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Snow Fighting Equipment.

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In certain portions of Canada and the United States the successful and regular movement of trains during the winter often depends upon the use of special equipment, the purpose of which is to remove snow and ice from the tracks and from the direct right of way. The object of this paper is to describe briefly the various types of such equipment. In a study of snow fighting equipment, it is interesting to note that its development is very largely due to Canadians and to Canadian railways, although snow conditions in Canada are no more severe than those met with on roads passing over the Rocky or Cascade Mountains in the United States.

The Russell design of snow plough was first put in service in 1885 on the Intercolonial Ry., now a part of the Canadian National Rys. The present rotary snow plough is a development of the invention of a compound revolving snow shovel, patented in 1869 by J. W. Elliott, a Toronto, Ont., dentist. This elementary device was modified by Mr. Orange Jull of Orangeville, Ont. The Jull rotary was taken up by the Leslie Bros., also of Orangeville, who built a full size model which was tried in the C.P.R. yards at Parkdale, Toronto, in 1884. The success of this trial led the Leslie Bros. to have made for them a complete plough which

was tried by the Union Pacific Rd. during the winter of 1886-87. This plough was the forerunner of the modern rotary. Orange Jull also invented, in 1889, the Jull centrifugal excavator. This type was not a success. Only one or two were built. The principal types of snow fighting equipment may be generally classified as follows: Locomotive and pilot ploughs, push ploughs, wing ploughs, spreader ploughs, machine ploughs, flangers, ice cutters and snow sweepers.

Locomotive and Pilot Ploughs.—As far as the writer can ascertain, the first snow plough ever built was of the push plough type. This was a wedge shaped wooden plough mounted on trucks and pushed in front of a locomotive. As this plough derailed frequently, an endeavor was made to take advantage of the weight of the locomotive. A plough was constructed utilizing the front end of the locomotive as a support. This was called a locomotive plough and fig. 1 shows an application made in 1880. This plough was made of steel. Locomotive ploughs are still in use today and their general arrangement has not been changed, except to adapt them to larger locomotives. The mold plates are generally built on a strong frame, which is bolted to the

front bumper in place of the pilot. On some of the original locomotive ploughs a framework fastened to the front of the pilot supported the nose of the mold plates. With the construction shown in the illustration it is usual to apply cast iron wearing shoes, which rest on and slide along the top of the rail if the weight and force of the snow cause a depression of the nose of the plough. Several railways have advised that occasionally locomotive ploughs are permanently secured to the front of a locomotive assigned only to plough service, thus making a complete unit available at any time. For severe work this locomotive may be assisted by others.

The pilot plough was developed for use in light snow. One form of pilot plough is made by either boarding over

sisting of a substantially built car, with a wedge shaped plough attached to its front end. This plough is generally pushed by one or more locomotives. The car may be fitted with flangers for cleaning the space between the rails. When the car is equipped with wings for widening the cut it is called a wing plough. Many railways use, for snow of moderate depth, a plough secured to the front end of a flat or ballast car, as shown in fig. 4, the car being loaded down with scrap iron or other heavy material. A more permanent construction is shown in fig. 6, where the mold plates are attached to the front end of a specially constructed car. This figure shows a plain, square nosed, single track plough without wings or flangers. The side walls are carried down over the trucks to prevent snow from working into them.

Push ploughs were frequently built V-shaped, simply throwing the snow to each side, without lifting it appreciably. These ploughs did not always prove satisfactory, as the snow was crowded aside, and if drifts were deep or in cuts it fell back on the track after the plough had passed. In hard drifts this plough packed the snow. In heavy side drifts, the form of the plough tended to derailment. Also, when backing, unless shields were supplied, snow was picked up on the back

of the mold plates and carried into the trucks. The square-nosed plough, fig. 5, was developed to overcome these objections. The front of this plough consists of two wedges. The main, or bottom wedge (a), with its cutting edge horizontally across the track, is a plane inclined upward and backward. Its purpose is to lift the snow. The upper, or vertical superimposed wedge (b) is set some distance back from the front edge and is either V-shaped for single track operation, fig. 6, or triangular for double track operation, fig. 7. The upper wedge throws clear of the track the snow which has been lifted by the bottom wedge. On single track ploughs the vertical wedge is placed centrally and snow is thrown to both sides of the track. On double track ploughs the vertical cutting edge is placed at the side of the plough so that all the snow is thrown to one side.

The advantages of the square nosed plough are obvious. The snow is lifted and thrown without being packed, and with greatly reduced side thrust to the plough. Many modern ploughs of this type have an additional feature known as the drop nose. This consists of a plate hinged to the front of the bottom, or lifting, plane in such manner that it

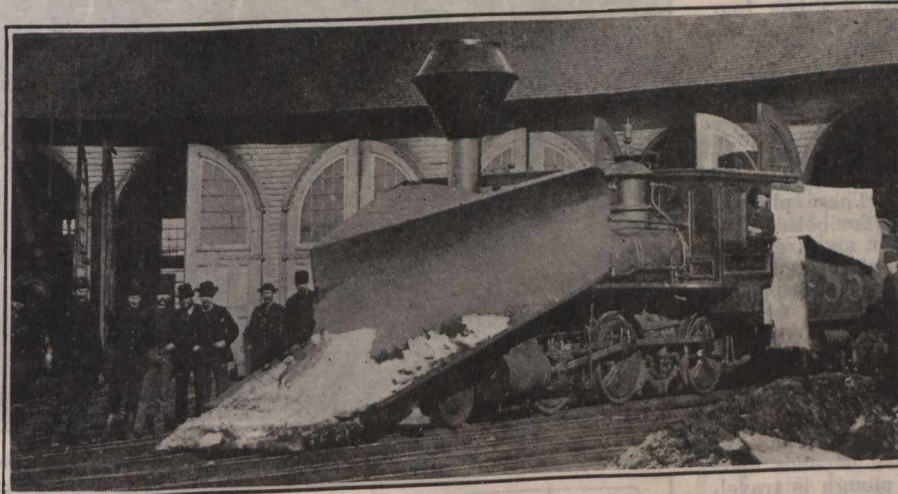


Fig. 1. One of the first locomotive snow ploughs.

the front of the pilot or filling between the slats with wood, thus converting an ordinary pilot into a makeshift snow plough. This arrangement has not always proved satisfactory, as the construction of pilots is not always sufficiently substantial to resist the strains imposed when ploughing. The pilot ploughs usually constructed consist of mold boards of steel plate securely fastened in front of and over the pilot, and braced to the front bumper and smoke box. These ploughs vary in size and shape. An early plough of such type is shown in fig. 2.

In moderate snows which do not pack hard or drift, and where the railway is free from deep cuts, and train operation is fairly frequent, locomotive and pilot ploughs are of great assistance in maintaining an open line. They are used on both freight and passenger locomotives.

Some types of modern pilot ploughs are shown in diagrammatic form in fig. 3. To obtain the greatest efficiency the angle formed by the mold plates should be fairly acute so that snow will slide aside instead of being pushed along in front of the plough.

Push Ploughs and Wing Ploughs.—A push plough is a self contained unit, con-