

shaft. It is claimed that these engines work easily on a curve of 50 ft. radius.

Up to this time 350 of these machines have been built by the Lima Machine Co. One 8-ton and one 15-ton are used by the Gilpin Forwarding Co., at Black Hawk, Colo.; one 14 and one 20 ton by William Allen, Republic, Mich.; one by the Malvern Lumber Co., Malvern, Ark.; one 28-ton by the Salt Lake & Fort Douglas R. R.; one 80-ton by the Montana Union Ry. Co., and others of various weights in different places.

The engine for the Montana Union which is illustrated is one of the largest of the type ever built. The following are the general dimensions:

- Cylinders, three, each 16 in. diam. × 15 in. stroke.
- Driving trucks, three, swivel, with 40-in. wheels, all drivers.
- Wheel base of trucks, 36 in.
- Centre to centres of front and middle trucks, 25 ft. 10 in.
- Centre to centre of middle and rear trucks, 12 ft.
- Total spread of trucks, 37 ft. 10 in.
- Tank capacity, 2,500 gallons.
- Coal capacity, 4 tons.
- Boiler, 32 in. diam., wagon top, with crown bars, 1/2-in. steel plates.
- Tubes, 181, 12 ft. long, 2 in. diam. outside.
- Firebox, 77 in. long × 49 1/2 in. wide, 39 in. deep above grates.
- Frames of 12-in. steel channels, in two sections, connected by flexible joint between tender and engine.
- Steam pipes, 6 in. diam. inside.
- Crank shaft journals, 5 3/4 in. diam. × 11 in. long.
- Brakes, steam brakes for driving trucks and Westinghouse for train.
- Truck wheels, 40 in. diam., with steel tires × 3 3/8 in. × 5 5/8 in.
- Truck axle journals, 6 in. diam. × 7 in. long.
- Truck bolsters of 12 in. steel channels.
- Truck springs, 30 double coil for each truck.

The cylinder and pillow blocks are cast in one piece of cast iron, fastened to the boiler above and to the 12-in. channel iron engine frames below, allowance being made for the necessary expansion. The steel gear rims for the truck wheels are secured to the wheels by turned steel bolts. These rims have 37 teeth, 2 1/4 in. pitch and 7 in. face. The pinions have 18 teeth, and are pressed on to the steel longitudinal shaft, which is 4 3/8 in. diam., and are keyed thereon. The longitudinal shaft journals are 12 3/8 in. long, and run in brass bearings, with brass collar for receiving the end thrust. The shaft couplings are of steel with a taper fit on shaft; they are keyed in position.

The truck axle boxes are made adjustable to provide for the alignment of the pinions as the axles wear. Each truck is equalized on the side which is not driven in order to prevent the springing of the truck frames. The axle boxes on the driven side are made of cast steel.

Some of the advantages claimed for this engine are: Shortest possible rigid wheel base; more uniform distribution of total weight over long wheel base, thus permitting the use of a powerful locomotive on a light rail; sufficient flexibility of wheel base on curves of the shortest wheel base that an ordinary freight car can pass; utilization of entire weight of engine for adhesion and decreased cost of hauling at low speeds on heavy grades and sharp curves.

**Semaphore Lamps Showing Green for "All Clear."**

The drawings shown herewith illustrate a system of signal lamps in use in several interlocking plants on the Chicago & Northwestern, and designed by Mr. Edward C. Carter, Principal Assistant Engineer of that road,

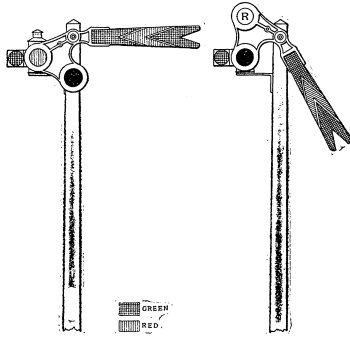


Fig. 1.—Distant Signal, C. & N. W. Railway.

with a view to eliminating the dangers and inconveniences incident to the use of white lights for clear signals, and also to make the semaphore lights of the road consistent with the common switch lights, which show green for the main track.

Fig. 1 shows the "on" and "off" positions of the distant signal, the first being a green and a red light side by side, and the other a green light alone, the spectacle casting being so arranged that when the arm is pulled down it lifts the red glass from its position in front of the lamp and brings up a sheet-iron disc in its place, covering the white light. The red and green glasses are indicated in figs. 2 and 3 in the same way as in fig. 1.

Fig. 2 shows the two positions of the home signal, and needs no explanation. Fig. 3 shows a home signal post with an illuminated blade for an interior diverging route, a facing point crossover or a side track. In all the cuts the glasses which are out of position or not in use are indicated by letters—G for green and R for red.

Fig. 4 shows a plan and a front elevation of the lamp used in the distant signal, arranged with reflectors so

that one flame lights both the red and the green portions of the signal.

The dangers attendant upon the use of white lights for clear signals are, first, white lights are so common that should a signal light go out there is a possibility of a light

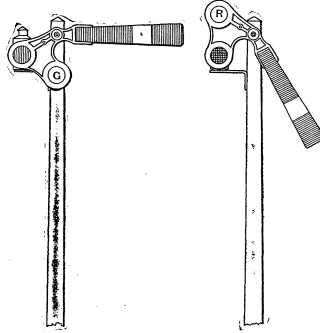


Fig. 2.—Home Signal, C. & N. W. Railway.

in a house about on the line of the signal being mistaken for the signal light; second, the red glass may be broken or jarred out of the spectacle; and third, the spectacle casting may itself break off. In either case a false indi-

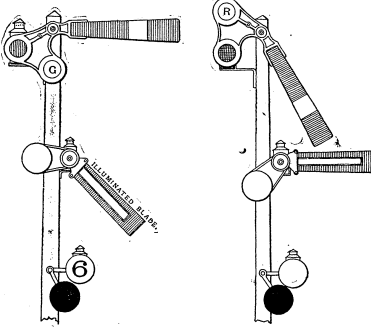


Fig. 3.—Home Signal with Indicators, C. & N. W. Railway.

cation is possible, whereas by the use of a color for the clear signal the failure will be at once detected.

The distant signal is, of course, the place where one first meets with difficulty in attempting to devise a

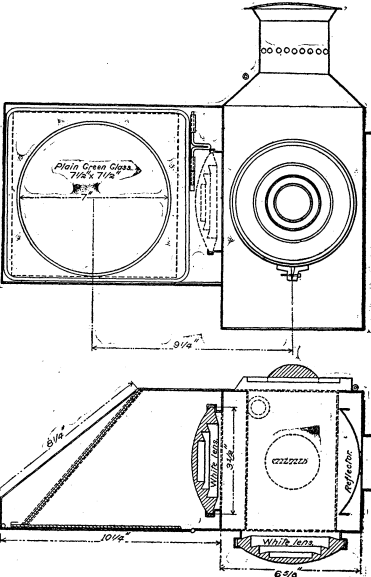


Fig. 4.—Lamp for Distant Signal, C. & N. W. Railway.

system using only two colors, red and green, to give indications. It will be seen that caution is here indicated by a combination of red and green lights. In answer to the criticism that red is used in an illogical manner, it is said that in practice no difficulty or complaint arises. The red is made more prominent than the green so as to err on the side of excessive caution, if at all; and an engineer approaching a signal of this kind, and coming in sight of it at a distance of a mile or more, sees only a red light; but as he comes nearer, say within half a mile of the

signal, the green comes into view and gives him a definite idea of the true meaning of the signal. Where a signal is located on a curve and comes into view only when the runner has approached close to it, he of course discerns the distinctive signal at once. No delay is occasioned in either case, as a distant signal apparently showing red alone never comes into a runner's view except when he is so far away that he need not slacken speed for it. He is placed on his guard and watches the signal the same as if it were a home signal, but before he gets near enough to necessitate shutting off steam he sees the green, and knows that it is a caution, and not a positive signal.

**Interchange Rules—New York Railroad Club.**

At the regular meeting of the N. Y. Railroad club, April 16, the special order of the meeting was a discussion of the Rules of Interchange of Freight Cars. The following members of the New England Railroad Club were present, and were, by vote of the club, requested to take part in the discussion and voting, viz.: F. D. Adams, J. W. Marden, J. N. Lauder and J. T. Chamberlin.

The rules were read by sections and acted upon as read. The following changes were recommended:

Rule 3, section (a), changed to read, "Unless the spots are over 2 1/2 in. in diameter," instead of "length," as formerly.

Section (b) changed to read, "Seams 3 in. long or over at a distance of 1/2 in., etc.," "or Seams 5 or more inches long, etc."

Section (c) to read "Worn tread, when the spot caused by wear exceeds 4 in. in length, etc."

Section (d) to read "Worn flange, flanges 1 in. thick or less, etc."

Condition No. 11, Section (s) to read "Brakeshoes secured to brakehead by either key-bolt, bolt and nut, or key, as required by form of head. Brakeshoes worn to 3/8-in. at the centre shall be considered as worn out, and may be replaced with new shoes, at the expense of the company owning the car."

Section (u). A new condition was recommended, to be Condition 9, viz., that "Any defect in the M. C. B. type of coupler shall be accepted, provided that it does not interfere with the effectiveness of the coupler."

Another condition was recommended as condition 10, viz.: "In the absence of any stencil on cars equipped with cast-iron drawbars showing what is the proper standard, any drawbar of the length or dimensions shall be accepted."

A new rule was substituted for No. 4, as follows: A car with new defects which do not render it unsafe to run or unsafe to trainmen must be accepted, but in such cases the company to whom such car is offered may require that a defect card shall be securely attached to the car with four (4) tacks, preferably on the outside face of intermediate sill, between tie timbers; but no defect card shall be required for old defects on foreign cars by the receiving road. Companies shall only be required to card their own cars for old defects.

Rule 5 was amended to provide that defect cards shall be filled in on both sides with ink, and a pen be drawn through the blank lines.

Rule 7 was amended by omitting the last four words.

Rule 9, Section (c), was amended to read "Worn tread."

Rule 10 amended by the addition of the following clause: "Cars belonging to private companies having drawbars broken shall be delivered by one company to another without being carded for wrong drawbars, provided that the broken drawbar has been replaced by a bar of proper dimensions, same as is in use on the different lines over which the said private cars may be run."

Rule 18 was amended to allow that two adjacent sills may be spliced (provided that both splices are not within 12 in. of the body bolster), if one splice is made between the body bolster and end sill and the other splice between the two body bolsters.

Rule 21 amended providing that a penalty of 25 cents per day be charged against the railroad destroying the car and failing to give notice to the owners within 30 days.

It was voted to recommend to the committee having in charge the matter of painting and lettering cars that the initials and number of the car be stenciled on the inside or outside of the door.

**The Harvey Steel Car.**

The Harvey Steel Car Works, in the town of Harvey, 20 miles south of Chicago, are now in running order, and 25 cars are being rapidly completed. The works are situated not far from the Illinois Central station and are built on a plan which permits of ready extension as business increases. Last Saturday a party of railroad men and engineers visited the works to examine the cars which are under construction. The machinery is all new and adapted to car work. However, much machinery must be added before the works will have the facilities they need to compete with wooden construction. The tools most needed are power riveters. These will be added immediately. In these shops the bulldozer is used for all it is worth, and that is considerable. The output of this machine, as here operated, is something enormous. It is run in connection with a very ingenious oil furnace for heating the parts to be bent. As might be supposed, drilling machinery is in preponderance,

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