



FRIDAY, NOVEMBER 13, 1896.

CONTENTS

Table with columns: ILLUSTRATIONS, PAGE, GENERAL NEWS, PAGE. Includes items like 'Rapid Transit in New York', 'Locomotive Building', 'The Bridges on the Lake Shore', etc.

Contributions.

The Bridges on the Lake Shore and the Rock Island Track Elevation—A Correction.

In our issue of Nov. 6 we described the track elevation work of the Lake Shore and the Rock Island in Chicago. Concerning the bridge floors we said: "The floor system used in this bridge is entirely new, and is the design of Mr. Clark."

Negative Lap or Inside Clearance on the Exhaust Side.

ALTOONA, Pa., Oct. 10, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

There seems to be considerable difference of opinion among locomotive designers in the matter of benefit derived by inside clearance of valves. Little by little, however, the amount of inside clearance has been increased until now we occasionally hear of simple engines with three-eighths of an inch, and in compounds even three quarters of an inch has been successfully used.

The speeds of simple engines are continually augmented. The effect of the compression line shows that we must either furnish greater freedom to the steam in getting out of the cylinder into the exhaust passage, or on the other hand provide more clearance space in the cylinder itself, into which to compress the steam at the end of each stroke. To analyze the effect of both methods we may base our observations on actual indicator cards taken from an eight-wheel passenger engine (see Fig. 1).

The speed at which this card was taken was 270 revolutions per minute, the valve having no inside lap or clearance, being line and line in mid position. If we consider the engine to be used exclusively for fast work, the valves should be designed to suit running conditions at some average speed, but without crippling the starting power. The compression line should, therefore, be governed entirely and only by the inertia of the reciprocating parts. The weight of the reciprocating parts on this engine is 540 lbs. on each side, and the ratio of connecting rod to crank is 7 1/2. We will confine our investigation to the back end diagram, Fig. 1.

In Fig. 2, line AB represents the accelerating and retarding effect, in pressure per square inch of piston area, of the reciprocating parts. Correcting the indicator diagram MNOPQ, representing actual horizontal pressures (per square inch of piston area) on the crank pin. From this diagram it can be easily seen that a reversal of pressures takes place at O, two inches from the end of the piston stroke. The work represented by MNO is, therefore, positive work, and that represented by OPQ, is negative work and neutralizes an equal amount of work in the cylinder on the opposite side of the engine.

In Fig. 3, RSTUV, represents the inherent power of the steam in the cylinder under existing conditions, during the stroke under consideration. Of this power the sectioned area is not used, most of the unused portion being entirely available; the remainder is that represented by the indicator card, and is available for doing useful work.

From Fig. 2 we see that we can get more work out of the steam, and still cushion the reciprocating parts by lowering the compression line OQ. If we try to get it by means of more cylinder clearance only, the amount of clearance would have to be increased from 9 per cent.

to 20 per cent. of the total cylinder volume. Fig. 4, drawn under these conditions, shows the compression line thus depressed, giving no reversal of pressures before the end of stroke and showing the horizontal crank-pin pressures, all positive. This has been accomplished at the expense of live steam. The area R'V'V' has been added both to the diagram representing total work and to the diagram representing unavailable work; therefore the per cent. of total inherent work available is diminished; also, the steam will have to be drawn from the boiler to raise the pressure of the volume of steam in the clearance space from X to R, or by 105 lbs. On the other hand, if we cut out the valve giving half an inch inside clearance, the compression line will begin considerably later than that shown in Fig. 4, ending at the same place. The exhaust begins earlier, but at a speed of 270 revolutions per minute the effect of this earlier opening will be so small as to entirely disappear.

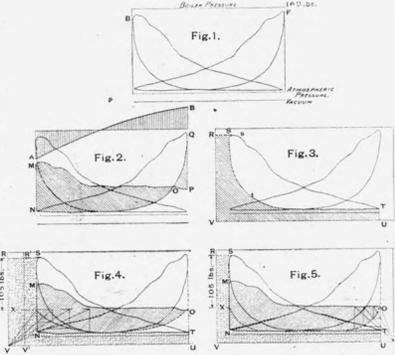
Fig. 5 clearly shows these conditions. The per cent. of the total inherent power of the steam utilized has been increased, and the amount of live steam necessary to raise the pressure in the cylinder clearance to initial pressure is but nine-twentieths of that in Fig. 4. It is, therefore, preferable to make cylinder clearances, including port passage ways only as large as absolutely necessary for the free flow of the steam, and if any further modification of the compression line is necessary, to effect the same by means of inside clearance in the valves.

Some of the Questions of Large Cars.

BY E. W. JUDD.

[Continued from Page 772.]

The Remedy.—Following out, now, the principles of Blackstone's familiar rule for the construction of remedial statutes, having examined the old law, and discovered the mischief that exists, what shall be the remedy? This is, of course, the perplexing part of the problem. That an adequate remedy will involve somewhat radical changes in the present system of charges for light and bulky freight is the all but universal opinion of those who have given the subject attention. In the New York Railroad Club's pamphlet the only dissenting voice is uttered by Mr. C. E. Gill, who says that the Official Classification Committee believes that all that is necessary for an "effectual, satisfactory and lasting remedy for the difficulties of the situation," is



to establish "maximum dimensions for freight equipment," and that this will serve the purpose "without material changes in methods or conditions as at present existing in the various classifications." That the sponsors for the existing classifications, minima and all, should think that their work cannot be improved upon, is, of course, natural; but Mr. Gill's views find little support in the pamphlet in hand. At the same time, those who have spoken have hardly agreed among themselves. To promote the end in view, let us bring together the various remedies suggested in the pamphlet, just as the diverse statements of the mischief have already been grouped.

To begin with, the weight of the numerous and able members of the New York Railroad Club, as declared by formal vote of the organization, has been thrown in favor of an "earnest recommendation" to the traffic associations "that in making their rates on light bulky freight, such rates shall be based on the cubic capacity of the car." Here is an authoritative demand for a "change in methods or conditions" that the classification committees will doubtless admit would be "material." In this demand is embodied what is perhaps the first decisive and well-marked step toward an "effectual, satisfactory and lasting remedy for the difficulties of the situation." In the discussion before the club, at all events, the late Mr. W. G. Watson, then its Secretary, took occasion to point out, that, although the large-car question had been a favorite subject for discussion, the committee's report, on which the rate above referred to was based, was the first one to make a definite recommendation; while according to Mr. Gill, the Official Classification Committee "at various special meetings" had got no further than the conclusion that no material changes in methods were necessary. An

effectual and lasting remedy will perhaps require more extensive innovations than any that have yet been seriously urged, and no traffic man is sanguine enough to believe that they will be made this year, or even next; but the discussion is bound to continue, and when the final and satisfactory solution of the problem shall have been reached, the New York Railroad Club, and Mr. Wheately's Committee in particular, will have the just credit that always attaches to pioneers.

That committee lays down the following general and comprehensive principle as the basis for the discussion—a principle whose soundness and force will doubtless be more and more clearly recognized as time goes on: "The simple and natural solution of the large-car problem would seem to be the establishment of a rate unit for light and bulky articles that will make no discrimination between small and large capacity cars." This principle suggests, and probably requires, far more radical action than any recommended by the committee or taken by the club. Realizing that many difficulties surround any radical changes of classification, the committee very wisely decided to proceed slowly and gradually. Its specific recommendation was the amplification of a scheme of reform that has been approved of by numerous traffic officials, and is now under consideration by the various traffic associations, as follows:

"To limit the existing minimum car-load weights to cars of 34 ft. in length, inside measurement, and to establish a sliding scale of minimum weights, increasing for cars over 34 ft. and decreasing for cars under 34 ft. in length, upon the basis of the proportionate weights per foot of 34-ft. cars under the present minimum weights. For instance, when the minimum carload weight provided for any article, if loaded in cars 34 ft. in length, is 20,000 lbs., it is proposed to deduct 600 lbs. for each foot of length of car less than 34 ft., but not less than 30 ft. in length; cars under 30 ft. in length to be charged the minimum carload weight applicable upon cars 30 ft. in length. Likewise when the minimum carload weight provided for any article, if loaded in cars 34 ft. in length, is 20,000 lbs., it is proposed to add 600 lbs. for each foot of length of car more than 34 ft., actual weight to be charged for when in excess of the minimum weight."

This remedy for the prevailing difficulties was proposed at length by the Western Classification Committee in November, 1895, and, according to Chairman Ripley's report, appealed to the committee as a "simple and efficient solution" of a "troublesome transportation problem." The suggestion is that the present minimum weights be retained and applied to shipments loaded in and on 34-ft. cars, and that in the case of freight that is loaded in cars over 34 ft. long 3 per cent. be added to the minimum for each foot or fraction thereof in length in excess of 34 ft. outside measurement of the car; an analysis of nearly 1,100 cars weighed by the Western Weighing Association indicating that 3 per cent. per foot is the proper addition to make to cover the additional loading capacity in excess of 34 ft. This arrangement would amount to a graduated scale of minimum carload weights based on car lengths above 34 ft., the present minima, and 34 ft. being retained as the basis of the system. With a minimum weight of 20,000 lbs. an addition of 3 per cent. per foot amounts to 600 lbs. per foot, as stated in the previous paragraph.

But this solution of the problem, which the Western Committee considered "simple and efficient," did not satisfy the New York Committee. The comment and the conclusion of this committee were as follows:

"The proposed sliding scale of minimum weights is based solely on the varying lengths of cars. It does not take into consideration the evident fact that cars of the same length often vary widely in their cubic capacity, the difference being in the width and height. From a traffic standpoint, in the handling of light and bulky freight, the width and height of box cars is of quite as much importance as their length. The committee is of the opinion that the basic factor of the sliding scale of minimum weights should be, not the length of the cars, but their actual inside cubic capacity, as suggested by Commissioner J. F. Goddard."

Upon this definite recommendation of a sliding scale of minimum weights based on actual cubic capacity the committee rested, so far as it discussed the large-car problem as a traffic problem, and its advice was earnestly seconded by the 90 expert members of the New York Railroad Club that were present at the February meeting, as has already been shown. The committee obviously did not consider this radical change of the classification, and it would doubtless have admitted that its recommendation was rather tentative than final, falling as it did far short of its cardinal principle, viz.: the establishment of a rate unit for light and bulky articles that will make no discrimination between large and small capacity cars.

The committee seems to have been indebted to Commissioner Goddard for the substance and even the language of its proposal. Mr. Goddard, apparently does not consider the solution of the problem so easy as it appears to Mr. Ripley, although his views are no less pronounced. He says: "From a traffic standpoint the question of the height and width of cars is as important as that of their length. In regard to the use of small cars now on hand, the question, so far as the public is concerned, is mainly as to their employment in loading light and bulky freight. The most equitable way to overcome this difficulty appears to me to be the adoption in our freight classification of a graduated scale of minimum carload weights, based on the cubic capacity of the cars. I am not unmindful of some, at least, of the arguments that can be brought against such a plan, but, all things considered, I believe that it is practicable and the most equitable plan to both the public and the railroads that has so far been suggested."

The views of Mr. Paul Wadsworth, Assistant General

Generated for Jon R. Roma (University of Illinois at Urbana-Champaign) on 2016-03-06 01:03 GMT / http://hdl.handle.net/2027/mdp.39015013053775 Public Domain / http://www.hathitrust.org/access\_use#pd