J. BELZNER, Jr.

OVERHEAD CONTACT SYSTEM FOR ELECTRIC RAILWAYS.

APPLICATION FILED JAN. 5, 1909.

959,197. Patented May 24, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

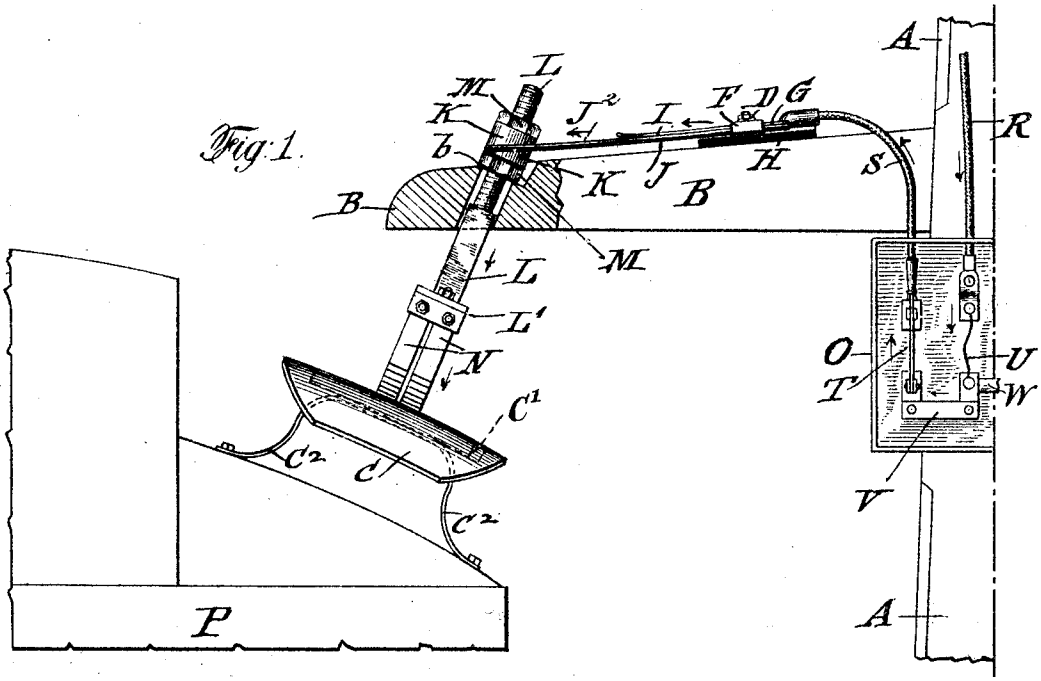


Fig. 3.

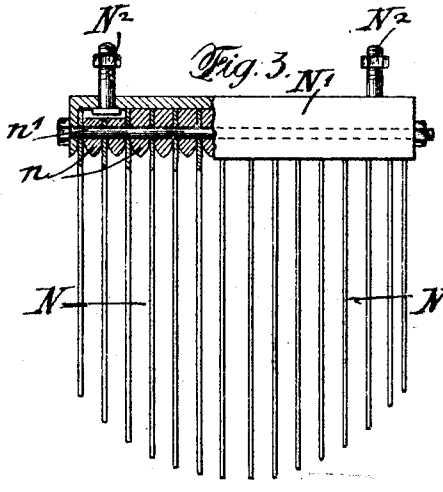
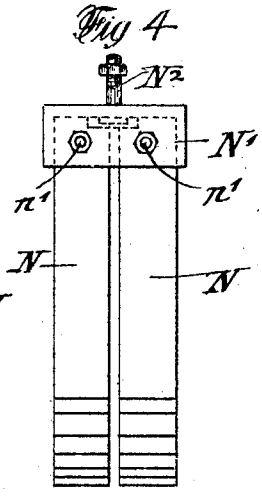


Fig 4



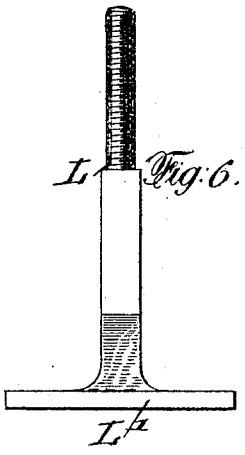


Fig. 5

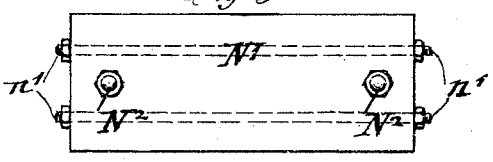
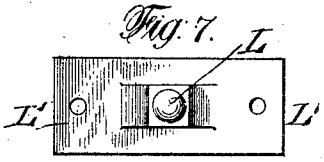


Fig. 7.



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2 SHEETS—SHEET 2.

Fig. 8.

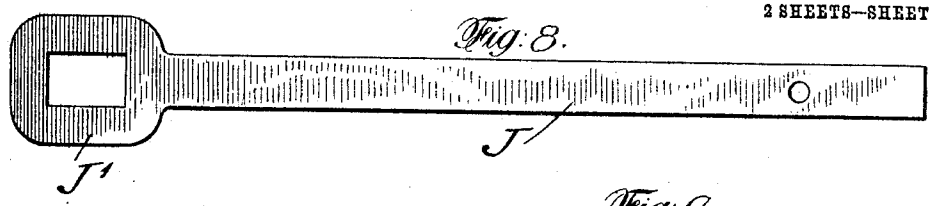


Fig. 9.

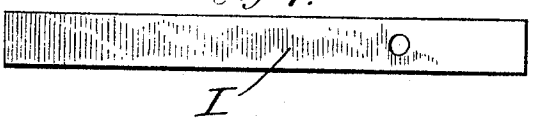


Fig. 10.

Fig. 11.

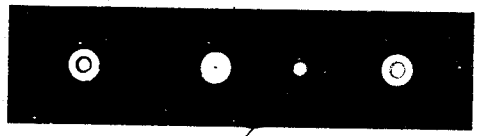


Fig. 16

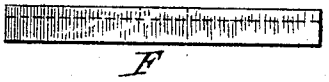


Fig. 12.

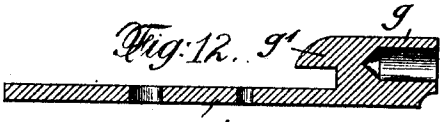


Fig. 13.

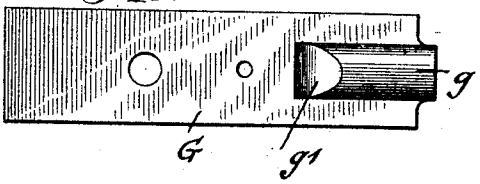


Fig. 17.

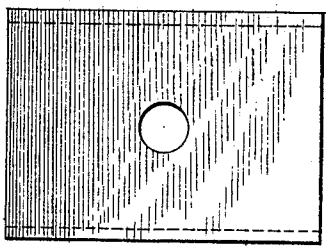


Fig. 2.

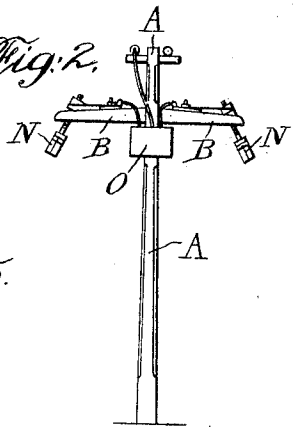


Fig. 14.

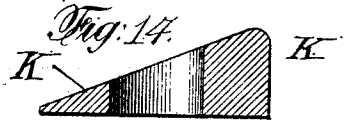


Fig. 15.

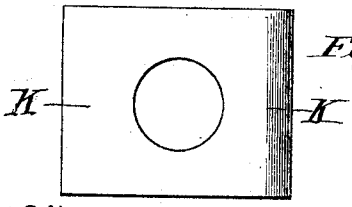


Fig. 18.

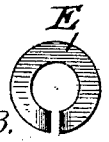
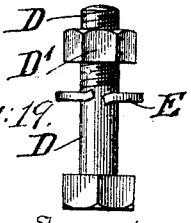


Fig. 19.



Witnesses:

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UNITED STATES PATENT OFFICE.

JULIUS BELZNER, JR., OF MOUNT VERNON, NEW YORK.

OVERHEAD CONTACT SYSTEM FOR ELECTRIC RAILWAYS.

959,197. Specification of Letters Patent. Patented May 24, 1910.

Application filed January 5, 1909. Serial No. 470,755.

To all whom it may concern:

Be it known that I, JULIUS BELZNER, Jr., a citizen of the United States of America, residing in Mt. Vernon, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Overhead Contact Systems for Electric Railways, of which the following is a specification.

This invention relates to an improved overhead contact system for electric railways in which, in place of the well-known third rail arranged alongside of the track, a contact-rail is arranged on the top of and on each side of the dome of the car so as to connect with stationary brushes supported on upright poles between or alongside of the tracks and by which the current is conducted to the contact-rail and from the same to the electric motor under the car and back by one of the track-rails to the central station. This contact system makes possible the electrification of railways generally, for passenger and freight service, without the elimination of grade-crossings.

The invention consists of an overhead contact-system for electric railways which comprises a contact-rail on the top of the car, a contact-brush supported by a brush-bar on a laterally-projecting arm of a pole, and means for connecting the contact-brush by an intermediate spring-actuated conductor and a switch with the feed-wire.

The invention consists further of the specific construction of the overhead contact-rail, the contact-brush, the intermediate current-conducting spring-plates, and the switch and fuse between the feed-wire and the conducting spring-plates, as will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a side-elevation, partly in vertical transverse section, showing the connection of the contact-rail with the contact-brush, and the connection of the latter with the conducting spring-plates, switch and fuse with the feed-wire, all supported on a pole located between the tracks, Fig. 2 is a front-elevation, showing a pole with my improved system attached, Figs. 3, 4 and 5 are respectively a detail side-elevation, end-elevation and top-view of the contact-brush, Figs. 6 and 7 are respectively a detail side-elevation and top-view of the brush-supporting bar, Figs. 8 and 9 are detail top-views of the conducting plate and steel-spring for the brush-bar, Figs. 10 and 11 are respectively a detail vertical section and a top-view of the insulating block for the conducting plate and steel-spring, Figs. 12 and 13 are respectively a detail vertical section and a top-view of the copper terminal plate for the conducting plate and steel-spring, Figs. 14 and 15 are respectively a vertical section and a top-view of one of the beveled collars for making connection between the brush-arm and the conducting plate, Figs. 16 and 17 are respectively a side-elevation and a top-view of the metallic plate for holding the conducting plate and steel-spring in position, Fig. 18 shows a top-view of the nut-locking washer of the nut-and-bolt connection between the steel-spring, terminal plate and insulating plate, and Fig. 19 shows a side-elevation of the nut, bolt and washer assembled.

Similar letters of reference indicate corresponding parts throughout the different figures of the drawings.

Referring to the drawings, A represents an upright pole which is located between the tracks, and which is made of reinforced concrete, steel, iron or wood.

On the upright pole A is arranged, at the proper height, a cross-arm B, which is preferably made of hard wood, and which is securely attached to the pole. Below the connection of the cross-arm B with the pole A is arranged a switch-box O, which is connected by a tap R with the feed-wire that is supported on the pole, near the top of the same. In the switch-box is arranged a switch T of the ordinary construction, while a fuse U is interposed between the tap R and a copper plate V, which latter connects the lower end of the fuse U with the lower part of the switch, as shown in Fig. 1. A copper-plate W connects the fuse U with the fuse of the adjacent switch-box for a second contact-brush supported on the cross-arm and which extends to the opposite side of the pole A. The switch T is connected by a second tap S with a copper terminal plate G, which is supported on an insulating block H on the upper inclined surface of the cross-arm B. The terminal plate G is provided with a socket g for the tap S and with a nose g^1 adjacent thereto into which latter a copper conducting plate J and a covering spring steel-plate J^2 of the same size and shape as

the conducting-plate J, and a shorter sheet spring-plate I are inserted, said plates being attached by a box-shaped steel-plate F, bolt D, nut D^1 and lock-washer E to the copper terminal plate G and insulator-block H, as shown in Fig. 1. The steel spring-plate I is made shorter than the conducting plate J, which extends over the cross-arm and is provided with an enlarged end-portion J^1 having an opening, said opening embracing the upper end of a brush-bar L, which is held in position by means of perforated wedge-shaped collars K, respectively above and below the enlarged portion of the conducting plate J, which collars are shown in detail in Figs. 14 and 15. The upper threaded portion of the brush-bar L extends through the collars K and is firmly held thereon and on the conducting plate J by regulating screw-nuts M, one above and one below the collars K, as shown in Fig. 1. The brush-bar L extends through an inclined opening *b* in the cross-arm B, which opening is made somewhat larger in diameter, so as to permit the free up and down motion of the bar L in the same. The lower end of the brush-bar L is made of square shape, as shown in detail in Figs. 6 and 7, so as to move freely in the opening in the cross-arm and give a certain freedom of motion to the same, while preventing it from turning on its axis or the so-called side-turning. The base of the brush-arm L is made in the shape of an elongated plate L^1 to which the contact-brush N is attached. The contact-brush N is made of two sets of parallel steel-plates, as shown in Fig. 4 and fastened by bolts to a box-shaped support N^1 which is again attached by bolts N^2 to the base-plate of the brush-arm L; the steel-plates are separated from each other by means of intermediate blocks *n*, which are connected with each other and the steel plates by means of transverse fastening bolts n^1, as shown in Fig. 3. The lower ends of the steel-plates of the contact-brush N form contact with a contact-rail C, which is preferably made of a convex iron plate that is supported on a longitudinal block C^1, of wood, which is attached to rigid rail-supports C^2 of inverted V-shape, that are attached at their middle portion to the block C^1 and at their lower ends to the roof of the passenger or other car P, as shown in Fig. 1.

The arrows in Fig. 1 show the course of the current from the feed-wire to the contact-rail on top of the car, from which contact-rail a tap carries the current to the switch in the cab of the motorman, and from the same to the motor. From the motor the current is conducted to one of the track-rails and along the same back to the central station.

The contact-brushes are located at a sufficient elevation above the track to clear the cars of the maximum height running on the tracks, and the contact-rails on the cars are of sufficient height to form contact with the brushes.

The spring-plates supporting the brush-bar are for the purpose of imparting the required degree of resiliency to the contact-brushes as the same pass evenly and in full contact over the contact-rails on the cars. The contact-rails are curved downwardly at the ends of the car, so as to permit the convenient passage of the contact-rails on the cars from one contact-brush to the other on the cross-bars of the poles. The spacing of the poles and cross-arms and contacts around curves is left to the judgment of the constructing engineer.

The advantages of my improved overhead system for electric railways are, first, that ice, snow, sleet or rain cannot affect the system; second, that all the electric connections are made in a reliable manner by the use of solid copper-contact; third, that the system can be used for both alternating and direct current by the proper insulation; fourth, that all possible danger to the passengers and employees is eliminated as the contacts are all located above the reach of the same; fifth, that repairs can be readily made on the contacts, without danger to the workmen, by opening the switch and cutting off the current; sixth, that the overhead contact-system, when applied to freight-cars, eliminates all danger to employees while they are on top of the cars in the performance of their duties; seventh, that the contact-rails on the top of the cars are of sufficient width to insure a reliable contact when the cars are in motion, due to the oscillations and listing of the cars; eighth, that the cost of the construction of the overhead contact-system is materially less than that of the third-rail construction, especially on the two-track system, where one pole can be used to feed the system for both tracks, whereas in third-rail construction two separate rails are required, one for each track; ninth, that this contact-system can be used in connection with the present third-rail system when extending the lines, as it is especially adapted for long distance haul; and, tenth, that the losses caused by leakage and resistance are reduced to a minimum in the transmission of power, as compared with those of the third-rail construction.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. An overhead contact-system for electric railways, comprising a cross-arm having an opening and supported by the side of the track, a brush-bar loosely passing through said opening, yieldable means secured to the upper end of the brush-bar and to the cross-arm at a point intermediate its ends for holding the brush-bar in the opening, a

contact-brush at the lower end of the brush-bar, and a conductor connecting the yieldable means with a feed-wire.

2. In an overhead contact-system for electric railways, a contact-brush consisting of a box-shaped support open at the bottom, closed at the top and having side and end walls, a plurality of contact-plates with their upper ends fitting in the support transversely from side to side, blocks located between said plates, said plates and said blocks filling the support from end to end, and bolts passing through the end-walls, the blocks and the plates.

3. In an overhead contact-system for electric railways, the combination of a cross-arm supported by the side of the track and having a squared opening at its end, a squared brush-bar loosely passing through said opening, a yielding resilient conductor secured to the upper end of the brush-bar and to an intermediate point of the cross-arm, a conductor connecting the yielding conductor to the feed-wire, and a contact-brush on the lower end of the brush-bar.

4. In an overhead contact-system for electric railways, the combination of an upright pole, a cross-arm on said pole, a brush bar, a contact-brush supported on said brush bar, a switch connected with the feed-wire, a copper conducting plate connected with the upper end of the brush-bar, steel spring-plates above the conducting plate, a terminal plate for said plates, an insulating block between the terminal plate and cross-arm, means for attaching the terminal plate, conducting plate and spring-plate to the insulator and cross-arm, and a conductor connecting said terminal plate with said switch.

5. In an overhead contact-system for electric railways, the combination of an upright pole, a cross-arm supported on the same and having an opening, a copper terminal plate on the cross-arm, an insulating-block below the terminal plate, a conducting plate on said terminal plate, steel spring-plates above the conducting plate, means for attaching the spring-plate and terminal plate to the conducting plate and insulator, a brush-bar provided with a threaded upper end adjustable in the opening of the cross-arm, said brush-bar being provided with a square lower part and a base-plate, and contact-brushes attached to the base-plate.

6. In an overhead contact system for electric railways, the combination of an upright pole, a cross-arm supported on the same and having an opening, an insulating-block on said cross-arm, a terminal plate on said insulating block, a copper conducting-plate, having an enlarged and perforated end, steel spring-plates above said conducting plate, means for attaching the conducting plate and spring-plate to the insulating-block, a brush-bar provided with a threaded upper portion passing through the opening in the cross-arm and the perforation in the enlarged end of the conducting plate, beveled collars above and below the outer end of the conducting plate, regulating screw-nuts above and below the collars, a base plate at the lower end of the brush-bar and a contact-brush attached to the lower end of the said base-plate.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

JULIUS BELZNER, Jr.

Witnesses:
Paul Goepel,
Henry J. Suhrbier.