Canadian Railway and Marine World

August, 1917.

Train Line Maintenance.

By A. McCowan, Supervisor Car Works, Canadian Northern Railway, Winnipeg.

The report of the Interstate Commerce Commission's Division of Safety for the year ended June 30, 1916, stated that there were 908,566 freight cars inspected, of which 3.72% were found defective; and 27,220 passenger cars, of which 1.82% were found defective. The defects which were found by the inspectors were given in detail in tabular form. Those directly chargeable to the air brake numbered 18,696, which was far above those chargeable to any other part of the car, the next nearest being couplers and parts. The number of defects per thousand cars inspected was 45.06. Of this number 20.58 defects per thousand cars inspected were chargeable to visible parts of air brakes; the next nearest percentage being couplers and parts, 6.09. The remaining 18.39 was chargeable to hand brakes, ladders, steps, hand holds, height of couplers, uncoupling mechanism and running boards as follows: Uncoupling mechanism, 4.17; hand holds, 5.; height of couplers, 1.08; steps, 0.62; ladders, 0.77; running boards, 2.20; hand brakes, 4.55.

We see from this the great relative importance of better train line maintenance. I believe it is possible to cut this percentage down materially by better maintenance of the train line. What are some of the most frequent defects in the train line? I believe they are defective hose and loose and broken train pipes at the hose connection. This percentage shown on visible parts of the air brake does not bring out the actual state of defective train lines, because we, of necessity, have to watch this matter closely and replace most defective hose or broken train pipes immediately. They, therefore, could not be discovered by Interstate Commerce Commission inspectors. In attacking the problem, therefore, we should not only attempt to cut down the percentage of cars which the commission finds defective because of the air brake, but decrease the material and labor in all repairs and renewals. I have gone into the life of the air hose with the idea in mind that there is a chance of decreasing very materially the number of hose necessary for renewals, and thereby the cost of renewals. The general opinion seems to be that the average life of hose is about eight months for air hose and one season for steam hose. I am of that opinion in regard to air hose, but in Western Canada we find the average life of steam hose is a little over four months. This, however, may be looked upon as a season in certain parts of the United States, but could not be considered such in the north.

A railway periodical stated in 1912 that the average life of hose, a couple of years previously, was only eight months, and that at that time the life of hose was probably less because the quality of hose was lower, and that the railways bought poor hose because mechanical destruction killed it in a few months anyway, whether it was good or bad. It is the opinion of people familiar with the hose question that a hose should last years if not subjected to mechanical injury. Since it seems that the average life is only eight months, there is then a chance for increasing the life of hose 20 months; in other words, making it last 4½ times as long. Let us see what this means in dollars and cents.

In the United States there were in 1915 in service 2,370,532 freight cars, 55,810 passenger cars, and 98,752 company service cars—a total of 2,525,094; and 66,229 locomotives. This means that there were in use 4,741,064 hose on freight cars; 111,620 on passenger cars; 197,504 on company service cars, and 66,229 on locomotives, or a total of 5,116,417 hose. This does not include hose on front ends of locomotives or between engines and tenders. The renewals of these 5,116,417 hose, with a life of eight months, would be at the rate of 7,674,626 a year; while if the life were three years, they would be at the rate of only 1,705,472 a year. This is a saving at which we should aim in the use of materials only. There are many other things which, in the aggregate, probably represent an even larger amount of money, viz., the labor of applying and taking off, the cost chargeable to train delays caused by hose or train pipes bursting in transit, capital account tied up in material, etc. Hose which costs from 30c to 60c or more a foot, if the life of the hose can be increased from eight months to 36 months, will make a saving in renewals of 5,969,154 air hose a year, which, at 55c each for 22 in. hose, would be $3,293,000.

It is claimed that loose or broken train pipes are even more prevalent than defects in hose, and this is borne out by the table of statistics. The train line often breaks just back of the angle cock, when cars are pulled apart. Mr. Kroft stated before the Car Foremen's Association in 1908 that it was his opinion that there were 20 breaks in the train line to one in the air hose when cars were pulled apart without uncoupling hose. What causes all these defects in the train pipe? And decreases so greatly the life of the hose? An inspection of the scrapped hose pile will show very plainly that most of the defects in hose are at the nipple end. This is where the great majority of hose fails. The train pipe breaks just back of the angle cock, or at least that is where most of the breaks occur. These facts point plainly to the jerking apart of the cars, while hose are coupled, as being the main cause. When cars are pulled apart, the hose bends at the nipple end. The fact that the bend is there and that that is the place where the great majority of defects in hose develops, proves conclusively that the short life of hose is mainly chargeable to pulling the cars apart. I do not mean to say, however, that pulling the cars apart is entirely responsible for defects at the nipple end. When a hose is not coupled up and a car is switched around the yard, the hose swings constantly and all the strain comes on the nipple end. The strain on the hose when cars are pulled apart without uncoupling, with train line fully charged, is said to be 500 lb. This not only causes rupture of the hose at the nipple end, but it stretches the hose and weakens the fabric throughout the entire length. This stretching is responsible for more hose failures than bending at the angle cock. The porosity of the hose is often charged up to poor material, when, as a matter of fact, it is really caused by jerking apart. In a test of 22,000 pieces of air hose described in a railway periodical, 82% were found to be porous. and the porosity was not localized but extended all along the hose.

We are accustomed to assume that tonnage reduction in winter is necessary because of slippery rails, greater radiation of heat, and therefore less heat applied to the work of heating the boiler, poor lubrication, etc. Investigations of one road have shown that a great deal of this tonnage reduction is necessitated because of leaks in the air line—the impossibility of providing enough air to operate the brakes on long trains. This subject of leakage is a very important one, not only for its effect on the tonnage that may be hauled and amount of fuel consumed, but also because of its effect on the operation of the compressor pump and delays which are caused by air sticking. Leaks may be classified under the following heads: 1. Leaks of hose coupler proper. 2. Leaks in the hose itself. 3. Leaks where the hose connects with the coupler. 4. Leaks where the hose couples to train pipe. Leaks in the coupler proper are usually chargeable to the wear of the materials and gaskets, or to the coupling being poorly made by the brakemen or carmen. Leakage is also caused by snow, frost and ice. Further, when air hose freezes it often becomes so stiff that it will not bend at all. This causes the joint between the two hose to leak whenever there is any movement between the couplings, and also causes leaks at the joints at the angle cock where the hose is often pulled loose. In a report to the M.C.B. Association in 1915, F. W. Brazier, of the New York Central, said that "with a 100-car train, the leakage should be kept down to 2 lb. or less. Keeping the leakage down to a minimum saves fuel, air hose, the compressor and the boiler." He also said that it requires 1 lb. of coal and 7 lb. of water to compress 35 lb. of free air in the compressor. A 100-car train requires 180 cu. ft., and with a 4 lb. a minute leakage (which is not unusual) the compressor has to pump 40 cu. ft. a minute additional. This is equal to 2,880 cu. ft. an hour, which requires burning 82 lb. of coal an hour and using 574 lb. of water. A leakage of 5 or 6 lb. is not uncommon, and a conservative estimate of the coal consumed is 860 to 1,720 lb. On many trains the leakage in five minutes is equal to the air necessary to make a full service application.