INCREASED BRAKING POWER FOR FREIGHT CARS.*

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Ever since continuous power brakes have been employed to control the motion of freight trains, the amount of braking power that should be used has been much a matter of individual opinion. It has been the custom since 1887, the date of the famous Burlington brake trials, to make the braking power equal 70% of the light weight of the car, using a cylinder pressure of 50 pounds per sq. in. from which to base the calculation.

To be able to control a freight train, wholly equipped with continuous power brakes, which could be operated easily from the locomotive, even when the maximum power capable of development by the brakes was only 70% of the light weight of the car, was such a vast improvement over what had hitherto been possible of accomplishment in the way of control with the hand brakes by even the most active crew of brakemen, that we need not be surprised that no energetic demand on the part of the railways has ever been made since, for increasing that percentage. But the conditions existing at present have brought the freight equipment to a point where some change in the percentage of braking power should be made.

I should consider that a braking power of 35% of the loaded weight of a freight car, based on a cylinder pressure of 50 lbs. would constitute an adequate power, and anything less than this inadequate. I consider this braking power adequate because, with the simplest type of automatic air brake apparatus, I should be able to take a loaded train down our longest and steepest grades in safety and (with few exceptions) without the use of pressure retainers.

Up to comparatively recent years the chief consideration for the limitations on the percentage of brake power that should be employed on freight cars has been that of the supposed danger to the wheels from sliding flat, rates of retardation in different parts of the train and the shocks resulting therefrom not being considered, probably for the reason that with the shorter trains the effects of these were not so pronounced and therefore not so likely to be noticed as they are to-day in our much longer trains.

Few who are familiar with this phase of the question now believe the wheels are in any danger from sliding flat, due to the braking pressure alone, however much may be applied to them, if all the wheels in the train are impressed with the proper amount of shoe pressure. Pressure alone cannot cause them to slide flat, but numerous other conditions which tend to produce wheel sliding must be present and active to cause them to slide while being acted upon by the brakes. Again, the length of the flat spot produced on the sliding wheel is in turn dependent on the weight that the wheel is carrying at the time, the condition of the rail (whether wet, dry or sandy), and somewhat on the kind of metal in the wheel, as well as largely on the inequality of distribution of braking power in the whole train.

Therefore, I do not anticipate any very decided opposition to my plea for an increase in the percentage of braking power now generally employed on freight cars to something quite beyond what some of us may deem practical, on the ground of any fear of what may happen to the wheels. But to my mind the objections that will be raised will come from a serious consideration of what effect a braking power of 120% of the light weight of each car (about 35% loaded weight) would have in a train of 100 or more cars, all braking at this percentage, when they were wholly loaded or wholly unloaded, part loads and part empties, whether running at 10 or at 40 m.p.h., with either a service or an emergency application.

When brakes are applied on a long train, whether in service or in emergency, some shock of more or less severity as a general thing results on the rear. Even when no brakes are applied and a very long train is drifting into a curve, the resistance produced by the curve on the forward portion of the train is sufficient to cause well pronounced shocks at the rear; it may be light, as it sometimes is, or it may be extremely severe.

Now, whether the shock be light or heavy, our long trains are subject to another danger coming from what we term the "internal pressure" which acts during the progress of an application of the brakes either in a service or in an emergency, and which becomes sometimes great enough to cause the train to buckle and force cars upon which the enormous pressure acts to move out sideways from the track.

The buckling of our long trains is a serious matter, even now while we are using only 70% braking power, although as equipment of steel construction increases this danger diminishes. But any change that we are to consider, either in braking power employed or method of handling the brakes, must be with a view always to lessening the chance for damage in effecting stops. In short, it should be possible for the brakes to apply from any cause, either in service or in emergency, without danger of heavy shock or damage.

Even with the automatic coupler there yet remains considerable slack in our long trains that makes itself felt more or less strenuously whenever the brakes are applied in emergency, so that, while we desire to give full credit to the air brake for all that it does, yet it is only fair to the coupler to give it credit for making possible the degree of success thus far attained by the air brake in operating without destructive shocks. But the amount of slack is yet so great that it must be considered in connection with any scheme of braking that may be proposed.

How are we to increase our braking power without at the same time increasing the danger of shock under all conditions of train make-up? To answer this question fully would require considerable space, but we may say that with every considerable increase made in the percentage of brake power employed we immediately reduce the probable number of emergency applications that will be required, and this in itself is a very great gain.

The consideration of the lessening of the time to complete a stop where the higher braking power is employed will, I am sure, lead to the conclusion that it can be successfully employed on trains that are composed entirely of empty cars or on trains composed partly of loaded and partly of empty cars, while as to its successful operation on trains composed entirely of loaded cars it seems to me there can hardly be any question.

With all things in good condition, a fairly short stop may be made in emergency on level grade with the present 70% of the light weight. But even here we find conditions such in fast freight service that a more powerful brake is very desirable. In fact, where such fast freight trains are run on a fast schedule and following passenger trains, the brake should be powerful enough to stop them in distances equally short from the speed at which they are run as passenger trains can be stopped from their average higher speeds.

When an emergency arises due to carelessness or oversight on the part of the engineman in charge of the freight train in observing signals, or in case of short flagging on the part of the flagman on a preceding train, a quick and

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