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Snow Fighting Equipment.

By W. H. Winterrowd, Chief Mechanical Engineer, Canadian Pacific Railway.

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Spreader Ploughs.—Figs. 17, 18 and 19 show what is commonly known as a snow spreader or dozer. The front of the car is V-shaped. A low V-shaped plough, with drop wings, is attached to the front. When these wings are dropped into working position they form a continuation of the plough mold plates. The simplest form of spreader consists of a flat car with wings attached to each side, the wings being operated from the floor of the car by means of levers. The

still further. This type of plough is frequently used for cleaning up yards. Some roads utilize their ballast spreaders for this purpose.

Machine Ploughs. — On roads which have to fight deep drifts, snow slides, or other conditions beyond the capacity of push ploughs, the rotary machine plough is used, and to date is the most effective instrument that has been developed for the purpose. These ploughs can work their way through deep cuts and slides where it would be impossible for any type of push plough to lift the snow and, in addition, can throw the snow

revolved without throwing any snow.

The next development was known as the Marshall plough, a full size working model of which was tried either on the Chicago, Milwaukee & St. Paul Rd. or the Chicago & North Western Rd., in the northwestern part of Iowa, in the latter part of the 70's. The wheel, which revolved on a shaft at right angles to the center line of the track, was a large wooden disc on which were fastened a number of radiating blades. This plough was also a failure.

Another attempt to construct a successful machine plough was known as



Fig. 31. Canadian Pacific Railway Rotary Snow Plough, built in 1911.

illustrations show a house car spreader. The drop wings are raised and lowered by air cylinders. The side wings are supported by jib cranes, hinged to the side of the car, and are held in working position by means of heavy bar braces. On some ploughs these braces are moved into working position by means of air cylinders. Some types of spreaders are equipped with drag wings hinged to the back corners, as shown in fig. 17. This type of spreader is used by some roads to widen cuts after a plain push plough has passed. When widening cuts these wings are in such position that they serve as snowbank cutters, and snow is carried in toward the center of the track, from which it can be thrown by either a wedge plough or a rotary. When equipped with drag wings these spreaders are often called cut wideners. The large side wings when extended to their full width have a total spread of approximately 30 ft. The snow is first cut by the V-shaped plough and, after it is thrown or pushed to one side, the long wings push it out

clear of the track. If the snow is much higher than the top of the casing it is only necessary to loosen it and throw it down in front of the plough in order to have it picked up and thrown clear of the track.

A rotary plough, invented in 1869 by J. W. Elliott, consisted of a wheel having four flat arms and which was supported on a horizontal shaft, rotating in line with the track. The wheel was enclosed in a casing, the front of which was shaped to collect the snow and the rear of which was shaped cylindrically.

The first machine plough built was known as the Hawley plough, and was exhibited at the Philadelphia Centennial Exhibition in 1876. The plough was equipped with a large vertical conveyor screw supported in a rectangular casing, the front of which was shaped to collect the snow. This plough was tested on what was then the Teeswater Division, Toronto, Grey & Bruce Ry., now a part of the C.P.R. This plough was an absolute failure, as the elevator screw

the Blake machine snow plough, and it embodied a rotary principle. It was tried on the Winona & St. Peter Division, Chicago & North Western Rd., in the early 80's, and was also an absolute failure.

A later attempt to develop a machine plough resulted in what was known as the Kryger steam snow shovel. In some ways this plough looked very much like a modern ditching machine. Buckets were placed on an endless conveyor and these buckets were supposed to pick up the snow and convey it up and back to a point where it could be automatically thrown clear of the track by a revolving wheel. This machine was built at the Minneapolis, St. Paul and Sault Ste. Marie Ry. Minneapolis shop, in 1889 or 1890, but was never tried in the snow.

The Cox machine snow plough, which was never built, was illustrated in several of the U.S. railway journals in the early 90's, and unsuccessful efforts were made to organize a company to build it.

Mr. Elliott was the original inventor of the rotary principle. His invention