wheels, but since cars are used mostly under load it is to that phase of the subject that our attention should chiefly be directed.

With a train braked on the 70% in emergency plan, at a certain speed the train could be stopped in 300 ft. with a full service application, whereas if the train was braked on the 80% in full service plan it would be stopped in approximately 160 ft. therefore it is very evident this plan of braking would effect a considerable difference to the stopping power of a freight train.

The above statements are not intended to suggest that we would make full service applications all the time, but to show what it is possible to do when desired. There is no doubt that higher braking power offered some difficulty on long trains with the old style (F 36) triple valves, because they took too long to apply at the rear of the train, and if the brakes were applied heavily at the head end before they applied to any appreciable extent at the rear, a severe run-in was liable to be the result, which of course, is liable to damage draft gear and lading, but since the advent of the type K triple valve this defect has been practically overcome, so that we now have no reasonable excuse to offer for continuing to use as low brake power as has been in general use in the past.

Something should be said in regard to the possibility of slid flat wheels with increased brake power, but this phase of the subject is so extensive that it would require a separate paper to deal with it adequately. Suffice it to say that it is not the increased brake power that is the immediate cause of skidded wheels. The most prolific cause of skid flat wheels is the inequality of braking power coupled with various conditions and variations in manipulation of the brake, as an instance, supposing there is a car on the train with the brake cut out and the one ahead of it has the brake operating, when the brake is applied the tendency is for the unbraked car to bump into the braked car and in this action temporarily relieves the adhesion between the wheel and the rail, the shoe grabs the wheel, and there is a skidded wheel, but the cause of it was not the braked car, the fault being the unbraked car. There are a great many other causes of slid flat wheels, but they are too extensive for this paper, still it may be interesting to mention that a car would have to be braked to about 500% of its light weight to skid the wheels if that car was travelling at the rate of 60 miles an hour where 20% might, under certain conditions skid a wheel at say four miles an hour, therefore it is very plain that speed is a very important factor in skidded wheel consideration. Where the increased braking power has been used in any class of service it has usually shown a tendency to reduce the number of slid flat wheels. But just so long as the weight of freight cars is varied without corresponding variation of the brake power, just so long will we have the skidded wheel trouble and although it is necessary to keep the brake power within reasonable limits there does not seem any valid reason why the brake power should not be materially increased, as the benefits to be derived far exceed the detriments to be encountered.

It is possible that freight car wheels, will require more attention in regard to being kept in line and perfectly round; for if any wheel becomes wobbly, it has a greater tendency to skid than one running true. In further consideration of increased brake power it is necessary to ascertain how this can be accomplished. On the car we have used as our example we could not brake it at 80% in full service with an 8 in. brake cylinder, because this would mean that we would have to multiply the brake cylinder value over 11 times, and with a piston travel of 8 ins. the shoe clearance would be only .7 in. and to overcome this we should use a 10 in. brake cylinder, which would mean a multiplication of the brake cylinder value of 7 times, which is within the recommended practice, and would give a shoe clearance of 1.14 ins. The increase cannot be had by increasing the train-line pressure, as no matter how much it is increased, a 10 or 15 lbs. reduction of the train-pipe pressure would only result in the same brake cylinder pressure as from 70 lbs. and it would be only at such times that the brake neared the equalizing point, that an increased brake power would occur. Also this method would be detrimental, because it would increase the liability of hose bursting, increased train-pipe leakage, set a higher pressure for the pump to work against, increase the liability of triple valves working undesired quick action, all these without any beneficial results, other than we can obtain from the brake cylinder and foundation gear. If we consider for a moment how much the increased brake power is going to facilitate the handling of our freight trains, it will leave no doubt in our minds that we can materially increase the earning power of our freight car brakes without inconvenience.

We would not purchase a locomotive with a tractive power of 30,000 lbs. and then use it all the time hauling trains of 400 or 500 tons on level divisions without some reasonable excuse for so doing, yet railway companies often buy the very best of air brake apparatus but fail to get all out of it they reasonably can. The next part to consider is, whether we should jump from the old style of brake power to the top notch of the new increased brake power (whatever we decide that top notch is going to be) in one jump, for some reasons it would perhaps be advisable to do this in stages, but if we look back at our past and present practice we find that it is quite common to run trains, with occasional brakes cut out, and that without very serious results, then this being the case there does not seem any valid reason why we cannot go to the decided top notch in one operation, because the percentage of difference would not be so great.

It is necessary for everyone who has anything to do with freight car brakes, to give some thought to the plea for a higher braking power, so that our engineers can handle our loaded freight trains with more assured confidence. We all know that the hole made in railway dividends by liability damages is very considerable and more efficient braking power will do a great deal to curtail this expense.

After what has been explained in this paper, it would appear incomplete without containing some recommendation, therefore, after considering the various powers and their effects, and road conditions, and all other forces bearing on the subject I would recommend that the braking power for freight cars be based on the full service application of the brake, with a train-pipe pressure of 70 lbs. per sq. in., and a brake travel of 8 ins., and that the theoretical brake power be not less than 75% of the light weight of the car, and that the increased brake power be obtained by proper cylindering of car so that the cylinder value will not be in any case multiplied more than 9 times. Furthermore, I will say that it is essential that all interested in the application of brake power to railway stock should regard the air brake as a most important factor in the earning of railroad dividends, and not simply a safety device for the protection of life and property.

The foregoing paper was written for presentation before the Western Canada Railway Club.

A Construction Manager's Opinion.

Chas. R. Scoles, General Manager of the New Canadian Co., Ltd., which is building the Atlantic, Quebec & Western Ry., writes from New Carlisle, Que.:—

"I find the Railway and Marine World very interesting and reliable in all matters both for construction and transportation information, and I would be very glad at any time if I could do anything to further the interests of your valuable paper."

As a result of the large amount of construction information which it contains the Railway and Marine World is subscribed for by construction managers and engineers, railway and canal contractors, etc., in every province of the Dominion.

L. H. Wheaton, Division Engineer National Transcontinental Ry., Moncton, N.B., in writing recently says:—"I have been so busy since coming here over a year ago, that I must have overlooked renewing my subscription to the Railway and Marine World. I now wish to get in touch again with railway matters generally and am dropping some United States periodicals to take yours, which is the best."

LIGHT WEIGHT OF CAR 35,000 LBS. CAPACITY 60,000 LBS. TOTAL LOADED WEIGHT 95,000 LBS.

BASE OF BRAKE POWER	Percentage of Brake Power with 10 lbs. service reduction					Percentage of Brake Power with 15 lbs. service reduction					Percentage of Brake Power with full service reduction					Percentage of Brake Power with emergency application				
	Brake Cyldr. Pressure	Theoretical Light	Theoretical Load	Actual Light	Actual Load	Brake Cyldr. Pressure	Theoretical Light	Theoretical Load	Actual Light	Actual Load	Brake Cyldr. Pressure	Theoretical Light	Theoretical Load	Actual Light	Actual Load	Brake Cyldr. Pressure	Theoretical Light	Theoretical Load	Actual Light	Actual Load
70 per cent. in Emergency ...	20 lbs.	23.3	8.6	10.8	0.6	38 lbs.	44.3	16.3	31.8	3.8	50 lbs.	58.3	21 5	45.8	9.0	60 lbs.	70.0	25.8	57.5	13.3
7· per cent. in Emergency ...	20 lbs.	25.0	9.2	12.5	0.8	38 lbs.	47.5	17.5	35.0	5.0	50 lbs.	62.5	23.0	50.0	10.5	60 lbs.	75.0	27.6	62.5	15.1
80 per cent. in Emergency	20 lbs.	26.7	9.8	14.2	0.85	38 lbs.	50.7	18.7	38.2	6.2	50 lbs.	66.7	24.6	54.2	12.1	60 lbs.	80.0	29.5	67.5	17.0
85 per cent. in Emergency	20 lbs.	28.3	10.4	15.8	0 88	38 lbs.	53.8	19,8	41.3	7.3	50 lbs.	70.8	26.0	58.3	13.5	60 lbs.	85.0	31.3	72.5	18.8
65 per cent. in Full Service....	20 lbs.	26.0	9.6	13.5	0.83	38 lbs.	49.5	18.7	37.0	6.2	50 lbs.	65.0	24.0	52.5	11.5	60 lbs.	78.0	28.7	65.5	16.2
70 per cent. in Full Service....	20 lbs.	28.0	10.3	15.5	0.87	38 lbs.	53.2	19.5	40.7	7.0	50 lbs.	70.0	25.8	57.5	13.3	60 lbs.	84.0	31.0	71.5	18.5
75 per cent. in Full Service....	20 lbs.	30.0	11.0	17.5	0.97	38 lbs.	57.0	21.0	44.5	8.5	50 lbs.	75.0	27.6	62.5	15.2	60 lbs.	90.0	33.1	77.5	20.6
80 per cent. in Full Service....	20 lbs.	32.0	11.8	19.5	0.99	38 lbs.	60.8	22.4	48.3	9.9	50 lbs.	80.0	29.4	67.5	16.9	60 lbs.	96.0	35.4	83.5	22.9