

A TROLLEY FOR HEAVY MULTIPLE-UNIT ELECTRIC TRAINS.

BY HERBERT L. BENNETT.

Electric railroading on the Pacific coast has been progressing at a more rapid rate than in any other portion of the United States during the last two years. This advance has not been along the well-established

practices for city lines alone, but much has been done in extra-heavy traffic for suburban service. The conditions met with have caused the engineers connected with these enterprises to do a great deal of original and pioneer work. Probably the most unique and absolutely successful device that has been developed is the trolley in use on the San Francisco, Oakland & San Jose Railway, commonly known as the Key route, which was designed and recently patented by Mr. John Q. Brown, the engineer in charge.

The conditions met with were most exacting, some of which we will mention here. A third-rail system was out of the question, as part of the road passed through streets of various towns and cities, including Oakland and Berkeley, with a combined population of 100,000. The ordinary trolley pole and wheel was entirely unsuited for the work, because at high speed the wheel would leave the wire, the direction of trains could not be reversed, such as in switching, without serious delay in reversing the trolley poles, and most important of all, the heavy currents could not be collected without severe arcing at point of contact. This road operates eight-car trains, weighing, approximately, 350 tons, and at speeds as high as fifty miles per hour, which require at times, approximately, 2,500 to 3,000 amperes to be collected from the overhead conductor. A device was required that, in addition to meeting the above conditions, would operate at high speed on curves without leaving the wire in any direction. Also it must have a range of not less than six feet in height for passing through subways and over surface railroad crossings. These requirements have all been more than met in this device, as it has been operating perfectly for one year, and is a great success.

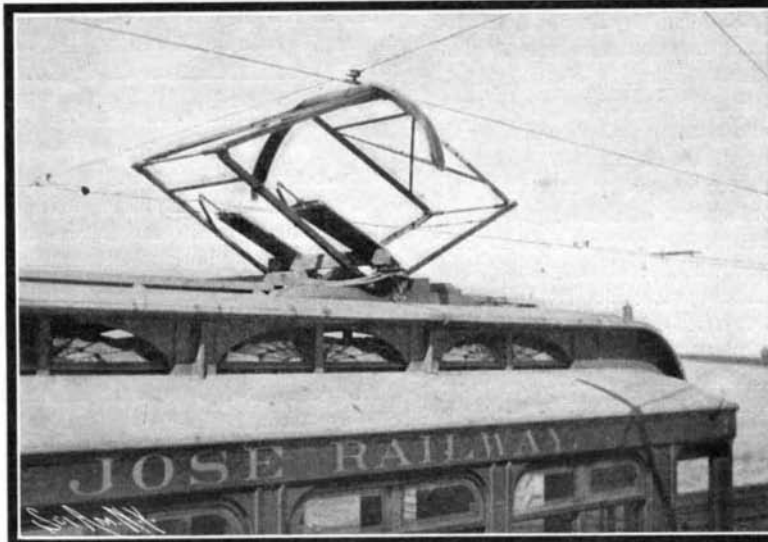
It has been found that it simplifies the overhead construction greatly, doing away with all trolley frogs and switches except at right-angle crossings, where a simple crossing of special design is used.

The wear on the trolley wire is less than that caused by the ordinary wheel, and the life of the roller which is used is not known, as the original rollers are still in service. These wear to a bright smooth surface, instead of being corrugated or pitted, as was expected.

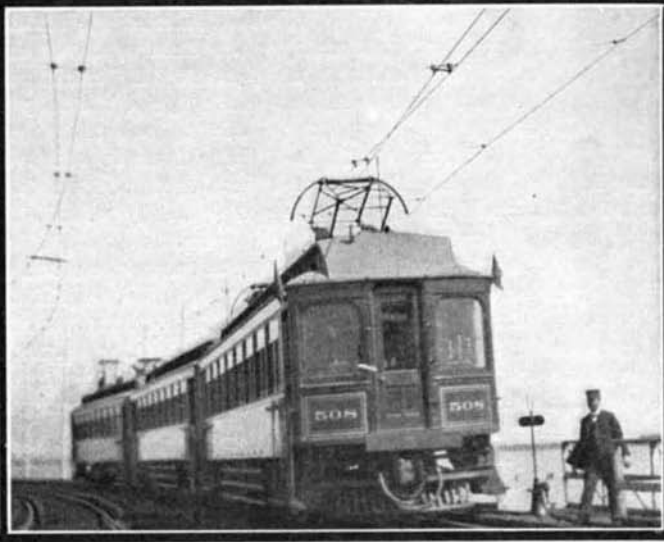
The device is practically noiseless when operating at any speed, owing to the fact that the roller is packed with non-resonant matter to destroy the vibration.

In Fig. 1 the trolley is shown in its normal condition upon the car. As readily noted, it consists of a double diamond frame of angle iron made up of four conjoined frames. These are connected on each side by elongated joints to give stiffness, while at top and bottom the frames terminate in segmental gears. The

gears at the bottom cause the side frames to move in unison, while the gears at the top keep the guards always in a vertical position, as shown. The roller is carried at the top on a shaft, the ends of which are fastened rigidly in a casting to which the guards are secured and on which pivot the segmental gears. The roller is made of 24 inches of 5-inch non-arc metal



The Roller Trolley as Mounted on a Car.



Multiple-Unit Train Fitted With Roller Trolleys.

AN IMPROVED ROLLER TROLLEY FOR HEAVY ELECTRIC TRAINS.

tubing with hubs in each end, which have graphite bushings forming the bearing. These bearings are lubricated with oil carried in a cavity in the hub. The guards, which are essential to the satisfactory operation at branch-off wires, are made of sheet steel pressed into the required shape. The arrangement of the tension springs, which keep the roller in contact with the overhead conductor, is worthy of notice. The springs are in practically the same plane as one side of the bottom frame, and secured as shown. This arrangement gives practically a uniform upward pressure on the roller for all positions of the trolley wire, those now in use operating with a pressure of 24 pounds.

Fig. 2 shows a three-car train at a branch track, the trolley having picked up the branch-off wire. It also shows that two trolleys are used on each train of two or more cars, as such an arrangement always insures a continuous and low-resistance circuit to the motors.

The Key route has twenty-six of these trolleys in use, and one other road has arranged to install fourteen.



Fig. 1.—The Apparatus Complete in its Original Form.

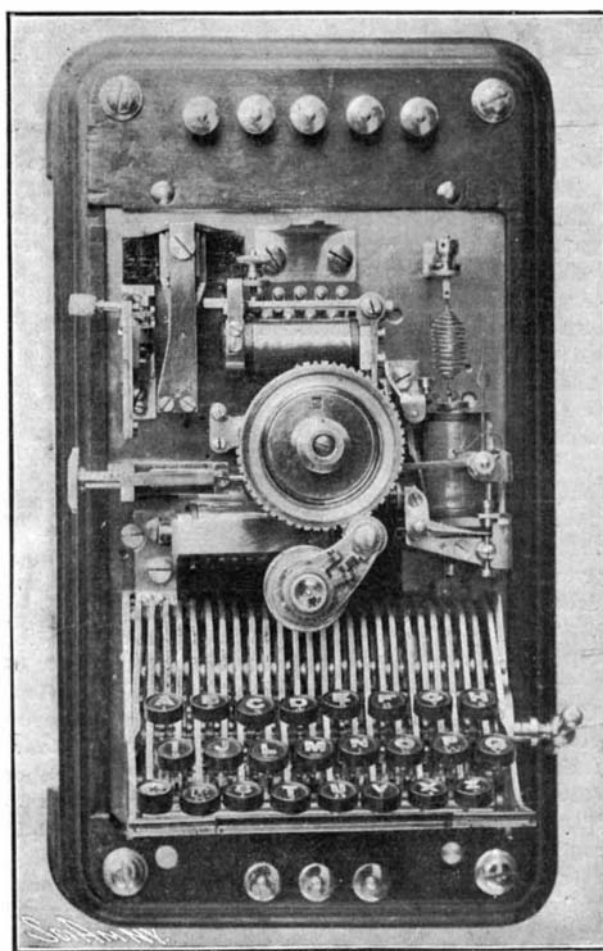


Fig. 2.—The Apparatus with Cover Removed, Showing Interior Mechanism.

THE MALCOTTI TELECRYPTOGRAPH FOR TELEGRAPHING ON TELEPHONE LINES.

To Secure Fulton's Birthplace.

An effort is being made to secure the house in which Robert Fulton was born, and in which he lived for a great many years, at Lancaster, Pa., that it may be preserved in its original condition. The house stands to-day just as it did when the inventor of the steamboat resided in it.

THE MALCOTTI TELECRYPTOGRAPH FOR TELEGRAPHING UPON TELEPHONE LINES.

BY EMILE GUARINI.

To develop the telegraph and put it within reach of everybody, to install private lines for the use of the public, of administrations, and of business houses, and even to create, by this method of communication, a

valuable auxiliary to the telephone—in a word, to popularize it as well as the latter—is a question that seems to be the order of the day, to judge by the interest that the daily technical press is taking in the subject.

We know that one of the weak points of the telephone is that it leaves no trace of the communications exchanged, and is therefore incapable of receiving in the absence of the subscriber; and that another is that it in no wise assures the secrecy of such communications.

In England, Italy, and France, to speak of these countries alone, this inconvenience has given rise to frequent complaints, inquiries, and lawsuits.

But it seems that such difficulties have finally been obviated, since almost simultaneous announcements have been made of the advent of several apparatus of more or less recent invention, to which the journals attribute characters nearly in common, and the accounts of which would almost lead us to believe that they write or print communications simply spoken in the telephone. At Brussels it is the telecryptograph of Engineer Malcotti, at Berlin the teletype and the Heljes apparatus, and elsewhere the Gruhu telautograph, the teledactylograph, etc., without counting the new systems of telegraphy and telephony with which also the press has for some time been occupying itself.

With this true chaos of new inventions confronting us, it will perhaps prove of interest if we present a summary of the true state of the question, of which the great importance must not be forgotten. If it is desired to extend the use of the telegraph, this can be done either by installing special private lines in the principal cities or else by using telegraphic apparatus in connection with the telephones upon telephone lines that already exist. These two problems are substantially different, for, although some regular telegraph system may be made to solve the first, this is not the case with regard to the second. The apparatus derived from the Hoffmann type, installed at Berlin by means of a special line having a central teletypic office, is an example of the first case, as is also the Heljes, a system derived from the Wheatstone and Hoffmann, and which an effort is now being made to introduce. This latter is a simpler apparatus than the preceding, and, since it operates by means of a magneto, it may prove very

useful to the army as well as in the operation of railways, and for private telegraph lines. Large business houses and administrative offices may have need of a printing telegraph apparatus for communicating with each other; but it may be seen that such a necessity is rather relative, especially when we think of the prejudicial dualism that might occur between the