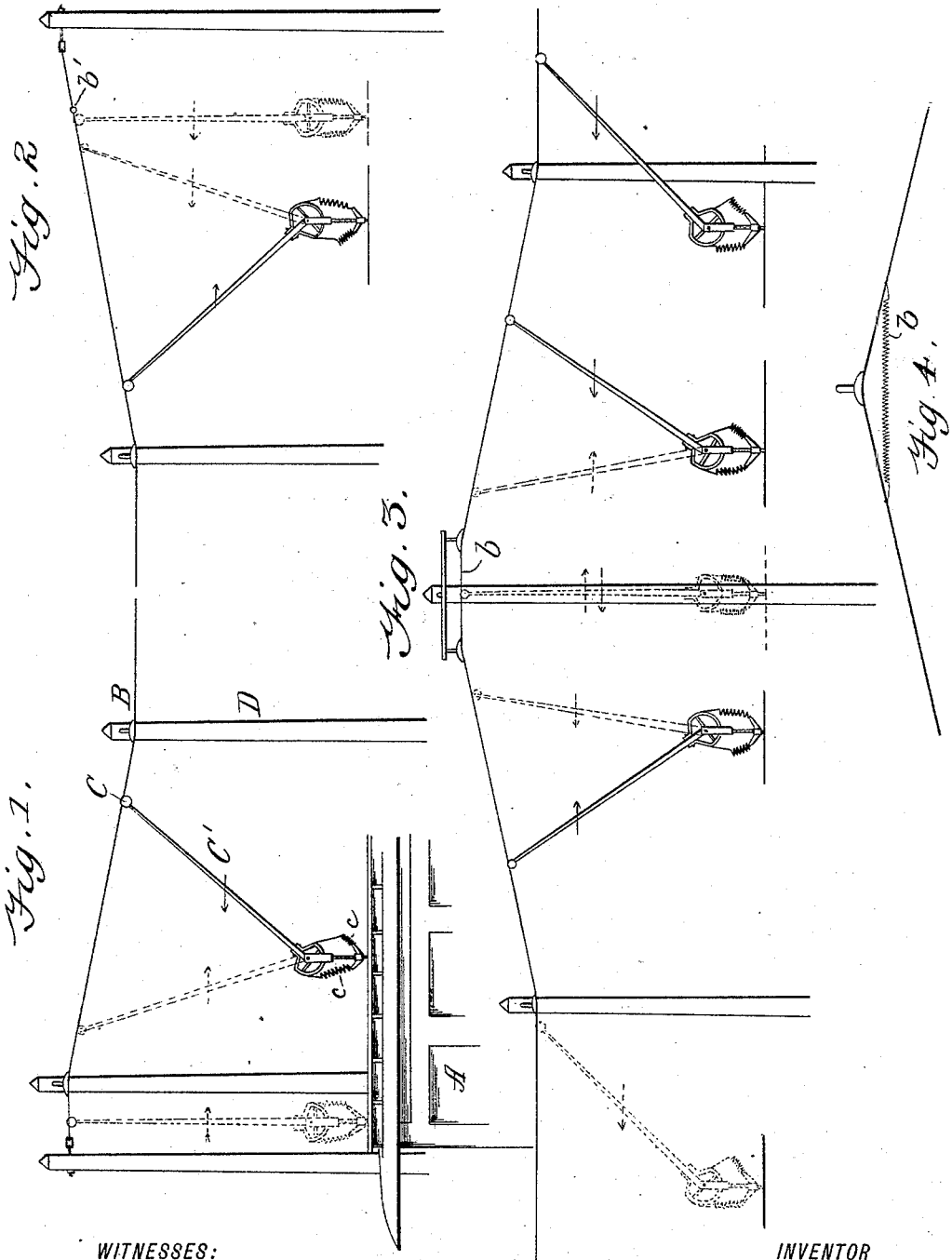
(No Model.)

H. P. ROBERTS.

REVERSING TROLLEY.

No. 422,976. Patented Mar. 11, 1890.



WITNESSES:

Frank S. Ober

Wm. A. Rosenbaum

INVENTOR

Henry P. Roberts

BY

W. J. Johnston

ATTORNEY.

UNITED STATES PATENT OFFICE.

HENRY P. ROBERTS, OF ROCHESTER, NEW YORK.

REVERSING-TROLLEY.

SPECIFICATION forming part of Letters Patent No. 422,976, dated March 11, 1890.

Application filed November 14, 1889. Serial No. 330,348. (No model.)

To all whom it may concern:

Be it known that I, HENRY P. ROBERTS, a citizen of the United States, residing in Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Electric Railways, of which the following is a specification.

My invention relates to electric railways in which the current of electricity is supplied to motors on the vehicles through an overhead conductor.

The invention has special reference to the collector or trolley, in combination with the overhead conductor arranged in a peculiar manner, whereby the trolley or trolley-arm is rendered automatically reversible.

The invention consists, essentially, of a trolley-arm having a tendency to assume a vertical position and carrying an under contact-trolley, in combination with an overhead conductor having a section or short length inclined upward and running to a height about equal to the height of the trolley-arm when in its vertical position. These inclined sections of the conductor are located at both ends of the line of road and at any intermediate points where it is desirable that the vehicles should reverse their direction of travel. So far as known to me there is no other automatically-reversing under contact-trolley in existence. As is well known, the trolley-arm, which carries an under contact-trolley, usually stands oblique to the top of the vehicle and the conductor and inclined backward from the direction of motion of the vehicle. Heretofore the under contact-trolleys have been reversed by hand and involved the use of a cord or system of rods and levers to first lower the trolley out of contact with the conductor and to then reverse its incline and again place it in contact with the conductor. In the dark or during a storm this is quite a difficult operation and often is the cause of a considerable loss of time, trouble, and other inconvenience. It will be seen that my invention entirely obviates this difficulty. I will describe it with reference to the accompanying drawings, in which—

Figure 1 represents a partial view of a car or vehicle fitted with a trolley bearing against an inclined section of the conductor at the end of the road and showing a short length of conductor arranged horizontally at the highest level of the incline. Fig. 2 is a similar view of the same apparatus, but with a stop fixed upon the inclined conductor to limit the movement of the trolley and to aid in its reversal. Fig. 3 is a view of a double incline placed at intermediate points along the line of road, and Fig. 4 is a view of a detail.

A represents a car or other vehicle carrying an electric motor which is supplied by electricity from the overhead conductor B through trolley C and trolley-arm C′. The conductor is suitably supported in a horizontal position by posts D or other means; but at the end of the line of road and at points where the vehicles reverse their direction of movement the conductor is inclined for a length, say, of about thirty feet. The inclines at each end of the road lead upward toward the end and will usually be made single; but those inclines located at intermediate points will be double—that is to say, first up and then down—as shown in Fig. 3. Now, the under contact-trolley, which I have shown in operation, when in its normal running position is inclined backward, and the tendency imparted to it by the two springs *c c* is to force it upward against the conductor, and, if left free, to make it assume a vertical position, or rather a position perpendicular to the roof of the vehicle; hence when the trolley runs onto one of these inclines in the conductor as it progresses it will gradually rise to its perpendicular position and at the same time maintain its electrical contact with the conductor. Now, if the car is brought to a standstill as soon as the trolley-arm becomes vertical, it is obvious that the motor may be reversed and the vehicle started off in the opposite direction or upon its return-trip, the trolley-arm being gradually forced to its backwardly-inclined position as it runs down the incline of the conductor. Ordinarily the inclines will be constructed as illustrated in Figs. 1 and 4—that is, with a short section *b*, say two or three feet—of horizontal conductor at the elevation where the trolley-arm is vertical, and a stop may be placed upon the car-track or any other means used to bring the car to a standstill in the proper position.

In the several figures the trolley-arms (shown in full lines) illustrate the positions

when traveling up the inclines or toward the reversing-point, while the dotted lines in all instances show the trolley traveling down the incline after reversal or in its vertical position and ready to move in either direction.

Fig. 3 shows the arrangement of the conductor providing for intermediate reversing-points. In this case the incline is double, one side running up to the short horizontal section *b* and the other side running from that downward to the normal level. With this construction, when the trolley is resting in contact with the section *b*, it is in a neutral position, where the vehicle may move in either direction without a manipulation of the trolley. From this it is obvious that the inclined lines at intermediate points do not affect the continuous running of the cars past them, while on the other hand they furnish a ready means for reversal. By placing an adjustable stop in the form of a ball of brass or rubber upon the incline, as shown at *b'*, at the point where the trolley-arm becomes vertical the incline may be continued a little higher to allow for trolleys of varying lengths. Besides this the ball aids somewhat in reversing the trolley.

As a further means for compensating for variations in the heights of the trolleys, due perhaps to inequalities in the road-bed or inaccuracy in the construction of the vehicles or trolley-arms, I propose to make the short length of conductor *b* a trifle slack, so that the wire will bear with its weight upon the trolley; or, in lieu of this, the slack wire may be substituted by a short length of coiled conductor forming a spring having a resiliency lighter than the force controlling the trolley-arm. This is shown in Fig. 4.

Having thus described my invention, I claim—

1. In an electric railway, an overhead conductor supported at intervals by suitable means, one or more of the supporting-points being at a different elevation from the other supporting-points, in combination with a moving vehicle and a trolley-arm secured to the vehicle and carrying an under contact-trolley, said trolley-arm having the tendency to assume a position perpendicular to the line of movement of the vehicle, substantially as described.

2. In an electric railway, an overhead conductor supported by suitable devices substantially parallel with the road-bed, the supporting-points at the extremities of the line being arranged at a higher elevation than the other supports of the line, in combination with a moving vehicle and a trolley-arm secured to the vehicle and carrying an under contact-trolley, said contact-arm having the tendency to assume a position perpendicular to the line of movement of the vehicle, substantially as set forth.

3. The combination, with an overhead conductor, of an under contact-trolley arm carried by a moving vehicle, said arm normally standing oblique to the conductor and having a tendency to assume a perpendicular position, said overhead conductor having portions of its length at intervals arranged at an incline, the highest point of which is the height to which the trolley-arm reaches when in a position perpendicular to the line of movement of the vehicle, for the purpose described.

4. The combination, with an overhead conductor, of an under contact-trolley arm carried by a moving vehicle, said arm normally standing oblique to the conductor and having a tendency to assume a perpendicular position, a portion of the overhead conductor being arranged to form two inclined lengths meeting each other at their highest point, this point being the height to which the trolley-arm extends when in a position perpendicular to the line of movement of the vehicle, as and for the purpose set forth.

5. The combination, with an overhead conductor, of an under contact-trolley arm carried by a moving vehicle, said arm normally standing oblique to the conductor and having a tendency to assume a perpendicular position, a portion of the overhead conductor being arranged to form two inclined lengths meeting at their highest points a short length of conductor parallel to the road-bed, the height of said short length being the height to which the trolley-arm extends when in a position perpendicular to the line of movement of the vehicle, as and for the purpose set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HENRY P. ROBERTS.

Witnesses:
J. E. ROBERTS,
CHARLES M. WILLIAMS.