

New Passenger Locomotive for the St. Paul

Center of Gravity Is 63 In. Above Rail, One-Hour Rating 4000 Hp., and Starting Tractive Effort 112,000 Lb.

THE Westinghouse Electric & Manufacturing Company and the Baldwin Locomotive Works have under construction for passenger service on the Chicago, Milwaukee & St. Paul Railway ten direct-current, regenerative locomotives. These form part of the electrification extension described in the issue of the *ELECTRIC RAILWAY JOURNAL* for Nov. 3, 1917, page 819.

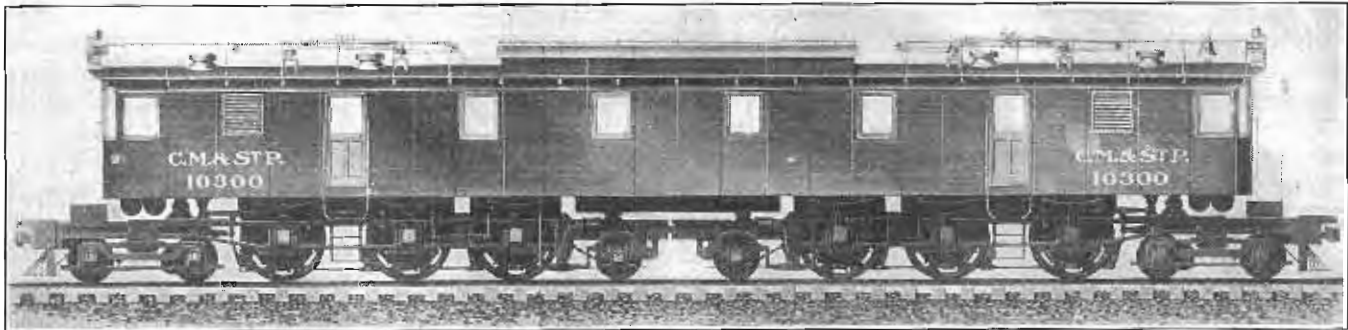
MECHANICAL FEATURES OF THE LOCOMOTIVE

The complete locomotive, with a total length over couplings of 90 ft., weighs ready for service 266 tons, and has an adhesive weight of 330,000 lb. The single cab is carried on the two main running gears, each having a four-wheel guiding truck, three driving axles in a 16-ft. 9-in. rigid wheelbase, and a two-wheel trailing truck. It thus corresponds to two Pacific-type running

The four-wheel guiding truck center pin and cross-equalized leading pair of driving wheels are equalized together on the longitudinal center line of the locomotive. This arrangement combines the advantages of the standard front and construction of the "American" and "Consolidation" types of steam locomotives. The remaining two pairs of driving wheels and the two trailing wheels of the main running gear are side-equalized together again, following accepted steam-locomotive practice. The method of equalization used here provides a weight variation on the driving wheels of only 6 per cent from normal when the locomotive is pulling at 30 per cent adhesion.

The center of gravity of the main running gear, including motors, is 41½ in. above the rail, and the height of the center of gravity of the complete locomotive is 63 in. above the rail.

The designers of this locomotive point out as salient features the following: Large capacity in single-cab unit; flexibility of running speeds with small rheostatic losses; twin-motor design with quill drive; low-voltage auxiliaries simplifying inspection, maintenance and



NEW LOCOMOTIVE FOR PASSENGER SERVICE ON CHICAGO, MILWAUKEE & ST. PAUL RAILWAY

gears coupled with a link and having the two-wheel trucks on the adjacent ends.

The main running gear center pins are located midway between the first and second driving axles of each running gear. On one running gear the center pin is designed to restrain the cab both longitudinally and laterally, while on the other the center pin restrains the cab only laterally, permitting free longitudinal movement. This arrangement of riding and floating pins relieves the cab of pulling and buffing strains due to train load, as these strains are taken directly through the running gear side frames and bumpers. The driving wheels are 68 in. in diameter, and carry 55,000 lb. per axle. The guiding trucks have 36-in. wheels, while each two-wheel truck has a load of 38,500 lb. at the rail, with approximately 62,000 lb. distributed on each of the four-wheel trucks.

On any single driving wheel, the non-spring supported weight is that of wheels, axles and driving boxes only.

The flexible type of quill drive is used to afford a means of permitting a motor located well above the roadbed to drive an axle which, with its wheels, is free to follow the rail independently. This drive secures all the advantages of a flexible gear in cushioning the transmittal of torque and minimizes the road shock.

Each main running gear has three-point equalization with a single point toward the end of the locomotive, in accordance with accepted steam-locomotive practice.

operation; simple and effective regeneration; improved equalization to minimize weight transfer in trucks; auxiliary train-heating plant.

One of these locomotive units is capable of hauling a 950-ton train (twelve coaches) over the entire mountain section at the same speeds as called for by the present schedules. The one-hour rating is 4000 hp. and the continuous rating is 3200 hp. with a starting tractive effort of 112,000 lb. The normal speed on level track is 60 m.p.h., and on a 2 per cent grade a speed of about 25 m.p.h. is maintained.

MOTORS, CONTROL AND AUXILIARIES

Flexibility of speed control is obtained by the use of nine running positions without rheostatic loss. The six 1500-volt twin motors on one unit are connected for three-speed combinations as follows: One set of six motors in series, two sets of three motors each in series, and three sets of two motors each in series.

Two additional running speeds are obtained on each speed combination by means of inductive shunts on the main motor fields, which assist in cutting down current peaks, as well as save rheostatic losses. The speed range is from 8 to 56 m.p.h., depending on the load.

The use of the twin-motor design with quill drive permits effective use of the space between the driving wheels, and the use of two armatures, each wound for 750 volts direct current, geared to the same quill. This voltage is preferred to 1500 on account of the better