

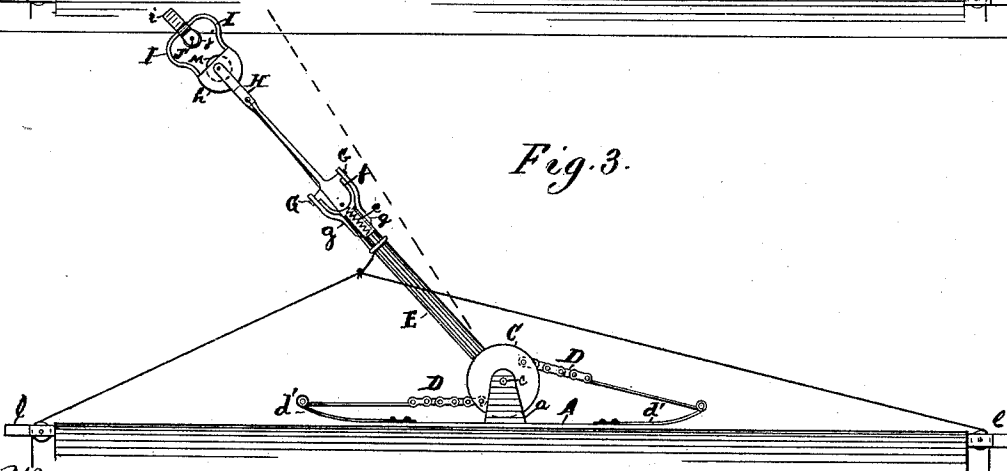
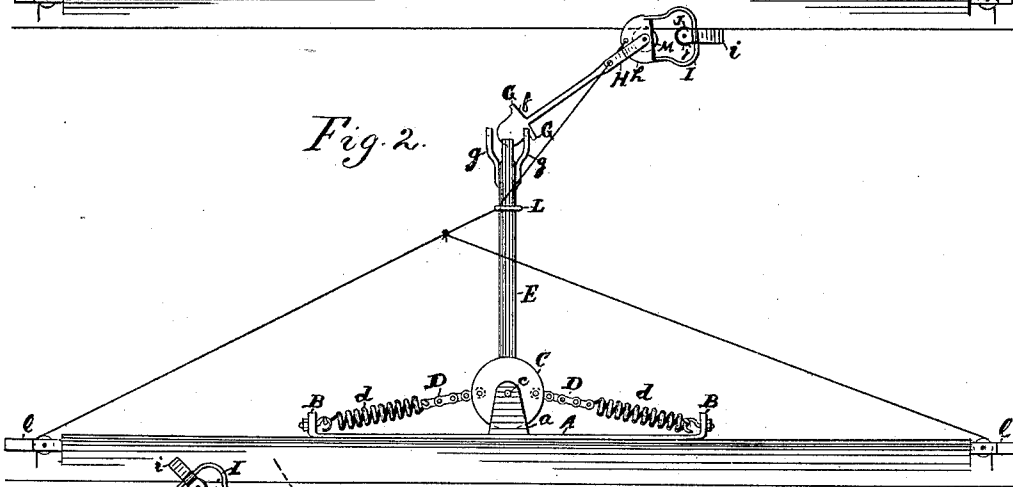
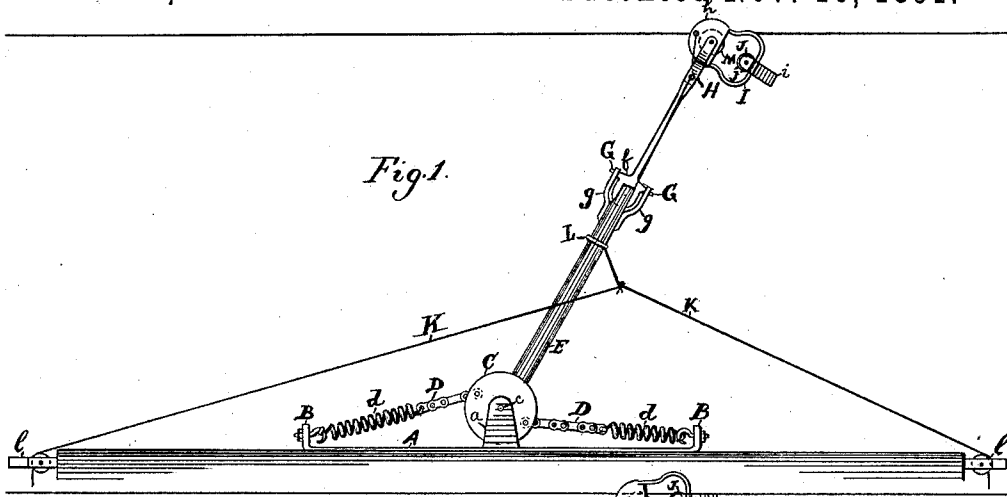
(No Model.)

2 Sheets—Sheet 1.

J. W. BATES & C. E. BLAKE.
REVERSIBLE ELECTRIC TROLLEY.

No. 463,024.

Patented Nov. 10, 1891.



Witnesses
Gerald D. Raymond
J. H. Stone

Inventors
Joseph W. Bates
Charles Grant Blake
by E. J. Fennell
att.

(No Model.)

2 Sheets—Sheet 2.

J. W. BATES & C. E. BLAKE.
REVERSIBLE ELECTRIC TROLLEY.

No. 463,024.

Patented Nov. 10, 1891.

Fig. 4.

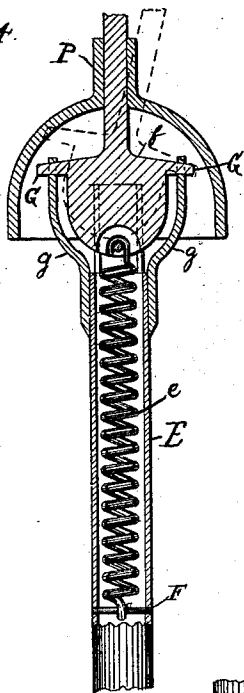


Fig. 6.

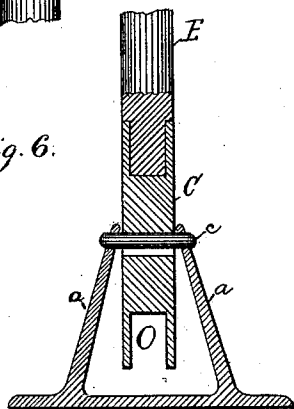


Fig. 5.

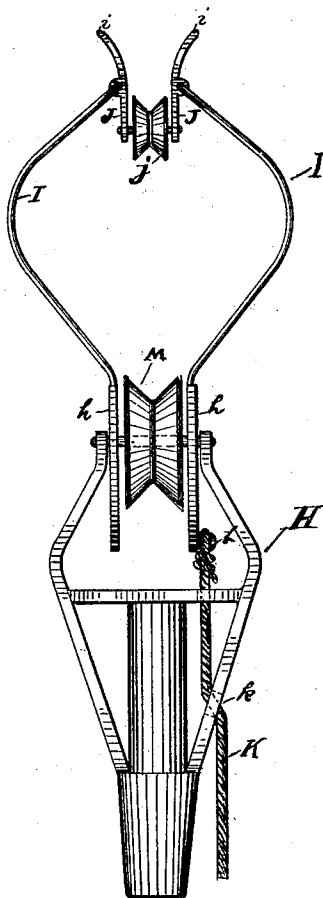
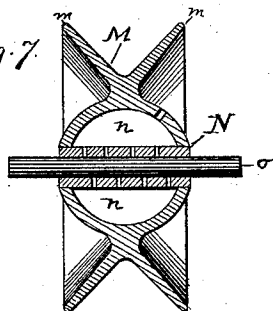


Fig. 7.



Witnesses

George D. Raymond
J. R. Stone

Inventors
Joseph W. Bates
Charles E. Blake
by E. J. Fenwick
att.

UNITED STATES PATENT OFFICE.

JOSEPH WM. BATES AND CARLOSTINE ERASTUS BLAKE, OF MINNEAPOLIS,
MINNESOTA.

REVERSIBLE ELECTRIC TROLLEY.

SPECIFICATION forming part of Letters Patent No. 463,024, dated November 10, 1891.

Application filed December 22, 1890. Serial No. 375,544. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH WM. BATES and CARLOSTINE ERASTUS BLAKE, citizens of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented new and useful Improvements in Reversible Trolleys for Electric Railways, of which the following is a description.

Our invention relates to improvements in a trolley and support or connecting-arm carrying a guide or wire-finder that is operated conjointly with the connecting-arm by means of a cord connected thereto, and the arm is normally held in a vertical position by an arrangement of tension-springs and bearings peculiarly adapted for that purpose; and the objects of our invention are, first, to afford facilities for the proper adjustment of the trolley without walking around the car or breaking the electric contact when reversing the direction of the movement of the car; second, to provide a trolley that can be suitably lubricated without constant watching. We attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side view of the entire machine; Fig. 2, a view to illustrate the operation thereof when reversing the trolley to the opposite end of the car; Fig. 3, a view showing the position of the connecting-arm and guide before the operator has slackened his tension on the cord, and the dotted lines represent the position of the arm after the operator has freed the cord. This view also shows our arrangement of a bow-shaped spring. Fig. 4 is a detail view, partly in section and in elevation, of the arm that contains the spiral spring and illustrating the connection of the upper part of the arm with the spiral spring, its operation being indicated by dotted lines. Fig. 5 is a front view of the trolley and guide when the cord is drawn tight. Fig. 6 is a detail vertical section and partial elevation of the lower end of the arm as fastened in a grooved wheel hinged loosely on a transverse axial pin carried by a support forming a part of the frame-work of the appliance; Fig. 7, a detailed cross-sectional view of the trolley-wheel.

Similar letters refer to similar parts throughout the several views.

The portion A, its projection B B, and the supports *a a* constitute the frame-work of the machine. In the supports *a a* swings the grooved wheel C on an axle *c*. To this wheel inside of the groove we fasten the chains D D, which connect the tension-springs *d d*, that are fastened to the frame-work A. When the trolley is lowered either forward or backward, the chains fit into the groove and have a tendency to keep the pole in a vertical position, as the side of the groove is in contact with the chain or connecting-link and acts at right-angles with the axis. To the wheel C is made fast the hollow arm E, containing the spring *e*, which is held at the lower end by the pin F. The upper end of the spring *e* is hinged to a half-circle *f*, having projecting points G G, that rest in grooves made in the bearings *g g*. The half-circle *f* forms the lower part of the upper portion of the arm, and is fitted into a slot having segmental bottom portions, one in front and the other in rear of the bore of the tubular portion of the arm made in the upper end of the lower portion of the arm. This is done to govern its operation when acted on by the cord and spring. On the top of the arm E we attach the trolley and guide, as shown in Fig. 5. The frame H, in which the trolley revolves, is made wide across its center or diamond-shaped for the purpose of giving the guide-bearings *h h* ample room to operate, also to prevent the guide I from resting on top of the trolley-wire if the trolley slips off the wire. The points *i i* of the bearings J J are extended out for the purpose of keeping the small trolley *j* in contact with the wire while reversing, as shown in Figs. 2 and 3, and thus avoiding the breaking of the electric contact while reversing the trolley. The guide either rotates on the trolley-axis or is made fast thereto, and the axis works in the frame H and is operated by the cord K, connected, preferably, by passing the rivet *b* through a piece of metal provided with a loop or eyelet, in which we fasten a piece of small round leather belting or other suitable material and extend it down through the hole *k* in the frame H. To this we connect the

rope K and pass it down through the loop L. We then connect the second rope thereto and pass an end over each of the pulleys *ll* on the ends of the car for the purpose of operating the arm, as shown in Fig. 2. The pulleys *ll* are arranged at the top of each end of the car centrally of its width. These pulleys or rope-guides are formed of two spring-jaws attached at their rear to the upper edge of the car at both of its ends centrally of the width of the car, and bent toward each other to form a circular loop slightly opened at its front end, and their ends bent outward to form a flaring opening for the ready insertion and removal of the trolley-reversing rope. Secured in the open-ended loop is a pulley or wheel over which the reversing-rope passes. The spring-jaws hold the rope in place on the pulley or wheel, and the pulley being secured at the ends of the car central of its width the rope is kept in a direct line and greatly facilitates the operation of getting the trolley-wheels in contact with the wire. The trolley is made hollow and is encircled with projecting flanges *mm* to receive the wire. Through the center of the wheel we pass a small perforated tube N after packing the hollow space *nn* with any suitable absorbent substance. Each end of the tube is fastened to the wheel and revolves on the axis *o*. The packing is filled with oil through a hole made in the wheel for that purpose. The frame-work portion can be pivoted on the car-top, but is preferably made rigid. The supports *aa* are wider between their ends joining frame portion A than where the pin *c* passes through them. The wheel C, provided with the groove O, has a larger opening through its center than the diameter of the axis *c*, thus providing ample lateral movement for the trolley and guide. P is a covering to exclude rain or snow from the spring *e*. (See Fig. 4.)

From the foregoing description it will be seen that by means of the tension-springs and chain connections of the jointed arm or trolley-wheel support the said arm is caused to keep the trolley-wheel in firm contact with the trolley-wire, while such contact is a yielding one; that the peculiar joint between the two parts of the arm allows the arm to shorten its radius during the reversal of the trolley-wheel, and this is accomplished by changing the fulcrum of the upper part of the arm either on the right or left side of a vertical line passing through the center of the tubular arm, and while this is taking place the parts are held from lateral separation at the joint by the peculiar construction of the parts, as hereinbefore described. This is a very important feature of our invention, and especially so in connection with the spiral spring, which connects the upper part of the arm with the lower part and is housed within the tubular part. Furthermore, the oscillating frame carrying an auxiliary contact-wheel enables us to maintain the electrical contact at all

times, and thus the lights of the car are kept from going out during the reversal of the trolley. This frame also facilitates the reversal of the trolley-wheel and aids in replacing the trolley-wheel upon the wire in the event of its becoming displaced, and in this operation it is aided by the points *ii* of the bearings J J, whose special office is that of keeping the small trolley *j* in contact with the wire while reversing.

Having thus fully described our improvements, what we do claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, with the trolley-wheel, of an oscillating reversing-frame provided with laterally-flared guides, the outer ends of which are made to converge and form a bearing or point of contact for the trolley-wire, the said guides serving as directors of the trolley upon the trolley-wire both on the right and left hand sides of the axis of the trolley, substantially as described.

2. The combination, with the trolley-wheel, of an oscillating reversing-frame provided with laterally-flared guides, the outer ends of which are made to converge, the said guides serving as directors of the trolley upon the trolley-wire both on the right and left hand sides of the axis of the trolley, substantially as described.

3. The combination, with the trolley-wheel and its supporting-arm, of an oscillating reversing-frame provided with upper and lower laterally-flared guides, the outer portions of said guides converging and connecting with a bearing carrying an auxiliary contact-wheel, the said guides serving as directors of the trolley and auxiliary contact-wheel both on the right and left hand side of the axis of the trolley, substantially as described.

4. The combination, with the trolley-wheel, of an oscillating reversing frame carrying an auxiliary contact-wheel, substantially as and for the purpose described.

5. The combination of the trolley-support, the trolley-wheel, the oscillating frame, and the reversing pull-ropes connected to the oscillating frame and extended right and left of the axis of said frame, substantially as described.

6. The combination of the trolley-wheel, the oscillating reversing-frame, the arm carrying said trolley and frame and constructed in two parts, one of which has a segmental connecting portion having projecting bearing-points and the other part having a semicircular bearing with grooved termini, substantially as described.

7. The combination, with the trolley-wheel, oscillating frame, and jointed tubular arm, of the spiral spring in the said tubular arm and connected to the upper portion of said arm, substantially as described.

8. The combination of the trolley, oscillating frame, jointed arm hung on a pivot so as to oscillate, the spiral spring connected to the upper part of said arm, the grooved pulley

around the pivot of said arm, chains or cords connected to the pulley and to tension-springs, and suitable means for oscillating the arm and the reversing-frame, substantially as described.

5 9. The combination of the downwardly-flared upper bearing-arms of the trolley-wheel and oscillating frame, whereby said trolley-wheel and frame are permitted to vibrate
10 sidewise, substantially as described.

10 10. The jointed trolley-arm, its lower portion being constructed with right and left fulcrum-bearings and the upper portion with right and left projecting bearing-arms, substantially as described.

15 11. The combination of the jointed oscillating trolley-supporting arm, the oscillating frame, the tension-spring means, and pull-cord extending to both ends of the car, whereby the trolley can be reversed without going
20 around the car, substantially as described.

12. The reversing-frame of the trolley, provided with bearings J J, having extended points *i i*, substantially as described.

13. The rope guide or pulley bent to form 25 an open-ended loop and having its front ends flaring for the ready insertion and removal of the trolley-reversing rope, a pulley or wheel within the open-ended loop over which the reversing-rope passes, substantially as de- 30 scribed.

14. A hollow trolley-wheel M, provided with an oil-supply hole, a perforated tube N, made fast at its end to the trolley-wheel and forming its bearing, a suitable absorbent *n n*, en- 35 circling said tube, and the axis *o*, substantially as described.

JOSEPH WM. BATES.

CARLOSTINE ERASTUS BLAKE.

Witnesses:

JOE HOEY,

P. S. BATES.