

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS
33 WEST THIRTY-NINTH STREET
NEW YORK



TELEPHONE, 4600 BRYANT
CABLE, CYANDRIC

3-1

January 21, 1909.

G. A. W.
FILE

3168

Mr. G. W. Wardlaw,
Editor.

Dear Mr. Wardlaw:

I am returning herewith memorandum from the Geological Survey. I do not think it is worth while printing this as you will find this matter contained almost word for word in Finlay's paper and a discussion of it.

Yours very truly,

A. G. Stott

In April, 1908. Proceeding.

[Handwritten signature]

[Handwritten flourish]

To Editor:

This is furnished for your use by the Technologic Branch,
United States Geological Survey; if you use article please send
marked copy of paper to John L. Cochran, U. S. Geological Survey,
Washington, D. C.

Washington, D. C., January A preliminary bulletin on "The Significance of Drafts in Steam-Boiler Practice" is soon to be issued by the Technologic Branch of the United States Geological Survey. The authors of the bulletin, Walter T. Ray and Henry Kreisinger, in carrying out the particular work assigned to them in the general plan for the conservation of the fuel resources of the country have this to say in their bulletin:

"The experiments so far made seem to indicate that it is possible to double or treble the capacity of a plant without making any radical changes in the furnaces and boilers. These increases require about double and treble the quantities of air to be put through the fuel beds and boilers. It also seems probable that rebaffling the boilers will often permit the capacity to be doubled or trebled, while still getting more steam than formerly per pound of coal for uses outside the boiler room.

"These experiments were undertaken with the object of clarifying ideas concerning the passage of air through fuel beds and boilers. Measured weights of air were passed through two beds of lead shot, in series, one of which remained always the same and represented a boiler; the other being varied as to size of shot and depth of bed, and representing a fuel bed. Careful observations were made of the weight of air passing through the beds per minute. All data were plotted in many charts, so as to permit the study of them from several points of view. A number of laws were deduced bearing on the relative amounts of power required to force air through fuel beds of various thicknesses, composed of various sizes of coal, and through boilers of

various lengths and areas of gas passages.

"An important part of the discussion relates to an increase in the capacity of boilers by increasing the amounts of power which must be applied to pressure and exhausting fans in order to force several times as much air through the fuel beds and boilers.

"It may be possible, as a result of these investigations, to raise the rate of working the boiler heating surface to three or even four times its present value. Such an increase would undoubtedly mean new designs of grates, stokers, furnaces, and boilers, especially fitted for high rates of working. Fan equipments designed to supply three or four times as much air under several times the pressure would be provided with more efficient engines, which is an additional factor favoring high-capacity working.

"It must be borne in mind, as stated above, that the results are tentative. It will cost money to force gases at high speeds through fuel beds and boilers, and there will soon be pressing need of such quantitative data as will enable the largest possible part of the energy imparted by the fans to be advantageously utilized.

"The attempt must not be made to put more air through existing boilers by running the fans a great deal faster, because the power consumed will increase far faster than the above calculations estimate. New fans and engines must usually be installed of sufficiently larger size to supply the larger quantities of air at as high an efficiency, if not higher.

"As has already been suggested, one way of reducing the work re-

required from the fan in the case of doubling the capacity of the boiler is to increase the grate surface, so as to avoid a high increase of pressure drop through the fuel bed, increasing materially only the pressure drop through the boiler proper. A low pressure drop through the fuel bed would also insure better combustion of the fine particles of coal which would be carried out of the stack unburned if high gas velocities through the fuel bed were employed, the high velocities being obtained by high pressure drops. This last method is being successfully used by H. G. Stott and W. S. Findley^a, of the Interborough Rapid Transit Company, New York City. They have recently installed an extra Roney stoker under the rear end of each of several Babcock & Wilcox boilers, with the result that the amount of steam produced was nearly doubled, the combined efficiency of the boiler and furnace dropping only about 3 per cent. A complete description of the outfits and the results is given in a paper read by Walter S. Findley^a, jr., before the American Institute of Electrical Engineers in December, 1907. In this case the pressure drop through the fuel bed was the same as with the single stoker, or perhaps decreased slightly. Of course, the pressure drop through the boiler proper increased considerably. An electrical engineer would say that the above experimenters put two fuel beds in parallel and with the same potential drop obtained twice the current (weight of gases). The same result could have been obtained by thickening somewhat the fuel bed on the single stoker and increasing the pressure drop through it, in which case the electrical engineer would say that the experimenters put two fuel beds in series and by increasing the drop of potential obtained twice the current (twice the weight

of gases). The method of increasing the grate area is a promising one because it requires less work from the fans; it is especially to be preferred in those cases where there is a high percentage of slack in the coal, as already explained.

"The figures and principles derived from the experiments and tests presented in this bulletin may not be applicable directly to special problems; they suggest methods by which each problem can be studied and its successful solution brought about. Further experiments with laboratory apparatus as well as with hot fuel beds are desirable before more accurate figures can be given. The Geological Survey contemplates the making of such experiments in the near future, the results to be worked up and published in the next bulletin on 'Drafts'."