

highway system of the world. It will mean the passing of the "mud" and rough road tax and, if the poet's version of the Bible is correct, will insure our eternal bliss, although it will kill the inspiration that caused him to sing his "Epigram on Rough Roads":

I'm now arrived—thanks to the gods,
 Through pathways rough and muddy,
 A certain sign that makin' roads
 Is no' these people's study;
 Although I'm not wi' scripture cram'd,
 I'm sure the Bible says
 That heedless sinners shall be dam'd,
 Unless they mend their *ways*.

SNOW REMOVAL ON COUNTY ROADS

By W. M. Tonkel,
 Allen County Highway Superintendent.

Years ago, before many roads were paved and before automobile and truck traffic, we hoped that snow would fall on our roads and fill the ruts, that had been cut during periods of thawing, and smooth the road over so that the old fashioned bob-sled and cutter could be used.

However, changes come with time and now it is very important that snow be removed from the road as quickly as possible. There are not many bob-sleds and cutters any more but in their place we have the large freight trucks and passenger automobiles that must have a clear right of way to their destination.

There are various problems to the removal of snow and one of the most serious, in my opinion, is the snow drift. To solve this problem it is necessary to study the experiences of preceding winters. For instance, snow drifts deeper in some places than it does in others. There is a reason for this variation and it is necessary to locate the cause of this condition so that preventative methods can be applied.

A snow drift will usually form where the wind is checked by some obstruction. The snow is deeper in drifts for the same reason that sand bars are formed in streams where the water current is not strong enough to carry the sand and silt, thus permitting it to settle to the bottom.

We usually find snow drifts more frequent on our north and south roads. This is due to the prevailing direction of our winds which are generally from the west, together with the fact that obstructions such as fences, hedges, etc., are usually found paralleling the road. Therefore, an obstruction on the west side of the road is much more objectionable than one

on the east side. Hills or high banks are often the cause of snow drifts.

The removing of obstructions which cause drifts involves such procedure as having low trees trimmed some distance from the ground and securing the farmers' consent to remove drift-forming fences. In justice to the farmer we cannot always tear down fences he has built at these particular points. However, the seriousness of the case will frequently justify the removal of certain objectionable types of fence and a wire fence built instead.

A board, picket or hedge fence should not be closer to the center of the highway than one hundred feet. This will give plenty of room in most cases for snow to settle before it reaches the highway. Weeds and brush on road shoulders or the outer edge of the right of way should be kept cut and trimmed. The higher the road bed the less trouble from drifting snow. Hence, in designing a road a great deal of consideration should be given this feature. During construction a road may be elevated at points where drifts are likely to form.

Of course we will not always be able to remove a hill which happens to be the cause of snow drifts. There is one way to prevent such drifts in this case and that is the erection of snow fences or gates as some call them. In some cases it is advisable to erect a stationary snow fence, but in other cases it would be an injustice to the farmer to take up certain parts of his land for this purpose thus interfering with the best use of the land.

In such cases I would suggest a portable fence. A picket fence with pickets placed close together may be temporarily constructed for this purpose and can readily be removed, for it can be detached from its posts, rolled up and laid away until the next winter.

There are various methods of removing snow from the road. The use of a snow plow pulled by horses or tractors or attaching same to the front end of motor trucks is quite satisfactory. My suggestion on this would be to start the plow down the center of the road and open up a traffic lane at once and then return and throw the snow from the sides as far over into the ditch as possible.

An ordinary grader is an excellent machine for scraping snow from the highway. Iron shoes should be placed under the blade to prevent gouging into the pavement or catching some slight projection, as it is not easily shifted sidewise when under heavy load.

A V-shaped plow can be used where the depth of snow is too great for use of a road grader. It will of course be necessary to use enough horse power to pull both the grader and the plow through the deep snow. A snow plow attached to

the front end of a motor is used to considerable extent but it cannot be made to operate in very deep snow or drifts as in the case of the horse drawn road grader. There is also the power driven rotary sweeper, similar to that used by electric railways to clean their tracks.

It is my experience that there is nothing at the present time that can deal with the 5 or 6 ft. snow drift excepting some kind of snow plow moved by a caterpillar tractor. My suggestion of course at all times is to clear the road from berm to berm of any snow on the surface, because it is quite dangerous for traffic to continue in one track and in most cases where the approaching vehicles turn out in passing they are liable to skid causing the drivers to lose control. Throwing snow completely over into the ditch is another important feature because when this snow melts it is less apt to damage the berm.

It has been our experience that the expense of snow removal in Allen county by use of the old methods of hand labor was excessive as compared to the cost at the present time using mechanical equipment. I would estimate that in 1918 we paid approximately \$15,000 for the removal of snow, but by the use of preventative methods, as well as the result of procuring suitable machinery for this purpose, we have been able to reduce this figure to not more than \$2,000 per season. The one thing that is most essential is the use of preventative methods.

MAINTENANCE METHODS ON CITY PAVEMENTS

By C. J. Allardt,
City Street Commissioner, South Bend.

South Bend has 158 miles of paved streets as follows: 54 miles of brick, 58 miles of sheet asphalt, 30 miles of asphaltic concrete, 5 miles of macadam and 16 miles of Portland cement concrete.

Most of our brick streets are old and were laid at a time when sand and gravel were used as a base. It is almost impossible to keep these streets in a serviceable condition. The repairs which we make in cases of both natural settlement and cuts do not last in a satisfactory manner. Where a brick pavement requires repairs we have had good success in re-surfacing with asphalt, although the patched surface is not pleasing to the eye.

In repaving small holes on asphalt pavements we have been quite successful in using Amiesite. This contains 95% of