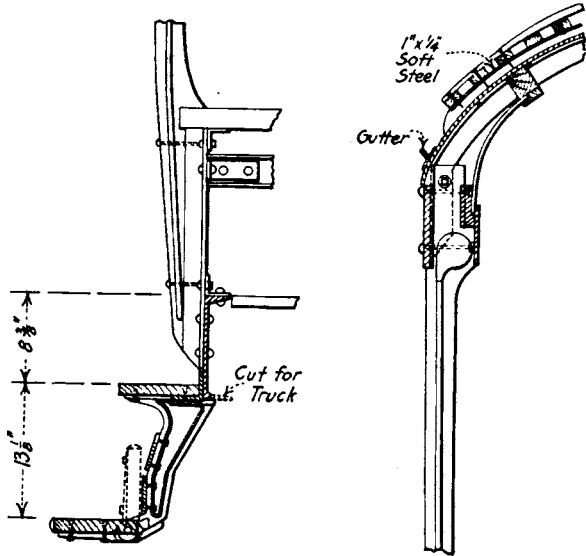
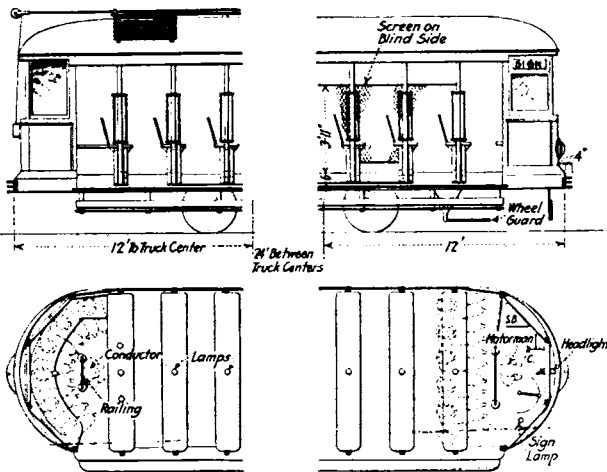


T-bars rest upon the flange of this and the end Z-bar, forming supports for the trap doors over the motors. These light T-bars also rest upon the bolster which is midway between, and which is the standard cast-steel bolster of the company modified somewhat to fit the deep side sills.

The bumper iron is an 8-in. channel weighing 11¼ lb. per foot, and its ends are riveted to extensions of the side sills. Fitted into the top of the bumper is a wooden crown piece 2 in. thick. The bumper is stiffened by means of two 3-in. x 3-in. x ¼-in. diagonal braces and 5-in. 6½-lb. channel knees. Nailing strips for the floor, which is of 7/8-in. pine, are mounted on the lower



PUBLIC SERVICE OPEN-BENCH CAR—DETAILS OF STEP AND SIDE POST POCKET, AND POST AND CARLINE JUNCTION



PUBLIC SERVICE OPEN-BENCH CAR—PARTIAL SIDE ELEVATION AND HORIZONTAL SECTION, LATTER SHOWING ALSO POSITION OF LAMPS

flanges of the Z-bars and upon light cross channel irons supplied for the purpose.

The side posts are anchored between two 2½-in. x 2-in. x 3/16-in. angles each, which form pockets for the posts and at the same time furnish end supports for the seats. On the step side the pocket angles are riveted on the outside of the channel, but on the blind side, in order to give a smoother exterior, they are mounted above the channel and braced securely by means of angle brackets. The seats rest upon the tops of the angles which are cross connected by 3-in. 4-lb. channels to furnish center supports for the seats.

The seats are non-reversible and are 8 ft. long between side posts. The seat proper is of 1 5/16-in. maple strips with 1/8-in. air space between. It is 15 in. deep, and 17-in. spaces are provided between adjacent seats. The back is curved to give greater comfort in riding than is possible with the straight back.

The side posts are of ash and of the standard form except that at the top they are fashioned for attachment to T-iron carlines. These carlines are 2-in. x 2-in. x ¼-in. T-irons, set into the tops of the posts in the manner shown in one of the illustrations. They are bent to form an arch roof and are covered, on the straight part, with 5/16-in. Agasote and with 3/8-in. Agasote on the curved ends.

On both ends of the car the side sash are stationary and inside lining of the end is thus rendered unnecessary. In the center of each end are two sashes, the upper of which drops outside of the lower. On each end is a Hedley combination drawhead and anti-climber.

The cars are equipped with four Westinghouse 101-B2 motors and Westinghouse HL control. The purpose in using the latter was to get the contactors out of the sight of the passengers who are apt to be frightened by the arcs in the ordinary form of controller. It is felt that the danger of accident will be thus greatly reduced.

The car is called a fifteen-bench car which rating, however, does not include the seat in the rear. As each seat accommodates six passengers the total seating capacity of the car is ninety-six passengers. Exclusive of the carlines there are about 5300 lb. of steel in the car. The weights of the different parts and of the complete car equipped but without load are as follows:

Body	13,200 lb.
Control	1,800 lb.
Air brakes	1,220 lb.
Hand brakes	200 lb.
Wheel guard	200 lb.
Motors	10,580 lb.
Trucks	13,000 lb.
Total	40,200 lb.

This total is about 420 lb. per seated passenger.

The new cars have just been put into operation on the company's Orange line which connects the Pennsylvania Railroad station in Newark with the Harrison Avenue terminal in West Orange. It passes through East Orange, Orange and West Orange. On this line there is considerable short-haul business. The cars are proving very popular, particularly with women.

Electrification of the Great Falls Terminal of the C., M. & St. P. Railway

The electrification of an important section of the main line of the Chicago, Milwaukee & St. Paul Railway for 3000-volt d.c. operation gives interest to an auxiliary electrification in the city of Great Falls, Mont. This city is at present the terminal of the new 138-mile feeder line from Lewiston, Mont., connecting with the main line transcontinental division at Harlowton, the eastern terminus of the main line electrification now under construction. The relation of this feeder to the main line is shown on the map published in the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 14, 1914, page 1157. The Great Falls terminal yards are located in the center of the city and are connected by a cross-town line about four miles in length, known as the Valeria Way line. The total trackage in the terminal is about seven miles. The terminal buildings include a large freight house, a roundhouse, a power plant for heating purposes and a passenger station.

The Great Falls electrification is at 1500 volts, 750-volt motors in series being used on the one locomotive employed at present. Provision has been made to handle



GREAT FALLS TERMINAL ELECTRIFICATION—
SUBSTATION EQUIPMENT

freight trains up to 580 tons in weight at a speed of about 9½ m.p.h. on the maximum grade of 0.65 per cent. Three-phase electric power at 6600 volts, 60 cycles, is furnished by the Great Falls Power Company from the hydroelectric plant at Rainbow Falls, 6 miles from the substation.

The substation is housed in the heating-plant building. It comprises a synchronous motor-generator set together with auxiliary apparatus. The set comprises a 6600-volt motor, rated at 435 kva at 80 per cent power factor, with compensator starter. The generator is of the commutating-pole type, rated at 300 kw. The set can carry 900 kw momentarily. Excitation for the motor field and for the shunt winding of the d.c. generator is supplied by a 10-kw, 125-volt, d.c. exciter. The appearance of the substation equipment is shown herewith.

The locomotive is of the standard 50-ton type shown in the second illustration. It is equipped with four GE-207, 750-volt, box-frame, commutating-pole motors insulated for 1500 volts. The motors have a one-hour rating of 79 hp. They are ventilated from a blower direct connected to the dynamotor in the cab used for supplying low-voltage current for operating the auxiliaries. The gear reduction is 64 to 17. Sprague, General Electric type M control is used, and provision is made for ten series and seven series-parallel steps.

The current collector is of the type being installed on the main line locomotives, the slider being lifted into position by air pressure and held against the wire by steel coil springs. Compressed air for all purposes is supplied from two CP-29, 1500-volt motor-driven compressors located in the cab, each having a displacement of 27 cu. ft. of air per minute at 90 lb. pressure.



GREAT FALLS TERMINAL ELECTRIFICATION—
1500-VOLT ELECTRIC LOCOMOTIVE

On each end of the locomotive is a headlight containing a 100-cp, concentrated filament Mazda lamp.

The overhead line construction is of the catenary type, similar in a general way to that installed on the Butte, Anaconda & Pacific 2400-volt railroad. Both span and bracket constructions are used, depending upon local conditions. Poles are spaced approximately 150 ft. apart on tangent track, supporting No. 0000 grooved trolley wires from three-point suspension. No feeder copper is installed.

The work was done by the electrification department of the Chicago, Milwaukee & St. Paul Railroad, R. Beeuwkes, engineer in charge, under the direction of C. A. Goodnow, assistant to the president. All of the electrical apparatus, including locomotive, substation equipment and line material, was furnished by the General Electric Company.

New Forms of Fare Indicators and Recorders

The accompanying illustrations show some of the interesting features of the new line of computing fare recorders and indicators developed by the Dayton Fare Recorder Company of Dayton, Ohio. Two illustrations show the register mechanism with the case removed. It has been designed with a view to avoiding intricate or delicate parts and the use of springs as far as possi-



INDICATORS USED WITH DAYTON FARE RECORDERS

ble, and to securing simplicity, compactness and durability. Two sets of printing counters are used in each machine, one to register and print the results of the fare collections on each trip and the other to register and print the total of all fares collected during the entire period of work by each conductor. The classification of the fares is made by means of a setting rod, and a system of fare indicators which guide the conductor in registering the fares and also serve as visual receipts. The registering operation is performed in the usual manner by means of a cord.

In connection with the register a double-dial indicator, located on the bulkhead at the end of the car opposite the recorder, and two-way indicators located in the center of the car and in each compartment are used to indicate the amount of fare paid.

The double-dial indicator, comprising two dials and two hands or pointers, each indicating a different range of fares, is shown in one of the illustrations. The two-way indicators are small cylindrical devices having openings on both sides through which the fare indi-