# Snow Fighting Methods

## On the Electrified Section of the Chicago, Milwaukee & St. Paul Railroad

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IN ELECTRIFYING a railroad through the Rocky Mountains, and more especially through the Cascade Mountains in the northern states, the weather conditions must be carefully considered, as the temperature sometimes stays around forty to fifty degrees below zero for days at a stretch. Seasonal snow falls of thirty to forty feet are recorded in places by the weather bureau. A snow storm of only a few inches on the level may drift to many feet deep in some places, and cuts are sometimes completely filled with snow within half an hour after they have been opened by the rotary snow plows. With steam locomotives, such weather conditions are at times very serious, resulting in temporary suspension of service, particularly freight, on account of the reduction of steaming capacity or the freezing up of the locomotives. The severe cold does not, of course, impair the operation of an electric locomotive, but is to some extent beneficial. It has, moreover, been found in actual operation on the Chicago, Milwaukee & St. Paul Railroad that the heavy snow falls do not interfere with the electric trains nearly as much as with the steam trains, and that clearing the tracks of snow is easier with electric locomotives than with the steam locomotives.

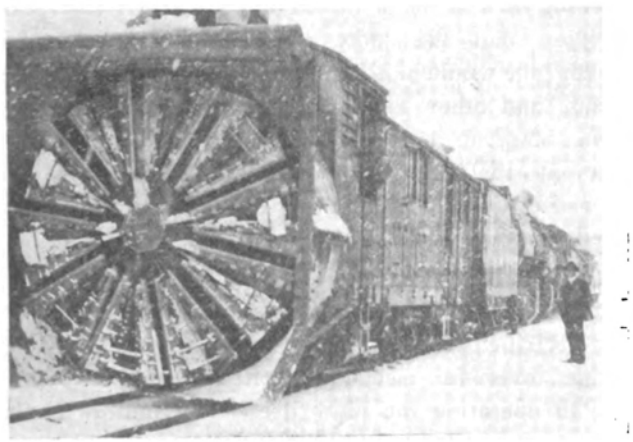

FIG. 1—ROTARY SNOW PLOW

A moderate depth of snow, say four to five feet, unless it is heavily packed, and even greater depths extending for only a short distance, can be removed most easily by means of the wedge type snow plow. The Chicago, Milwaukee & St. Paul Railroad have a number of double mold board Barr plows of this type which are placed ahead of loaded ballast cars and driven at high speed through the snow by two or three locomotives. These are usually able to take care of the snow situation in the Rocky Mountains, as the snow does not usually attain as great depth in this territory as in the coastal ranges. When fighting snow in this manner the entire crew are continually wet from the snow which is melted by the heat of the locomotives. The flying snow fills every part of the equipment, and the quantities of snow which are necessarily shoveled into the fire box with the coal makes steaming difficult. A considerable gang of laborers with snow shovels is usually carried for use in emergencies.

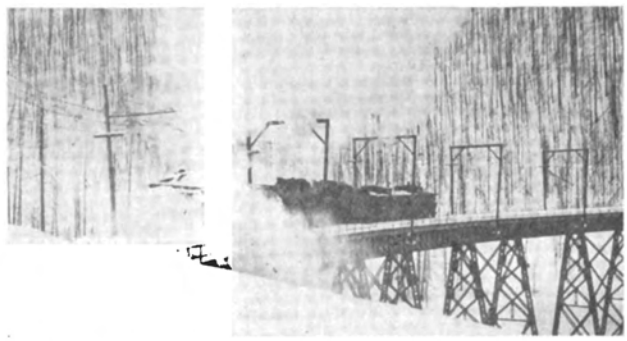

FIG. 2—ROTARY SNOW PLOW PUSHED BY STEAM LOCOMOTIVE

For deeper snows the Chicago, Milwaukee & St. Paul Railroad have six rotary snow plows, which are used mostly in the Bitter Root and Cascade Mountain ranges. As will be evident from Fig. 1 the rotary snow plow is pushed ahead of the locomotive, and acts as a large auger, boring its way through the snow banks. The rotary wheel is about 12 feet in diameter. It is faced with knives that cut into the snow which is thrown by centrifugal force out of the chute at the upper part of the wheel housing. The wheel can be driven in either direction in order to throw the snow to whichever side of the track is desired. The blades are tied together in pairs, and when the direction of rotation is reversed, the centrifugal action reverses the

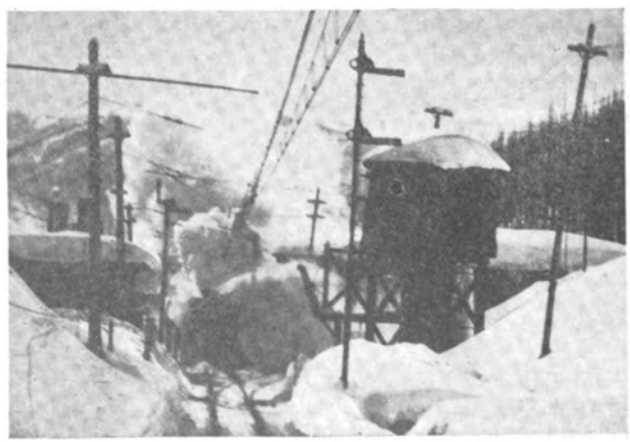

FIG. 3—ROTARY SNOW PLOW AT ROLAND, IDAHO IN THE BITTER ROOT MOUNTAINS

blades, so that they always cut in the direction of the rotation. They are strong enough to handle slides containing small tree stumps without sustaining any material damage.

The plow is equipped with a boiler and an engine which drives the rotary wheel. This engine and boiler are operated by an engineer and fireman in the cab of the snow plow.

The snow in the Bitter Root and Cascade Mountains often attains a depth of 15 to 20 feet in one snow storm, and there are times when these drifts are higher than the plow itself. The rotary plow can operate in drifts which are somewhat deeper than the plow itself, as the snow is thrown out with considerable force. When the snow is packed deeper than the rotaries can handle, short holes are bored into it with the rotary wheel, into which the tops or sides are broken by laborers.

The snow slides are the greatest enemy of the snow plow in the mountain district, as they cover the tracks to considerable depths; at times they catch a plow and bury it completely. Several times the entire crew have been caught in such slides, making it very difficult for them to dig their way out. In one case, one of the electric locomotives without a rotary plow attached, ran into a large drift and several visiting electrical engineers who were on the locomotive were entirely buried in the snow, which forced itself through the broken windows and filled the cab.

Prior to the electrification, as high as three or four steam freight locomotives were placed behind the rotary plow. Now the rotaries are handled by one electric locomotive and, inasmuch as each half of the present freight locomotives, when not coupled together, can be run as a separate unit, only one unit of the engine is sometimes employed, although in heavier drifts both units can be cut in, giving full power to push the snow plow. The tractive effort required to push the rotaries depends on the depth of the snow, and we have had no deep snows recently. Last winter we had no use for the rotaries at all.

The heavy snow falls do not interfere with the electrical operation over the mountain territory as much as they did with steam, since an electric engine will plow through snow where a steam engine will not go. The heavy snows have no bad effect on the overhead wiring. We are not subject to any heavy sleet storms in this section, but at times a very heavy frost collects on the two 4/0 copper trolley wires. With a pantagraph of the double shoe type, sliding on two trolleys whose hangers are spaced alternately, excellent current collection is obtained at all times and sleet and frost have not so far bothered us to any extent. Sometimes during heavy frosts, both pantagraphs are raised, the front one serving principally to clear the wires.

Experience indicates that snow fighting can be handled better with electrical equipment than with steam. The electrical equipment gives better speed control, as there is no difficulty in securing all the power desired and there is no opportunity for the freezing up of injector pipes, etc., on the locomotive, or the necessity of having to go back for water or fuel, except to meet the fuel and water demands of the rotary plow itself.

The only change necessary to adapt the rotary snow plow to use in the electrified territory was the attaching of a deflector on the upper part of the rotary hood, so that the snow and other material, when thrown out, would not come in contact with the power limiting and other wires. These are at such a height that a rotary, in its original condition, would throw the snow onto the wires and trouble was experienced from this cause when first operating the rotaries in the electrified section.

No doubt in the near future rotary snow plows will be built with electric motors instead of steam engines for electrified territory, and the old ones will be changed over for electric operation. The only draw back to operating the plow itself with motors is that quite often the rotary wheel will freeze, in which case it is necessary to have steam available to thaw it out. This could be overcome by using a small boiler similar to the ones which are now being used for heating the passenger trains.

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# Reminiscences of the Erie Electrification at Rochester

*To the Editor of The Electric Journal:*

Dear Sir:—The article on the Erie Railroad Electrification, published in the October number of The Electric Journal, is an excellent account of the pioneer single-phase steam railroad electrification in commercial service in the United States, and is naturally of especial interest to the present writer, because of his connection with it in the capacity of engineer-in-charge of the design and execution of the work which was carried out between September 1906, and June 1907, by the old engineering organization of Westinghouse, Church, Kerr & Company, which left its stamp upon so many large railway improvements throughout the country.

Mr. Hershey is not quite correct in stating that the New York, New Haven & Hartford, and the Boston & Maine single-phase electrifications were in successful operation at the time the Erie electrification was created. It is true that the former electrification had been in process of construction for a year or two and the engineering features of it naturally supplied some useful precedents in working out the details of the overhead construction on the Erie road, but the difference in the size of the jobs was so great that less than a year sufficed to do the preliminary engineering and installation for the Erie, and its successful and continuous commercial operation began on or about June 23, 1907, just about one week before regular