

superstructure as we have from experience largely overcome the weaknesses that were common to the underframe.

To Reduce Weight.—While not so necessary as increasing strength, yet it is important to reduce weight where it is possible to do so with safety. Many opportunities are afforded with the variety of rolled shapes available, to accomplish this without extra cost, and often with a reduction in cost.

To Reduce Cost of Maintenance.—While the cost of maintenance is carefully considered by the designer, yet the cars in actual service when carefully observed bring to notice certain items of expense that can be remedied, and in some cases entirely eliminated. The use of rivets in place of bolts is probably one of the most important items to be considered in repair work. Bolts were used in the past for securing parts that would require frequent renewals, but as the failures to these parts have been reduced the bolt, which is expensive in maintenance, has been replaced by the rivet. Cast steel and pressed shapes in place of malleable iron have also to be considered here.

The comparatively low average cost of maintenance of the present day, considering the large amount of old wooden equipment still in service, is entirely due to the present design of car which confines the repair expense almost exclusively to the wearing parts, outside of a few unfortunate mistakes in design, as previously mentioned. It must also be borne in mind that the car of the present cannot show the lowest cost of repairs, while relieving the high cost of repairs to the old wooden car.

To sum the matter up, the parts that are movable and need to be renewed should be and are standardized. The use of rolled sections gives us a car which is otherwise a car of standard parts. We also have minimum requirements for the center sill construction which would seem, for the reasons given above, to be about as far as we should go at present in standardizing the box car, except that limiting outside and inside dimensions should be arranged for; this should be attended to by the traffic department. One of these dimensions, the height of running boards, it would seem very essential to decide on in order that the roads will not keep on increasing the height of their cars until the government concludes that there is not sufficient room for the trainmen on top of the cars and issues an order that bridges, tunnels, etc., must be raised to give sufficient clearance, which would be very expensive.

As small changes in the development of the car do not increase the amount of material to be carried in stock, or the cost of maintenance, why should a complete standard car be adopted, which, if followed, will shut off the improvement of details which is necessary if we are to progress?

A WAY TO STOP TRESPASSING

R. C. Richards, chairman of the Central Safety Committee of the Chicago & North Western, is distributing cards on which is printed a diagram showing the number of persons killed and injured during the 25 years ending with 1914 while trespassing on railway tracks or cars, below which is the following note: "Why not enact and enforce a law similar to that recommended by the National Association of Railway Commissioners, a copy of which is shown on the reverse side of this card, to prevent this slaughter."

The proposed bill referred to provides that "it shall be unlawful for any unauthorized person to walk, ride or drive upon or along the tracks, or within the right of way of any railroad company, or to cross such tracks or right of way at any place other than at a public or private crossing." An exception is provided for employees of a railroad engaged in the performance of their duties, persons going upon the property to save human life or to protect property, and persons going upon such property for the purpose of transacting business with the company or as passengers. It is further provided that station agents or section foremen shall have the same power, and shall be charged with the same duties in the enforcement of the act as are given to deputy sheriffs

by the general laws of the state. The proposed bill also provides that any person wilfully violating the act shall be deemed guilty of a misdemeanor and liable to a fine of not more than \$100, or to imprisonment in the county jail for not more than 90 days, or both.

The diagram shows that 113,570 persons have been killed and 123,611 injured, a total of 237,181, while trespassing, during the last 25 years, and that 66 per cent were citizens of the locality in which the accident occurred, mostly wage earners; 14 per cent were children under 18 years and 20 per cent tramps or "hoboes."

BEAM LIGHT SIGNALS ON THE PENNSYLVANIA

The light signals used on the Pennsylvania Railroad in place of semaphores for both night and day indications have been described in the *Railway Age Gazette* of January 8, page 61, and February 26, page 366. In addition to the high-speed and me-

ASPECTS		
SEMAPHORE	LIGHTS DAY/NIGHT	MEANING
		STOP
		PROCEED PREPARED TO STOP AT NEXT SIGNAL
		PROCEED PREPARED TO PASS NEXT SIGNAL AT MEDIUM SPEED
		PROCEED
		PROCEED AT MEDIUM SPEED PREPARED TO STOP AT NEXT SIGNAL
		PROCEED AT MEDIUM SPEED
		PROCEED AT LOW SPEED PREPARED TO STOP TRACK MAY BE OCCUPIED OR NEXT SIGNAL AT STOP
		PROCEED AT LOW SPEED
		STOP THEN PROCEED - RULE 504
		PROCEED PREPARED TO STOP AT NEXT SIGNAL
		PROCEED PREPARED TO PASS NEXT SIGNAL AT MEDIUM SPEED
		PROCEED

Semaphores and Their Equivalents in Light Signals

dium-speed indications described in the articles referred to, provision has been made at interlockings to give low speed indications also; and we give herewith the complete code of twelve aspects as printed for the use of enginemen. These signals are in use from Fifty-ninth street, Philadelphia, to Bryn Mawr; and this section includes two interlockings, OB and WH.

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