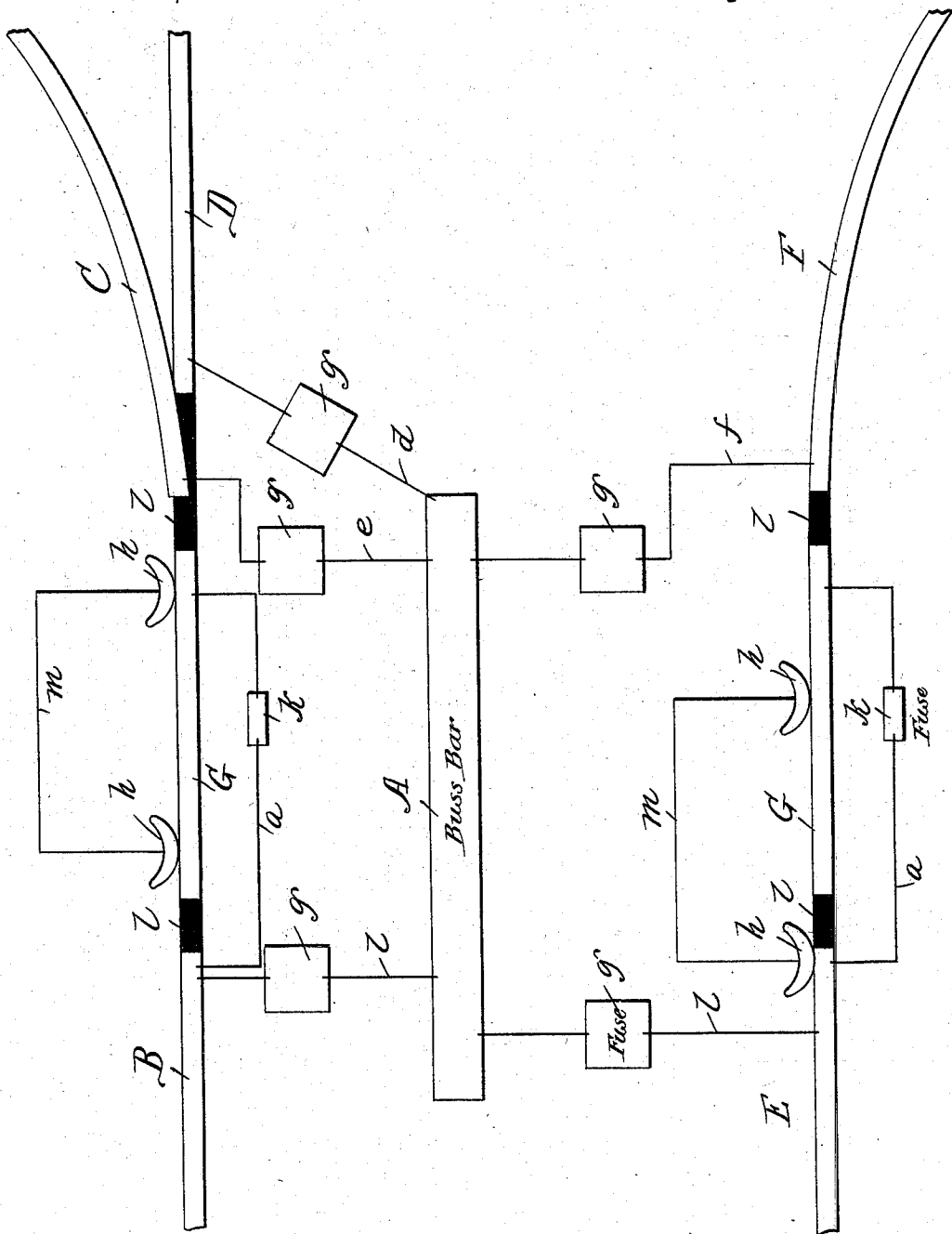


(No Model.)

H. M. BRINCKERHOFF.
ELECTRIC RAILWAY SYSTEM.

No. 558,033.

Patented Apr. 14, 1896.



Witnesses.

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UNITED STATES PATENT OFFICE.

HENRY M. BRINCKERHOFF, OF CHICAGO, ILLINOIS, ASSIGNOR TO CARTER
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ELECTRIC-RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 558,033, dated April 14, 1896.

Application filed June 13, 1895. Serial No. 552,625. (No model.)

To all whom it may concern:

Be it known that I, HENRY M. BRINCKERHOFF, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Electric-Railway Systems, of which the following is a specification.

This invention relates to electric-railway systems.

10 In the practical construction and operation of an electric railroad, where current is supplied to the entire road from a central station, it is the practice to divide the road into a number of sections and to supply each section with the current necessary to operate
15 the cars through an independent connection with the source of electricity. The purpose of this arrangement is to avoid stoppage of traffic throughout the entire length of the
20 railroad by reason of a break or short-circuit in any portion of the road.

It is the object of the present invention to provide an arrangement of the meeting ends of the sections comprising a railroad.

25 The invention consists, substantially, in the construction and arrangement of parts, combination, and relative location, all as will be more fully hereinafter set forth, as shown in the accompanying drawing, and finally
30 pointed out in the appended claims.

The drawing illustrates diagrammatically in plan the application of the present invention to a railroad comprising a number of different sections.

35 In the drawing, reference-sign A designates the bus-bar of the central station and into which generators of the station feed.

Reference-signs B, C, D, E, and F designate the conductors of the various sections of the
40 road. Each conductor is in electrical connection with the bus-bar A through its own individual and independent connection *b*, *c*, *d*, *e*, and *f*, respectively, in order to supply said conductors independently with the current
45 necessary to supply and operate the cars on said respective sections. In each connection *b*, *c*, *d*, &c., is arranged a circuit-breaker *g*, having a current capacity equivalent to the maximum amount of current required to operate
50 all the cars in any one section of the road.

Reference-sign *h* indicates the contact-

shoes, or trolleys, or wheels mounted upon each car, and reference-sign *m* designates the wiring on the car.

Heretofore it has been customary to arrange 55 the terminals of the conductors B, C, D, E, or F adjacent to each other. Take, for instance, conductors E F, belonging to different sections of the road. It has been the custom heretofore to arrange the meeting ends 60 of these conductors adjacent to each other, and to interpose between the two a short block of wood or other suitable insulating material in order to effect a smooth travel over the joint of the contact-shoe or trolley. 65 This arrangement is unsatisfactory and objectionable, and particularly where the lighting and heating circuits of the car are supplied from the same source of electricity as the motor, for in such cases there is a break 70 in the current as the trolley or contact-shoe passes from one section to the other. While this is not such a serious matter with the lighting and heating apparatus, although objectionable, it is a matter of serious consequence with regard to the motor on the car, requiring the motorman to exercise the greatest diligence and care in cutting out the motor from its supply-section when the car passes from one section of the road to the other, and 80 in such cases the failure to exercise the greatest possible care and attention will result in the motor-operating current being suddenly relieved from the motor and then turned on again at its full strength, thereby subjecting 85 the motor to undue stress and strain. This arrangement is objectionable and unsatisfactory, even aside from and in addition to the further objection that the momentum of the car must be depended upon to carry the car 90 past the joint, and becomes an even more serious matter when for any reason, by accident or otherwise, one section of the road should become dead or short-circuited or cut off from its supply-current, and one or 95 more contact-shoes or trolleys are carried at each end of the car, as in the forms illustrated in the drawing, and as is usually employed with the three-rail system of electric railways and particularly in elevated- 100 electric-railway constructions. In such a case the contact or trolley at one end of the car

being in electrical connection with a live section of the supply-conductor or third rail and the contact or trolley at the opposite end of the same car being in electrical connection with a dead section of conductor or third rail—
 5 as, for instance, a grounded section—the wiring on the car connecting the contacts carried by the respective ends of the car will act as a shunt for the live supply-conductor
 10 or third rail and will receive therethrough the full amount of the current carried by the live section of conductor or third rail—that is, the full maximum amount of current required to operate all the cars adapted to be
 15 run on any particular section of the road, instead of only that portion of current required to operate one car, which is the limit of capacity of the wiring upon each car. The obvious result of such an event would be the burning out of the wiring of the car through which the heavy current is shunted and possibly serious injury or burning of the car itself, and even if the car-wiring is able to stand the entire current the circuit-breaker of the
 20 other section would be thrown out, thus shutting down another portion of the road.

In order to avoid the objections noted, and to provide a construction and arrangement wherein a continuous current is supplied to the car either for motive, heating, or lighting
 30 purposes while passing from one section of the road to another, and in order to avoid the danger of passing a current of a strength beyond the capacity of the wiring upon a car through said wiring while passing from one
 35 section of a road to another or the shunting of the current from another section, thus defeating the very object of separate sections of road, I provide the following arrangement:
 40 Between the adjacent ends of adjoining sections of conductors—as, for instance, the sections E and F or B and C or B and D—I interpose a short section of conductor G. In the particular form and arrangement shown
 45 in the drawing I have illustrated my invention as applied to electric-railway constructions wherein the working or supply conductor B, C, D, E, and F comprise rails arranged parallel with and adjacent to the
 50 track-rails of the road, said track-rails forming the return or ground conductors. This is the arrangement usually employed in elevated-railway structures, and current is taken from the working-conductor rail by any suitable contact device taken by the car.
 55

In the drawing I have omitted illustration of the track-rails B, C, D, E, and F of the several road-sections. In the form shown the auxiliary sections of conductors G are arranged between adjacent or meeting ends of the conductor-rails B, C, D, &c., and the sections G should be of a length sufficient to receive thereon the contacts or trolleys carried on both ends of each car. Between the ends
 60 of the auxiliary section G and the ends of the adjacent sections B, C, D, E, or F are placed

suitable insulating-blocks L, in order that the contacts or trolleys may pass smoothly over the joints. The short auxiliary sections of conductors G are electrically connected
 70 through suitable connections *a* with one of the sections, as B or E, as shown, and arranged in each connection *a* is a circuit-breaker *k*, having a current capacity corresponding with the amount of current required
 75 to operate a single car.

By the construction above described where contacts or trolleys are carried upon each end of the car it will be observed that during the passage of the car from one section to another—as, for instance, from the section of
 80 road supplied by conductor E and the section of road supplied by the conductor F, as in the case illustrated—the wiring upon the car is continuously supplied with current and, too, without danger of supplying the wiring of the car with a greater amount of current than its capacity, as any additional current would cause the circuit-breaker K to break the connection between the short or auxiliary section
 90 of conductor G and the live section to which it is electrically connected. This condition continues whether the contact-shoes or trolleys are in electrical contact with the auxiliary or short section of conductor G or whether
 95 one of said shoes or trolleys is in contact with one or the other of said sections, as E F, and the other of said shoes or trolleys in contact with said auxiliary section G. If desired, section G may be supplied directly from the bus-bar by direct connection therewith of connection
 100 *a*.

It will be understood that the circuit-breakers *g* and *k* may be of any usual or well-known construction and arrangement, and the specific construction thereof forms no part of the present invention.

Having now described the principle of my invention and a mode of application thereof, and having explained its object and purpose,
 110 what I claim as new and of my own invention, and desire to secure by Letters Patent of the United States, is—

1. In an electric-railway system, wherein are employed two or more independent sections of road and an independent working conductor for each section, means whereby a car may pass from one of said sections of road to another without interruption of the current-supply and without danger of short-circuiting, consisting of an auxiliary conductor arranged between the meeting ends of the working conductors for said sections, means for supplying current to said auxiliary conductor; and a contact device carried by the car and adapted to make contact with said conductors, said contact device being of shorter length than said auxiliary conductor as and for the purpose set forth.

2. In an electric-railway system, wherein are employed two or more independent sections of road, and an independent working

conductor for each section, means whereby a car may pass from one of said sections of road to another without interruption of the current-supply to said car, and without danger of short-circuiting, consisting of an auxiliary conductor, independent of and insulated from said working conductors, means for supplying current to said independent conductor; and a contact device carried by the car and adapted to make contact with said conductors, said contact device being of shorter length than said auxiliary conductor as and for the purpose set forth.

3. In an electric-railway system, wherein are employed two or more independent sections of road, and an independent working conductor for each section, and as a means for bridging the space between the meeting ends of working conductors for successive sections of road, an auxiliary conductor at least equal in length to the distance between contacts carried on opposite sides of a car, and means for supplying said auxiliary conductor with current; as and for the purpose set forth.

4. In an electric-railway system, a central station, two or more sections of road, an independent working conductor for each section of road, means for independently supplying current from said central station to each of said conductors, and means whereby a car may pass from one of said road-sections to another without interruption of continuous-current supply and without danger of short-circuiting, comprising an auxiliary conductor arranged between the meeting ends of said working conductor, means for independently supplying current thereto, said auxiliary conductor being also in circuit with one of said working conductors, and cut-outs arranged in said auxiliary-conductor circuits; as and for the purpose set forth.

5. In an electric-railway system, a central station, two or more sections of road, an independent working conductor for each section of road, means for independently supplying current from said central station to each working conductor, of the capacity of all the cars upon said section of road, and means for supplying continuous current of the capacity of a single car during the passage of such car from one section of road to

another, whereby danger of short-circuiting is avoided; as and for the purpose set forth.

6. In an electric-railway system, a central station, two or more sections of road, an independent working conductor for each section of road, means for independently supplying current from said central station to each working conductor, of the capacity of all the cars upon said section of road, an auxiliary conductor arranged between the meeting ends of the conductors of successive road-sections, and means for supplying current to said auxiliary conductor of the capacity of a single car, whereby a car may pass from one section of road to another without interruption of the current, and without danger of short-circuiting through said car; as and for the purpose set forth.

7. In an electric railway, two or more sections of road, connections for supplying current independently to each section, a circuit-breaker arranged in each connection and of a current capacity equal to the total current supplied to said section of road, an auxiliary conductor arranged between the meeting ends of two sections, connections for supplying current thereto, and a circuit-breaker arranged in said connections, and of a current capacity equal to the current required for a single car; as and for the purpose set forth.

8. In an electric-railway system, a central station, two or more sections of road, main conductors for supplying current to each section independently from said central station, an auxiliary-conductor section insulated from but arranged to bridge the space between the meeting ends of said sections, and of a length adapted to receive the contacts carried by each end of the car, and means for supplying said auxiliary-conductor section with current required by only one car, whereby a car may pass from one section of road to another without interruption of the current; as and for the purpose set forth.

In witness whereof I have hereunto set my hand this 10th day of June, 1895.

HENRY M. BRINCKERHOFF.

Attest:

S. E. DARBY,
JUDSON LATTIN.