Sparks
from
The MILWAUKEE road
Electrification Exhibit

A CENTURY of PROGRESS
Chicago
May 27 - Nov. 1, 1933
SMOOTHER, SURER, AND SWIFTIER

The east and west by which trains have been handled by electric power since The Milwaukee Road pioneered in its use, demonstrates that it is more reliable, more economical, and more economical than steam in the movement of traffic in mountain districts. As the locomotive in exhibition is a passenger locomotive, the comments in this letter are for the most part confined to application of electric power to The Olympic, although its advantages are equally applicable to freight trains.

The Olympic is started, operated, and brought to a stop, hoot up and down mountain grades, with a precision and swiftness that only the mobility of electric power and the great speed and capacity of the electric motor can supply.

How electric power and the electric locomotive have revolutionized passenger service is evident to every traveler. Where previously an otherwise tedious journey was marred by smoke and cinders from the steam locomotive lumbering up mountain grades or steaming through mountain tunnels, by the jerking and jarring incident to starting and the application and release of the brake on steep gradients and sharp curves, the electric locomotive now picks up its load and The Olympic moves immediately over the rails with scarcely a perceptible motion. Gliding as the word that best describes its even speed. As it is brought to a stop, the thousand ton train is used down to a standstill by the even application of the current, and, in starting again, the passenger is often surprised to find himself under way, so smoothly in the application of power.

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The source of this compelling current is in the mountain rivers, none of them is far distant as 200 miles from the rails over which, you ride. These rivers are fed full with the waters of lakes and springs and with the melting snows of mountains that reach their summits into altitudes of almost perpetual winter. There the rivers leap and plunge down rocky cascades, their maddened waters momentarily imprisoned and the full head of their imprisoned force is turned against the great wheels of dynamos that generate electric power.

This current, generated at plants of several water-power companies, is carried along high-tension wires to twenty substations on the main line of The Milwaukee Road throughout the Belt, the Rocky, the Bitter Root and the Cascade ranges. As it comes down to the substations at 100,000 volts a. c. it is far in excess of any normal requirements, and has strong for direct application. So, through the medium of oil switches, it is reduced to 3,000 volts d. c. It passes out on feeder wires to the valley suspended from poles along the track. From this trolley the power is taken down to the

SPARKS

from

THE MILWAUKEE ROAD

Electrification Exhibit

OVER THE ROCKIES TO THE SEA

BY THE POWER OF “WHITE COAL”

The Chicago, Milwaukee, St. Paul and Pacific Railroad operates America’s Longest Electrified Railroad.

Stretching for 466 miles, over four of America’s greatest mountain ranges, it represents nine times as much electrification as all other transcontinental lines combined, an accomplishment which takes 460 miles from Harlowton, Mont. to Avary, Idaho—constitutes the longest continuous electrified ride in the world.

From all parts of the world, men who have spent a lifetime in the study of transportation, have come to draw very mountain barriers to see for themselves how great a thing man has accomplished.

You view here today, at A Century of Progress Exhibit, an integral part of the triumph of science. This great locomotive, known as the Bipolar Type, is one of several used in handing “The Olympian”—America’s Queen of Transcontinental Trains, across the Cascade mountains. Other types, mainly the Quill type, are used in the same bringing the Belt, Rocky and Bitter Root mountains, and in freight service in the Cascades.
driving wheels of the locomotive through that claw-like arrangement, called the pantograph, that you see on top of the locomotive exhibited there. In transit it passes through various control devices before it reaches the air motor itself. When nitrogen is forced into the motor, the motor shaft is caused to revolve and it is this action which propels the locomotive.

CAPABLE OF 3500 HORSEPOWER

The locomotive which features this exhibit is called the Big Mohawk. It is equipped with twelve of these motors and is capable of developing 2000 b. h. continuously or 3500 b. h. for a one-hour period. Each motor is mounted directly on the driving axle, the axle itself forming the shaft of the motor. This arrangement does away entirely with the usual gears such as are found on street cars.

An interesting feature of the locomotive is the means by which it is controlled. The controls are operated by many of the same men who formerly cycled along on the steam engines, so far as the possible, the control arrangement was made to duplicate the arrangement commonly found on a steam locomotive. Also, as it would produce a dangerous condition to have the 3,000 volts in the engineer's cab, all the switches that are in contact with this high voltage are operated by compressed air, which voltages to be electrostatic.

The Engineer handles only the air control or low voltage switches. The high voltage circuits are all isolated in a separate compartment. No one is permitted to enter this compartment while the pantograph is in contact with the track.

REGENERATIVE BRAKING

A very important feature of this locomotive is the so-called regenerative braking whereby energy is recovered on the descending grades. This is accomplished by reversing the usual function of the electric motors, thus utilizing the momentum of the train to drive them as generators. On the long-sloping grades, encountered in crossing the several mountain ranges, great skill is required to handle the heavy freight or high-speed passenger trains with the usual air brakes. To obtain a 2100-ton train traveling at a rate of 17 miles per hour on a 2 per cent grade, 6700 b. h. must be delivered. It is then necessary then that those brakes sometimes become red hot.

With the electric locomotive the air brakes are used only in emergency or in bringing the train to a stop in a very short distance if it would be necessary to be wasted in braking the shoe contact is converted into electricity and returned to the power plant. Not only is this a big saving but it also contributes greatly to the comfort of the traveler. The grinding and jolting often encountered with the use of the air brake is eliminated and the train descends with a smoothness that is remarkable. From 60 to 40 per cent of the energy that was required to pull the train up the mountain is recovered in making the descent. About 12 per cent of the entire amount drawn from the power plant is later returned or in effect merely borrowed.

656 MILES ELECTRIFIED

The first section of electrical train encountered on a trip from Chicago to New York is that which extends from Chicago to Oklahoma City. In this section the trains travel the Big Mohawk, the mountain ranges of the Rockies, and the Blue Ridge mountains, where the severest weather makes operation under steam power very difficult. Scenically, this extra region is one vast expanse of eagle wilderness. The towering mountains, the wooded walls of the canyons and wind-swept plateaus create a vista both magnificent and inspiring.

In 1918, after two years of test, the results of the electrification were so satisfactory that a second electrification zone was authorized. This includes the extreme west end of the main line of the Chicago, Milwaukee Road between Othello and Brawley, California, Washington, over the Cascades, a distance of 316 miles, where heavy grades and severe winters prevail. This total of 656 miles is by far America's longest Electrically-Railroaded.

If you ever travel over these two electrified sections you will readily see how electric power and the electric locomotive have simplified the passenger service. There is, of course, the comfort of absence of smoke, soot and cinders, transit through the mountains are clean and fast. In the summer, observation cars may be fitted with electric fans for comfort.

Other advantages are increased operating ease and economy, reduced wear on rails and equipment, maximum of cold weather service and, for the most part trouble-free handling of traffic in districts that normally present tremendous operating difficulties.

SPARKS FROM THE LOCOMOTIVE ON EXHIBIT

Passenger Type
Class

Pace...

Type of Service.............

Number in use.............

Length over all......

Total wheel base......

Rigil wheel base......

Total weight........

Weight on Drivers......

Per cent of weight on drivers......

Averuge weight per driving axle......

Diameter of driving wheel......

Diameter of guiding wheel......

Number of driving axles......

Continuous tractive effort at 20 k. p. hour......

Continuous tractive effort at 15 k. p. hour......

3,900 b. h.

Tractive effort available at starting ..... 114,450

Throughout the entire electrification system of 656 miles, the entire 3,000-horsepower of copper is used in the different facilities involved.

First Again and Again—

THE MILWAUKEE ROAD

First and only road to operate over its own rails from Chicago to New York via Indiana and Ohio, the Milwaukee Road is considered a model of efficiency. It is the only double-tracked line from Chicago to the Pacific Coast.

Due between Chicago and the Twin Cities—the only double-tracked route.

Due also to operate long distance trains between Chicago and the Twin Cities.

Due to use open observation cars on transcontinental services.

Due to use steam heat and electric lights on trains between Chicago and the Twin Cities.

Due to operate long distance trains by electric.

Due to use electric refrigeration in dining cars.

FAMOUS TRAINS

The OLYMPIAN—between Seattle-Spokane-Seattle.

The PIONEER LIMITED—between Chicago and St. Paul-Minneapolis.

The SOUTHWEST LIMITED—Chicago-Minneapolis—Golden-Russian Empire-Seattle.

The ARROW—Chicago-Milwaukee—Des Moines- Omaha-St Louis.

The COUNTRY LIMITED—between Chicago and Denver.

The SIoux—Chicago-Mason City-SiouxFalls, Mitchell-Sioux City.

The FISHERMAN—Chicago-Minneapolis—Manistee-St Louis.

GEO. B. HAYNES—PASSENGER TRAFFIC, Pacific Coast.

W. B. DIXON—GENERAL PASSENGER AGT., Chicago.