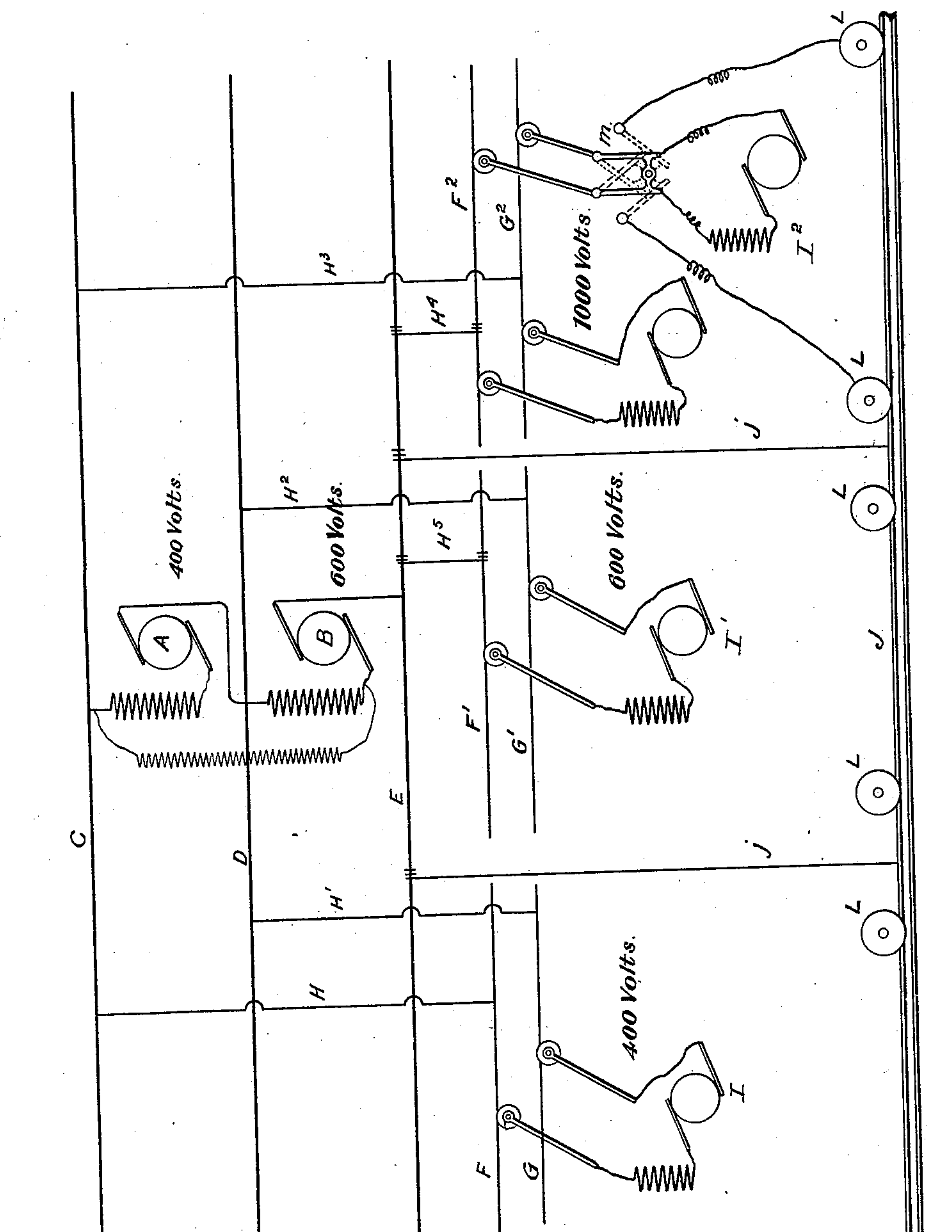
(No Model.)

J. C. HENRY.

ELECTRIC RAILWAY SYSTEM.

No. 560,265. Patented May 19, 1896.



Witnesses

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JOHN C. HENRY, OF WESTFIELD, NEW JERSEY.

ELECTRIC-RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 560,265, dated May 19, 1896.

Application filed November 26, 1895. Serial No. 570,191. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. HENRY, a citizen of the United States, and a resident of Westfield, in the county of Union and State of New Jersey, (but now temporarily residing in the city of Denver, county of Arapahoe, State of Colorado,) have invented certain new and useful Improvements in Electric-Railway Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to the letters of reference marked thereon, which forms a part of this specification.

My invention relates to electric railways; and its object is to provide an improved system of distribution whereby the advantages of what is called the "three-wire system" may be availed of, and at the same time the potential on different sections of the line may be kept at different voltages, in order to meet different requirements as to speed, grade, and load. In my Patent No. 543,382, of July 23, 1895, I have described a system whereby the electrical pressure from a three-wire or compensating source of supply is maintained at different voltages on different sections of the road as the local conditions may require.

The present invention is an amplification or an improvement on the patent referred to. It permits of the use of three different voltages along the line of way. In it current is supplied from the terminal of a three-wire or compensating system, where the dynamos may be of different potentials. One section of road is supplied with current from one of the dynamos at four hundred (400) volts, another section may be supplied from the other dynamo at six hundred (600) volts, while the third section may be supplied with current from the two dynamos in series at one thousand (1,000) volts. In order to economize in the copper supply, I prefer to connect one of the outside mains from said source of supply to the track-rail or to other parallel metallic mediums, such as gas or water pipes, so that they may assist in carrying the current, avoiding the necessity of such heavy copper mains as are commonly used. With this construction it is obvious that the compensating or neutral conductor and also the supplemental conductor, which is connected to the track-rail, may be small.

While my invention will be described in connection with electric railways, it is also particularly applicable to vehicles which do not run on railroad-tracks—such as electric wagons, carriages, &c.

The main object of the invention is to provide for the use of higher electromotive forces, so that the current may be transmitted longer distances without increasing the losses. Such a potential as herein referred to being considered beyond the danger-line, I propose to surround it with safeguards which have not heretofore been applied. In my experience with electric cars operated under five hundred volts, and at a less pressure, I have noticed an element of danger which would make me hesitate about employing in regular practice a potential of, say, one thousand volts, where the current was grounded or taken to the track-rails through the ironwork of the car. I have on different occasions experienced quite a severe shock when stepping from the ground to the car. Car-wheels do not always make good electrical contacts with the track-rails. The mud on the track becomes vitrified from the arc and heating effect of the contact and becomes an insulator. In such a case, where the terminals of the motor are connected to the metal work of the car, a portion of the current is liable to be shunted through the brake-gearing, dash-railing, and car-handles, through the passenger boarding the car having one or both of his feet on the ground. I have also noticed that passengers stepping from the motor to the trail-car also received a shock. In this case it was evident that the wheels of the trail-car made better electrical contact with the track-rails than did those of the motor-car.

In the invention I am about to describe, while I use the track-rails to supplement one of the main feeders to help carry the current, the car-wheels do not make electrical contact with them, except in the special cases to be hereinafter referred to. Ordinarily the motors are completely insulated from the running-gear of the car, and the passengers are not exposed to any of the dangers incident from this increased proposed potential.

In the drawing, A represents a dynamo arranged to give a potential of, say, four hundred (400) volts. B represents a dynamo arranged to give a potential of six hundred (600) volts. The two dynamos are connected together in series somewhat in the manner shown in my Patent No. 543,382, of July 23, 1895. The several terminals are connected to the continuous supply or feeder conductors C D E, which extend along the line of way, to which are connected at intervals the sectional working conductors F G, F G′, and F G^2 through the medium of branch conductors H, H′, H^2, H^3, H^4, and H^5. The road may be divided into sections, as at I, I′, and I^2. In the section I the motor receives current at four hundred (400) volts. On the section I′ it receives current at six hundred (600) volts, while on the section I^2 it receives current at one thousand (1,000) volts.

J represents the track-rails, which are connected to the continuous-supply conductor E by branch wire *j*.

L L L L L L represent the motor-car wheels. The sectional working conductors of the same sign may be connected together, so that in all cases they will help carry the current to other motors in the same system. I prefer, however, to make them sectional, but long enough so that each one may accommodate a number of cars and have numerous connections with the feeders. It will be understood that the motors ordinarily take current from insulated working conductors, which may be in the form of overhead wires, surface conductors, closed or open conduits. I use the term "insulated conductors" to distinguish from systems where the car-wheels are in electrical contact with the track-rails.

In order to avoid the liability of delay caused by accident to one of the trolleys or the working conductors when the cars are on the sections having the double overhead trolley-wires, I supply each car with a supplementary switch, which will enable the motorman to connect either side of his motor to the track-rail and to run his car by connection with but one of the working conductors.

In the section I^2, M represents a switch for the purpose referred to.

Having thus described my invention, what I claim as new is—

1. In an electric railway, a system of current distribution having sources of supply of different electromotive force, coupled together in the three-wire or compensating system, working conductors divided into electrically-separate sections, and conductors leading from said coupled sources of supply to different sections of the road, and arranged so that one predetermined section is connected with one side of a three-wire system; another section connected with the other side of the three-wire system, and a third section that may be connected with either side or in series with both sides as desired.

2. In an electrical distribution system for traveling vehicles where the energy is obtained from the several terminals of a three-wire or compensating system, feeders arranged along the line of way, sectional conductors connected to said feeders and so arranged that one predetermined section is connected with one side of a three-wire system; another section connected with the other side of the three-wire system, and a third section that may be connected with either side or in series with both sides as desired.

3. In an electrical railway system where the car takes current from a pair of insulated conductors located in line with the roadway, one of said conductors being connected to and having its current-carrying capacity supplemented by the track-rails, with which the traveling contact is not in direct traveling connection, substantially as described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

JOHN C. HENRY.

Witnesses:
OLNEY NEUELL,
MARY HAMPTON LLOYD.