(No Model.) 2 Sheets—Sheet 1.

F. S. SMITH.

TROLLEY ATTACHMENT FOR ELECTRIC CARS.

No. 556,941. Patented Mar. 24, 1896.

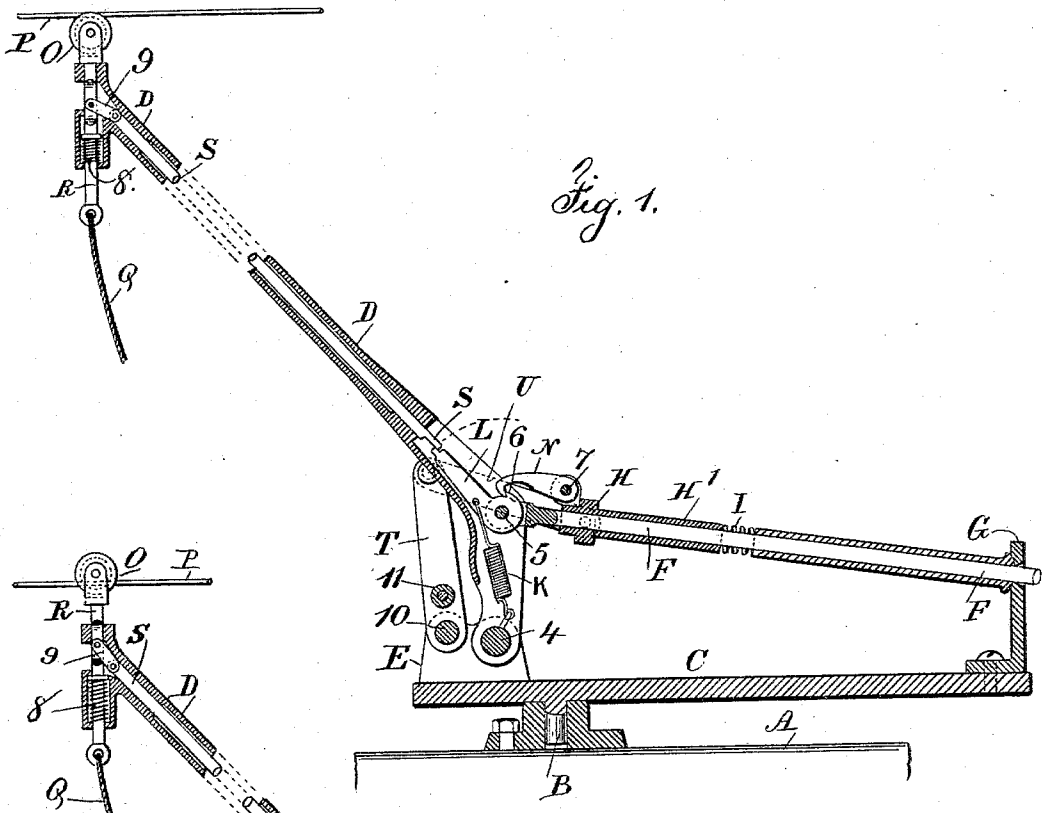

Fig. 1.

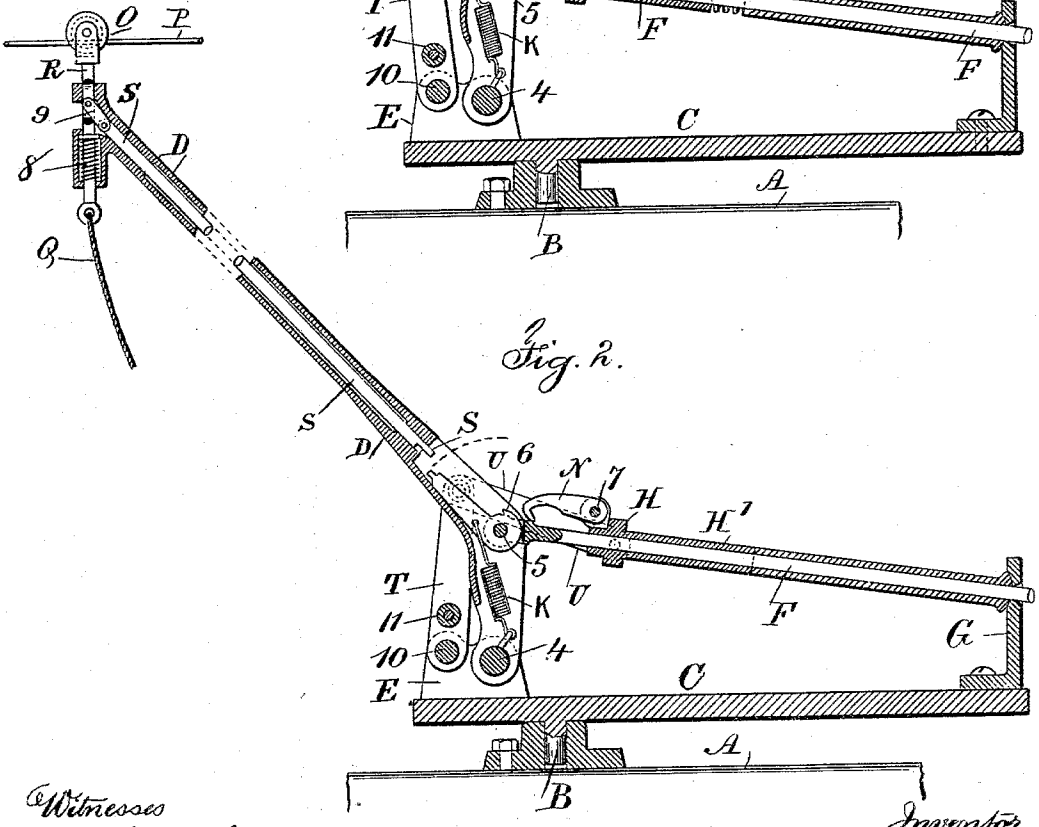

Fig. 2.

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J. Staub

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(No Model.) 2 Sheets—Sheet 2.

F. S. SMITH.

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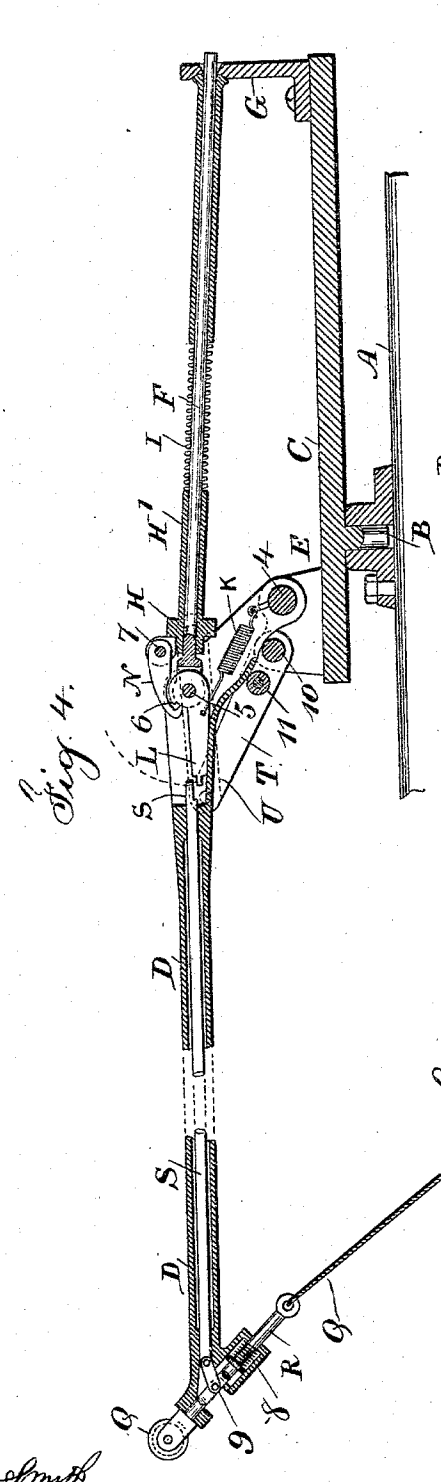

Fig. 4.

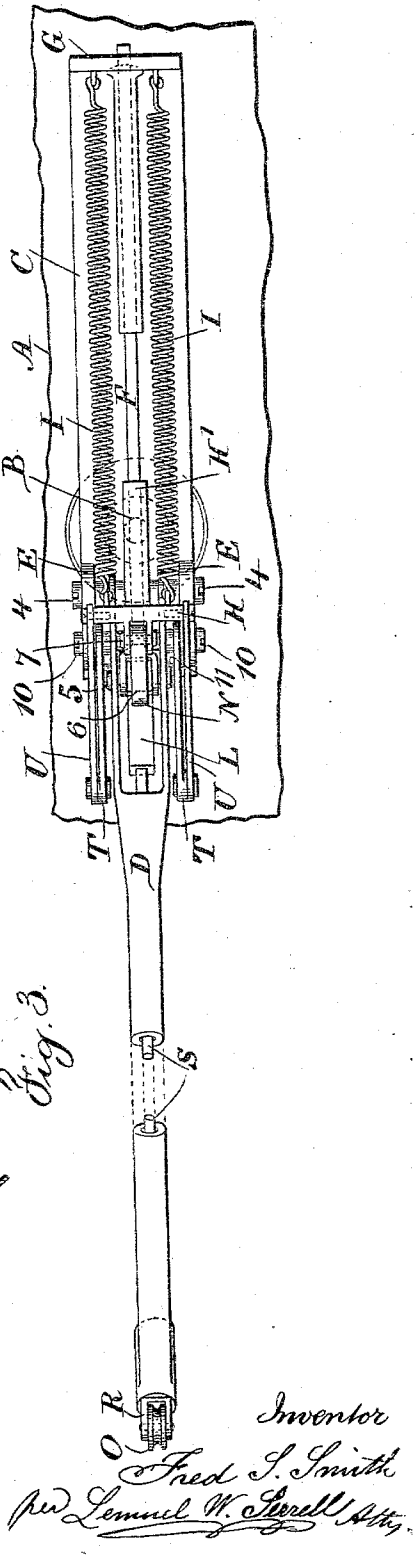

Fig. 3.

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UNITED STATES PATENT OFFICE.

FRED S. SMITH, OF HARTFORD, CONNECTICUT, ASSIGNOR TO HIMSELF AND FREDERICK C. ROCKWELL, OF SAME PLACE.

TROLLEY ATTACHMENT FOR ELECTRIC CARS.

SPECIFICATION forming part of Letters Patent No. 556,941, dated March 24, 1896.

Application filed June 11, 1895. Serial No. 552,385. (No model.)

To all whom it may concern:

Be it known that I, FRED S. SMITH, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented an Improvement in Trolley Attachments for Electric Cars, of which the following is a specification.

In electric cars having an overhead conductor it is usual to employ a trolley-arm that is forced upwardly by spring-pressure, so that the wheel at the end of the trolley-arm bears against the conductor, and to the end of the trolley-arm a rope is usually attached by which the driver or motorman can draw down the arm and swing the same around from one end of the car to the other. In passing switches the grooved pulley at the end of the trolley-arm sometimes separates from the conductor and the spring throws up the trolley-arm, and the same is liable to become injured by contact with the guard-wires or with trees or other obstructions, and sometimes the guard or span wires are broken.

The present invention is made with reference to unlatching the trolley-arm and allowing the same to drop whenever the pressure of the flanged wheel at the end of the trolley-arm against the conductor is relieved, so that if the flanged wheel of the trolley separates from the conductor it is raised instantly by a spring, and in so doing the mechanism connecting the springs with the trolley-arm is unlatched, so that the trolley-arm ceases to be acted upon by the springs and immediately descends, and the mechanism that is employed to connect the springs with the trolley-arm is so constructed that upon drawing the trolley-arm down to a nearly horizontal position the springs are strained and a latch connection made between the same and the trolley-arm, so that such springs immediately lift the outer end of the trolley-arm ready to be guided into contact with the under side of the suspended conductor.

In the drawings, Figure 1 is a side view, partially in section, showing the trolley-arm in the normal position for use. Fig. 2 is a similar view representing the flanged roller as having separated from the elevated conductor and then raised by the spring and the mechanism unlatched ready for the trolley-arm to descend automatically. Fig. 3 is a plan view, and Fig. 4 represents the parts with the trolley-arm drawn down nearly horizontal to latch the springs to the arm for lifting such arm.

In the figures the central portion of the trolley-arm is removed, it being understood that such arm is of any ordinary or desired length to reach from the top of the car to the conductor.

A portion of the top of the car is shown at A with a vertical pivot B for connecting the trolley-stand C to the car, and it is to be understood that the pivot in the trolley-stand may be of any desired character and that the trolley-stand and trolley-arm can be swung around upon the vertical pivot in bringing the trolley-arm D around to the other end of the car when the direction of travel of the car is reversed.

The lower end of the trolley-arm D is at an angle to the upper part, and it is pivoted at 4 to a jaw E upon the trolley-stand C, and the trolley-arm is advantageously made hollow and the lower end of the arm may be trough-shaped with parallel sides for the convenience of receiving the parts hereinafter described.

The rod F is pivoted at 5 to the trolley-arm and the other end of said rod slides through a fixed support G upon the trolley-stand, and there is a sliding cross-head H upon this rod F, preferably guided by a tube H′ around such rod F, and to this cross-head H the springs I are connected at one end and the other ends of such springs are connected to the support G. In this arrangement the springs I become tension-springs, as these usually are preferable, but I do not limit myself to any particular kind of springs, and the end of the tube H′ may strike against any suitable stop to limit the movement under the action of the springs. I have shown a separate tube-section around the rod F for the end of the tube H′ to stop against.

The pawl L is connected with the lower end of the trolley-arm preferably by the pivot 5, the lower end of the pawl L coming between the forked end of the rod F, and there is a spring K, which tends to hold such pawl L down into the trolley-arm and between the side flanges thereof, and upon the knuckle or

joint of the pawl L is a notch or projection 6, into which engages the hook N, which is pivoted at 7 upon the cross-head H. It will now be understood that if the pawl L is held from turning and the hook N engages the notch 6 in the pawl the power of the springs I will be applied through the cross-head H and hook N to swing the trolley-arm upwardly and cause its flanged wheel O at the upper end of the trolley-arm to bear against the under side of the conductor P, so as to pass the electric current down through the trolley-arm, as usual, and if the hook N is disengaged from the pawl L the springs will draw back the cross-head H and tube H' and allow the upper end of the trolley-arm to descend.

I provide for holding down the end of the pawl L, as next described, so as to keep the hook N in engagement with the notch 6 in the pawl and for allowing the parts to separate by relieving the end of the pawl L, so that it may swing upwardly and disengage the knuckle of the pawl from the hook. With the said object in view I mount the flanged wheel O upon a movable support R and employ a spring 8 to throw the support R and flanged wheel O upwardly in relation to the trolley-arm when there is no resistance offered by the conductor P resting upon the flanged wheel of the trolley, and the bolt S that normally passes over and engages the end of the pawl L is withdrawn from such pawl L by the spring 8 raising the flanged wheel and its movable support.

The movable support for the flanged trolley-wheel may be of any desired character. I prefer to make the same in the form of a slide-bar, to the lower end of which the cord or rope Q, usually provided with trolley-arms, is connected, and the spring 8 surrounds the support R and tends to lift the same, and there is a link 9 between the support R and the rod of the bolt S. Hence when the spring 8 lifts the support R and flanged wheel O the link 9 draws the bolt S along and unbolts the end of the pawl L, and when the rope Q is drawn upon and the support R pulled down the link 9 projects the lower end of the bolt S over the swinging end of the pawl L and holds such pawl in its position, and the parts remain as shown in Fig. 1 during the time that the rope Q is pulled upon, and also during the time that the flanged wheel O rests against the elevated conductor. Hence the pawl L is not unbolted when the trolley-arm is drawn down by the action of the rope and such arm swung around from one end of the car to the other; but if the flanged wheel O and movable support R are allowed to rise in relation to the end of the trolley-arm, so as to draw back the bolt S, the pawl L will thereby be unbolted and the hook N and cross-head H will be drawn back and the springs cease to exert any force in holding up the outer and upper end of the trolley-arm, and such trolley-arm will descend until it is stopped.

The restoring-lever T is pivoted at 10 in the jaw E, preferably behind the pivot 4, and upon this restoring-lever is a cross-rod and roller 11, and the upper ends of the restoring-lever T are connected by links U to the cross-head H and by screws or pivots.

When the trolley-arm falls, as before mentioned, it is arrested by the roller 11 upon the restoring-lever T and the restoring-lever may yield to the force or leverage of the trolley-arm, because such restoring-lever T can be swung upon its pivots and the springs I lengthened. I make use of this condition to prevent undue concussion upon the trolley-arm and also to restore the parts to a normal position when the trolley-arm is brought substantially horizontal.

The proportions of the parts are such that as the trolley-arm is brought down nearly horizontal by drawing upon the rope Q the cross-head H is drawn along bodily by the links U as the trolley-arm swings the restoring-lever T by its action upon the roller 11, and in so doing the cross-head H is brought along far enough for the end of the hook N to engage the notch 6 in the pawl L. Hence the tension of the springs I will now be applied through the cross-head H and hook N and the knuckle of the pawl L to lift up the outer end of the trolley-arm and cause the flanged wheel O to bear against the conductor, and the parts remain in this position with the bolt S holding the end of the pawl L, and this condition continues regardless of any rise or fall in the outer end of the trolley-arm, because the power of the springs I is sufficient to overcome the spring 8, such spring 8 not being sufficiently strong to lift the weight of the conductor resting upon the flanged wheel O; but so soon as such flanged wheel O may jump away from the conductor in passing a switch or otherwise there is no resistance to keep down the flanged wheel O, and the spring 8 raises the same and draws back the bolt S, liberating the pawl L and allowing the same to swing up and unhook the hook N from the notch in the knuckle of the pawl, and thus disconnecting the cross-head and springs from the trolley-arm, allowing such trolley-arm to fall until it is arrested by contact with the roller 11. These parts are efficient and the cost of construction is but slightly increased over the trolley-arms now usually employed.

If the trolley-arm is allowed to rise by its springs until nearly vertical the hook will slip off the knuckle of the pawl and the arm fall. This will sometimes be a convenience in actuating the trolley by the rope to lower such trolley and in storing the cars at night or in passing an obstruction.

I claim as my invention—

1. The combination with the trolley-arm and its pivot, of a rod pivoted to the trolley-arm and a support through which the same passes, a cross-head sliding on said rod, and a hook carried by the cross-head, and springs acting upon the cross-head, a pawl upon the trolley-arm for engaging the hook, a flanged

wheel at the end of the trolley-arm to bear against the elevated conductor and mechanism intervening between the flanged wheel and the pawl for holding such pawl and for liberating the same when the flanged wheel does not bear upon the conductor, substantially as set forth.

2. The combination with the trolley-arm and its pivot, of a rod pivoted to the trolley-arm and a support through which the same passes, a cross-head sliding on said rod, and a hook carried by the cross-head, and springs acting upon the cross-head, a pawl upon the trolley-arm for engaging the hook, a flanged wheel at the end of the trolley-arm to bear against the elevated conductor, a movable support for the flanged wheel and the bolt acting to hold the pawl and a connection from the bolt to the movable support for withdrawing the bolt and liberating the pawl when the flanged wheel rises in its relation to the end of the trolley-arm, substantially as set forth.

3. The combination with the trolley-stand and pivoted trolley-arm, of a rod and a cross-head thereon, springs acting upon the cross-head, mechanism for connecting the cross-head and the trolley-arm and mechanism for disconnecting the cross-head from the trolley-arm by a movement of the flanged wheel in its relation to the trolley-arm, and a restoring-lever acted upon by the trolley-arm and having links connecting the restoring-lever with the cross-head for applying a strain to the spring and restoring the parts to their normal position, substantially as set forth.

4. The combination with the trolley-arm and the stand to which it is pivoted, of a rod connected with the trolley-arm, a support for the same, a cross-head and springs for acting upon the trolley-arm to raise the same, a pawl pivoted upon the trolley-arm and having a spring, a hook upon the cross-head engaging the pawl, a bolt for holding down the moving end of the pawl, a flanged wheel to run against the conductor, a movable support for the flanged wheel passing through the end of the trolley-arm and a rope connected therewith, a connection between the support for the flanged wheel and the bolt and a spring for lifting the movable support and flanged wheel and withdrawing the bolt from the pawl, substantially as set forth.

Signed by me this 7th day of June, 1895.

FRED S. SMITH.

Witnesses:
GEO. T. PINCKNEY,
S. T. HAVILAND.