

Exhibition of St. Paul Locomotives

The First 3000-Volt St. Paul Locomotive Was Taken from Erie to Seattle and Shown at Many Cities to Interested Visitors—Tests of Regenerative Features of Another Locomotive Made Last Week in Montana

A decided novelty in methods of publicity was recently carried out by the Chicago, Milwaukee & St. Paul Railway Company in connection with its 440-mile electrification across the Continental Divide, one of the electric locomotives having been hauled across the continent and exhibited at every important city on the route, finally being placed in trial operation on the Butte, Anaconda & Pacific Railway, which joins the St. Paul System at Butte, Mont. That the exhibitions were an unqualified success is shown by an article by E. S. Johnson in the forthcoming issue of the *General Electric Review*, wherein it is indicated that some 60,000 people took advantage of the opportunity to inspect the machine.

The railway company's contract, which was made on Nov. 25, 1914, called for the delivery of the first locomotive in ten months, and shipment was made on Sept. 25, 1915, a delivery that is unusual in view of the fact that the design is entirely new, that the capacity exceeds that of any steam or electric locomotive ever built, that the voltage of the system is higher than that of any direct-current system for commercial operation, and that the important feature of regenerative control, which is included in the design, was entirely untried for direct-current railways. Since the first delivery several additional locomotives have been shipped, so that electrical operation of the first division between Deer Lodge and Three Forks is expected to begin about Dec. 1.

The first public inspection of the exhibition locomotive was held in Chicago at Fulton Street near the Union Station on Oct. 6, from 12 o'clock noon to 4 p. m. It was estimated that 10,000 people gathered to see the great machine and 5000 visitors actually passed through the interior. So great was the popular interest that several "movie" operators were on hand and made films at different points which are now being exhibited throughout the country.

Prominent among these visitors were many railroad officials located in Chicago and university professors; particularly those interested in engineering work at the University of Chicago and at Northwestern University. A number of students were dismissed from class work in order to give them an opportunity to examine the

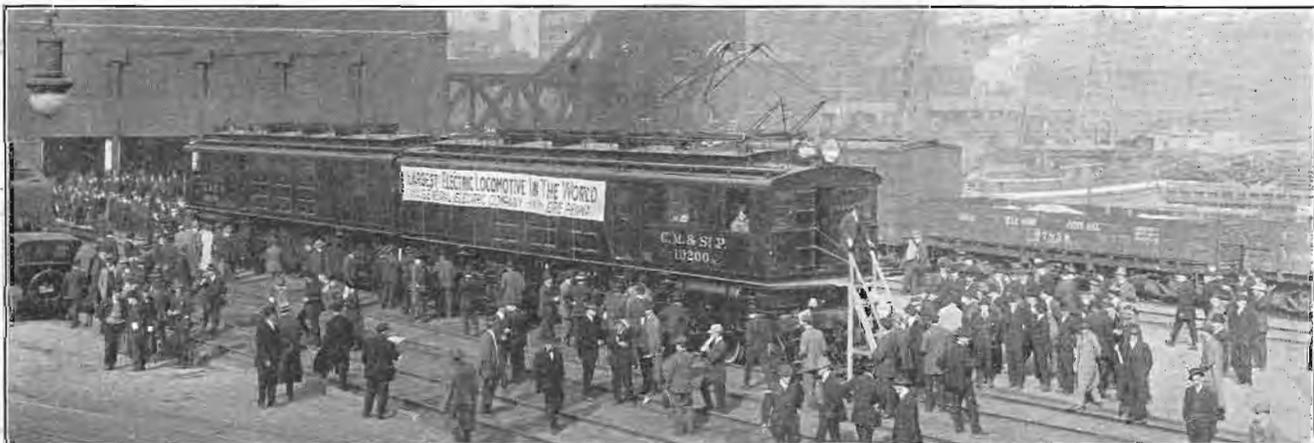
locomotive. Superintendents of motive power, street and steam railway officials, consulting engineers and city officials from Chicago and points within 200 miles took advantage of the opportunity to inspect the first transcontinental locomotive. Public men of every profession and city officials were especially interested on account of the agitation in favor of electrification of the railway terminals of Chicago.

The feature that evoked the greatest interest was, naturally, the regenerative braking which enables the locomotive to hold back the heaviest trains on long descending grades—at the same time returning power to the line. The air brakes are thus used only for emergency service or in making the final stop. Regeneration is controlled by the engineer through an auxiliary handle on the master controller which causes the motors to return power to the trolley in the proper amount to maintain any desired speed. This feature, it may be said, was very thoroughly tested on the General Electric Company's experimental track at the Erie Works before the locomotive was shipped.

The general public showed much interest in the fact that cold weather offers no obstacles to electric locomotive operation as is the case with steam. It was pointed out that steam locomotives are usually in difficulties in the winter time, necessitating extra leeway in the time-table to take care of delays. With electric operation there will be no delays for fuel or water or cleaning fires and the electric engine will always be ready at a moment's notice. Trains will move exactly as scheduled so the meeting and passing points may be figured to the minute. Fuel trains will be eliminated in the mountain districts, thus giving track-room for additional trains handling revenue freight.

During the inspection at Milwaukee an accurate count was kept, and it was found that 5010 people went through the locomotive. As many more inspected the locomotive from the outside and either did not have the time or the opportunity to make an examination of the interior. Especial interest was displayed by the employees of the railway company, practically the entire office and shop force taking occasion to visit the machine.

In St. Paul 2550 visitors passed through the locomotive, and in Minneapolis nearly 6000. Opportunity



CHICAGO, MILWAUKEE & ST. PAUL LOCOMOTIVE ON PUBLIC EXHIBITION NEAR UNION STATION, CHICAGO, DURING SPECTACULAR TRANS-CONTINENTAL TRIP

was also afforded the faculty and students of the railway engineering course of the University of Minnesota to make a careful examination at a special hour. On the trip west over the Chicago, Milwaukee & St. Paul lines stops were made at Aberdeen, Miles City, Butte and Missoula, an average of 2000 to 3000 visitors inspecting the locomotive at each stop.

At Butte, the president's special car was attached and a trip made over the lines of the Butte, Anaconda & Pacific Railway to Durant and return. It is noteworthy that the locomotive was operated under its own power as a demonstration to these officials the day it arrived at Butte after being hauled more than 2000 miles. Among the officials on the trip to Durant were President A. J. Earling, Vice-President H. B. Earling, Assistant to the President C. A. Goodnow in charge of electrification work, R. M. Calkins, traffic engineer at Seattle; A. M. Ingersoll, assistant to the vice-president; R. Beeuwkes, engineer in charge of electrification; H. A. Gallwey, general manager of the Butte, Anaconda & Pacific Railway, and many others.

Final exhibitions were made at Ellensburg, Spokane, where there were 10,000 visitors on the first day, Seattle and Tacoma. The number desiring to inspect the locomotive at both Spokane and Seattle was so large that it was necessary to allow two days at each place for the exhibition. From Tacoma the locomotive was sent back to Butte to be placed in trial operation. Most of the tests now being conducted on the Butte, Anaconda & Pacific Railway with the new St. Paul electric locomotives received there have applied to the power regenerative feature. The results of one of these tests, conducted on Nov. 13 with locomotive No. 10,201, show the severity of the trials to which the locomotives are being subjected.

TEST OF REGENERATIVE BRAKING

The weight of the train tested was as shown in the following table:

Sixty-five ore cars at 70 tons each.....	4,550 tons
One caboose	15 tons
One business car	94 tons
Total, excluding locomotive.....	4,659 tons
Total including locomotive	4,943 tons

This load was hauled from Rocker to Anaconda yards without the use of air brakes except to stop at Durant and Anaconda yards, electric braking being used to hold the train on the 1 per cent down grade with the current averaging at times as high as 880 amp. at the locomotive, corresponding to approximately 2100 kw. returned to the line at substation voltage. The train was allowed to speed up to approximately 25 m.p.h. on the down grade, and the train was brought to as low as 7 m.p.h. with the electric brakes in order to demonstrate the wide field of application of this method of braking. The braking was very smooth, and the reduction of speed from 25 m.p.h. to 7 m.p.h. was made without the slightest jar to the train. As the braking was done entirely by the engine, the slack between cars was bunched, and at no time was there any danger of breaking the train in two.

The tests were witnessed by the following representatives of the Chicago, Milwaukee & St. Paul Railroad: C. A. Goodnow, assistant to the president; E. H. Barrett, assistant general superintendent; R. Beeuwkes, electrical engineer; George Spaulding, traveling engineer, and H. A. Gallwey, general manager Butte, Anaconda & Pacific Railway. A. H. Armstrong, chairman of the electrification committee General Electric Company, and P. P. Spaulding of the same company were also present.

Australian Railways to Be Electrified

According to a recent commerce report from Sydney, Australia, to the bureau of foreign and domestic commerce, Washington, D. C., two schemes for electrifying existing lines of urban and suburban railways of Sydney are engaging the attention of the local transportation departments. The railway service, known as the North Shore Lines, running from Milson's Point, the traffic center immediately opposite the city proper, to Hornsby, 13 miles away on the main line from Sydney to the north, is about to be electrified. Already a tunnel under the harbor for carrying the necessary feeder cable is being driven, and but for an unexpected interruption, owing to a fault in the rock, would have been nearly completed by this time. The plan is to supply energy for this service from the existing power stations at White Bay on the Sydney side of the harbor. The work is being carried on by the Railway Department of the New South Wales government.

The second project, for the construction of a metropolitan railway, is much more extensive in conception. Parliamentary sanction for the expenditure of \$32,000,000 has just been obtained. J. J. C. Bradfield, who is chief engineer of metropolitan railway construction, is in full charge of the preliminary arrangements.

The electric railways about to be constructed in the metropolitan area of Sydney include: (a) The immediate electrification of the inner zone suburban railways, comprising 64 route-miles or 200 track-miles, and in the near future the electrification of the outer zone suburban railways radiating some 36 miles from Sydney, and additional length of 200 track-miles. (b) The construction of a 16-mile, double-track loop railway around the city of Sydney. (c) The construction of double-track railways to the eastern, western and northern suburbs, connecting with the existing railways and with the city railway, a length of 37 miles of single track. The ruling grades will be about 3½ per cent with the load and 2½ per cent against the load, while the sharpest curve is 11½ deg. All platforms will be 520 ft. long and will be placed in shallow subways; access will be generally by steps. Energy will be supplied from overhead wires to the train motors at 1500 volts.

The railways to the northern and western suburbs necessitate long-span cantilever bridges across the harbor, without piers in the fairway; the bridge to North Sydney is to be 1600 ft. long, center span, accommodating four tracks, and having a main roadway 35 ft. wide, a motor roadway 18 ft. wide and a footway 15 ft. wide. A bill for the construction of this bridge is shortly to be submitted to Parliament, and though the European war may postpone its commencement it is hoped that a beginning will soon be made. The bridge to Balmain is to be 1350 ft. center span, accommodating double-track and the same roadways and footways as the North Sydney bridge. The clear headway for shipping under the bridges is to be 170 ft. at high water. The total cost of the scheme is approximately \$97,330,000.

The construction of the Sydney City Railway, Sydney, Australia, will be begun as soon as the scheme has received the sanction of Parliament. Electric traction will be used, and it is intended to connect the lines with North Sydney and the Nelson's Point Railway. The estimated cost of wiring from the present Nelson's Point terminus to Hornsby is \$526,500; in addition further expenditure will be necessary to provide rolling stock, transmission lines and substations. The question of funds for the electrification of the Nelson's Point-Hornsby Railway will be considered in connection with the next loan estimate.