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THE DESIGN FEATURES OF THE CONSTAM T-BAR LIFT.

By

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Layout: About 20 years back I discarded "spreading the plan view" i.e. using 6 foot terminal sheaves on lifts of 8 foot gauge, 4 foot terminal sheaves with 6 foot gauge, etc. simply because the rope deflections on the down-going side of the lift at the first and at the last tower threatened rope derailments.
I also favor two sister towers instead of one where the profile breaks over sharply, one of the two intended to save the day if the rope derails at the other.
While relatively long spans on the low ground are taboo on chair lifts as inducive to rope dance, tow lifts are less susceptible, almost immune to that. I built one in Canada, for example, with an initial span measuring 670 feet.

Towers: Towers with only one column located within the loop of the lift rope are the order of the day. I have used them on at least one high capacity lift of only 6 foot gauge, however I prefer larger clearances and therefore as a rule recommend this type of tower for lifts of 8 foot or more gauge. The slightly more expensive portal type is good for all gauges.
The design has to cope with two conditions: normal operation and entanglement of the lift rope at the tower head. While in normal operation the pressures exerted by the lift rope on the tower head are relatively moderate compared to other structures, the substantially horizontal wind pressures and the pull of an entanglement can be brutal. As easy to understand the portal type resists such forces somewhat better than the type with a single column. The tower foundations have often cost more than expected, but can be cheapened decisively by using guys or tie rods. With the footings of the latter spread not more than the footings of the columns, the guys do not block valuable downhill playground. Naturally if you can spread their footings more the tower gains strength and such spreading is almost standard where the lift is located in a forest. I believe in relatively deep tower foundations, not shallow ones which topple over together with the tower structure. For at least twenty years I have discarded form-work at the tower foundations. Holes are dug or blasted into the ground and backfilled with concrete. Also the single column type can be improved with guys at both ends of the tower head. Back in 1942, for example, I designed a 6,000 foot long T-Bar lift for the Army Camp Hale, Colorado, with 21 such towers of wood and 84 guys. The lift is still in profitable operation.

Line Sheaves: I politely refer to my treatise entitled "About Chairlifts and Their Record" where this subject is discussed.

Terminals: Naturally what is operationally most convenient decides between bottom-drive, top-drive or combination drive-take-up. Nowadays unsheltered terminals are being preferred except in the

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deep snowbelt. Usually only a small booth is built located aside of the drive machinery booth, housing the electric controls. For T-Bar lifts I recommend a shallow pit accessible from the booth, pit housing the electric motor and the V-belt drive. A vertical transmission shaft emerges from the pit and reaches up to the spur gear at the elevated drive sheave of the lift.
Gear boxes I avoid wherever possible because their operational record on lifts is downright alarming: weeks of down-time, disappointment, even law suits, not to speak of foreign lift equipment. The types and sizes of gear boxes suitable for lifts of more than 75 hp have so narrow a market that generally speaking replacements are nowhere available from the shelf.
Where I cannot avoid a gear box I try hard to use a single stage unit, or at the worst a two stage unit, choose the most reliable make and insist on "shop-testing" before shipment. In the deep snowbelt I have built stilted drive terminals with the whole drive machinery in an elevated booth. In such case I refrain from motors or engines the rpm of which exceeds 1500 by fear of vibration. Loading the lift takes place at the first tower equipped with a raising and lowering device of the upgoing lift rope. This eliminates the nuisance of snow removal. Such rope adjustment you find on all towers of my lifts equipped with telescopic T-Bars. To raise or lower the rope (which is usually done two to three times only a season) takes only 1½ to 4½ minutes per tower.

Towing Outfits: Some few tow lifts had been built in Czechoslovakia in the early twenties of the century, while I started toying with the idea around 1931. The earlier attempts had been short-lived on account of, among other things, the "tow girdle" which the skier wrapped around his hips holding the ingenious lock closed with one hand. So far so good, but when he let go unintentionally he invariably grabbed the escaping girdle and wrapped it around his wrist. Now the tow pull came through his arm into the shoulder which is much too far for comfort above the center of gravity of the body. When therefore or for other reasons the skier fell he could all too often not disengage himself promptly enough. A series of accidents culminated in one where an arm was pulled out at the shoulder and the victim bled to death on the snow. My contribution consisted mainly in replacing the flexible girdle by the stiff J and T-Bar, and in recognition of the decisive though very simple difference I was granted valuable patents in this country and abroad. Equally important to me was that a tow lift transports people in one direction only and not back again. Therefore, in my old country of Switzerland, the tow lift was recognized exempt from the mandatory Federal building permit which was rather difficult and slow to get because the operators of the funiculars and cogwheels had a lobby in our Congress.
Fare per single ride prevailed at that time all over Europe and the profiles were relatively long and often staggered. 200 skiers per hour was terrific, 400 spectacular. During the ride the individual skiers were far apart from each other, all of which stimulated

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illicit free riding. Therefore, and for no other reason I had to keep the empty T-Bars out of reach except of course at the start. I developed the so-called spring box with a lifting stroke of 25 feet. The device featured a reel powered by an oversize clock-spring, a thin wire rope fastened at one end to the reel and at the other end to the T-Bar proper, and a centrifugal brake against all too vehement retraction of the abandoned T-Bars.

Generally speaking, my first lifts paid very well: fare per single ride moderates the demand for transportation of the skiers and thereby indirectly the initial investment of the operator who could satisfy the skiers with less powerful and accordingly cheaper equipment.

The rope tow was unknown in Europe and a great surprise to me when I came to America in 1940. It operated with day tickets and without "out-of-reach" protection. Under this inspiration I promptly trimmed by about 50% the height of my towers and developed telescopic T-Bars with a lifting stroke of only a few feet. The new much simpler towing device featured an internal helical spring for the jerk-free acceleration of the skiers at the start and for lift speeds up to 450 feet per minute, and just enough pneumatics to avoid self-destruction of the abandoned T-Bar, however not enough to tame the whole retraction. This type is now being copied by competitors.

In 1957 I developed the hydraulic telescopic T-Bar, featuring an external helical spring for jerk-free acceleration of the skiers at the start up to 550 feet per minute of lift speed and truly slow retraction all the way. As steadily perfected the latter T-Bars have now proven maintenance-free over three winter seasons and offer two distinct advantages. At the start the wooden seat of the device reaches the skier from behind below the seat of the pants in the correct position i.e. crosswise to the direction of hauling. This eliminates the manual loading help which before was quite costly wage-wise. At the finish the seat of the T-Bar does not stick to your pants, i.e. the slow retraction makes it much easier to abandon the T-Bar and of course eliminates the before not infrequent small accidents like broken teeth, broken eyeglasses and cut cheeks.