man of the rotary to increase the speed of the wheel. In case the pusher engine still crowds the rotary, the pilot should apply the air brakes to check the pusher. apply the air brakes to check the pusher. If the pusher cannot be checked with the brakes, the pilot should signal the loco-motive man of the pusher to shut off. He should respond quickly to prevent stalling the rotary. In case the rotary is stalled the flangers are raised and the plough drawn back four or five feet from the cut the cut.

the cut. When again ready, the wheel is start-ed and pushed into the cut. The rotary plough should never be pushed into the bank from a distance of more than 4 or 5 feet, as failure of the rotary will re-sult. If the wheel of the rotary becomes blocked with snow the plough should be stopped and back up a few feet. The snow can then be loosened between the

the style shown in fig. 62. The horizontal slats which are attached to the top ex-tension of the back braces tend to throw drifting snow backward and to cause it to pile upon the outer side of the fence. Some roads use a portable fence, the al-ternating panels of which form an A design.

Permanent fences may be of any recognized type, but are usually of boards placed close together, although in some cases stone fences have been used. The writer has been advised that metal lath or metal fences have proved satisfactory under some conditions.

Trees.—One of the Canadian roads uses spruce hedges and finds this a very satisfactory method of forming a snow barrier. The distance at which trees or hedges are spaced or planted from the track depends entirely upon local condi-





FLAMGED STEEL SHOE APPLIED TO SPREADER Fig. 57. Ice Cutter, Canadian Pacific Railway.

casing and the scoops, after which the wheel will clear itself. Rotary ploughs should not be forced through snow deep-er than the hood. When the snow is er than the hood. When the snow is deeper than the hood the top bank should be shoveled off. In slides or ice forma-tions the top of the obstruction is frequently loosened by blasting. The successful operation of the rotary

depends greatly upon the manner in which it is handled, and it is highly essential that the men on both the rotary and the pusher engines should be experienced men.

Preventative Measures. — At points where it is known that snow will drift it is usual to construct snow fences; these may be either temporary or per-manent. The usual temporary snow fence is about 7 ft. high, frequently of

tions. On the C.P.R., tree planting has been done in selected localities, species native to the locality being used. Along the north shore of Lake Superior jack pine and spruce are utilized. In Quebec spruce and balsam and some cedar are used. The trees, when planted, are gen-erally not over 30 in. high. The practice of using hedges and trees for this pur-pose is quite general in Europe. When properly planted, hedges and trees not only give snow protection but enhance the appearance of the right of way. Snow Sheds.—On roads passing through

mountain territory where slides are frequent, snow sheds are generally used for protection. Snow sheds are of various types and built to suit local conditions. The level fall type is of box-like section and used simply to protect the road from

falling or drifting snow. The valley type shed is generally placed against an em-bankment in such a way that a slide will pass over the roof of the shed without falling on or damaging the track. The sheds are ordinarily braced with crib-work backed with earth or gravel. Sev-eral years ago at Rock River, the Union Pacific Rd. constructed a very interesting permanent snow shed of concrete sections fitted together. This shed covered a track which had in previous years given a very great deal of trouble on account of deep drifting snow.

The question of preventative measures a very large one. The writer has not felt it within the scope of this description to more than make reference to the best known methods.

Conclusion .-- In conclusion the writer wishes to acknowledge his very great indebtedness to J. S. Leslie, one of the Leslie Brothers, whose ingenuity and untiring efforts have made possible the operation of our railways under severe winter conditions. His assistance and collection of data and photographs were placed at the disposal of the writer and made it possible to complete the his-torical review of the subject. The writer also wishes to acknowledge his indebtedness to the various railway and manufacturing companies, particularly Q & C Co., and the American Locomotive Co., for information placed at his disposal. Acknowledgment is also made to H. H. Vaughan for much valuable information. Additional illustrations are shown on pages 587 and 588.

American Railway Association's Mechanical Committees.

As stated previously in Canadian Railway and Marine World, the officers of the American Railway Association, Section 3, Mechanical, for the current year are W. J. Tollerton (Chairman), General Mechanical Superintendent, Chicago, Mechanical Superintendent, Chicago, Rock Island & Pacific Ry., Chicago; J. Coleman (Vice Chairman), Assistant to General Superintendent, Motive Power, and Car Department, G.T.R., Montreal; V. R. Hawthorne, Chicago, being Secretary. At a recent meeting of the general committee, committees were appointed to serve until June, 1921. Following is a list of the committees, with the names of their chairmen, and also names of officials of Canadian railways, allied lines, etc., who are members of the committees.

lines, etc., who are members of the committees.
General Committee.—W. J. Tollerton (Chairman), General Mechanical Superintendent, Chicago, Rock Island & Pacific Ry., Chicago; J. Coleman (Vice Chairman), Assistant to General Superintendent, Motive Power and Car Department, G.T.R., Montreal; W.H. Winterrowd, Chief Mechanical Engineer, C.P.R., Montreal. Nominating.—F. W. Brazier (Chairman), Assistant to General Superintendent, Rolling Stock, New York Central Rd., New York.
Arbitration.—T. H. Goodnow (Chairman), Superintendent, Car Department, Chicago & Northwestern Ry., Chicago, Illinois; J. Coleman, Assistant to General Superintendent, Car Department, Chicago & Northwestern Ry., Chicago, Illinois; J. Coleman, Assistant to General Superintendent, Motive Power and Car Department, G.T.R., Montreal, Que.
Prices for Labor and Material.—A. E. Calkins (Chairman), Superintendent, Buerintendent, Packar, Cartural Rd.

Prices for Labor and Material.—A. E. Calkins (Chairman), Superintendent, Rolling Stock, New York Central Rd., New York; I. N. Clark, Master Car Build-er, G.T.R., London, Ont. Arrangements. — W. J. Tollerton, (Chairman), General Mechanical Super-intendent, Chicago, Rock Island & Paci-fic Ry., Chicago; J. Coleman, Assistant