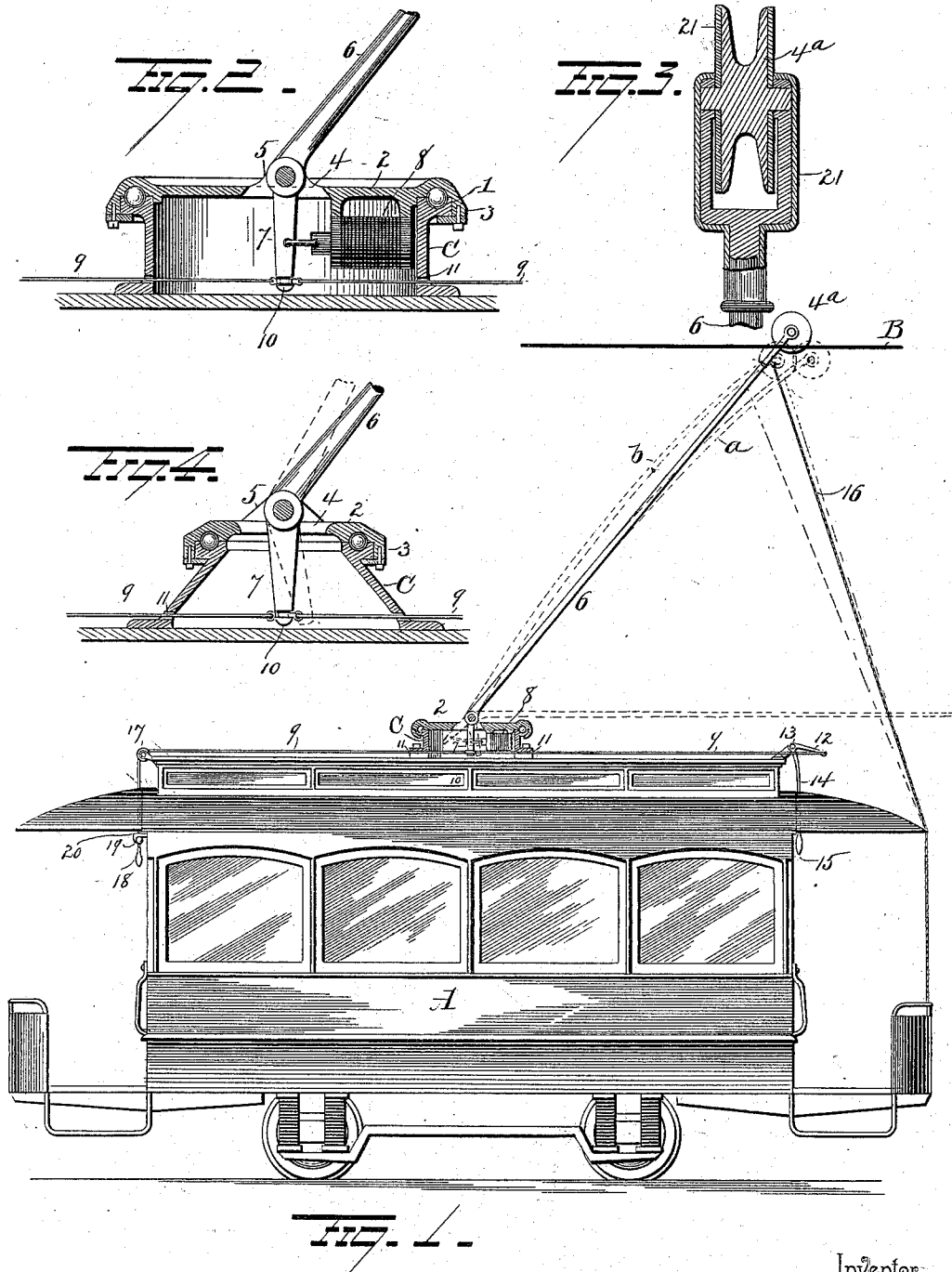


(No Model.)

H. A. SEYMOUR.
TROLLEY.

No. 562,494.

Patented June 23, 1896.



Witnesses
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TROLLEY.

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To all whom it may concern:

Be it known that I, HENRY A. SEYMOUR, of Washington, in the District of Columbia, have invented certain new and useful Improvements in Trolleys; 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.

My invention relates to an improvement in electric railways, and more particularly to trolley devices therefor.

Heretofore it has been the custom to pivotally connect a trolley-pole to the roof of the car and maintain the trolley-wheel at the free end of said pole against the wire with a necessary degree of pressure by means of strong springs. It has been found in practice that to properly maintain the trolley-wheel in contact with the wire when the car is running, a constant pressure of about eighteen pounds is necessary. The use of springs for the accomplishment of this purpose is accompanied by various objectionable features which, by my improvements, are obviated. The pressure exerted by a coiled spring is not uniform, and its tension varies with the power or force exerted to extend or compress it. The pressure with which a trolley-wheel is forced against a trolley-wire, therefore, varies as the trolley-pole is turned on its pivotal connection with car and the spring extended or permitted to contract. Should the trolley-wheel run on a slack portion of the trolley-wire, the minimum tension of the spring would be exerted against the pole and the pressure of the trolley-wheel against the wire at such time would fall below the degree of pressure which it is desired shall be maintained, and if the wire is very slack the result will be that the trolley-wheel will leave the wire. Thus it is apparent that the constant and unvarying degree of pressure which it is important and necessary shall be maintained by the trolley-wheel against the wire, in order to insure the continual contact of the wheel with the wire, cannot be had or insured by means of springs.

It has not infrequently happened that a trolley-wheel has left the trolley-wire in proximity

to a span-wire or other device extending transversely over the track and the trolley-wire, and when the wheel has thus left the trolley-wire, the pole has been thrown with great force by the springs against the span-wire, resulting in breaking the trolley-pole or some of its attachments or the span-wire or both and rendering it impossible for the car to proceed until the damages shall have been repaired, thus delaying traffic. These and other objections accompany the use of springs for the purpose stated, and it is the object of my invention to provide means for maintaining the trolley-wheel in contact with the conductor without the use of auxiliary springs or weights and to so construct and arrange the trolley-pole that it can be readily lowered onto the car-roof when the car is to be run under low places.

A further object is to so connect a flexible trolley-pole to a car that the trolley-wheel will be maintained normally in contact with the conductor without the use of springs or weights and to provide electrically-operated devices for causing the trolley-wheel to bear against the conductor with an adjustable pressure when the car is running.

With these objects in view the invention consists in the combination, with a pivoted trolley-pole, of devices under control of an operator for raising the trolley into contact with the conductor.

My invention further consists in the combination, with a pivoted trolley constructed to fall by its gravity, of means connected with the lower end of the pole by which the pole may be raised so as to bring the trolley into contact with the conductor.

The invention further consists in the combination, with a pivoted trolley-pole, of devices under control of an operator for raising and retaining the trolley at a point above its position when in contact with the conductor.

The invention also consists in the combination, with a pivoted trolley-pole, of devices under control of the operator for raising and retaining the trolley above the conductor, and separate means for depressing and guiding the trolley so as to engage the conductor.

The invention also consists in the combi-

nation, with a pivoted trolley-pole and devices under control of the operator for raising and lowering the pole and for locking it in its raised position, of an electromagnet for forcing the trolley into contact with the conductor; and the invention further consists in certain novel features of construction and combinations and arrangements of parts, as hereinafter set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view illustrating an embodiment of my invention. Figs. 2 and 3 are detail views. Fig. 4 is a view of a modification.

A represents a portion of an electric car, and B an electric conductor suspended above the track. An annular casting C is secured to the roof of the car and provided at its upper edge with a flange 1. A plate or turn-table 2 is revolvably mounted on the annular casting C and provided at its periphery with a depending flange 3, adapted to loosely embrace the flange 1 on the casting.

The plate or turn-table 2 is made in its center with a slot 4, at each side of which lugs or short standards 5 are located. Between said lugs or standards 5 a flexible trolley-pole 6 is pivotally connected at a point near its lower end, the lower portion 7 of said pole projecting within the annular casting C. At the free end of the flexible pole 6 a trolley-wheel or contact device 4^a is connected in any suitable manner and adapted to engage the conductor. A solenoid 8 (or electromagnet) is supported by the turn-table and the core or armature of said solenoid (or electromagnet) is attached to the trolley-pole below the pivoted support thereof, the coil of said solenoid (or electromagnet) being included in circuit with the electric motors on the car.

Cords, wires, or equivalent connections 9 are attached to a ring 10, swiveled on the lower end of the trolley-pole, and project through grooves 11, made in the base of the casting C, said devices extending in opposite directions from the pole to the ends of the car, where they may be attached to the forwardly-projecting arms 12 of bell-crank levers 13. Each bell-crank lever 13 is pivotally supported in suitable brackets on the roof of the car and the arm 14 thereof projects downwardly through the roof and forms a handle, which may be made to bear against the end 15 of the car. When not in use, the arm 14 will be disposed in a nearly horizontal position, and when it is moved down the lever will be turned on its fulcrum and cause the pole to be elevated.

When the bell-crank lever 13 is thus disposed, the trolley-pole will be locked in its upright position, as the cord or wire will be below the pivotal support of the lever 13 and the depending arm 14 of the latter will be forced against the end of the car, which forms a stop for it.

Normally, only one of the cords or wires 9

need be locked, the other cord or wire being left free.

It will be seen that when one of the cords or wires 9 is locked at the end of the car in the manner above explained, the trolley-pole will be held in an upright (diagonal) position. The parts will be so arranged and the pole made of such length that when thus held up the trolley-wheel will project slightly above the conductor. A cord 16 is attached to the pole near its upper or free end and by means of this cord the attendant will pull the free end of the pole down, so as to cause the trolley-wheel to engage the under face of the conductor, the inherent resilience of the pole serving to permit the trolley to yield and adapt itself to the variable conditions of the road-bed and conductor, and thereby be maintained in good contact with the conductor.

If desired, the solenoid may be dispensed with altogether and the construction of parts indicated in Fig. 4 be employed. In this construction the trolley-pole is raised and retained in its elevated position by means of the wire or other equivalent devices, which may be adjustably secured so as to lock the trolley-pole in its raised position at any desired angle of inclination and thus insure any desired degree of upward pressure of the trolley against the conductor when the trolley shall have been pulled down beneath the conductor and into contact therewith.

The trolley-wheel will be made to engage the conductor when the car is at rest sufficiently to insure a proper electrical contact therewith, by the resilience of the pole, as above explained, (the pole being bent, as shown by dotted lines *a*, Fig. 1,) and as soon as the circuit through the motors and solenoid is closed the latter will immediately become energized, suck in its core, and tend to cause the pole to turn on its fulcrum. The pole will be bent, as indicated by dotted lines *b* in Fig. 1, and the trolley-wheel will be pressed against the conductor with a force sufficient to maintain a proper contact therewith while the car is running.

From the construction and arrangement of parts above described it will be seen that in the construction wherein a solenoid is employed the upward pressure of the trolley-wheel against the conductor is effected by the solenoid and that such pressure is constant and unvarying. Should the trolley-wheel leave the wire while the car is running, the current through the coil of the magnet or solenoid would be immediately broken, the magnet deenergized, and the pressure of the wheel against the wire instantly relieved. Thus it will be seen that should the trolley-wheel leave the wire when the car is in proximity to a span-wire, as above alluded to, the trolley-pole would not be thrown violently against said span-wire because the pressure which forces the wheel upwardly would have been immediately relieved the instant the wheel

left the wire, as above explained. The pole would therefore strike the span-wire very lightly, and, being quite flexible, would yield and ride under the span-wire without injury, whereas, if springs were used for maintaining the maximum pressure of the wheel against the wire, the pole would be thrown violently against the span-wire with the disastrous result hereinbefore mentioned.

In order to prevent the trolley-wheel or its supporting-frame from making contact with the conductor, I provide the sides of the trolley-wheel with suitable insulating material 21, and also provide the supporting-frame of the trolley-wheel with a covering of insulating material. The object of insulating the sides of the trolley-wheel and its supporting-frame is as follows: Without such insulating material on the sides of the trolley-wheel and supporting-frame, whenever the trolley becomes accidentally disengaged from the conductor it will fly upwardly, and in the event the sides of the trolley-wheel or its supporting-frame should come in contact with the conductor, which would inevitably result, it would operate to close the circuit through the magnet, which would operate instantly to force the trolley upwardly above the conductor and render it very troublesome to pull it down and readjust it; but by insulating the sides of the trolley-wheel and its supporting-frame all such trouble is obviated, because the magnet is deenergized as soon as the trolley is disengaged from the conductor and is retained out of circuit until the trolley has been replaced, thereby rendering it perfectly easy to reengage the trolley with the conductor, and then, and not until then, will the magnet be energized and serve to force the trolley upwardly against the conductor.

Should it be desired to lower the trolley-pole to permit the car to run under a low place, such as a bridge or into a shed, the cord or wire will be released, by moving the depending arm 14 of the bell-crank lever outwardly or upwardly from the end of the car, whereby to turn said lever on its fulcrum, raise the arm 12 thereof, and move the cord or wire 9 above the pivotal support of said lever. The pole will then fall by gravity upon the car.

When the direction of running the car is to be changed, the turn-table will be given a half-revolution by means of the cord 16, so as to shift the position of the trolley-pole, and the cord or wire 9 at the opposite end of the car will then be locked in the manner above explained.

One or the other cord or wire will be locked except when the pole is to be lowered onto the car. There will be no necessity for releasing both of said cords or wires when the pole is to be shifted.

The bell-crank levers 13 may, if desired, be dispensed with, and the cords or wires passed over pulleys 17 and through suitable holes in the car-roof, as shown at the left of Fig. 1. When this construction is employed, the free

end of each cord will be provided with a knob or ring 18, and above each cord or wire is provided with a stop or button 19, adapted to engage an arm 20 on the car, whereby to retain the pole locked in its elevated position.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a pivoted trolley-pole mounted to have both vertical movement and lateral movement at its outer or free end, devices connected with the trolley-pole and leading to the end of the car for manually raising the free end of the trolley-pole, and means for securing the trolley-pole in its raised position, of means attached to the free end of the pole for moving it laterally, and for depressing the trolley and causing it to engage the under side of the overhead conductor, substantially as set forth.

2. The combination with a turn-table, a trolley-pole pivotally mounted thereon; devices leading to the end of the car and under the control of an operator, for raising the free end of the trolley-pole so that the trolley will project above the overhead conductor, and means for securing the pole in its raised position, of means attached to the free end of the pole for moving it laterally and for depressing the trolley and causing it to engage the under side of the overhead conductor, substantially as set forth.

3. The combination with a turn-table, a trolley-pole pivotally mounted thereon; devices leading to the opposite ends of the car and under the control of an operator for raising the trolley-pole from either end of the car, so that the trolley will project above the overhead conductor, and means for securing the pole in its raised position, of means attached to the free end of the pole for moving it laterally, and also for depressing and flexing its outer end and causing the trolley to engage the under side of the overhead conductor, substantially as set forth.

4. The combination with a turn-table, a trolley-pole pivotally mounted thereon and provided with an arm depending below its pivotal bearing; devices connected to said depending arm and leading to the opposite ends of the car and under the control of the operator, for raising or lowering the trolley-pole from either end of the car, and means for securing the pole in its raised position, of means attached to the free end of the pole for rotating it on its turn-table, and also for depressing and flexing its upper end and thereby causing the trolley to engage the under side of the overhead conductor, substantially as set forth.

5. The combination with a pivoted trolley-pole and devices under control of the operator for raising and lowering the pole and for locking it in its raised position, of an electromagnet for forcing the trolley into contact with the conductor, substantially as set forth.

6. The combination with a pivoted trolley-

pole, of a bell-crank lever and intermediate connections, whereby the bell-crank lever may serve to raise and lower the trolley-pole and to lock it in its raised position, substantially as set forth.

5 7. The combination with a flexible trolley-pole pivotally mounted on a car, and devices under the control of an operator for manually raising the trolley into contact with an over-
10 head conductor, of an electromagnet for forcing the trolley against the conductor with a pressure sufficient to maintain a good contact therewith when the car is running, substantially as set forth.

15 8. The combination with a turn-table, a trolley-pole pivotally mounted thereon, and devices leading to the opposite ends of a car and under the control of the operator for raising and lowering the trolley-pole, and posi-
20 tively securing it in its raised position, of means under the control of the operator for depressing the trolley or contact device carried by the trolley-pole and causing it to en-
25 gage the under side of the overhead conductor, substantially as set forth.

9. The combination with a turn-table; a trolley-pole pivotally mounted thereon, said pole being constructed and arranged to fall onto the car-roof by its own gravity, and de-
30 vices permanently connected with the pole for manually raising and lowering it from either end of the car, and for locking it in its raised position, of means attached to the free
35 tact device connected therewith, and for re-

versing the position of the pole while it is locked in its raised position, substantially as set forth.

10. The combination with a car, of a flexible trolley-pole pivoted to the car, a ring swiv-
40 eled on the lower end of said pole, cords or wires attached to said ring and means for adjustably securing the free ends of said cords or wire at the ends of the car, substantially
45 as set forth.

11. The combination with a car, of a turn-
table mounted thereon, a flexible trolley-pole pivotally connected to said turn-table and a
50 cord or wire attached at one end to the lower end of said trolley-pole and adapted at its
55 other end to be adjustably secured to the car, substantially as set forth.

12. The combination with a trolley-pole, and an electromagnet for forcing the trolley
55 against the conductor, of a trolley-wheel having non-conducting side faces, substantially
as set forth.

13. The combination with a trolley-pole and an electromagnet for forcing the trolley
60 against the conductor, of insulating material on the sides of the trolley and its supporting-
frame, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

HENRY A. SEYMOUR.

Witnesses:

C. S. DRURY,
R. S. FERGUSON.