgley.

October 5, 1910, Wednesday, 8:30 P.M., 33 W. 39th St., New York City. "Attunement of Wireless Telegraph Circuits for Highest Efficiency" by Elmer E. Butcher.

November 2, 1910, 33 W. 39th St., New York City. A demonstration of Electrical Phenomena, By Goldsmith, Marriott and others. Tickets were sold for admission to both this meeting and the meeting on December 7th. Lighting an electric light with a match, was the stunt that made the big hit. A selenium cell at the base of the bulb operated a relay when light from the match hit the selenium.

December 7, 1910, Wednesday, 8:30 P.M., 33 W. 39th St., New York City. "Side Lights on the Navy Department Wireless Telegraph Specifications" by J. Martin, Expert Electrical Aid, Brooklyn Navy Yard.

January 4, 1911, Wednesday, 8:30 P.M., Room 304, Fayerweather Hall, Columbia University, New York City. "Singing Spark Sets" by Mr. Kolster of the Radio Telephone Company. Election of Wireless Institute officers for 1911. The same officers had continued through 1909 and 1910. At this election Alfred N. Goldsmith was elected secretary and treasurer replacing Mr. Sydney L. Williams and Mr. Gene Thurston.

March 1, 1911, Wednesday, 8:15 P.M., Room 304, Fayerweather Hall, Columbia University. "The Seibt Quenched Spark System as Used by the Radiotelephone Company" by Emil J. Simon.

April 5, 1911, Wednesday, 8:15 P.M. Fayerweather Hall, Columbia University. "Recent Developments in Wireless Telegraphy" by Fritz Lowenstein.

May 3, 1911, Wednesday, 8:15 P.M. Fayerweather Hall, Columbia University. "Resonance Transformers" by John Stone Stone.

November 1, 1911, Wednesday, 8:15 P.M., Room 304, Fayerweather Hall, Columbia University. "The Application of Multiphase Currents to Wireless Telegraphy" by J.V.L. Hogan of the National Electrical Signaling Company. (Kolster, Lowenstein, Stone and Hogan were members of the Society of Wireless Telegraph Engineers."

December 7, 1911. "Amplifying Relays" by Mr. A. N. Goldsmith.

March 6, 1912, Wednesday, 8:15 P.M., Room 304, Fayerweather Hall, Columbia University. "Recent Practical Developments in Wireless Telegraphy Due to Dr. George Seibt". 1) A direct reading wavemeter. 2) A new

constructional form of receiving condenser, to be read by E. J. Simon. "Thousand Cycle Transmitting Sets in Theory and Practice" by Baron Shunkichi Kimura, Chief of the Japanese Wireless Bureau. The former officers of the Wireless Institute were reelected at this or the following meeting. The same officers were elected for the Wireless Institute for 1909, 10, 11 and 12 except that Mr. Goldsmith replaced Messrs. Williams and Thurston for 1911 and 12.

The notice of this meeting included the following statement: "------ we expect the publication of our Proceedings ----. Once we resume publication, our large list of foreign applicants, numbering several hundreds can be admitted to membership -----. Your promptness in paying your enclosed bill for dues will determine how soon it will be before our printed Proceedings are again being regularly placed in your hands".

April 3, 1912, Wednesday, 8:15 P.M., Fayerweather Hall, Columbia University. "A New Constructional Form of Variable Condenser Due to Dr. G. Seibt" by E. J. Simon. "Utilization of Both Waves Emitted from Closely Couple Transmitters" by Mr. Torikata. The notice said, the matter of the consolidation of The Wireless Institute and The Society of Wireless Telegraph Engineers would be considered.

May 6, 1912, Monday, 8:15 P.M. Room 304, Fayerweather Hall, Columbia University. The notice for this meeting says: "This meeting will be the last meeting of The Wireless Institute being a joint meeting of the Society of Wireless Telegraph Engineers and the Wireless Institute at which meeting both societies will combine to form the new society which will probably be known as The Institute of Radio Engineers. The articles of the constitution of the new society and its officers will be decided upon at this meeting."

May 13, 1913. A meeting of the Institute of Radio Engineers was held at ~~Room 304 Fayerweather Hall~~ See * note, Columbia University, New York. The following officers were elected to serve during the balance of the year:

R. H. Marriott, President
F. Lowenstein, Vice President
Emil J. Simon, Secretary
E. D. Forbes, Treasurer

The following members were elected to the Board of Directors for 1913: in addition to the Institute's officers.

G. W. Pickard
F. Fay
J. Hogan, Jr.
L. Espenschied

The following committees were appointed by the President for 1913:

Standardization

J. S. Stone
F. Lowenstein
J. L. Hogan, Jr.
G. W. Pickard
A. N. Goldsmith
R. A. Weagant

Papers

L. Cohen, Chairman
A. N. Goldsmith

Publicity

J. L. Hogan, Jr.
Emil J. Simon

*note. Room 304 was being used so we were given the use of a room in the building south of Fayerweather. The IRE held its meetings in 304 Fayerweather Hall for years. No charge by Columbia. To clear up the mess we made, we gave the janitor one dollar per meeting.

CHAPTER XVIII

SERVICING SHIP WIRELESS

The equipment of ships by United Wireless was increasing. More ships equipped by United were coming from Europe. To serve those ships more shore stations might be useful, also they might be located where they could be expanded to handle transatlantic messages if some hoped-for wireless improvements materialized. I went to the eastern end of Long Island and picked a site near Montauk and then to Eastport, Maine, the nearest point to the British Islands, picked a site and followed it up by building a station.

While investigating for the station site on eastern Long Island, I made my headquarters at the hotel in Montauk village and covered a greater part of the ground on foot from Promised Land to Montauk lighthouse, finally selecting land on the west side of Fort Pond Lake which came to a usable point in the lake. During my stay I had asked if the residents had found many relics left by the Indians who had traditionally lived around that lake ~~on~~ at one time. Somebody said relics had been found in recent years, including a human skeleton, while digging for some other purpose and that the skeleton had been reburied someplace east of Fort Pond Lake.

Beginning at the age of about five, I had collected Indian arrow heads and other relics in several places. I did not collect bones but kept my eye open for the possible reburial site, thinking that some arrowheads or something might have been buried with the bones. I found a grass covered spot that looked promising.

Speaking of promising, the sites around Promised Land did not look promising for a wireless station because the owners of that section were

the exclusive rich type. Local gossip said Promised Land was a by-product of a Cincinnati soap business, possibly related to the present day soap bubble radio broadcasts that contribute to the incomes of radio engineers and entertain housewives. I guess those Cincinnati folks were selling air or a gas with soap around it when I was born.

After picking what I thought was the best available site I had some spare time before the next train left for New York. I borrowed a spade and dug for Indian relics. About eighteen inches down there was something brown. I scratched dirt carefully exposing a wider surface that continued to be flatter than I thought human skulls had ever been. It was not a skull but a can of what had been embalmed beef that Teddy Roosevelt had ordered buried when he and his Rough Riders were camped there. I had dug my way to what I could identify as part of a Spanish American war scandal, bad beef instead of older but maybe more creditable Indian relics.

Picking a site at Eastport, Maine, buying it and building the station took a lot of time in late 1909 and early 1910. Where the station was located the tide rose and fell ninteen feet and three car loads of stuff had to be brought to an open snow covered hill on a single track and unloaded with the temperature about six above and between trains, which is a rather long story. Also when I returned to New York I had to change DF from Manhattan Beach to Dreamland Coney Island where we probably started the fire that burned Dreamland, which requires quite a little explanation. On top of those I was told to take over the installation and maintenance work of ships entering New York harbor. Eastport and Dreamland handled ship to shore business. Our company was put out of business before we got around to using the Montauk site.

John Murphy was superintendent of installation and maintenance at New York. Why the company directors suddenly put me over him I did not know. I did not even know they were contemplating changes in station maintenance work of any kind. I had not heard any gossip about the costs or about Murphy and his gang. I was then told that the cost of maintenance for ships using New York harbor averaged fourteen dollars a month, which seemed unreasonable. But that could be accounted for to some extent by the fact that Murphy and his gang were not provided with sensible facilities. They had a corner space on top of 42 Broadway, big enough for Murphy and his desk and seat space on big steam pipes for his gang if there were not more than half a dozen and the pipes were not too hot. When they needed any replacement parts that they could not carry in their satchels, or equipment for a new installation, a couple of the gang went to the corner of Cortland Street and West Street where they would meet Sproul, the truckman. His horse would pull them onto the Jersey City ferry and to our factory about two blocks below Colgates. There the material would be brought downstairs when the factory was ready to let them have it. If the job was large, the rest of the gang would probably go to the saloon across from where the ship was docked on West or South Streets ~~on~~ or in Brooklyn and watch and wait. After about three hours Sproul and the other two would come in for a round of beer. The equipment would then be taken over to the ship. That day or the next the mate would left their heavy stuff aboard by using the ships donkey engine. When the gang had nothing to do but hang around 42 Broadway, they spent part of the time in the saloon across from the New Street entrance to 42 Broadway. Murphy and Boyle knew where to look for them.

At the time I was called in, Murphy was being provided with better facilities. He and his boys were completing a combination shop, store

room and office in a third floor loft. Why they had not given Murphy a chance to show what he could do with the improved facilities was a mystery to me. There might be something very wrong some place so after lunch on Saturday I took all of the gang's telephone addresses and told Murphy to come back on Monday and asked Billy Boyle to remain Saturday afternoon. Explaining to them that as this was a surprise to me I wanted to get more information and make some plans before calling others back. They had all been paid off to take effect that Saturday night. Some were paid by the day and others by the week.

From Boyle I learned that Murphy had been called on the carpet and Murphy had blamed their inefficiency on the lack of a convenient shop, stockroom and office facilities on Manhattan Island. Murphy had been told to go ahead and get a Manhattan headquarters. Then before the stock room was quite completed, Murphy and I were told that I was to take over.

TheSSaturday I took over I received a letter from the general manager saying I was to take over and would be allowed a helper. That was another mystery, one with a helper could not possibly maintain the vessels we had entering New York. Saturday I could not find out anything from the officers but got a story from an office employee that Murphy had hired his relatives and some fellow Catholics who did about as they pleased because they were sure he would keep them on the payroll. Also that the boys spent most of their time in the saloon on New Street drinking beer or sleeping off an overdose in some operator's bunk on a ship.

On Monday I showed the general Manager's letter to Dibol~~l~~, the Treasurer, and told him the job could not be run by me with only one helper. He said, "Of course not, run it but don't use any more help

than is needed". He said the matter had been brought up to the directors with a lot of complaints about Murphy and his gang. He said one director said I was the most experienced construction and maintenance man in the country and could do as much with one helper as one of the complaining officers said Murphy did with the gang, and Diboll supposed that was why the letter to me limited me to one helper, but the idea was that I was to organize it and run it without interference from any officer of the company. I suspect they knew Murphy had been pulled one way and another by several officers who assumed the right to boss him.

Later I concluded that company officers had interfered with Murphy and that two of the officers each had a man they wanted to put in charge, so they said what they could to get Murphy out. Their talk about the importance of the job caused me to be put in in place of either of the two men with little practical experience because my construction and maintenance experience had been on both coasts and from Cheyenne to Galveston.

Shortly before I took charge, Murphy had needed some more help to fix up the loft and make some ship installations. He hired the first applicant that came along, Henry Kasner. When I saw Henry I promptly checked him out of the story that they were all Catholics. Kasner was obviously a Jew. Johnny Gregg apparently was in my class. He did not belong to any church. Billy Boyle did not need any make-up to look like a Catholic priest. One day he told me he had been raised for the priesthood but had jumped the training and had gone to sea. Boyle said that Murphy, his brother, ~~Ronny~~ Tomey Cleva, Mike Ryan, Joe Fountain and the others were Catholics. I kept Murphy, Boyle, Gregg and Kasner on the payroll all the time, Cleva and Ryan most of the time, Tom Murphy and

fountain part of the time. The others I used were temporary and had not been with Murphy.

Under the organization scheme that Boyle and I worked out, they all proved to be reliable. Each man was provided with a pocket notebook that accounted for their time and material on each job, with two carbons. The original was sent to the accounting office, we held a copy at Pearl Street and the workman held a copy. All new installations were made according to scale plans that I drew and all of the conduits and wires were cut and prepared in advance at our Pearl Street shop. That work kept them busy when they were not on a station job. Also we reduced maintenance costs by giving cash prizes of from one to five dollars each week to operators whose equipment required the least repairs. The Maintenance dropped from 14 to 4 dollars per boat per month.

Mike was the smallest of us. I was next. Mike was small enough but hardly strong enough to handle a one kilowatt motor generator under an operating table. I was just about right for the job and did it on the rush jobs. Little Mike was the big producer on ships antenna repair jobs. Mike xxx had a method - I did not ask what it was. To lower an antenna and keep it where there was room and time for repairs and hoist it was difficult on many ships and on any ship when cargo was being slung from the dock and from lighters on the other side. One day I received a hurry call for a ship's antenna doctor. There was nobody available but Mike who was soldering terminals on wires in the shop room. I told Mike about it and that nobody was due in soon enough to go with him. He said, "I'll fix it. Just slip me a couple of dollars for the mate". He fixed it. After that he got those jobs and always said, "Slip me a couple of dollars for the mate". A mate could supply help and regulate loading.

Romey
Ronny Cleva was the fastest and neatest workmen when it came to installing motor-generators, transformers and wiring. He was not always available because he had other things he wanted to do and he always wanted his pal, Mike Ryan, as his helper. Also he was a tough worker. The ships "Yale" and "Harvard" had Marconi apparatus on them but they wanted it removed and United wireless installed quickly ~~on~~ for a trip to the west coast. One ship was in drydock and the other in water in South Brooklyn. Also we had to install fifty-five storage cells in each boat. All in limited time. I sent for Ronny and turned Romey
Boyle loose at the job of collecting eight or ten extra men. When I arrived at the ships I found the Marconi ten inch coils still in the operating rooms. I called Fred Sammis, Chief Engineer of Marconi. He pulled a characteristic stall on me, saying he would not be able to get them off until the next day. I told him that would do, we would disconnect his instruments and set them out on deck. He said that would be bad as they might be injured. I told him we would cover them if it rained. He had men on the boats to pick them up within an hour after Romey
Ronny and the rest of us had removed them to the deck. T

Those two jobs took 72 hours of continuous work. I was on the job all of the 72 hours but I did not use my muscles for anything but walking and climbing stairs. I collected men and took men out for refreshment at the waterside saloon very frequently. These all night saloons had lunches and three meals a day. We probably used thirty men on those jobs, including longshoremen I hired to hoist and move stuff. Romey
~~Ronny~~ worked sixty hours, getting power leads through bunkers from the engine room and other hard jobs. Others worked from about 8 to 18 hours. Romey
Ronny was good. I think he frequently worked too hard. He died young.

I do not remember all who were on the "Yale" and "Harvard" jobs. Frank Hart and Percy Collison (now Comdr. USNR) worked as long as they

could. Benny Martin, our hunchback operator, helped by handing tools to others. I believe Benny died before the ships sailed later from Staten Island. Both ships were nearly wrecked rounding the Horn. One was wrecked later at Point Conception where some destroyers whose wireless had been serviced several years later under my supervision were also wrecked. It was not our fault in any of these cases. The wireless worked.

John Murphy was surprised that he had lost his job and felt badly about it. He did not blame me because it was evident that I had not tried to get over him and was as surprised as he. I kept him on the jobs he chose. He soon got another place, becoming radio construction and maintenance men for the Standard Oil and xhxxx went to New Orleans. Tom Murphy went with him. Joe Fountain went to the Great Lakes in a United installation job and stayed for the growing wireless on the Lakes. Murphy and all of his gang are dead, I believe, but Henry Kasner. For several years Henry installed spectacular shows for R.C.A. most of the time, I believe under the direction of George Clark. During the second world war, I believe he has been located at Camden.

Before taking over the maintenance work and while trying to find out what it was all about, I was told, among other things, that Murphy's gang was unreliable. I did not know all of the gang then but I had seen enough of Johnny Gregg to feel sure that he was very reliable and so conscientious that he might fall over backwards. Later I found that all of Murphy's men were reliable if you considered their personal circumstances. And Johnny Gregg was so reliable that I feel like calling all of the reliable folks of wireless "The Johnny Greggs".

Gregg supported his widowed mother who died only a short time before Johnny. He never married. He started as an installation and maintenance

man with United Wireless, continued with Marconi of America, Independent Wireless and died while in charge of Radio Marines' stockroom. He could have had more extensive and high sounding jobs but Johnny did not want to take a job that he thought he might not deserve or might not be able to do as well as somebody else. There were a lot of people in wireless like that; operators, clerks, machinists, research men, salesmen (even some stock salesmen, possibly); designers, draftsmen, physicists, teachers, patent lawyers, writers. Some of each in all of the types, grades and classes of people who made wireless. They have not been advertized much but they were the kind of people that the super-advertised people relied upon. Johnny never did anything spectacular but he was good for more than thirty years of our wireless development. While I was in charge of maintenance for United, I insisted that no ships sailing be delayed for wireless installations or repairs and they were not because of Johnny, Mike, Kesner and other reliables that were backing up my sayso and incidentally, they did the work, I did the bossing and talking. I cannot name all of the fine people of that kind who helped make wireless and radio.

Wireless was not entirely developed by people who were spectacular one way or another, good or bad. As wireless services broadened more and more of the work, nearly all of it, was done by people whose names were recorded less and less in published records. Operators were one class of the necessary ancestors of today's radio. They were known of as a class, some who were on ships were known personally by travelers and some became more or less famous because they handled an SOS.

Another class of essential wireless folks were the men who built the wireless stations on ships and shores and maintained them. They did not have doctor's degrees, not even batchelor degrees, but they could, would and did install and maintain stations under conditions that

provided a wide range of degrees of hardships and of needs for ingenuity. I was frequently in very close contact with such work over a period of twenty-five years.

Because the nearby Ward Line was one of our best customers and cheap rent may have helped, Murphy in choosing our location, the location of our combination office, stock room and shop appeared on our letterhead as 192 Pearl Street but that is apparently not now the right number. Also there may be a shift in some of the names on street corners. However, Pearl Street and Fulton seem to run like they used to and intersect at the same places with the same markings on the corner. Starting at Pearl and Fulton, on the next southeast corner south of Fulton Street was a saloon. The next entrance south of the saloon was to a stairway and elevator, both of which served a tobacco warehouse on the second floor, us on the third floor and a plant that thumpingly produced embossed print on the fourth floor. A Spanish restaurant with a seperate entrance occupied the first floor. Workingmen's noonday stews or corn beef and cabbage were available at our corner saloon. By heading east on the north side of the saloon you could follow that sidewalk to Sweets restaurant which was on the corner of South Street and Burlingslip or Fulton Street. Not far from the saloon things ran together, such as John Street seemed to change to Burling Slip at Pearl and Burling Slip seemed to become Fulton at South Street. From that saloon you could go to Fulton Street by heading north or east and you could go to South Street by heading south or east. Pearl Street was crooked too, it started northeast at State Street, passed us going north by east then headed north, staggered westerly, glanced off the Bowery and Chinatown and broke off at Broadway. Those old New York streets followed nature's crooked ways. Even Maiden Lane wasn't straight. But that Pearl Street location contributed to the way the first Standard

Radio Terms and Symbols were prepared and published, also to the pre-meeting dinners of the Institute and to helping keep Doc Deforest from looking through the grids in penitentiary windows.

After finishing his collegiate work, Goldsmith would, in 1910 and 11, come down to Pearl Street and climb the two flights of stairs to my office where in a hard chair he would listen to the elevated trains three feet outside the windows, the ancient freight elevator on his right, the thumps of tobacco bales that were end-over ended on the floor below and the several-a-second thumps of the embossing machines in the print shop above. Once he said the place was noisy. When I finished my work he and I went to a Sweets dining room table on the second floor above the corner of South and Fulton streets or up Pearl for dinner in Chinatown at the Oriental on a second floor by the Bowery. Sweets was in the fish market section that was aromatic like seafood and/or fertilizer. The Oriental restaurant but with ~~xxx~~ in Chinatown/~~xx~~ one side ~~xxx~~ on the Bowery, tried to smell like punk. Goldsmith never criticized the odors. Insofar as taste was concerned he seemed to like anything that others liked. Later he advocated a method of taste reception for wireless code and his friends or enemies suggested that odors might also be used, such as, fish odor for "f", rose for "r", and skunk-onion-skunk for SOS.

It was due to the location of our United Wireless Maintenance place at Pearl near Burling Slip that caused Goldsmith and me to make Sweets a habit. We were the 1910 neucleus that became a crowd at Sweets in 1913. Committees and board meetings started there and finished in the Radio Inspection office at the Custom House or maybe in John Hays Hammonds board room. Institute meetings were preceded by food and some beer at Sweets and were continued with papers and some

discussion at Columbia.

Looking out our shop window at my first inspection, I saw some frames on a roof that were evidently so pivoted that they could be turned to face the sun. I thought they were blue printing frames at first. Later it occurred to me that they were not blue print frames. I climbed out on the roof and examined them. Something under the glass was apparently made up of many little units. The entrance to that building was on Burling Slip. I went around there and found an office where they were trying to sell stock in a company that produced electricity from the sun's rays. Those things on the roof were probably thermocouples connected to a voltmeter or possibly to a nearly frictionless motor. From what I saw and heard, I thought this was about the same group that had been promoting the Deforest Radio Telephone.

Usually on Saturday afternoon we all adjourned to the corner saloon for beer at about two and then went home, sometimes Boyle and I went back upstairs to get some things ready for Monday. One Saturday Boyle and I were leaving at a later hour in the afternoon than usual. On the second floor landing I smelled smoke. Half way to the first floor I did not smell it. I told Boyle and went back to the second floor, heard crackling, peeked through a hole in the wall and saw a little fire. I yelled for Boyle to run around the corner to the fire station. I went to the door of the loft, kicked out the glass in the door and went in. I pulled a bale or two of tobacco away and the burning bale into the middle of the floor and kicked out the fire before the firemen arrived. As nearly as I could guess, somebody thought everybody was out of the building and had dropped fire through the hole in the wall. A day or two later the cigar maker across the street said to me, "Why the hell didn't you let it burn?" I said we did not want our place burned out. He said "Well you have insurance, don't cha?" I guess he

owned the tobacco.

Boyle who said he had been educated to be a priest but had become a non-sectarian wireless operator, looked so much like a priest, pink and round, that some of the boys called "Father Boyle", remained in the Pearl Street place, wrote my letters, kept books and stock, answered the phone and chewed the rag with the gang, operators, solicitors, truckmen, et al. We had no female visitors in person. Dolly at 42 Broadway in the accounting section telephoned frequently. Boyle liked to talk to her. So did I. I guess everybody did. She later married Henry Hughes, the Chief operator and traffic superintendent. I assume Dolly is still living. I believe Henry, who left wireless for Western Union when United was broken by its rivals through Federal prosecution, died in about 1935.

Fitzpatric told me Billy Boyle died while I was in the northwest and they had him cremated. They moved from office to office with the urn of ashes and remarked occasionally and more occasionally as time went on that Boyle's urn was rather depressing. Fitzpatric said he noticed one day that Boyle was no longer on the mantel and he did not ask when or where Boyle had gone. Fitzpatric was one of my early operator friends in United Wireless and was one of those who brought the Veteran Wireless Operators Association into being. Fitz died about two years ago.

To see that no vessel was delayed for wireless I went to some installation jobs and remained until they were completed because I could get help and material in an emergency that the others of our gang could not get or might hesitate to ask for. In such cases I usually left Johnny Gregg and Kasner on the job at Pearl Street to watch maintenance. Most of the men used on the rush installation jobs were

extras. Longshoremen, operators, operators who were studying to become engineers and water front bar flies. A bar-fly could do better at yanking a BX cable through holds and motor generators from deck to deck than a lot of superior-in-the-mind people could do, drunk or sober.

While we were hustling to keep up with an increasing number of new installations, action was begun against United officers. I found afterward that I was questioned by Department of Justice agents. One was a civilian employee of the army who came to see me ostensibly for information about apparatus that the army might want to buy. The army had bought a portable outfit that I had demonstrated to them on the old Sheepshead Bay race track and had me make an estimate for some equipment at the Bedloe's Island station. The other investigator claimed to be the representative of an express company that wanted our business and who liked to loaf in our office and talk to Boyle and me.

At this time my title was General Superintendent of Construction and Maintenance and I had to look after work outside of New York. February 2 to 6 inclusive, my time was taken up at Baltimore and Sparrows Point, Maryland and in transit. We had stations at those points. When I reached my desk at 192 Pearl Street on February 7, 1911, I found a subpoena for U.S.Grand Jury, from the U.S,Circuit Court, Southern District of New York to appear on February 8 at 10:30 in the forenoon, to tell what I knew of an alleged violation of the statutes of the U. S. by C.C.Wilson. I apparently was excused because the subpoena had been delivered when I was away and I did not know about it. The prosecution did not call me again but the defense did.

Isaacs got a good many United Wireless employees in 1911 and 1912. I was the first of the United Wireless employees that the Marconi W.T. Co. of America hired. United had been thrown into receivership. Why

not? - We equipped ships with receivers. Courts were generous with receivers. Judges in all the districts must have appointed at least one receiver. I was told that I was fired by the twenty-sixth receiver before he took the train to report to a judge in Maine. We had a rush ship installation job that I had been on for more than a day and night. On my way from the ship to Pearl Street I stopped at the 42 Broadway office where they told me the receiver had fired me effective at four P.M. that day because I was the highest paid United employee in New York City and he wanted to tell the judge he had reduced expenses.

CHAPTER XIX

ISAACS TO ISAACS TO LLOYD GEORGE

On June 1st, 1910 I was directed by the Executive Committee of United to take charge of construction in New York City and vicinity, taking the place of what my letter of appointment called the Constructive Committee and the Superintendent of Construction. On September 21, 1911, Seldon Bacon, Receiver in Bankruptcy of the United Wireless, discharged me before leaving to report to Judge Hale, saying "it is simply a matter of economy" and that he had amalgamated the two departments -- 192 Pearl Streets, and the factory, Jersey City. Even if he had known wireless and the company by experience he could not have saved it. Telling the judge that he was letting higher paid people go and getting separated departments under one roof probably made him sound good to the judge. In New Jersey the property had previously been under another receiver. But as the company was incorporated under Maine laws, the various in-and-out receivers had to report to Judge Hale in Maine.

The United was pickings for lawyers, particularly for defense lawyers and the kind who get to be receivers. The United office said Bacon was the twenty-sixth receiver. Wilson, Bogart, Parker, Tompkins, Butler and Dibol[illegible] of United Wireless were prosecuted by District Attorney Wise before U. S. Judge Martin, convicted and sentenced late in May, 1911. Assistant District Attorney Stephenson who took part in this case was the prominent prosecutor of Deforest about two years later. The court was informed that I was busy equipping ships. By letter District Attorney Wise arranged that I would not be required to be in court until necessary. I was not called by the prosecution.

I was called by the defense in the fourth week of the trial, May 22, 1911. I produced tables of distances our operators had attained

In 1916 New York papers got a lot of stories about the shadier side of wireless

March 7 – Sheriffs sale of the effects of the Radio Telephone Co. was reported. This was one of a series of companies with which DeForest was associated.

March 16 – Head line: "Stock promoter Monroe to Prison for 3 years". It seems that he had surpassed most wireless stock salesmen, in that he did not sell just one stock but a variety of stocks including Marconi and he saw to it that none of them could pay in the cases where he applied this specialty. His specialty was to take the buyers money and fail to give a stock certificate.

The month of May papers repeatedly reported the trials of the United Wireless officers. They were accused of several misrepresentations and some were found guilty. Fines for some fines and prison for others.

with United Wireless equipment. They were not admitted because the operators who sent and the operators who received the messages were not present. Defense said it would call the operators. They probably did not get many, as most of the operators were at sea.

The defense had several attorneys. Mr. King represented the defense, back by the famous attorneys, W. Bourke Cockran and John B. Stanchfield. Cockran could look like he was crying when that might help with a jury. Stanchfield described Wilson as "an uneducated, illiterate man now sixty-seven years old who had not had more than three month's schooling in his life".

The pre-trial Grand Jury on February 14, 1911 took my file of telegraph and letter correspondence with C. C. Wilson, relating to Pacific coast ~~statuses~~ stations. In his letter of June 18, 1907, he wanted me to prepare for a chain of stations from Alaska to Mexico with which we would cooperate with the government. Our stations to be located where we would not interfere with the government and they would take messages from us and we from them. The company secretary, Cloyd Marshal, was to keep in close touch with the government.

I made pencilled briefs of forty-six letters and telegrams that Wilson and I exchanged while I was on the Pacific Coast. From these it seems that Wilson complained that I talked to agents in a way that discouraged them. It seems agents reported I had said our five kilowatt set was no better than our two. Maybe I did because the sets larger than two broke down frequently while the twos and ones were very reliable. Also I had said the Wyoming-Colorado-Texas system of stations did not pay which was true and Wilson admitted it but blamed that claim on the Deforest management. He told me not to say anything to others about those things but he and I argued back and forth about locating some

stations that I said would not pay any more than the Colorado stations did. I favored the Astoria-Oregon station to work with ships we hoped to get, except that it had to be near the Navy Northhead station. Vice-president Bogart agreed with me about the stations I said would not pay and Secretary Marshal said the government would object to our going to Astoria. Wilson and those officers were in New York. We finally got started at Astoria, apparently with government consent.

Parker acted like he wanted to stick a station anyplace it would help his agents sell stock. Parker was the one that told Wilson I answered questions in ways that did not help in the sale of stock but that Cooper had come to him and asked him what he should say about things. In an earlier letter to me Wilson complained that Cooper had been sent to Los Angeles and "got the stock selling fever" there. He wanted Cooper to locate sites that we could get free. I was bad because I didn't help stock sales and Cooper was bad because he tried to sell stock.

I suspect Vice-president Bogart caused those letters and telegrams to be subpoenaed from me because one or two of them showed that he argued against putting stations where they would not pay while a good many indicated that Parker's main thought was to sell stock. Bogart turned states evidence and the prosecutor said he helped by finding correspondence files. They let Bogart off with a $2,500 fine. Bogart was an ex-wire telegraph official who knew what localities had or had not paid in wire service.

In commenting on the fact that the Wyoming-Colorado-Texas series of stations did not pay, Wilson said many wire line stations did not pay (which was true) and that his idea was that wireless stations could be made to pay by starting with some big city like Chicago and gradually working out. He and many others continued to believe that there was some simple way for

making overland wireless pay in competition with wire lines, but he believed we should get it on ships, too, and I solicited some steamship companies on the west coast while working on shore stations. He got Captain McGoldrick to solicit steamship companies in San Francisco and rapidly extended his solicitors to get ship business. The idea of overland wireless service never died and after many fiascos has found places as other methods and more frequencies have been exploited. Now maybe you can soon use a set of petite waves for messages that big static doesn't bother but that mountains stop, by bouncing them off the moon, when the moon is on your side, say from Spuyten Duyvil, New York to Los Angeles, if you get a suitable license. The moon doesn't care - it promotes some marriage licenses.

According to the stories I heard from people in the New York offices, Parker soon got his way on the Pacific coast, particularly in the northwest. Sentiment I contacted in New York was for ships and only such shore stations as necessary for communication with the ships. The factory at Hudson and Sussex Streets in Jersey City was the company's only factory and was controlled by the New York office through Secretary Marshall and Shop Superintendent Babcock, who was listed as Scientific Director, presumably because that title was left lying around when Deforest moved out of United.

The Jersey City factory apparently did not want to build any more transmitters and receivers than were needed for ships and ship-serving stations. Their manufacturing was gauged to honoring ~~calls~~ such orders and not much more. Parker hurdled that obstacle. He hired N.O.Nelson to superintend a factory in Seattle. They built duplicates of what were built in the regular United Wireless factory in Jersey City. Oddly, I had contributed to Nelson's knowledge of how to do that. Most any electric shop could have taken United apparatus and produced duplicates of everything but

the transformers and high voltage condensers.

In about 1904 while trying to see what Ashley could or would do with his wireless telephone that I had worked on, I was in Chicago. I thought I might want to stay there and got a job with Nelson's company to build X-ray coils. N. O. Nelson had been building static machines for X-rays using micanite plates in place of glass but felt that induction coils would replace his products. I spent a week or two telling him what I knew about coils and returned to Denver. Nelson learned the tricks of making such coils and the wireless open core transformers were such coils. The high voltage condensers were Leyden jars similar to those Nelson had used with his static machines, except that we used a closer fitting carbon coating electroplated with copper on the jars rather than the lead foil he had pasted on his jars.

By about 1909 Parker had apparently reached the point where he could take his commission and use the other receipts from the stock sales to build apparatus and stations, in the northwest, that would help sell stock for more commission to George and more stations that would help funnel more commissions to George. The printed lists of where the stations were located are hard to judge for accuracy for they varied. In some cases where a station for serving ships might be useful, two stations were located. In other cases the locations of the stations seemingly added nothing to existing communications. Some listed stations may have only been an outfit attached to a wire hoisted on a convenient flagpole for a few days.

P. C. Kullman & Co. gave a list of some more companies I have not mentioned, that were said to have sold wireless stocks, including the following:

Collins Wireless Telephone Co.
Collins Marine Wireless Telephone Co.
Colling Northwestern Wireless Telephone & Telegraph Co.
Collins Pacific W. T. & T. Co.
New York State W. T. & T. Co.
Southwestern W. T. & T. Co.
American Patent Rights Corporation
Atlantic Radio Co.
Commercial Radio Co.
Central Wireless Co.
Continental Wireless Construction Co.
Great Lakes Radio Telephone Co.
North American Radio Co.
North American Wireless Corporation
Pacific Radio Co.
The Radio Telephone Co.
Universal Wirdess Corporation

I do not recall that I heard of any wireless service being rendered by those companies. I heard a great deal about stock selling by Collins companies and believe some of the companies in this list were affiliated with the Deforest Radio Telephone Co. Collins and his associates and Deforest and his associates were prosecuted later. Some were convicted.

I find that in November 1914, in connection with testimony in a case of Wolcott versus the National Electric Signaling Company, defendent and Reginald A. Fessenden, as intervener, I testified that I could recall about fifty overland stations in the U.S. that had been unprofitable and abandoned. That was a low figure, some of the stations did not exist long enough to be noticeable. Fessenden had promoted two that came under that catagory and about three others for the Weather Bureau that were probably even less useful but not competing with wire lines.

I went to the Marconi Company not to get away from stock selling but to stay in wireless and to support one wife, two daughters and myself. I did not get away from stock selling environment in that company. They sold a lot of stock and attained a high water mark in international wireless stock scandals. I was not thinking about the stock selling past, present or future of the Marconi Companies when I asked Mr. Sammis for a job with the Marconi Wireless Telegraph Company of America. He took me

on as Assistant Chief Engineer. I did not think about the stock selling side of the company for quite a while. The office occupied by Mr. Bottomley, Secretary of the company, was next to the office occupied by Sammis. So frequently did I see and hear a man wrangling with Bottomley that I asked Sammis who he was. He said P. C. Kullman. To the best of my knowledge Kullman was a broker who was continually trying to get people to buy some brand of wireless stock.

While all of the stock selling events of the Marconi companies that I am talking about here did not occur all at once, I will try to put them together in this one place instead of spotting them along according to the times they occurred. Apparently the boss of all the Marconi companies was Godfrey C. Isaacs in London, while in the U. S. Bottomley was the active sub-boss that represented the British parent company. John Bottomley was born in Belfast in 1848 and came to the U.S. in 1880. He was a nephew of Lord Kelvin and had been connected with legal practice before he became associated with the Marconi company. I gathered from the office remarks that the American subsidiary of the British company did not have money enough to buy United or even to expand slightly but Isaacs had told Bottomley to go ahead with plans and some increased personnel, for which the parent company would increase their allowance. I was one of the first few of the added personnel.

The company office was in Lords court building at 27 William Street, another of lower New York's crooked streets a little west of Pearl Street. There were four rooms in the offices and six people. Bottomley, Sammis, De Sousa and Miss Horton with two other girls. Bottomley was Secretary and worked most of the time at a high bookkeeper's desk on big books. DeSousa was traffic manager with other duties. Miss Horton and her assistants were stenographers or typists and file clerks. Sammis was Chief Engineer and apparently did a lot of things that would now go with

other titles. His desk, most of the chairs and part of the floor were covered by papers relating to the various things he had been doing. When discussing a subject he could reach out, lift up maybe papers a foot high and extract a letter or catalog pertaining to the subject. He could give a favorable answer to most any question whether or not the answer was favorable or whether or not he knew the answer. When he gave such answers over the phone he would turn to look at me and wink. William Walter Bradfield, who had started with the "Wireless Telegraph and Signal Co., Ltd." in September 1897, had come to the U.S. in 1902 to be Chief Engineer of the Marconi W. T. Co. of America. After his return to England in 1908, Sammis took over the title. The local company had been hard put to it for cash. All three men had apparently formed a habit of scheming every way to save a penny. They spent enough to look like sedate, church deacon-like, important gentlemen.

Part of the time I was at 27 William Street and part at 29 Cliff Street, a straight but very short street. That was the factory as they called it. Only a little over a short block from where I had been with United at 198 Pearl.

Opposition to the Wireless Institute occurred before and after it was formed and to its successor, the Institute of Radio Engineers. Sammis did not say anything to me against it but when I had asked him to join a year or so earlier, he said he was too busy. Mr. Bottomley gradually made remarks that indicated disapproval on his part and that since I was now under him it wasn't cricket on my part if I continued working for the Institute. Bottomley was a kindly old soul who wanted to be kind and protective to his subordinates but he thought it was wrong for them to exchange ideas very much and certainly they should not exchange ideas with employees of other organizations employees, either commercial or government employees. Also only the right people should read a paper,

speak or lecture before any society or institute.

Bottomley said he lectured occasionally before technical societies. Apparently he thought the right lecture was one wherein a gentleman officer of a society made a properly pre-arranged call upon the right officer inaa company and asked for a lecture. After an exchange of compliments an arrangement might be made whereby a suitable elderly representative of the company would meet with a few gentlemen at a club with good cuisine, decorum, soft chairs and preferably with monocles. After which the speaker should be escorted to and introduced on a suitable dais with compliments. Also there should be no discussion or embarrassing questions. Young upstarts and other objectionable people should be excluded. Mr. Bottomley had given a lecture before an electrical society. I had not heard it but asked an electrical man who had. He said the lecture modestly said that Bottomley was honored in being permitted to speak before the wonderful society and was honored to represent his company that was serving the world with wireless, the world's greatest invention, made by the world's greatest inventor, Signor Marconi, and with repetition of some accounts that had appeared in papers and added prophecies. I had heard of a lot of lectures of that type, some of them referred to other companies and lauded other inventors.

Bottomley acted like some of the U. S. boys mystified him. They did not behave like royalty or English gentlemen and they did not show any proper sense of inferiority, yet they seemed to do things well and get along. His attitudes toward many things were equally mystifying to me. One day we were talking about chicken. I said liver was the part of the chicken I liked best and asked him what part he liked best. After an embarrassed, nervous hesitation, he said, "The part that goes over the fence last". I liked that part too, but why be embarrassed about it. They called it Jacob's nose where I was raised.

Bottomley prepared a statement that he wished to make before a congressionnl committee. Fred Sammis was away and as I was assistant Chief Engineer, Bottomley referred the draft of his talk to me. In it he said the Marconi Company was not bothered by interference, that their receivers cut out interference to receive desired signals only. This was when Congress was trying to provide a law that would minimize interference with radio signals, particularly distress signals from ships. I told Bottomley that Marconi's receivers would not cut out interference and nobody had a receiver that would, under existing conditions. He did not like that. I heard later that he went ahead and told the Congressional committee that the wonderful Marconi receivers eliminated the interferences. Marconi had talked like that.

Marconi and the representatives of the companies he was connected with, had made such statements over and over since 1899 when Marconi personally demonstrated that he could not cut out interference before representatives of the Navy, and other employees of Marconi companies had repeated those demonstrations up to date.

Fessenden had demonstrated that he could not cut out such interference also as early as 1902 after he had insisted that he could.

In 1905 representatives of the American Deforest Company insisted that Deforest's receivers would cut out such interference. Shortly afterward I asked Deforest about it. His answer was that the regular company receivers could not do it but he had receivers that would.

All of us who had designed receivers knew that we could not tune out interference of the kind produced by Marconi and amateur plain-antenna transmitters or of better transmitters when they were too close, too powerful or on a wave length that was too near that of the station we wanted to receive on. We were the kind of people who wanted an

Institute. Bottomley was one of the kind who did not want us to have an Institute!

Kopperl's statement that we of United Wireless could cut out interference because "our waves travelled 186,000 miles per second and how the hell could anybody else's wave catch 'em" was as good as what Marconi and Fessenden claimed. Kopperl was fifty-fifty Irish and Jewish, lawyer promotor, fixer, born in Texas. If you asked him what he really knew about the technical side of wireless he said "nothing". If you asked him if he always told the truth he would inhale cigarette smoke, squint his eyes, grin and say "Let's have a drink".

A printed letter to the stockholders of the Marconi W. T. Co. of America, dated 27 William Street, New York, March 26, 1912, and signed by order, J. Bottomley, Secretary, was sent out with notice calling a special meeting of the stockholders to increase the capital of the company. It includes the following statements: "--- our colleagues from London, Com. Guglielmo Marconi and Mr. Godfrey C. Isaacs, were requested to visit New York to confer with and assist us---." "In order to assure and cement the solidarity of the patent position of our company, we commenced an action, under the guidance and direction of the parent company, against the United Wireless Telegraph Company, This has ended in that company admitting infringement of our patents and our obtaining judgment against them." "Marconi's Wireless Telegraph Company, Ltd. of London has purchased, subject to the sanction of the Court, the whole of the tangible assets of the United Wireless Telegraph Company in bankruptcy. These assets, together with very valuable patents for wireless telegraphy - those of Sir Oliver Lodge - the parent company desires to pass over to this company and at the same time join us in the program of extensive development which they have foreshadowed for us."

The letter also goes on to say the program would include a powerful station near New York to provide "telegraphic service between the old world and the new that will be equal, both in accuracy and speed, to that of any existing service". Also the program provides for a high power station near New York to work toward South America "though perhaps Cuba". "The new conditions under which the Company will exist will enable it to enter into a dividend earning stage from the very moment the arrangements above referred to will have been completed."

During years of high-hatted attempts, the Marconi Company had failed to get control of wireless in the U. S. on the strength of the alleged Marconi inventions because he had not invented wireless or a sufficiently essential part of it. But when United Wireless was an almost dead cripple they claimed it admitted infringement of their patents and their parent company bought United, subject to sanction of the court, to sell back to the American company along with some Lodge patents that they claimed were really good and some high-power equipment that was supposed to work across the Atlantic and to distant points south. That meant a lot more stock was to be sold to buy the United, some patents of questionable value and some high power stations of a type that had not worked well.

On the 18th day of April, 1912, the authorized capital stock of the Marconi Wireless Telegraph Company of America was increased from $1,662,500 to $10,000,000, according to a printed letter signed by John Bottomley, Secretary.

On June 11, 1912, TheWireless Liquidating Company of New York was incorporated with a capital of $1,700,000. On the announcement is a note saying the company was formed to sell United Wireless to the Marconi Co. and divide what is left among the re-organization of United stockholders.

United stockholders gave fifty cents with each share of stock and received shares in the Liquidating Co. A share of that company was exchangeable for part of a Marconi share. Kullman promoted buying and selling of these shares to get blocks of shares that would exchange for a whole number of Marconi shares.

Godfrey Isaaks was trying to put over a British contract for the parent Company. Since the Marconi apparatus offered the British seemed to competitors and others to be so inferior to the apparatus of two competitors, there was a clamor for investigations to find if government officers were getting something for favoring Issaks, Marconi and the company. Stories of how both American and British shares were exploited were published for more than a year.

The Marconi Company's stock selling schemes did not put any officers of the American sub-company in prison but they almost caused two members of the British cabinet to be kicked out. The following are parts of newspaper stories: "Sir Rufus Issaks, Attorney-General and perhaps the most skilled cross-examiner at theEnglish bar, had a taste of his own medicine today---". "Godfrey Isaaks, brother of the Attorney-General, managed the campaign in the stock." "Sir Rufus said today that when his brother returned from America in 1911, he told him he had set him down for quite a lot of Marconi shares..." "Of his shares, he said, he sold 1,000 to Lloyd George, Chancellor of the Exchequer, and 1,000 to the Master of Elibank, at $10." Several stories were told in newspapers about how much Lloyd George made. One story said he made over three thousand dollars in three days. One report said, "Mr. Lloyd George, while admitting that he made a profit of about $500 on his first sale of wireless shares, added lugubriously, "I wish I had left it there". This was brought out mainly in European papers, in different languages, with some accounts in U. S. publications.

According to the May 1, 1913, Telephone and Telegraph Age (~~xxxx~~) "Mr. Godfrey Isaaks, managing director of the Marconi Wireless Telegraph Company, London, in his testimony before the Parliamentary wireless investigating committee on April 17, stated that the assets of the United Wireless Telegraph Company (of America) had been bought by the British Marconi Company for $750,000 and sold to the American Marconi Company for $1,400,000 in shares".

An editorial in the Electrician, London, defending Marconi and trying to separate him personally from the scandals that resulted from the deals in and with Marconi stocks, says that he has an engaging personality. My contacts with Marconi were few - a few times at patent trials sessions, once in his rooms at a New York hotel, once at a dinner and once on the speakers platform before an Institute of Radio Engineers meeting. I was impressed by his engaging personality on all of those occasions, including the patent suits where the atmosphere was antagonistic and at the IRE meeting where he was pushed around by a mob of autograph seekers.

CHAPTER XX

29 CLIFF STREET

The Marconi W. T. Co. of America had a shop and stock room in a loft at the southwest corner of Fulton and Cliff Streets. We entered at 29 Cliff and were elevated on Monday mornings by a cockeyed pilot. He greeted us with a cheerful "good morning" and one eye. The other eye would be aimless or aimed at something to your right or left. By evening he was usually able to use both eyes on you, at the same time. He said the independent behaviors of his eyes were due to close application in the game of poker from Saturday night to Monday morning, aided by stimulants. Just how he could be so cheerful with such a hangover, I don't know. I grinned each time I saw him. He had nothing to worry about. All he had to do was work about sixty hours a week handling freight and running the elevator for two nights and a day of cards and drinks and such room rent, board and clothing that could not be avoided. He had not compromised himself by diverting from single blessedness.

The shop, like the William Street office, was small compared to the United Wireless factories and shops. The whole Marconi W.T. Co. of America had been up to about that time very little more than a representative office and local servicing organization for the English company and for ships that came from Europe. Nearly all of the installation and servicing had been done in Europe. European companies did not want to pay something to an American company, if they could avoid it.

Sammis had looked upon the sale of experimental apparatus to schools and amateurs as a likely field and as something to keep his shop men busy between jobs on ships that might need repairs in New York. Although he had that idea for some time, the English parent company had not given their consent until shortly xfxm before I joined the company.

We had model apparatus of the amateur type made up to add to their regular commercial apparatus. Bunnel, Gernsbach, Manhattan Electric Supply Co. and others had been selling experimental wireless apparatus for years. I believe Bunnel sold wireless receivers for experiments before any wireless company was incorporated in the U.S. In 1900 I used a coherer receiver that Bunnel sold to Ohio State University. It was made by the United States Electric Co. and I believe had been advertised for some time by Bunnel.

Sammis evidently had looked forward to having a good time running the Experimental Apparatus Department as a side issue, but with the imminent expansion that the failure of United Wireless was expected to bring about, he was busy in far more things than he could handle, so he shifted that to me. The shop facilities and personnel were not suitable for turning out amateur devices at prices that could compete with others, if the cost of their time was charged to those items. Bottomley thought and to some extent, Sammis thought, the Marconi name would sell the equipment. But among people who knew wireless, the Marconi commercial instruments were considered inferior to other makes of commercial instruments, so why expect much from the amateur equipment, and if they looked at the devices or catalog pictures they could see the instruments were no better than they could themselves build or buy for less money.

So that I might attend to some things in the shop, the show room of the Experimental Apparatus Department was located opposite the elevator but so arranged that a customer could not look into or walk into the shop. At my desk in the show room I could look through the door back of me into the shop and if in the shop, I could know when anybody came into the show room. The show room was chiefly a sales counter about a foot wide with shelves under it and back of it. What we had for sale were lined up on a back shelf where a visitor could see them but could

not reach them. Whoever was back of the counter had to set them out for handling. Our counter and shelves were about a foot wide and ten feet long. Altogether, including the space for customers, the floor space was about ten by fifteen. It was big enough. Once I believe we had three customers at the same time. It cost twenty dollars to put in the counter and shelving and paint. We spent $562.35 for magazine advertising between Oct. 1, 1911 and July 1, 1913.

I made up a dummy loose leaf catalog of what we had to sell and took it to printers. The prices were higher than Sammis said he had estimated. I guessed that he had submitted an estimate on the cost of this new department to their English backers. Sammis took me around to an old printer he knew and who seemed to need work. He gave the old fellow a big talk about wonderful prospects of the Marconi Co. in this venture and in the taking over of the United Wireless business which would bring more printing jobs. The old fellow gave us a price that was much lower than the others.

Most of the orders we received came through the mail. Occasionally amateurs would drop in to look us over. Some of them told stories about how they or others had heard very distant stations by using an "Audion". Butcher who had been teaching prospective wireless operators for United Wireless in a little steampipe room on 42 Broadway, and at the east side YMCA and later at Cliff Street for the Marconi Co., kept telling me of stories he heard from amateurs about the wonderful distances they reached with "audions". None of the professional wireless folks I contacted claimed they had obtained any such results. We thought those amateurs were just a group of liars that were extraordinary even in wireless. But later I came to the conclusion that the older, more careful professional wireless men had not achieved such results because they had connected up the "audion" right, while the amateurs had connected it wrong

in so many ways that several had used a wrong way that was better than the orthodox or supposedly right way.

Butcher was one of the wireless people who changed their names. His name was, as I first saw it, Elmer E. Butcher. Later in a magazine it was Butcher, E.E. and years later it was E. E. Bucher, he jettisoned the "t". In some articles I was asked to write, but did not want to write, I used the name "E. N. Nie" - my middle name was broken and altered to make that one.

Our first sale was to Charles A. LeQuesne, Jr., 1788 Brooklyn Ave., Brooklyn, N. Y. He came in on December 4, 1911 and bought a Fleming valve with base over the counter for $5.00. Fifty cents off for being first. He was one of the boys who attended Wireless Institute meetings. All sales were recorded in duplicate on an order form which said the device could not be used for commercial purposes, and both were signed by the purchaser. One order was retained by the auditor and the receipted copy was returned to me when I gave him the money. I kept about a hundred of those copies. They show we sold more valves than anything else and they were frequently broken in transit or burned out and had to be replaced.

We listed twenty-eight items, enough to make transmitters and receivers combined in several ways. We listed wave meters and decremeters and books. But other people listed equipment that would do better for the price. Nobody else listed Fleming valves and magnetic detectors but crystal detectors were better and cheaper. We sold more Fleming valves than any other item, probably because they only cost about $3.50 with socket and because some of the buyers may have thought they worked like an audion.

The airship "Akron" tried to cross the Atlantic from the U. S. early

in 1918. After wandering east, northerly and southerly, she came down between New York and Bermuda. Jack Irwin, wireless operator on the "Akron", left his duffel with me before he left on the "Akron" and after he returned. I put his stuff under the counter of the Experimental Apparatus Department. The "Akron's" effort was an experiment. Jack was the kind of boy who would go in for such a dangerous experiment. Jack rescued the hairbrush from the "Akron". It was the only hairbrush the crew had. For that trip they did not need a hairbrush unless they wanted to slick up for the mermaids they might meet in Davy Jones' locker. Jack gave me the hairbrush. I am looking at it while writing this. Data about it is on the back. A picture of the "Akron" is on its bristles. I could not brush my hair with it if I had hair worth brushing. That brush rests beside a mast-band of the Roosevelt that Captain Bartlett mastered to take Peary near the North Pole. We, in United, equipped that vessel with the ~~three-coil~~ wireless after it returned from Peary's trip to the Pole. Arbuckle (the coffee man) had Teddy Roosevelt's namesake changed, removing one mast to make her a salvage ship.

Jack Brennan was the Cliff Street shop foreman. Klinschneider did the finer mechanical jobs in the careful slow German manner. Ran worked on the electrical and mechanical jobs. There were two other employees whose names I don't remember. A Mr. Smith was a purchasing agent for the company and spent some time at the shop trying to find out what was needed.

The company did not know reasonably well what the items they made cost them or what they should carry in stock. Now that there were more things to make, they needed a system that would show stock and individual manufacturing costs. Mr. Bottomley asked me to submit a system to him. I guess he had asked Sammis to do it but Sammis was far from systematic or orderly and he was trying to do too many things as it was. I submitted

a system to Mr. Bottomley on Jan. 15, 1912, based on my knowledge of their needs and facilities and the order systems advocated by people who made filing cards, blanks and cases. I guess it did some good. When I went there the benches were cluttered with parts that were left over from different jobs. Workmen had to push parts aside to get room for the present job. After I submitted my recommendations the work benches cleared up and the stockroom was closed enough so everybody could not go in and pick up whatever seemed to fit their needs. Both Brennan and Sammis probably were against the job order system, but they did not say anything to me about it.

As a shop for repairing Marconi apparatus that shop fit in with Marconi practices but for manufacturing it was very poor. They made high voltage condensers consisting of lead foil on sheets of glass immersed in oil. Those condensers were not as good as the copper plated Leyden jar condensers used by United. As I had been making mica condensers for about ten years, some of which had been for high surge voltages, I tried to design a mica condenser that would stand as high wireless service voltage as a copper plated jar. I succeeded but when I estimated the cost of manufacturing it there, the cost was about ten times as great as the cost of a United copper plated jar.

In the back room, where incoming and outgoing packages rested, was a place to wash up, a toilet and a space for research and development occupied largely by a long table and the researcher or developer or tester or designer or genius or wizard or the highbrow in the backroom.

When I arrived, J. Albert Proctor was working in that space on transformers. The American Marconi Company did not have satisfactory wireless transformers. When they wanted to get more power, they connected the primaries of two ten inch induction coils in series with the second-

aries in parallel and applied alternating current to the primaries through a choke coil. Proctor was trying to work out some one and two kilowatt transformers for them. Proctor was from Boston. I did not have much to do with his work but we had a mutual friend in Pickard with the result that we teamed up at lunch time and on extra-curricular wireless.

Sammis made a trip to the Pacific coast. Before he left Proctor had two sizes of transformers made and in stock. Transformers that drew one and two kilowatts of power and they were rated on their name-plates as one and two kilowatt transformers. Sammis telegraphed Bottomley ordering some equipment for the west coast, including transformers, and said tell Marriott to have the one kilowatt transformer plates changed to one and a half and the two's to three. I showed the telegram to Proctor but said I would not tell anybody to mark up transformers any higher than the wattmeter indicated. That had been a standard wireless transformer rating method for about nine years. Proctor handled the shipment of the transformers and did not boost their nameplate markings.

Somebody in the William Street office mentioned Davey Sarnoff. They said he was a Jew boy from the old country whom they had hired as an office boy but who got the fever to be an operator and practiced code until he was an operator. He was given an operating job at Siasconset, Mass. and later in New York. We had some Jew boy operators in United. We thought they would drop that and get into drygoods or some kind of banking business. The first I recall talking to Davey, he was with Proctor. Davey had contracted the I-want-to-be-a-wireless engineer fever. He was still an operator but was making the acquaintance of those engaged in wireless engineering. Of those Proctor was nearest his age and had been an operator. He frequently joined Proctor

and me. We joined him once or twice at the station on Wanamaker's store, where he operated. Davey hung around and tried to be of assistance to people he thought could help him get what he wanted. He was noticeably clever at finding ways to be so helpful.

Proctor went back to Boston, joining Pickard in the designing of transmitters for the Wireless Specialty Co. that had been taken over by the United Fruit Co. interests. They were to build equipment for United Fruit and others. Later when their new company came nearer to the point of producing complete stations, it was planned that I would join them but the nearest I came to that was to go on a vacation trip with Pickard and Proctor at Poland Springs, Maine where we consumed blueberries, a grain breakfast food, rolls, ham, fried eggs, wheat flapjacks, maple syrup, pie, coffee with cream and sugar followed by a morning of cigars, walking and sightseeing. Outside of a bellyache everything worked out as planned for that trip except that Proctor tried to make his car climb a steep side-road grade and stripped his differential. On my way back to Brooklyn I had to get him another in Boston and ship it to him so he could ride the car home.

With the imminent taking over of much of the business of United Wireless, more and more personnel were added to Marconi of America. Weagant, Hallberg and Chadbourne came over from the National Electric Signaling Co. They brought a lot of receiver designs. Weagant took over the design of transformers that Proctor had been on. What they wanted to do was to make a transmitter for ship service that was as good or better than the Telefunken five hundred cycle quench gap transmitter. The simplest way might have been to steal a Telefunken generator and transformer but they tried to get there by figuring and experimenting. Stealing would not have been easy because those things were, with a few exceptions, only at German stations and navy stations, ship and shore.

possibly there were some on tied-up private yachts that could have been borrowed, examined and returned. Those Telefunken transmitters were almost unbelievably good compared to monstrocities that the British parent Marconi Company made. A year or more later I tested a half kilowatt Telefunken transmitter on a ship and then went over to nearby ship and tested a ten kilowatt British Marconi transmitter. The Marconi transmitter was so large that a special room was provided for it! The German transmitter was so small that it was installed under, on and above the operating table in a way that did not take usable table space. The little one delivered about twice as much power to antenna as the big one delivered. The power delivered to the antenna was what counted for carrying messages. Those of us who were trying to [illegible] find a truthful power rating were trying to measure the power delivered to the ether by measuring the power in the antenna. Institute people were working along such lines.

There was strong resentment in the American Company against Isaacs who seemed to be bent on bossing everybody and everything and making the American Company give up the cash it had collected from the big stock sale American put over. The resentment spread from #7 William Street after it became apparent that Isaacs was trying to make the American Co. buy equipment for a New York station from the British Co. and particularly after it looked like he was going to try to force the American Co. to pay Britishers to come to America to boss Americans. Then the William St. office gave copies of Isaacs cablegrams to the U.S. boys the American Co. had hired to be its engineers. I have one in which Isaacs was trying to get six hundred thousand dollars for equipment that he said the Americans should buy from the British company.

I don't know how much money Isaacs succeeded in getting from the American Co. He gave up trying to have the station built by British

personnel. Hollberg and others were sent over to Britain for instructions to prepare them for building the American station. Marconi and hi associates tried to hold up the U.S.Navy in 1899 by patent bluffing. They did hold up America considerably beginning in 1912 after the United had been destroyed by prosecutions based on the way United stock was sold. Marconi did not have patent rights to successfully monopolize before or after 1912. Other companies went into operation in the U.S. after 1912. After World War I, the U.S. government took a hand in getting rid of the largely foreign controlled (British) Marconi Co. In an article entitled, "Keeping the Stars and Stripes in the Ether", Commander Hooper (now Rear Admiral, retired) said, "The only logical solution of the problem was to encourage the formation of a strictly American radio commercial company---". Admiral Bradford had about the same idea when Marconi tried to dictate to the Navy which was before Hooper entered the Naval Academy.

Weagant took over the design of transformers and other transmitter parts in the room left vacant by Proctor. I went in there frequently and found him with his pipe looking at a nude transformer. He seemed to be figuring it out by mental mathematics and mental pictures occasionally writing something on a handy pad of paper.

Davey Sarnoff continuing in his idea of becoming a wireless engineer was frequently with us. Weagant, Hollberg, Chadbourne and I flocked together. Weagant joined the Wireless Institute. Hollberg, Chadbourne and Davey were lined up to join but did not begin paying dues until later.

I wrote a paper about several features of wireless and read it before the Ohio State University Association of New York. The portion of the paper dealing with wireless equipment and personnel I recommended for ships to protect life and property, was mimeographed and sent to

Congressmen and other interested people. I advocated for ships all the act that was passed later contained and more. I advocated three operators with qualifications such that at least one could make fairly extensive repairs. The auxiliary for use when power from ships engine rooms failed was more reliable and powerful than the Marconi companies tried to put over under the act that became law. Part of those features had been previously advocated by me before the Wireless Institute and some of my recommendations were reported in the New York Times in May, 1912. We had installed auxiliary power I advocated on ships while with the United Wireless Telegraph Co.

The first Wireless law that went into effect was quite limited in scope, only requiring some wireless on a restricted class of vessels. W. D. Terrel and A. Y. Cadmus, wire line telegraph men in Federal Civil Service positions, were assigned to New York and San Francisco to check up on vessels and see that the wireless law was enforced, in conjunction with Customs inspectors. When Terrel came to New York in 1911, I tried to get him to join the Wireless Institute. He did not join but we saw a good deal of each other and discussed the existing and proposed wireless laws. When the new more drastic law was to go into effect in 1912, they wanted experienced wireless men to enforce it and held a competitive civil service examination to get them. I took the examination and, having the most experience, received the highest grade.

On October 19, 1912 I submitted my resignation to The Marconi W.T. Co. of America to take effect on October 21, 1912 as I had passed the Civil Service examination, making me eligible for appointment as U.S. Radio Inspector. I was going into a job where none of my job associates sold stock. No stock jobbers.

CHAPTER XXI

REGULATING RADIO

The failure to use Radio on the part of some and the misuse of Radio on the part of others brought about the laws and regulations and the need for Radio Inspectors to enforce them. As many eligibles as the existing appropriations could afford were notified to meet at Washington in the office of the Bureau of Navigation of the Department of Commerce and Labor on October 24, 1912. I remained in Washington that week for instruction at several places. Others went to New York to see ship installations and returned to Washington for instruction.

A. Y. Cadmus and William Danforth Terrel came into the U.S.Radio Inspection Service automatically from the preceding service. John Dillon, Henry C. Gawler, V. Ford Greaves, Charles C. Kolster, Robert Henry Marriott, Arthur N. Rice, Roy A. Thompson, Benjamin E. Wolf and R. B. Woolverton came in through competitive examination. At the last minute in Washington, D. C. as we were about to be sworn in, E. T. Chamberlain, head of the Bureau of Navigation, told us there would be a delay. He was as mad as a wet hen. Word had been received that Louis B. Krumm was to be added to the service. Krumm's brother was an effective politician so the Secretary of Commerce and the head of the Bureau had to bow to the political will as they were political appointees themselves. Krumm was being transferred, according to the remarks, from some civil service job in the Army. Not only did Chamberlain get one more man than he expected but apparently Krumm insisted on having a job that Chamberlain had planned for another - Greaves, I believe.

V. Ford Greaves and Frederick A. Kolster were pals. Fred was the elder brother of C. C. Kolster. Fred had a civil service Radio job at Bureau of Standards and was to work with the Radio Inspection Service

of the Bureau of Navigation. He and Greaves wanted to be so close that they rented adjacent houses in a solid block of houses. They cut a door in the wall that separated the Greaves Parlor from the Kolster's. Greaves sort of acted as Kolster's press agent. Kolster designed a Decremeter for our service and he designed "radio compasses" or "direction finders". Greaves talked largely about Kolster and his devices. Kolster was useful. The Decremeter met an urgent need in our service. Kolster and his Radio compass improvements went along together for years.

When Greaves had to leave the Kolster-Greaves Siamese twin house because he was being transferred by the government to another city, he tried to break his lease by claiming to be overrun by cockroaches. He did have what I thought were cockroaches but lost the case because an expert said they were water bugs. They were not big and dark complected like what we encountered on ships. The boys claimed we could ride ships' bugs and had to hit 'em with a hammer to kill 'em.

The Kolster Decremeter was a great help to our inspection service. Before we received it, the most accurate wavemeter we could use was a Telefunken meter that we borrowed sometimes from Richard Pfund of station TWT on Broadway. By taking readings with it we could also calculate decrement. But it was heavy for two men to handle on and off ships. Kolster's wavemeter had an extra decremeter scale that did away with calculations and one man could carry it like a suitcase. I did not carry it when there was little question about measurements. It weighed about twenty-five pounds and the government would not honor cab fare, porter charges or parcel-room charges. I had a small wavemeter in a leather case I had made while with the Marconi Co. It weighed about four pounds and could be crowded into my overcoat pocket or briefcase. Its range of 150 (2000KC) meters to 750 (400 KC) covered ships and

and amateurs. I still have it. Insofar as decrement was concerned, I knew when the apparatus was well within the law by its appearance, if it was of a familiar type. New types that came out after the law went into effect usually more than met the requirements. However, we checked them with our best instruments.

Greaves liked parties and liked things to be very nice or as we said then, very classy. He started by getting us handsome gold plated badges and fine brief cases. He carried on that policy insofar as appropriations would permit. Located as he was at the Bureau of Navigation in Washington, he seemed to regard us as his guests when we came to Washington. He liked to take us out to dinners that probably would be described better if called small stag banquets. Before he left Washington he insisted on giving a farewell dinner although we tried to talk him out of it because we knew he had little cash and would be under heavy expenses in moving to his new assignment.

After being sworn in we spent most of our time at the Bureau of Standards, making measurements. We visited at Arlington where the Navy was completing station NAA. For some reason I lagged behind the other inspectors. When I came in the door of the station I stopped to talk to a Navy operator who did not recognize me as one of the U.S. Radio Inspectors. I looked at a room and asked what that was to contain. He said it was to be the office of Captain Bullard, Director of Naval Communications, who will supervise all the radio in the U.S. Also I learned from him the shore end of all ship to shore business would be handled by the Navy and the amateurs would be shut up. He motioned toward the inspectors ahead of me and told me they were the U.S. Radio Inspectors who would see that all commercial vessels were properly equipped and that the amateurs were shut up. That was the way the near future of wireless appeared to him. I did not think anyone would supervise all

Radio in the U. S. and I did not think we would find it necessary to exterminate many amateur stations, if any.

I moved on across the floor to a Poulson Arc they were installing but which was not working. I had used a lot of small arcs but not one that big. At the end of the room was a big Fessenden rotary gap transmitter that was working. I had used rotary gap transmitters too from little table models up to a couple of kilowatts. The big one was still more spectacular and noisy. Both Marconi and Fessenden were using rotating electrodes that I believe Deforest or somebody called "slingers of molten brass".

The chief's gossip about Bullard supervising all Radio and that we would put amateurs out of business stuck in my mind more than other things. The towers were high, the receiving room was large and the building was very substantial compared to what I had seen before. Later in 1915, back of that station the A.T. & T. boys, Heising et al, installed a flock of improved audions for use in telephoning by radio to Frisco, Hawaii and Paris. Also the same Bullard after the first World War, promoted an American organization to get rid of the Marconi British ownership of Radio in the U. S.

Terrel and I were assigned to New York. Terrel was very familiar with the methods of Washington, D. C. bureaus and he was well known in Washington. All who knew him found that he was very careful and fair. He considered controversial problems deliberately and judiciously. He managed the office which was in the Customs House at the foot of Broadway. We had one stenographer, Herman Schlang. I had contacted more ship and shore wireless station equipment than any other and knew more about the insides of the then dominating wireless company than any of the others in the Inspection Service. My time was to be devoted as much

as possible to inspections and tests of equipment.

I have acquired quite a few nicknames at different stages - Brohie, Reggy, Henricus, Bobbie and Merrie. As Radio Inspector I acquired another. When testing a ship or shore transmitter, on the air, I used my call M. A. "Mama" was thereby added to my list of nicknames.

New York City had the most problems coming under the law. The most ships, shore installations, amateurs and influential connections that went with them. Also it had the most of the Institute of Radio Engineers which Washington knew was trying to provide cooperative effort along scientific, efficient lines that were fundamental for good application of Radio laws, regulations, rules and practices. New York also had more people who had appeared directly or indirectly to be against the law. New York was the guinea pig for trying out and selecting Radio inspection practices as standards for the United States.

Our office was on the main floor of the Custom House at the foot of Broadway in the southwest corner which we occupied in conjunction with a file room. We did not use much of the file room but it was reached through our office. One day when a violent wind and rain storm was beginning to strike I tried to close a file room window, a very large high window that closed like a door. The wind was so strong that it slammed the window and me back. The plate glass shattered and fell mostly ~~on me~~ back of me. One big piece punctured the bottom of a leather chair and some small pieces hit me. Fourteen years later a place on my wrist bothered me, something seemed to be imbedded there. It worked up to a hard point. I slit the place and removed a piece of glass that I could not account for except as a Radio inspection office souvenir.

The office contained at the start not much more than lockers for our clothing, three desks, a long table, a case for instruments, a typewriter, one or two file cabinets and chairs, plus white stationery for letters and yellow for copies and pencils. Our white letter heads read: Department of Commerce and Labor, Radio Service, Office of Inspector, New York, N. Y. The "and Labor" was dropped soon after we joined. Labor became a separate department.

Institute matters take a great deal more time than the time spent at members meetings where papers are read and discussed. Directors meetings took nearly twice as much time as members meetings. Committee meetings took more or less time. One committee took at least ten times as much time as members meetings. The Institute had no paid employees or rent space for any but members meetings which were held at Fayerweather Hall, Columbia University, free except for the dollar we paid to clean up the muss we made and close up the lecture room. All other meetings were held in somebody's office for free and after business hours. Beginning with the opening of the U. S. Radio Inspection office in the Custom House, the directors and committees meetings were held there, and usually after a dinner at Sweets. Lower New York is so crooked that we could almost cut across from Sweets to the Custom House. A lot of directors and committee transactions were typed by Goldsmith on the government typewriter, using four of his fingers, three on one hand, and the yellow paper. Sometimes as dictated by a Goldsmith inspiration, sometimes as dictated by Emil J. Simon, or in bass by Jack Hogan or by Roy Weagant after his pipe was working.

We had a good view of vessels entering the Hudson from the windows of our office. An English operator, whose equipment had been out of order and who had visited our office, said we could tell when a ship's radio was out of order by the looks of the vessel's antenna. He said

we could see it from our windows, pick up our brief case and instruments and be at the pier ready to come aboard when the ship docked. He reached that explanation from his knowledge that we were frequently waiting for ships whose wireless sets were not in working order and because he knew we could see the ships. We frequently did know when a vessel with out-of-order wireless was starting up the Hudson. That was because the New York Herald tried hard to keep track of shipping. They were advised by cable when vessels left other countries for New York and at the Battery in New York they had a radio station that not only sent messages to ships but listened continuously for messages that would indicate the positions of ships. Not only position reports given by wireless but the run of ordinary messages indicated the positions of ships and frequently the condition of the wireless. If nothing was heard about a ship after it left the other side, the nearly always correct assumption was that the wireless was not working or not working well. We were advised of that and advised when the vessel left quarantine for its pier. The equipment at the Herald station was good and so were the operators, old experienced ex-United Wireless operations, like W. H. Gillen. Terrel kept in touch with the Herald station and usually knew before a vessel started for its dock if its wireless had not peeped for days.

Our main object was as stated in the following words:

"The principal purpose of the regulation of radio communication, international and national is to secure the greatest efficiency of maritime communication through this agency, especially as a means of promoting safety to life." Page 52 of Department of Commerce Regulations governing Radio. Edition of July 27, 1914.

Actually the laws and regulations upon which our inspection service was based, with explanations, made a book of about forty thousand words. The laws included an act of June 24, 1910, as amended July 23, 1912 and the act of August 13, 1912, and the International Radio-Telegraphic

Convention; regulations made pursuant to the above acts. The U. S. Senate ratified the London International Radiotelegraphic Convention with the provision that nothing in the Ninth Article of the Regulations would exclude the U. S. from the execution of her inspection laws. That Ninth article seemed to mean that if a government had licensed the station on a ship, we were to assume the station was in good working condition. They were not always in good condition, so we tested them. We assumed the operators were capable if they had licenses that conformed to our laws. The U. S. Congressional bills used the word "Radio" in preference to "Wireless" in 1910 and have continued to use it in subsequent bills and laws. The word "Radio" had been used naturally before. Maxwell's theory said that kind of wireless radiated like light, before Hertz demonstrated that it radiated and was reflected like light. The Act of August 13, 1912 put all kinds of wireless under the general title of Radio. "Sec. 6. That the expression 'Radio Communication' as used in this Act means any system of electrical communication by telegraphy or telephony without the aid of any wire connecting the points from and at which the radiograms, signals, or other communications are sent or received."

Radio is one kind of wireless. There are kinds of electrical wireless that are not Radio. But the people who wrote the act probably consulted experts who knew that somebody might claim to have a new or old wireless that was not Radio but which would radiate interference. Therefore, the law-makers played safe by putting all electrical wireless under the Radio title. A direct current conductive arrangement or an alternating current inductive arrangement for wireless might also radiate when the key was opened or when it was closing, or the circuit was otherwise interrupted, depending on how conductors happened to be arranged. It is likely that some of the very early wireless results that were reported

were really due to radiation rather than to the theory offered in explanation.

There were a number of things that had to be ironed out. Some were only inconsistencies, for examples, the requiring of a lower decrement than had been the practice meant requiring a longer wave train. The main advantage of the longer wave train was to make sharper tuning possible. However, if transmitters were all tuned to the same wave there was not much if any advantage in the lower decrement. We asked what accuracy in setting wave lengths was expected. Washington said within ten percent. On U. S. vessels coming into New York I set most of the wave lengths and tried to give each a separate wave length some place between 540 and 660 meters, for the co-called 600 meter wave. The 800 meter wave was practically unimportant because it was not used so far as we knew, except for short distances by a few operators. Practically all traffic was in the 600 meter band. By having stations on 540 to 660 meters, more stations could work at one time and handle more business.

Amateurs at that time were considered as noisy, mischievous, ether disrupting children. Some of them had not changed from short to long pants. But some were older. Older than Terrel who was about ten years older than I. Also knowing what we did about the commercial companies and the Navy, we thought amateurs were not relatively too bad. They needed attention but so did the commercial wireless companies and at least one commercial wireless company needed more attention than the amateurs, insofar as safeguarding life and property at sea was concerned. Amateurs as a rule interfered with shore stations rather than ships. They were not near enough to some shore stations to interfere and if we got them down to or below their 200 meter wave length, they should not bother the usual 600 meter wave length that would be used for distress

calls.

The Radio Club of America of New York then and still going ~~45 years or more~~, joined us to enforce the laws pertaining to their amateur members and others. Some of the club wore short pants, (or had recently) some were long ones, some went to Columbia, and Dr. Hudson, one of them, was a research man for a Dupont Company. He later wrapped with wire an Audion filament so it could produce more electrons without burning out. They tried to make their members behave by talking at their frequent gabfests and by wireless between meetings. They gave Terrel copies of the first list of amateurs with call letters that the government had. I think I have one of the copies in some file.

After a couple of years things became so regulated that they were not interesting. Police officers paid no attention to me regardless of where I went around the docks. On the ships the equipment passed inspection, the operators might not be present but their licenses were, but the inspection blanks had to be filled out. Because the cops paid no attention to me I walked through a fire line once. When I saw the fire I walked right back out. Lots of queer things set on docks that might burn fast, explode or give up poisonous gases. As long as we were fighting for better equipment and better care of equipment it was very interesting. Also some of the predicaments we got into before our presence became a habit, were funny.

Other inspectors came to New York in relays to inspect always available ships and so we would use a uniform procedure. I usually took them around. On one such occasion there were four of us. We went aboard a French ship where the operators could not speak English. I tried what I could remember of my college French on them. I thought my words requested them to operate the transmitter. No results for more than a minute - then one said: "Oui, oui!" and other things that

sounded Frenchy and ran out. The other operator opened a closet door and produced part of a bottle of Cognac with glasses which he filled. The first operator returned with a full bottle. By making signs we succeeded in having them operate the transmitter. I thanked them in French, (I thought), wherewith they poured another round of drinks. We poured them down our hatches, bowed and silently filed out. There was a limit to what a Radio Inspector could hold. Even Roy Thompson had his limitations.

CHAPTER XXII

EXTRA CURRICULAR RADIO REGULATIONS

On February 6, 1913, Mr. Eugene Tyler Chamberlain, Commissioner, head of the Bureau of Navigation of the Department of Commerce and Labor, wrote to me saying, "Mr. Greaves has just shown me your retiring address as President of the Institute of Radio Engineers and I wish to congratulate you upon it".

On February 12, 1913, Roy Thompson wrote me from New Orleans saying, "I have just been furnished a copy of your address to the IRE by the Commissioner. He asked for a report on conditions in this district as brought out by you in your address. Believe me, I sent him a five page letter---------. It is such addresses as yours that amount to something. I shall now renew my membership in the Institute. ----- One address such as yours will do more to correct the present disgraceful conditions than even the Departmental regulations."

The retiring address they referred to was not what I set out to write and also I did not actually retire. I had been president from January, 1909 of the Wireless Institute and its successor the Institute of Radio Engineers. In 1912 I told my closer associates that I did not want to be president in 1913. However, I was nominated for president and withdrew in favor of Pickard who was also nominated. Also I had been one of the nominees for vice-president. Because Pickard lived in Boston and probably would not be in New York everytime the Institute needed a presiding officer, I was elected vice-president. I became a spare presiding officer and batted for Pickard and other succeeding presidents who did not attend all meetings, until I moved to the Pacific coast in 1915 and some after I returned to Brooklyn in 1925.

The retiring address I intended to write was to be a resume of

It seems hard to believe anybody would be president one year and vicepresident the next. One person reversed me to VP first and president second. I was mystified. Then later another cancelled the presidency and left me the VP. The presidency was restored. I am about due for another alteration.

In 1912 the general idea was that since I had as much experience I should continue as president of the young Institute. I did not want to because those of us who had studied our prospects believed IRE would be advanced and expanded better if we elected a new president each year. We nominated Pickard, who had taken part in institute activities four years, for president and me for vice president.

When all the nominations came in I too was nominated for president but I declined which meant any ballots for me for president would not be counted but vicepresident ballots for me would be counted.

As vice president I presided at lecture meetings and board meetings when president Pickard could not attend. When he attended I was his right hand adviser.

That is the way IRE got the benefit of Pickard and my experiences and how we put over the idea of getting a new president annually.

1912 radio developments but before January 8th, 1913 when I delivered it, I became so disgusted with the way a large operating company tried to force its inferior equipment and principles in radio that I picked one 1912 development as the basis of my address which was entitled, "Radio Operation by Steamship Companies". It was published in Vol. 1, Part 2, 1913, of the Proceedings of the Institute of Radio Engineers. It was inspired by improved radio that had been installed on United Fruit Steamships.

The United Fruit Company had taken the stand that it was not going to be dictated to by any radio operating company and was buying its equipment and hiring its operators independently in 1912. Some, if not all of the other steamship companies could do that and I went into details about how and why they might do it. Two years later the same Roy Thompson, Charlie Cooper, the Kilborne-Clark Co. and the Alaska Steamship Company got together and did that too, under the name of Ship Owners Radio Service, Incorporated. The Marconi Co. tried to stop them in several ways, including patent suits. The Marconi Co. was putting out improved equipment by that time but some steamship companies did not want to be dictated to by an operating organization, especially an organization that was more or less under British domination. Several times, beginning before 1776, rawther broad hints had been made to the effect that at least some citizens of this country would like the British to keep their fingers out of our affairs. The Alaska S.S. Co. presumably could have purchased very good radio from a german company but evidently they wanted to patronize home industry. Oddly enough, I was inspector in Seattle for about six weeks which included the time when the first of the Ship Owners Radio Service sets was put in operation and so shortly before sailing time that I had to hang around to inspect it one damp December night. Kilbourne fed us.

He made a salad dressing that caused one to eat lettuce like a hungry rabbit.

This same Vol. 1, 1913 of the Proceedings of the Institute of Radio Engineers also includes the report of the Committee on Standardization. The report includes one hundred and twenty-nine Definitions of Terms, fifty-nine Literal Symbols, thirty-two Graphical Symbols, two rules for Test and Rating, and explanatory paragraphs. They served to regulate and expedite radio development.

Standardization was the hardest function of the Institute to get started. In each of the four years I had been president of the Wireless Institute and its successor, the Institute of Radio Engineers, I had appointed a committee on Standardization but we did not get any standards. Hogan was taking a very active interest. I thought he would take to writing standards and so would Goldsmith. When Pickard was elected president I asked him to make me Chairman of the Committee on Standardization and to include some others whom I was sure would work very hard and one or two who might help. He did that but one of those named would not serve on the committee and he tried to stop my committee from doing anything. He lived in another city where there was a section of the Institute and tried to arouse his section to stop us. That's where I got mad and said, "The tail can't wag the dog". After four years of effort to have our work interfered with by one who should cooperate, was too much. We came back at him and asked him if he did not think we should have standards. He said yes but we were not ready yet. He was one of the type who were very particular about having things done after a lot of consideration only in the right atmosphere by the right people. Such atmosphere was expensive and his choice of people was elderly, busy and not available in one place. He was very academic and not strong enough physically to get around much or show much pep.

We went ahead without him. Our going ahead and my saying that a section could not boss the Institute, which was what was meant by "the tail can't wag the dog", brought us some enemies but we produced standards with boyish enthusiasm and put them up to an elderly expert on standards for approval. Mr. Boyish Enthusiasm was one of the ancestors of Radio, a very productive one.

After eliminating to get people who could make up a small effective group that would meet frequently and work, the Committee was: Marriott (Chairman), Goldsmith, Hogan, Kennelly, Weagant and Pickard (ex officio). That committee met fifty-two times and had the report ready for printing by September 1913. Twice a week during most of the time after January. Goldsmith and I attended all meetings. When no others attended, we ate dinner at the Oriental in Chinatown; considering terms, symbols, water chestnuts, lychee nuts, mushrooms, bamboo shoots, shredded chicken, noodles, salty sauce, rice, miniature oranges and tea for an hour and continued at the Custom House or the College of the City of New York, digesting them.

We had to meet after hours or on holidays. It was extracurricular work. Employers did not give time off for what the IRE did. In some cases it was best for employees to keep their IRE work secret, so far as their bosses were concerned.

Usually Standards meetings began at Sweets restaurant and did not get serious before we reached the Custom House. We mussed up the office some with tobacco ashes but were careful to see that the typewriter was covered and furniture was left as we found it. Also one night I did not bring cigars but smoked up Terrels 7-20-40's. We probably consumed five hundred sheets of the yellow paper that belonged to the U. S. Radio Inspection Service. During part of that year, after meetings I xxx walked

down to West Street with Weagant where we conferred some more over a couple of big beers, the kind that longshoremen drank. We lived in New Jersey and commuted by ferries and trains to our homes. I believe Weagant lived at Roselle Park at that time. I had moved from 588 East 9th Street, Brooklyn to Dumont, New Jersey on May 3, 1913.

Hogan was at more than ninety percent of the Standards committee meetings, Weagant almost as many and Pickard whenever he was in New York. When Goldsmith was enthusiastic he would swing his briefcase through a wide arc as he walked and arriving at the Custom House, Goldsmith would type out a long definition from dictation or his own inspiration. Hogan would promptly proceed to boil it down. Hogan at that time was paying a lot of attention to words. He was writing articles. I asked him why he wrote them and he said for practice. He certainly could take a proposed definition and rub its fur the wrong way to shed unnecessary words. Weagant kept quiet most of the time but when he made suggestions they were good and Pickard did the same when he was there. I got them to define more words than we finally included and drew a lot of graphical symbols in pencil. At the end, Goldsmith prepared all of the final copy for the printer. I think that was the only committee I was ever on where I was the only one who did not spell correctly, frequently. I still spell a word three ways on the same page and reread it without noticing it.

When we felt it was time to stop standardizing, we sent our product to Dr. Kennelly at Harvard. He was the only member who did not meet with us. He was probably more familiar with the making of such standards in electrical engineering than any other person and he knew radio from an academic standpoint. Kennelly ran away and went to sea when he was a kid and was a practical electrician long before he became a college professor and famous for his work as such and in the A.I.E.E. and other

technical organizations. He was older but still enjoyed such things and approved what we had produced. We then sent the report by mail to the membership as a preliminary report saying the final action as to adoption would be based on replies received from the membership. With this was a form to fill in that would indicate whether or not they were in favor of its adoption or with modifications.

The report was prefaced by the following:

"The early history of new branches of engineering always shows the discouraging spectacle of a confused and ill-defined nomenclature, together with widely different connotations assigned to the literal symbols by the various investigators and authors. Such a state of affairs gives rise to unfortunate misunderstandings, or, at best, to a considerable amount of unnecessary labor on the part of the practicing engineer and students of engineering.

"The field of radio engineering is far from having escaped the objectionable conditions mentioned above, as is easily seen from reading theoretical papers on the subject or the reports of the patent lawsuits."

Replies were to be sent to Dr. Goldsmith as Secretary of the Committee. He was a real secretary. He studiously pecked the Radio Inspection Service typewriter and another at the College of the City of New York. All definitions were rewritten two or more times. I reckon thirty thousand words or more were typed by him on that job. He played fast on the piano but typing was hunt and peck, he wasn't fast on the typewriter. But after the report was mailed, he did not have much more writing to do on that committee because only a few replies were received and they were all in favor of our Standard report. Since then the Standards committees and their reports have become bigger and bigger. However, I don't believe Goldsmith ever again typed them or licked the stamps to mail them.

The preface to the Standards, in effect, pointed out that standard terms and symbols enabled engineers to speak the same language. Those standards did more than that, they helped to regulate radio, particularly

standard tests and ratings helped to regulate. Laws aimed at protecting the lives of people at sea, based the value of a radio transmitter on its ability to send a distress call that could be easily read at a certain distance, usually 100 miles. So-called ten kilowatt transmitters as used on some commercial vessels, usually could not be easily read as far as some of the transmitters that were rated at a fraction of a kilowatt. Standard tests and ratings helped to stop the overrating of transmitters that were inferior in efficiency and range of service. And the standards report helped to increase the membership of I.R.E.

The membership of the IRE increased rapidly about then but that increase was not entirely due to efforts of Institute members. It was partly due to the trend of the times. In the beginning and repeatedly since then, outside factors have caused the membership to decrease and increase with the increases far greater than the decreases. And the increase is also because the IRE has tried to increase its usefulness. Rising on the whole but occasionally falling, with expansions, depressions and wars.

Around the year 1913 there were other expanding radio affairs that we helped and that helped us. The laws and regulations going into effect and being enforced increased the number of radio installations on U.S. commercial ships over one hundred and twenty-five percent between 1913 and 1914. Radio engineers increased in number and operators increased about three hundred percent. The Marconi Co. spent money it garnered from sales of stock. Other commercial radio companies expanded their Radio work and so did the Navy. The Federal Telegraph Company was expanding with Poulson Arcs and the Navy was expanding with telefunken types of quenched gap equipment and with Federal made Poulson Arcs. Two large German transatlantic stations were coming into use.

Due to the failure of the United Wireless and other changes, there was a general radio uncertainty or Radio depression still in effect at the time the two societies joined to form the IRE. Some Wireless Institute members had not paid their dues although they attended meetings. The Society of Wireless Telegraph Engineers had not been holding regular meetings for quite a while, but John Stone Stone saw to it that dues for enough members were paid to match the number who had paid dues to the Wireless Institute. As a result, only those whose dues had been paid were classed as the first members of the IRE. Because they had paid dues to one or the other societies in previous years, several have frequently argued that they were charter members of the IRE, but as their dues were not paid at the time of the formation, they were not rated as first members and most of the first members were not actual charter members, because they were not present when the application for incorporation was signed. The first members were twenty-two from the Wireless Institute:

Wm. F. Bissing
P. B. Collison
James Dages
Lloyd Espenschied
Philip Farnsworth
Frank Fay
Edward Gage
Alfred N. Goldsmith
Francis Hart
Robert L. Hatfield
Arthur A. Herbert
Frank Hinners
James M. Hoffman
Robert H. Marriott
A. F. Parkhurst
G. W. Pickard
H. S. Price
A. Rau
Emil J. Simon
C. H. Sphar
Floyd Vanderpool
R. A. Weagant

That number was matched by the payment of dues for twenty-two from the Society of Wireless Telegraph Engineers:

J. C. Armor
S. Cabot
F. E. Chadbourne
R. H. Cram
G. S. Davis
Lee Deforest
E. D. Forbes
V. F. Greaves
G. Hill
J. L. Hogan, Jr.
W. S. Hogg
F. H. Knowlton
W.S. Kroeger
F. Lowenstein
Walter W. Massie
E. B. Moore
G. W. Pickard
Samuel Reber
O. C. Roos
J. S. Stone
E. W. Sunberg
A. F. Van Dyck.

when those people who had paid their dues got together, Radio was still in a depression of its own but getting more hopeful. By the time application was made to incorporate IRE under the laws of the State of New York, radio people were beginning to be enthusiastic and expansive.

The matter of who was a charter member of IRE has been argued in various ways. According to the understanding between the two societies when they joined, only those whose dues were paid were members of IRE. In that sense they were first members, or original members, and maybe they were charter members. In another sense only those who signed the application for incorporation were charter members of the IRE and they have since been known as, technically speaking, the charter members because only their names were on the corporate papers. But to make the matter still more complicated, insofar as the IRE corporation is concerned, all who were in good standing as members, dues paid, were charter members when we of the board signed the application for incorporation or, maybe, when the State of New York issued the corporate papers. Some might say they were charter members of the Institute, unincorporated. More might say they were charter members of the Institute, incorporated, and a few could say they are real signers of the document that produced the incorporation papers or charter. Most of those argument have been put up to me.

The application for incorporation of The Institute of Radio Engineers under the laws of the State of New York was signed by R. H. Marriott, Lloyd Espenschied, A.N.Goldsmith, John Stone Stone, E.J.Simon, R.A.Weagant, G.W.Pickard, J.H.Hammond, Jr. and J.V.L.Hogan, Jr. The papers were filed in Albany on August 28, 1913. Those signers were all of the officers and directors of the IRE for the year 1913. Hammond was not one of the first or original members of IRE but he was technically a charter member. Pickard, President of IRE for 1913, was everything. He was a member of

the Wireless Institute, a member of the Society of Wireless Engineers, a first member of the IRE, a charter member of IRE, technically speaking. Since he had paid his dues to both of the basic societies he was maybe, two charter members. As he xx signed the incorporation document we might as well add another and make him charter member triplets.

CHAPTER XXIII

AMATEUR ANCESTORS

Boys and a few girls who could have been expected to be getting lessons for the next school day or doing chores, took to fooling around with mysterious wireless, which was not as dangerous as fooling around streets, poolrooms and livery stables. Some of them started when what pulled the vehicles were rated in horsepower but did not all smell like gasoline. There were some gas buggies, some Stanley or White steam buggies but mostly horses around 1903 and later. Those boys and an occasional girl were early amateurs and amateurs did not turn out bad at all, at all. The trouble with amateurs is that they turned out to be so extensively useful without being publicized like alleged inventors or organizations that paid for publicity. Our Navy and Army had to learn that the amateurs were our reserve radio personnel in 1916 and learn to like them despite what they had said about them in previous years.

According to definition, "one who loves is an amateur". Love presumably has led to a lot of ancestoring. Sometimes lovers have stuck to one or a frictionless few objects of their loves. Professional radio ancestors are supposed to have gotten that way about radio because they wanted the money. Most of the early radio amateurs were at the age when they wanted to make love to something or a flock of things. They did monkey with a lot of radio devices and ancestored a lot of Radio. They were the ancestral radio broadcast audience and they still brag about the radio schemes they invented. Some of the professionals were amateurish, but they got paid for it.

Amateurs did not turn out to be preventors of etheric communications, as was prophecized. In fact, as a class, maybe there were none better.

They ignored simple mathematics. On cold nights they did not add, they multiplied. All of the reasons why they multiplied are not known. Lots of them were inspired like their parents - they wanted to keep up with the Joneses, perferably to show Archibald Jones that they could not only skin him for distances received but they also ran rings around Professor Smythe's son, Kelvin. Electrical theories they had been exposed to, therefore, stuck with them much longer than was required to pass an examination. So far as doing a neat job of wiring was concerned, they did that like the way they left their clothes scattered around. Due to those characteristics in wiring, several amateurs and at least one professional wireless operator connected audions in a wrong way that gave better results than that known as the right way.

Radio clubs of amateurs met at the homes of their members and insofar as possible they made the apparatus they used. Induction coils, transformers, telephone receivers, storage batteries, motors and even telegraph keys were usually too difficult. But tuners both for the transmitter and receiver, condensers, crystal holders and haywire connections were easily made and commonly used. One of the arguments amateurs had for existing was that they learned to make things. Also amateurs learned the code that prepared them to be possible future commercial or government operators.

Amateurs came to me about buying valves or for other reasons and told me amazing stories of what sensitive results they had achieved with the audion. In time I believed them but could not account for their results. Later I assumed that some of them probably had assembled their circuits in a way that produced regeneration. In the winter of 1912 and 1913, after I became U. S. radio inspector, I found on a United Fruit ship a Mr. Wallace with an audion receiver that to

the best of my recollection was connected up like Armstrong's later published circuit. I traced and diagramed the connections in the Wallace receiver and used the receiver at that time. I thought it was unbelievably good. Years later I could not find records that would fix the date and for legal standing the date would have to be fixed to a date before February 1st, 1913. I believe that receiver existed and was in use before that date because I believe it had traveled to South America and back on that ship before I saw it. Wallace told me at the time that he did not know why it worked as it did. He was secretive and asked me to keep it a secret. I destroyed the diagram I had made and did not mention it until the Department of Justice asked me about it ten years later. However, whether or not Armstrong was the first to use the regenerative audion intentionally or unintentionally, or invented it, Armstrong did the thing that is most important from the standpoint of a Radio Club. Outstanding purposes of a Radio Engineering Society are to interest its members and others in radio development and to explain the how and why of radio phenomena. Armstrong was a rabid user of the regenerative audion and he interested others, particularly Pupin and Morecroft, and he followed that by explaining its theory or operation. It was from what Armstrong and Morecroft did and said at an I R E meeting that I learned the theory of the regenerative audion and I think that goes for everybody else. Whether Armstrong was first to discover the regenerative audion or not, I think everybody will agree that he was the first to turn a lot of light on it and he should have plenty of credit for that. He got a lot of credit and, we guess, a lot of money.

Armstrong and Deforest are both scrappy individuals who don't mind doing a lot of name-calling. In fact, that was a characteristic of Radio Ancestors. Professor Morecroft published quite a little of what he thought of wireless folks. Inadvertantly during a radio patent trial

I stopped between Armstrong and Morecroft. When I heard the uncomplimentary bellowing that Armstrong was enunciating as he approached prof. Morecroft, I stepped aside rapidly. According to the Saturday Evening Post article and stories I heard, Armstrong put up printed signs along the New York Central that were supposed to slur Deforest. In the run of patent suits I guess Deforest got the best decision.

Early audions were sort of hit and miss arrangements. Probably no two of them were enough alike to make stories about them seem to be reliable. I suspect that the first use of the regenerative audion was evidence that a poor, simple minded, unorthodox manipulator may be the first to do what may be heralded as an outstanding scientific achievement. Poor boys, playing with wireless, did not go to the expense of providing binding posts or marked points of connection for the devices they hooked up to make radio transmitters or receivers. They twisted wires together. The wires all looked alike and they frequently made mistakes. Even though an amateur had connected his audion properly to the batteries and telephone receivers, the only mistake he had to make was to twist the wire from his tuner to the wrong tip of his telephone receiver cord. That is what Wallace had done and what I suppose others did, who put the phones at the negative end of the "B" battery. Careful older research men probably did not do that because their connecting wires were not jumbled and telephone receivers were regarded as something that high frequency tuner currents would not go through. In a sense, the high frequency currents did not go through them (that is, not through the turns of wire) but used some first and last turns of wire like the plates of a condenser. That arrangement caused some power to feed back and build up signals making them stronger. It was called "tickling", the plate and grid circuits were hooked together in the phones so the plate tickled the grid which in turn sent more current to the plate. That is what Armstrong and Deforest

about that is,
quarrelled in U. S. Federal Courts over which one taught the audion to "tickle itself". I suspect from the stories I heard that some unrecorded amateur really beat both of them to it. Armstrong was an amateur when he did it. But Armstrong with Prof. Morecroft and an oscillograph demonstrated to us what happened, at an Institute of Radio Engineers meeting. With the oscillograph you could see "tickling".

The amateurs grew to be numerous potential radio engineers and operators that were called for Army, Navy and Commercial services. They were, after the first World War, the available audience for the beginners of the second era of broadcasting. Also in time amateurs formed the American Radio Relay League. It was not only large but it spread to other nations.

The first era of broadcasting ran from 1907 to 1917 and was accomplished by using arc telephones. It was stopped by the first World War in 1917. That same war produced a lot of vacuum tube transmitters and receivers that could be used for broadcasting and a lot of war trained ex-amateurs to produce the broadcasts and listen to them.

Amateurs of New York City usually were not at home when their stations were examined by Radio Inspectors. Most of them were in school or college. Frank Brick told me about twenty-five years after I inspected his station that I nearly scared his mother to death. His was quite powerful - it contained former United Wireless equipment. I did not know she was frightened but I did know Walter Lemmon's mother was frightened when I got to his station. I had to spend some time explaining to her that nothing would be done to him if he made an inexpensive change in his set before he disturbed the ether with it again.

By the time the 1912 Radio Regulations went into effect, amateurs were well distributed over the U.S. New York's metropolitan district

The original ingredients of the Radio Club of America were amateur. They are so mature now in 1949 that they have lost a lot of teeth and hair and are probably looking forward to arthritis and enlarged prostates.

New members have been added from time to time, usually professional radio engineers. They continue to meet, eat and read papers once a month, for ten months. They publish some of the papers. Officers are elected annually. A stag banquet at which dull moments are avoided, is part of this yearly behavior. The boyish club spirit is still there

had the most. Naturally that district was the Guinea Pig for testing Radio Regulations. The outstanding amateur society in that district was the Radio Club of America. Its conduct molded what happened to amateurs all over the U.S. That was a club of amateurs when it sprouted. It grew to be a Radio Engineering society but retained some of its clubby friendliness and early members.

Just how many Wireless Clubs there have been or which was first, nobody could know. They were far from lasting organizations and the first one might have been in a town that did not have a wire telegraph or newspaper. But the Radio Club of America was in the right place with suitable membership to help the guinea pig work of the U. S. Radio Inspector's service. Somebody estimated in arguments before Congress that two thousand or more inspectors would be required to make amateurs behave, and that the poor public would have to pay each inspector $50.00 per week or thereabouts. At that rate the New York metropolitan district should have had three or four hundred inspectors. New York was assigned two inspectors. They did not get fifty a week. It was one of the weakest salaried I have drawn. The incomes I have connected with advanced or crawfished sometimes with the woods or sunspots or administrations or national psychology or indigestion. Corns, Colitis, cosmetics, cosmic rays, corporations, co-eds and cordials are related to arriving and departing coins.

In about 1907 the Junior Aero Club of U. S. was formed under the leadership of Miss Lillian E. Todd. The club included Frank King, W.E.D.Stokes, Jr., George J. Hltz and Frederick Seymour. W.E.D.Stokes,Sr. called a meeting at the Ansonia Hotel, N. Y. to form a new club. It took the name of the Junior Wireless Club Limited, January 8, 1909. Director General - W.E.D.Stokes,Sr.; Honorary President - Miss L. E. Todd; Consulting Engineer - Prof. R. A. Fessenden; President - W.E.D.

Stokes, Jr.; Counsel - Mr. Seymour; Vice-President - George Eltz; Recording Secretary - W. Faitoute Munn; Corresponding Secretary - Frank King; Treasurer - Frederick Seymour.

W. E. D. Stokes, Sr. owned the Ansonia Hotel opposite the southeast corner of New York's Central Park, where they met and exchanged information about how to build wireless sets. Stokes, Jr. was almost fourteen. Eltz and King were nearly sixteen. Stokes, Sr. seemed to be wealthy and fond of arguments with a lot of publicity. The wireless club boys got their names in the papers and went to Washington's Legislative hearings on proposed bills to control wireless. On April 28, 1910 both Stokes, Jr. and Eltz testified before the Senate Committee on Commerce ahead of John Bottomley of the Marconi Co. Frank King and Ernest Amy were also on the committee, before Congress. Buster Stokes lacked so much in size and age that he attracted a lot of attention. In the long run the publicity helped amateurs as a class. One newspaper reporting that hearing, said, speaking of Buster, "He stands about four feet five, wears short trousers and does not assume to be more than the boy he is". Buster, George, Frank and Ernest made enough noise and received enough publicity to impress Congress with the thought that amateurs might have useful possibilities. Those boys with others changed the name of the club to "Radio Club of America", holding their first meeting under that name on November 4, 1911 with President - Frank King, Vice President - George Eltz, Corres. Secretary - George Burghard and Treasurer - Ernest Amy.

In 1912 Dr. Hudson and Frank King obtained a list of amateurs by talking to them in code through the ether. From the lists of Doc and Frank, what is called the first Amateur Call book was published. It was typewritten and copied by blue printing. The Radio Club of America charged ten cents a copy for that Who's Who. It contained 111 names

with their call letters and addresses. That was the starter for the lists of amateurs prepared by the U. S. Radio Inspection Service. It was a good starter but it did not include all the amateurs who belonged in "Who's Walloping the Ether around New York".

The headquarters of the society changed from the Ansonia Hotel to the home of Frank King at 326 W. 107th Street. On October 21, 1911 the name was changed to the Radio Club of America. The officers were Frank King, president; George Eltz, Jr., Vice president; George Burghard, Corres. Secretary; Ernest Amy, Treasurer. Thirty-five years later the mailing address of the club is the office of Amy (Ernest), Aceves and King (Frank). George E. Burghard is legal counselor and chairman of the Year Book Committee. In 1934 a fine silvery twenty-five year book was printed under the chairmanship of Burghard with a preface by George Eltz. It was dedicated to: "The Spirit of Good Fellowship and the Free Interchange of Ideas among All Radio Enthusiasts".

A local Radio Engineering Society that served good fellowship for its first and last courses and did not mind letting its hair down between courses. And at dinners or banquets the fact that George E. Burghard was the grandson of George Ehret, the brewer, did not detract from the conviviality, fluency, careless honesty and humor of the Club. Their annual fracas (banquet) has bubbled at the Engineers Club opposite the New York Library for several years. Harry Honck arranges for it and Club grown talent usually make all of the speeches. The head table gang is usually selected during the preliminaries. The preliminaries involve paying for a ticket, drinking cocktails or beer, shaking hands and talking. Because some of them served as operators on ships and encountered ship's stokers who are called the "black gang", this club divides sometimes at xxxx banquets into a black and a white gang for the purpose of exchanging remarks about each other. Yes, the stories

told are usually very good dirty stories.

The Radio Club of America on January 20, 1912 adopted an emblem RCA with a flash of lightning or spark across the C. About twenty-five years later I was being considered by Congress for appointment as Federal Radio Commissioner. The word was passed around among Congressmen that I was endorsed by RCA which was true in that I was endorsed by the Radio Club of America but they made it sound like I was endorsed by a later RCA, the Radio Corporation of America. The Radio Corp. put a spark on the tail of its A, and was generally regarded by many as a would-be monopoly.

By about the first of 1913, the Radio Club of America boys had, practically all if not all, graduated from short pants. Some had graduated from high school and some were in college. In 1910 they were the Junior Wireless Club Limited and Fessenden was listed as their consulting engineer. In their 1910 testimony before Congress they implied that they would not interfere with the Navy if the Navy had Fessenden apparatus. By 1913 most of the organization, which had changed its name to the Radio Club of America, knew that tuning out an amateur or a Marconi plain antenna transmitter was not much if any easier than tuning out lightning or other "static" and that stations on the same wave length interfered. They were already headed toward getting unprejudiced information about wireless and they were trying to avoid the "hokum" in the so-called scientific information that was spread by promoters and self-rated inventors.

The Radio Club of America shifted from a boy's ether gabfest temporary organization toward a permanent scientific but fraternal organization. Now my guess is that none of them are interested in amateur gossip in code or even the spoken words of amateurs. Maybe some of

One of the proud claims of the Radio Club of America is that it is the world's oldest Radio Club; another something to be proud of is that its members sent and received the first radio message across the Atlantic using an amateur station, with a vacuum tube transmitter on an amateur wave length of about 230 meters. Their power was about 990 watts.

Those active in the building of the transmitter were E.H. Armstrong, Walker Inman, E.V. Amy, John Grinan, Minton Cronkhite and George Burghard.

Paul F Godley a member of the club had been sent across the Atlantic by the American Radio Relay League to set up a temporary station and to try to receive from some A.R.R.L. station. Amy, Armstrong, Burghard, Cronkhite, Godley and Grinan were no longer boy amateurs. Armstrong probably knew more about vacuum tube transmitters and receivers than any other one person. The others were not far behind him.

The transmitting station was 1BCG on Cronkhite's property at Greenwich, Connecticut. A monument is planned for the site of that station. Godley received two message from that station between 9:45 and 10 P.M. December 11, 1921. Also at various times messages from that station were received in every state in the U.S. and in England, Holland, Germany, Vancouver B.C., and Porto Rico. Mr. Burnham of England awarded 1BCG the prize for the best station in the A.R.R.L. test. Navy, Army and Commercial organizations became very interested in what the contest had proven could be done with vacuum tubes on amateur wave length. The amateurs and ex amateurs had provided another hitch upward for radio service.

A Club banquet story indicated that Godley and Pierson, his assistant, were irritated by chilly weather, wind, long listening and two major catastrophies namely, the tent blew down once and they ran out of scotch whiskey, once.

them or of the other amateurs of their day have grandchildren who are amateurs.

The amateur survived. His mother loved him but wished he would not stay up so late at night with headphones and sparks. She did not understand those things but those things did not seem to be like the bottles, talk and dark places that had bad effects on kids when she was a kid, neverthless she had some doubts. She could not read the code - just a lot of buzzing that might be yicious.

But, of course, all amateurs did not try to behave. We had a bad amateur in New York. In his case it was obviously willful, malicious interference. He sassed the Navy operators and amateurs who told him he was interfering. The law provided as much as a year of imprisonment and five hundred dollars fine for that.

To catch an operator who was purposely interfering and otherwise violating the law was not easy. We had no direction finders. I had made and tried them but with the then available detectors they would only be useful for a few blocks. The same later with amplifiers worked hundreds of miles. Somebody presumably an amateur, went on the air for short intervals and defied everybody. The Navy stations, amateurs and commercial stations reported him but they did not recognize the sound of his spark or touch. Amateurs thought it was a certain one of their number, mmm mainly because they thought he would do such tricks, but the interference did not sound like his spark or fist and gradually he was reported to be in places where he could not send at the time the interferences were heard by Navy, amateur and commercial listeners.

The Department did not have money for the hiring of extra people and even if they had the bureaucratic red tape produced long delays. In the Radio Club of America, the New York Herald, the Institute and

Philosophy, life + destiny have probably never been mentioned as such in any Institute meeting or publication. I asked Harold Reamans how he became acquainted with Goldsmith. He said they discovered in their undergraduate years that they enjoyed talking to each other about philosophies, life and destiny. They walked and talked about these things. When Goldsmith became interested in the Wireless Institute, Reamans came along with his pad. As a result he became legal counsel for IRE and still is. He put considerable into legal terms for incorporation and for other developments.

in others we had extra reserves, extra curricular assistants. We, the inspectors, were only two but those cooperators were numerous. Goldsmith, Zeamans and I went ~~it~~ into a huddle. The next night we, with a cop, started checking up on amateurs.

We went to their homes all of which were in apartments where we could get on the roof and check their antenna to see if they were sending. Then we went down to the apartment. In most cases nobody was at home. But when they were we made quite an impression. An inquisitive Federal inspector with a badge, a cop with badge, uniform, nightstick, handcuffs and gun and two unidentified intent men, was a disquieting combination for any who felt even no more than a suspicion of family guilt. Whether or not we contacted the trouble-maker directly we did not know but no more interference reports came in after that night.

CHAPTER XXIV

KEEPING AN ANCESTOR OUT OF THE PEN

Dr. Deforest was expected to go to Atlanta Penitentiary about Christmas of New Years in the winter of 1913-4. He had apparently been a responsible officer of companies that sold stock in the early wireless manner which did not include protective practices that could keep officers from dangerous contacts with drastic laws. He had been with Abe White in several Deforest companies, with Christopher Columbus Wilson in the United Wireless Telegraph Co. and with other promoters in one or more companies, such as the Deforest Radio Telephone Company. Wilson and his associates had gone to Atlanta and to another pen or two. Therefore, the general supposition was that Deforest and other officers of his later company would do likewise.

Emil J. Simon, who had been working hard with us in developing The Wireless Institute and The Institute of Radio Engineers, was trying to keep Deforest outside of bars - penitentiary bars. He talked to us about what we could do, maybe, and should do, maybe, for Doc. Simon had to talk a lot to get any favorable reaction from us that might be useful, largely because nobody seemed to suspect Deforest of being innocent of the charges. But, of course, Doc's chances were not so bad. The chances of anybody's going to jail were perhaps one in fifteen thousand and of going to an exclusive place like a penitentiary were, maybe, one in a hundred thousand. Those were somebody's guess about the chances of an average person and were not considered seriously in our discussions of Doc's predicament, and we knew that never would he want to be considered as an average person. Many of us considered things more or less flippantly at that time.

Radio development was not always as has been advertized. Trying to write history without halos and hokum produces distasteful results

in spots. The oral opinions about Doc were varied, mostly on the shady side. But sunnyside up or blackside up, the boys did not want to express all of their thoughts in writing.

I have, in letters from Deforest, indications of what people thought of him, in his own handwriting. The Stevenson referred to in the following was Assistant United States District Attorney. Doc said in one letter: "Stevenson told my atty that if he could be convinced of my innocence and of my genuine ability as an inventor & not merely a copyist & faker, he would be willing to give me a separate trial, or dismiss the charges. No one save my attorney has thus far said a word in my behalf". And the attitudes toward him that I encountered were mostly that - bad or worse.

Marconi had started the wireless trend which included copying what others had done and claiming too much. Deforest was not the first or unusual in that. What Deforest wanted was help from the conservative type of radio engineers who had copied others and had sometimes patented improvements but whose claims had not been noticeable or not greater than their contributions, preferably those that had not been spotlighted to sell stocks. Good inventions are sometimes only slight improvements on that of a predecessor but they do not entitle the last inventor to say he is as good as all of his predecessors plus himself. In Deforest's case it so happened that he was legally entitled at that time to be considered as an outstanding inventor but his past history and that of others in wireless were against him. He had been issued many patents and had from a legal standpoint made one great invention but at that time the value of all of the patents and what he claimed was considered questionable or worse.

Deforest had patented the three electrode vacuum tube; which has

The more I write about early radio, the more this scamp sticks out. This photo of Dee Deforest was taken ~~at Boulder Colorado about May 10, 1905.~~ Shortly before he began collecting a series of wives and vacuum tubes. The tubes are famous for their productivity. They were ancestors of Radio, Radar, Long line telephony and Electronics, plus.

The last gossip I heard was that Dee (age 73) still took a lively interest in the women and vacuum tubes.

An old time radio man who lives near Dee's home in southern California told me that Dee's present wife keeps a watchful eye on him to prevent him from making more bad contacts. Not wiring contacts in radio experiments but contacts with get-rich-quick stock schemes.

After Maxwell and Hertz, I am inclined to say Defrost was Radio's outstanding ancestor. Also I am inclined to say that he deserves more ribbing than any other of Radio's illustrious ancestors.

I recall hearing a lot of remarks to the effect that Dr. was always on the pivot for something. That picture originally looked like he was on the pivot. That was when it had legs. Radio Broadcast got the picture, cut off the legs, published it and neglected to return the original, with legs, to me. When it was taken he was returning from a good lunch with a good cigar and perhaps about three drinks, paid for by some other employee of the Am. Defrost Wireless Telegraph Co. The cost was probably entered on his "swindel sheet" (expense account) and possibly charged by the two who were showing him the Baltimore wireless station and sights.

Dvc class at Yale listed him as its homliest and nerviest member.

Yales motto was: Lux et Veritas. Lux is sometimes translated as Light and sometimes as Beauty. H/e put out the lights at Yale by ~~H~~ the unauthorized use y a wireless transmitter. They suspended him fa that. Also the New York district attorney, Edwin H. Armstrong and others frequently implied that Dvc frequently disentened the use y Veritas.

The picture y old Dvc Defforest gazing at a glass bulb may make him look like a pure scientist but it is not a Veritas picture. He was not old when he invented the "audion" that made him permanently famous. H/e was a cut-and-try scientist. Was he pure or not, I always thought he was fanny and like him.

DeForest married more than Marconi married. Shoremaker told many stories about his many affairs with women. I believe Marconi was the first wireless man to get one of his encounters with women into the newspapers.

So far my files have not disgorged the clippings but I believe Canadian and U.S. papers morgues can disclose that Marconi followed the picking-up of the letter "S" on December 12, 1901 by picking up a skirt. Follow'd by Marconi's hurried departure from that part of North America.

been developed to serve a billion people around the earth, in the third of a century since he was tried for some of the other things he had done. Stevenson made fun of Deforest's little light bulb during the trial. He did not know whether or not it was useful but he took a crack at it. In that way I think he was more or less in Deforest's class who had not know whether or not it was useful but he took a crack at it. The difference was that one had hoped it was and the other had hoped it wasn't.

Probably to help along the thought that he maybe had invented an important something, Deforest wrote a paper and read it and ad libbed it to the Institute of Radio Engineers. The paper in later years was regarded as so important that there was an argument over when it was delivered before the IRE. The IRE Proceedings said it was delivered on December 3, 1913. The New York Herald, Nov. 7, 1913 dated it "last Tuesday night" which would have been November 4, 1913. They were all wrong. Wireless Institute and IRE meetings were held on Wednesday nights, sort of ritualistically, at Fayerweather Hall, Columbia University, but beginning in Sweets' second floor dining room on the corner of Fulton (or Burling Slip) and South Streets. The real date was November 5, 1913. A goodly crowd attended at Sweets and at Columbia.

The paper as it is in the Proceedings of the IRE is an amplified result of what Doc actually gave us. As I recall it, Goldsmith took what Doc gave and sent to the Federal Telegraph for more illustrations and explanatory material. Deforest seemingly said all that is in the paper as printed in the Proceedings. But as I recall it, things in the paper and discussions were not logically together like Goldsmith arranged them for the paper as it is in the 1914 volume of IRE Proceedings.

The IRE is so old now that its "old-timers" like to talk about the

ways IRE helped to make Radio what she is and Electronics - what they are. Take any present day Radio or Electronics and you will find IRE someplace in its ancestry. Electronics has an old history too but the use of the electronics tubes in Radio was what Shiefler put Electronics into other than radio services.

That paper entitled "The Audion - Detector and Amplifier" said much about alleged uses of the audion (three electrode vacuum tube) and predicted much. Some of its anticipations were put in effect in Radio then. Some of its wire line uses were put in effect by the transcontinental wire telephone within two years. The amplifiers used in wire recording (telegraphone) did not get into noticeable use for about thirty years. To many who were born this side of the naughty naughts (1900) that paper stands out as a very valuable contribution to Radio & Electronics, but few of them know that it helped to keep Deforest on this side of the penitentiary bars. Also the later day saints cannot quite understand why we did not understand the audion and Doc Deforest better. Well, the answer is partly that we don't understand Deforest yet. The tube has been subjected to a lot of research and improvement but Doc is still Doc in a less energetic condition.

According to my notebook, at the time when I was helping to keep Deforest out of the pen and he was preparing that paper for IRE, I was on my annual civil service vacation at home in Dumont, N. J. I had to make special trips to New York to help Doc, attend the IRE meeting and get my Department of Commerce paychecks. Also the file letters from Terrel and my letters to Colonel Firth and Doc indicate that I was taking it easy in Dumont while Doc was taking it hard in New York. Colonel Firth was another whom Simon had persuaded to help Doc. Terrel took no part except to let me know that Stevenson was trying to get in touch

with me. I was experimenting at that time, not with an audion but with a Goldschmidt type of dynamo I had made and some devices for measuring high frequency currents.

Those I talked to about helping Doc were suspicious of Doc, the audion or both. They were not sure the audion was a practical device and even if it were, they were not sure that Doc had invented it. They did not want to sign a petition saying how much of an inventor they thought he was. But most of them thought he might not belong in the same class as other officers of the company. They felt that Doc had also tried to design better wireless devices while the others only tried to sell wireless stock certificates. Therefore, I prepared a petition asking that Deforest be given a separate trial. The wording of the petition in its final draft was, I believe, editted by Simon and Goldsmith and typed by Goldsmith. The copy of the petition after it was signed was, I believe, made by Herman Schlang, our Radio Inspection Service stenographer.

On the evening of Nov. 5, 1913, in Sweets dining room after the boys had put away some good food, beer and coffee, I took the petition from table to table. When Cloyd Marshall read it, he looked up at me and said, "What's the matter, Marriott, are you getting mellow?" Some of those present did not sign. Some signed because they read it carefully, some did not read but signed, presumably on the basis that they would not be asked to sign any but a worthy document. Here is the petition and its signers. Check up on the signers, they are not a bad lot, or are they? They have been mentioned in publications, including various who's whos. Goldsmith and I signed it before the dinner. When I went from table to table with it after dinner at Sweets, they signed all over the page below our signatures.

"We, the undersigned, members of The Radio Engineering Profession, re-

quest that, should Dr. Lee Deforest be tried for any alleged infraction of our Law, he be given a trial separate from that of others who may be tried and whose profession is other than that of Radio Engineering."

R. H. Marriott
Alfred N. Goldsmith

R. C. Crosby
George B. Englund
J. K. Noble
E. H. Armstrong
Fredk. G. Simpson
E. F. Alexanderson
Samuel Isler
T. E. Ward
E. F. Yudkin
J. W. Tracey
John Stone Stone
Joseph D. Laurent
G. H. Clark
W. E. Chadbourne
D. Sarnoff
G. J. Waller
C. H. Sphar
E. E. Butcher
John Engler
I. J. Roberts
A. M. Curtis
E. B. Mayer
H. Atherton Moore
Harold R. Zeamans
Edw. J. Nolan
J. F. Arnold
J. E. Orinan
W. T. Russell
P. D. Naugle
R. H. Langley
Julius Weinberger
W. S. Lemmon
M. C. Spencer
C. A. Le Quesne, Jr.
Emil J. Simon
Cloyd Marshall
Guy Hill
H. W. Secor
V. F. Camp
Jos. A. Fried
F. N. Waterman
A. E. Seelig
Jane Victory
Chas. E. Apgar
S. Singer
F. Lowenstein
R. A. Weagant

Doc was not at the dinner but presented the paper at Columbia later in the evening. The next day, Nov. 6, he wrote me from Spuyten Duyvil, N. Y. thanking me for my efforts regarding the petition. Asst. District Atty. Stevenson tried to get in touch me with me at the Custom House on the tenth but as I was on vacation I did not see him until later. When we got together Stevenson and I talked about Doc for two and a half hours. My impression was that our petition would not get a separate trial for Deforest but that it would reduce the violence of Stevenson's attacks on Deforest during the trial. I mailed the petition to Stevenson on the twenty-first. On the twenty-seventh Doc wrote me from 1391 Sedgwick Ave., N. Y. thanking me for conferring with Stevenson and delivering the petition saying he thought those efforts "will be productive of good". Also he wanted some of us to take the witness stand for him. I was at his trial on Dec. 1, 1913 but do not recall going on the witness stand.

I understood that Stevenson handled the case as though he did not think Doc was in quite the same class as his associate officers who

were convicted. The Jury decided that Doc was not guilty of three charges. They could not agree about the fourth charge so Doc wasn't fined or locked up. He did not get a pen term or a fine for Xmas or New Years. He was free to get more wives and promoters. Which he did.

Doc did not turn up every winter with a different paper or trial, nor every summer with a new wife. However, Doc had presented a paper the year before on Nov. 6, 1912 on "Recent Developments in the Work of the Federal Telegraph Co." At that time the dinner gossip was to the effect that Doc had been engaged in a divorce trial in San Francisco during which the Judge had asked him what his marital standing was. To which Doc had responded that he was only a biological necessity. Whether or not that story was true, I made no effort to find out. At any rate it sounded like what could be expected from Doc.

Emil Simon had prodded me and others to help Doc, otherwise we probably would not have presented the petition and Doc might have been imprisoned. Emil continued to look out for Doc. At that time the building on the southeast corner of Broadway and Forty-second was the Knickerbocker Hotel. The corner entrance was to the bar. Deforest in one of his stories said Simon was a stage-door Johnny. I don't know about that but I do know I met him occasionally in the evening at that corner which was not far from several stage doors. Anyhow, one one week-end evening not long after Emil had helped to keep Doc out of prison, he introduced Doc to a chorus girl. Whether brotherly love caused Simon to do those things or not, he didn't say, but Doc married the girl in the City of Brotherly Love within a few days. The company moved from New York to the Quaker City and Doc went with it and her. That marriage was quite productive and lasted quite a while, without public reference to biology. Gossip said he tried to promote that wife as a grand opera singer.

Emil J. Simon was also a major Radio Ancestor and did not confine his efforts to keeping Doc out of prison, or keeping him wedded. When his friend, Morris Liebman, died, Emil gave the IRE ten thousand dollars to provide an annual prize for an outstanding Radio development. Liebman was the Foote-Pierson shop manager who made radio equipment according to Emil Simon's designs. For about a quarter of a century that prize has helped to develop Radio.

Doc was a promoter himself, of himself , whether he was entitled to promotion or not. Deforest was outstandingly capable in the getting of others to promote or help him. After he had been helped to stay out of prison, efforts were made to have him elected to the highest membership rank in the IRE. I objected because my efforts to help him had called down a lot of abuse on me by members who thought badly of him in a variety of ways that indicated we should wait and see before advancing Doc to the highest grade. Very soon thereafter I received similar letters from two government employees in Washington, implying that the entire welfare of the Institute depended on my approving Deforest's advancement in grade. They did not know the facts but were being influenced by some of Doc's promotional connections. So I was damned for helping Doc and by others for not helping him to get the next thing he wanted. In fact, it took years to bring out how Deforest stood as an inventor. Where Doc stood or stands in other respects is still rather subject to modification. In later years in Hollywood, he has added bankruptcy, another wife and occasional publicity.

I helped to elect Deforest to the office of President of the IRE shortly before he left the Atlantic coast for Hollywood and I was cussed for that. If I had helped him I got into trouble and if I opposed a scheme of his, I got into trouble. But now I guess anybody will admit that he, from a legal standpoint, invented the three electrode vacuum

High vacuua tubes would have been made ovvner if McCandless had possessed a better vacuum pump.

In 1911 Fred Sammis told me the Marconi companies had been trying to get higher vacuum tubes in the U.S. and Europe. He sent me to McCandless to see if I could work out a scheme with him for higher vacuua.

McCandless was irritable. He had been pestered for higher vacuua so often. Very likely Defrest had been after him for a long time. Defrest would, if he ran to form, have said: since some vacuum is good, more may be better. I have heard stories to the effect that Defrest and his boys did try to pump more air out of the McCandless tubes.

tube. Then some will say, yes, but without enough vacuum and then they get unfriendly. Both the A.T.& T. and General Electric Company obtained better vacuum pumps and by using those pumps they produced better tubes than what previous tube makers had produced. They ancestored better wireless tubes for what became pupularly known as Radio about a decade later.

H. D. Arnold of the A.T. & T. and Irving Langmuir of General Electric, with better vacuum pumps, almost simultaneously but not at all cooperatively, took the deceitful characteristics out of the audion. They improved its circulation so it did not have a heart attack frequently and turn blue. They took enough more wind out of it to make a fairly reliable electronic device that other Radio Ancestors would have faith in, for new developments in Radio or in other places where electronics could be useful. Also the new tubes had the characteristics of having been turned out by a combination of research men and various skilled craftsmen.

The making of a better audion when better vacuum pumps became available seemed to fit into a natural succession of events. Also it seemed natural that amateurs with inexpensive and careless connections would connect some audions so they would feed ~~leads~~ back to produce better than regular detector results. Those were naturals after the audion had been devised. But according to Babcock's story, the original audion was inspired by Deforest's mind by the thought that if Fleming found two electrodes in a vacuum made a detector, maybe three or a flock of electrodes in a vacuum tube would make a better detector.

Electronic vacuum tubes go back in history a hundred years or more. The Fleming valve and other devices that preceded it were what we now call electronic devices. Fleming picked up an electronic device and

applied it to Radio. It included a hot and cold electrode in a vacuum. Deforest had his assistants put more electrodes in similar vacuums and changed some of the connections. Subsequent inventors produced better vacuums and changed still more connections. From there the vacuum tube electronics have expanded into many fields other than Radio.

At the time when Deforest was trying to use the electronics of the vacuum tube to keep Doc out of the pen, others were working on such electronics, too. They were hopeful but worried and continued to be for several years. In 1915 the improved audion was not going too strong but strong enough for the telephone company to use it in relaying wire line telephony across the U. S. to the World's Fair in San Francisco and to use it for sending Radio Telephone messages from Arlington, Va. to Paris, Honolulu and Mare Island, California. I was at Mare Island when they were received but not in the Radio station. I had been at Arlington Navy Station not many days before and knew that a lot of tubes were being assembled in the extension at the back of the station to be used as a Radio transmitter but I did not know they were going to try to receive it at such great distances.

That Arlington transmission was a broadcast with hopes that it would be heard by men who were sent to places to hear it. When the war came on in 1917, the same kind of tubes that were used at Arlington were used in the Radio Telephones made for war purposes. But they did not use a Block of tubes in one transmitter as was done at Arlington. After the war those smaller tube transmitters were used to start broadcasting and the numerous war veterans, ex-amateurs and amateurs, users of audions, made up the broadcast audiences together with their relatives, friends and neighbors. But that was several years after Deforest's audion as a detector and amplifier helped keep Deforest from going to the pen. Radio and Electronics existed long before Deforest messed

them up, but he certainly helped to kick them upstairs.

Deforest has come east from Hollywood several times. His promotional friends have tried apparently every time to get him as much publicity as they could and arrange for dinners to be attended by some of the older of the still animated Radio Ancestors, and we old-timers like those Reviews. The fact that Doc lives in Hollywood does not mean that he is on a payroll as an actor. He has been connected with a laboratory there that builds diathermy generators. He has been in the sound-on-film business with promoters but not now so far as I have heard. To us old-timers, he is some actor. We would not be surprised to read that he was interviewed on a skiing trip while recuperating from producing a wonderful invention and triplets, maybe from a wife we have heard about or a new one. He has been a very versatile Radio Ancestor. Very audible, with and without vacuums and added connections.

CHAPTER XXV

VARIETY IN INSPECTIONS

Radio had to make good in the life saving business and war work before it took with the public for home use. When it was domesticated the public decided that wireless was what saved lives and things but radio was phonograph records and things that were broadcast to sell soap, etc. Broadcasting had occurred a dozen or more years before the public became broadcast conscious. Fessenden gave a short Xmas recital. Deforest did it a little later and more of it for years. So did the Merry Widow and I from the end of Sheepshead Bay, modestly. The Merry Widow as seen across my laboratory had the same sex appeal as Yankee Doodle. Both were phonograph records to be played on a "his master's voice" phonograph with the microphone stuck in the horn. I actually bought the phonograph from a Nassau Street show window where it was showing with a nice looking white fox terrier that I did not want because it was not a real dog, did not smell, was not odiferous, or have the other qualities except shape and color that I like. It was paper and paint.

All the way through Radio development the earlier Radio ancestors did a variety of things, some of which were unexpected and not suspected. The beginning Radio Inspectors did various things that later inspectors did not do. The first Radio inspectors were not standardized, nobody knew exactly what they were expected to do, and they did not know by precedent what their Bureau bosses would do or what the commercial and amateur folks would do. The inspectors were more or less between the shore devils and deep seagoers. Inspectors could have trouble with bureaucrats, seagoing autocrats and plutocrats. Radio inspectors could be suspected of various things that they did not do and not suspented of some they did.

I inspected ship and shore wireless stations usually without warning. In the beginning, because I could not anticipate my time accurately. There were unexpected things to be done in the office, urgent unexpected inspections and defects were found that caused delays. It soon became apparent that not knowing when the inspector would walk in caused operators and maintenance men to try to see that equipment was kept in good order.

The regulations restricted different users of radio to different times of operation, different wave lengths, purity of waves (decrement limitations), amount of power and required that both stations and operators be licensed. Ships requiring radio under the law on the oceans and Great Lakes usually were required to have two licensed operators and they were required to have auxiliary power for emergency use. In addition to these were variations and special complications. Roughly, commercial shore stations were tunnd to 600 meters or 1600 meters and higher. Ships were tuned to 600 and 300 meters. Amateurs were given what did not seem to be useful for military or commercial users; 200 meters or less.

A British operator told a story describing his experience with inspectors. He said in Europe the inspector notified the steamship company that their vessel would be inspected on a certain day and that the inspector would come aboard at a certain hour. The operator and other crew members were ordered to make preparations. The inspector in uniform was met at the gang plank and escorted to the captain who escorted him to refreshments and from there to the wireless room where the operators stood at attention. The inspector looked at the equipment, asked a question or two and was escorted back to the dock. But in New York a small, insignificant chap in baggy clothes with things sticking out the pockets would come aboard and climb the ladder nearest the

wireless cabin, walk in, say he was the U. S. Radio inspector and pull his coat back revealing a handsome gold badge. He would operate your main and the auxiliary transmitter, read all of your meters and some of his own, weigh the acid in your storage batteries, examine your licenses, operate the communication phone or tube to the bridge, tell you that this or that must be put in order before sailing or the ship would be liable for a five thousand dollar fine, say he would be back and then go and tell the captain the same and give it to him in writing.

On one occasion Terrel sent word that the Collector of Customs wanted to see me the next morning. Terrel did not seem to know why except that it had to do with the customs service, something their own men were not in a position to handle but that I might be able to do without apparent departure from my inspection methods.

The Collector told me he expected diamond smugglers on a boat that was arriving that forenoon and he wanted me to go aboard as soon as the vessel docked and examine the copies of radio messages that had been handled while the ship was approaching the U. S. No U. S. officer probably could demand the right to see such messages on a U. S. vessel and this was a German vessel. But I frequently boarded vessels when the first gangplank hit the dock and inspected the wireless. Also I had inspected this vessel many times and he thought I might be able to see the copies of messages. I thought I could too, particularly on that vessel because the operators would be on the job and they were very proud of the amount of business they handled. And the amount of business they handled was of interest to us because it indicated capable apparatus and capable operators.

I had always found the equipment on this vessel in first class

condition and the operators knew that. They were not at all excited by my sudden appearance just as they were about to go off duty. When I asked a few questions and wanted to know if they handled a lot of business on this trip, they brought me the file of copies. I went through the file. The Collector had told me to look for a message containing certain addresses, names or sentences. I found one and memorized it, laid down the file and wrote key letters on my inspection blank while I talked to the operators and wrote their names and license data. The rest of the data I knew and the amount of business handled indicated the set was operative. Also we had people listening to it on the way in, so I could fill out ~~almost all of~~ the blank later.

I was back on the dock in about ten minutes and in a phone booth that I had been told to use. Almost immediately after I gave a number the Collector answered. I repeated the message to him. He thanked me and hung up. I suppose an officer in plain clothes had monopolized that booth until I showed up. Also the disembarkation of the passengers had apparently been delayed. They began to trickle down after I left the booth. Apparently nobody on the dock or on the ship except the operators had paid the slightest attention to me. I moved on to another ship and learned about six hours later that two chaps came ashore and were taken into custody with fifty thousand dollars worth of secreted diamonds and a confederate on shore had also been arrested. Just what part the wireless message played, I don't know.

Europeans seemed to think inspectors should be treated to some refreshment. U. S. ship officers paid little or no attention to Radio inspectors except to cooperate in testing or repairing apparatus when requested. The only Japanese ships I encountered were at Seattle while I was there for about six weeks. They were very attentive but offerred no refreshments.

I improved my French, German and sign language. Greek and Italian as spoken were beyond me. In print I could understand a few words. Most ship operators spoke some English. Russian vessel operators were U. S. citizens. Belgians were very easy to understand, very cooperative and served excellent Danish beer, not too cold or warm. Russian arrival dinners were too much. I understand they lasted from 1 P.M. to sometimes the next day. I tried one of their ordinary midday meals that went something like this: vodka, soup, fish, continuous full half-litre glasses of beer, five or six kinds of vegetables, meats, breads, ice cream, fruit, cake, coffee, pony of brandy and cigars. The table was always full of food and waiters tried to see that you avoided none. Greek meals were too different from what I was raised on for me to enjoy them.

What was known as the ten-inch Marconi coil transmitter gave us the most trouble. We knew the vibrator interrupter it used was unreliable but it might work when we tried it. It took its power from storage batteries, which frequently were not in good condition when we examined them. We required them to be put in good condition before the ship sailed. Usually they had plenty of time for that. The deck insulator they used would leak electricity in damp weather, but despite those defects, the company insisted on using that transmitter as an auxiliary. The auxiliary was most apt to be required when the ship was in such distress that the engine room could not supply power and distress conditions occur in damp thick weather.

On one occasion the SS Olympic's storage batteries were found in poor condition. To correct them would take up to sailing time on the 4th of July. I said I would make the inspection the 4th. Her British captain said "but that is a holiday". I told him I would be there on the 4th and I was. He never got over that. I had to avoid going on that ship near lunch or tea time. He always wanted to feed me. That captain

appreciated wireless and his attitude was almost opposite to many British captains.

Arrogance was one of the reasons for Radio laws. The SS Titanic was notified by wireless that icebergs were in the vicinity. The Titanic operator did not report the message to the bridge. Later he received more such wireless warnings and reported them to the bridge but apparently the officers paid no attention. They were full of arrogance or something. The SS Californian was nearby reporting bergs. The arrogant Titanic operator told him to shut up. The Californian operator did shut up and went to bed so no nearby wireless operator heard the Titanic's wireless screams for help. The Californian was probably close enough to have taken everybody off the Titanic when she struck but having been told to shut up, that vessel had become deaf and had gone on her way, too far away to help the Titanic.

On one occasion I had the pleasure of hearing an English captain cuss me, all the other damned Yankees and others who had to do with the making of wireless laws. I found the wireless on his ship to be out of order and went to the bridge to report it. The captain and two other officers were in the chart room. I told him the trouble that would have to be corrected before he left port or the vessel would be subject to a five thousand dollar fine. Then I handed him the same information in writing and kept a carbon copy and said I would be back before he was due to sail. He looked like he was full of profanity that would be released when I was out of range. I did not go out of range immediately but stepped around the corner of the chart room and waited for the remarks. Outside of the cussing of all who might in any way be responsible for his getting that kind of a ticket, he stated that he had never lost a ship in the many years before he had to carry wireless, that he did not need it and that it was a seagoing nuisance. I kept out of sight by

going down aft. When I returned on sailing day, the wireless was fixed.

I guess my queerest experience was with an operator. On a French vessel equipped with Marconi apparatus, the operator had substituted U.S. made amateur receiving equipment for the equipment supplied by the company. It was a crystal detector outfit. The induction type of tuner and general assembly had been made by him. I gathered from what he said he had been several months in the process of getting it together which included talking to other operators, reading with difficulty the U.S. popular articles on how to make and where to buy, buying parts in New York, winding and rewinding and connecting and disconnecting.

I tried his receiver. Having designed a number of receivers myself and having listened in that locality on various receivers to the hearable stations, I was a good judge or thought I was. I was impressed by his laudable efforts and laudable results and told him so. In my enthusiasm I enlarged on how much better his receiver was than the receiver that had been supplied to him by the Telegraphie Sans Fil Company that employed him. He grabbed the receiving equipment, tore it from the table and slammed it on the floor. He was obviously an impetuous Frenchman and he may not have understood all I said but my guess was that he thought the receiver was bad if it caused anybody to think the company he worked for did not supply the best in wireless. To those of us who inspected various kinds of equipment, what his company supplied was far from the best and we were pleased when the inferiority of apparatus was demonstrated. But he probably thought his adventure into making and using a better receiver looked like disloyalty to the company he worked for so his inspiration was to ruin that good receiver.

To avoid creating interference in New York harbor and get at the same time fair comparisons with different transmitters by applying them

to the same task and measuring instruments, I made a dummy antenna. A combination of inductance, capacity and resistance that did not radiate interference but was otherwise similar to a radiating antenna. I could not carry it and the other instruments which were needed. Dr. Goldsmith talked to his physics class at the College of the City of New York. Bill Preece and Lester Israel volunteered and went on inspections with me, lugging the dummy. Lester later changed his name to Jones, his mother's maiden name. William, Lester and I boarded the ships. Lester carried the inductance and Leyden jars. William carried the resistance and ammeter. He was the watts. EM (that's me) carried the briefcase where the records were recorded and the meter that indicated the wave lengths and decrements. That is, figuratively speaking, we divided our equipment that way. Big Bill Preece carried the heaviest load, with a grin. Bill had the most watts, so really Lester and I carried the lighter stuff.

It was difficult to tell the British anything about superior radio equipment. They held like a bulldog to the stand that anything British was always superior. But the companies that controlled some 200 U.S. vessels, listened to me and appointed a committee to examine an exhibit of a higher class transmitter with full power auxiliary of Edison Storage batteries, and another committee was appointed to call on Mr. Chamberlain, chief of the Bureau of Navigation, relative to the law in the matter. The demonstrations were at the College of the City of New York. It was extra curricular work for Goldsmith and for me. I could seldom demonstrate because I was inspecting and Goldsmith could only demonstrate when he was not lecturing. Therefore, demonstrations were arranged by telephone in advance.

The equipment that Goldsmith and I installed for months of repeated tests in CC.N.Y. physics laboratories consisted of a Telefunken

five hundred cycle quenched gap transmitter and Edison storage batteries. The transmitter was the most efficient transmitter of that time. That is, it would send a readable wireless signal over a greater distance in proportion to the amount of power it drew from the ship's engine room or storage batteries than any other transmitter I tested. The Edison storage batteries were chosen because they were more nearly fool-proof than the lead-acid batteries. A hundred cells were used of the smallest size that would comply with the law. We ran the set continuously for four hours in tests - for example, sending my call letters (MA). It was explained to our visitors that this was minimum equipment; if larger cells were used, the set could be operated longer or if larger cells and a more powerful transmitter were used, the signals could be sent to a greater distance.

Before I tried to borrow a set of storage cells for the demonstration, a steamship company president had told Edison that the Radio Inspection Service had a live wire in New York that was prodding them to have a large storage battery available to run their wireless sets at full power if the ship's power failed in an emergency and that the inspector had said the Edison battery was most suitable. Edison told me about it in his laboratory office that contained the big soft leather chairs and the big soft leather sofa where he could lie down for a nap. In his younger days he pushed back things at a work bench and took a bench nap on the occasions when he was too much interested in something to go home and to bed. I got the promise of the battery and as I was leaving Miller Reese Hutchinson gave me a photograph of Edison. On it is written: To the Wireless Live Wire, R. H. Marriott, (signed) Thos. A. Edison.

Several people examined our exhibit. Here is an extract from an American Steamship Association letter:

New York, June 11, 1913

"To the Committee of Construction, Maintenance and Repair,
American Steamship Association.

"Gentlemen:

I am pleased to advise that, with Mr. Geo. C. Shephard, of the American-Hawaiian Steamship Co., I visited the College of the City of New York on June 6th, and that we examined a complete outfit of wireless telegraphy there, which had been installed by Mr. Marriott, U.S. Radio Inspector, and Prof. Goldsmith ----------we found our visit very interesting, as well as instructive. I enclose for your consideration a specification for wireless equipment, which has been prepared by Mr. Marriott,-------

Yours truly,

H. C. Higgins, Chairman"

The demonstration helped to bring about better wireless for all around protection. The United Fruit installed bigger batteries and transmitters than we demonstrated. However, the particularly unsatisfactory Marconi induction coil and plain antenna was hit hardest later by two spectacular failures of those unreliable devices that were not only embarrassing but quite expensive for a British steamship line and the Marconi Company and one of which embarrassed the boss of us inspectors, the Commissioner of Navigation. The commissioner was returning from a trip to Europe for a conference at government expense and with the steamship companies' special attention. As he was the boss, we at New York went down to the boat to meet him. After the greeting I went aboard the boat that brought him back to us. The auxiliary wireless wouldn't work. If that ship had encountered something that cut off the engine room power and was sinking the ship, the Commish could not have been saved by wireless because it would not work. The failure of the equipment not only came out in our reports but in public print.

As early as 1897 we said interference would be avoided by tuning wireless to different frequencies when continuous wave transmitters came into use that became possible. But for years the inability to tune out interference was an outstanding feature of wireless.

The first commercial transmitters used a vertical wire that sparked to ground (plain antenna). It was about as easy to tune out as lightning and we did not have receivers that could be tuned to different frequencies.

Then the spark was put in a separate circuit that was inductively coupled to the antenna and the detector was in a separate circuit inductively coupled to the antenna. Each of the circuits could be tuned to some extent but couplings were usually close (tight) and fixed. This was an improvement, more stations could be turned out.

Various scientific and technical people knew various features of the interference and other radio problems. We had to get together to educate each other and others who had no theoretical or practical understanding of alternating current, waves, or resonance. IRE helped to do that. Business managments resisted the starting of the institute but once it was started they paid attention. After I became U.S. radio inspector, I don't believe even John Bottomley of the Marconi Co. would have said anything against IRE while I could hear him. No business manager wanted to irritate an inspector.

John Stone Stone became acutely interested in resonance while working mathematically on wire telephone problems. He promoted a company to make better use of resonance. In 1903 he with others formed the Stone Telephone and Telegraph Company with a capital stock of ten million dollars.

The Stone company set up wireless stations with loose coupled transmitters and receivers. Two stations working back and forth that way could avoid interference from other stations and to some extent from disturbances such as were produced by the sparking at street car trolly contacts. Others in the U.S and Europe advocated loose coupling and in time it came into use.

George H. Clark recorded details of this in "The Life of John Stone Stone" a book published privately and distributed to a number of libraries.

Resonance probably contributed to the Stone companies' failure in its last competitive demonstration for the award of a Navy contract. Before the tests the rumor was that the Stone Company had a Unity Power Factor transformer. That was a 100% power factor. The power factor of transformers commonly used in wireless transmitters was much less than 100%. The secondary of the Stone company's transformer was said to be resonant to the frequency of the current supplied to the primary. With such resonance, larger wire and better insulation than usual would be needed as a safety factor as secondary current and voltage would probably be excessive at times. After the test the story that came out was that the transformer burned up.

Our operators in Limited Wireless did not like loose coupled transmitters. Tight coupled transmitters made a broad disturbance. Our ships transmitters were on a number of different waves from a very broad 200 meters to 600 that was not quite so broad. With loose coupling at a transmitter the receiving operator had to keep turning to pick it up. A good many operators liked to set their tuners at a place that was likely to pick a station they might want to talk to and then lie down on the bunk for a nap or to read a magazine. Their pay was small. There was some incentive for picking up news from certain shore stations. They inserted the news in a thin magazine called the "Aerogram" and sold copies. They could keep part of these receipts.

If we put in effect some method or device that the operators did not like they would tell their chief it interfered with business, he would tell the business managers who would complain to Secretary Marshal and we at least had to do a lot of arguing. The reports I got about loose coupled shore stations was that the ships, nearly all, failed to hear them.

I was able to get loose coupled receiving tuners used at D.F. largely because I selected the operators and paid them a bonus based on the quantity of paid business they handled and the distance over which they sent & received it. To get what they could use quickly and easily I built several kinds of loose couplers, some were odd. Before the demise of United Wireless a large number of its ships and shore stations were being supplied with tuners in which the coupling could be easily varied over a wide range. The Dimer was going out and one about like Picard's IP was taking its place.

When the radio law and regulations took over telling radio and steamship people what they could & couldn't do, a low decrement was required that could only be attained, with the U.S. spark transmitters in use, by loosening their couplings.

Also we were required to see that the transmitters on ships with general public service wireless stations be tuned to 300 and 600 metres. 300 did not give service as far as 600, so the normal wave length was 600. The idea behind that was if ships sent in 600 only receivers would be tuned to 600 only and all distress calls would be heard.

Our idea was not the same. We thought all ships having paid messages to deliver would be trying to get them to shore stations on 600 (their only wave) and a ship in distress would have to be very close to some listening ship or shore station to have ~~their~~ her SOS heard above the messages on 600. Also that there would be very little general public service if stations had to take turns using 600.

We found a loop-hole. Regulations said transmitter wave lengths should be as specified, within an accuracy of 10%. Using that leeway I tuned ship transmitters to such wave lengths as 540, 545, 550 -- up to 660. Some could be put on the same wave because ~~they~~ were never at sea at the same time or were seldom close together.

My reports went to Washington. Before long, we received a letter saying, in effect, the law and regulations meant I was to tune the transmitters to as near 600 as I was able, the 10% was only to take care of errors and meant 5% above or below 600, a total of 10%. We explained to Washington in written detail why we tuned the transmitters to the approximately 25 different wave lengths between 540 and 660. I suppose wireless companies backed me up because I heard no more about it and the ships wave lengths were not changed.

That variety in wave lengths made the loose couplings valuable. If they had to all be on 600 they would have done better on tight coupling that would have come in loudest on two wave lengths from one station and a different two on another, subject to a variety of interferences from other tight transmitters. There was plenty of confusion and interferences in radio development.

CHAPTER XXVI

AN ANCESTOR RETIRES

Some ancestors were people, some were devices and some were vices - many sorts of people, things and policies. The plain aerial type of transmitter was retired in 1914. Marconi had used it for about eighteen years. It was such an objectionable arrangement that others had abandoned it about a dozen years earlier. Also it was agreed in 1914 that no more induction coils were to be born for use in wireless and those that existed could be used only if inspections and tests indicated that the wireless transmitters in which they might charge condensers, complied with law.

The plain aerial was an ancestor that followed the earlier Hertz arrangement. The induction coil that was placed on probation in 1914 was used for wireless experiments by several before and after Marconi first used it. Outside of wireless it was used mainly in large sizes for X-rays and in small sizes to make sparks in gas engines. Amateurs used these little ones on plain aerial at first.

The coil at best produced a raucous buzz that was difficult to read through static because it sounded so much like static. Vibrator changes and running down of the storage battery produced signals that were harder to read or failed altogether. Adjusting a vibrator took time. The chief weakness was the Bradfield insulator in Marconi plain aerials, called that because W. W. Bradfield designed it. That insulator was a hard rubber tube with a brass rod through it and an inverted metal funnel on top to protect it from rain. But moisture would precipitate on the tube when it rained and when the humidity was high and when spray was blown above the ship's sides. Also the other antenna insulators leaked electricity in wet weather when the plain antenna connection was used. British called it plain aerial - we

called it plain antenna.

When Commissioner E. T. Chamberlain returned on the SS Majestic on the morning of January 29, 1914, Terrel and I were at the bottom of the gangplank to greet him. He was our boss. He had gone to Europe for some kind of a conference. Probably it had to do with safety at sea. Being a U.S. Government officer, the Majestic crew from captain down had been extra nice to him. He said they had and we saw their cordial farewells before he came down the gangplank. What an auxiliary plain aerial transmitter didn't do and what I did do made that kow-towing very embarrassing to the Commissioner, within a few hours. The weather was the damp kind that put plain aerials on the bum. I probably could have found several if I could have been in several places at about the same time. That day and the next not only produced embarrassments but the plain aerials and weather cost two steamship lines and the Marconi Co. dollars and pounds.

The Majestic on that occasion was not sailing for the White Star Line but for the American Line. After Commissioner Chamberlain had been received, Terrel accompanied him and I went aboard to inspect the Majestic wireless. The wireless set did not work, instead the roof insulator, known as the Bradfield, caught fire. I asked the operator to put in a new roof insulator while I went on to inspect the Cedric and Kroonland, intending to be back in about two hours.

As the Cedric was due to sail at noon, I asked the man at the gangplank to hold it until I went ashore. It was then 11:45. That set was bad in the common plain aerial manner and uncommon ways. A wire had been thrown loose about the soundproof transmitter room so it grounded both transmitters. This was cleared up five minutes before sailing time. Then the plain antenna auxiliary set fire to the Brad-

field as occurred on the Majestic. I telephoned the bridge and reported the situation to the officer on watch. The captain wanted to sail at noon and asked if I would stay aboard and come back by tug. I said I would if they did not proceed farther than St. Georges. A little later the captain said the tug was alongside to take me ashore. I told him the operator had put in a new roof insulator and the set still failed to work which probably meant defective insulators aloft and that if I went ashore with things that way I would report the ship and captain for violation of the law. I suggested he send the tug ashore to get repair men and a complete set of insulators. Also I suggested that the operator try to send a wireless message to the Marconi Co. to expedite matters. I thought he could get through, using the main set. He didn't but burned out fuses in the radio room and engine room, while I was on the bridge talking to the captain. We were anchored off the Statue of Liberty about twelve miles from Sea Gate, the Marconi station, but he apparently did not get a message through. The tug did not come back for about two hours. In the meantime the insulators aloft seemingly dried and both the main set and auxiliary operated about as good as they ever did. Dave Sarnoff, who was then local inspector for the Marconi W.T. Co. of America came on the tug and brought a full set of insulators which he left aboard. We went ashore but before the vessel could up-anchor and sail, a heavy fog moved in. They remained at anchor. Between the wireless and the fog, the vessel said it was delayed twenty-six hours. The gossip was that the steamship line estimated a loss of over ten thousand dollars and collected about six hundred pounds from the Marconi Company.

The Cedric's captain complained that we should inspect longer before sailing time. The British apparently wanted us to inspect for them. The stories the operators told us were to the effect that certain

older British Marconi operators were supposed to inspect British ships when they were in port but that the local Marconi W.T. Co. of America was not to be called upon for inspections or repairs because the British company did not want to pay their charges. Some seemed to think we could inspect on arrival which would reduce the necessary care on the part of the steamship company or Marconi Co. Foxy birds trying to get our service to inspect sets for them. Inspection on arrival corrected some faults but it was inspection just before sailing that broke the bulldog hold of the dangerously unreliable Marconi plain aerial transmitter.

Because of the Cedric's failure to work I did not get back to the Majestic until the next morning at 9:30 and found the wireless room locked. The room where I had formerly found an operator was vacant. By the help of a steward I found a sleeping operator below decks and got a key to the wireless cabin from him. At 9:40 I tested the auxiliary and it did not work. I went to the bridge and notified Captain Beadwell. At 9:50 Port Captain Smith came into the wireless room. I knew him fairly well but don't know who notified him. Between 9:50 and 10 both captains searched for the operator. A wireless that would not work and an operator not findable. There should have been two operators. Even the one I had obtained the key from had seemingly fanished. The supposition is that because the Commissioner had come over with them and was my boss, they felt a husky "to hell with the inspector" and acted accordingly. They thought there was economic or class distinction pressure here as probably there was in Europe, and in some cases there was maybe, but not in that one.

At 10:00 A.M. the operator came into the room and was unable to make the apparatus work. Captain Beadwell asked if I would go out with him as I had with the Cedric. I said I would as far as St. Georges,

Staten Island. I did not explain that I did not approve of anything that would shanghai me to Europe. Hell, no, if I was six hours late my wife called the police. If I was later, she probably would call the National Guard, Army and Navy.

The operator claimed he had put in a new deck, roof or Bradfield insulator as I had suggested the day before but that I had not come back as I said I would within two or three hours. He was right in one respect, I was anchored near the Statue of Liberty on the S.S. Cedric when I expected to be back on her sister, the Majestic. Also I could not get a message ashore by wireless. At 10:05 the Majestic left the dock. At 10:24 the equipment worked. It worked probably because moving downstream dried the insulators. Of course, I knew that such recovery did not insure their usefulness in a distress case but I had to stay entirely within the law, so a tug took me back to the Red Star Line pier.

If I went to sea outside of the Port of New York on a ship that did not have workable wireless, the steamship company would still be liable. Also if I went to sea with the Red Star Line or even with the White Star Line, my wife might suspect I was not with a star but with some gal in the supporting cast. She got the police to try to find me when I was several hours late in reporting. If we got outside and I could not send a wireless message ashore, she probably would have sent the Navy after her shanghaied husband.

As it was, the Majestic was delayed about two hours. The Failure of wireless on the Majestic was about as effective as the twenty-six hour delay of the Cedric because the Commissioner himself had come over on the Majestic and the wireless might have been out of order then or would have been if they had encountered similar damp weather. Of

course, the Commissioner knew very little about wireless. He fell heir to the Radio Inspection Service because the law as enacted put that service under the Department of Commerce and Labor. The Bureau of Navigation seemed to be the suitable place in the Department, so Chamberlain, as head of that Bureau, got it. Commerce and Labor were divorced soon after and Navigation remained with Commerce. For Chamberlain to travel across the Atlantic on a ship that was not properly equipped with wireless was embarrassing.

The Cedric event was reported in the newspapers quickly. The New York American told about it and added that two women were taken off the boat due to that delay. One story I heard was that they were stowaways and the other that they were on board at a farewell party for friends when the Cedric left dock. Magazine accounts about the Cedric, Majestic, poor wireless, good wireless, the U.S. Inspection Service and R. H. Marriott appeared in articles and editorials as late as the following August. One article said, "United States Department of Commerce is now refusing to permit steamers with defective radio apparatus to leave United States ports". An Electrical World editorial of Feb. 7, 1914 said; "The sublime confidence of the seagoing public in wireless as an all-potent saviour would appear misplaced. It is high time that all passenger steamers were equipped with emergency or auxiliary transmitters which are really worthy of the name". Nearly 34 years later I learned that J. V. L. Hogan wrote that editorial.

After all of that commotion quite a number of people and interests gathered the idea that it was high time something was done to provide reasonably good and reliable wireless for emergency use. A meeting was arranged to be held in Washington, D. C. on April 2, 1914.

We had records of 126 cases of failure of the Marconi ten-inch coil on plain antenna (aerial). Also Terrel had obtained from operators,

captains and steamship companies many reports indicating that such a transmitter would not work 100 miles when the operator could get a spark. When he couldn't get a spark the ship's whistle was about all that could be used to call help in thick weather. Most of the test reports said the auxilliary wireless would work 100 miles. But the gossip was that operators were told they had to work it a hundred miles on test or they would get the sack. Also the Marconi magnetic detector was reported for its comparative lack of sensitivity on the wavelengths used by passenger ships. Americans did not use it. It was part of European Marconi equipment. Some European operators bought American amateur detectors or complete receivers to use at sea in place of the Marconi equipment.

Greaves presented our side of the case and Bradfield, General Manager of the British Marconi Company and for whom the insulaters that leaked and caught fire were named, presented the Marconi Company's side of the case.

As I recall it, the rest of us did not say much except to answer questions put to us by the Chairman about phases of the problem with which we were most familiar. We sat at a board table. Chamberlain was at the head with Bradfield on his right. Ferrel was at the other end with me on his right. The following is the report of the meeting as signed by Chamberlain.

Department of Commerce
Bureau of Navigation
Washington

April 4, 1914.

At a meeting held, April 2nd, at the office of the Commissioner of Navigation, Chairman of the committee representing the various Departments of the Government concerned, of representatives of those departments and representative of the American and British Marconi Wireless Telegraph Companies, the following propositions were unanimously agreed to:

1. That the days of the induction coil are numbered, and its use shall not be extended beyond those manufactured or now being manufactured.

2. That the plain aerial shall be abandoned and the induction coil shall be connected with the antenna through an oscillation transformer, subject to test by radio inspector in each case.

3. That a motor generator or rotary converter operated by storage battery is probably the most satisfactory means available at present of energizing the transmitting apparatus.

4. That because of the well known reliability of the magnetic detector, its continued use be approved provided tests made with the above specified transmitting arrangements shall show that it will give clearly perceptible signals at the range required for emergency use under normal daylight conditions.

Those present were:

Captain W.H.G.Bullard, USN, Superintendent, Naval Radio Service
Lieut. Commander A.J.Hepburn, USN, Bureau of Steam Engineering, Navy Department
Major Edgar Russell, USA, Signal Corps, War Department
Lieut. B. H. Camden, USRCS, Treasury Department
Prof. A.J. Henry, Weather Bureau, Department of Agriculture
Mr. J.C. Koons, Superintendent, Division of Salaries and Allowances, Post Office Department
Mr. W.W. Bradfield, General Manager, British Marconi Wireless Telegraph Co.
Mr. G.S. DeSousa, Traffic Manager, Marconi Wireless Telegraph Co. of America
Mr. C.J. Pannill, Superintendent, Southern Division, Marconi Wireless Telegraph Co. of America
Dr. Edward B. Rosa, Chief Physicist, Bureau of Standards, Department of Commerce
Dr. L.W. Austin, Bureau of Steam Engineering, Navy Department
Mr. F.A. Kolster, Associate Physicist, Bureau of Standards, Department of Commerce
Mr. G.S. Davis, General Superintendent, Tropical Radiotelegraph Co.
Mr. V. Ford Greaves, Radio Engineer, Department of Commerce
Mr. L.R. Knumm, Chief Radio Inspector, Department of Commerce
Mr. W. D. Terell, Radio Inspector, Department of Commerce
Mr. R. H. Marriott, Radio Inspector, Department of Commerce, and

E. T. Chamberlain (signature)
Commissioner of Navigation
Chairman of Committee.

Goldsmith had helped me in the fight against these inadequate transmitters so I wrote him promptly about the decision and I also said, "Guess better get new job. The fight is almost over". A day or two later Bradfield offered me the job of representing the British Marconi Company in the U. S. to see that their sets were ready to sail in good order. I did not take that job but early the next year I was borrowed from the

Department of Commerce by the Navy Department to serve as an expert in two patent cases and later Commander Hepburn asked that I be transferred from Radio Inspector with Commerce to Export Radio Aide with the Navy, and that list of names reminds me of other events.

My contacts with Commander Bullard started in 1912 and were repeated under various circumstances for about twenty years. When transatlantic stations were to be inspected, the inspectors were Commander Bullard, Lt. Commander Hepburn, Terrel and I. Charley Pannill, who was at the meeting that retired the plain antenna, left the Marconi Co. and went with the Navy as an assistant to Bullard.

George S. Davis, General Superintendent of the Tropical Radiotelegraph Co., was present because the United Fruit Company that owned the Tropical Radiotelegraph Co., had and was equipping its vessels with auxiliary power that we approved of. They installed large Edison storage batteries that could in emergencies furnish power for the regular ships power two kilowatt transmitter and emergency lights on deck, in passageways and by lifeboats for about twelve hours.

In talking to Dr. L. W. Austin, I told him I had more trouble with British operators, officers and equipment than with any other. He said, "you would - you are so much like the British". About six years after he made that remark, I established an experiment station where Dr. Austin had to sit on a log surrounded by stale cow manure. We were checking the directions from which static came at a location in Oregon near the mouth of the Columbia River. Only three sites were available for our large direction finder and instrument tent. One was a field in which there was a very active bull, one was where there were many inquisitive cows and the one I chose, which was an unoccupied cow and calf yard. Unoccupied when all the calves were weaned. Dr. Austin, Mr. Barber, my

assistant, and I took over. Barber chuckled most of the time and photographed Dr. Austin sitting on the log, smoking his pipe. At our next test site, he had it better. He sat on my front porch or hunched inside between test periods - that was in Bremerton, Washington.

After this victory over the plain antenna transmitter, Greaves engineered an evening celebration - a protracted dinner. I do not remember who all were there, but the party included Greaves and his pal, Kolster, Terrel and I. Kolster did the same the next night. This time each of us paid his share. Greaves was inclined to pay his share or all. We enjoyed a happy ending to the plain antenna and maybe to the induction coil and other undesirables. We told stories at this dinner that I don't remember.

The wireless companies and wireless individuals that ancestored radio, habitually claimed to be first in this or that. Oh yes, if you have looked, you see we brag enough. But of all the accomplishments I saw or heard about, there was, I believe, only one case where a radio man baptized himself and crowned himself in one operation. Some efficiency. It was not accomplished in Washington, D. C. or even on the East coast according to the story as I have heard it from three.

The names of DeSousa, Greaves and Kolster remind me of this story that those ancestors tell. They are of an early nineteen-hundred vintage. They went to the Pacific Coast and so did I and the country went dry. That was several years later and the lack of alcohol was noticeable outside of spots. They tell a story of a radio man who did a stunt that was the first and only of its kind - I hope.

I have heard the story from all three of them. They vary a little but are alike at the finish. The story is that two radio men set out one week-end from San Francisco with their own wives in an automobile. They had a conservative allowance of home brew and other rations. Along

late in the afternoon, well south of their 'Frisco homes, they acquired a very delectable brew in quart bottles, from a thrifty son of the golden west, or maybe he had learned how to make it in Hoboken. They were elated and put into the first available tourist rooms for the night. They ate, drank beer, played cards and spoke fluently. The wives decided they would occupy one of the two available bedrooms. The husbands retired to their room, made more speeches and finished the beer. Earlier in the evening they had disagreed about a piece of scenery that could be seen from the road but they did not go out to check their observations. This peeved the shorter one who always wanted all observations to be accurate within ten percent.

About three in the morning, Shorty got up and turned on the light. They had been up before to put some water in the big thundermug under the bed. The taller one said, "Whass you doin'?" The other said, "MK goin' out and check up on the schenery". Wherewith he reached under the bed, brought out the thundermug and put it on his head, bottomside up.

CHAPTER XXVII

PEACEFUL PREPARATION FOR WAR WIRELESS

Davey Sarnoff came into wireless as an office boy for Bottomley, De Sousa, Sammis and Miss Horton who steered the affairs of the Marconi Wireless Telegraph Company of America at 27 William Street, New York. While serving that executive group, he studied to be a wireless operator. When I first ran across him he was a wireless operator but wanted to be a wireless engineer. He studied engineering subjects and tried to be helpful in the things that wireless engineers were doing. He spent spare time with Proctor, Weagant, me and others. Also he worked with us in the Institute of Radio Engineers, all sails set apparently to become a Radio Engineer. He kept working into spots where he had more authority. He had changed from Davey, the office boy, to the more important Dave. He apparently was always on the lookout to be a convenient and willing helper for people who could help him to a more important spot.

Dave telephoned to me one morning before I left the Custom House to inspect wireless installations. I believe the date was April 27, 1914. He said there was something he wanted to tell me and would I have lunch with him. For a lunch place we decided upon a ratskeller at the northwest corner of Broadway and Park Place. To get in you descended a few steps from Park Place to a cellar containing a bar and tables. Pigs knuckles mit sourkraut und beer or maybe saurbrauten and beer, rye bread, boiled potatoes, or maybe roast beef and German fries, soup, beer, pie with cheese and coffee cost about fifty cents and a dime for the waiter. It was that way ~~over thirty years ago~~ in 1913. It is not that way now. Even the Post Office that was across Broadway from it, where Doc Deforest was tried, has vanished.

Dave began the explanation of what was in his mind by saying he

was going to tell me something I would not like to hear. Then he said he was going to quit trying to be an engineer. I asked him why and he told me briefly. He said: First, because I don't believe I could be as good an engineer as you fellows are and, second, because even a good engineer has a small chance to make money. An engineer or scientific experimenter is at the place where money is going out. The place to make money is where money is coming in. An engineer may experiment and devise things of great value, but from the standpoint of the people, who control the money, he is always spending time and money. These people who control the money are hurt every time they see time and money disappearing. On the other hand, the people who control the money are continuously pleased by the man who gets money out of other people and brings that money into the Company. I am going to quit trying to be an engineer, therefore, and am going to solicit the sale of contracts and service that will bring money into the Company.

Sarnoff had thought he wanted to be an engineer and had hung around to help those of us who thought we were engineers. I was sorry to hear that he had changed his mind but so far as making money was concerned, I thought he had stated the situation in a few words. His saying that he did not think he could be as good an engineer as "you fellows" was to be taken with a pinch of salt, because although he did not have the usual academic training he had unusual persistence and intelligence. Some of the "you fellows" he referred to worked under him later, after he became a company executive. I did not work under him but remained with the government on a salary for a dozen years and then became a consulting engineer.

As I understood Dave, he was going to try to sell wireless service contracts to commercial ships, private yachts and elsewhere, if possible. Presumably salesmen work like Galbraith, Bob Armstrong and Mason had done in United Wireless. Galbraith and Armstrong were jovial salesmen who had wholesaled hot dogs on Coney Island by the carload. They sold

wireless service before the law required steamship companies to buy it. Dave was unlike Galbraith, Armstrong and Mason, so I thought he might have trouble in reselling or renewing contracts that they had sold. With this new job, he got a private office and I dropped in to see him about some Institute problems. He took an active personal interest in the Institute for some years after he decided he was not going to be an engineer.

In the new line of work, Sarnoff was assigned a cubby hole office big enough for Dave, his desk, a file, a visitor and a hall tree. It was in the Woolworth Building at the windy southwest corner of Park Place and Broadway. Since the Post Office building was torn down, the wind there may not do as it used to. When Dave was there, on a windy day, the girls' skirts shot up when those who wore them negotiated the Broadway sidewalk by the Woolworth Building. But Sarnoff had nothing to do with the pushing up of skirts so far as I know. However, in his little den, he was just outside the door of Edward Julian Nally who was then the practical head of the Marconi Wireless Telegraph Co. of America. Located in that cubbyhole, he was nearest to Nally who called him in for all sorts of things, and Dave was characteristically helpful with executive troubles. Dave was back again, next to the chief working executive. Office boy for Bottomley first, then some operating and engineering experience and back again as the most convenient man to the chief working executive, Nally. If he had gone in for engineering, he would have been farther down the hall in the Woolworth Building or out where wireless was being constructed. With his experiences, he knew answers to Nally's questions or where to find the answers. That is the way the situation looked to me. Dave slid into one Executive position after another.

The scientific and engineering work of the Marconi Wireless

Telegraph Company of America was attracting attention at that time, mainly because they were trying to build bigger spark transmitters, higher towers and larger antenna for long distance operation overseas from shore to shore and for ships they were making quenched gap transmitters that might or might not be as good, all around, as the Telefunken five hundred cycle transmitters. From the viewpoint of those who discussed scientific developments as they did in the Institute of Radio Engineers, the Marconi companies efforts were conspicuous for their publicity, size of equipment and expenditure of money, but transmitters that could produce constant amplitude wireless waves for better tuning and for telephony were of more far reaching interest. Also the quirks that were coming from the audion were of more interest than what the Marconi companies were doing.

Various wireless people were trying to produce wireless waves of constant amplitude. The Federal Telegraph Co., using the Poulsen arc was producing such waves with some of the power in long waves but with some of the power in shorter waves or harmonies that produced interference. These were an improvement for high power, long wave lengths, long range stations. When built for wave lengths of six hundred meters or less they did not work so well. They could be used for telephoning or telegraphing.. Their main use for telephoning was mainly earlier, in 1907-1909, when Deforest, I and others tried them. In the Inspection service 1912-1915, I did not see an arc transmitter on a commercial ship. However, Goldsmith in working up radio equipment for his physics laboratory had acquired a Poulsen arc that was intermediate in power between what I had made in 1908 and what I worked with in the Navy in 1915. In Goldsmith's laboratory I tuned the arcs to frequencies that I could hear and then raised the frequencies to find how high the frequency had to be to prevent it being heard. With that arrangement I could

seemingly hear frequencies up to thirty-two thousand cycles or waves per second. But when I caught cold I could not hear such high frequencies. At the highest frequencies the sound was not a note but a feeling that the circuit was alive. Sort of like a quiet place in the summer woods where insects are probably present. In early wireless when I got that sensation I kept working at the receiving tuner and usually brought in a station. If the arc arrangement had given a pure note I doubt if I could have detected anything at thirty-two thousand. However, later in designing audio frequency cirsuits I found that the notes I could hear easiest were considerably higher than what the operators chose, by from twenty-five to fifty percent. To get a frequency that was just above audibility was a way to a wireless telephone because it could produce high spark frequencies. High spark frequencies were used for wireless telephony but they were not good enough to last. Ashley, for whom I built special induction coils in 1903, seemed to be trying to do that. D. Galen McCaa using three transformers and three phase sixty cycle current did it around Lancaster, Pa. and from New York to the SS Tyler of the Old Dominion line. He worked his wireless telephony about as far as Deforest and I did using little Poulsen arcs, but what you heard was the voice and the high pitched but rough buzz of the spark. McCaa wrote Col. Firth about his phone. The colonel asked me to go to Lancaster, Pa. and look it over at his expense. I did and thought it might do some good on boats that were not required to carry wireless and did not want to hire an extra crew member but would like to call for help by wireless telephone if they needed it. The Old Dominion Line, a coastwise line between Norfolk and New York, did not go far to sea but they were coming and going every day and felt a need for some kind of wireless telephones on their smaller vessels that carried freight only. Their larger

vessels also carried passengers and two wireless operators. Mr. H. B. Walker, President of that company, was very friendly toward me and I told him about the McCaa scheme. He let McCaa try it on the SS Tyler beginning June 8, 1914. The New York Herald station at the Battery served as the shore station for the test. I listened several times at the Herald station. The farthest I heard was when McCaa gave a position not far south of Atlantic City. That was one of the numerous attempts to provide wireless telephony.

McCaa was backed by a Lancaster angel so did not get stock selling publicity and, therefore, few people knew of how he strained to make a wireless telephone in that way for several years. He also strained to make devices that would reduce static interference. He succeeded in that to some extent. I think the devices were what could be classified under limiting devices. That is, they did not let static or speech or signal get any louder than what he adjusted for. Limiting was very effective in some cases for making signals readable through static and in all cases it eliminates deafening crashes of static. I patented one type of limiting device for use in radio reception.

It is quite possible that some who were not too scientifically specialized had better imaginative confidence in what wireless telephony would be developed than the more scientific. What were interesting the more scientific members of the Institute of Radio Engineers were devices or theories that pointed the way to producing constant amplitude radio waves, one frequency at a time but at any desired frequency between about one hundred thousand and one million. To do that various people had built dynamos but the frequencies they produced were not high enough. In 1908 while with United Wireless I wrote to the General Electric Co. asking for quotations on a dynamo that would produce 100,000 cycles. The answer was that they had not been able to furnish quotations, this

being an altogether new type of machine it takes time to have the formal cost estimates worked out. Signed by E. F. Alexanderson, Railway Engineering Dept.

Fessenden had asked G. E. to build him a high frequency dynamo. They had, but its frequency was too low to suit Fessenden. He changed it to produce about 50,000 cycles and used it for his Christmas Eve telephone breddcast. Alexanderson who had worked on the dynamo for Fessenden continued to work on such dynamos. He made bigger ones and provided controls that kept them whirling at about the same speed, but that whirling speed was frightening. Once when I was at the G.E. plant they had a little one of the size that Fessenden had used. They had it covered by a half circle part of the iron frame of a large dynamo - iron about a foot thick. They were afraid the little high speed alternator would fly to pieces. Later I was there when Alexanderson had a big one that he showed me. Whitney, who was head of the work, wanted to know if I thought they would ever be practical. I said I thought a few might be for long distance shore stations but they would be too expensive or too dangerous for nearly all cases.

Other high frequency dynamos were coming from Europe. Cmdr. Bullard, Lieut. Lieut. Cmdr. Hepburn, Terrell and I inspected the Atlantic Communication Company station at Sayville, Long Island. They had a large quenched gap transmitter and German tubes like audions for receiving. They were able to work across the Atlantic at times with a similar German station. Also they were installing a dynamo with frequency doublers. The dynamo did not revolve at terrifically high speed. Their idea was to produce a fairly high frequency with machines that would not fly to pieces and get higher frequency by doubling, and redoubling enough to get the desired frequency. That scheme might have worked out if other devices and a war had not entered radio development.

When we got into the war in 1917, Hallborg who was then a Radio Aide, ditched the German transmitter and pepped up a Poulsen arc to high power to replace it. The magnets used were large. I think Columbia University got those magnets about fifteen years later and made a cyclatron by using them. Cyclatrons led to the atomic bomb of the second World War.

We also inspected the German Goldschmidt station. In this a Goldschmidt dynamo ran fast enough to produce a fairly high frequency alternating current and then multiplied that frequency by reflecting frequencies back and forth, in itself, between the rotating and stationary magnetic circuits of the dynamo. I was very much interested in the possibilities of that scheme. I built one before I saw anybody from the Goldschmidt company. When I left for the Pacific Coast I gave it to Goldsmith's laboratory at the College of the City of New York. I used a simple one for years to get 1000 cycles. A 500 cycle dynamo produces a 1000 cycle pulsating current in its field circuit. If that is put into a tuned circuit and used to additionally vary the magnetism in the field, the armature frequency will go to 1500 and in turn induce field pulses that can induce 2000 cycles. That method wastes power as did the frequency doubling method used by Telefunken. I had made some experiments with finely divided iron particles insulated with paraffin, shellac and bakelite that I thought might help in such machines, but as happened repeatedly in wireless, something else was better for high frequencies.

Things were quite active in Radio about May 1914. I believe we had Institute of Radio Engineers meetings on the regular night, May 6, and also on the 13th and 20th. Greaves gave a paper on the 20th. On the thirteenth Emil J. Simon and Lester L. Israel (Jones) gave a paper on "The Operating Characteristics of a Three Phase 500 cycle Quenched Gap

Transmitter". That was the night before I was to go to Tuckerton to inspect the Goldschmidt station.

After that meeting on the thirteenth, Armstrong invited Hogan, Goldsmith, Weagant and me to see his receiver. The receiver was in a basement room in the building next to Fayerwether Hall where we had been attending the IRE meeting. The receiver was tuned to the long wave Telefunken station at Nauen, Germany. With that receiver Nauen sounded like it was whistling short and long notes. Nauen used a dynamo with frequency doublers to produce constant amplitude waves, which they broke up into dots and dashes.

We did not thoroughly comprehend it at the time, but that receiver contained the type of constant amplitude transmitter that was to replace all other constant amplitude transmitters. Armstrong was making a little audion ~~tiddle~~ tickle itself until it oscillated continuously to produce constant amplitude current that beat against the constant amplitude current picked up from Nauen. If the audion produced, say, a thousand more oscillations per second than Nauen, the two sets of oscillations piled up to produce a thousand cycle note or whistle from the headphones.

We went to Tuckerton on the fourteenth and spent a greater part of the fifteenth in official inspections. Commanders Bullard and Hepburn got away fairly early in the afternoon for Washington and Terrell later for New York. I remained over, returning to New York on the seventeenth.

Emil E. ~~Mayer~~ Meyer who had superintended the building of the station, and I were very well acquainted. When he had come to the U.S. the previous year, he was not acquainted. I told him then where he could find materials and introduced him to the boys in the IRE. He gave a paper on the Goldschmidt alternator before a joint meeting of the IRE and AIEE on March 13, 1913. That was when Michael Pupin said that alternator was

lousy with frequencies. It had the first alternating current frequency plus two, three, four, five and six times that all at the same time, and there could be more frequencies. It was lousy with frequencies but by picking off the frequency they wanted, the results seemed to be good and their other frequencies apparently did not cause interference.

On Saturday I made more notes on the station and Mayer (Meyer).let me try some experiments at receiving the German station on a crystal detector. The next morning was outstandingly peaceful. We did not have to attend to experiments or measurements. It was Sunday, a warm quiet May morning in the country. After breakfast, Emil and I took a walk along a dirt road. The substance of one thing he said on that stroll has remained with me. He said Russia was getting more powerful and would try to crush Germany before long if Germany did not strike first and whip Russia so bad that she would not want to fight for fifty years. That is as I remembered what he had said, when the European part of the first World War started, about three months later.

After the war started, the armature of the Goldsmidt alternator was injured. The station stopped transmitting to Germany but a message was sent through other channels to Germany. The message said, "Mary's mother is sick". They received an answer which said, "Mary is coming to New York and will take a job with the American Express Company". A new armature was delivered to the American Express Co. and they delivered it to Tuckerton. That's the story as I heard it.

Emil's fiancee was in the United States and sailed from New York for Germany just before war was declared in Europe. The vessel she was on turned back when war was declared and unloaded the passengers at Boston. In case of war Emil was required to join the German forces as a lieutenant. He could not get out of the U.S., he could not get into the European war,

he could get married. His fiancee came back by train to New York. They went to City Hall and were married by a Justice of the Peace.

CHAPTER XXVIII

MARS WAS A RADIO ANCESTOR

War gods were radio promotors or ancestors. Mars is the name for the war god that cartoonists picture in the papers. There are a lot of names of war gods, possibly more names than languages. Natives had war gods and beat on logs or drums for war purposes. That was a wireless but not the kind that civilized people use when they get murderously uncivil. Wireless for war oozed in from time to time and rushed in at other times. The war god (or devil) influence was not always obvious. Our ways were molded by war influence before we realized it. The Institute of Radio Engineers was helped, hindered and helped by the coming and going of the first World War.

Most of the IRE work except printing was done by a few members. Goldsmith did committee and board or manager work like several others and he attended to getting the papers ready for the printer. Money to pay for the printing was hard to get and some members who did little or nothing criticized what we were doing and tried to force friends to higher grades of membership, threatening to wreck the IRE if we did not do as they said. We did not. After several years I concluded that all of the disturbance had been started by one man who was trying to promote another to as much prominence as possible to help sell a patent, for which he, the promotor, would get a commission.

These things produced pressure on all of us. As a result Goldsmith became discouraged and talked about forgetting the IRE. He wrote me a letter on one occasion asking me to take over what he was expected to do at meetings, suggesting that Hogan might keep secretarial notes when I would not be in position to make notes. Also his letter indicated that he thought he had better attend to other opportunities where his

efforts would be appreciated more. However, we continued to lean on Goldsmith and tried to keep him in line. He liked that work but it had more discouraging features than most folks will endure if they are not well paid and we did not pay Goldsmith. He had been awarded a doctor's degree by Columbia and his income was from teaching Physics at the College of the City of New York. What he did for IRE was extra work, without pay.

Not only was Goldsmith suffering from over-doses of IRE work and undeserved criticism, but he was showing more and more symptoms of impending matrimony. However, he stuck with us and just before he took down with matrimony, he said he would try to get IRE sections started in Europe and said he would tell me when he returned from Europe just what he would do about continuing with IRE. Then he married the daughter of a wealthy Wall Street man and left for Europe on their honeymoon. He wrote back several letters about his interview with Europeans concerning the formations of sections. Some letters did not refer entirely to IRE. For example, he told of how he ran across Dr. Kennelly combining engineering and other things. He found the professor sitting in the sun reading a salty French novel and anchored to him by a long rope was his youngest son playing with pieces of wood in a little pool.

Dr. Goldsmith did not get results in the form of IRE sections in Europe. The first World War started and chased him and all IRE section movements out of Europe. I guess things happened so rapidly that Doc got across Lake Constance into Switzerland with only his bride, pocket book and the clothing they were wearing. Whether or not all of their baggage caught up with them I did not hear, but they seemed to have plenty for customs inspectors to examine when I, among others, met them at the dock. Goldsmith and I knew there was no chance for establishing

sections in Europe during the war and at best not until after they recuperated from the war. The members we had in Europe were soon unable to keep up their dues.

It was on September 23, 1914 that I met Goldsmith and his bride on the dock. He said he would stick with the IRE as Editor of the Proceedings and would donate $150.00 per issue or take IRE notes for $100.00 per issue or more. From my point of view it was a momentous occasion when Doc and I slid away from the others for a walk up the dock and he told me that because it has turned out to be a guarantee for the past thirty-two years that from about 12 to 120 major papers would be editted and published per year in the Proceedings. The Proceedings were the backbone of the Institute. Every member received a copy of them. Standards reports and condensed papers were also editted and published in the Proceedings or as supplements. With that probably from 20 to 250 unpublished papers or lectures per year have been delivered before the Institute sections. At the time Goldsmith promised to keep the Proceedings going, even if he had to put up money himself, the membership was about 500. Now it is over ~~15,000~~ 20,000. The Institute income is over three hundred thousand per year, principally from dues and advertising space in Proceedings. The IRE owns a building for its offices on Fifth Avenue. It has more employees than we had listeners at some of the early Institute meetings.

War has ancestored Radio, publically, secretly, semi-secretly and accidentally. The preparations for the first World War helped the IRE. After the European part started, it helped the IRE in 1914-15-16 but after the U.S. began shooting in 1917, the IRE income declined. We did not collect dues from combatants overseas. As an Institute we took a neutral position, not favoring either side. Privately some U.S. members contributed to the U.S. side after we entered the war. The

Germans, Zennick and Braun, were highly respected. As a rule we regarded German transmitters as the best and in receivers they were second only to the U.S. and since the IRE was designed to be international, we tried to keep the IRE neutral. That war changed most everything in wireless, including the U.S. Radio Inspection service. We had to take precautions against letting some of the best radio equipment operate even before we declared war.

Quite a while before the war one of the German vessels came in and docked on the east side. I believe it was the Deutchland. What impressed me was that it had a globe representing the earth where vessels sometimes have figureheads and above it were the words, "Deutchland Uber Alles". I didn't like that thing hanging over South Street. It was not on the ship the next time she arrived. The Atlantic Ocean raised a wave that washed it off.

On August 10, 1914, I went aboard the German's big ship, The Vaderland. We sealed the wireless room and disconnected the antenna. Customs men were told to watch the room and keep it closed, also to see that the antenna remained disconnected. I don't know whether or not they tried to use it in any way but I believe a section of the wall was removable between the operators and the transmitter room. They probably used it to pick up messages but not to send messages. After the war that vessel was operated under the U. S. flag as the "Imperator". E. N. Pickeril who I first knew as the operator at Boulder, Colorado, became chief operator of this vessel.

I inspected the Lusitania. As I was walking along the dock near the entrance, some fellow said, "She carries guns and should not sail. Germany says she will sink ships carrying guns and she will." As I went aboard the ship I looked for the guns. Forward near the anchor capstans

were two canvass tarpaulins that humped up like they might have guns under them. That was the last time the Lusitania's radio was inspected. The Germans sank her before she reached the other side. Afterward I believed the remark I overheard was meant for me to ~~overhead~~ hear, in hopes that I would report it to authorities who might prevent the sailing of that vessel. Maybe they thought I would hold it up for some wireless reason. A lot of people knew me by sight and that I had delayed the sailing of vessels for wireless reasons. But my only business there was to check the wireless and ~~it~~ the wireless was in working order.

The coming of wars and conduct of wars repeatedly caused wireless development. The stimulation of wireless became more extravagant after war started. Even imaginary war wanted wireless. The Payne's Fireworks Company put on a ~~fiery~~ fireworks show called "The War of the Worlds" in 1909. They fenced in a space between Sheepshead Bay and Manhattan Beach, that included a battle field for several hundred actors, supports for fireworks, rocket firing space and a grand stand. The final touch was called by wireless. They got me to install a wireless transmitter for them that produced flashing and crashing sparks when they called for help. I don't remember who they called. Whoever they called came on the run from the Coney Island direction and annihilated the men from Mars with din and fireworks. The showy transmitter really did not send wireless signals that were detectable at our Manhattan Beach station, about a quarter of a mile away, but it did make a column of ascending flashes and a racket.

The impending first World War probably not only pushed the building of transatlantic wireless stations around 1913, but it seemed to stir up patent suits. I was called in as an expert frequently because I had been in wireless so long, had seen what actually happened in many cases, had used so many different makes of wireless and had made so many

measurements. In 1914 I frequently had to take time off from my job as U. S. Radio Inspector to dig out records or testify in patent suits. Not always on one side. I was called to testify by four interests that were rivals but not at the same time or in the same case.

Warlike wireless preparations go back in the years. About 1900 the Chinese wanted wireless with which they could guide small boats loaded with explosives, torpedos that traveled in the surface, The American Wireless Telephone and Telegraph Company sold them equipment that was supposed to do that. Harry Shoemaker designed those wireless sets.

Wireless for wars that were expected produced odd offers as well as development. In 1908 I was offered the job of being a colonel in the Chinese army to supervise wireless for War. The pay offered was high for that period. To that was added quarters with a flock of government paid servants and I was to be a Chinese colonel, without a pigtail.

John Hays Hammond, Jr. went in strongly for designing boats that could be remotely controlled by wireless. Emil J. Simon persuaded him to take a helpful interest in the Institute of Radio Engineers. Hammond was elected Treasurer in 1914. The senior Hammond had office space on lower Broadway that included a small unused room and a board room that was seldom used. The IRE was given the small room for use at all hours and the board room frequently for our evening board meetings. That small room was the first office that IRE occupied exclusively. No rent. It was in that office that we finally decided to add the Fellow grade. We needed money. Members of greater distinction were usually willing to pay higher dues for a more exclusive top grade. The AIEE had that experience so we copied them again. Their membership was on a sort of 3, 5 and 10 basis so we did likewise. Associates paid the least, members

next, but with more privileges, and Fellows the most with all privileges. Fellows could be nominated for IRE president. Years later the Fellows' dues were made the same as members'.

After the first World War there was gradual return to Hertz Dipoles and reflection. In the second World War, around 1940, craft were guided by wireless and the Hertz dipoles with sheet metal reflectors were used for messages and for Radar. Names are still mixed. Before the U.S. went into the second World War I examined men to see if they were suitable to work with Radio Locators. That was for the British. When we entered the war I examined men to see if they were suitable for Radar. That was for the U. S. Navy. A Radio Locator and a Radar are the same thing. When examining for the British I wore the little gold wings of the Civilian Technical Corps in my buttonhole and a badge under my coat. With the Navy I had an identification card with photograph in my hip pocket for use anywhere and a badge on a ribbon that was flopped out of my top coat pocket when around the offices of the Navy in Washington. The card with its seal and my thumb print and the fact that Naval people knew me by sight served in other places. The British said I looked more like Churchill than any Britisher in New York. They put Churchill's picture back of the desk in the office I used on Broad Street. That helped identify me and caused the people who came into that office where I was sitting below the picture, to grin. I might have been a better Churchill stand-in if I had continued cigar smoking. After forty years of smoking I spit so much that I quit. In mentioning those things I have jumped about a quarter of a century from where we were in the preceding paragraph.

Europe was at war in 1914. Various changes were being made in the U.S. Part of the war was to be patent litigation in the U.S. between a

German owned company (The Atlantic Communication Co.) and the Marconi Company and the National Electric Signalling Co. We who were wireless minded favored the Germans because their wireless transmitters were ~~xx~~ so good as compared with others. The Navy, in trying to get the best, had purchased Telefunken transmitters (German). The German quenched gap transmitter sparked about a thousand times per second. The National Electric Signalling Co. sued them for using so many sparks in such a short space of time. As a result of such patent litigation and war, a number of shifts occurred in wireless organizations, including the U.S. Radio Inspection Service.

I was shifted from the Atlantic to the Pacific Coast. I left New York on December 26 and arrived in Seattle on the 30th to take over the Radio Inspection for that district about the first of 1915. Before leaving, the IRE gave me a banquet on December 28, 1914. That was the first IRE banquet. The menu for that banquet speaks of food and drink in the wireless terms of that time. "73" means something like "regards to you". MA were my call letters. The "Second Phase" of the printed dinner menu consisted of subjects that persons at the dinner were asked to talk about. The whole menu was attempts to be funny about things that were uppermost and serious, except the war, and we avoided that. War and war preparations were spoken of with caution.

The Institute of Radio Engineers did not have conventions early in its history but it did start having banquets or dinners quite early in its existence. Not just eating together before a meeting but affairs called dinners where the evening was spent in a dining room eating and listening to after dinner speeches. The first of the dinners of that kind was given to me because I was going to move to Seattle. The dinner was given at Mouquin's, a place famous for its wines in pre-prohibition days. The dinner program and menu at the time was believed to be funny.

It read as follows:

Dinner held by the Board of Direction of The Institute of Radio Engineers on the occasion of the departure of past president, R. H. Marriott, for Seattle, Washington. Officers: L. W. Austin, President, John Stone Stone, vice president, John Hays Hammond, Jr., Treasurer. Emil J. Simon, Secretary. Managers: R. H. Marriott, John L. Hogan, Jr., Guy Hill, Roy A. Weagant and Alfred N. Goldsmith, Editor.

"73" "MA"

A periodic Heterodynner of the Institute of Radio Engineers in the Receiving-Room of Mouquins Trans-Sixth Avenue Station. New York, December 23, 1914.

First-Phase

Menu

(Note: We are enjoined from serving courses at a frequency exceeding 250 per second)

Automatic Starter to Order

Rat-tail of Non-adjustable Bare Blue Points for Bivalve Detectors

Gumbo Electrolyte in Insulating Container of fixed Capacity

Portable Submarine Equipment in Dilectric

Brush Discharges Oval Insulators

Sans-Filet of Bass

Pocker Ultraudion Detector, Spud Type

(Licenced for use in Dining-Room only)

Vol-au-Vent of Jiggers, with Spherical Electrodes

Fancy Sleet, with Plain Aerial

Etherized Chicken, on Switchboard with Protective Devices

Cohered Low Temperature Cream, with Spade Electrodes

High Powered Cheese

Radiation from Tree Antennae

Ungrounded Coffee

(Note: Saturation point should not be exceeded! Avoid examining Tikker.)

Second Phase

John Stone Stone, Chief Operator

Atmospheric Disturbances by Eminent Static Producers, on Current Topics:

Antennae I have Known

Secrecy in Radio

Prevention of Decrement

Financial Radio Research

Experiments in Radio Patent Litigation

All About Radio

Specifications for Building Radio Engineers

How to make a Wireless Station

Who Invented Radio?

Il-Lodge-ical Circuits

Radio in the Time of Rameses I

Radio in 1914

Radio in 1926

Radio in 2014

Trans-New York City Radio Station

Trans-ient Service

How to Raise Injunctions

Those present at the dinner were:

John L. Hogan, Jr.
Emil J. Simon
H. Boehme
J. B. Shelby
G. B. MacMahon
Herman Schlang
Guy Hill
W. D. Terrell
D. Sarnoff
E. B. Pillsbury
Julius Weinberger
Julian Barth
William H. Priess
Charles E. Apgar
Geo. B. England
R. H. Marriott

Alfred N. Goldsmith
Harold R. Zeamans
R. A. Weagant
E. H. Armstrong
Chas. Wm. Taussig
Paul F. Godley
Frank King
L. G. Pacent
Capt. E. Heurl
Philip Farnsworth
A. H. Janke
A. Veller Sloan
J. C. Gregg
E. P. Knowles
L. Espenschied
Frank H. Fay

454-458 Sixth ave., had long been a meeting place of Masons. It was known as Knickerbocker Cottage and later as Moquins Restaurant. Between 1870 & 72 a physician, Dr F Lewing and an actor, a comedian, and others there, talked about forming another organization for Masons to belong to, a not-so-serious society as Masonry. As a result, thirteen of them formed the first Shrine Temple in 1872. Mecca. In 1911 I was one of a groups who were to take extra Masonic degrees rapidly and be initiated into the Shrine. But on the day we were to begin I had to begin an unexpected hurry-up radio installation on a ship.

This dinner was photographed. I have a copy. John Stone Stone could not attend the dinner. He gave a special dinner to Mr. Marriott and members of the Board at the Brevoort House, 8th St. & Fifth Avenue, December 18, 1914.

Mouquin's was famous in those days as a place where the foods and wines were good. I ate there a few times and attended another banquet there that I recall. At the other banquet I was introduced to the Mr. Mouqin who was in charge. That was a dinner to celebrate the impending marriage of Val Woodruff. Val was a distant relative of my wife. His first wife died and then in his fifties he married an ex-nurse who was in her fifties. Val was a Mason, a Shriner. I suspect all present at the dinner were Masons. Val made the funniest speech of the evening. It was fairly long but the finish was brought in so that we laughed until, maybe, some cried. He said he had to go to see a Catholic priest and sign a paper saying any children they had would be baptized as Catholics. The old lady he was marrying was a Catholic. That Shriner bunch were great pranksters. I was only a third degree Mason so maybe that is why the cigar I picked after dinner had a piece of hard rubber in it. I had encountered hard rubber in tobacco before because we used so much hard rubber in early wireless instruments and jokers frequently put turnings in other people's tobacco. When I discovered the hard rubber in the cigar I followed the others around and kept puffing. They kept as far away from me as possible.

At Seattle I found that suggestions I had written in a paper on Wireless Operation by Steamship Companies were being carried out, more or less. Roy Thompson, the U. S. Radio Inspector, had resigned. Charlie Cooper of the Marconi W. T. Co. of America was resigning. They with the Alaska Steamship Co. and the Kilbourne Clark Co. were forming the Ship Owners Radio Service. Simpson of Kilbourne-Clark Co. had designed a

transmitter which was expected to avoid the patents of others. It contained a mercury vapor rectifier that caused people in the vicinity to have a corpse-like or seasick complexion. Also it was not very efficient and barely got by my inspection when the first one was installed on the SS Alameda on Friday, January 1st, 1915. They were late in their efforts. I had to stick around long after hours. However, Kilbarne fed us a dinner that took up time, including the salad dressing he made with ingredient after ingredient entering the mix at intefvals.

In the Radio Inspection office on top of a large filing closet was the largest duffel bag I have seen. I don't know what was in it. Roy Thompson said it belonged to Mr. Musgrave who had previously been superintendent of the Tropical Radio Company but who was at that time the wireless man, purser and freight clerk on a small boat operating, when possible, between Seward and the Aleutian Islands, Alaska. Musgrave had a stroke later. Roy Thompson hustled around and talked a steamship company into bringing him to Seattle and a hospital into taking him. Roy Thompson did things like that. I guess Roy had worked under Musgrave at one time.

I wanted to form an IRE section in Seattle and wrote the Board of Directors. A letter came back saying a section was contemplated for members on the Pacific Coast at San Francisco and we could use that. There were actually a lot of people in New York then who thought there was nothing big west of the Hudson River. I wrote back asking them if they thought a section in Florida would be sufficiently convenient for folks in New York City. The distances were about the same. They said then that we could have a Seattle section. On January 19, 1915 I saw Physics Professor Osborne and Electrical Engineering Professor Magnusson of the University of Washington and arranged for an IRE meeting place.

And we got the Seattle section started. It is still going.

There were few ships to be inspected at that time of year. On January 6 I inspected the Japanese ship, "Aki Maru". The Jap boys understood me and were extremely attentive. The English they spoke had their accent but was precise.

Port Warden, A. A. Paysee of the City of Seattle, wanted to establish a station on a Seattle dock. I gave him information which he used. On May 20 he wrote me that the station was working and thanked me for my help.

One corner in Seattle seemed to be "hexed" or something. I don't remember the names of the streets that met there. It was where the public market began. One street ended there - I think it was Pike St. First, a woman wrote in saying that when she crossed to the Public market at that place, her enemies attacked her by wireless that ran up and down her and made her quiver so she almost died. She wanted the government to have that stopped. An unsigned letter said there was a German wireless station operating there and the antenna crossed the street about two doors below the corner. I could not find any wireless. A twisted pair of fire alarm wires crossed the street there. I believe it was those two letters that were addressed to Josephus Daniels, Radio Inspector, Seattle, Washington. I still have those queer envelopes.

My main trouble was lack of money. Moving about took money and the government takes its time about returning what you have paid out for expenses. On the morning of February 20th, I received my expense check, and at 3:30 P.M. I received a telegram telling me to return to New York to take part in the patent trials. At 10:15 on the morning of the 22nd I was riding the Olympian back to New York. While I was theoretically Radio Inspector at Seattle, on leave with pay, for two months more, I

never went back except as a visitor. As a visitor I was at the office many times during the next ten years.

CHAPTER XXIX

SEATTLE, 1915.

Seattle was young and growing. Big trees, mountains and fish with Alaska as a side dish. Seattle was quite a place and probably admits that it still is. I was there in 1907 starting United Wireless stations, in early 1915 as U. S. Radio Inspector and with headquarters about twelve miles from Seattle at Bremerton as Naval Expert Radio Aide for ten succeeding years.

When I went to Seattle in late 1914 several of my friends asked me to write to them about Seattle. They seemed to be curious about that city. I wrote them the letter which follows. Jack Hogan gave it to the New York Times and William Bissing sent it to the Ohio State University Monthly. They both printed it in part. Generally speaking the OSU magazine printed the parts that the Times omitted. The Times chronic lly has said that it prints what is fit to print. The Seattle Times or maybe it was the P.I., made caustic remarks about what the N. Y. Times printed. The following is what I wrote:

VALENTINE DAY, 1915

"Greetings:

Quite a number of people have asked me to write to them about Seattle. Owing to the quantity of requests, probably the most efficient way is to write only one long letter and send copies to all of you. I thereby save time for myself, not for you. I assure you that this letter was not aided in any way by alcoholic stimulations. However, you may take several before you finish it. Far be it from me to apologize for anything written heretofore or hereafter, yet in case you are not capable of noticing it, I wish to call to your attention that this letter is somewhat rambling.

Seattle is the second largest city on the Pacific coast but won't

admit it, because somebody might think about San Francisco. They are a bit jealous, you know.

Seattle is located on water and under water. Salt water on one side or more, and fresh water around the rest of it. Fresh water from above comes down most of the time and launders the air.

The surface of the city is like the roof of a house, except that strips are cut in for some streets. The cross streets are usually provided with small steps or with sandpaper or fly paper finish. A Seattle man seldom falls over when he gets drunk - he is used to travelling at an angle with the surface of the ground.

Seattle men may not get drunk in the future, as they, that is some of them, and women, are going to eliminate liquid by cutting out the sale of alcohol.

Seattle drinking water is exceptionally good, judged by taste and health reports showing comparatively few typhoid fever cases. The scheme of frequently passing water through the air seems to be beneficial in purifying the air. Natives say they take cold if it fails to rain. The salt water accounts in a way for Seattle's commercial activities. Both the salt water of Puget Sound and the fresh water of Lake Washington contribute somewhat to the cleanliness of the citizens.

The changes from one temperature to another usually occur slowly, and there isn't such a very great difference between maximum and minimum. You can see snow from Seattle occasionally, but you seldom see it in Seattle. The snow you see is on the distant mountains.

Seattle people call one mountain peak Mt. Rainier. The name is said to come from the name of a man, not from rain. Tacoma people call it Mt. Tacoma, and persons desiring to be neutral, when in Tacoma,

simply refer to it as THE MOUNTAIN.

Seattle is supposed to be a very healthful place. It claims the lowest death rate of any city the same size, or larger, in the United States. This is probably partly due to a younger population on the average than some of the eastern cities. Also, it may be due to good water and good milk, and lack of sudden variation in temperature. Maybe climbing hills help some. Owing to the hills, the rear foundation is sometimes higher above ground than the front wall of the house.

Seattle people, as a rule, are mainly interested in the living human beings that come before them, not in their dead ancestors.

In Seattle men quite commonly eat at a bar. If you don't know what a bar is, ask somebody. However, this bar has a lot of stools in front of it in addition to the brass foot rail, and instead of bar tenders and liquors occupying the space back of the bar, that space is occupied by waiters, cooks, stoves, pies, and other food. In some of these places intoxicating liquors may also be purchased, while in others coffee is about the strongest drink you could get.

Seattle people ride in automobiles for a nickel a ride, only they call it a jitney. An automobile comes along with a sign on it that says where it is going; you step in or on. When it comes to sitting down, you may sit on a seat, or on a man or woman, or on the floor. It is not considered good form to sit on a baby. You may stand up inside or out, I haven't noticed anybody riding on the radiator. According to my observation, there are about six of these automobiles to every street car, and they cover the distance in about half the time.

The street cars are of various types. Some of them are entirely open behind and partly open in the front. Some open in the latter half

and are closed in the front half. Some of them are closed all around except the back end. Some are of the vintage of about 1896. Cable cars operate over the steeper hills. They are open fore and aft and closed in the middle. These cable cars have right of way over anything but dynamite. Also, they have a funny little bell. It is a shrill hysterical little affair and is heard a long way, through most any kind of interference. The cable cars are illuminated, theoretically, by oil lamps. Street cars are seldom over heated, however the street car company has certain characteristics which frequently causes a rise of temperature in individuals.

The people are apparently honest, as far as pennies go, if we can judge from the way newspapers are sold. Boxes on the corners hold the newspapers standing up edgewise and displaying the headlines, different pockets being assigned for different publications; the customer pulls out a newspaper and leaves a penny in one of the pockets. Apparently there are few New York people in Seattle, as the pennies seem to stay there until they are picked up by the collector.

They have a cafeteria in Seattle which is somewhat different from those in New York. In these Seattle cafeterias you pick up a tray and then a little white bundle. The little white bundle is a napkin wrapped around a knife and fork and some spoons. You set this outfit on a couple of runways which serve as a track, then push it ahead of you partly around the room. On the other side of this track are various things to eat, chaperoned by males and females. When you see something that looks good to to you, you nod to it (food or drink) and the chaperon immediately places it at your disposal on the tray. The track ends alongside of a not necessarily pretty but usually capable looking girl, who doesn't look at you but critically scans your tray, goes through some mental gymnastics, and then puches a register which produces a check that may read anywhere from

three cents to eighty-one cents, or more. After this little affair with the lady, you grasp the tray tightly with both hands, taking into account the force of gravity relative to the distribution of the contents, and endeavor to carry it to some table that is not occupied by persons and trays. On attempting to leave the place you run across another of the feminine class. She is usually older, and is supposed to succeed in taking the check and the money. These cafeterias are quite genteel, and in some a good orchestra assists your mastication. On the outside of one a big electric sign says "Good Eats Cafeteria". a few years later I R E (Seattle section) used a room in one for eats and meets.

The money in Seattle, the kind I usually see, is silver. However, if your income is sufficiently large, you may see some gold. You can obtain bills, but it usually takes longer. When you ask for bills they take a first or second look at you, which may be due to a suspicion on their part that you are a crook or that you are feeble minded. After this they usually hunt around among a few drawers, and finally give you a part of the sum asked for in more or less ancient bills. It is a matter of chosing between having your feelings chafed when you ask for the bills, or your leg chafed by carrying silver.

If perchance you have any laundry washed, the bill will not come back totaled to the number of cents itemized, but totaled to the nearest five cents. If economical, it is desirable to hold out a collar or wait a few days until one gets dirty.

Seattle is very modern. It has some of the finest bars that have ever been described to me. For example, one of these bars is practically entirely walled and finished in Circasian walnut, except, of course, the large mirrors back of the bar. Five custodians preside over the liquor, and the view of the interior is denied the passing feminine contingent by an onyx screen.

This is a great city for hotels. One never has to go home if over a quarter of a block from home, because there is always a hotel within half a block.

They have an alleged forty-two story building here which is something like the Woolworth building, only not so much so. The main thing that is wrong with the building is that they put it down in the low part of town instead of putting it up where it could be seen further.

There are a number of markets in the city, where meats, fruits, etc., can be purchased at a quite reasonable price. It is not necessary to say that they have lots of apples here.

Restaurants have a peculiar way of putting their refrigerator in the front window. They frequently bend the refrigerating pipes to spell the name or initials of the proprietor in front. The walls of these refrigerators are the show window. Cooking is done inside the restaurant, but in plain sight, so you can walk along the street, look in the window, pick out the steak you want, go inside and tell the man, and see all that happens to that steak from the front window until you put it in your mouth.

This city is a great place for doing things in the line of municipal voting. They have hired and fired the same mayor on two or three occasions. He was elected once to open up the town and then recalled for opening it up, and then they hired him again to close it up, and he is on the job at the present time. I do not know whether the town should be called open or closed. However, I believe, so far as closing the saloons at twelve o'clock Saturday night is concerned, it may be considered closed, because a saloon was closed on a recent Saturday night so quickly that one of the customers was locked in. After a time the customer discovered he was locked in a saloon, however, his mental capacity was not sufficient

to allow him to decide as to just what saloon it was. He took down the telephone and called up the owner of a saloon and told him he was locked in a jin mill, but the owner having been aroused from sleep said something more or less pertinent or profane, or both, and told him to stay there till Puget Sound froze over (not a verbatim report). The captive friend simply told him that he was a "---! lucky dog" and hung up the receiver. The prisoner was disagreeably restricted in his occupancy of the saloon, as he was unable to go the bar, because it was in plain sight of the policeman on the outside, and he was afraid he would be taken for a burglar. The prisoner, after some concentration, discovered whose saloon he was locked in, and that it was the saloon of the man whom he had formerly called up. He, therefore, recalled the owner, who then said this put a different light on the case and he would come down and let him out right away, which he did in a more or less impolite manner.

Men do not stand around the corners here like they do in New York. You see the wind doesn't blow here like it does in New York. However, there is one corner which looks something like the curb market. Men gather there night and day to discuss local and national politics and the war. They have fought and refought the war several times in the last few months without any noticeable bloodshed.

As is always the case in strange cities, the newspapers don't seem to have any news in them. A few familiar things are printed, such as "Bringing Up Father" and "Krazy Kat". Also, they do not always print all their news in the headlines of different editions and then repeat it in the balance of the paper. You can usually find all the war news here in one column or in a part of one. Since I have been here I haven't read one paper in which they said anything about turning Von Kluck's flank or capturing him. I think you will admit this is a relief. The name of one newspaper is the Post Intelligencer, but everybody calls it the "P.I.".

They have a beer here called Rainier Beer. Maybe the Mountain was named after the beer. The Brewery uses big electric signs to advertise it, which read, "Rainier Beer, Its the Water". Some folks say this is the reason the state is going dry; that the women decided if Rainier Beer is so good, and "It's the Water", why should they have alcohol and malt; and therefore they decided to cut the alcohol out of the state.

This is a great state for experimental and research work in political economy. Their laws here are made, to some extent, so they can try anything once, and if they don't like it they can stop it.

Take the people all around here they seem to be a hearty aggregation, both from the standpoints of digestion and fellowship.

They had a city engineer who cut down the hills and smoothed them up considerably, so it is possible, if you have plenty of time and strength, to walk up most any of the streets. In doing this he perched some houses up in the air, and spent considerable money. After the people found out how much it was costing they fired him. The general supposition is that sooner or later they will erect an expensive monument, poetically inscribed, to show their appreciation of his work.

Seattle had a fair here some years ago, a big national affair. They put it on the grounds of the University of Washington, which occupies a portion of the city. By prearrangement a large number of fair buildings were left for the use of the University. The University of Washington has a national land grant, at least some of this land is near the business center of the city, so they leased the land for ninety-nine years to a development company which has proceeded to erect hotels, theaters, office buildings, and other things on the land. Even if you were born and raised in New York, I think you will have to admit that they show some sense in Seattle, and I would not be at all surprised that should you come to

Seattle and stay long enough to get some New York out of your system, you might admit, in an unguarded moment, that New York is not the only city on the map. Even if you are addicted to white lights, I think you would find Seattle has more white lights in proportion than New York has.

Seattle lives on fish to some extent, not so much that it eats fish, but it gets considerable sustinance from that business about Washington and Alaska. Of course, some of Seattle's sustinance comes from suckers, but apparently not so much so as is the case with some other cities I have seen. However, you can find evidence of present and past land booms, wave motors, oil wells, etc.

They have woman sufferage in this state. However, the women do not seem to suffer much, judging from their appearance. In fact, they seem to have a great collection of plump faced women, with peaches and cream complexions. However, some of them young and old, prefer artificial color. Also, you see men here with red faces, which apparently were not all acquired from the use of Scotch whiskey. Speaking of drinks, I am told that the drinkers here are quite cosmopolitan in their taste, and there is no particular drink, characteristic to Seattle.

Nobody eats breakfast food or cereal in this country. They call it mush, whether it is labeled grape~~x~~ nuts, corn flakes or oatmeal. They like crabs. The kind of crabs they eat are hard shelled fellows about as large as a dinner plate. They like oysters, and their oysters are about half as big as a dime. As salmon is one of the main western products, they advertise canned salmon extensively for its food value. However, I haven't seen anybody eating it. They claim it is good brain food. Better try it.

When it comes to the matter of tips, Seattle certainly has it all over New York. They actually pay their waiters. I am told they have to be paid because the law says so. The result is that the waiters look surprised if you give them a tip. Also, in some of the clubs and restaurants where coats and hats are checked, this checking is done by machinery. You hang your coat on a hanger and hang your hat on a hook above it, then pull down a little lever which locks them in place and at the same time pushes a check up where you can take it out. The check is shaped something like a key, and all you have to do to get your coat and hat is to insert the check in the slot and push down on it. The check is numbered, and the hangers are arranged conveniently in a coat room or hall. Similar contrivances are supplied for umbrellas.

It rains here most of the time in winter, but nobody cares. In fact, they get peeved if it doesn't rain. The usual Eastern person on arriving in this country buys a pair of overshoes, a raincoat and umbrella. After a time he leaves the umbrella some place. In a little while he leaves the overshoes. Finally he neglects the rain coat, and he and the others move around the street practically the same whether it is raining or not.

Japanese servants are very common. They open the honorable door, take the honorable laundry, light the honorable match for you; and otherwise make themselves useful, with descretion. They are about the only people here who do not have pink or red faces.

Eastern people, as a rule, seem to think that the West isn't much but Indians, and that Seattle people live in houses made of snow and ice in the wintertime. From what I see and hear, there are as many or more Indians in the State of New York then in any other state in the Union, and so far as cold in Seattle is concerned - the grass grows in

the winter time, and winter cold in Seattle is something like the last of May in New York, only not so cold in spots. One chap tells me that he has seen strawberries growing right out in the open in the middle of winter. They say the milk is good here because the cows eat green grass the year around. Possibly the pure water has something to do with the milk.

Seattle has a peculiar monumental record of one chief, in the shape of a totem pole, located at Pioneer Square. This totem pole is the trunk of a tree upon which faces and images have been cut, and painted in all the colors they could find. Presumably it was an idol carved by Alaskan Indians. Probably we should forgive them for this monument, as they have no Carnegie library.

When they tackled these hills they did it with water pressure and carried the dirt through pipes to the tide flats, thereby raising the tide flats and partly razing the hills, so that both could be occupied.

Most of the saloons have a cigar store where good cigars are sold, and bootblack stand in front. The entire front of the cigar store and the bootblack stand is open to the street, while swinging doors lead to the saloon. Who knows, when a man enters a cigar store whether he is after a smoke, a shine, or a drink? Also, the fact that many of the saloons have a restaurant in the rear makes it all the more confusing to wives and preachers.

I ask you now, Do you believe they have brains in Seattle?

There is considerable shipping from this port by water in summer time, especially when the traffic to Alaska opens. An old fashioned method is used for chartering dangerous rocks in the Alaskan district. The system is to chart and name the dangerous rock for the vessel that

was sunk by it. This Service has been quite active. Of course, it uses up quite a number of people and considerable merchandise annually, but it keeps down the federal expenditure, somewhat.

Several railroads get into Seattle - some by train and some by boat. There is quite a little rivalry for traffic. Two lines from the East have rather novel ways of competing for public favor. One of the lines supplies baked potatoes six inches longer than usual, while the other line supplies berths six inches longer than usual. I came via the potato route.

It doesn't rain in Seattle - the sky just cheerfully and gently leaks, and nobody seems to want to have the sky fixed. They call it a dry rain - I suppose they mean it lights lightly and rolls off.

The inhabitants seem to think that Adam first met Eve in Seattle, on Second Avenue between Pike Street and Yesler Way, maybe in the neighborhood of the Rathskeller.

So far as I have seen there is just one Rathskeller, and it is on the second floor. I suppose it was in the cellar before they cut the street down.

There is a Seattle mutual benefit boosters organization (Tillikums) which bursts into song as follows:

"It's a long way to Tipperary,
But who wants to go;
We "Boosters" say Seattle
Is the greatest town we know.
You take your Piccadilly, we'll take
Pioneer Square,
Then we'll give three cheers for
Old Seattle,
Whale, Bird and Bear".

This is the terminus:

You may swear at the above, I will not swear to it.

Don't get the idea that I consider Seattle the only place in the world. I simply have not mentioned the good qualities of other places I know of.

Seattle is a damp place, but it is a damp good place.

EXCUSE IT

R. H. Marriott

CHAPTER XXX

I WAS BORROWED AND RELOANED

The telegram I received from the Department of Commerce telling me to return to New York said I was to report to Knight Bros. at 2 Rector Street. Harry Knight, other Knights and Janke, a German, were the Knight Bros. They handled anything from the filing of a patent caveat to complicated and far reaching law suits. Harry Knight, the senior member of the firm, and Janke were the firm members that I contacted the most. Harry Knight became Assistant Attorney General some years later and called me in regarding suits against the government. I was sort of subleased to the Navy and from there, lend leased to the German government as represented by Knight Bros. and others.

I had been borroved by the Navy Department from the Dept. of Commerce and loaned by the Navy to Knight Bros. to help defend a German company. The U.S. Government, principally the Navy, had repeatedly bought German wireless spark transmitters because they were better than other spark transmitters. The suits against the German company were, in a way, against the Navy and other departments that had purchased the German equipment. At the end of the trial I went back to the Navy Dept. but no farther. I was transferred permanently from the Dept. of Commerce to the Navy Dept. With the Navy my title was Expert Radio Aide and at higher pay than I received as U. S. Radio Inspector.

Knight Bros. included Harry E., William E., Octavius, Arthur O., and Herbert H. Knight and H. Alfred Janke. For these cases they had other legal associates. One of their associates was Phillip Farnsworth with whom I had been frequently associated. Another was Walter Pumphrey with whom I was associated in this and in subsequent patent work.

My being called back to New York was not a surprise. I had worked

on preparation for those trials during the previous year and was told before leaving New York that the trials were expected in the near future. Farnsworth wrote me about the imminence of the trials shortly before I received orders to return. I had not moved anything to Seattle except what was in my suitcase. The family was in the same house in Dumont, N. J. where the girls were in school.

Those trials brought to the United States, Ferdinand Braun and Jonothan Zenneck. Braun invented the Cathode ray tube that has more recently been used in Radar and Television. The Nobel prize was divided, half to Braun and half to Marconi. Braun was too old to attend our night meetings of the IRE. Zenneck attended them enthusiastically. Braun was a quiet gentle old fellow. Zenneck was about forty-four, very strong, healthy, highly educated, very practical, a scientist, a professor, frank and not timid. He said he wanted to help Germany every way he could, but he apparently avoided going to any place where he might pick up U. S. military information. Two years later when we fought Germany, he was interned. Braun was not interned.

Both Braun and Zenneck came to the U. S. After the war started in Europe in 1914. I don't know how Braun got here. I think Zenneck came through Norway or Sweden. He looked like a Scandanavian and spoke one or more of those languages. Braun looked and acted like a gentle old chap derived from two or three generations of U. S. ancestors.

Zenneck was a Hauptmann (a German Captain) and was pulled out of the battle front to come to the U. S. for these patent suits. I believe he was in the part advancing toward Brussels when he was called back to defend German patents. He said that the evening before he was called back he and others were going along a road when they heard or saw a mortar shell coming. He and others dived into a ditch by the road.

One fellow literally lost his head. He didn't dive, the shell ricocheted on the road and hit his head. Zenneck was not a regular military man. In this country he would be called a reserve officer. Dr. Zenneck was an instructor in higher educational institutions. In 1939 he was obliged to retire as professor of the Institute of Technology in Munich for the benefit of a Nazi professor. He is still president of the "Deutsch Museum", a job that pays no salary. I have a 1930 postcard picture of the museum. He lives in a little cottage, they used for vacations, between Munich and Augsburg. At seventy-five he continues to ski in winter and paint in summer in addition to repairing the Museum. He was vice-president of the Institute of Radio Engineers in 1933.

The induction coil type of transmitter with a vibrator interrupter as used by Marconi companies produced about thirty sparks per second. More sparks per second were produced by various arrangements. At that time the Telefunken transmitter had accumulated the reputation of being the best spark transmitters. They used a 500 cycle dynamo with suitable transformer and quenched gap that produced 1000 sparks per second. The higher spark frequencies could be more easily read through static because the note-like sound was less like the crash noise produced by static. When there was not much static to interfere, lower spark frequencies usually reached greater distances, with qualifications made for power and other features.

Fessenden claimed to have a patent on any more sparks than 250 per second, not only because the higher spark frequencies were more easily distinguishable from static, but because the human ear is more sensitive to notes higher than 250 per second. Others claimed that such higher spark frequencies had been used in wireless and for other purposes before Fessenden applied for a patent and that sound heard in the headphones of the receiver could be higher than the frequency of the spark

that caused it. I had used fairly high spark frequencies. To further complicate the case, Fessenden had been ousted from the National Electric Signalling Company (NESCO), and it was the receivers Nesco used that were doing the suing. During preparation for the trials, Fessenden came to Knight Bros. offices. I presume he gave them information that would hurt the Nesco arguments. At this time I was helping to defend the Atlantic Communication Company against Nesco and a different Marconi suit. However, in 1913 I had tried to help defend the Marconi W.T.Co. of America against a similar high spark frequency suit by Nesco. I knew that higher spark frequencies were good. I had tried to buy a 480 cycle generator in 1905 which would have given a spark frequency close to what Telefunken used. In 1905 we used both electrolytic interrupters that gave high spark frequency and alternating current suppliers that gave more than 250 sparks per second. In 1902 I had seen the electrolytic and mercury turbine interrupters at the Annapolis station. The Navy did not produce a record of them but I had both a written and photographic record of them.

Nicola Tesla was brought into the Marconi versus Atlantic Communication Co. trial. Tesla was one of those who had done what, or some of what, Marconi later patented. Such evidence could invalidate or partially invalidate Marconi claims. Those trials brought a number of radio ancestors to New York. Insofar as the trials were concerned, those taking part were in three antagonistic groups, but some of all three groups got together at Institute of Radio Engineers affairs. They gathered to hear and discuss Institute papers about radio and at banquets where several made more or less humorous speeches. They were friendly despite their employment by competing interests.

My part in these trials dealt mainly with the history of wireless in the United States added to my own experience. The government

departments supplied me with copies of their historical records and the Navy furnished me with a room in Brooklyn Navy Yard, three helpers and some of the transmitters they had purchased between 1899 and 1915. From that I wrote a paper on U. S. Radio Development and delivered it at a joint meeting of the IRE and the American Institute of Electrical Engineers at the World's Fair at San Francisco in the fall of 1915. It was published in volume 5 of the IRE.

Part of my work was to examine or interview prospective witnesses in a room assigned to me at Knight Bros. So far as I can recall, I never have had the slightest ambition to examine or interview people but for one reason or another I have been assigned that job. Examinations were sometimes all on paper. Sometimes I was one of a Board of Examiners. In interviews I filled in a form that I had prepared and which covered the time, place, person and answers. I usually did that while talking to the person. For more answers I only had to check words on the interview form I had prepared. The last one of the forms I used was a very large file card with questions, answers and check words on both sides. That was mainly for Naval Radio, Radar and underwater sound people during the second World War.

In both trials I testified as to the history of wireless. In some cases I had not seen more than a few equipments of an era or type. Therefore, I produced photostatic copies of reports. One was of the annual report of the Chief Signal Officer of the Army for 1901 to 1904. Another was instructions for the use of wireless telegraph apparatus by Lieutenant J. M. Hugins, USN, Bureau of Equipment, 1903. I think he was the Navy's first very effective Radio Ancestor. He did not live long to speak for himself. An accidental explosion on a battleship killed him.

Among those I interviewed was Leonard D. Wildman. In 1904 when he

was a captain in the U. S. Signal Corps, he obtained a tuning patent that could be used against Marconi. Wildman was another of our early U. S. Radio Ancestors. He took part in the attempts at reporting of the 1899 yacht races by wireless. In 1903 he tested various makes of sets at Ft. Schuyler and Ft. Wright. In 1904-06 he installed stations at Nome and St. Michaels, Alaska.

In addition to the other work I prepared tests which were to be used in connection with testimony by John Stone Stone, supplied information to attorneys, experts and witnesses from the files with which I was familiar, and gave testimony as a fact witness.

Of about 30 wireless patent suits brought in the U. S. up to November 1915, none apparently materially injured the defendents. One suit was filed each year in 1902, 03, 04, 06 and 12. None in 1905, 07, 08 and 10. Seven were filed in 1914. Those trials turned out that way - the defendents refused to be bluffed, fought back and were not badly damaged, if at all. We knew wireless history in the U. S. that the Marconi and National Electric Signaling Companies did not know. Even before starting the collecting of evidence we felt that our opponents would lose their cases.

Sparks played a part in both suits but more conspicuously in the high spark frequency suit. Sparking in my father's day was what boys and girls did that sometimes led to matrimony. It included love making and accessory performances. Sparking was such a prominent part of wireless that the symbol for wireless, most frequently used, was a saw-tooth line or cluster of such lines like the lines of light sometimes produced by lightning or other electric sparks, and the short word for "Wireless Operator" was and still is "Sparks". Sparks were not prominent in radio before the love pains of soap operas. Now it is not a question

of sparks, all sparks are taboo in Radio. Sparks were part of both patent suits. Sparks were Radio ancestors, and some of the early wireless men were said to have contributed expert sparking with girls.

On April 19, ~~1916~~ 1915, Lawyer Fish, former President of A.T. & T., came with me to the Brooklyn Navy Yard to check up on the demonstration we had planned to show Judge Mayer. Fish was the one who made the final decision on what evidences were to be presented to the court. Different lawyers handled different phases of the case. Patent lawyer Walter Pumphrey from the department of Justice, obtained the government documents and government wireless equipment we used. The Marconi Company had obtained a questionable decision over the United Wireless when United was on its deathbed but Marconi and Nesco were not attacking a cripple when they jumped on the Atlantic Communication Co., which was backed to a considerable extent by both the German and U. S. Governments.

Fish said the demonstration was good, but for me to be sure no accidents happened. That is the trouble with demonstrating before a judge for if some electrical or mechanical devices go wrong or one of the persons involved in the demonstration makes a mistake, the judge doesn't know what to believe and the opposition hops on the demonstration error with both feet. We needed to be careful for our demonstration was made with about twenty devices used six or more ways. In each act two, three or four people had to take part. Therefore, we rehearsed the demonstration several times before Mr. Fish saw it and several more times before Judge Mayer saw it.

Not only was this a group of demonstrations that could not be produced in the court room, but even at the Navy Yard only three of us saw and heard all of the final demonstrations. We were Judge Mayer, Jack Hogan and I. Hogan was the National Electric Signaling Co.'s representa-

tive, who was there to see that I did not put something over on the judge. The second part of the demonstration for the judge was in a small sound-proof room. We three were rather small. There was no room for others. The other members of the contending forces remained outside with the transmitter.

The sparking trial was caused by the claim of the National Electric Signalling Company receivers that Fessenden had invented the use of any more than 250 sparks per second at wireless transmitters. Fessenden was of the exclusive prima donna type and claimed things accordingly. We knew that spark frequencies higher than 250 were in use when he applied for his patent. In our exhibit we had a Deforest transmitter operating on 183 cycle current and giving 266 sparks per second as such a transmitter had operated at Gallilee, N. J. before Fessenden. Also we had a German Slaby-Arco transmitter with mercury turbine and electrolytic interrupters that produced about 400 sparks per second and had been in use on the Idaho, warship of the U.S. Navy before Fessenden.

On April 24, 1915 the IRE held its second banquet. That banquet was in honor of Braun and Zenneck at Luchows, a famous German restaurant. The menu card was small - it only included blue point oysters, cream of fresh mushrooms, celery, olives, baked muscallonge, creamed potatoes, sirloin of beef with sauce Bordelaise, carrots and pears, broiled spring chicken, romaine salad, strawberry tart, ice cream and demitasse. Steins of beer were extra and frequent. Because the menu card was small, I only have the names of those who autographed the card at the head table. Each of us signed the back of his card and passed it on. The card was finally returned to the first signer. My card contains the following names: R. H. Marriott, Dr. H.G. Frank, Fritz Lowenstein, Nicola Tesla, Lee Deforest, (Prof.) J. Zenneck, John Stone

Stone, (Prof.) F. Braun, (Prof.) G. W. Pierce, (Judge) Julius M. Mayer, E. J. Nally and Dr. Alfred N. Goldsmith. Stone was president that year and toastmaster. Nally was vice-president of Marconi of America. Mayer was the Federal District judge of Nesco versus the German A.C.Co. case. The rest of us were on the German side, more or less. Dr. Frank was probably the chief representative of Telefunken in this country.

The tables were arranged to form a letter T, maybe in honor of Telefunken. The top was the head table and only seated people on the upper side. The stem was a longer table that seated people on both sides. I believe it was Louis Pacent who built a miniature Manhattan Beach station on the stem and equipped it with a raucus buzzer and a flash light that crackled and flashed when Louis and somebody else used the keys by their plates. I believe the other telegraphist was Dave Sarnoff. Some place in my files I have a photograph of the dinner that may identify more of those present. All Radio ancestors would not attend the fairly undignified, joyous dinners and banquets. I think there was at least one who would not go beyond a ladylike four o'clock tea. On the other hand, some would attend stag parties only, no teas or banquets at which ladies were present.

A number of early wireless men were brought into these patent suits that have not been mentioned elsewhere in this chapter. For example, Dr. Ives, Iredell, Batterman, Boome, Baker, Dean, Lee, Kolster, H.V. Hayes, Mahood, Shoemaker, Galbraith, Proctor, Capt. Robeson, Murphy, Ostheimer, Schmitzler and Prof. Pupin.

We made our historical demonstration before Judge Mayer on April 29th. We did not limit ourselves to showing him transmitters that preceded Fessenden's patent application. In the large room I took Judge Mayer past the various transmitters that produced various spark frequencies.

fhowing how we could get one or two sparks or 15 to 30 sparks per second from a Marconi transmitter and how we could get very high spark frequencies from other transmitters. We explained that these demonstrations would be repeated in the same order when he went into the sound proof room where the wireless signals from these transmitters were only hearable by being picked up by a wireless detector and amplified.

In the large room where the transmitters were displayed we could hear the sparks and see them, except the sparks in a Wireless Improvement Company quenched gap transmitters that had been recently designed by E. J. Simon. In the soundproof room the sparks could not be heard directly. By using a radio receiver radiations from the dummy antennae of the transmitters were picked up and amplified to operate any one or more telephone receivers, including two head sets and nine special phones. Also I had a wireline telephone to the men in the transmitter room for telling them what we wanted next.

One telephone receiver had its diaphragm supported on points so that it vibrated violently for one spark frequency. There were eight single phones that were alike except that their diaphragms were of different thicknesses. They were in a row with a key in front of each. The natural periods of the diaphragms were 380, 434, 488, 542, 596, 650, 704, 760. When a key was pressed, not only the sound of the spark but the natural sound of the diaphragm was heard. Eight different sounds could be produced from one spark frequency. Judge Mayer thought this was very funny. With one transmitter going he played a little tune by touching the keys in proper sequence. Then the natural notes of the diaphragms attracted attention more than the note of the sparks. I believe John Stone Stone borrowed that set of eight phones from the Western Electric Co.

Owing to the possibility that nature would not provide when we

called for static to serve to the judge and since the judge would not hang around waiting, I made Edison phonograph wax cylinder records of lively static. A large part of the argument for high spark frequencies was that they did not sound as much like static as lower spark frequencies did. Everything occurred as scheduled. Judge Mayer seemed to enjoy all of it. I guess it was sort of a relief from listening to long speeches by experts and the wrangling of lawyers. Hogan and I did not wrangle much. He kicked about one feature. I don't remember what it was. The judge let us argue for a short time and then said to go ahead with the program. The demonstrations included a close approximation to all of the kinds of sparks used in wireless telegraph from about 1885 to 1915.

Early in April Naval Expert Radio Aide, George Clark, who came from Washington to Brooklyn frequently, asked me if I would like to transfer from U. S. Radio Inspector to Naval Expert Radio Aide. He said they thought George Hanscom, who was chief civilian in charge of Naval Radio on the Pacific Coast, would not be able to continue more than a year or two because of his health and age. The plan was for me to take over when Hanscom retired but in the meantime to serve as Expert Radio Aide in the thirteenth Naval district with headquarters at Bremerton, Washington. Hanscom was located at Mare Island in the twelfth Naval district. I said I would like that so the departmental red tapes started moving for my transfer from borrowed status to permanent status with the Navy as soon as practicable after I was no longer needed at the trials. I was to take over the thirteenth district gradually, including Alaska. On April 30 I wrote saying I would take that Navy job.

CHAPTER XXXI

THE INSTITUTE OF RADIO ENGINEERS GETS A MEDAL.

My wife needed a minor operation. We had a good doctor and altho we lived in Dumont, there was a hospital in nearby Englewood where our doctor operated. We decided to have the operation before going west. I took her to the hospital on March 19. She had her operation the next day and moved to an outdoor sleeping porch where the air was good and there were no critical cases. Our two girls, the boy and I went to see her on Sunday. During the week I took the boy, Woodie, over before going into New York. The girls were in school. Then two things happened. One was a heavy snow storm - the other was measles. The snow storm gave me an alibi for not taking Woodie to see his mother after the measles moved in. A few days later when taking her home, I told her she probably would get a little more nursing as we had added a nurse to our equipment when the kids got the measles that the doctor and I had not mentioned to her. We also had a cook. My wife's operation was presumably painful, but she missed all the nursing and worrying that she would have had with the measley kids. All she had to do was lie around which was something she seldom did. She still regards that as one of the best rests she ever had. The measles were a joke that she could not worry about by the time she joined the kids.

Harry Knight released me after my testimony and cross examination in the Marconi case was completed on May 26, 1915. We took a vacation trip upthe Hudson and I went to Schenectady to see Alexanderson and talk about high frequency alternators, the pliotron and kenotron. We packed up. The furniture was stored and my wife and kids went to Ohio for visits with our parents on June 9. That evening I read a paper before IRE on Radio Engineering Precautions.

On June 10th I went back with Knight Bros. for more work on the high

spark frequency case. Part of the time at the N.E.S. Co. station at Bush Terminal, Brooklyn, part of the time at the Atlantic Communication Co. station at Sayville, part in office and part in court. Finishing on June 18, I had dinner and spent the evening with John Stone Stone at the McAlpin, leaving at 12:30 A.M. for Washington.

The high spark frequency trial was completed before Judge Mayer. Later, as I recall, he decided in our favor and the decision was appealed and finally decided in our favor. The tuning trial was not completed at that time because Marconi failed to appear as a witness. We were told that the war had called him from England to Italy where he was detained. In the long run, I believe, that case was decided in our favor. Neither the Marconi Co. nor National Electric Signaling Co. took over the Atlantic Communication Co. About two years later, when we entered the shooting of the first World War, our Navy took over the stations of all three companies and wireless stations owned by others. I took part in the taking over of Commercial Wireless stations in the Pacific northwest. A dozen years later I again helped the Telefunken Companies' claims before the U.S. War Claims Arbiter. They were awarded $6,800,000 in July, 1931 for the patent rights and station that the U.S. had confiscated during the war. The Telefunken apparently had a better collection of wireless patent rights in the U.S. in 1917 than any other wireless organization. Therefore, they were granted about six percent of what Congress had set aside for all German war claims. Half the sum was paid but I believe the other half was withheld until the U.S. should receive payments due from the German government.

The trip to Washington after dinner with Stone on June 18th, was to get oriented with the Navy for taking the Expert Radio Aide job at Bremerton, Washington. Lieutenant Hooper had taken charge of the Radio Division of the Bureau of Steam Engineering, succeeding Lieut. Cmdr.

Hepburn. I spent some time with him but most of my time with Expert Radio Aide George Clark at Washington Navy Yard and at the Arlington Radio station where the long range radio telephone equipment was being installed by Heising and others for the A T & T. Also I spent some time with Terrel who had been transferred to the Washington office of the Radio Inspection Service and some time with Dr.Austin and Fred Kolster at the Bureau of Standards.

George Clark tried to wise me up on the duties and pitfalls of Expert Radio Aiding. Chiefly indoctrinating me in the Radio coordination plan that he and Guy Hill had worked out. With this plan practically all things in Naval Radio Engineering were classified. A combination of letters and numbers described things and told where they were designed or used and, if altered, how often.

The Navy's Radio laboratories at that time were not large. Dr. Austin had some space at the Bureau of Standards. I believe George Clark had the largest laboratory. It was at Washington Navy Yard. About eighteen by twenty feet, perhaps, and two stories high, of brick. George was a fast worker. He used plenty of short cuts. I thought his ways of testing things were funny but practical. To test the breakability of an insulator they clamped one end in a vice and hit the other end with a hammer. To test the ruggedness of radio receivers, they pushed them off a work bench for a while. George thought that was too ladylike for a Navy receiver, so at Washington Navy Yard he pushed them out his second story window.

At 6:15 P.M., June 21st, I left for Columbus. The 23rd I spent at Richwood, my home town. At 9:50 P.M. on the 25th we four went west arriving at Denver at 4:30 P.M. on the 27th, where we owned the house at 566 High Street. I tried to make arrangements for its sale and we visited

the Prices, Miss Duncan and others we knew. Carstarphen was not in the city. He had gone out of business at the corner of Colfax and Broadway and Cahn said he was selling stock certificates. Cahn had a store where he sold electric light fixtures and took wiring contracts. Cahn had worked for Carstarphen and was the fellow who had made the roulette wheel with electromagnets in the rim and the hollow steel balls covered with celluloid that looked like ivory. Miss Duncan had been the bookkeeper in the United Wireless Denver office with Christopher Columbus Wilson, Arther Dibol, John Wilson and Miss Tabor, stenographer (now called secretary).

We left Denver on the 29th at 10 A.M. and arrived in San Francisco at 8:50 P.M. ~~June~~ July 1st and put up at the Hotel Lankershim. Next day we went to the World's Fair and the family went there every day to the 9th when we left at 11:40 P.M. for Seattle. I spent some time at Mare Island Navy Yard with George Hanscom and some at the U.S. Radio Inspector's office, also with Hensgen at the Navy Yard, who had been in the New York Radio Inspectors office for part of the time I was there but who had also transferred to the Navy. Also I visited the broadcasting station on the roof of the Fairmont Hotel where they were broadcasting phonograph records and local talent. They used an arc in alcohol vapor. It worked something like Deforest's 1907 arc and the one I used in 1909. They believed John Q. Public should go for broadcasting in a big way. J.Q.P. was nibbling even then, but very little.

During the time of the San Francisco World's Fair, the A T & T Co. put over two demonstrations of what are now parts of broadcasting and chain broadcasting. I was in 'Frisco and at Mare Island in July and again in September when I read a paper on U. S. Radio Development at the Fair, at an AIEE-IRE joint meeting.

The A T & T demonstrated their ability to telephone by wire across the U.S. That was accomplished by the use of modified audions used as

amplifiers. When your voice was weakened by miles of wire, the amplifiers boosted it enough to go to the next set of amplifiers, over and over, from the east coast to the west coast and vice versa. Deforest had a pamphlet distributed saying he deserved credit for that transcontinental wire telephony because he had invented the audion. That extending of wire telephony by inserting amplifiers here and there, made chain broadcasting feasible some years later and made transcontinental wire telephony feasible then.

Also during the 1915 Fair the A T & T used the flock of tubes that Heising and his associates had persuaded to produce constant amplitude radio frequencies at the Navy Arlington Station (NAA). With them enough radio power was made and varied by a microphone to be picked up by A T & T employees who were located in various places. For example, Lloyd Espenschied heard that broadcast in Honolulu, Austin Curtis heard it in Paris, others heard it at Mare Island, California. A T & T men probably heard it at Montauk, Long Island and other places that were not mentioned in the publicity spread by the A T & T. That was the first long range radio telephone broadcast. It was another ancestral stunt for radio broadcasting. I was at Mare Island when the radio voice from Arlington was heard there but did not take part in the receiving. The broadcasts from the roof of the San Francisco Hotel, that I witnessed, probably did not reach as far as Deforest's 1907 broadcasts from midtown New York or my 1908 broadcasts from down by the end of Sheepshead Bay where not much water seperated Coney Island from the Brooklyn end of Long Island. A lot of people had the idea that broadcasting would take in time. George Hanscom's cousin, William H. Hanscom, was interested in broadcasting and Roy Thompson obtained one of the arc transmitters like that used on the Frisco hotel. He wanted to start broadcasting with it in Seattle. He sent it over to the Puget Sound Navy Yard for me to test. I did not get very encouraging

results and Kilbourne-Clark became very busy with a patent suit, so Roy dropped the arc project.

July 13, 1915, at 9:45 A.M. I was sworn in as Expert Radio Aide by D. W. Blamer, Commandant of the Puget Sound Navy Yard. The next day we moved into a furnished cottage at 715 Fourth Street in Bremerton. It had just been vacated by Lieutenant Manning who I suspect was the son of Captain Manning. The captain was Admiral Bradford's assistant and had shown me, in 1902, how to get to Annapolis to see the Navy wireless station.

I presume the Navy was anticipating our entry into World War I. About a week after I arrived, Robert E. Coontz came to succeed Commandant Blamer. Coontz was a hard worker and democratic. He was a democratic from the Hanabal, Missouri that Mark Twain made famous. He was very democratic for a Naval officer. He brought in other officers. Coontz a few years later, held all of the highest ranking jobs in the Navy. He liked the west and people with the western democratic spirit. It was part of my job to report to the Engineering Officer of the Yard. Coontz brought in William (Billy) Wells for that job. Billy was democratic, too. Coontz had been more or less broken-in at Sitka, Alaska where he married the daughter of a Sitka merchant. Coontz, Wells, Luther Gregory and I became very friendly. Gregory later became the head of Yards and Docks at the Navy Dept. and retired, an Admiral. Wells was retired as a captain after he had been injured while commanding a Naval vessel during the first World War. He retired to Brooklyn where he died within a few years. We played bridge at his house one night but he was not able to make the trip to my house in south Flatbush for another game.

Several years later, in 1921, I followed a trail south of Sitka, Alaska looking for a possible radio station site. Woodie, my eleven-year

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The Hawaiian system using Marconi equipment was a failure. Later John A. Baker and associates serviced wireless in those Sandwich islands. Still later the Federal Telegraph Co. using arc transmitters, connected the islands with the U. S., telegraphically, when the static was not too bad. Induced currents in the nails at the San Francisco station were so strong that they discharged into the wood to burn pear shaped cavities about the nail points. That is why I had the balcony floor of the Radio Laboratory at Puget Sound Navy Yard put together with wooden dowels. The dummy antenna for testing Federal arc transmitters was on that balcony.

old, was with me. The trail led to the open back door of a log cabin. Through a short hall we could see the open front door and beyond it the waterfront we wanted to reach. We continued along the hall. Through a door to the left we saw a very modern kitchen with an electric range and stopped to stare. From a door on our right a smiling woman said hello. I attempted to explain why we were there and who we were. She said she knew, that everybody around Sitka knew that I was the Radio Aide from Puget South Navy Yard. She said she was well acquainted with the Navy Yard because Admiral Coontz was her brother-in-law. He had married her sister when he was a young officer stationed in Alaska.

One of my first duties at Puget Sound was to pick a site for a radio transmitter station at some distance from the Navy Yard receiving station. The transmitter was to be a forty kilowatt arc. By using wire connections, such a transmitter could be controlled from the receiving station without interfering with receiving. The Navy owned two properties outside the Yard. One was the Magazine about four miles from the Yard. The other was the Torpedo station at Keyport about nine miles from the Yard. With the Commandant and Mr. Larimer I inspected Keyport on July 26. On August 10 I went alone to the Magazine site. The badge under my coat permitted me to pass the Marines who guarded all such places. I did not need to know any of the personnel. Walking across the property I came to a railroad. The railroad was a local arrangement for conveying munitions within the Magazine property. The nearest continental railroad connection was at Seattle. I stopped to let a Yard engine pass. The engine stopped in front of me. The engineer swung down and said "Hello, Marriott". The engineer was Detweiler. Eight years earlier I had rented half of his house at Seaside, Oregon, when I was building the wireless station at Astoria for United Wireless. He and his wife ran a restaurant at Seaside during the summer. I guess he ran engines the rest of the year. With the

Navy he had obtained a steady job shortly after I had left Seaside.

On August 17, Ducky Hyde took Woodie and me fishing, trolling in his rowboat driven by an outboard motor. Hyde was chief draftsman in the Public Works section of the Navy Yard. He came from Boston a few years earlier with a shotgun and a strong desire to hunt and fish. He saw ducks flying around, lots of them. He promptly shot several. They were Siwash ducks. Cooking them stinks up the whole neighborhood. That's the way he got the name "Ducky". Also he was fat, generous and good natured. Some years later I went fishing in the Olympic Mountains with John Stewart, Benedict and Ducky. In climbing the mountain trails Ducky was pulled up by a pack horse. He held onto the horses's tail.

Ducky took Woodie and me on a fishing trip when he got a Ford. He had not learned to drive well. On the way back we were following a very heavy logging truck. The truck stopped. The Ford hit it and cracked its radiator and two head lights. The truck was not damaged. Woodie caught four fish on the first trip he took with Ducky in his boat. Woodie had practiced with a bent pin in a ditch by our house in Dumont, N.J. but caught his first fish in Washington State. He was fine and went to sleep before we returned to Bremerton. That successful encounter with the four fish he strutted into the house with, aged him greatly, - changed him from a little boy to a big guy.

On Sept. 13 I started back to San Francisco to deliver my paper on U.S. Radio Development before a joint meeting of the Institute of Radio Engineers and the American Institute of Electrical Engineers at the World's Fair. I had orders from the Navy to attend a conference on wave lengths at the San Francisco Custom House on the 14th and to report for duty at Mare Island Navy Yard from Sept. 20 to 24th. The duty at Mare Island was mainly regarding the installation of radio on the Bushnel, a

naval vessel that Mare Island had made plans for but which would be equipped in Seattle and Bremerton and for conferences with radio personnel including Lieut. E. J. (Buck) Blankenship who was to be transferred to Puget Sound Yard as District Communications Officer. Buck was another of the officers that had been picked for their efficiency and democratic attitude. The Blankenships and Marriotts became so friendly that we rented houses across the street from each other. If I went home and did not find my wife and three kids, I went to the Blankenships because she and the kids would be there and that's where we would eat supper. If Buck came home and couldn't find his Jane, Pete and Ruthie, he headed for our house for supper. After supper Buck and I would smoke while others did the dishes. We played whist or Pedro, after Maw Blankenship or Marriott wrung the dishcloth.

The conference on wave lengths at San Francisco was called at that time because the IRE meeting at the Fair would bring more radio men than usual to San Francisco. There were quite a number of people at the conference table. Naval officers, Roy Thompson from Kilbourne-Clark of Seattle, V. Ford Greaves of the U. S. Radio Inspection Service, George Hanscom, Expert Radio Aide from Mare Island. I may have a list of all and what all we talked about. The conference table was long - a naval officer sat at one end and presided. I was seated at the other end of the table.

Only one subject they brought up excited me enough to stick in my recollection. The chairman or somebody close to him started the argument that amateurs should be eliminated because they produced interference and that we should write a statement to that effect and sign it. As all of us were to vote on it or sign it, the chairman asked for the opinion of each. One after another down the right side of the table agreed that the amateur should be eliminated. My turn was at the foot where the talks would turn

and go up the other side of the table. I turned the tide of remarks when I said rather caustically that I thought amateurs might advance radio as much as some of the radio interests who wanted them eliminated. I talked quite a lot and to the effect that the Department of Commerce could regulate amateurs enough. Others sided with me and some of the anti-amateurs became luke warm. We did not sign an anti-amateur resolution.

I read my paper on U. S. Radio Development before the IRE and AIEE at the World's Fair on September 17 and the chap who had been the electrical engineer at Avalon, Santa Catalina Island when I put in that station thirteen years before, came up and identified himself. I was attending the joint IRE-AIEE meeting for three days so the Navy did not pay me salary or expenses for those days. I collected $3.95 per day expenses for the 20th to 23rd. On the third of those days (Sept. 18) the Fair official in the Court of Abundance presented a medal to me. Not for me - but for IRE. I made an acceptance speech.

IRE should have that medal. Woolverton wanted to see it so I returned it to Gen. Manager with the understanding that he would forward it to IRE in New York.

XXXII

SMOKE

I was an inveterate smoker of cigars and corncob pipes. The Navy had rules against inveterate smoking. Officers could smoke while working in their semi-private offices but civilians were more restricted. At the Puget Sound Navy Yard civilians were not to smoke in the Yard except at lunchtime. Some used snuff. In the main office building where I landed, there was a typewritten order to the effect that civilians would only be permitted to smoke in a fairly large room next to the cafeteria on the ground floor. That room was listed as a smoking room but civilians with two or three exceptions were not located on that floor. Most of them were on the third floor. To smoke on the third floor they had to use cigarettes and go to the toilet frequently. If an officer came into the toilet room they threw their cigarettes over a slate wall back of the urinals. Waste paper was thrown there also. Conflagrations frequently occurred with little damage but contributed a lot of smoke and some excitement.

I was placed in a little office with Lieut. Pond and his secretary. I wanted to smoke while I worked. Pond said he would take it up with Lieut. Lacy, the office superintendent on the floor. Lacey said that since I was in a semi-private office where officers were permitted to smoke that he guessed I could, too. Outside of that office the rest of the floor was taken up by very large rooms containing draftsmen, estimators and the correspondence section. Two or three officers and dozens of civilians were in those big rooms.

A few days later Lieut. Pond said I would have to stop burning cigars in his office as the civilian employees outside had complained about my being permitted to smoke when they could not. An officer said "if the damned fools had kept quiet and let me smoke, they would have obtained the

same privilege soon". The local Bremerton paper had published some articles about radio and me. There was a reporter in the Yard, a sort of yard booster. Those articles, among other things, had said I was the highest paid employee. For me to get more money and smoking privileges and not be required to punch a clock was waving things at civilian bulls. Pond or the engineer officer did not care one way or the other. The officer connection with radio was not yet a very definite arrangement and those two seemed to want to please everybody and avoid as much work as possible.

I quit smoking in Pond's office. There were ships in the Yard that required radio alterations. I could take paper work and cigars to the ships radio rooms that were not occupied and work on ship and shore radio problems, which I did. But I needed a laboratory as there were some devices that needed to be tested and they were bulky. I could not test them on a ship or in a small office. I had picked a site for a laboratory over the electric shop but it required a lot of alterations that would mean red tape and work that would total up to a lot of time. So I went to the engineer officer and said I could get along for a while with the room next to the cafeteria that was set aside for an after lunch smoking room but which nobody used. They did their smoking where they sat in the cafeteria or out of doors after lunch. I got the room. It was still a red tape smoking room. Those who had more or less business with me dropped in for maybe one word of business and two cigarettes. I kept up on my smoking with cigars and a lot of corncob pipes.

After getting some laboratory space to work in I began collecting assistants. Tyng M. Libby first, then Freddy Gruell. Fred came permanently when we moved above the electric shop. Tyng had been a naval wireless operator, had an amateur experiment station in Bremerton and was employed by the yard electric shop. Freddy was an electrical apprentice

and a radio amateur. Tyng had been an operator on the battleship that crossed the Atlantic to test the range of a Fessenden rotary gap transmitter installed at Arlington in 1915. Radio Aide George Clark was on that test trip. Libby told me about a hatch cover falling on Clark's hand.

We left the smoking room laboratory and moved into our just finished laboratory over the electric shop on March 1, 1918. In that laboratory I had specified a mezzanine floor above part of the laboratory and it was to be put together without nails. Wooden pegs only. They did not believe me when I told them the transmitters we were to test would cause sparks from all nail points and set fire to wood, but they gave me an all wood mezzanine. I made rules against nails in wood but none against the tobacco habit. Some of my associates smoked - some didn't. Lieut. Buck Blankenship and I smoked and chewed tobacco when we were alone on an inspection trip.

My job was to organize the radio engineering of the 13th district which extended from California to the Arctic Circle and east to the Dakotas. We had no ships, shore stations or radio manufacturers to keep track of east of Seattle. Between Washington and Alaska was Canadian territory but naval wireless bridged the space with stations in Washington and Alaska, after we put in some Poulson transmitters. Also the District Radio Communications officer and I searched east of Seattle in 1916 and 17 for radio amateurs and others who might be suitable for operating or engineering if we were drawn into the shooting part of the war in Europe. When war came we had the names, addresses and telephone numbers of a lot of people.

I spent some time in Seattle, usually about two afternoons and evenings each week. On August 14, 1915 I learned that Marconi of America had started suit against Kilbourne-Clark of Seattle on the same wireless tuning

patent that they had used to attack the Atlantic Communication Co. That suit like others took time to develop. It brought a number of old time wireless men to Seattle the next year. The failure of interests to get a wireless monopoly was probably helpful to rapid radio development. Those who pioneered some of the developments including broadcasting would probably have been afraid to do it if the would-be monopolists had been able to crush others by patent suits. Monopolistic failures may be rated as contributors to radio development.

Commissioned officers were given their rank by a paper signed by the President. Warrant officers were those who were given titular papers signed by an officer of higher rank, but the titles of general, colonel, captain, etc. are also conferred in other ways. This law suit of the Marconi Wireless Telegraph Co. of America against Kilbourne-Clark produced a new title for me - the title of captain. That was during the first World War but before we put bloodshedding troups into Europe. During the second World War a naval commander called me captain. I said don't call me Captain or some of these officers here will have a fit. He said "the hell with it. You are more entitled to that title than they are". A semi-docile civilian can be called captain.

The Navy wanted the Kilbourne-Clark Company to successfully defend itself against the Marconi Company. The Navy wanted numerous possible sources of wireless equipment and in various parts of the U.S. For any would-be monopoly to wipe out such sources was undesirable. Kilbourne-Clark had sold equipment to the Navy. I had been checking up on K-C as a part of preparing recommendations on what could be done in the thirteenth naval district in case of war. Later, before we started shooting, I strongly recommended that K-C be given contracts to manufacture wireless according to designs to be furnished by the Navy. I did not recommend

K-C as designers. K-C did good manufacturing during the war and for some time thereafter. Marconi Co. and K-C made from the same designs. All of K-C equipment passed inspection but fifty thousand dollars worth of Marconi equipment was held up for over a year because the top half wouldn't fit on the lower half. It could not be used until the parts would fit.

The suit of the Marconi Co. of America against Kilbourne-Clark brought several wireless people to Seattle, caused the third Institute of Radio Engineers banquet, caused me to become one of the few patent suit assessors (court experts) and caused me to get the gratuitous title of Captain. The suit brought to Seattle L.F.S.Betts, chief attorney for Marconi, D.Cosgrove, his associate, Frank H. Waterman, patent expert and Roy Weagent, chief engineer of Marconi. For Kilbourne-Clark the suit brought J. Zenneck, Phillip Farnsworth, G.W.Pickard, F.A.Kolster, V.Ford Greaves and Ellery Stone.

On March 18, 1916 Commandant Coontz let us take the Sotoyomo, a small vessel that was used for radio work, transporting officers and as a tug. Buck Blankenship and I rode it to the Seattle port warden's dock where we picked up port warden Paysee, Prof. Magnusson, Francis M. Ryan, Charlie Cooper and all of the visiting Radio engineers, experts and lawyers. We first visited the Navy Yard, met the commandant and went to my house for refreshments. Then we took the Sotoyomo to our Keyport radio transmitting station which was controlled from the Navy Yard receiving station. Then on around Bainbridge Island and back to the Seattle city dock. This was a novel and scenic experience to our eastern visitors.

During the trip I was frequently addressed as captain. The officer who controlled the movements of the boat always addressed me that way when asking where we wanted to go next. He got into that habit when we had

been on trips to the Tatoosh radio station. Of course, I was not captain. Buck Blankenship, District Communications Officer, was the ~~xxxixxxx~~ highest ranking officer aboard from Seattle to Bremerton and Billie Wells, Engineer Officer, outranked him from Bremerton back via Keyport to Seattle. Actually the real working captain was a warrant officer.

The Marconi lawyers heard them call me captain so when some days later they recommended that Captain Marriott be appointed court assessor in the trial, I went into the trial records as Captain Marriott every time my name was mentioned. The records were printed and read, particularly around the Department of Justice in Washington. Therefore, I was called Captain Marriott in Washington, D.C. although I picked up the title in Washington State.

On our return to Seattle the local section of the IRE gave a banquet at the Butler Hotel. Our trial visitors, Commander Wells, Lieut. Blankenship and George Hastings were our guests. Hastings was assistant shop superintendent and the Navy Yards official greeter that took us around the Navy Yard shops and drydocks. His wife helped give the visitors a mid-afternoon snack of lunch at our house. No alcoholic was served. Maybe tea was part of it as the Hastings were Canadian born, I don't remember, but naturally my wife would produce coffee. I don't recall any alcoholic at the IRE banquet, probably not with Naval officers present. Josephus Daniels, Secretary of the Navy, was anti-alcohol. However, the boys got theirs in private. I knew a supply officer who frequently took a five gallon can of alcohol up the hill to his house and one officer had to wear his cap because he got stewed one night and put lysol on his hair instead of mange cure. His scalp and upper forehead were brown for quite a while.

I was toastmaster at the IRE banquet but don't remember who made

speeches or what they said. The Navy, city papers, local IRE and visitors seemed to be pleased. That was the first IRE banquet at which naval or military officers were guests of honor. The visiting engineers and lawyers who had encountered the IRE in the east ~~xxx~~ were impressed with the long arm of the IRE that brought radio people together on both coasts.

The contestants wanted to make demonstrations and measurements that could not be made in the court room and that would require considerable time. Even if the judge could watch them, he would not understand well enough to decide offhand if opposing experts disagreed in the middle of a demonstration. Therefore, they decided to have court experts which are called assessors. Opposing council and the Judge agree on who the court experts are to be. Judge Neterer and council for Marconi and K-C decided on Dr. Magnusson, Professor of Electrical Engineering of the University of Washington, and me. Our job was to watch all tests, settle disputes between opposing experts and explain controversial points about wireless to the judge.

Dr. Magnusson was not an experienced wireless man but he knew all of the theories that might be involved in a wireless argument. There were several arguments between the experts during the course of demonstrations. They fought until they reached their own decision in all cases but one or two. In one case they disagreed about the measurement of wave lengths. Each measured a series of frequencies or wave lengths and did not agree. Therefore, it was decided that a new series of wave lengths would be tried and that the opposing experts and I would measure them separately. The readings were arrived at by turning a large knob and picking the adjustment that gave the budest sound. A pointer attached to the knob indicated the wave length, but you did not look at that while making the adjustments. The K-C and Marconi experts always disagreed. My readings were identical to those of the Marconi expert, so far as we could see, therefore, we

accepted those readings. There was some disagreement about electrical condensers. After conference with Prof. Magnusson I went on the stand and gave an explanation about electrical condensers that we thought the judge would understand and that both sides would accept. Magnusson was very conversant with the use of inductances and condensers in his laboratory attempts to simulate very long line sixty cycle power circuits. They covered a wall of one of his laboratories but in wireless we considered condensers from other angles.

This was said to have been one of the first cases in the U.S. where assessors were used. As assessors are experts for the court, they are paid by both sides. The court decides what the assessors are to be paid after conference with both sides and the assessors. I received $475.00 for nine and a half days in April, one half from K-C and the other half from Marconi of America attorneys in separate checks. I was called back for five and a half days in July, for which I was paid in the same way.

Jack Hogan did not have anything to do with the Marconi vs. K-C trial so far as I know, but he showed up in Seattle on May 9th where I saw him for a short time at the New Washington Hotel. I suppose he was scouting for the National Electric Signalling Company. Maybe they wanted to try suing Kilbourne-Clark also.

Francis M. Ryan who was an amateur, professional operator and student at the University of Washington, was employed by the Navy Yard on June 19, 1916 to work during the summer vacation. I put him on some antenna and receiver arrangements that we thought might subdue static more than they subdued signals. I had used a long horizontal antenna that I thought reduced static more than the signal but I did not know why and when I made the set up that Ryan worked on I had the receiver on the wrong end of the long antenna. Inside the Navy Yard there was no place for such

an antenna with the receiving house on the other end.

Zenneck and Farnsworth came over to my house from Seattle on July 26th. They remained one night and the next morning I took them on a scenic auto ride to where we could see the Keyport radio station. As Zenneck was a German officer I did not take him within the boundary of any Navy property. He was very much impressed by the scenery and by the fact that my wife, a college graduate, with a degree, did all kinds of housework, raised children and cooked. When he returned to New York he sent Woodie a book for boys about the German army.

No wonder our guests thought the scenery was beautiful. We lived on a hill overlooking the industrial part of the Navy Yard, Port Orchard Bay and islands. To the west the snow capped Olympics - East, the snow capped Cascade range with the dish of ice cream (Mt. Rainier) rising 14,000 feet out of lower Puget Sound. Douglas firs more than two hundred feet in height in the Navy Yard. Our mast for the receiving station antenna was a Douglas fir that had been trimmed down to two hundred and twenty feet inheight. It was about three hundred feet from where we lived. Thick forests of big firs began about two miles from there. At Christmas I could get a nice little tree in a few minutes, no cash required - only an ax. Curtains of forest fire smoke in the fall and fog at other times obscured the scenery occasionally or oftener.

The Marconi attack on Kilbourne-Clark apparently did not hurt the latter. It seemingly helped K-C and injured the Marconi interests. The Marconi interests were smoking themselves out and their claims of invention were too foggy.

CHAPTER XXXIII

WAR CHANGES RADIO

Broadcasting efforts were discontinued when we entered the war in 1917. Such experimental stations were closed by government order. The broadcasting audience was largely put in uniform or civilian war work. They were mostly the amateurs. Broadcasting efforts for the public stopped in 1917 but were taken up again in 1919 using wireless transmitter designs that had been improved by the war and with an expanded audience of a lot more boys who had taken up wireless in their war work and had equipped themselves with receivers for home listening to all kinds of wireless. Our entering the shooting war made many changes. We in the Pacific northwest were far away but lots of ships, men and radio were contributed from there.

Compared to our soldiers and sailors overseas we were not in a dangerous position. However, even inside the Navy Yard and in outside ship building yards and other producers for war that we contacted there were inspired troublemakers. I helped to spike those efforts through the Masons, Knights of Columbus and our radio laboratory personnel. Our lab only included two Masons and no Knights. I wrote short sentences under the heading of Harmony for Liberty. Those sentences were printed on large cards by a Knight of Columbus and tacked up in Oregon and Washington by Masons and Knights and our men. A booklet about the Harmony for Liberty program including what was on the cards was sent to many Masonic Lodges and persons. I had letters from some who received them, including Teddy Roosevelt.

Our most belligerent local enemies were the I.W.W.'s, a communist organization that wanted everybody to divide with them. Divide anything they asked for, even a wife. I had to send a man with every shipment we

made to the numerous yards in our district. Even so they threw part of a radio transmitter off a dock and hurt one of my men by putting grease on the roof of a ship's radio cabin where they knew he would walk. Part of the time, particularly when I was in Seattle at night, going to and from ship yards or the Kilbourne-Clark plant, I was followed by a plain clothes detective. The inspectors I sent to such places went in pairs at night. We had one or several people on one job from a short time to twenty-four hours per day. Inspections were frequently two shifts of twelve hours each.

When we were notified of the start of our part in the shooting Lieut. Blankenship released telegrams to those we had on our list except some that I was bringing in as civilians for engineering work. It was so arranged that I could use both civilians and men or women in uniform. Civilians were preferable because nobody could take them away from me, but uniformed personnel might be called by somebody because of their classification. If,for example, the Navy decided they needed more Radio gunners or chiefs in the floating service or in Europe, they could take them from shore service in the U.S. Or if a station in our district needed them, they would go. The major part of maintenance was under me but some of it was done by uniformed men assigned to specific stations and they were under Communications - not under Engineering.

We only had one girl in uniform, Yeomanette Frances Riech. She enlisted at Portland, Oregon, a very fine, handsome and capable secretary. We did not take full advantage of her stenographic ability as I never dictated and the others seldom dictated. I wrote everything in pencil in full or as memoranda referring to some form of letter or report to be used. Two of our girls married men in the laboratory after the war. Frances married a chap who was a marine at the main gate during the war.

I became a conglomeration of officials. By civil service rules I was Expert Radio Aide. By circumstances of my being in charge of the manufacture, installation and maintenance of radio equipment, I obtained Charlie Robinson, a quarterman and Wright, a leading man. Those were the normal class of assistants for a Master. Also draftsman Warren E. White was transferred to me which made our place a sort of division or section. Then when the war started I was given the physical examination to enlist as an officer. An officer in the Yard said he was going to take me to Brest, France to supervise the reception of radio apparatus at that port. As that might come about, I took special lessons in French from Miss Munchner and from phonograph records. I remembered little of college French. The Bureau of Steam Engineering said I should not become an officer because they wanted me to remain in the thirteenth district where I could be most useful. As they did not have enough officers to go around, they made me Acting Radio Materiel Officer and Acting Receiving Officer for contract radio devices. All radio contracts handled in that district had to bear my signature as Receiving Officer for a contractor to collect his money from the Navy. To be an acting officer I had to "speak with the voice of the Engineer Officer". The Engineer was a Commander. As such an officer I caused one of my men to be reprimanded by a summary Court Martial. Also the Navy Yard Supply Officer and I were called on the Commandant's carpet for a summary Court Martial. Files in the supply office had been moved and a contract misplaced so it was written up twice, months apart, and sent through for signature. Both of us had signed it. The Supply Officer said it was not his fault but the result of moving and that made the Admiral mad. I said I should not have signed the duplicate because I should have remembered I had signed the same thing before. That seemed to make the Admiral madder. He questioned the Supply Officer some more and dismissed him. Then he turned to me and grinned saying that since I admitted being

at fault, I would have to suffer a penalty and the penalty was that I promise not to do it again. There was not a slight chance that I would do it again. Washington caught the mistake and did not pay twice.

The Radio Laboratory personnel mounted to about seventy-five people but that many of the force were not in the laboratory all the time. The largest number would be there when one shift was coming on and another was going off. Twenty-five might not be in the Navy Yard, they were at district shipyards, radio stations or the Kilbourne-Clark factory. There were always some on sick leave but although we worked seven days a week, there were less on sick leave or annual leave during the war than in peacetime. Interested working seven days a week apparently kept them healthier than working five and a half peace-time days. The day and a half off for the maybe devilish, sanctimonious, lazy or glutinous peace-time week ends seemed to cause more sick leave than working enthusiastically for seven days. With seven days work one day was like another, - no Sundays and no blue Mondays, as a rule.

In addition to our regular personnel, we called upon other yard forces from time to time. For example, we had a rigger but sometimes one was not enough and others were assigned to our work for hours or days. Electricians were borrowed from the Electric shop from time to time. Our rigger was about sixty years old, highly respected, careful, thorough and the most picturesque for his job of anybody who took orders from our radio office. His name was Jack Berling. He lived across the bay in Port Orchard. Speaking of sauerkraut, he told me that he and his wife and numerous children put up nine barrels a year of regular kraut and one of selected kraut for use in case of sickness.

Some of our quickly assembled war personnel came from nearby and some from a distance. Margaret Burnham was a Bremerton High School girl.

She was our special messenger and helped with drafting, office and laboratory work. The yard had a corps of messengers who followed a regular route but frequently we wanted our memorands or letters delivered to somebody or from somebody right away. That was Margaret's job. She was frequently delayed by young Marines and others who wanted to talk to her. At one of our Radio Laboratories' parties, after a banquet in Bremerton, I married her and John Grieg as part of an after-dinner stunt. John was in the lab with us for a while, then he wanted to fight and joined the Army from which he returned to really marry Margaret after the war. In later years we saw them frequently when he was with the Bell laboratories. He died while on some aviation radio at Dayton, Ohio. Margaret went back to Seattle.

Frances Regan, a Bremerton girl who was a student at the University of Washington, joined us. She was not specializing in any science. Most of her time with us was spent in tracing drawings and office work. She was a Pi Beta Phi, I noticed, after she joined us. I did not ask for her for that reason although my wife is a Pi Beta Phi. I believe the main office files section sent her to me when I asked for more help to handle drawings and the filing of those drawings. Drawings, tracings or blue prints were continually moving in and out of our big filing cases that were lettered and numbered according to the Navy radio coordination system. When the war was over she went back to U. of W. to finish her course. She did not get University credits or a husband for her work with us, so far as I know, Credits only went to those in engineering courses.

Sophronia Ballaine, M.Sc., who had specialized in Physics came to us from the University of Washington as laboratorian. Part of the time her work was in our laboratory. Part was in the Kilbourne-Clark Seattle

plant watching assemblies or testing completed equipment. When KC was producing rapidly, she frequently worked with Dr. Lester or Jack Tolmie. After the war she married our Radio gunner, Albert Kalin.

Dr. H. H. Lester, associate Physics Professor of the University of Washington, came to us in civilian capacity. He gave lectures in our laboratory to the U. of W. students and others with us. Such students received credits for their attendance to such lectures and their work with us during the war. Helpful credit but not as much as if they had attended the normal electrical engineering classes at the University. Dr. Lester was everything from a higher mathematical physics highbrow to a two-fisted roughneck. He would want to calculate all of the places power might go when we coupled a transmitter to our standard dummy antenna. We did not know where the power went but we knew by years of experience about what a transmitter would do in service if he gave us the wave length and hot wire ammeter readings of that dummy. We were interested in his speculations but there was a war on and we needed to keep moving passable transmitters to the U.S. Navy and the U.S. Shipping Board vessels. He promptly dropped professional assumptions and clicked off transmitter production and tests rapidly. Dr. Lester worked at installing sets on battleships and testing such sets in our yard laboratory as much as sixteen hours a day and sometimes until he was so covered with grime that none of his college professor associates would have recognized him. Doc was not afraid of any kind of work or dirt.

Radio engineering was done according to coordination plans. It had taken time and the consideration of a lot of naval features to create such standard plans. One yard had made the plans for one class of ship, another yard for another class. They were forwarded to the Bureau of Steam engineering. After arguments and alterations, they were approved.

Every effort was made to avoid installations that did not conform to standards. A radio station on ship or shore was not to be put together according to somebody's whim or hangover. Trained civilians and service personnel knew that. In our lab we had a full sized radio house with metal walls and soundproofing. It was a standard for the kind of ship for which we had made the radio plans. Also it served as a science room, dark room, oscillograph room and soundproofed room for experiments. Even the changes we might be forced to make in emergencies were somewhat standardized.

We were to equip a battleship with an all new outfit, arc and spark transmitters and receivers. From ship plans forwarded to us, we made installation plans according to our standard coordination system and forwarded them to Washington for approval. To expedite the installation I had all the equipment delivered to the laboratory and asked Dr. Lester to assemble it as it would be installed on the ship, connect up and operate it. That would check for defects, provide connecting wires and give the gangs who would install the equipment a preview of their job. That was in advance of when the ship would arrive and be made ready by the Construction and Repair section. They made all changes in ship structure, bulkheads, decks, etc. We worked on or in what they made ready. All of which was based on coordination.

One morning I noticed that the arc transmitter and switchboards had been shifted from the positions called for in the plans. When Lester came in for the night shift I asked him about it. He said that Lieutenant Painsky had been in the night before and had insisted that the arrangement be changed. Lester knew that the lieutenant was some kind of an assistant to the Engineer officer so he shifted the set. I told the Engineer Officer about it and the lieutenant quit visiting the laboratory. The set was

shifted back to where it conformed to the blue prints. He was a junior grade lieutenant that had enlisted in Brooklyn, one of the kind who thought having been born east of the Hudson River made him superior to anybody west. Also he seemed to feel that he had the right to boss all in uniform below his grade and all civilians. I doubt if he had any practical radio engineering experience and he had no authority over any civilian that I knew of, possibly he occasionally dictated to a civilian stenographer. Somebody had apparently wished him on Commander Wells to get rid of him and Billie Wells did not know what to do with him so had told him to look over engineering jobs and report what was going on.

One day leading man Wright hurried into the laboratory office, folded up his six feet plus in the chair beside me. He was mad - the only time I ever saw him mad. Leaning over so others could not hear, he told me that while he was off the battleship they were working on, Lt. Painsky had climbed down into the below decks radio room and had told his men to stop putting switchboards where the blue print said and to put them where he said. They stopped but did not put the boards where he said. They waited for their leading man who was the one to give them orders. Wright came back to find that idle situation and promptly came to me. To his remarks he added that any more butting in by that lieutenant might produce an accident, a wrench could fall down the ladder way and tap him on the head. I promptly went to the Engineer Officer who sent a messenger for Painsky. When the lieutenant came in the Engineer Officer had a desk for him in a corner of his office. He was told to stay at that deck. I suppose he was given paper work to do. Painsky did not bother anybody any more. We were so busy that I did not remember to ask what became of him. His name wasn't Painsky but he was a couple of temporary pains in our wartime team work. He probably didn't know that I had lived in Brooklyn and had contacted several of his type. Not that

Brooklyn is a bad place. I live there now. It is not next to Hell and although it has been called the City of Churches, it is not next to Heaven either.

Charlie Robinson was an estimator. Planning not only included drawings, it included estimates of costs. When our laboratory over the Electric shop was completed, the Bureau of Steam Engineering asked us to manufacture some radio equipment. To do that we needed more drafting facilities, an estimator and somebody to watch the shop work. While we designed, supervised and assembled, we did not make patterns, castings or machine the parts. Charlie was a quartermam electrician and an estimator. He had started in the Navy as a gob and some years later became a civil employee. He came to the laboratory to look after the manufacturing job. The war came on and I,,in effect, became a shopmaster with quartermam Robinson as my right bower. My desk was that of the former Commandant and was placed diagonally across a corner of the laboratory office. From there I could see all of the office and nearly all of the laboratory through the glass partitions. Charlie occupied the desk at my right. We were about the same size. Old timers knew us apart but the newcomers during the war got us mixed. Their business was handled in the same way regardless of whom they thought we were. After the war started, Charlie was in the office all of the time during the day. I was frequently in other parts of the Yard or outside the Yard and when in the Yard I was usually there from about ten to five and from about six-thirty to eleven or twelve at night. Charlie was not a radio man but he knew where to get answers from the radio men who were in the laboratory or on an installation job in the Yard, or from our extensive files.

Charlie was so genteel, highly respected, even tempered and fair that his longtime experience with the Navy made him outstanding. All of

us trusted Charlie Robinson. When it came to dealing with officers, he was slightly timid and that stuff was left to me. I had never been dominated by an officer like he had been when he wore the uniform. I never saluted an officer except in fun and Marines at the gate who thought I was an officer in plain clothes because I came and went at any time and through the officers' gate. We were parts of the Navy machine and to me an officer might be anything from a first class producer to an egotistical dud and I did not refrain from showing what I thought if the officer interferred with our work. Junior officers were most apt to be troublesome.

C. E. Williams, a radio amateur and draftsman, was one we had listed to join us at the outbreak of war. A Marine telephoned from the main gate that a C.E. Williams was there and could I identify him. I said, "Is he a freckle-faced shrimp?". The Marine said, "He is and I am sending him up." A Marine brought him up. Until a man was hired and given a badge, he was escorted by a Marine or one of us who wore identification devices on the outside. I wore two - a badge under my coat and a different badge outside my coat when passing Marine guards. Outside of guarded territory, the outer badge on a ribbon was slid into a handkerchief pocket.

George Hubbard came with us almost without our knowing it. That is, he was practically in before we knew there was any such person. He didn't like Mare Island Navy Yard for some reason and after we went to war he got himself transferred to us. During the war Williams' job was mainly to make the plans for installations on Shipping board vessels that were built in numerous shipbuilding Yards in our district. We had two installation crews for that work who traveled about the district. Between the two of them they installed as high as thirty radio stations with auxiliary

storage battery power on Shipping Board vessels in one month. That was the highest record to that time. One man saw that equipment was delivered to the ships and Hubbard came along as jobs were finished to check the wave lengths.

The crews included five men each. One of the men was a rigger and handler of heavy equipment. Each crew carried light dummy or mock-up devices which they set in proper places and wired to. After that they replaced the dummies by the large heavy switchboard and other devices. All geared for easy and fast work. They were proud of their work and there was rivalry to find which crew was the fastest. Berkheimer was leading man on one crew. Wright was leading man of another.

The war lost me the first man I had picked in 1915 but it brought me a lot of others. Tyng M. Libby was the first I picked for an assistant at Pugent Sound Yard, but Tyng was temperamental. Freddy Gruwell was the second one. Freddy was as reliable and comfortable as a nice pair of broken-in moose high boots. Freddy is still there, well paid and just as reliable. Tyng became so excitable when we entered the war that we were afraid he would upset all of our new people. He was said to be a red socialist by other Yard employees. As a result, he was not put on work where he had much authority and he quit to take a drafting job in Tacoma, but he still stuck to radio as a side issue, attended IRE meetings and worked on radio inventions. After the war he went with the telephone company.

Jack Tolmie, Kleist and John Greig, who came to us for the war and received U.of W. credits, went to the telephone company after graduating from the University. Francis M. Ryan also went with the A.T.& T. Bock, another of our University men, went to the phone company.

Henry Cordes, an electrical draftsman, was an intemperate mathematician. So far as I know he did not drink, smoke, overeat or overwork but continuously figured or thought high and low mathematics. Libby also was impressed with the value of mathematics in engineering but his school work had not included much mathematics. He and Cordes teamed up to tackle all sorts of radio problems. Libby learned more math and tried to apply his and Cordes math to radio problems. Libby had an amateur station in Bremerton where he and Cordes tried out some radio things, both mathematically and physically. They got hold of a formula that was supposed to tell how far a radio transmitter would transmit. That distance was in some way proportional to the current in the antenna. They did things to increase the current in the antenna. They made the antenna a wider flat top which helped. In their numerous nights of work, they lowered the flat top. The current kept increasing. Their mathematical assumption was working. It worked until the flat top came down to near the ground and Libby discovered that other amateurs were seldom heard and did not answer his signals. They spliced the down lead and put the flat top up as high as they could and regained communication with other amateurs. They told that story on themselves. Their assumption had led them to making a dummy antenna.

When the war came we made places and things do multiple duty. The hall to the Radio laboratory was big enough to handle the freight elevator, stairway, a doorway into the office, a big sliding door to the laboratory and large hinged doors that could be used for swinging in things, that were too big for the freight elevator by block and tackle or by a Yard crane. We made a school room out of that hall by putting blackboards and charts on available wall spaces and by providing very light tables and camp stools. The tables carried a key, buzzer, headphones and plug-in sockets for cords that connected them together or to the instructor as

required. The joiner shop that supplied us with lumber from which we made the tables was only known to me then as a Yardmaster and a brother Master Mason and his name was Harry Mason. About eight years later he was my daughter's father-in-law. From what I have heard I suspect Cooden (Amos of Amos and Andy) learned radio operation that hall.

The tables were wide enough so our operator could rest his entire forearm on the table when operating the telegraph key and there was plenty of writing space. The tables were very light and could be quickly stacked, three deep at both sides of the passageway when we were moving our bulky equipment in or out of the laboratory. They were made of half inch clear northwest lumber, except the legs which were one and a half by one and a half. We had previously designed them and the boys in the lab started making them promptly. They were ready by the time we began to receive prospective operators from the Yard receiving ship.

Bill Sparrow of Seattle, whom we brought in as a chief Petty Officer, taught the boys code and some radio fundamentals in that hall. Bill was an amateur first, then a professional radio operator. The chaps they marched in for instruction were in several classes of would-be operators, junior amateurs and fairly advanced amateurs. That spot served for quite a while until Barracks and instruction houses were constructed by the Navy on University of Washington property in Seattle. At times our hall class room was used by Dr. Lester when lecturing to our several college men from the University and some others. Bill Sparrow received some college credits from Lester's courses. Albert Kalin also conducted some of the engineering instruction work.

Buck Blankenship and I worked out preliminary plans for getting and training operators and started things off. However, Buck was a regular Naval lieutenant and was to be pulled out for overseas service so Benny Wolf, who had become U.S. Radio Inspector in Seattle, was

enlisted to be Radio Communications Officer with the rank of lieutenant Junior Grade and he got the nice new house by the radio station to live in. The Blankenships had occupied it only a short time. Benny did not have a wife so he substituted an old woman housekeeper and he had a Philippino houseboy sometimes. Benny had been a naval radio operator. He was a junior radio inspector when I had left the inspection service. I knew him on the east coast and we were in close touch with each other after he was transferred to Seattle. Things went along harmoniously. One friend left and another took his place.

CHAPTER XXXIV

EXPANSION, CONTRACTION AND DENATURED RADIO ALCOHOL.

During the first war I took part in a lot of things. I had research, development, manufacturing, installation, maintenance, instruction, design, supervision, expediting, contracts and even morale building. The 1915 to 1920 period was very interesting. We expanded from a desk to a smoking room to a high second floor about forty by forty with a mezzanine and then to a three story building ~~about a hundred~~ seventy by a hundred. With a personnel of about seventy-five and an 8800 ton ship for Alaska work. By 1921 things became less interesting in Navy work. What we did seemed to be less and less important. We included design, research, manufacturing, construction, installation, maintenance and instruction of operators and college students during the war. After the war maintenance and some installation with smaller appropriations seemed to be the order of the days.

Immediately following the cessation of hostilities, the Bureau of Steam Engineering came through with orders for us to estimate on further expansion, including a place in Seattle to be somewhat similar to the yard radio laboratory and we spent quite a little time on that and other expansive projects that did not materialize because Congress cut appropriations.

Top officers at Pugent Sound liked me for some practical reasons. Before I came the radio in the ~~3rdxdixxxxxx~~ 13th district was dominated by civilian Manscom and officers of the twelfth district, Mare Island, California. After I came we took over, gradually, everything in radio in the 13th and made outstanding records on battle craft and emergency fleet ships. Also I transferred from Adytum Lodge of Masons to Upton Naval and Military Lodge in Bremerton and helped to initiate the top line officers Coontz and Wells. Gregory was the Master then. We worked together in the yard.

After the war Gregory and I were on the building committee that built a one hundred and ten thousand dollar temple. When the officers were transferred I remained on the succeeding committee, known as the House Committee.

None of the Radio Materiel Officers, Communication officers, with one exception in Alaska, or employees of the radio laboratory, with one exception, were Masons. During the war, Gregory met with the Knights of Columbus. Believe it or not, a lot of Knights and Masons worked together to win the war by trying to counteract the influence of trouble makers, such as the IWW communists. The priest came to see me after the war, saying that one of my men who lived in Port Orchard had been doing anti-Catholic work. I asked him if the chap did it during working hours. He said at night meetings. I told him I had no authority over him then and would not do anything. The fact is that I did not know the chap was anti-Catholic. The priest did talk me into fixing his radio receiver at his house. Incidentally he fed me cognac during the operation. When he went out I found he was using a thick walled glass that looked like the thin walled glass he dealt to me.

The engineer officers I dealt with were lieutenant commanders and commanders. The radio materiel officers varied from lieutenants to commanders. The district communications superintendents were from lieutenants (j.g.) to lieutenant commanders. The commandants varied from commanders to rear admirals. Coontz, the commandant I worked with before and during part of the war, became a full admiral before he retired, as chief of operations and admiral of the fleet. Before he left Puget Sound Yard during the war, we got together a book of 4880 civilian employees with photographs of the work they were doing on battleships and in the district. For our farewell, a dry dock was used as a stadium. The sides of the dock were like steps. All the Navy Yard personnel sat on

the steps. On a raised platform in the middle Coontz was the recipient of the farewell speeches. I spoke for the civilians and gave him the book.

Billie Wells, Reed and Church were the engineer officers I worked with the most. Church was one of the few engineer officers to become an admiral and a commandant. Reed and his wife became very popular during the war. Civilians liked the Reeds. The whole town of Bremerton thought Mrs. Reed was a wonder or an angel. During the war there was a great deal of sickness including the flu epidemic. Mrs. Reed who was big and strong, went out by herself to shacks where workmen were sick. She picked them up, washed them, put them to bed, gave them emergency treatment, got doctors and others on the job. When the Reeds left the Yard at the close of the work day, both sides of the roadway in the yard were lined with civilian employees and between the yard gate and ferry the street was lined with townspeople. Some cheering - some crying.

On one occasion after the war started, I received an important message requiring an answer that would have to be signed by the commandant. I telephoned and found that Engineer Officer Commander Wells was not in the yard and Commandant Coontz was on his way to the Yard gate. I was near the gate and intercepted him. He listened to my story and said, "Well, Merit, when I go out the gate, I guess you are the highest ranking acting line officer in the yard. You give Forbes your answer and tell him to send it". Forbes was the commandant's secretary and had been such a secretary since the yard was started. He was the only civilian who lived inside the yard fence. Being an acting officer speaking with the Engineer Officer's voice did sort of make me the highest line officer authority when the Engineer officer, Captain of the yard and

Commandant were outside of the fence. Admiral Coontz always called me Merit. He said what he had to say with as few letters and words as possible.

Admiral Coontz was one of those who liked the west, particularly Puget Sound. He went back there in his last years. He died in Puget Sound Navy Yard, Hospital. Puget Sound could accommodate all of the navies of the world. All of the navies if sunk in her deep waters south of the Strait of ~~Fuca~~ Juan de Fuca, would leave plenty of room for submarines and surface craft. The Yard was on Port Orchard Bay and Seattle was on Elliott Bay, about a dozen miles away, about an hour apart by ferry. At that time Bremerton and Charleston flanked the Navy Yard on the land side. Later the two towns were combined under the Bremerton name. Bays and waterways were numerous. That section was part of the Olympic Penninsula but Hood's Canal to the west and south and bays to the east and south almost cut that section of land off to make it an island. On the road to Olympia you could see water on your right and left. That road to Olympia wandered up, down and sidewise around Douglas firs in 1915 without concrete and with only the gravel in the spots where a glacier had left it. Also there were roots, boulders and slippery clay in that road. A very nice local cripple operated a for-hire automobile. I hired him one Sunday and kept him going to Olympia. That had never happened to him before and we were lucky that there was no rain or we would certainly have been stuck some place in the big timber. He said he would not take me again without extra gasoline and other precautions.

The narrow neck of bays frequently carried fast moving tide waters that drowned people who did not take suitable precautions. I hunted many houses for a friend of mine, a yard chemist. The Yard let me have

a launch and some of our storage batteries and a submerged light to examine places where he might have been caught on a snag or rocks. North, the Chief Chemist and I examined many places. The young chemist was never found. The tide probably carried him to some place where crabs ate him. In those very cool waters gas might not bring a body up before it could be punctured by crabs.

The war made a lot of potential radio broadcast transmitters. We installed them on ships and we had one in the laboratory for a sort of standard to check up or use as a substitute if a ship radio phone could not be repaired before sailing time. The only failures were tubes or batteries which we replaced. After the war, transmitters of that kind spoke up as broadcasters. Five watt babies that were better than the pre-war broadcast transmitters.

The end of hostilities was a radio letdown. It let some down to less radio and many down to no radio. There were numerous results, one was that the radio broadcasting ideas were rejuvenated and expanded by the increased radio personnel using old and new equipment. The end of hostilities are a letdown to fighting men, equally uniformed men in safe jobs, civil service war employees, civil employees with higher pay than they ever had before and war profiteers. To both uniformed and civil participants or profiteers conditions after the war are frequently boredom.

After the cessation of hostilities we, at Puget Sound, lost the college students almost immediately, and others went back to what they were doing before the war. Shoenfeld went back to X-ray work in Seattle where he was his own boss and could make as much or more than he could with us. Dr. Lester went to a higher paid job with the Army - X-raying castings and other war materials. We did not have places for many and

fortunately, a lot of our people were only working with us to help the war effort. Some dropped radio promptly.

After the fighting in 1918, the Kilbourne-Clark Company had a fine modern plant but not much to do. Some work for Ship Owners Radio Service and some minor contracts probably coming up from the Navy. They were letdown from working twenty-four hours a day to operating a few machines eight hours per day. One afternoon I was walking with Kilbourne when he said, "I have two hundred thousand dollars in that bank over there and can you think of anything I can do with it to keep the plant busy?" I could not think of a profitable undertaking but said I would try to suggest something. Soon after they started making radio receivers for amateurs. They with others expected more amateurs which was a belief that helped to bring about more radio broadcasting and to move the boys receiver from the attic to the parlor and put headphones on the whole family.

Kilbourne apparently had a foolish way of trusting people. Some helped him greatly but others tricked ~~xxx~~ him, according to the stories I heard. He went into a wooden ship building venture and took me over to see it. The yard was not much and they were only building two ships but ships cost a lot of money. According to the story as I heard it, Kilbourne signed checks in blank and gave them to his ship building associate to take care of expenses. Kilbourne went broke. The K-C Company sold their fine plant to the Westinghouse Company and tried to survive in a cheap wood structure. Kilbourne went to New York and lived with Roy Thompson, up the Hudston. One morning he and Roy ran to catch a commuter's train. Roy caught it. Kilbourne stumbled and fell, dead.

When the Kilbourne Clark Co. called a meeting of directors and others to figure out what they could do next, the Bureau of Steam Engin-

eering directed that I attend the meeting as the K-C Co. was working on a Navy contract. I did attend and made a report. Everybody present knew why I was there and all were in favor of completing the Navy contract. They did complete it and got another, but the thing that I remember more vividly was the entrance of Frederick Simpson. Simpson had been the Chief Engineer of Kilbourne-Clark but had enlisted as a Lieutenant Commander and had been Radio Materiel Officer at Boston for a while. At the cessation of hostilities he was a Commander. He toured around with Lieutenant Hall, another K-C employee. Simpson was a Pomp and Circumstance parade. Hall was seemingly a sort of aide de camp. When Simpson entered the K-C meeting, he did it in the grand manner, - A big chap, plus a finely tailored uniform overcoat, a cap with gold on the vizor, an important bow, a kingly removal of cap and overcoat. I almost snickered. The others looked like they wanted to kill him because he was so lordly, not because of anything he had done. Apparently they ignored him. Later Simpson rented the top office in the LC Smith tower and continued as a consulting engineer but not with the K-C company. Hall worked with him for some time. They got together a radio telegraph transmitter which I believe went into use to some extent.

After the K-C Company lost its fine Factory building and moved into the wooden structure, they manufactured some receivers of the vacuum tube type that sold fairly well to broadcast listeners. Ship Owners Radio Service, Inc. (Sorsinc) sold K-C apparatus and parts made by other companies. Charley Cooper handled the east coast operations of Sorsinc. They failed as did a lot of others earlier and later companies that pioneered the manufacture of amateur and broadcast receivers. Early firms were sacrifices upon which others cashed in. Some of those who cashed in were old companies that had high-hatted the wireless pioneers and some were newcomers.

A good many officers who had been at Puget Sound before the war came back. They liked duty in that district. Buck Blankenship came before the war as District Radio Communication Officer - after as Radio Material Officer, Captain of our district radio ship "Saturn" and on battleships based at the Yard. Commander Shoenard came as Radio Material Officer and on ships based there. He was Captain of the destroyer that was rammed by the ship bringing in President Harding to Puget Sound from Alaska. Harding was sick so the ship's captain did not blow his whistle although in a thick fog with the result that he sideswiped Shoenard's destroyer. Shoenard brought his destroyer into the Navy Yard and came to our house for dinner. Harding signed the paper making him Commander that day. Lt.Commander Offley, son of Captain Offley, retired, came to us as Radio Material Officer. He was a new officer to us but had the attitude toward civilians that made him popular with us. His father had been a very popular engineer officer at Mare Island. All of those officers were far from the stuffed nightshirt, fourflushing, dictators that crop up sometimes. They did not do such things.

After hostilities were over and we had Annapolis graduates as Radio Material Officers, I did not contact so many officers. During the war when there really was a lot to do, I was acting Radio Material Officer, Receiving Officer, Expert Radio Aide and a Master in effect, but after the heavy activities we were sent regular Navy line officers to take care of all officer jobs. They did not have much to do and I had less to do than before. That gave me time to play with oscillographs, receivers, location of static centers, loud speakers and surveys about the district including some of Alaska.

An admiral, whose name I do not remember, came into power over radio engineering for a short time. The gossip that reached us was

that he started a movement to close all Navy radio stations in the U.S. but the one at Arlington. His orders hit me but glanced off. He said the Canal Zone should have a local radio engineering organization and that I was to go there as Radio Aide. As I recall there were some special inducements such as, quarters, buying from the commissary and a long vacation in the States every two years. They said I was picked because I had been the last to establish a radio engineering organization in the U.S. The Department of Justice requested that I be kept available, in the U.S., as I was needed in patent litigation for which I furnished information or testimony from time to time. I did not want to go and did not go to the Canal Zone. The Navy did not retire any of our normal radio stations but the admiral was retired. In our district there was less and less to do and more and more officers coming and going, trying to find something to do.

Our shore radio stations were protected during the war. For example, at Keyport both of the towers, the station house and the operators quarters were enclosed by a high barbed wire fence that could be connected to high voltage. Marine guards were on duty and flood lights were available. Those were to protect the station against German saboteurs, IWW communists and any other enemies. The Navy felt that it needed to protect itself against its own personnel so they sent us a directive saying that the alcohol issued for use in Arc Radio transmitters should be denatured by adding wood alcohol. We bought grain alcohol by the car load for the arcs at about forty cents a gallon. It was in five gallon cans that I knew by sight. I frequently saw a can in the Supply Officer's car when he was on his way up the hill to the row of officers' residences. I fared better than he did. The chemist redistilled what I and other of his friends consumed. Mixed with fruit juices, it made a fine punch for the meetings of the Indoor Yacht Club. That club included

North (Chief Chemist), Benedict (Chief draftsman), and Steward (Chief engineer of Public Works(, Gendner (Foundry Master), Paulson (Bremerton druggist) and others who played ten cent limit poker at our houses. Stewart and I discovered that we had been born and raised about ten miles apart and had both gone to Ohio State but he entered the year I left.

The order did not affect the alcohol we obtained from the chemist. His alcohol was not to be denatured. Of course, he used a lot of it. Beakers and other chemical vessels were washed with alcohol. I drew some directly from the Supply Department for use in the washing and quick drying of oscillograph films. Otherwise, we only used alcohol in shellac.

When the letter directing the denaturing of alcohol for arc radio transmitters by adding wood alcohol was received, I sent the letter back with an endorsement that objected to the use of wood alcohol. I agreed that it was desirable to fix the alcohol so people would not drink it but not so it might blind or kill them. Therefore, I recommended that oleo resin capsicum be added to the alcohol in sufficient quantity to make the drink too hot even when the alcohol might be diluted with nineteen parts of water. That capsicum was the hottest concentrated pepper that I knew about. The Bureau of Steam Engineering approved my recommendations. Josephus Daniels, Secretary of the Navy, was an ardent prohibitionist but none of the uniformed navy personnel were prohibitionists as far as I knew.

When the Supply Officer obtained the oleo resin capsicum, I was told to go to the Supply warehouse and show the men how much capsicum to put in each five gallon can of alcohol. I mixed more and more capsicum with five gallons of alcohol until when a half ounce of the alcohol was

mixed with about ten ounces of water, the combination was too hot for me to drink. Every time they got a new shipment of capsicum, I did that. There was some variation but about a heaping tablespoonful was usually plenty hot. I was the official taster of radio alcohol which was the alcohol used in Poulsen Arc transmitters which were then the best high powered radio transmitters.

The operators at Keyport complained that the oleoresin capsicum gummed up the arc. The District Communication Superintendent passed the complaint to me. I operated the arc and told him it operated as well as it did before we peppered the alcohol. Some months later the ~~xxxx~~ superintendent and I inspected the station together. He went back to the yard. After he was gone, the chief said to come over to his house and have something to eat. Before eating he poured drinks. After eating he poured again and said, "How do you like that drink?" I said it was good. He said, "That is made from alcohol that you denatured with pepper". I asked how he did it and he said, "cut the ends off a loaf of bread and filtered it through the loaf". So far as I know, nobody kicked about the alcohol used in radio arcs from then on.

CHAPTER XXXV

THE PUBLIC'S RADIO DATE

The first World War rid the U. S. of radio companies that were controlled or substantially influenced by foreign companies. The German stations, equipment and patents had been taken over by the U.S. Enemy Alien Property Custodian during the war. The Tuckerton (NJ.) station was ostensibly French but actually German and French mixture. The Marconi interests were dickering with the General Electric Co. for the Alexanderson alternator to use in foreign countries and for oversees communications with the U.S. That big alternator was an outgrowth of the little alternator that Fessenden had requested the G.E. to build about ten years earlier. The Navy did not like the Marconi maneuver. In time of war Radio takes the place of cables that are cut. The Navy had not liked things the Marconi interests had done from 1899 on when those British interests tried to make the Navy lease Marconi instruments at high rates with the proviso that Navy could make no changes in the instruments. Such things had caused Admiral Bradford to properly cuss early in the century.

Rear Admiral Bullard, Director of Naval Communications, Commander Hooper, Chief of the Radio Division of the Bureau of Steam Engineering, and Lieut. Commander Loftin, in charge of the Radio patent section of the S.E. Bureau, became very active in getting rid of the Marconi interests after the war. Working with General Electric and others, the formation of the Radio Corporation of America was brought about. The RCA bought out the Marconi Wireless Company of America. The Alexanderson alternator was not used much but it served as an argument to rid us of foreign radio interests. The alternator was a wonderful, awesome, precision-made machine but the oscillating vacuum tube came into use as a better, cheaper, more flexible and far safer generator of radio frequencies. The transactions bringing in RCA were extensive. In

Investigating the claims of the Telefunken Company for arguments before the War Claims Arbiter, I had access to many documents relating to the formation of RCA. Some probably that RCA people never saw. RCA people had files we never saw.

With the war over, none of the Naval Radio work seemed to be very important. I made tests on the direction of static centers from points in Oregon, Washington and Alaska. Also in Alaska I investigated Alaska Sports and Amusements and compiled a book of 118 photographs with forty pages of blue printed explanations and stories. It is largely about Kodiak bears, including one sixteen feet long, fur seals, including photographs of thousands, deer, moose, ducks, geese, fish and other things that might interest Navy radio operators in going to Alaska for a while. The Communications officers wanted it to interest some of their men. President Harding had a copy of it when he visited Alaska. I don't think that killed him. Many stories have been told about what killed him. A local doctor told me he had what they called the "flu". It had killed so many in the northwest. He said if Harding had remained in Seattle where the doctors were treating so many cases, they might have pulled him through.

I worked on a scheme for guiding ships through crooked channels by a cable, in the channel, that carried 1,000 cycle current which could be followed by receivers on vessels. I used an army cable that terminated at our yard. Also I spent a lot of time in trying to reduce the effect of static in radio reception, reducing the effect of interference (harmonics) produced by arc transmitters, on loud speakers and with tuned audio frequency circuits. The personnel left over from the war did not need much supervision. Once I was called out at 8 A.M. to straighten out some rush work on a battle ship. One ship arrived at the yard with a tube transmitter that the installers in an east coast yard and the

ship's crew had not been able to make work. I said I would try it if they would deliver it to the laboratory. They did. I did not find a thing wrong. It worked.

The war stopped broadcasting's slow development and provided means to bring it back for fast development after the war. The title "Radio Ancestors" tended to include more than Radio pioneers. War, stock jobbing and other undesirables helped develop radio. Governments, technical societies, colleges, commercial organizations, individuals and radio devices are in the family tree.

Broadcasting stations were licensed by the Department of Commerce as Experimental stations for several years. For example, Hanscom's station (6XH) on the Fairmont Hotel in San Francisco in 1915. It used an arc at the transmitter but the Deforest Company station at Highbridge, N. Y. in 1917 used a vacuum tube transmitter. Ships heard Deforest broadcasts as far as about 300 miles. They danced to music from Highbridge in Morristown, N. J. That station broadcast music and stories on about 800 meters at 8 P.M. Monday to Friday. They had a plan to become a wireless newspaper which would include the day's happenings "hot off the wire" and advertising. They received fan mail but our going into the fight in 1917 shut them up. The Deforest station was probably as good as several of the broadcasting stations that bobbed up after the war. Government war contracts had caused transmitters known, for example, as CW936, to be produced on a production line basis. They were suitable for broadcasting and many ex-navy and army men knew how to hook up something like them. We had them at Puget Sound Yard.

So many people had experimental licenses or had applied for them to broadcast information and music, that the Department of Commerce decided after the war to classify them, not as experimental stations,

but as broadcasting stations. Frank Conrad was the first to apply after that new classification was decided upon. Conrad was an employee of the Westinghouse Electric and Mfg. Co. and they received the first license under the new classification. That was in November, 1920. Except during the war period, the broadcasting of music and speech had been going on for more than thirteen years before the Department of Commerce decided that broadcasting was no longer an experiment. Broadcasters were given call letters beginning with K or W instead of with a district distinct number followed by the letter X. Broadcasting was thereby graduated from the class of being an experimental unknown. It took several ancestor stations to bring that about. Among radio people it has been characteristic to claim being the first to do something, especially by those who had something to sell. Broadcasting stations continually claim to be or to have been first in this or that, - profitable print, wind and ether.

Soon after I began to encounter the revived broadcasting, one of the RCA family wrote to me saying the demand for receivers to listen in on radio broadcasts was entirely out of hand. The public had inconsiderately gone wild about listening to radio before the RCA was ready for them. There was a lot about the demand for receivers, including the stealing of telephone receivers from paybooths. We had experiences, too. The ground floor of our laboratory at Puget Sound was taken up on one side by rows of switchboards that had been removed from ships or were for installation on ships. At times there was nobody in that big room on the first floor. Stuff that was easy to steal was kept in a locked room back of that and on upper floors, but some person or persons did slip in between the switch boards and remove voltmeters and ammeters. They probably thought they could use them in connection with broadcasting. Also a packer in the Supply Department took good radio tubes

out of their boxes and substituted burned out tubes, with the result that radio stations accused us of sending them bad tubes. We tested some of the tubes but they were packed and shipped by the Supply Department. A secret Service man put to work in that department caught the packer and sent him to prison.

The excitement over broadcasts was so great that I drew up a little pamphlet telling how to make a crystal receiver. It was blue printed in quantity. Taking our amplifiers that we used for docking ships and other radio equipment, I demonstrated the use of equipment by picking up weak broadcasts and amplifying them so the entire audience could hear and gave away the pamphlets. We packed the dance and banquet floor of the Masonic Temple with townsfolk who paid to get in. It was for the benefit of a charitable organization, the Sunshine Society, and was the best paying benefit they had ever had up to that time.

In connection with existing or possible patent claims against the government, Mr. Wallace had told the Department of Justice that he had used an audion circuit with feed back before there had been any publicity about such feed back and that his receiver had been used on a ship for commercial service. Wallace said I had seen it on that ship. Justice took it up with me and I said I had seen it but did not remember the date or have any notes in Bremerton that would help xx fix the date, such notes or something might be in my files I had stored in New York City or on Radio inspection forms that I had sent to the Department of Commerce. Also I recalled that Wallace had been an operator, with the United or Marconi Co. but I did not know his first name or initials. I remembered that I was passing a United Fruit ship and saw somebody by the radio room. I was on my way home but thought I would stop and talk to the operator. On going to the radio room, instead of the operator I found Wallace who was about to take ashore an audion receiver that the operators had tried

on their last trip. He asked me if I wanted to try it. I tried it and told him I thought it brought in signals louder than I had heard them on ships in that locality. He said it was more sensitive than any other detector. I had been hearing such stories about audions directly or indirectly from amateurs. I asked him how the audion was connected. He drew a little sketch. I said that was not the right way to connect an audion. He had the phones in both the plate circuit and tuner or grid circuit of the audion. He said that was the way it was connected and asked me to check the circuits. I did. Tracing the connections took a lot of time. The top of the box had to be removed. Several pieces of lamp cord went through one small hole in the top to their connections. I traced them several times and drew a diagram, which confirmed what he said. When we were leaving the ship, he asked me to keep the matter secret. I said I would and tore up the circuit diagram I had made. My recollection was that I had made no further inspection of the radio equipment, as it was after hours and I was on my way home. So far as I could recall, I did not pass those docks in that direction on my way home after May 8, 1913 because we moved from Brooklyn to New Jersey on that date. The date was important because a circuit that had been in commercial use could give it priority over the date of a patent application.

The Department of Justice wanted me to check further. In 1933 when my father died, I notified Justice that I would be in Ohio for his funeral and if they wished, I would go to New York and Washington. They wanted me to do that. I examined my files in the N. Y. storage warehouse and files at the Department of Commerce. My files did not fix the dates and files for the period I wanted at the Department of Commerce were missing. Terrel said they were burned in an accidental fire. We could only decide that I probably saw the Wallace circuit some time between October 1912 and May 8, 1913. Harry Knight, Special Assistant to the

Attorney General added that information to his files.

From my experience I have suspected that feed back circuits like that used by Wallace had been used as early as 1911. In 1911 and particularly in the early part of 1912, I heard stories directly and indirectly from amateurs who claimed to have found the audion to be very sensitive. That was while I had charge of the Experimental Apparatus Department of the Marconi Co. where we sold equipment to amateurs and colleges. Also I was familiar with the "haywire" connections that amateurs used when their devices were largely homemade. In tracing the circuits of the Wallace receiver I had difficulty in being sure whether the tuner was connected directly to the audion filament or through the headphones to the audion filament. Re-checking showed it connected through the headphones. I told Wallace that was wrong but he said the audion was more sensitive when connected that way. It did not occur to me that the telephone cord and other parts of the headphones acted like a condenser to pass radio frequencies and I thought the phones should be connected only between the B battery and plate or between the B battery and filament. People who used haywire or hurried connections would wind wire from their tuners, around what I thought was the wrong telephone tip but which produced a self-tickling or feed back that made audions more sensitive. But they had not applied for patents. Armstrong did apply for a patent and from what I saw, we all learned a fairly correct theory about feed back and audion tickling from Armstrong and Professor Morecroft and their application of an oscillograph to the audion circuits. Those amateurs who probably used the same feed back arrangement that Wallace used without knowing what they were doing, were developers of radio. They talked about their wonderful results. Their bragging caused others to worry the audion until it became an oscillator that grew up to be tnx transmitters that took the place of, and have gone far beyond,

Having been connected with broadcasting efforts dating back to 1907, I was a trifle dubious about the broadcasting a part of the early 1920s. I put up for a night and part of a day in an Indian village and discovered a station in the general store [illegible] radiated the words of "Yes We Have No Bananas." I was convinced broadcasting was here to stay.

all other transmitters. In 1911 and 1912 when I heard stories about amateurs getting such wonderful distances with audions, I asked some old people who, I knew, investigated such things. They said they thought the amateurs were just talking big as they did not get such results. Those men were the careful kind who checked all of their connections and used marked binding posts instead of loose wires, so they did not make the happy mistake of getting the phones into both the plate and grid circuits. After Morecroft and Armstrong explained the feed back, before IRE, we all did it, several ways.

Our sale of Fleming valves in the Experimental Dept. of the American Marconi Co. may have contributed to feed back. To use them the phones were connected between the tuner and filament or plate.

This subject of vacuum tube feed back is an example of why I argue that radio had many unknowns who at some point were doing important things that directly or indirectly led one or a few others to fame and fortune. From what I saw of the homes of amateurs, particularly when I was U. S. Radio Inspector, I believed that the mothers, in most cases, gave up something every time son bought a part for his radio.

What I saw and heard about audion feed back and results that indicated audion feed back is an example showing that radio development did not occur in one man steps. A lot of people took part and the one who received the money or most publicity may not have contributed as much to that step as others who did not receive money or mention. I doubt if either DeForest or Armstrong was the first to use feed back and suspect that Wallace was the first to build a feed back receiver that was used in commercial service although probably he was not the first to use one experimentally.

While in New York at WEAF and Washington and during a stop-over in Chicago at WDAP, I saw more radio broadcasting and became more interested

Tickled subject. When tubes were used for the amplification of light frequencies they tickled themselves without an Armstrong or Deforest circuit. A lot of people tried to stop the tickle. Dr Alan Hazeltine provided the better cure. Grebe wanted to break the Hazeltine patent after a lot of study I was sure I could not give expert testimony that would hold it. Moreroft tried to and Grebe lost.

in broadcasting, patent cases and returning to the east coast. During my tenth year with the Navy I did not use any of my leave time until the end of my year. Then I went to Chicago, Cincinnati and New York. After arranging to go with the A.H.Grebe Co. as consulting engineer for a third of my time, principally on patents in the office of Walter Pumphrey, patent attorney at 165 Broadway, I resigned from the Navy job. The resignation took effect on July 18, 1925, the last day of ten years with the Navy. Nearly all of the work I did for pay had to do with patent applications and suits. Oddly enough, I was in the office of the Radio Division of the Navy, Bureau of Engineering, getting some information about a patent when that office received a letter from Puget Sound saying I had resigned.

After all my efforts to check up on radio history when I became associated with radio in 1897 and all of the experience with radio I had from then on, I found after I got settled back in Brooklyn New York in 1925 that John Q. Public seemed to think radio began in about 1925. By then, listening to radio broadcasts had become a fairly general household habit. Listeners had reached their own conclusions about radio. I was told by listeners that broadcasts were radio and something new and that ships did not use radio, they used wireless. There probably were more people in Flatbush, Brooklyn with such ideas about radio than there were people in the U. S. who thought Maxwell and Hertz were the radio ancestors. On that basis all who helped develop radio before about 1925 were radio ancestors. Except for those who had taken up the study of radio in college or some school where the course started with the Maxwell theory and the Hertz demonstrations of radio, people generally talked about radio as though radio began when they first paid attention to it. Not only the John Q. Public type but some amateurs who took up radio as a means for talking to others at a distance, without studying anything more than what might help them to send and hear farther.

One night I was in a broadcasting studio hallway when Irwin Cobb came out of a room where he had been broadcasting his humor. The man in charge of the studio introduced me saying I was the oldest radio man around there. That seemed to put Cobb in a bad humor. He snapped "I don't know about that. I have been in radio since 1922". I said that is about twenty-five years after I got in it. He snorted and stalked to the elevator.

While the public picked a too modern date for the beginning of radio, it is also possible to pick a very early imaginary date. Electromagnetic radio waves were produced before the dates that I have mentioned even though I went back to late seventeen hundred for a date. I have seen pictures of Adam and Eve departing from the Garden of Eden a few jumps ahead of lightning flashes. Such lightning produced radio waves like we get from static and like we got from early spark transmitters. Theoretically A and E were the first dodgers of static. Sometimes radio waves may have caused the soles of their feet to tickle if they were standing not far from where lightning struck the earth, if they did not wear shoes. I have left it with shoes on. We can say that Maxwell and Hertz were radio's ancestors but I think it is more accurate to say that Radio had a lot of ancestors, including hundreds that have not been mentioned in books. The bipeds in Radio's Pedigree ranged all the way from profound sad-scientists to many merry, cut-and-try boys.

XXXVI
Preserved ancestors

I have museum pieces which illustrate spots in Wireless History. The following are some of them.

#1 is an Induction coil (Ruhmkorff coil). Such coils are used in nearly all of the wireless transmitters before 1904 and in many main, auxilliary and amature transmitters to about 1920.

An induction coil with a battery, spark gaps and antenna was the transmitter Hertz used in 1886 to demonstrate and prove Maxwell's 1864 theory of Radio.

My little Ruhmkorff weighs about two pounds. It was used to demonstrate how Professor Dolbear of Tufts College used an induction coil in his Wireless. He applied in 1882 and received a patent in 1886 for a Wireless Telephone. The company that bought the patent was incorporated as the American Wireless Telephone and Telegraph Co.

That was the first wireless company I worked for. Harry Shoemaker was chief engineer. Pickard and I were assistant engineers. Pickard was in charge of the nearly completed station at Galilee N.J. when I arrived in 1901.

The tag on my little coil says "US Circuit Court Southern District of New York. Marconi Wireless Telegraph Company of America VS De Forest Wireless Telegraph Company - In Equity - For Identification Induction Coil D' of Galilee Test Dolbear Apparatus"

The trial was over in 1904. Farnsworth the defense attorney gave me the coil later and told me Shoemaker said he had demonstrated the Dolbear wireless using this coil at Galilee and would repeat the demonstration for the court. But when the time came, Shoemaker did not appear in court to testify and demonstrate.

While I was with the AWT&T Co in 1901 I was told, Dolbear used an induction coil to send wireless telegraph signals several miles in about 1884. The stories I heard were similar to the record in "A History of Wireless Telegraphy by J. J. Fahie, third edition, revised. Dodd Mead and Co MCMII" page 94-99
94-99

(Ind Coil)

#2 Coherers

The evolution of wireless showed up the Rulmkorff coil as the worst wireless transmitter, a nuisance. The Marconi companies were the worst offenders. On April 2, 1914 there was a show-down in Washington attended by British and U.S. Marconi representatives and U.S. government representatives. We passed the following resolution:

"That the days of the induction coil are numbered, and its use shall not be extended beyond those manufactured or now being manufactured."

The filings are between silver plugs attached to platinum wires which pass through the contracted end of the hermetically sealed glass tube that encloses the plugs and filings. The tube is supported by an ivory rod. The rod fitted into a clamp on the receiver where it was tapped by the decoherer.

The M M S stamped in the ivory had a meaning. S, as I recall, meant sensitivity. I took the matter up with the British Marconi company to find when these coherers were made. They thought about 1900. The numbers apparently are not a clue. Wireless companies often used numbers that did not correspond to the number of the items made or key the date of manufacture.

Each coherer is in a tin box about 4" x 1 3/4" x 1/2". One of them, (1201), is cracked the other probably partially evacuated.

#2 Coherers

Hertz in proving the Maxwell Radio Theory, in 1886 used a directive loop antenna with a little gap in the loop. The gap was lit up by a spark when radio waves hit the loop.

In 1892 Eduard Branley made another detector which became known as the Branley coherer.

My coherers MMS 11301 and 13712 were made about 1900 and used by a Marconi company. In these are many very small gaps between, presumably, silver and nickle filings with a trace of mercury. Currents caused by radio make such gaps close. Filings touch each other, cohere, letting battery current through to produce a sound or a marks on tape and to jar the filings so they fall apart, decohere, ready for the next signal.

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#3 Two Polarized relays

All coherer receivers included polarized relays. Battery current passed through the coherer, when it cohered, and through a sensitive polarized relay which closed a battery circuit through a less sensitive relay that closed the battery circuits through a decoherer and a tape recorder.

One of my polarized relays is what I knew as the Western Union type and was the kind used by the American Wireless Telephone and Telegraph Co.

In trying to help the coherer I sent for another relay that I was told would act on weaker currents. I understood it was a European make. But when I received it I found it was marked Queen & Co. That did not make much difference as I had abandond the coherer in the mean time.

#4 Two 1901 prospectuses of the Pacific and Continental Wireless Telephone and Telegraph Companies

Here was the best of the early prospectuses. The cover is in color. On the front is a handsome picture of a stream in a wide deep canyon. Illustrations include two photos of Fred Nerr ostensibly receiving a message and two of me sending with a portable transmitter. In both cases I also wore a mustach and in one case, a hat. They are good pictures but not in color. Also there is a dissertation on how wireless works. This is followed by reasons why you should buy stock in Nerr, quote: "History will ever repeat but opportunity like stock in Bell telephone and Wireless Telegraphy, below par, is the opportunity of a lifetime, if not a century." That sales talk became, in essence, standard Wireless and Radio Telegraph and Telephone sales promotion gospel. Four subscription blanks are enclosed in the prospectuses.

I was listed with the officers: A.M. Stevenson (republican boss) President. A.L. Nerr (brother of senator Nerr of Indiana) V.P., General Manager (and promoter) J.E. Tipple 2nd V.P. Dewey C. Barly (U.S. Marshal) secretary and treasurer. Colorado Nat. Guard General Irving Hale (Manager Denver office of General Electric Co) consulting Engineer. R.H. Marriott, chief Engineer.

#5 Spherometer

Several materials in contacts served for detectors. In my tests, a steel point against oxidized iron remaind sensitive longer than others. The screws I made to adjust the point were not fine or steady. Having spent time measuring the curvature of lenses in physics lab., I thought of the Spherometer point with its fine thread and large disc that would do for a detector. Therefore the successful detectors used at Avalon and on the mainland in California in 1902 were Spherometer points touching oxidized iron (a piece of tobacco can with the tin melted off). The sherometer was bolted to the top of the detector box. A disc of oxidized iron was held in a clamp where it could be turned like a phonograph record or moved sidewise for thorough coverage of the iron disc.

The Department of Justice used my patent application that I had not prosecuted to issue, about twenty years later in defense against detector suits. Since I had put it in public service of record, it was prior art.

This sherometer lacks its legs but otherwise it is like three I used in the 1902 detectors.

—H.

#6 An Early Wireless Message

It is the message I sent from Avalon to my father in Columbus, Ohio in 1902. It is behind glass in a frame. It went by wireless from Avalon to Whitepoint on the mainland where it was transfered by our operator to the Western Union wire in our station.

#7 Electrolytic Detector

to

#8 Carborundum Detector

Officers, stock salesmen and operators of the DeForest Wireless Telegraph Companies said the electrolytic detector was one of DeForests great inventions, far better than any other detector and the liquid in it was his secret.

Then DeF and the DeF companies were sued for infringment which brought out that DeForest had not invented the electrolytic detector. That disclosure was the explosion that brought the carborundum detector into immediate use, skidded DeForest toward the exit and probably was what caused him to try to get something practical out of the two electrode vacuum tube that he could call his own (and that he did). Also it was probably what hurried Pickard into bringing out different kinds of crystal detectors. Fessenden and Vreeland fought over who had invented the electrolytic and in the mean time crystals took over. The failure of the high power transmitter (40? KW) at DF to span the atlantic and its general impracticability was seeming the last straw that caused United Wireless officers to get rid of DeForest.

The detector boxes I have were made in about 1904 and were alike. Both have space in the base for three flash light cells and the resistances of a potentiometer. On the back is an off and on switch, switch for 1, 2 or 3 cells and a seven point potentiometer switch. One has the glass cup for electrolyte and the support for the electrode and name plate: "De Forest Wireless Telegraph Co. Receiver Patented Dec 16 1902 The electrode was a Wollaston wire in a glass tube. Some wire protruded and when dipped into the electrolyte the silver was eaten away leaving the fine platinum wire. After DeForest et al were frightened they sent us thin flat platinum in a flattened glass tube exposing a thin edge of platinum. But that did not dodge the suit.

Then they sent us carborundum sealed in hard rubber tubes and told us to return the platinum electrodes. The sealed carborundum did not work. I bought carborundum and, in the Spring of 1906, replaced the electrode holder and cup with four adustable carborundum holders and a selector switch. They worked. Operators carried pet (sensitive) chunks of carborundum in their vest pockets. My headquarters was Denver when these events took place.

#9 Crystal Detectors

Crystal Detectors and other devices were designed by Pickard and sold by the Wireless Specialty Apparatus Co. (Pickard, Farnsworth and Firth). They were very well made by Foot Pierson and Co under the supervision of Morris Liebman. He was so admired that Emil Simon, who had Wireless Improvement Co apparatus made in the same shop, gave $10,000. to IRE, when Liebman died, for investment to provide for a cash prize to be known as the Morris Liebman Memorial Prize.

I have three samples of the Wireless Specialty Detectors, Two are one base.

One Galena with metal point contact. IP88 #116

One Bornite to any one of nine Zincite piece and one metal point to Iron Pyrite with selector switch (silver top contact buttons). IP94#216

Also a heavy brass shelbox 2½ x 3 x 4½" with outside on and off switch. The galena detector could go in it. I thinks a silicon detector was in it, but I don't find it.

Also there is a typical cat whisker arrangement of unknown make that had silicon in it once but not now.

#10 Head Phones

I have the following that were used for wireless.

2 made by O. Brunet, Paris
1 Federal T+T, Buffalo N.Y. Type 5-3W
1 Murdock Radio #56
1 Schmidt-Wilcke Elect. Co., New York
The Schmidt-Wilkes was one of the first to be popular with operators. As I recall it was first sold as Lambert-Schmidt.
1 H.W. Sullivan, London. These were considered about the best around 1908. Light and wound with fine wire, 7200 ohms. I don't believe they were used to operators, too expensive.
1 C. Brandes Inc., New York. Superior Matched Tone. About a 1920 model. I helped Brandes in 1908-10. I had used head phones for years and obtained information from our operators. He was in my office discussing a new head band the afternoon before he was called in a wreck of the night train to Buffalo.
1 Baldwin and several pairs of Baldwins
1 (not a pair) normal Western Electric and one renamed to 4.46a

#11 Audibility Meter

This type of audibility-meter was used for years. It was designed by Pickard and sold by the Wireless Specialty Apparatus Co. This was the first one made the model. On it is a Forbe Pierson, 160-162 Duane St., New York, nameplate. The subsequent instruments were marked audibility meter and Wireless Specialty Apparatus Co. Pickard and one like one.

a laminated ebonite switch sweeps 23 buttons (silver type). The output of the wireless receiver and head phones were connected in shunt to it. When the switch is on the button marked 1, the phones only are connected to the receiver. If the signal is heard and when the switch is on one the audibility is one. when the switch is on 2 half the current goes through the phones. If the signal is heard only on 1+2 the audibility is 2. On 3 only 1/3 the current goes through the phones. 1, 2, 3, 4, 5, 7, 10, 15, 20 and in jumps of 10, 100 and 1000 to 10,000

Before these were a lot of ways of guessing at the strength of received signals. I used a special phone arrangement to measure the distance I could hear the signal from tight against my ear to several feet away.

#12 amplifier

Before the vacuum tube amplifier, there were several alleged amplifiers. There I remember, varied the resistance of contacts. I worked with a lot of variable contacts and my assistant in building the California stations ~~[illegible] 1902~~ in 1902, G T Swenson, applied for a patent on and a "Sound Amplifier" December 17, 1902 and got it (#757,818), February 9, '04.

April 5, 1911, Mr. Elmer Sperry took Mr. S. G. Brown and me to lunch. Mr. Sperry was trying to impress people with the value of the gyroscope. He had a little gyro in his pocket and demonstrated what it could do. People seemed to think the gyro was a toy and Sperry was a foolish boy like a. Fortunately he lived to see some of the successes of the gyro and his other devices.

The purpose of the lunch was to interest me in Mr Brown's instrument. It is marked S. G. Brown's Telephone Relay, patent 11135-1908. Makers: Brown and Murray Ltd. London. No 43. A fine piece of workmanship enclosed in lacquered brass, a magnetically operated adjustable reed carries an iridium plate which touches an osmium point. a more durable contact and made better than others. Mr Brown said it amplified wireless signals and he wanted me to try it for possible use by United Wireless.

Tried in my home laboratory, I thought if the magnet was rewound with fine wire, it could be used to amplify signals of a certain strength, but the signals we received were Marconi strong or weak. April 8 the operator and I tried it at DF which had been moved to Dreamland Coney Isle. Fortunately I took it home, Dreamland burned down, and I ended ja station known as D F. The D F call was taken from the name of the inventor of ancestors of the Vacuum Tube amplifier; De Forest.

#13 Hot wire meters

Roller Hot Wire
Direct & A.C. Meters

Ammeter	#33406
Milliammeter	#29145
Voltmeter	#23252

These were the first hot wire meters I used. That was about 1908. They were not satisfactory even for direct current, they did not stay in adjustment. For wireless frequencies they were hopeless, they were coiled shunts, connections through twisted cords and with the voltages we used current would leak or jump to wrong places.

About three years later I began using German hot wire meters that were satisfactory. I believe they were desendents of the Slaby-Arco hot wire ammeters made in 1903 or earlier. Telefunken the company that succeeded Slaby-Arco and Braun companies used them at an early date in the antenna connection to their transmitters and small milliameters in their ivavemeters.

#14 Tuner

I have one of the tuners I made for easy coupling and tuning. Two little boxes that are easily pushed around on the table have mica cradles on the coupling side, supporting a flat spiral inductance a knot on the opposite side and another on tip control tuning.

My patents Dec 13 1910 978,605 & 606

also there is a rotary switch for adding inductance coils and another for adding condensers. These were for a short to long wave tuner. A large instrument where the variable air condensers and one inductance would do very short waves and adding inductances and condensers built up to the longest waves by pushing buttons. The complete tuner was one submitted by United Wireless to the Navy. My patent Dec 13, 1910 978,604

#15 Weston Portable
Wattmeter
Model 16 # 45760

This is one I used about 1910. We were interested in the power consumed, power factors and power radiated. We tried various schemes to find how much power went into the antenna, or came out of it. Around 1913 I borrowed some of Dr Goldsmiths physics students to lug around a dummy antenna, from ship to ship. It was an inductance, capacity, ammeter and supposedly known resistance, in series.

By World War One we had sev standardized our dummy antenna, that we had several that were more compact and portable. We tested all transmitters on them and compared them to many antennas. I believed the input wattmeter but was always dubious about the readings we used to indicate the power delivered to dummies or real antennae.

#16 Wavemeter

Because wavemeters were big or heavy or both I had this little wavemeter made. The Marconi Co made a condenser with hard rubber dielectric. It had a capacity of near 0 to .01 mfd. and was mounted on a square hard rubber base. Being round it left four unused corners on the base. We used these spaces for two little binding posts for the inductance and a miniature light bulb base, a carborundum detector and two posts for the headphones. A leather case 6x6x4" enclosed all but the headphones (these were available in any station).

The condenser scale was calibrated in mfds and wavelength (150 to 750 meters), with more accurate graphs in the lid of the case. When near a transmitter the miniature bulb was used to indicate resonance. At a distance the detector and phones were used.

When I became U.S. Radio Inspector it was a great help. We had two much to carry. It could be hooked on a brief case or put in an overcoat pocket and weighed only about 6 lb. It was accurate enough to come within the margin for error.

The Fleming Cymometer was a long box truck portable in an express wagon. The Slaby was a long reel wound with wire, he applied for a patent on it in 1904. The Donitz was heavy, he applied for a patent in 1903. It was probably the ancestor of the Telefunken wavemeter that was very good and I used it in 1912. There was a handle on each end so two men could carry it. The United Wireless used bulky wavemeters. The Kolster Decremeter that became standard in our service in 1913 weighed about 25 lb.

#17

Telefunken
Radio Slide Rule

For quite a period the Germans made the best wireless telegraph transmitters, hot wire ammeters, and wave meters. The best detectors were made in the U.S. U.S. made receiving tuners were preferred by us as lighter and easier to manipulate than the German.

Germany financed radio development. The US government did not donate subsidies to radio development. Detectors and receiving tuners did not cost so much. An individual with little money could develop and test them more or less without help and even without anybody else knowing what he was doing. Dunwoodie probably had no financial assistance in bringing out the carborundum detector up until United Wireless (am Detroit) took it over. Pickard seemingly started his crystal detectors and tuners without financial help.

The Telefunken topped off their private efficiency by bringing out a slide rule marked specially for use in radio. Inductance, Capacity, Resistance, Wave Lengths and Current are prominent with tables on the back that equalize the units and symbols used by ~~English~~ US and German engineers. We had no such slide rule but carried note books containing formula, graphs and tables for use in radio problems.

Richard Pfund, Telefunken representative and manager of TWT station on Liberty Broadway, gave me this slide rule in 1912 or 13. It looks as good now as it did then.

Vacuum Tubes

The cathode ray tube, ancestor of the television picture tube was demonstrated in about 1896. Tubes like Geisler tubes were used in the early nineteen hundreds, not as detectors but to protect detectors, they were connected to the input of receivers for conducting violent oscillations, due to static, to ground. Some coherers were evacuated to the limit of the ability of Sprengel pumps.

I thought I had held on to more tubes than I find now. I handled a number of Fleming valves but did not keep one. In September 1906 three of the DeForest types of tubes and receiver with elements for a wet A battery were sent to me at Dallas Texas. I had to buy electrolyte for the A and dry cells for the B battery. Two burned out when I heard a signal and before I could switch to carborundum for comparison. I left them there expecting to take them to Denver. They did not impress me enough to remember them when I was at Dallas later on my to Denver.

#18

Ultraudion
le volte
Hudson Filament
Patented Feb. 18, 1908

This one was probably made in 1914. It is wound with a base like a christmass tree light. Has a red lead to the plate and a green to the grid. Looks like the one old Doc DeForest is gazing at in his most publicized pose. He did not look like that when he applied for the first audion patent.

This tube is probably a direct descendent or like the tube Armstrong and Morecroft used to prove the how and why it oscillated and disclosed at the I R E meeting. And the one Armstrong used to let me hear the squeals he picked up from German stations, in Pupins laboratory in 1914.

Dr. Hudson who invented that kind of filament and Armstrong were members of the same club, the Radio Club of America. I thought he contributed much to the audion and to the club, particularly; stability.

#19 3 VT ones
and
3 VT twos

These were made for use in World War One, and are from the American Telephone and Telegraph Co. branch of the Vacuum Tube Family tree. They did not turn blue frequently like the tubes we had been using.

I guessed that the VT ones were about like the tubes used at Paris, Mare Isle and Honolulu in 1915 to pick up the radio transmitter, made of a lot of VT twos, in the back room of the Navy station at Arlington, Virginia.

VT twos were used in Navy Radio Planes during the war and, I think, for unofficial and unrecorded broadcasting of voice and phonograph records, at cessation of hostilities.

#20 Miscellaneous Tubes

When we moved in 1925, some tubes were lost. There are two unidentified tubes that are older than the following which bear some identifying marks.

1-Arcturus UX100A, 1-KR0201A

1-Arcturus 42, 1-75, 4-124, 1-127, 2-145

" 1-180, 1-UX216B

1-C&Co Type A, 1 Detector Type H, 1 245

1-Cunningham 6A7, 2-(25-25), 1-42, 1-75 in Aluminum Shield

" 2-78 " " "

" 1-80, 4-C301, 4-CX301A, 2CX345,
1-CX371A, 1CX380

1-Curtis Energy 280, 4 Davon Amplifier type MU20, Duvac 1-280

2-Duval 222, 5-DX226, 1-DY227, 1-GE45, 1-GSX20

2-Hytron 224A, 1-247, 1-280, 1-55, 1-KR0201A, 1-Macy's 245

5-Magnatron 201A. 3 Nameless triode probably made after 1924.

1-Paramount DOV227, 2-Philco 45,

2-Radiotron (25-25), 1 Radiotron, Westinghouse UA201A,

6- " UV201A, 3-UX201A, 5-UY227, 1-UX245

1-Rectron UX213. 4-SX201A.

1-Special High Mu triode.

#21 Hair brush

There was but one hair brush on the dirigible "Akron" when she tried to cross the Atlantic and came down between New York and Bermuda. Jack Irwin was wireless operator on her and kept his duffel in my office. When he left the downed "Akron" he salvaged some, including this brush he gave to me. That was in 1932. He became manager for the Marconi W.T. Co of America at Seattle, where I believe I saw him last in about 1936.

#22 Mast band.

Altho I had to do with wireless on tugs, yachts, tramps, luxury liners, battleships and other vessels, I took souvenirs from only one and that was a sailing vessel. She also had an auxiliary.

Peary used the Roosevelt, her hull was four feet thick at the bow, to negotiate the ice, on his trips toward the north pole.

On her return, Arbuckle bought her for use as a deep sea salvage vessel and I equiped her with wireless at the coffee and sugar dock near Brooklyn bridge. Divers went over her side and nailed on a copper plate for the wireless ground.

To provide for wireless and deep sea gear they kept the fore and aft masts but removed the other mast. The bands around it, to which the sails had been fastend, were thick wooden hoops, riveted. I took one of these, a wooden belaying pin and an iron belaying pin. I still have the mast band and with it a Life magazine article about Pearys disputed discovery of the pole. Pictures of the ships with all three mast are included.

The last I heard she was in use in Alaskan waters.

PART 1

Notes on the History of The Institute of Radio Engineers

by

Robert Henry Marriott

This was written in long hand in unconnected parts while going through numerous records in 1937. The separate parts were then assembled and delivered to the typist to be typed double spaced with as many carbons as practicable to provide editorial space and readable copies for some who will, I hope, read and correct or make suggestions.

It has been roughly estimated that a good printed history of radio up to 1937 would occupy three big books. The evolution of The Institute of Radio Engineers alone includes many details. From the details I can recall or have records of,

I pick out what I think may be wanted particularly along the lines of what people have asked me questions about at various times. Also I would like to indicate to some extent what radio and other conditions were like before, when and after The Institute of Radio Engineers adopted that name.

In describing radio organizations it has frequently been the practice to say or imply that radio practically began with the birth of the organization being described. One of the features of radio history has been organizations that have tried in that way to take credit for radio and then in the course of time radio has been forced to take discredit for those organizations. In trying to tell what led up to the Institute of Radio Engineers it is perhaps best to start by saying that radio, or wireless as it was called, led up to the formation of the Institute of Radio Engineers. At any rate that is the way I think of it. Probably I think of it that way because this is not my twenty-fifth but my fortieth anniversary in radio.

Radio needed something like The Institute of Radio Engineers, so something like it grew in indefinite forms and then in definite forms before it was named: The Institute of Radio Engineers.

The wireless including radio that led up to The Institute of Radio Engineers covered considerable time and included many people, schemes, devices and places. All of that wireless cannot be told about in these notes. An indication of the extent of that wireless has been attempted by going through the old files and jotting down some of the names of people, places, stations, and devices and some brief subjects. Effort was made to include only names and subjects that were in wireless before 1912. Names of people who were not in radio but who brought about things that had notable effects on radio are also included.

The words were set down as they were encountered or thought of in going through the files, the result is a jumble but so was early radio.

Here are the words, names, etc:

Radio, Wireless. The American Science Association, The American Institute of Electrical Engineers, Clerk Maxwell, Christopher Columbus Wilson, The Navy, Seasonal variations, Rectifiers, The National Electric Signaling Company, The United Wireless, Day and Night Variations, Faraday, Dolbear, Safety of life at sea, Heinrich Hertz, Brady, Henry, Steinheil, Lindsay, pure science, blue sky stock sales, the ionized skies, The Society of Wireless Telegraph Engineers, The Wireless Specialty Apparatus Company, wine-women-song, financially poor engineers, operators, The American Wireless Telephone and Telegraph Company, desire for a job, Guglielmo Marconi, The Wireless Institute, Howard, Ohio State University, Penn State, Columbia, M.I.T., C.C.N.Y., Yale, glass bottomed ~~watts~~ boats, John Greenleaf Whittier, CQD, atmospherics, anti-static devices, sanddabs, science appeal, Theodore Roosevelt, Wilkins, O'Shaughnessy, Heyworth, Trowbridge, Fitzgerald, Edison, Gilliland, Phelps, Smith, Rathenau, ~~Apple~~ Cripple Creek, ~~Marne~~ Nome, clerks, clarks, sparks, sharks, arcs, Cohen, Hogan, Popoff, Silver, Branley, ~~Tesla~~, iron, steel, oxides, sulphides, chow mein, the Occidental, oriental, the Bowery, Fulton Market, Sweets Restaurant, Silicom, Seidels, Bull line, adventure, glamour, Fessenden, Pannil, Isabell, Pierce, Hill, Bull Hill, Midgley, Rick, Sawyer, Brown, Collins, Pullen, Rodebaugh, torpedoes steered by wireless, radiogoniometer, Braun, Zenneck, Binns, Betts, Sheffield, Bentley, Farnsworth, Simon, Pfund, lack of funds, fun, Telefunken, Von Lepel, Waldorf Astoria, Austin, Boston, Curtis, Williams, ~~Grigg~~, J. H. Bunnell and Company, induction coil, decoherer, microphone detection, comedy, tragedy, Jefferies, Fitzsimmons, interrupters, press agents, muckrakers, muck, microphone detectors, guys, flattops, Ls Ts, complications, difficulties, Metropolitan Tower, Massie, Helix, anchor ~~guys~~ Gaps, Gage, Poulson, Brant ~~Scott~~ Rock, Chicago

Worlds Fair, St. Louis Worlds Fair, Ashley, Tikker detector, Hebert, Maxim, Hubley, Annapolis, heights of navesink (Atlantic Highlands), ~~Galilee~~, Avalon, Russian Hill, Todd, Hepburn, Hooper, Manning, Hudgins, Bullard, Hanscom, Austin, Cram, Sweet, Dodd, Squires, Russel, Fahies history of wireless telegraphy, Galbraith, Marshall, Dubilier, Sayville, quenched gap, ships average $4.00 per month in message tolls, Krum, Woolverton, Nally, Taylor, Ginman, Federal Departments, penitentiary, Gernsbach, Electro Importing Company, Modern Electrics, Joseph Henry, Kilbourne-Clark, The Merry Widow Waltz, via wireless play, Alexanderson, Collison, American Transformer Company, magnetic detector, telegraphone, Round, Sammis, deSousa, Bottomly, valve, ten inch coil, jigger, Hughes, Popoff, Bjerknes, Righi, Jackson, Preece, shielding, tapper, Morse writer Tesla, Scientific America, Murdock Aetheric Telegraphy, Nengschender wave detector, space telegraphy, Sandwich Islands, Shamrock-Columbia races, Telegraphing Without Wires by Dam in McClures for March 1897, A.L. New, Broadcasting, radiophony, wavemeter, decrementer, physics, mathematics, geology, meteorology, antenna, coherer critical voltage, Bose, Hertz 50 megacycle demonstration, heterodyne, barreter, Lynden, Mulligan, cage antenna, wave chute, link circuit, Sir William Crooks, Muirhead, Weaver, Dame, Lang, International Telegraph Construction Company, Delaney lamp detector, Dean, Bell, patent suits, amateur sets, Torikata, Seibt, Kimura, Gleason, Milligan, Wildman, Thurston, Duffy, Hughes, ~~Jackson~~, Fitzpatrick, Thompson, Davis, Stone Telegraph and Telephone Company, Russell, Newton, Jackson, Baskerville, Stokes, Rice, Walton, Meneratti, Isaacs, Seelig, Van der Wonde, Hogg, umbrella, Trench, Perikon, ~~Perikon~~, Duddell, Bleakney, Bradfield, Norman, Consolidated Wireless Telegraph and Telephone Company, DeGroot, Dillon, Amy, Armstrong, Eltz, Erskine Murray, King, Babylon, Galilee, profane wireless, Curtis, Boaz, Burghard, Clapp-Eastham, Blitzen, Wallace, Beckerman, wireless schools, U.S. wireless laws, Gregg, Cleva, Ryan, Butcher, Somerville, Jones, Murphy, Ginsberg, Clifden, Burglund, arc broadcasting, Caruso broadcast, automatic wireless, wired wireless, Ansonia hotel, The Aerogram, SS Republic disaster, Howe, syntonizer, Bower, Alexanderson, Martin, electrolytic interrupters, Vreeland, Consolidated Wireless Telegraph

Company, Rochrangle, USS Prairie, Switzer, Kolster, Hudson, Barnhardt, Carrol, perhaps salary, Rochefort, Ducretet, Lodge-Muirhead, Sluby-Arco, Frank, Braun-Siemens, Telefunken, Swenson, U.S. radio stations increased from about 50 in 1903 to 700 in 1912. About 30 radio companies were started in the U.S. between 1899 and 1912. wave meters, decremeters, radio required by law in 1911, signal strength measuring devices, Kennelly, Espenschied, Fay, Hart, Parker, Brooklyn, bed spring antenna, towers, underground antenna, masts, Manhattan, et al. Al. for others and for Al Goldsmith, alghol, Almighty and allegations.

I have been asked how or when I became so interested in societies like I.R.E. What first caused me to become particularly interested in scientific societies took place in the summer of 1899. The American Association for the Advancement of Science held its meeting at Ohio State University with excursions from there to other places of interest. I was given a summer vacation job of handling their transportation and getting other students to help at different events.

From that series of summer meetings I got the idea that their Association was a very valuable educational society and of great benefit to its members. Not only because of the material in the papers they read, but for other reasons. As a rule science professors had a bad reputation with students. Particularly the professor I had the most work under. He was so precise. His chair was just the right height and his lecture table was cut away to fit his belly precisely. He lectured precisely in the best Ohio English and in a monotone. He bowed and smiled precisely and flunked students profusely.

On one excursion of the A.A.A.S. we went to Kellys Island in Lake Erie to examine the very large grooves in stone that a glacier made. As we arrived at the grooves a student who was with the party as a guide, gave me a sign to look around the corner of a barn. I looked and saw a building bearing a sign which read "native wines" five cents a goblet. I sneaked around the corner of the barn. The other students were ahead of me. At the door of the wine place I looked back

and received an agreeable shock, professor after professor was sneaking around the corner of the barn. Then somebody started to laugh and they made the wine drinking unanimous. The humanizing effect of the Association meetings on the scientists was I thought a very worthwhile feature. As part of my course, I had used their ("Science") publications which was not so very different from using a textbook or an article in the London Electrician, but the meetings feature was something different, it was a get-together in the production of publications and a get-together in other respects.

By 1906, a wireless society was on my list of things I would like to see come about to help in developing wireless. But there were not enough people engaged in radio for a starter, in any one place in Wyoming, Colorado, Texas, Oregon, or Washington where I was building and maintaining stations. However, I was transferred to New York about the first of 1908 and began talking up the Institute idea.

Talking it up wasn't easy. As a rule, the officers of the wireless companies of that time thought their employees should not even know the employers of another wireless company and certainly they should not associate with them. Being secretive between companies and even between employees in the same company was generally considered to be the only right and sensible policy.

The company I was with was the United Wireless Telegraph Company. Christopher Columbus Wilson had become its president. I had known him in Denver and he had known for some time that I believed in experimental work, research, institutes and such things. He had come to think there was some good in the ideas I had. His favorable leanings finally caused some of the other officials to take a more favorable attitude toward my institute ideas. But about the time I thought I could start something somebody would object.

The United Wireless Telegraph Company was an operating company, the chief operating company under the U.S. flag. It was a manufacturing company too but it manufactured for itself. Keeping down the costs of the wireless sets was uppermost in the minds of the officers. Ship captains didn't want wireless. If their company officials could reach them by wireless the captains were not the absolute monarchs at sea that they had been. The S.S. companies thought maybe they wanted wireless if they could get it cheap enough. Passengers did not demand wireless nor did the public on shore. The law did not require wireless. Therefore the wireless company officials could not get much rent for sets and felt that they were forced to make and install the sets as cheaply as possible

and sell stock to make up the difference until there was a demand for wireless. We all thought a demand ought to come in time. People who wanted to develop improved radio apparatus by experiments, research, continual collection of data, discussions, institutes, etc. were thought to be bad. They wanted to change the apparatus and every change made the sets cost more. The effort of the officers of the wireless company was to keep the sets standardized for in that way they were cheapest. They regarded any society or institute that talked about improvements and changes as a menace. The world was not yet oriented to want wireless let alone improvements. Government wireless men wanted to buy improved wireless but they had to ask congree for the money and congress was not oriented to appropriate much money for wireless. It was a money losing business to try to build wireless for sale to the government, then.

Even opinions about the making of improvements were instable. Officials who were raising the money for the making and operating of wireless, sometimes put great hopes in what those who wanted to experiment, improve and develop might do. For example there was broadcasting at that time with the alcholic arc transmitter. In the winter of 1907-08 the Merry Widow Waltz was played at the Liberty Theatre on West 42nd Street. Boys selling kazoos played it from Wall Street north, wherever there were possible customers. Dr. deForest played it on the ether from the Metropolitan Tower NY and I played it on the ether from Manhattan Beach NY (DF). One could not help but think there were possibilities there. Officials of wireless companies thought there were. The Cahill teleharmonic was then being exhibited at 40th and Broadway NY for delivering dynamo made music to homes over wire lines. If the wireless music wheels officials could hear by listening in at the Waldorf could be made a little louder wouldn't it mean business, was in the minds of the United Wireless officials and others. The result was that officials oscillated for and against those who wanted to experiment, make improvements, establish an institute and such. I could not make out whether or not I would get in trouble

with the officials of the United Wireless if I started an institute but I decided to try it regardless.

I was a member of the American Institute of Electrical Engineers. One of the first things I did, outside of talking to United Wireless employees, was to talk to Mr. Hutchinson, assistant, and Mr. Pope, secretary, of the A.I.E.E. Mr. Hutchinson immediately suggested that we get our wireless people to join the A.I.E.E. and read papers before that body. My answer was that I believed the wireless people needed more papers than the A.I.E.E. could afford to allow to be read. My idea was that the wireless people needed to have meetings once a month and of course wireless was too small a part of electrical engineering to be entitled to many A.I.E.E. meetings.

Then I sent out a form letter to a number of people who were not connected with the United Wireless, and some who worked for United Wireless but were located in other parts of the country. The letter read as follows:

New York, May 14, 1908

Dear Sir:

You have often thought no doubt that wireless telegraphy would be developed faster if those engaged in it would work together more.

The electrical engineers have come together in the United States by forming the American Institute of Electrical Engineers. This institution has helped to make better electrical engineering, better electrical engineers and better feeling between competitive firms.

Why should not we form the Institute of Wireless Engineers and pattern it after the American Institute of Electrical Engineers. The American Institute of Electrical Engineers plan as applied to wireless people would be briefly as follows:

First: Any person interested in wireless with proper recommendations, etc. would be eligible to associate membership.

Second: Any person having done valuable original work in wireless would be eligible to full membership.

Third: Any person whom the society by vote, should decide upon, would be eligible to honorary membership.

Fourth: Meetings should be held once a month, at which papers on wireless subjects would be read and criticized.

Fifth: Every member and Associate would receive a copy of the papers read, together with the criticisms, thus giving absent members the same information as those present.

Sixth: A library of wireless publications would be accumulated as rapidly as the funds of the Institute would permit. Each member or associate member would have access to this library.

Seventh: The officers and committees would be about as follows: President, Vice President, Manager, Treasurer and Secretary.

Committees: Executive Committee, Committee on Finances, Committee on Papers, Board of Examiners, Library Committee, Editing Committee and necessary special committees appointed from time to time.

Eighth: The dues would possibly be about $10.00 per year.

I believe an organization formed on a plan similar to the above would materially improve wireless, increase the knowledge and ability of members, avoid friction between employees, between employees and employers and to some extent between wireless companies.

Would you join such an organization as outlined? If so please write me and give full expression of your views in regard to the matter in order that an organization may be formed on the right lines. Also such an organization might contemplate the establishment of a beneficiary association in connection with the Institute.

Yours very truly,

R. H. Marriott

Assistant Scientific Manager
United Wireless Telegraph Company

42 Broadway
New York

The beneficiary organization, an employees insurance or old age pension idea was something that Vice President Bogart of the United Wireless Telegraph Company had in mind and thought it might fit in there.

Early in 1909 a notice was posted on the bulletin boards of the United Wireless Telegraph Company which read as follows:

"Notice"

"A meeting for the purpose of forming a Wireless Institute will be held in Room 1909, 42 Broadway (Mr. Marshall's office) Saturday, January 23rd, 1909, at 3:00 P.M.

All employees of the United Wireless Telegraph Company who are interested in the formation of such an Institute or Society, will please come.

R. H. Marriott

January 21, 1909"

According to my recollection the Wireless Institute held about ten meetings per year. A letter written in December 1910 says "as a rule there are not over nine meetings in a year." The plan as stated in Vol. 1, No. 1 was to hold meetings on the first Wednesday of each month except July and August, at the United Engineers building, 33 West 39th Street.

The following is the list of meetings of which I have found a record:
January 23, 1909, 3:30 P.M. in Room 1909 at 42 Broadway, New York City, the first Wireless Institute meeting was held. A temporary organization was formed by Messrs. John S. Murphy, R.A. Somerville, Joseph D. Fountain, R. B. Respes, R. A. Cleva, John Gregg, E. Barmwell, Philip Farnsworth, Sidney L. Williams, and R. H. Marriott. The purpose of this organization was to draw up a constitution and make the necessary arrangements for the formation of a permanent organization.
Mr. Marriott was elected chairman. Mr. Sidney L. Williams was elected secretary. Various phases were discussed, motions passed and a Committee on Organization consisting of Respes, Somerville, Murphy and the chairman and secretary ex officio.

was appointed.

Wednesday, February 3, 1909, Room 1909, 42 Broadway, at 8:00 P.M. Second meeting of the Wireless Institute. Temporary organization preparing constitution and plans.

March 10, 1909, 8:00 P.M. at the United Engineers Building, 33 W. 39th Street, New York City. In the small room at the southeast corner of the building on the balcony floor. There were present Messrs. R. A. Somerville, Joseph D. Fountain, John C. Gregg, Roland B. Respes, A. R. Sharpless, E. M. Thurston, B. P. Martin, W. M. Jones, J. A. Bryan, Arthur C. Pike, Francis X. Butler, Wm. F. Bissing, Sidney L. Williams, and R. H. Marriott and others represented by proxy. A constitution was read, amended and adopted. Mr. Marriott was elected President, Mr. Harry Shoemaker, Vice President to serve one year and Mr. Pickard Vice President to serve two years. Directors: John B. Murphy and Richard A. Somerville. Sydney L. Williams, Secretary. Eugene M. Thurston, Treasurer. Entrance fees: $5.00 for Members, $2.00 for Associates. Dues: Members $5.00, Associates $3.00.

April 7, 1909, 33 W. 39th Street, New York City.

President Marriott called the meeting to order at 8:40 P.M. and presented a paper entitled "The Wireless Institute" which explained the reasons for this Institute, the constitution and the plans for the future. This was followed by reading a letter from Greenleaf W. Pickard discussing the paper. Mr. Ralph W. Pope, Secretary of the American Institute of Electrical Engineers then addressed the meeting, discussed the paper, gave the Wireless Institute the benefit of his experience and suggested that the Wireless Institute might arrange for a wireless session at the convention of the American Institute of Electrical Engineers in June 1910. (we remembered his advices and used them in both the Wireless Institute and IRE)

A printed record of the January 23, March 10, and April 7, meetings and the constituion as adopted are contained in Volume 1, Number 1, of the Wireless Institute Proceedings.

Printed applications for admission were also issued.

May 5, 1909, 8:45 P.M., 33 W. 39th St., New York City.

Greenleaf W. Pickard presented a paper entitled "Antennae." A lively discussion followed, lasting until 11:15 P.M. Thirty-two members and guests were present.

Committees on Papers, Membership and Emblem were appointed.

This paper and account of the meeting is printed in Vol. 1, No. 2 of the Wireless Institute Proceedings.

Wednesday, June 2, 1909, 33 W. 39th St., New York City.

Meeting called to order at 8:45 P.M. A paper on "How Business Can Best Be Handled in Case of Distress" by Jack R. Binns was read and discussed at length. Committee on Standardization was appointed. This paper, etc. was publihhed in Vol. 1, No. 3 of the Wireless Institute Proceedings.

Wednesday, September 1st, at 8 P.M., 33 W. 39th St., New York City.

"The Production of High Frequency Oscillations" by Mr. Harry Shoemaker.

Wednesday, October 6, 1909, at 8:45 P.M., 33 W. 39th St., New York City.

Mr. Frederick W. Midgley presented a paper entitled "Proportioning the Transmitter to the Aerial."

The Wireless Institute emblem was exhibited in the form of a pin. To seal for $2.00 with owner's name engraved on the back. A gold disc with a Hertz oscillator in the center encircled by a Hertz receiving loop.

The paper and transactions of this meeting were published in Vol. 1, No. 5 of the Wireless Institute Proceedings.

This number of the Proceedings bears the Wireless Institute emblem.

Wednesday, November 3, 1909, 8:45 P.M. at 33 W. 39th St., New York City.

Mr. Alfred Norton Goldsmith, B.S. presented a paper entitled "Radio-Tedephony" illustrated by lantern slides.

The papers to be presented in December, January, February and March were announced.

The November paper and transactions were published in Vol. 1, No. 6 of the Proceedings of The Wireless Institute.

December 1909

"Conversion of Electric Oscillations Into Continuous Current by Means of a Vacuum Valve" by Wm. E. Smith.

January 5, 1910

"Measuring Instruments and Measurements in Wireless Telegraphy" by Louis R. Gleason. A half dozen copies were sent to members in advance and most of them were prepared for discussion.

February 1910

"Resistance in an Oscillating Current Circuit" by A. R. Sharpless.

March 2, 1910, 33 W. 39th St. at 8:30 P.M.

"Wireless Legislation, and the Stations of the Individual Operator" by Harold Zeamans.

April 6, 1910, Wednesday, 8:30 P.M. Wireless Institute meeting at the Lecture Room of the Department of Physics, College of the City of New York. A discussion on "Experimental Tests of the Radiation Law for Wireless Oscillators" opended by Professor M. I. Pupin of Columbia University. Published in Vol. 1, Part 1 of the Proceedings of The Institute of Radio Engineers.

May 4, 1910, Wednesday, 8:30 P.M., 33 W. 39th St., New York City.

A paper entitled "High Insulators". A comparison of high insulators as to electrical resistance, resistance of heat, chemicals, etc. by Stanley M. Hills. Published in Vol. 1, Part 1 of the Proceedings of the Institute of Radio Engineers.

June 1, 1910, Wednesday, 8:30 P.M., 33 W. 39th St., New York City.

"The Obtaining and Influence of a Good Ground in Wireless Telegraphy" by Frederick W. Midgley.

October 5, 1910, Wednesday, 8:30 P.M., 33 W. 39th St., New York City.

"Attunement of Wireless Telegraph Circuits for Highest Efficiency" by Elmer E. Butcher.

November 2, 1910, 33 W. 39th St., New York City.

A demonstration of Electrical Phenomena, by Goldsmith, Marriott and others.

Tickets were sold for admission to both this meeting and the meeting on December 7th.

December 7, 1910, Wednesday, 8:30 P.M., 33 W. 39th St., New York City.

"Side Lights on the Navy Department Wireless Telegraph Specifications" by J. Martin, Expert Electrical Aid, Brooklyn Navy Yard.

January 4, 1911, Wednesday, 8:30 P.M., Room 304, Fayerweather Hall, Columbia University, New York City.

"Singing Spark Sets" by Mr. Kolster of the Radio Telephone Company.

Election of Wireless Institute officers for 1911. The same officers had continued through 1909 and 1910. At this election Alfred N, Goldsmith was elected secretary and treasurer replacing Mr. Sydney L. Williams and Mr. Jean Thurston.

March 1, 1911, Wednesday, 8:15 P.M., Room 304, Fayerweather Hall, Columbia University.

"The Seibt Quenched Spark System as Used by the Radiotelephone Company" by Emil J. Simon.

April 5, 1911, Wednesday, 8:15 P.M., Fayerweather Hall, Columbia University.

"Recent Developments in Wireless Telegraphy" by Fritz Lowenstein.

May 3, 1911, Wednesday, 8:15 P.M., Fayerweather Hall, Columbia University.

"Resonance Transformers" by John Stone Stone.

November 1, 1911, Wednesday, 8:15 P.M., Room 304, Fayerweather Hall, Columbia University.

"The Application of Multiphase Currents to Wireless Telegraphy" by Mr. J.V.L. Hogan of the National Electrical Signaling Company.

Kolster, Lowenstein, Stone and Hogan were members of the Society of Wireless Telegraph Engineers).

December 7, 1911

"Amplifying Relays" by Mr. A. N. Goldsmith.

March 6, 1912, Wednesday, 8:15 P.M., Room 304, Fayerweather Hall, Columbia University.

"Recent Practical Developments in Wireless Telegraphy Due to Dr. George Seibt."

1. A direct reading wavemeter.

2. A new constructional form of receiving condenser.

To be read by E. J. Simon.

"Thousand Cycle Transmitting Sets in Theory and Practice" by Baron Shunkichi Kimura, Chief of the Japanese Wireless Bureau.

The former officers of the Wireless Institute were reelected at this or the following meeting. The same officers were elected for the Wireless Institute for 1909, 10, 11 and 12 except that Mr. Goldsmith replaced Messrs. Williams and Thurston for 1911 and 12.

The notice for this meeting included the following statement:

"------ we expect the publication of our Proceedings ------.Once we resume publication, our large list of foreign applicants, numbering several hundreds can be admitted to membership ----- Your promptness in paying your enclosed bill for dues will determine how soon it will be before our printed Proceedings are again being regularly placed in your hands."

April 4 (or 3) 1912, Wednesday, 8:15 P.M., Fayerweather Hall, Columbia University.

"A New Constructional Form of Variable Condenser Due to Dr. G. Seibt" by E. J. Simon.

"Utilization of Both Waves Emitted from Closely Coupled Transmitters" by Mr. Torikata.

The notice said, the matter of the consolidation of The Wireless Institute and The Society of Wireless Telegraph Engineers would be considered.

May 6, 1912, Monday, 8:15 P.M. Room 304, Fayerweather Hall, Columbia University.

The notice for this meeting says:

"This meeting will be the last meeting of The Wireless Institute being a joint meeting of the Society of Wireless Telegraph Engineers and the Wireless Institute at which meeting both societies will combine to form the new society which will probably be known as The Institute of Radio Engineers. The articles of the

constitution of the new society and its officers will be decided upon at this meeting."

May 13, 1912. A meeting of the Institute of Radio Engineers was held at Room 304 Fayerweather Hall, Columbia University, New York. The following officers were elected to serve during the balance of the year:

R. H. Marriott, President
F. Lowenstein, Vice President
Emil J. Simon, Secretary
E. D. Forbes, Treasurer

The following members were elected to the Board of Direction for 1912: in addition to the Institute's officers.

G. W. Pickard
F. Fay
J. Hogan, Jr.
L. Espenschied

The following committees were appointed by the President for 1912:

Standardization

J. S. Stone
F. Lowenstein
J. L. Hogan, Jr.
G. W. Pickard
A. N. Goldsmith
R. A. Weagant

Papers

L. Cohen, Chairman
A. N. Goldsmith

Publicity

J. L. Hogan, Jr.
Emil J. Simon

The Wireless Institute Members, December 1, 1909.

Athearn, Harry E., New York, N.Y.

Installing Engineer, Wireless Telegraph Company.

Almour, George W., c/o Postmaster, New York.

Chief Electrician U.S.S. Connecticut.

Bissing, William F., New York, N.Y.

Attorney at Law

Bogart, Samuel S., New York, N.Y.

Vice President, United Wireless Telegraph Company.

Butler, Francis X., New York, N.Y.

Attorney at Law

*Butcher, Elmer E., New York, N.Y.

Installing Engineer, United Wireless Telegraph Company.

Bawn, H. R. Galilee, N.J.

Wireless Operator, United Wireless Telegraph Company.

Beardsley, Don G., Albany, N.Y.

Wireless Operator, U.W.T. Co Ten Eyck Park.

Buchernberger, Francis C., Brooklyn, N.Y.

Second Co. Signal Corps, N.G., N.Y.

*Browne, Walram S., Brooklyn, N.Y.

Amateur Wireless Operator

Bates, Louis W., Brooklyn, N.Y.

Wireless Operator

Barnwell, E., New York, N.Y.

United Wireless Operator, S.S. Antilles.

Bakerville, J. M., Chicago, Ill.

Chief Operator, Great Lakes Div., U.W.T. Co.

Brownlie, H. L., Tangier Island, Va.

United Wireless Operator.

Bryan, J. A., New York, N.Y.

United Wireless Operator, S.S. Saratoga.

Bowen, Paul, New York, N.Y.

United Wireless Operator, Manhattan Beach Station (DF).

Beckerman, Benjamin, New York, N.Y.

U.W.T. Operator, S.S. Hamilton.

Brodhead, E. F. New York, N.Y.

U.W.T. Operator, S.S. Merida.

Chapman, Corwin C., Southampton, England.

United Installer and Operator, Royal Mail SS Line.

Chase, Stacy Reeves, Jersey City, N.J.

Engineering Department, U.W.T. Company.

Cleva, R. A., New York, N.Y.

Construction Department, U.W.T. Co.

Cole, Arthur B., Montclair, N.J.

Wireless Department, Manhattan Electrical Supply Company.

Collins, Daniel, New York, N.Y.

U.W.T. Co. Operator, SS Cherokee.

Cornwell, J. H., Brooklyn, N.Y.

Wireless Telegraph Operator.

Duffy, J. B., New York, N.Y.

Chief Operator, Marine Dept., U.W.T. Co.

Davidson, James E., Montpelier, Vt.

President, Consolidated Lighting Co.

*Dolbear, Benjamin L., Tufts College, Mass.

Dibol, W. A., New York, N.Y.

Treasurer, U.W.T. Co.

Drace, I. H., Brooklyn, N.Y.

Wireless Telegraph Operator.

English, William P.,Jr., Boston, Mass.

Manager, U.W.T. Co.

*Ehret, Cornelius D., Philadelphia, Pa.

Attorney at Law

*Espenschied, Lloyd, Brooklyn, N.Y.

Wireless Telegraph Operator.

Earle, C. L., New York, N.Y.

Wireless Telegraph Operator.

Farnsworth, Philip, New York, N.Y.

Attorney at Law.

Ferrick, W. J., New York, N.Y.

U.W.T. Operator, Manhattan Beach Station (DF).

Frasse, William H., Brooklyn, N.Y.

Pratt Institute.

Fountain, Joseph D., Cleveland, Ohio.

Construction Dept., Great Lakes Div., U.W.T. Co.

Fay, Frank H., New York, N.Y.

Assistant to Special Agent in Charge of Leased Wires, A.T. & T. Co.

Fike, Arthur C., Jersey City, N.J.

U.W.T. Co.

Fitzpatrick, W. S.,New York, N.Y.

Finkelstein, I.C., New York, N.Y.

U.W.T. Co., Operator SS Morrow Castle.

Ford, R. G., New York, N.Y.

U.W.T. Co., Operator SS Allianoia.

Ferguson, F. H., Charleston, S. C.

U.W.T. Co., Operator, SN Station.

Galbraith, C.C., New York, N.Y.

General Manager, U.W.T. Co.

Ginsberg, Louis M., New York, N.Y.

U.W.T. Co., Operator SS Bermudian.

Gnau, G. F.,Brooklyn, N.Y.

Gleason, Louis R., Elmhurst, L.I.

Late with R. A. Fessenden, Brant Rock, Mass.

*Goldsmith, Alfred N., New York, N.Y.

Instructor in Physics, College of the City of New York.

Gregg, John C., New York, N.Y.

Construction Dept., U.W.T. Co.

Gillen, W. H., New York, N.Y.

U.W.T. Co., Operator SS Prinz Joachim.

Horton, Harry M., Mansfield, Pa.

Wireless Telegraph Engineer.

Hughes, H. J., New York, N.Y.

Superintendent, Marine Service, U.W.T. Co.

Heintze, E. H., Alpena, Mich.

U.W.T. Operator.

Haslett, Crowell M., Jersey City, N.J.

International Telegraph Construction Co.

Haslett, Oscar S., Jersey City, N.J.

International Telegraph Construction Co.

*Hart, Frank A., Brooklyn, N.Y.

U.W.T. Operator, 42 Broadway Station (N.Y.).

Hance, S. W., Tampa, Fla.

U.W.T. Operator, PD Station.

Henderson, G. E., New York, N.Y.

U.W.T. Co. Operator SS Thames.

Hilken, H. H.,

U.W.T. Operator Cape Hatteras Station (HA).

Jackson, Arthur E., Cleveland, Ohio.

U.W.T. Operator.

Jones, Marvin, New York, N.Y.

Jones, Clifford M., New York, N.Y.

U.W.T. Operator, S.S. Caesar.

Kendrick, G.O.K., Buxton, N. C.

U.W.T. Operator, Cape Hatteras Station (HA).

Latta, Edward G., New York, N.Y.

Auditor, Marine Dept., U.W.T. Co.

Lemieux, Oscar, New York, N.Y.

U.W.T. Operator, Royal Mail Line.

*Marriott, Robert H., Brooklyn, N.Y.

Engineering Dept., U.W.T. Co.

Murphy, John S., New York, N.Y.

Superintendent Construction, Atlantic Div., U.W.T. Co.

Midgley, Frederick W., Jersey City, N.J.

Engineering Dept., U.W.T. Co.

Maxson, C. P., New York, N.Y.

Capt. SS Comus, So. Pacific SS Co.

Miles, Cecil, New York, N.Y.

U.W.T. Co. Operator, SS Atrato.

Mowat, A., New York, N.Y.

U.W.T. Co. Operator, SS Colorado.

Mandle, Henry H., New York, N.Y.

Miller, Robert F., Atlantic City, N.J.

U.W.T. Operator.

Mason, F. Howard, New York, N.Y.

Morse, Arthur H., Seattle, Wash.

Construction Department, U.W.T. Co.

McCullough, H.F., Wilkinsburg, Pa.

Designer, Westinghouse Electric and Manufacturing Co.

Martin, Benjamin P., New York, N.Y.

U.W.T. Co. Operator, SS Iroquois.

Moe, Fred G., Duluth, Minn.

Manager, U.W.T. Co.

Murphy, Thomas, New York, N.Y.

Construction Dept., U.W.T. Co.

McGivern, Joseph P., New York, N.Y.

Wireless Telegraph Operator.

Nall, Ellison, Charleston, S.C.

Wireless Operator, U.S. Naval Station.

Nelson, N. Oliver, Seattle, Wash.

Factory Superintendent, U.W.T. Co.

*Pickard, Greenleaf W., Amesbury, Mass.

Consulting Electrical Expert.

Payne, M. H., Brooklyn, N.Y.

U.W.T. Co. Operator, 42 Broadway Station (NY).

Peck, Joseph A., E. Orange, N.J.

Engineering Department, U.W.T. Co.

Pickerill, E. N., New York, N.Y.

Manager Waldorf Astoria Hotel Station (WA) U.W.T. Co.

Parker, ~~Joseph~~ James E., Brooklyn, N.Y.

Wireless Telegraph Operator.

Pike, Louis P., Seattle, Wash.

Construction Dept., U.W.T. Co.

Perry, W. W., Norfolk, Va.

U.W.T. Operator.

Pearse, William C., New York, N.Y.

Wireless Telegraph Operator.

Proctor, J. Albert, Revere, Mass.

Wireless Telegraph Operator.

Robinson, George A., New York, N.Y.

Construction Dept., U.W.T. Co.

Respess, Roland B., Chicago, Ill.

Respess and Co.

Reick, Louis F., Jersey City, N.J.

International Telegraph Construction Co.

Roberts, H. S., Albany, N.Y.

U.W.T. Co. Operator.

Rushworth, F. B., New York, N.Y.

U.W.T. Co. Operator, SS San Jacinto.

Robinson, Geo. N., New York, N.Y.

U.W.T. Operator, SS Florida.

Shoemaker, Harry, Jersey City, N.J.

Chief Engineer, U.W.T. Co.

*Sharpless, A. R., Jersey City, N.J.

Engineering Dept., U.W.T. Co.

Smith, William E., New York, N.Y.

N.Y.S. Naval Reserve, SS Granite State.

Sheedy, Joseph E., Seattle, Wash.

Lieutenant of Engineers, U.S. Revenue Cutter Service, USRC Thetis.

Strahl, William, Brooklyn, N.Y.

Second Co., Signal Corps, N.G. N.Y.

Sawyer, James M., Jersey City, N.J.

Factory Supt., International Telegraph Construction Co.

*Smith, J. O., New York, N.Y.

Hill Publishing Co.

Stevens, T. M., Boston, Mass.

U.W.T. Co. Operator.

Schmitt, F. J., New York, N.Y.

U.W.T. Operator, SS San Juan.

Somerville, Richard A., New York, N.Y.

Construction Engineer, U.W.T. Co.

Sheehan, Jas. J., New York, N.Y.

Wireless Telegraph Operator.

Smith, Eugene B., San Juan, P. R.

Wireless Operator U.S. Naval Station.

Thurston, Eugene M., New York, N.Y.

Inspector, U.W.T. Co.

Tuck, William H., Brooklyn, N.Y.

Expert in Factory Economics.

Townsend, L. T., New York, N.Y.

U.W.T. Operator, SS Havana.

Toms, R. W., New York, N.Y.

U.W.T. Operator, SS Ligonier.

Vosburgh, R. J., Buxton, N. C.

U.W.T. Operator, Cape Hatteras Station (HA).

Wilson, C. C., New York, N.Y.

President, United Wireless Telegraph Co.

Williams, Sidney L., New York City.

U.W.T. Co.

White, D. B., New York, N.Y.

Inspector, U.W.T. Co.

Wallace, L. C., New York, N.Y.

Assistant Treasurer, U.W.T. Co.

*Wolf, Benjamin S., New York, N.Y.

Chief Electrician, U.S. Navy Yard.

Walley, G. P., Elizabeth City, N.J.

U.W.T. Operator, HD Station.

*Ware, Paul E., E. Orange, N.J.

Wireless Telegraph Operator.

Wheeler, Harry A., New York, N.Y.

Construction Dept., U.W.T. Co.

Watkins, Harold E., Jersey City, N.J.

The renewal of membership in 1910 did very well. A letter dated January 26, 1910 indicated that eighty-three had paid their dues for 1910 and that new applications for membership had been received from:

*Keyes, Edwin F., Washington State College, Pullman, Washington.

Rawles, P. C., 1174 W. 18th St., Des Moines, Ia.

The members above marked with an asterisk (*) were listed as members of The Institute of Radio Engineers in the 1932 Year Book. Others on the above list were members of the I.R.E. for different lengths of time.

Several who belonged to The Wireless Institute in 1909, 10, or 11, have asked me why it was that they were not rated as charter members of The Institute of Radio Engineers. The answer to that question is contained in the "Report of the Committee on Consolidation of The Wireless Institute" in resolution number 3 which says in part "---- all members of either society who shall have paid their dues for 1912 in either society shall be regarded as members -----". Unless they had paid their 1912 dues they were not listed as members of The Institute of Radio Engineers.

The Wireless Institute was unable to publish the papers it had in 1910. This was followed by the government prosecution of officers of the United Wireless Telegraph Company for misrepresentation in the sale of stock through the mails and later by the United Wireless Telegraph Company going into the hands of receivers. United Wireless Telegraph Company employees were reduced in pay, thrown out of wireless employment temporarily or permanently or were afraid they would be. All of which not only made it much harder to collect dues but much harder to even

ask for dues. And despite the efforts of both Espenschied and Goldsmith with the help of others, it was difficult to get a paper to be read at meetings.

That was another case of darkness before dawn. The new laws requiring radio were about to pop up radio and members of the Society of Wireless Telegraph Engineers had been moving from New England into New York.

Many Institute things were cooked up at "DF." Members were solicited there and from there by mail, phone and wireless telephone and telegraph. Manhattan Beach Station (DF) was located in the waterway that used to make Coney Island an an island. A space west of Sheepshead Bay and continuing wider than the bay, used to be a tide flat and little channels. Mud, muskrats and Manhattan Beach station on stilts about 400 feet from the present end of Sheepshead Bay. It smelled like a tide flat that is ~~too~~ too close to civilization, smells like.

Before meetings, dinners, committee meetings and Board meetings were held at the Oriental in Chinatown and at Sweets next to Fulton market. Your know what Chinatown smells like. If you don't know what Fulton Market smells like, go down and smell it. There was real atmosphere in the early development of the Institute.

It is hard for one who did not know earlier wireless days to get an idea of what they were like. For example Manhattan Beach Station (DF) was relatively profitable, important, and famous. United Wireless folks were proud of it and Marconi folks dammed it. The Wireless Age for December 1914 says: "The following verses (with apologies to Kipling) were composed in 1907 by the late Neil McIntyre, a former Marconi operator."

Old "DF"

by

Neil McIntyre

Way up mid the Labrador icebergs, workin a CXP boat,
W'en you thinks you're free from jammin, doesn't it get your goat?
You've given 'im "G" for twenty, wiv'is signals weak as bref',
We'en 'es just startin up wiv 'is third one
You're jammed all to h--- by "DF".

For we all 'ears the bounder a sendin, but the bounder 'e don't 'ear us,
So we just throws the fones on the table and gives vent to an impotent cuss,
'Is signals get stronger 'an stronger, till they bloomin nigh render you deaf;
You may go where you please from Cape Race to Belize,
But you can't get away from "DF".

They talks about multiple tuners, and valve sets and such sort of guff,
We consign the whole lot to the junk pile, we'en "DF" is andlin the stuff.
'Is percentage of dampin is awful, and the thing that puzzles me yet,
'Is 'ow in the 'ell does 'e do it,
Wiv a simple two kilowatt set?

For we all 'ears the bounder a sendin, but the bounder 'e don't 'ear us,
So we lays the fones down on the table, 'an gives vent to an impotent cuss.
'Is signals get stronger and stronger, till they bloomin nigh renders you deaf;
An' you can't get away, from the call of "HA",
Sent out by "FG" at "DF".

Of course 'e 'as got a big aerial, and an acre of ground plates we know,
But only two kilowatts power, tho you 'ear 'im wherever you go.
From forty-two degrees right to Sea Gate, 'e follers you up like a ghost,
You can't get away from 'is music,
From Belle Isle to the Mexican coast.

For we all 'ears the bounder a sendin, but the bounder 'e don't 'ear us,
So we just lays the fones on the table, and gives vent to an impotent cuss,
From the cold Arctic Sea down to Cuba, 'is signals would render you deaf,
You can go where you like, anywhere on the pike,
But you can't get away from DF.

Sidney L. Williams did a great deal of work for The Wireless Institute particularly in 1909 and 1910 when he was secretary. He was a clerical employee of the United Wireless Telegraph Company. He did not expect to be a technical man but he believed in the principal of the thing and worked for the Institute for nothing, enthusiastically.

Three pals, Brooklyn amateurs, or perhaps it would be more correct to say of them that they were in the transitional stage from amateurs to professionals, were good workers. For example, ~~Joseph~~ James E. Parker printed the meeting notices on post cards at very low cost, Lloyd Espenschied worked hard getting papers and Frank A. Hart was a booster for getting members.

Soon after the Wireless Institute was formed in 1909, Frank Hart was sent down to Manhattan Beach (DF) to operate that station. Part of that station building was used by me as a laboratory to test new wireless devices. At night part of the station was operated for clearing business and to collect data for me on the ranges of ships.

One afternoon Hart arrived at Manhattan Beach early and full of enthusiasm. He hurried in telling me that he had met a Professor Goldsmith at the College of the City of New York and had told him about Manhattan Beach and Professor Goldsmith wanted to visit Manhattan Beach and would I invite him. I would and did.

Professor Goldsmith showed up soon and told me he was a physics instructor at C.C.N.Y. and was specializing in color-photography at Columbia for a doctor's degree. I was hepped up on the baby Institute and told him about it and invited him to attend the next meeting, which he did, and he attended every succeeding meeting, board meeting and committee meeting for many years.

The United Wireless Telegraph Company published a monthly magazine called the "Aerogram". It was sold chiefly on ships with the days news as received by wireless mimeographed and inserted in the printed magazine. A Mr. Pratt worked on this magazine and on other publicity for the company. As a newspaper reporter he had early in this century attended a dinner for a senator or ambassador who had lived in China. At that dinner "chicken chow mein" was introduced into this country. That dinner was served at the Oriental Cafe. If Pratt liked you he took you to that cafe and introduced you to "chicken chow mein." He introduced me to it and I introduced members of the Wireless Institute to it and the Oriental as a place to eat before meetings. Goldsmith and I ate there before engaging in Institute work, as often as once a week.

In 1909 the Oriental Restaurant was one flight up on the southwest corner of Pell Street and the Bowery. Chow Mein (not so good) is very common now in New York but then I only found one other place in New York where I could get it.

Some Institute members did not relish Chinese dishes. Weagant for example wanted good American dishes so we went to Sweets. Fulton Market wholesalers wanted American dishes made from the best foods that wholesalers handled. They delivered the best to Sweets Restaurant at Number 2 and 4 Fulton Street. That restaurant served that food to the market people and to anybody else who would go to that out-of-the way place to eat. The food did seem to be as good as could be had and the prices were relatively low even when you added a couple of seidels of beer at ten cents a seidel and gave the big, elderly and dark gentleman who served you, a dime. That restaurant was established in 1845 and it looked it. It was old and very plain. We ate on the second floor just above the southwest corner of Fulton Street and South Street.

Sometimes only a committee or the Board and sometimes many members ate there before a meeting. Eating there before meetings continued for years.

I think there may be a photograph of one of The Institute of Radio Engineers' dinners held at Sweets. I gave the Institute a gavel at that dinner, made

from a belaying pin from the steam schooner "Roosevelt" that Peary used in his trip to the North Pole. The account I have says that dinner was called the Incorporation dinner and was held at Sweets at 7 P.M., June 25, 1913. Evidently when the Incorporation papers were made out, they were filed in Albany on August 23. As I recall there was quite a crowd at that dinner or some other and a photograph was taken, but I have not found such a photograph.

The part where we used to eat, the second floor portion of Sweets Hotel Restaurant is still there doing business with what look like some of the same colored men, same tables and about the same bill of fare. But without the downstairs restaurant and bar at number 4 and only serving beer and wine now. It looks a little older and clams are for wholesale where the bar was.

Some years ago I heard a director of the Institute of Radio Engineers tell about the history of the Institute of Radio Engineers. He said it had been formed by the combining of two amateur radio clubs. I do not know when he came into radio but I think it was after the sale of broadcast receivers became profitable probably more than ten years after the Institute of Radio Engineers was formed. If he had that idea probably others have it also.

The Institute of Radio Engineers was formed by the combining of The Society of Wireless Telegraph Engineers and The Wireless Institute. The SWTE (they called themselves Swatties) excluded amateurs as will be seen from Article II of their constitution.

At that time the commercial and government wireless people were, as a rule, against amateurs. They wanted to swat the amateurs like you would smash a buzzing mosquito. So far as I know the SWTE did not advocate swatting amateurs but that nickname fitted the professional spirit toward amateurs at that time.

The Wireless Institute was formed by Wireless Company Employees principally by United Wireless Telegraph Company employees, but the Wireless Institute did not exclude amateurs as will be seen by Article II of its constitution and some amateurs joined the Wireless Institute soon after its formation. However,

as is indicated by the 1909 membership list, about 110 out of 123 members were employees of wireless companies or wireless branches of the government. Many amateur radio clubs existed in many towns and cities for periods ranging from a month to many years after about 1910. Some of the members of those radio clubs belonged to or attended the meetings of The Wireless Institute and The Institute of Radio Engineers.

Kicks aimed at amateurs occurred in the Wireless Institute meetings, Board meetings, committee meetings and correspondence. The following is a copy of a reply to such kicks found in a letter dated April 11, 1910.

"Apparently we can stop interference from amateurs better by taking them in than by keeping them out. We bring up the subject at nearly every meeting and show the amateur wherein he can be harmful and I believe we have helped stop interference some."

The Society of Wireless Telegraph Engineers limited its Associate membership exclusively to people associated with a wireless telegraph or telephone company.

The Society of Wireless Telegraph Engineers' constitution read as follows:

Article XIII

Membership

"Sec. 1. The members of this Society shall be designated as members and associates. Associates shall be equally entitled with the members to the rights and privileges of the Society, except eligibility to the offices of President and Vice President, but shall not have the privilege of voting except upon matters directly involving the finances of the Society. There shall also be honorary members who shall be entitled to all the rights and privileges of the Society, except the right to vote and to hold office.

Sec. 2. A member shall be a member of the technical staff of any wireless telegraph or wireless telephone company, or a wireless telegraph engineer.

Sec. 3. An associate member shall be associated with a wireless telegraph or

wireless telephone company.

Sec. 4.Honorary members may be chosen from among those who have rendered acknowledged eminent service to wireless telegraphy or its allied sciences."

As wireless knew no national boundaries and might be developed by anybody who took an interest, the Wireless Institute constitution was intended to admit anybody anywhere as an associate, after the applicant had been OK'd by at least three members. The founders hoped to have Wireless Institute sections in many places.

The Wireless Institute constitution read as follows:

ARTICLE II

Membership

"Sec. 1. The membership shall consist of:

(a) Members, who shall be entitled to all of the privileges of the Institute.

(b) Associates, who shall be entitled to all of the privileges of the Institute except the right to hold the office of President or Vice President.

(c) Honorary Members, who shall be entitled to all of the privileges of the Institute except the right to vote or hold office, except when elected from the members, or associates, they shall retain their rights as members or associates.

Sec. 2. A member shall be a person of high professional standing who has engaged in the development of the wireless art for at least three years, and who is not less than twenty-five years of age.

Sec. 3. An Associate shall be a person who is interested in the advancement of the wireless art.

Sec. 4. An Honorary Member shall be a person of acknowledged eminence in the wireless art."

Nor did the constitution adopted by the Institute of Radio Engineers

exclude amateurs. The only change it made from The Wireless Institute, for Associates under Article II was to substitute "radio-transmission" for "the wireless art."

Report of the Committee on Consolidation of The Wireless Institute.

The above committee met at 4 P.M. on Saturday, March 9, 1912 to consider the proposal laid before The Wireless Institute by The Society of Wireless Telegraph Engineers. It was unanimously decided that the following proposals be laid before the members of The Wireless Institute and, on their approval of the same, be handed to The Society of Wireless Telegraph Engineers.

In consideration of the desirability of concentrating the efforts of those interested in the scientific and commercial development of radio communication, the attainment of which end will undoubtedly be furthered by the consolidation of The Wireless Institute and The Society of Wireless Telegraph Engineers, and in reply to the proposal submitted by the Society of Wireless Telegraph Engineers: Be it resolved,

1. That the Wireless Institute and The Society of Wireless Telegraph Engineers shall be combined, thus forming a new society, which shall be incorporated as The Institute of Wireless Engineers.

2. For purposes of consolidation, at a properly announced meeting (joint meeting) of the societies first named, a new body of officers and Board of Direction for the year 1912 shall be elected by all members and all associates of each society voting.

3. The funds of each of the component societies shall become the absolute property of The Institute of Wireless Engineers, and all members of either component society who shall have paid their dues for 1912 in either society shall be regarded as members (or associates respectively) in The Institute of Wireless Engineers without further initiation fees or further dues for 1912.

4. The status of all members of either society in The Institute of Wireless Engineers (that is as members or associates) shall be determined by the impartial vote of the newly elected Board of Direction.

5. At no time shall any discrimination against or in favor of any member of either society be exercised on the basis of his previous membership in either society, the explicit understanding in the consolidation of the component societies being that both societies completely lose their individual identity and are not to be regarded as factions or parties in the management of The Institute of Wireless Engineers.

6. The officers in The Institute of Wireless Engineers shall be a President, Vice President, Secretary, Treasurer, and Editor of Publications. It shall be the duty of the last named to superintend the printing, choice of typography, and arrangement of parts of each publication, said publications having been previously selected for publication by the Committee on Publication and Papers hereinafter mentioned.

7. The governing body of The Institute of Wireless Engineers shall be the above mentioned officials and four (4) members, who together shall constitute the Board of Direction. Five (5) members of this Board shall be a quorum.

8. Members in The Institute of Wireless Engineers shall be nominated by at least five members and shall meet with the approval of the Board of Direction. Their names shall then be submitted for approval to the Institute. More than one-fifth the votes of those present (but not less than three votes) adversely cast shall suffice for rejection of the candidate. Members shall be drawn from the following classes:

(1) Wireless engineers of recognized standing who shall have been engaged in commercial work for five years.

(2) Professional scientists of recognized standing who shall have shown a mastery of the field of radio communication through their publications or otherwise.

9. Associate members in The Institute of Wireless Engineers shall be nominated by at least three members, meet with the approval of the Board of Direction, and be elected by a four-fifths vote of the Institute, all members and Associates present voting. Their qualifications shall be the following:

(1) Wireless engineers in commercial employment.

(2) Scientists or laymen who shall show to the satisfaction of the Board of Direction a greater knowledge of the theory and practice of radio communication than is necessary for the design, adjustment, and operation of noncommercial installations. A commercial installation shall be regarded herein as characterized by high efficiency, reliability in operation and scientific correctness, though not necessarily by lowest possible cost. All associates must be over eighteen years of age.

10. Members or Associates, if found delinquent in their duties or disobedient to the constitution of The Institute of Wireless Engineers may be tried by the Board of Direction and upon decision of the Board of Direction their names shall be submitted to the Institute to determine their suspension, expulsion, or restoration to membership. A three-quarters vote of the Institute shall be necessary to ratify such action of the Board of Direction.

11. The Proceedings in print of the Institute shall cost 50¢ per copy to nonmembers, but shall be furnished gratis to all members. Colleges, universities, and public libraries shall have membership privileges in this particular.

12. The annual dues shall be $3.00 for both Members and Associates unless decided otherwise at the constitution meeting described below.

13. There shall be the following standing committees:

(1) Committee on Papers and Publications composed of the President, Vice President, Secretary and Editor of Publications. This committee shall decide what papers are to be published, what papers are to be read to the Institute, and the priority of publication of papers. The Editor of Publications shall have two votes on this committee.

(2) Committee on Standardization and Publicity. This shall be composed of the Board of Direction and six (6) members or associates. It shall

be the duty of this committee to lead in any movements toward the standardization of wireless apparatus or its rating, to inform the public correctly where necessary concerning wireless matters such as patent legislation, wireless legislation, questionable enterprises, and such other matters as shall be regarded the duty of the Society to publish for the benefit of the public and the wireless industry.

14. In the absence of an emblem adopted by the Society of Wireless Engineers, the emblem of The Wireless Institute though of course with name of the society shall be adopted as the emblem of The Institute of Wireless Engineers unless adversely decided by the constitutional meeting of the Institute below described.

15. One of the three first meetings of The Institute of Wireless Engineers shall be taken up by the adoption of a new constitution, which constitution, however, shall contain the material of Articles I through XIV above except articles XII and XIV. All members and associates shall vote on the provisions of the constitution, a majority of the members and associates constituting a decisive vote.

Alfred N. Goldsmith
Secretary of the Committee on Consolidation.

Mr. John Stone Stone gave a history of The Society of Wireless Telegraph Engineers when he received the 1923 Institute Medal, as follows:

"The Society of Wireless Telegraph Engineers had its origin in Boston and Cambridge, Massachusetts among a small group of men who constituted the technical staff of the Stone Telegraph and Telephone Company."

"In 1907 it occurred to me that it would be a distinct advantage to each of us if we crystallized our ideas about our work into scientific papers, and that it would be of great value to all of us to hear and discuss such papers. I therefore organized a Society of Wireless Telegraph Engineers within the staff of the Stone Telegraph and Telephone Company. We held regular meetings, usually at my house in Bay State Road, Boston. Many excellent papers were read and

discussed, and after the adjournment of the formal meetings we had a light supper.

"The value of this society to its members became so apparent that in 1908 it was decided to incorporate the society and to extend the privilege of membership to radio engineers generally."

The constitution of the Society of Wireless Telegraph Engineers was published in 1908 and listed the following officers:

John Stone Stone, President
E. R. Cram, Vice President
C. E. Russell, Secretary
Dr. R. T. Wells, Treasurer

Managers

F. A. Kolster
A. P. Browne
C. C. Kolster

Geo. K. Woodworth, Ernest C. Robes, and Oscar C. Roos were also members at that time.

The Institute of Radio Engineers January 1, 1913 publication of the constitution, officers, committees and list of members, gives the names of the charter members of the Institute of Radio Engineers as follows:

(a) From the Society of Wireless Telegraph Engineers.

J. C. Armour
S. Cabot
W. E. Chadbourne
E. R. Cram
G. S. Davis
Lee deForest
E. D. Forbes
V. F. Greaves
G. Hill
J. L. Hogan, Jr.
W. S. Hogg
F. H. Knowlton
W. S. Kroeger
F. Lowenstein
Walter W. Massie
E. B. Moore
G. W. Pickard
Samuel Reber
O. C. Roos
J. S. Stone
E. W. Sundberg
A. F. Van Dyck

(b) From the Wireless Institute:

Wm. F. Bissing
P. B. Collison
James Jam Dages
Lloyd Espenschied
Philip Farnsworth
Frank Fay
Edw. Gage
Alfred N. Goldsmith
Francis Hart
Robert L. Hatfield
Arthur A. Hebert
Frank Hinners
James M. Hoffman
Robert H. Marriott
A. F. Parkhurst
G. W. Pickard
H. S. Price
A. Rau
Emil J. Simon
C. H. Sphar
Floyd Vanderpool
R. A. Weagant

I have always felt that John V.L. Hogan, Jr. deserved the most credit for bringing the Society of Wireless Telegraph Engineers and The Wireless Institute together under one name. As I recall, he was the first to suggest it to Goldsmith and me. May be he suggested it to Goldsmith first. When we took to the suggestion he worked continually with us to bring the combination about and continued to work with us after The Institute of Radio Engineers was formed.

The application for incorporation of The Institute of Radio Engineers under the laws of the State of New York was signed by R. H. Marriott, Lloyd Espenschied, A. N. Goldsmith, John Stone Stone, E. J. Simon, R. A. Weagant, G. W. Pickard, J. H. Hammond, Jr. and J.V.L. Hogan, Jr. The papers were filed in Albany on August 23, 1913.

C. M. Haslett was the committee who arranged for the making and selling of Wireless Institute pins and P. B. Collision for the Institute of Radio Engineers pins. Shoemaker and I worked out the design for the Wireless Institute emblem and pin. Goldsmith, Hogan and I did the same for the I.R.E. emblem and pin. I recently found an envelope containing a number of pin models I made out of thin foil. It was Goldsmith or Hogan who suggested that the I.R.E. pin represent the wave rather than the sending and receiving apparatus of Hertz that were represented on The Wireless Institute pin.

After the Institute of Radio Engineers had been formed and the charter member list had been made up, several who had taken an interest in The Wireless Institute and had attended meetings, but who had not paid their 1912 dues, paid dues and became members of The Institute of Radio Engineers.

The printed applications for admission to The Wireless Institute and to The Institute of Radio Engineers looked much alike except that the color of the paper changed from "pink lemonade" to "cafe au lait."

The same individual was president of The Wireless Institute and Institute of Radio Engineers in 1912, vice president (who in the frequent absence of the president did much of the presiding) in 1913, and sort of a spare chairman who presided when succeeding presidents were absent.

The meetings continued at Columbia, usually on the first Wednesday of every month but July and August.

May 20, 1912, 8:15 P.M., Room 304, Fayerweather Hall, Columbia University.

Mr. Marriott spoke on the need of standard terms, units and symbols.

Messrs. F. Lowenstein, Geo. Clark, R. Weagant, Sphar, Fay, Goldsmith, Marriott and Kolster spoke relative to provisions for the safety of life at sea, power, wavelengths, decrement and the coming International Radio Convention at which Mr. Kolster of the Department of Commerce and Labor was to be an advisory delegate.

Resolutions were passed regarding the death of Mr. John Phillips the chief operator of the steamer "Titanic."

June 3, 1912

Mr. Losh talked on "Radio-Signalling in Aviation."

September 4, 1912

Mr. Marriott exhibited and described a small, light, portable wave-meter he had designed, and discussed the 300 and 600 meter wavelengths limitations.

Dr. Goldsmith read a paper by W. Torikata and E. Yokoyama on "Utilization of Both Waves Emitted from Closely Coupled Transmitters in Radio Telegraphy."

In a note added to the meeting announcement Goldsmith said to me: "there will be present at Fayerweather Hall the very cream of the wireless profession, as usual."

October 2, 1912, Room 301, Fayerweather Hall, Columbia University.

Dr. Alfred N. Goldsmith presented a paper on "Present Educational Necessities in Radio Communication." He spoke of the ~~past~~ part year course that had been previously established at Ohio State University in radio and of the course that he had recently established at the College of the City of New York.

November 6, 1912, Room 301, Fayerweather Hall, Columbia University, Wednesday 8:30 P.M. Sharp.

Dr. Lee deForest lectured on the work of the Federal Telegraph Company, using undamped oscillations.

This paper was published in No. 1, Vol. 1 of the Proceedings of the I.R.E.

December 4, 1912

Mr. Simon talked on Dr. G. Seibt's new direct-reading wavemeter.

Beginning with 1913 records of meetings were recorded in connection with such papers as were printed in the Proceedings.

As I recall, The Wireless Institute had made little effort to get publicity. When The Institute of Radio Engineers was formed, somebody argued strongly for publicity as a means for increasing our membership. From then on we received more publicity. For example in the Telegraph and Telephone Age for June 1, 1912, October 16, 1912, November 16, 1912, February 16, 1913 and April 16, 1913; Electrical World for May 25, 1912, September 14, 1912, December 14, 1912, April 12, 1913; and in the London Electrician for June 2, 1912, November 22, 1912, December 20, 1912, February 21, 1913, and March 28, 1913.

The Institute of Radio Engineers is now in the McGraw Hill Building. A closer connection between McGraw-Hill and the Wireless Institute was considered in 1910. Mr. Bissing of the Wireless Institute discussed several plans with Mr. Weaver, Editor of the Electrical World whereby the Electrical World would for example print our papers in part in that McGraw-Hill Magazine and in full in pamphlets, as the main part of our Proceedings.

A. B. Cole was in charge of the radio portion of the long counter in the Manhattan Electric Supply store on Park Place that ran through the block west of Broadway ~~in Park Row~~. Cole was a Wireless Institute - Institute of Radio Engineers booster to his customers. His father was mathematics professor at Columbia and I believe it was through Cole that we went to Columbia to hold our meetings. Later Louis Pacent became Cole's assistant and still later his successor. He too was a booster.

Lantern slides were not used in connection with the presentation of many of the early papers. The slides, the lantern and the operator cost money. In a few cases drawings were made on sheets of paper about two by three feet fastened to a stick at the top and thrown over the back and were removed after use. However, in most cases blackboards were used.

Before a meeting the author would sometimes miss the dinner at Sweets and go to Columbia early enough to draw all his figures on the blackboard before the audience arrived. Sometimes the author and helpers would each take a sketch of figures and copy them on different parts of the board, at about the time the meeting was scheduled to begin.

Blackboard figures had advantages and drawbacks. Having all of the figures in view before, after and during the reading of the paper was an advantage. When the figures remained during discussion they helped, but a discusser was apt to erase some to make room for his own illustrations.

A very long black board at Columbia was a communication medium for those who preferred to say what they had to say in numerals, Greek letters, sines, cos and such. John Stone Stone and J. Zenneck said their say in Mathematics to some extent. Mr. Louis Cohen said it with mathematics almost entirely. Any of them could express himself eloquently in a dash of mathematics ten to forty feet long. The mathematicians coughed their ways happily through the chalk dust fog. The non-mathematical units in the audience dropped their anchors and remained motionless while waiting for the mathematical fog to clear up. Most of the faces in the audience carried an understanding expression.

The Wireless Institute and The Institute of Radio Engineers did not pay anything for work except for example when they paid a printer or the janitor at Columbia. As I recall, a couple of dollars to the janitor paid for the room at Columbia.

All meetings, Board meetings and committee meetings were held outside of working hours. At night, in the evening, on holidays, or Saturday afternoons.

The active workers were so few that some were on all of the committees and the Board. Meetings were frequent, for example Board minutes show that the Board met at the Custom House on December 18 and 20, 1912. At the meeting on the 20th, Espenschied, Goldsmith, Hogan, Marriott and Simon were present in person and Forbes by proxy. Being radio inspector, I donated the Custom House. Other notes show one Institute meeting on April 1 and Board meetings on April 8,15,22 and 29, 1914.

To get enough money to pay for Proceedings continued to be difficult. Although some money was left over from 1911 and more was collected in 1912, Volume 1 of the Institute of Radio Engineers was not published until 1913 and little more than enough dues were collected by March 1914 to pay for the last number in the 1913 Proceedings.

About the time the Institute was started "wireless" had become the subject of many financially and scientifically speculative and questionable articles. One of the reasons I wanted an Institute, dated back to when I was taking up the study of wireless and wireless history, from 1897 to 1901 at Ohio State University. Then and for years later the lack of accuracy in what was published about radio was another weak link in radio development. My professor at college had the most confidence in the London Electrician. As a result, I read all wireless articles in the London Electrician quite faithfully up through 1905. The increase of wireless articles in popular magazines further emphasized the need for something that would publish wireless articles and be careful to see that they were accurate.

Presumably new things usually start amid untrue claims made by those who want to sell the new idea. Radio started with a double dose of false allegations, both pro and con.

When claims were made that wireless messages were sent much farther than beyond the horizon, college professors and others who had read Maxwell, said that could not be true. From what Maxwell wrote, wireless waves were believed to travel like light and light would not follow the curvature of the earth beyond the horizon

except when it was reflected or refracted by something and supposidly there was not anything in the atmosphere or heavens to reflect or refract wireless waves. Also, with a coherer receiver, static produced much the same dots and even the dashes that a wireless transmitter sent. So Maxwell and static caused excessive allegations to the effect that radio people were lying even when they were not. A sufficiently reliable society and publication could overcome that in time.

I was skeptical about wireless going around the world, to a sufficient extent in 1901, so that in playing safe in every way I could in picking a location for a practical wireless circuit, I picked ~~one~~ Avalon, Santa Catalina Island ~~to the~~ and White Point on the mainland ~~location~~ and put the stations high enough so you could see one from the other ~~with a good telescope~~ on a clear day.

About July 1, 1911 the enforcement of U.S. law requiring radio on certain passenger vessels began. This law, the act of June 24, 1910, was extended on July 23, 1912 to include cargo vessels, auxiliary power, communication between the radio room and the bridge, and two or more skilled radio operators in charge of the apparatus on certain passenger-carrying vessels. On August 13, 1912 an act was approved by the United States Government to regulate radio communication including the licensing of radio operators and transmitting stations. Demand for radio had arrived. A definite legal proscription requiring sea captains to take two radios and two operators. That depressed the captains, caused passengers to live longer and stimulated the radio business. The number of U.S. commercial ships equipped increased over one hundred and twenty-five per cent between 1912 and 1914. Employees increased, the operators increased about three hundred per cent. More people and more dollars in radio were available to help make an Institute. Radio had saved passengers of, or had aided, nearly fifty vessels before the Titanic sunk in 1912.

The Marconi Wireless Telegraph Company of Amerika employees and other Marconi employees had held aloof from the Wireless Institute and from the Society of Wireless Telegraph Engineers, except Jack R. Binns.

Jack had become a hero by saving lives, probably 1500 lives via wireless in the Republic disaster. Frederick Thompson who ran the shows at the 1904 St. Louis Worlds Fair, who built the Hippodrome and Luna Park, had put on a show at the Liberty Theatre on W. 42nd St. called "Via Wireless." I put a regular United Wireless outfit in his stage cabin. That cabin rolled and pitched in the storm while the full powered transmitter and wide open spark made a noise like a machine gun and saved lives and also married a couple. When Binns actually did what the show had been playing, Thompson wanted Binns to appear with his show. The Marconi Company would not let Binns do that unless Thompson used Marconi apparatus in place of United Wireless. Binns and I became friends through our contacts while the United Wireless equipment was being thrown out and Marconi equipment was being moved in.

In 1911 I went with the Marconi Wireless Telegraph Company of America. Then other Marconi employees joined me in The Wireless Institute including, R. A. Weagant, and A. Ram.

Of course in developing the Institute there was inertia and opposition. Inertia all the time and opposition particularly the first time we did something. Putting the word radio in the Institute name and trying to get people to use it produced some antagonism against the Institute because at that time English speaking people were partial to the word "wireless." Trying to name anything or define anything stirred up hornets. The Wireless Institute had a Standards Committee. It did not produce. The Institute of Radio Engineers Committee duplicated that nonproductioness in 1912. I appointed those committees and was dissappointed at not getting any standards. I thought we should get busy and put out some standards.

In 1913 I asked President Pickard to appoint me chairman of the Standards Committee. Then I found that influential people wanted to make the radio standards but they did not want to make them until sometime, maybe within a few years. However, our Committee on Standardization went ahead. Our meetings were usually

held in the U.S. Radio Inspector's office at the Custom House. We met over fifty times between January and September 1913. Dr. Goldsmith and I attended all the meetings. Mr. Hogan nearly all. Mr. Weagant who lived in Aldene, N.J. attended most of the meetings. Mr. Pickard who lived in Boston attended a few. Dr. Kennelly who lived in Cambridge contributed by mail. Being so conscious of the influential opposition caused us to go over and over the work, shrinking long definitions and throwing out doubtful definitions and symbols.

Because of the opposition we called our report a preliminary report and had it printed with a tear sheet on which members were asked to answer the following questions:

(1) With the exception of the changes suggested by you below, are you in favor of the acceptance and adoption of this Preliminary Report by the Institute?

(2) If you are not in favor of its acceptance, what are your reasons for its rejection?

(3) What criticism of the Report do you make and what changes in the Report do you suggest?

Signature

Date

That report contained about one hundred and twenty-five definitions, about sixty literal symbols, about thirty-five graphical symbols and a page and a half on tests and rating.

That report, dated September 10, 1913 was favorably received and is bound in Vol. 1 of the Proceedings. Subsequent reports have been made by a number of succeeding committees and were published in 1915, 1922, 1926, 1928, and 1931.

Before we proceeded as far as The Institute of Radio Engineers, I felt that Goldsmith was made to order for development of the Institute. From past experience one in my shoes naturally felt that any employee of a commercial radio company might lose his job because the commercial company might fail or change

management and a commercial or government radio employee might have to move at any time or his boss might tell him to pay less attention to the Institute. I felt that Goldsmith would not be interferred with by any of those circumstances.

By the beginning of 1914, I felt that if Goldsmith would stick by the Institute, the Institute's existence would be assurred. But he had often wanted to give up the responsibility. In fact he wrote me as early as January 1912 and as late as February 1914 to that effect. After the 1914 letter that subject was the chief topic of our conversation whenever we were together up to the summer of 1914 when he went to Europe. Just before he sailed he said he would decide on that trip and let me know once and for all when he got back whether or not he would stick to the Institute. I met him at the dock when he landed. He did not waste any time after saying hello, in telling me what he knew I wanted to know so badly. He said he would stick. To me that was a red letter day for the Institute.

It was on September 23, 1914. He also said he would give financial assistance. He said he would advance $150 per issue and take a $100 note or advance more if necessary. To me that was insurance that the I.R.E. would be kept going until radio would have grown enough and the Institute had grown with it into the self-supporting stage.

That trip by Goldsmith to Europe cleared up another Institute matter. Or rather it dampened a hope or created a perpetual doubt. With the principal in mind of wanting the Institute to be international I wanted Goldsmith to try to arrange for sections in Europe. He consented to do this and wrote me from abroad that Europeans were interested.

I received a letter from him dated July 29, 1924 in which he said he was working hard on the Paris and Vienna section ideas, and had finished Number 2 and was working on number 3 of Volume 2 of the Proceedings. Then the World War started. The next I heard from Goldsmith was to advise me that he had managed to get out of Austria with all of his skin and with some difficulty about his baggage. I do not believe any of the I.R.E. people thought that trying to start

sections in Europe, started the world war, but the World War did stop the project then and seemingly established a precedent for cold feet on the subject of foreign sections. Except in Canada which isn't another nation to the extent of producing many cold feet on either side of the thin line. However, I.R.E. being international avoided taking a part in the World War, and foreign vice presidents are elected.

In trying to convert people in 1908 and 1909 to the Institute idea one possible Institute feature seemed to have a strong appeal. It was that an Institute would collect radio books, a library. The library became a nuisance subject that took time from the consideration of more immediately practical subjects. Starting with a few radio books the idea would expand to include related and unrelated books, a librarian, a reading room, a smoking room, a billiard room, etc. The fact that we could not afford desk space would not prevent the library thought from being expanded to a club house with bar and turkish bath.

That trend of time consuming discussion was cut short by Secretary Pope of the A.I.E.E. at the first Wireless Institute meeting in the Engineering Building. He said we could arrange to use the Engineering Building Library.

The desires that led up to the club idea resulted in arranging to eat together before meetings, in banquets and still later in conventions.

The Institute of Radio Engineers did not have conventions early in its history but it did start having banquets or dinners quite early in its existance. Not just eating together before a meeting but affairs called dinners where the evening was spent in a dining room eating or listening to after dinner speeches. The first of the dinners of that kind was given to me because I was going to move to Seattle. The dinner was given at Monquin's, a place famous for its wines in pre-prohibition days. The dinner program and menu at the time was believed to be funny. It read as follows:

Dinner held by the Board of Direction of The Institute of Radio Engineers on the occasion of the departure of past president, R. H. Marriott for Seattle, Washington. Officers: L. W. Austin, President, John Stone Stone, vice president, John Hays Hammond, Jr., Treasurer. Emil J. Simon, Secretary. Managers: R. H. Marriott,

John L. Hogan, Jr., Guy Hill, Roy A. Weagant, and Alfred N. Goldsmith, Editor.

"73" "MA"

Aperiodic

A-periodic Heterodynner of the Institute of Radio Engineers in the Receiving-Room of Mouquins Trans-Sixth Avenue Station. New York, December 23, 1914.

First-Phase

Menu

(Note: We are enjoyned from serving courses at a frequency exceeding 250 per second)

Automatic Starter to Order

Rat-tail of Non-adjustable Bare Blue Points for Bivalve Detectors

Gumbo Electrolyte in Insulating Container of fixed Capacity

Portable Submarine Equipment in Dielectric

Brush Discharges — Oval Insulators

Sans-Filet of Bass

Pocker Ultraudion Detector, Spud Type

(Licensed for use in Dining-Room only)

Vol-an-Vent of Jiggers, with Spherical Electrodes

Fancy Sleet, with Plain Aerial

Etherized Chicken, on Switchboard with Protective Devices

Cohered Low Temperature Cream, with Spade Electrôdes

High Powered Cheese

Radiation from Tree Antennae

Ungrounded Coffee

(Note: Saturation point should not be exceeded. Avoid examining tikker).

Second Phase

John Stone Stone, Chief Operator

Atmospheric Disturbances by Eminent Static Producers, on Current Topics

Antennae I have Known

Secrecy in Radio

Prevention of Decrement

Financial Radio Research

Experiments in Radio Patent Litigation

All About Radio

Specifications for Building Radio Engineers

How to make a Wireless Station

Who Invented Radio?

Il-Lodge-ical Circuits

Radio in the Time of Rameses I

Radio in 1914

Radio in 1926

Radio in 2014

Trans-New York City Radio Service

Trans-ient Service

How to Raise Injunctions

Those present at the dinner were:

John L. Hogan, Jr.
Emil J. Simon
H. Boehme
J. B. Shelby
G. B. MacMahon
Herman Schlang
Guy Hill
W. D. Terrell
D. Sarnoff
E. B. Pillsbury
Julius Weinberger
Julian Barth
William H. Priess
Charles E. Apgar
Geo. B. England
R. H. Marriott
Alfred N. Goldsmith
Harold R. Zeamans
R. A. Weagant
E. H. Armstrong
Chas. Wm. Taussig
Paul F. Godley
Frank King
L. G. Pacent
Capt. E. Heurl
Philip Farnsworth
A. H. Janke
A. Veller Sloan
J. C. Gregg
E. P. Knowles
L. Espenschied
Frank H. Fay

This dinner was photographed. I have a copy.

John Stone Stone could not attend the dinner. He gave a special dinner to Mr. Marriott and members of the Board at the Brevoort House, 8th St. & Fifth Ave., December 18, 1914.

The secretary-treasurer work was first run on nothing, than on a shoestring. The 1909 Wireless Institute books of Williams and Thurston were audited by James Sawyer. I first knew Jim as a draftsman working on Harry Shoemaker's patent and

other drawings in 1901. In 1909 I knew him as an accountant. Later I knew him as superintendent of construction.

About 1911-12 The United Wireless Telegraph Company had been the best salesman of Radio Service for ships in the United States. Gernsbach and his Modern Electric Magazine and Electro Iporting Company had been the best saleman to amateurs. Colonel Firth of 81 New Street had been the best salesman to the Navy and other government departments.

Firth had sold Shoemaker apparatus to the government. He was selling Picard tuners and detectors. Firth, Farnsworth and Picard were the Wireless Specialty Company. At the time Simon became secretary of the Institute of Radio Engineers he was associated with Firth at 81 New Street in a firm called the Wireless Improvement Company. Ralph Langley and Miss Federson also worked in those offices. After Simon became secretary, 81 New Street was where the Board of committees sometimes met in 1912. Also Langley was assistant secretary and Miss Federson took the I.R.E. messages when Simon and Langley were absent. She is now with Allen D. Cardwell who still manufacturers air condensers and other radio parts. She has probably been connected with the manufacture and sale of radio as long as any woman in this country.

Emil J. Simon, beginning back in the Wireless Institute days, did a lot of things for the Institute. For example; he became acquainted with John Hays Hammond, Jr. got him elected treasurer of the Institute of Radio Engineers and obtained the every day use of an office in the offices of John Hays Hammond, Sr. for I.R.E. and the occasional use of the Hammond's handsomely furnished and decorated board room for I.R.E. Board meetings, all free for the year 1914 at 71 Broadway, where the rent for such facilities was high. That was the first time a room or office was set apart for the Institute. In some cases, the secretary was not located at the Institute office but kept in touch with the office by phone, mail and occasional visits. For example, Miss Malkind ran the office at 111 Broadway during 1915-17 and Misses White and Dunne ran the office at 37 West 39th Street, next door to the Engineers Building, during 1924-25, by remote control from the elected secretarys.

More notes will probably be forthcoming from time to time. I want to discuss some points with others who I hope to contact from time to time.

Some of my records were destroyed in moving from coast to coast. Some I.R.E. records probably exist in my files under other subjects and may be found from time to time.

The first time I heard Armstrong's oscillating receiver was a big event to me. Goldsmith, Hogan, Weagant and I attended some I.R.E. meeting, as I recall it, and after the meeting Armstrong invited us into his laboratory at Columbia to see and hear his receiver. We spent so much time attending I.R.E. meetings or committee meetings or Board meetings that I have not been able to identify that meeting. That part of the evening with Armstrong was a sort of condensed I.R.E. meeting and preliminary disclosure. Condensed to fit the small room. I think some others than those indicated above were present but I do not remember who they were or the exact date. Armstrong and I have had the following recent correspondence about that event. I believe that correspondence tells the story better than any equally brief story that I might write.

June 2, 1937

Prof. Edwin H. Armstrong,
Columbia University,
N.Y.C.

Dear Armstrong:

In some historical notes that I am writing I want to tell about you taking us from Fayerwether hall after an IRE meeting (down into a small room in the basement of the next building I think) and showing us the audion outfit that oscillated and produced beat notes (from Sayville I think) and the tall coils and the funny way the beat notes changed when one waved his hand at a coil.

We were greatly impressed and went away wondering how you had connected the audion to make it oscillate and work on the received CW (we called it CA, constant amplitude) to produce beats. We did a lot of talking but none of us seemed to know, that night, how the audion was hooked-up. However the next night (as I recall it) Weagant told me he had tried connections in the meantime and had found an audion arrangement that produced beats.

I believe I made notes about your demonstration at that time but so far I have not found them.

Because I did not know how you had the audion connected causes me to think the date of your demonstration may have been before March 3, 1915. Other notes indicate that it might have been on December 2, 1914. Goldsmith,

Hogan and Weagant were there, but I do not remember who else.

When you get time I wish you would straighten me out on those points.

Cordially yours,

R. H. Marriott

Columbia University
City of New York

Department of Electrical Engineering

June 11, 1937

Mr. Robert H. Marriott,
1470 E. 18th St.,
Brooklyn, N.Y.

Dear Mr. Marriott:

Thank you very much for your letter. I am always glad to take time to get history straightened out.

If my recollection serves me correctly there were a couple of times when I had the pleasure of showing you the funny beat notes. One was the occasion when Goldsmith, Hogan and Weagant were there, but there was a second occasion when you alone were present. That was the night that the Goldschmidt station at Tuckerton opened up and you wanted to check up on them and see what interference they were causing in this part of the world. Nothing very serious happened as we were able to receive Glace Bay on 7800 meters through them while they were operating on 7500. The date of this can easily be fixed because it was the night of an Institute meeting and after listening to signals for awhile we both went over to the meeting where Simon was presenting a paper on three-phase quenched spark systems. During the discussion you mentioned the fact that Tuckerton was now on the air and that you had been listening to them earlier in the evening in my diggings. On both this occasion and at the time that the group was there we received signals from San Francisco and Clifden as well.

I have a faint recollection that you were there on another occasion and if it comes to mind I will be glad to write you. Meanwhile, if there is anything further along these lines please let me know and I will be glad to dig it up.

With best wishes.

Sincerely yours,

E. H. Armstrong

My notes show that the Goldschmidt alternator was due to start at 7 P.M., May 13, 1914 and that I went to Tuckerton the next day to inspect it,

as U.S. Radio Inspector. The Proceedings show that Simon read the paper May 13, 1914. Notes indicate that I was at Columbia on May 11 and 12 and attended a Pupin lecture on May 6. However, I have not found a note that says on what date Armstrong demonstrated to Goldsmith, Hogan, Weagant and me. It was some time before May 13, 1914.

One man did almost everything at times in the early history of the Institute. That is one man wrote the meeting notices, had them printed, addressed them, mailed them, opened up the meeting room, acted as chairman, presented a paper he had written, had the paper printed and collected or made up the funds to print the paper and mail it. I did about those things and then Goldsmith came along and did about the same. At times, Hogan, Espenschied, Simon, Sarnoff or others carried much of the financially unprofitable Institute. The Institute frequently approached a one-man, two or three man conditions. Actually the chairman was such a large per cent of the audience in the beginning that the chairman did not stay on the platform in his chairman but went down in front of the speaker to increase the number in front of the speaker by several per cent. Naturally the audience tried to help out by discussing. An audience of five then probably discussed as long as an audience of five hundred does now.

When Goldsmith told me he would stick with I.R.E. he meant, as I understood it, to stick as Editor of Publications and as a Board member but about four years later the office of secretary landed on him again. He had succeeded Sidney Williams and Eugene Thurston as secretary and treasurer of the Wireless Institute in 1911. E. J. Simon was secretary of I.R.E. until 1915, then David Sarnoff until 1918. In 1918 the job of being secretary again fell on Goldsmith. Both the title and the office equipment found a home with Goldsmith at the College of the City of New York.

How the Institute landed on a very few about that time, World War time, is indicated by the fact that Prof. G. W. Pierce was president of I.R.E. for the two years including 1918 and 1919 and never attended a meeting. Hogan as vice

president and Espenschied and Sarnoff as directors and secretary Goldsmith and treasurer Hubley were I believe the working crew of the Institute at that time and their attention to the Institute was sidetracked by the war. Others were taken completely away from I.R.E. affairs by the war, after the United States went into the war and in the early post war period. The war put many into radio and much money into radio equipment but that did not count then, it counted later.

The part of the World War from 1914 and 1917, before the U.S. became a combatant, or the patent war which was related to the other war, brought about a growth in the Institute. It brought more radio experts to New York than had previously been in New York at one time. Not only to New York but to other places such as Seattle. They increased the attendance at Institute meetings, increased the membership and caused Institute banquets at New York and Seattle.

Germany, a party to the patent war and represented in the U.S. by the Atlantic Communication Company, had sent Professor Jonathan Zenneck and Professor Ferdinand Braun to the U.S. in 1915 to serve as experts. Braun was a radio pioneer dating back to 1898 in the development of Telefunken. Early German drachtlose companies bore the name Braun. Braun, Braun-Siemans, Siemens-Halske, to Telefunken in Germany and to Atlantic Communication Company in the U.S. Zenneck was the author of the most-used radio book of that day.

A banquet at Luchow's Restaurant on 14th Street, New York, April 24, 1915 was given to Zenneck and Braun by I.R.E. I cannot identify all of those shown in the photograph. There are fifty-five. Those at the head table are Pierce, Braun, Stone, Zenneck, deForest, Tesla, Lowenstein, Goldsmith, Judge Mayer, Dr. Frank, Nally, and Marriott. Mayer was the Federal judge in an important patent trial at that time. Dr. Frank was, and is now I believe, the local Telefunken representative. Mr. Nally was the head of the Marconi W.T. Co. of America. The I.R.E. banquet was the friendly meeting ground for all sides.

Of those others present at the I.R.E.-Braun-Zenneck banquet twenty-two years ago I now recognize the following in the photograph. On the right reading from the head table, Warren Hubley, Roy A. Weagant, Guy Hill, Emil E. Mayer, E.F.W. Alexanderson, George Clark, Julius Martin, Lieut. U.S.N., Mahood, H. O. Boehme, Water H. Pumphrey, H. Alfred Janke, Lester Israel Jones, Julian Barth, Louis G. Pacent, William Dubilier, On the left: Dave Sranoff, Emil J. Simon, George deSousa, Frank N. Waterman, Cloyd Marshall, J. Andrew White, Ralph Langley, Gage.

To better visualize the situation youcan assume (and probably correctly) that Telefunken through its patentents and through the licenses or rights which the Atlantic Communication Company had obtained, had the strongest radio patent situation in the United States. It was a fight between Telefunken backed by Germany and the Marconi interests, back by England.

That banquet indicated and increased the interest in I.R.E. It produced and increased enthusiasm. Institute membership and affairs increased until about the time we went into the war, then the membership curve sagged and flattened out.

A banquet under the auspices of the Seattle Section of I.R.E. was held at the Butler Hotel in Seattle March 18, 1916. The patent battle in this instance was between the Marconi W.T. Co. of America and Kilbourne-Clark, a Seattle firm that manufactured radio apparatus and had started the ship owners radio servece that operated ship stations. Outstanding radio men of that time were present and came together in a friendly way only at the I.R.E. banquet. I have to give the list of those present partly from memory. During the day (March 18) I, as naval expertradio aid at the Pugent Sound Navy Yard, was enabled to take the following for a trip on a naval vessel from Seattle and back for the banquet: L.F.S. Betts, Jas. I. Cosgrave, F.N. Waterman, Roy Weagant, Paysee, C.B. Cooper, G.W. Pickard, V. Ford Greaves, F. M. Ryan, F. A. Kolster, Ellery Stone, Lieut. E. J. Blankenship, Dr. Magnusson and one or two others. Also at the banquet

were Commander W. B. Wells, George Hastings, Frederick Simpson, Phillip Farnsworth, Hall, Zenneck, Roy Thompson, T. M. Libby, Fred Gruwell, and other members of the Seattle Section. Those were big things in those days. The I.R.E. brought radio men together in a friendly, as well as instructive, basis where nothing else could. I have been asked why I.R.E. has the Fellow grade. As I recall, it was the result of one of the many discussions on how to get more money, and because A.I.E.E. had such a grade.

The A.I.E.E. had Fellows. We in I.R.E. had the same classes of membership but we did not have the Fellow grade. We needed more money. More money from more members or more from the existing members or both. In 1915 we copied another A.I.E.E. precedent by establishing the Fellow grade with its higher dues.

Harold R. Zeamans attorney for I.R.E. and Goldsmith got together frequently to talk about the philosophy of life and to decide how humans should behave. Zeamans was interested in Goldsmith's new interest (The Wireless Institute) and came to meetings with Goldsmith. As I recall, that is about 1910. While attorneys Philip Farnsworth and William Bissing were early members, they were patent attorneys and did not practice other law. Zeamans was a general practitioner and the applying for incorporation papers (gratis) fell to him.

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

345 EAST 47TH STREET, NEW YORK, N.Y. 10017 AREA CODE 212 752-6800

May 28, 1968

Mr. Haraden Pratt
2612 Northeast Seventh Street
Pompano Beach, Florida 33062

Dear Mr. Pratt:

In response to your letter of May 24, I'm enclosing a copy of "Notes on the History of the Institute of Radio Engineers" by Marriott. It turns out that we have four carbon copies (but not the original), so I'm sending you one of the carbons. One of the other carbons has some marginal notes by Goldsmith and another has marginal notes by Hogan.

As you suggest, I'll check with Goldsmith, Espenschied, and Hogan's son to see if they have any early IRE (or SWTE or WI) minutes. I'm not sure where to contact the latter. There's a J.V. Hogan in the 1966 Membership Director in Forest Hills, N.Y. This may be he. I'll check with Espenschied; if he can't help me, I'll query you further.

Most sincerely,

W. R. Crone/jw

W. R. Crone
Staff Secretary
IEEE History Committee

WRC/jw

Historical Display Suggestions

Old documents, old apparatus, copies or pictures of such and old data are of interest to some people. A locked glass case or two containing such displays should be interesting at conventions.

Owners of such curios will probably loan them if they are given suitable credit and are sure the curios will be returned.

Here are some of the things I have that do not take up much space and may be interesting:

British Admiralty Wireless Instructions 1901

Call list of United Wireless Stations 1910

Marconi Apparatus catalogs old English and first American

Photo of U.S. wide coherer receiver used by R.H. Marriott in 1900

The "Aerogram Magazine" 1909

Grand Opera by Radio, Caruso broadcast, scheduled broadcasts, advertising predictions, etc. Jan. 1915 to 1917

Photostats of papers and magazines

Wireless Institute Proceedings

Vol. 1 and 2, I.R.E. Proceedings in brown covers

Wireless Institute application blanks

Society of Wireless Telegraph Engineers constitution

Message sent by R.H. Marriott from station built by him to his parents in 1902 as delivered on W.U. blank

Marconi Coherer

Polarized relays used with coherer sets 1901

Small induction coil to illustrate Marconi transmitter, used in 1902 Marconi suit.

Small special wavemeter, 1912

Brown amplifying relay, 1910

Switches to sectionalize inductances and capacities in tuners 1908

Some special experimental tuners 1908

Electrolytic detector, 1904

Electric detector (1904) made into four carborundum detectors 1906

Perikon detector 1909

Silicon detector 1909

Steel-oxidized iron parts of detector as used 1902

Some old hot wire meters 1908 and 1912

Sullivan 7200 phones 1909

The first audibility meter, about 1910

Because an instrument or document of this kind may require explanation that would take up more space than the exhibit, the exhibits may be numbered and put in the case with correspondingly number explanations on a wall by the case.

If such an exhibit is made this year offerings and suggestions will probably be made that will provide for improvement andvariety in future years.

Extracts from biography of R. H. Marriott
Concerning organization of
The Wireless Institute
and
The Institute of Radio Engineers

Marriott was transferred from Colorado to New York City in December 1907.

"Now that I was in New York where there were a number of wireless people, I set out to put over the argument that there should be a wireless scientific society. Being a member of the American Institute of Electrical Engineers, I talked to their secretary, Mr. Ralph W. Pope, in addition to wireless folk of various kinds. Pickard was very friendly to the idea. Shoemaker who had been secretive and adverse to discussing such technical subjects, seemed to be inclined to help do something about it. The technically inclined operators were for it insofar as they could afford. Technically inclined people were almost invariably handicapped financially, Others in United Wireless felt that they could not understand the technical stuff but they thought it might be a desirable help to wireless development and, therefore, they would join as financial contributors but not to attend meetings or contribute papers. The most popular thought seemed to be that we should have a library with rooms where members could read and get together.

We went over the constitutions of various organizations. I thought the organization should be copied largely from the American Institute of Electrical Engineers but not limited to America as wireless was not limited by national boundaries. Then its greatest value seemed to be on oceans and not so much on continents as between continents. The organization should be world wide and should have a name and constitution to fit that scope. Secretary Pope and others of the AIEE wanted to take us in as a part of that AIEE organization but it seemed better that we try to be international and not a minor part of a national organization. Mr. Pope gave us good advice on how to proceed and one of the main reasons we succeeded was that we did our best to follow his advice.

It was doubtful whether the word "engineer" should be included in our name. Of those I contacted or knew about, several had higher education in Science but only two had taken engineering in college and one of those two was antagonistic. My job as a guide and transportation arranged for the American Science Association Convention at Ohio State University in 1899 had brought me in contact with the desirability of science meetings and I thought there should be a Wireless Science Association. However, too few in wireless could be appropriately classed as Engineers or Scientists and others would object to the inference that they were, when they obviously were not. They were interested in wireless and would not mind contributing by becoming a member of a society that would advance wireless. Therefore, broad names like "The Wireless Institute" repeatedly occurred in the naming of the proposed baby. Farnsworth, who was Pickard's patent attorney, and mine at times, and Bissing, who was my patent attorney, helped particularly with the name and constitution. Patent claims are made broader by eliminating qualifying words. The same idea was applied to the institute; we tried to avoid unnecessary words.

It took over a year of preparation before the meeting was held at which we adopted a constitution and elected officers. That meeting was held in Farnsworth's office, room 1909, 42 Broadway. We were employed in wireless work and nearly all had to get the consent of our employers. In United Wireless, the largest company, there were officers who insisted that employees should mind their own job, keep their mouths shut, exchange no ideas and never associate with employees of another wireless organization. We had to win over the United Wireless, prepare constitutions, and take care of our wireless jobs before we could stage an official opening. Several other things occurred in wireless during that time. The starting of the Wireless Institute was extracurricular but here and there it was brought about in connection with sustaining wireless work.

The working up to what is now known as The Institute of Radio Engineers goes back to early persistence, preparation and people that only a few knew about after thirty-six years of meetings. The first paper to be read before the Wireless Institute was by R. H. Marriott and its title is "The Wireless Institute. It was printed in the first of the published proceedings. The meeting was called to order at 8:40 pm on April 7, 1909 at 33 W. 39th St., New York where IRE meetings are now held. That meeting was held in a small room in the southeast corner, on the balcony floor.

The first proceedings contained the paper by Marriott, letter by Pickard and address by Ralph W. Pope which was taken in shorthand by Sidney L. Williams, our secretary. Pickard's and all of Pope's recommendations became part of the religion of the Wireless Institute and the succeeding I.R.E. and Pope was remarkably prophetic in his anticipation of inventions by Wireless amateurs. The first proceedings also contained the Constitution and a loose pink page, an application blank. Twenty-four pages, six by nine, very neatly printed on white paper, with no advertising. Subsequent proceedings bore the emblem on the front cover. The emblem was a Hertz oscillator within a circular Hertz receiving loop with the name The Wireless Institute around the outside. Altogether a half inch in diameter. This was also made in a gold membership pin. The following is a copy of a portion of the first proceeding Vol. 1, No. 1."

(Two paragraphs from this paper are quoted here)

"On May 14, 1908, the writer sent out some two hundred letters to persons interested in wireless, asking their opinions regarding the formation of such an institute. Answers were received from about sixty, and with one or two exceptions, were in favor of forming an institute on the lines indicated. On January 23, 1909, a temporary organization was formed by Messrs. John S. Murphy, R. A. Sommerville, Joseph D. Fountain, R. B. Respess, R. A. Cleve, John Gregg, E. Barnwell, Philip Farnsworth, Sidney L. Williams and R. H. Marriott, in room 1909, 42 Broadway, New York City. The purpose of this organization was to draw up a constitution and make the necessary arrangements for the formation of a permanent organization."

"On March 10, 1909, a meeting was held at the United Engineer's Building, New York City, at which were present Messrs. R. A. Somerville, Joseph D. Fountain, John C. Gregg, Roland B.

Respess, A. R. Sharples, E. M. Thurston, B. P. Martin, W. M. Jones, J. A. Bryan, Arthur C. Fike, Francis X. Butler, Wm. F. Bissing, Sidney L. Williams and R. H. Marriott and others represented by proxy. At this meeting a constitution was read, discussed, amended and adopted - resolutions were passed whereby any properly recommended person joining the Institute before April 10, 1909, would be considered a charter member and would not be required to pay the entrance fee. It being necessary that the offices of President and Vice President be held by Members, Messrs. Greenleaf W. Pickard, Harry Shoemaker and Robert H. Marriott were unanimously elected to membership and Mr. Marriott was elected President, Mr. Shoemaker , Vice President to serve one year and Mr. Pickard, Vice President to serve two years."

"We were helped by people who were not members of our organization or profession. One of the practices that Ralph W. Pope recommended after his years of experience as secretary of the American Institute of Electrical Engineers, and of which he told us at our meeting on April 7, 1909, was the recording of Institute papers, speeches and transactions. He gave excellent advice that we tried to follow. He was very sincere. We heard what he said (Sydney Williams recorded what he said) and he dictated what he said to an AIEE stenographer and mailed it to us and we printed it in Vol. 1, No. 1 of the Wireless Institute Proceedings."

(Organization of the Society of Wireless Telegraph Engineers (SWTE).

"John Stone Stone, bachelor gentleman, member of exclusive clubs, well-to-so mathematical scientist and producer of the largest number of U.S. mathematical patents, had been trying to design, manufacture and sell the best in wireless apparatus. In 1907 he began inviting employees of his company to his home for evenings devoted to the reading and discussions of papers pertaining to the wireless problems in which they were interested. After the papers, refreshments were served. In 1908, Stone had the group incorporated as the Society of Wireless Telegraph Engineers (SWTE). Stone gave up trying to design, manufacture and sell wireless instruments. His employees scattered. In the later years the SWTE became less exclusive and added some who lived in New York, for example, Hogan, de Forest and Lowenstein. Stone moved to New York and some of his former young employees were in New York off and on.

Some of them attended our meetings and some contributed to our meetings by presenting papers. However, we were unable to get any of them to contribute financially by paying membership dues. One day Jack Hogan, who had been continuously helpful, remarked to me that he thought Stone and his crowd would come in with us if we would make it a combination of the SWTE and WI under a new name. I had never thought of that. We of the WI talked it over and proposed a merger to SWTE. Goldsmith typed our proposal. We agreed to make it a marriage under the name: Institute of Wireless Engineers; and at the last minute changed it to: THE INSTITUTE OF RADIO ENGINEERS. The members were to consist of those who had paid their dues in the WI and SWTE. Most of our WI's had paid and Stone told me he paid for some of the SWTE's who had not paid, to bring things up to a fifty-

fifty basis. I suspect he contributed financially to the IRE several times that were not mentioned. For committee meetings, in which he took part, he asked us to join him at the National Arts Club for conference and very good refreshments, at his expense."

"May 6, 1912, Monday, 8:15 P.M. Room 304, Fayerweather Hall, Columbia University. The notice for this meeting says: 'This meeting will be the last meeting of The Wireless Institute being a joint meeting of the Society of Wireless Telegraph Engineers and the Wireless Institute at which meeting both societies will combine to form the new society which will probably be known as The Institute of Radio Engineers. The articles of the constitution of the new society and its officers will be decided upon at this meeting.'

May 13, 1912. A meeting of the Institute of Radio Engineers was held at (see note) Columbia University, New York. The following officers were elected to serve during the balance of the year.

R. H. Marriott, President
F. Lowenstein, Vice President
Emil J. Simon, Secretary
E. D. Forbes, Treasurer

The following members were elected to the Board of Directors for 1912:

G. W. Pickard
F. Fay
J. Hogan, Jr.
L. Espenschied

The following committees were appointed by the President for 1912:

Standardization

J. S. Stone
F. Lowenstein
J. L. Hogan, Jr.
G. W. Pickard
A. N. Goldsmith
R. A. Weagant

Papers

L. Cohen, Chairman
A. N. Goldsmith

Publicity

J. L. Hogan, Jr.
Emil J. Simon

Note. Room 304 was being used so we were given the use of a room in the building south of Fayerweather. The IRE held its meetings in 304 Fayerweather Hall for years. No charge by Columbia. To clean up the mess we made, we gave the janitor one dollar per meeting."

(Marriott neglected to explain that John Stone Stone had his business in Boston and that the SWTE was organized and based there).