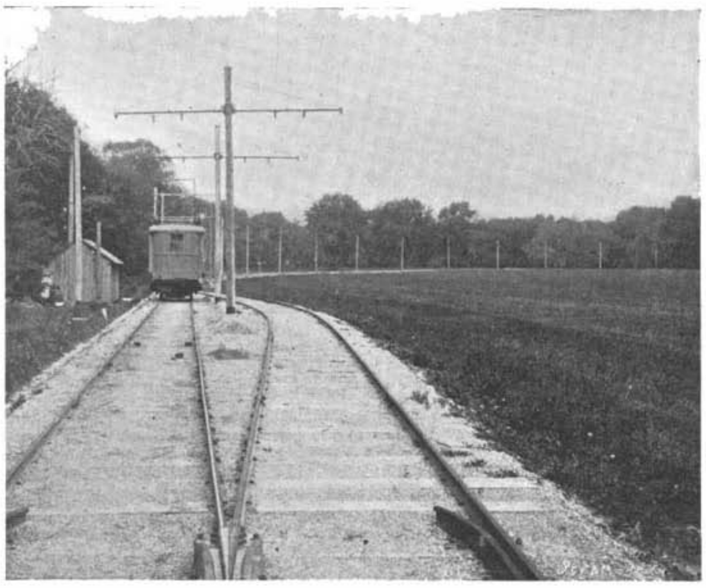
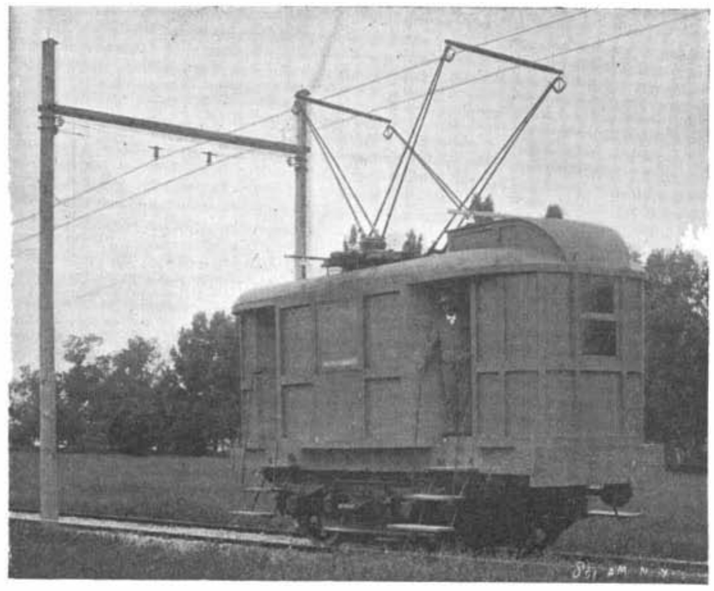
THE GANZ ELECTRIC LINE OF VALTELLINA.

In a very short time the electric line of Valtellina built by Messrs. Ganz & Co., of Budapest, will be opened to the public. The line has attracted no little attention among European electrical engineers, for the reason that it represents the very highest development of the Ganz three-phase high-tension system of electric traction.

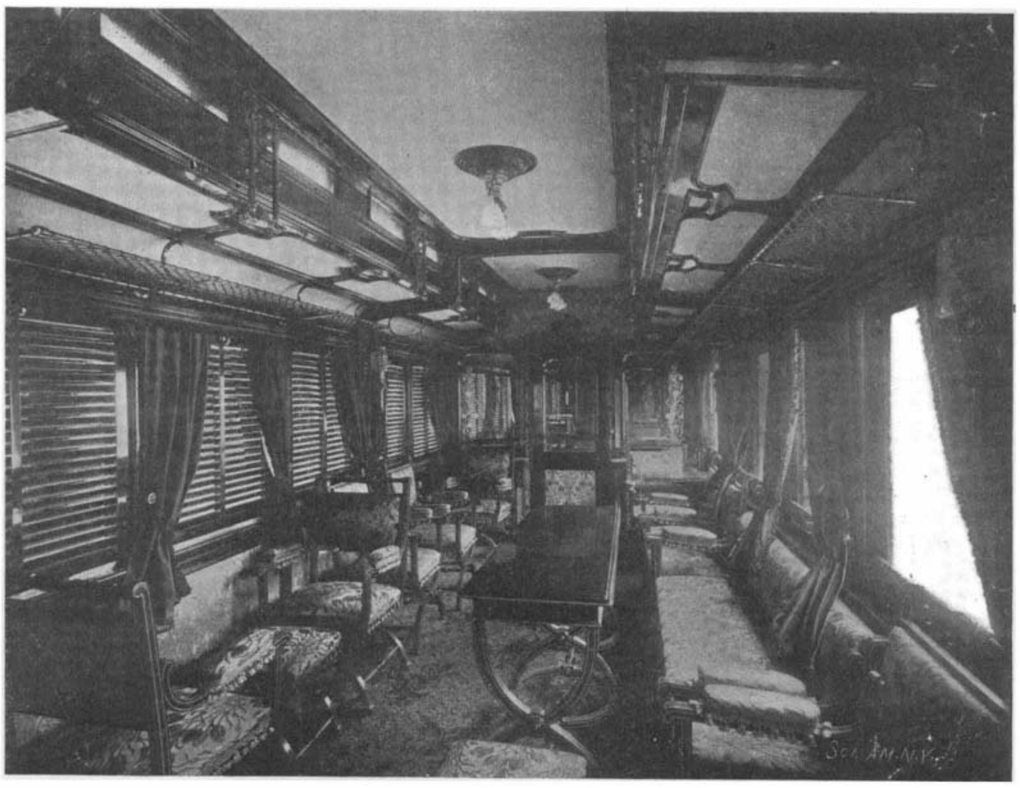


THE GANZ EXPERIMENTAL ROAD ON ALTOFEN ISLAND, NEAR BUDAPEST.



DUMMY CAR OF THE GANZ EXPERIMENTAL ROAD.

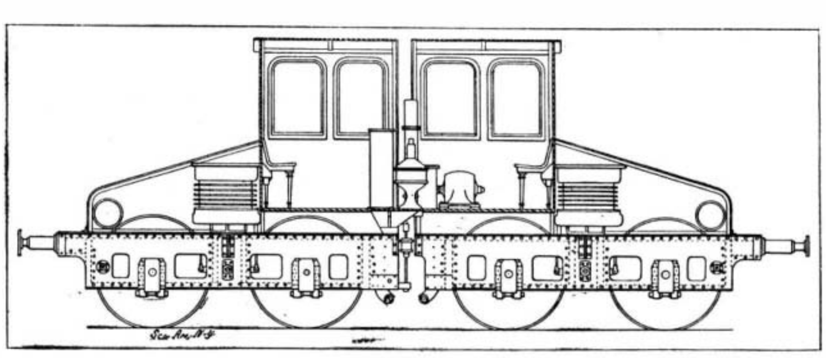
The Valtellina line is some 60 kilometers, or 38 miles in extent. Starting from Milan, it runs to Lecco, at the southeast corner of Lake Como, extends along the eastern shore to Colico, at the north end, and then branches off to Chiavenna on the north and to Sondrio on the east. The high-tension lines deliver the primary current of 20,000 volts to nine stationary transformers, which feed the current to the trolley wires and earth rail as three-phase current at 3,000 volts. The efficiency of transmission from the dynamo to the transformers averages 95 at full, 94 at the half, and 94 per cent at quarter load. Current is generated at a central station situated at Morbegno, between the Colico-Sondrio branch. Hydraulic power is used to develop electrical energy. Three turbines, each of 2,000 horse power, are directly coupled with three-phase generators, which supply the primary current of 20,000 volts.



INTERIOR OF CAR ON GANZ VALTELLINA ROAD.

For the line at Lake Como the motor cars are 18.1 meters in the carriage body and 19 meters (62¼ feet) over the buffers. The cars rest on two bogie-trucks, each truck having a wheel-base of 2½ meters. Without passengers a car weighs 50 tons, including the motors. The wheels are 1.17 meters in diameter, while those of the electric freight locomotives supplied to the same line have a diameter of 1.4 meters. The locomotive motor weighs 3.8 tons; its rotor about 1½ tons. The car-motors with a smaller size wheel weigh 3½ tons approximately. Each cascade pair of these motors develops a full-load horse power of 150, while the high tension motor itself, when running at full speed with the low tension motor cut out, yields about the same horse power. Thus, 300 horse power are developed in one truck carrying two pairs of motors, or 600 horse power (450 kilowatts) on one train with front and rear driving cars.

The current generated at the central station has a frequency of 15 per second. When running synchronously the high tension motors make 300 revolutions per minute. In the rotor of the same motor the periodicity of the induced currents varies according to the slip. During the start, when the high tension is switched into cascade connection with the low tension motor, after the speed has risen to "half speed," or 150 revolutions per minute—above which speed the cascade connection ceases—the periodicity of the currents in the rotor of the high tension and in the stator of the low tension is about 7½ per second. The speed of the locomotive motors is 125 revolutions per minute. The Valtellina locomotive motors are not geared in cascade; they are all high tension.



ELECTRIC FREIGHT LOCOMOTIVE FOR THE VALTELLINA ROAD.

The line will be used for the transportation of both passengers and freight. Passengers will be carried by the cars at a speed of 60 kilometers (37½ miles) per hour. The electric locomotives will be used for hauling freight trains. Each train will have a net weight of 250 to 300 tons. The speed to be attained will be about 30 kilometers (18½ miles) per hour.

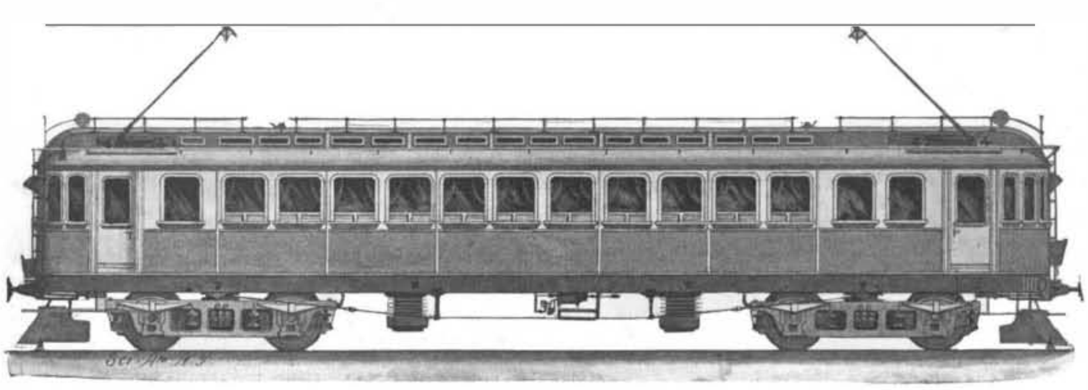
The commercial merits of the system are many. The initial outlay is not inordinate. The annual cost of maintenance is said to be comparatively small. For railways of considerable length and heavy traffic, less maximum power is required in the central station with the Ganz high tension distribution than with the necessarily low tension of continuous current distribution, the ratio of maximum to average load at the central station being less.

The electrical merits of the system are no less noteworthy, especially when the length of transmission from one central station is considered. By reason of the high voltage no large currents are used. The loss involved in converting to continuous current by rotary converters is eliminated. The use of pure induction motors without commutators, and the coupling of these in cascade pairs, results in a high motor efficiency.

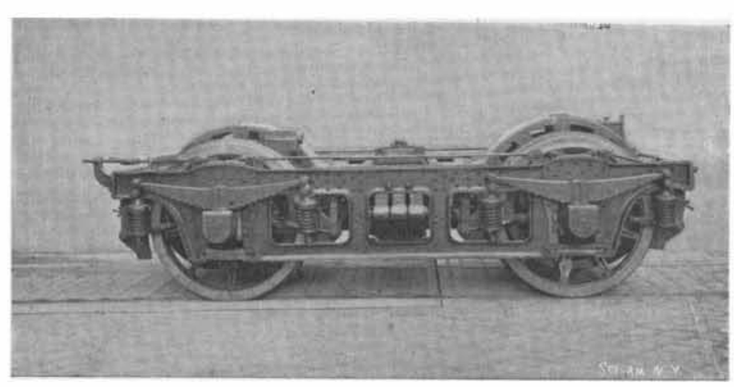
Our Mineral Resources.

A chart published by the Geological Survey gives a summary of the mineral products of the United States for the past ten years, says Bradstreet's. The aggregate values have increased by more than one-half in that period, and the figures for 1899 are greater than in any previous year, footing up the enormous total of $976,000,000. The value of the metallic products of the year is given at $527,218,084 and of the non-metallic at $447,790,862. The latter class includes, of course, the coals—$168,000,000 in bituminous and $88,000,000 in Pennsylvania anthracite—$64,600,000 in petroleum, $20,000,000 worth of natural gas and large value in stone, brick clay and cement, with various other minerals. Of the metals, our pig iron is worth almost as much as all others together, the value of the product in 1899 being given at $245,000,000. Copper comes next with $104,000,000, and the $71,000,000 in gold is third. The market value of the silver produced in 1899 was about $33,000,000 and the lead and zinc together were worth about as much. Quicksilver, aluminium, antimony, nickel and platinum are the other metals that figure in the table.

Applied on a burn, where the skin is not yet open, turpentine quickly alleviates the pain.



GANZ ELECTRIC CAR FOR THE VALTELLINA ROAD.



TRUCK OF A VALTELLINA CAR.