ing." The other is the lack of doing the needful shimming around frogs, crossings, etc., where the frost is retained a longer period. Some foremen neglect this important matter with the expectation that the frost will disappear in a day or two, when in many cases it remains for weeks. As soon as shims "show high" they should be reduced or removed, as the circumstances demand, and the material used elsewhere, such as around public crossings and frogs, as mentioned above.

Where track heaves badly, such as in cuttings, the section foremen should examine it frequently by walking over it and sounding the ties, as the frost is liable to drop out suddenly, leaving a serious defect which is not noticeable on the surface of the rail. Such track as this cannot be inspected properly on a hand car.

All switch ties should now be filled up to insure a uniform departure of the frost and to prevent them getting slack.

One of the most important matters is a daily patrol of the entire section by a competent trackman. This is especially so during stormy weather. It is his duty to keep a sharp lookout for a spread track, broken rails, etc. A very important matter and one that must not be lost sight of by foremen and supervisors of track, is the accumulation of ice in rock cuttings, side hills, around cliffs, or at any other points where the track is liable to be flooded during soft and rainy weather.

Paper by W. M. Jocklin, Track Inspector, C.N.R., Port Arthur, Ont.

Inspection of Track .- There should be a well organized system of inspection on The entire section should every railway. be patrolled every day, and in severe, cold weather it is a good plan to patrol track oftener, especially where traffic is heavy. Inspections should be made in the morning where only one is made; if two inspections are made, one should be in the morning, and one in the evening. The inspections should be made in full daylight. If this work is performed early in the morning and late in the evening during the winter, it is not light enough to enable the section force to detect defects in the track; even broken rails and spread track may be overlooked in this way. The work of inspect-ing track should not be entrusted to laborers, except in ordinary weather, and then not to any great extent. When making inspection trips with a handcar, all tools for making track repairs should be carried. There should be the necessary danger and cautionary signals on hand cars at all times. When patrolling track on foot, the track walker should always carry a track wrench, spike maul, four torpedoes, and two red flags. In bad snow storms, heavy fogs, and at night, a red light should be carried in addition to the above signals. The section foreman should ride over his section at least once a week, on a locomotive, noting carefully bad spots in track, which will be readily felt while on the loco motive. He should then examine the track carefully where rough spots were observed, and get these places repaired as soon as possible. If this is properly done, it will greatly improve the riding of the track.

Preparing Right of Way for Winter.— Right of way through timbered sections should have the brush cleared each autumn for a distance of at least 12 ft. from rail, and every second year the entire right of way should be brushed. If this is done during August or September, and burnt as soon as sufficiently dry, it will be but a matter of a few years until the brush and undergrowth will be entirely killed out.

Vegetation should not be allowed to stand along the track during the winter, as it will cause snow to drift in on the track, and a great deal of unnecessary trouble and expense.

Right of way on open prairie sections should have the grass cut each autumn, for a distance of 10 ft. from the rail and a strip about 8 or 10 ft. wide should be cut along the extreme outer edge of the right of way. If this is done and burnt as soon as sufficiently dry, the remainder of the right of way may be burnt with a great deal less danger of fire.

Preparing Track Switches and Roadbed for winter .--- To get the best results from track during the winter it should be gone over in the autumn, and any inequalities as small as a fourth of an inch must be taken out and all ties brought up to the rail, so as to give the rails an even bearing on all ties, and put the track in perfect line. All damaged rails should be changed out, worn frogs and switch points renewed, and all bolts properly tightened. The gauge of track must be looked after very closely, so as to make sure that there is no spread track whatever at the beginning of winter. All spikes should be driven down, so as to hold the rail firm to the ties. This will greatly lessen the guttering of ties, it is also a good preventive of spread track, as it will have a tendency to keep snow from getting between the base of rail and tie.

The ditches in cuts should be examined closely, to see that nothing has accumulated in them that would in any way block the flow of water in the spring when the snow is melting. The ends of culverts, where there is not a continuous flow of water, should be boarded up and a long stick driven down at each end, so as to enable the section men to find them at the first signs of a thaw in the spring, when the boards should be removed and the snow cleared from the ends, so as to allow a free passage for the water. I have found it a very good plan to open up ditches in cuts, especially those that have a considerable amount of snow in them.

In the autumn, before the ground is frozen, all track signs should be straightened and put in proper shape, making sure that all bridges, road and farm crossings and switches are protected by flanger signs. Ballast must be removed from between ties on turnouts just underneath switch points, guard rails and frogs, to a depth of at least 4 ins. If this is done, the switches can be cleared of snow and ice at a great deal less trouble and expense. An old shovel and broom, hung to a post set near the switch stand, will be very handy for train crews wishing to use the switch dur-Interlocking plants ing snow storms. thoroughly cleaned out should be as to dirt, which may have accumulated from any All debris and vegetation which cause. may have accumulated underneath pipe lines for interlocking plants, must be thoroughly cleaned out to a depth of 6 ins., so there will be no possible chance for snow to drift around the plant.

A small amount of salt may be used in switch points, frogs and guard rails to good advantage in severe weather and when there are frequent snow storms, but in no case should it be used on interlocking plants. If it is used on detector bars, pipe lines, and locks of the plant, it will rust them and shorten the life of the plant.

Shimming of Track.—There is no work connected with track repairs requiring more care and judgment than shimming. All mud ballasted track, and even track properly ballasted with gravel, will heave in spots from the action of the frost, and heaving spoils the surface of the track. Inequalities as small as a fourth of an inch should be corrected by shimming the track. Shims should be made of hardwood, and those of half an inch thick and over must have 'holes bored to receive the spikes. The practice of placing shims, larger than half an inch thick, angling on tie, should not be allowed. All spikes should be drawn, holes plugged and ties edged off to a smooth and even surface, before placing the shim. It should then be placed underneath the base of rail, parallel with tie, and securely spiked.

Where shims exceed an inch thick, shimming spikes, 7 or 8 ins. long should be used. For 4 in. shims, a 3 in. plank and a 1 in. shim should be used, and for a 5 in. shim, 5 by 8 in. timber should be used. Wherever planks are used for shims, they must extend under both rails and be secured to tie with shim spikes. All shimmed track-must be well braced, this is best taken care of by using a shim about 11/2 in. thick, placing one end against the rail and spiking the other end to the tie. These braces the other end to the tie. These braces should be used on every third tie, and under no circumstances should shims an inch thick be used on curves, without spread ties or rods being used to protect the gauge of the track. All shimmed track must be closely watched, especially high shimming. The snow should be cleaned away from the spikes on shimmed track at least once each week, and oftener if track is still heaving, in order to see that track is not spreading, that all braces are in proper shape, and that shims are not broken or crushed un-derneath the rail. If this rule is rigidly enforced, derailments caused by spread track and broken rails will be prevented. Too much care cannot be given to shimmed Where high shims have been used. track. it will be found necessary in the spring to replace them with smaller shims, as the frost leaves the ground (this is commonly called reducing shims), and this process will have to be followed up from time to time until the track has so settled as to make it possible to remove all shims. After shims have all been taken out, it is a good plan to take them to the car house, unless there is a very large amount of them, in which case they should be piled in neat piles at the emergency rail rests.

The heaving of track may be greatly lessened by having good drainage in cuts. The ditches in cuts should be so constructed as to carry the water off as fast as possible. Water should not be allowed to stand in cuts and along track, as it will soak into the roadbed, and not only make rough track, during the summer, but will cause it to heave a great deal worse during the winter. Poor drainage is the cause of a great deal of rough track, during both winter and summer. Another good remedy for bad heaving spots is to remove the clay from underneath the track to a depth of at least 4 or 5 ft. and fill in with good clean gravel. This work can be done by the section force and in no way endangers the safety of track. The best method of doing this is to have the gravel unloaded at the site where it is intended to be used, using one side of track for this, and the other side for the waste material that is taken from under the track. Both ends of the spot can be worked at the same time. After having placed a slow order on track, and putting out the proper cautionary signals, remove two or three ties from track and use them as a stringer running parallel with the track, bedding them in, so as not to disturb the surface of the Then proceed to remove the clay track. from under the track, taking a strip about 4 or 5 ft. long and the width of track. When this spot is dug out, fill in with gravel, take out the ties that were used as stringers,

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