(No Model.) 2 Sheets—Sheet 1.

# W. E. KENWAY.

## TROLLEY FOR ELECTRIC RAILWAYS.

No. 590,527. Patented Sept. 21, 1897.

*Fig. 1.*

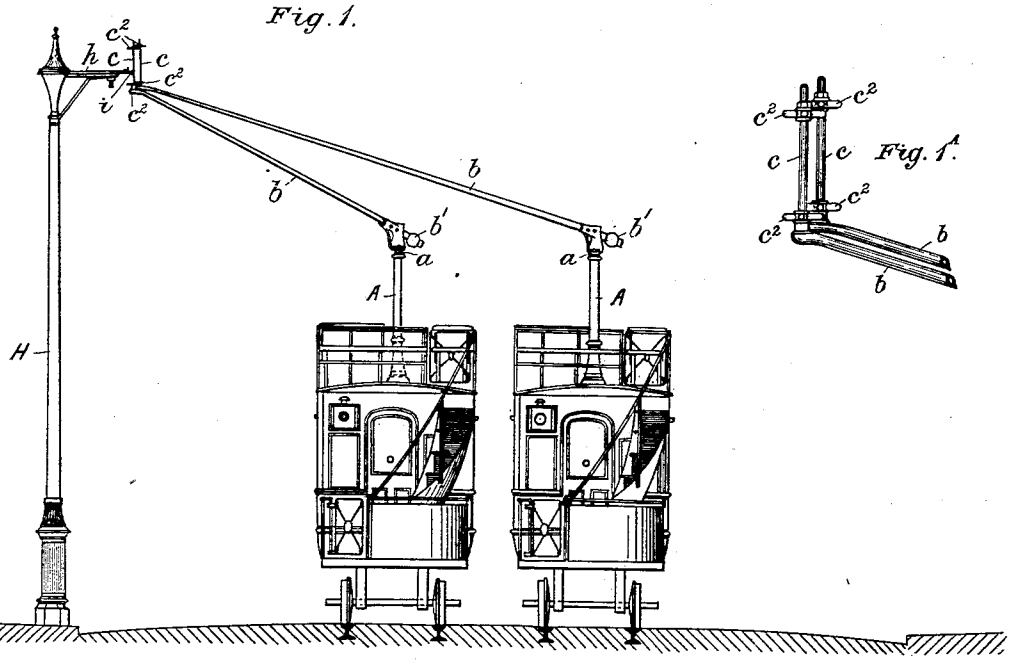






*Fig. 1ª.*

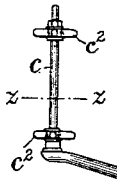



*Fig. 3.*

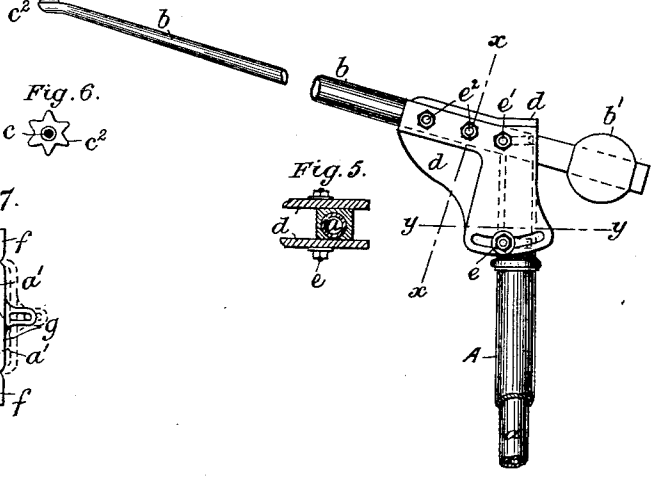



*Fig. 6.*




*Fig. 5.*




*Fig. 7.*

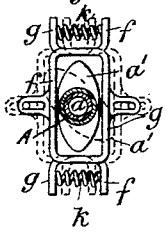
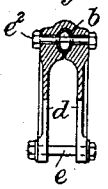



*Fig. 4.*




*Witnesses;—*

George Shand

Richard Skerrett.

*Inventor;—*

William Edward Kenway

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

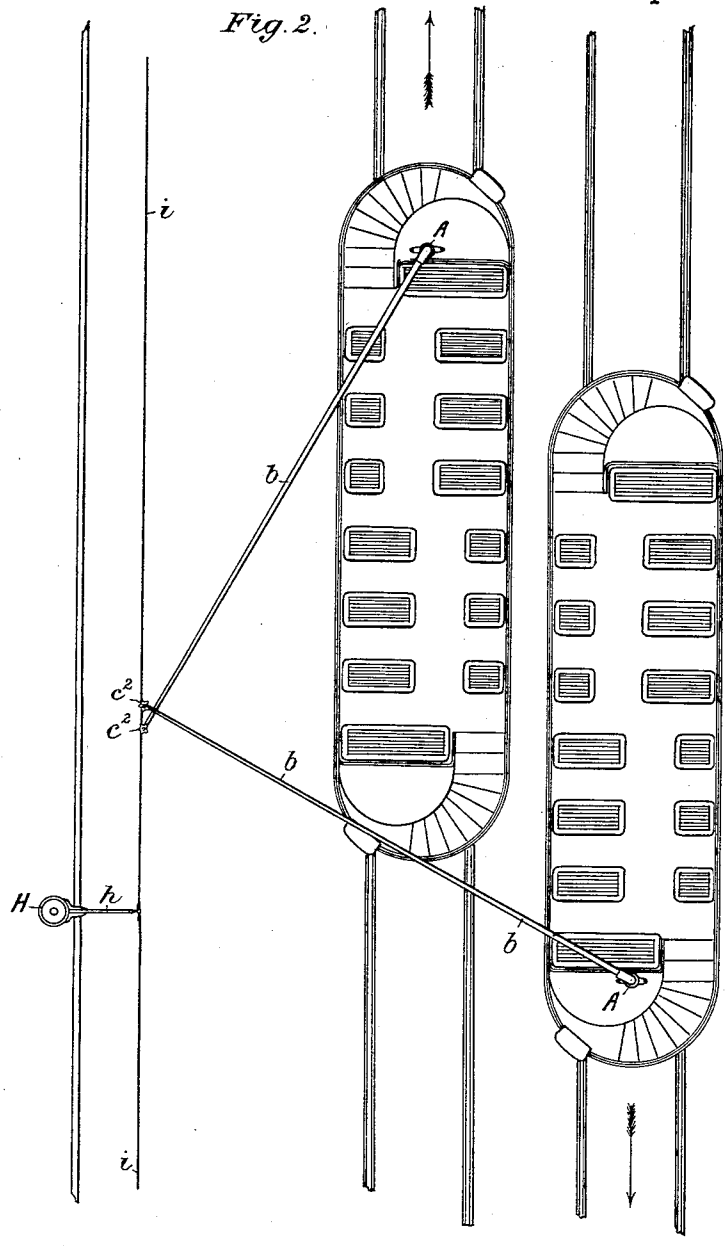
(No Model.) 2 Sheets—Sheet 2.

# W. E. KENWAY.

## TROLLEY FOR ELECTRIC RAILWAYS.

No. 590,527. Patented Sept. 21, 1897.

*Fig. 2.*




*Witnesses;—*
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

WILLIAM EDWARD KENWAY, OF BIRMINGHAM, ENGLAND.

## TROLLEY FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 590,527, dated September 21, 1897.

Application filed May 4, 1897. Serial No. 635,039. (No model.)

*To all whom it may concern.*

Be it known that I, WILLIAM EDWARD KENWAY, a subject of the Queen of Great Britain, residing at Birmingham, England, have invented certain new and useful Improvements in Trolleys for Electric Railways; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention consists of the improvements hereinafter described in the mode of connecting the cars with the overhead wire in tramways worked by electricity whereby a single overhead electrical conducting-wire only is employed, whether the said tramway is a single-line or double-line tramway, the method of connection hereinafter described permitting two cars in the case of a double-line tramway to pass each other in opposite directions without or practically without breaking the electrical communication between the cars and the single overhead wire.

In carrying my invention into effect I so support the single overhead electrical conducting-wire that the said wire has at the side toward the tramway-lines a smooth continuous or unbroken surface. The arm by means of which the tram-car is put into electrical connection with the overhead wire is supported on a standard fixed to the top or roof of the car and is capable of a horizontal angular motion on the said standard. The top of the standard on the car is situated at a lower level than the overhead wire, so that the connecting-arm is curved or inclined upward from its inner to its outer end. The outer end of the arm is fitted with one or more vertical metallic rods, bars, or contact-makers, which when the car is in motion slide along the overhead electrical conducting-wire and make electrical contact therewith. When two cars in the case of a double-line tramway traveling in opposite directions pass each other, the arm projecting from the car farthest from the wire passes over the arm of the car nearest the wire and the contact-maker of the first-named arm slides over that of the nearer car, so that electrical contact with the wire is practically never broken as the cars pass each other.

Figure 1 of the accompanying drawings represents in end elevation two cars provided with my improvements passing each other on the up and down lines of a double-line tramway, and Fig. 2 is a plan of the same. Fig. $1^A$ represents a part of Fig. 1 drawn to a larger scale. Fig. 3 represents the inclined arm of a tram-car and a portion of the standard on which the said arm turns. Fig. 4 is a section on the line $x\ x$, Fig. 3. Fig. 5 is a section on the line $y\ y$, Fig. 3; and Fig. 6 is a section on the line $z\ z$, Fig. 3. Fig. 7 is a plan of an arrangement for preserving the contact-maker carried by the inclined arm in electrical connection with the overhead electrical conducting-wire. Figs. 3, 4, 5, 6, and 7 are drawn to a larger scale than Figs. 1 and 2.

The same letters of reference indicate the same parts in the several figures of the drawings.

On the top or roof of each tram-car is a hollow upright or standard A, within which is a tube $a$, carrying at top the inclined tubular arm $b$, to the outer end of which the vertical rod or contact-maker $c$ is fixed. The inclined tubular arm $b$ is preferably of an elliptical figure in cross-section, the longer axis of the ellipse being vertical. The vertical rod or contact-maker has at or near its top and bottom disks or buttons $c^2\ c^2$, capable of a rotary motion on the said rod or contact-maker $c$. I prefer to make the said disks or buttons $c^2\ c^2$ of the star-like form best seen in Fig. 6. The rod or contact-maker $c$ is in electrical connection with the wire or electrical conductor which passes down the inclined arm $b$ and tube $a$ to the car. The inclined arm $b$ is connected to the vertical tube $a$ by a quadrant $d$ and screw nuts and bolts $e\ e'\ e^2\ e^2$, the said screw-bolt $e$ passing through slots in opposite sides of the said quadrant $d$, so that the arm $b$ may be adjusted to the desired inclination with respect to the standard A. The screw-bolts $e\ e'$ fit in grooves in the tube $a$, so that when the several screw-bolts $e\ e'\ e^2\ e^2$ are relaxed the arm $b$ may be turned horizontally on the tube $a$. The inner end of the inclined arm $b$ preferably extends beyond the vertical tube $a$, the extended part carrying a weight $b'$ sufficient to counterbalance the weight of the arm $b$.

The tube $a$ is fixed at bottom to mechan-

ism which tends to turn the said tube *a* into such a position that the inclined arm *b* carried by it would make, if free, a right angle or nearly a right angle with the side of the car. I do not limit myself to any particular mechanism for effecting this object, as any mechanism in the nature of those ordinarily employed for closing swing-doors will answer the purpose. I have, however, shown one arrangement of parts in Fig. 7 for effecting the said object. The said mechanism consists of a cam *a'* on the tube *a*, which cam is situated within the rectangular loop of a frame made in two parts marked, respectively, *f* and *g*. The two parts of the frame are closed on the cam *a* by the action of the springs *k k*. When the tube *a* and cam *a'* are turned in the standard A, the frame *f g* is opened, as indicated in dotted lines, and the springs *k k* are compressed, or instead of employing the arrangement of parts described and represented I may employ mechanism which, while preserving the tube *a* in the position required, permits it to perform a complete rotation in the standard A.

The overhead wire *i*, conveying the electrical current by which the cars are worked, is so supported by mechanical clips or soldered ears fixed horizontally to the arms or brackets *h* of the street posts or columns H that a continuous smooth or unbroken surface is presented for the contact-maker *c* of the inclined arm *b* of each car to work against. When the cars are placed on the tramway-rails, the arms *b* have to be turned from their position at right angles to the car, as will be seen by reference to the plan Fig. 2, so as to bring the contact-makers *c* against the side of the overhead wire *i*. The springs *k k* of the mechanism represented in Fig. 7 are consequently put into a state of compression, by virtue of which the said rods or contact-makers *c* are preserved in electrical contact with the side of the overhead conducting-wire *i*. The buttons or disks $c^2$ $c^2$ on each of the rods or contact-makers *c* prevent the contact-maker, by the swing or vibration of the arm *b*, produced on the traveling of the tram-car, from being thrown over or under the overhead wire *i*.

When two cars traveling in opposite directions are passing each other, the arm *b* of the car most distant from the overhead wire *i* glides over and is slightly raised by the arm *b* of the other car, and the rod or contact-maker *c* of the raised arm moves around the rod or contact-maker of the other arm *b*, so that electrical contact of the rods *c*, carried by the arms *b*, with the side of the overhead wire *i* is practically never broken.

By the swing or vibration of the arms *b* of the tram-cars the contact-makers *c* are made to rise and fall while in contact with the overhead wire *i*, so that the tendency in the said wire to cut a groove in the contact-maker *c c* will be counteracted. I may, however, provide the rods or contact-makers with long tubular metallic sleeves or rollers, which on the motion of the cars roll against the side of the overhead wire and rotate on the rods or contact-makers proper.

It will be seen that by the construction and arrangement or combination of parts hereinbefore described and represented tram-cars may be worked on two parallel lines of rails by the use of one overhead electrical conducting-wire only, the electrical connection of the tram-cars with the overhead conducting-wire being practically never broken.

I wish it to be understood that although I have represented my invention in connection with a street-tramway for passenger traffic it is equally applicable to other tramways—such, for example, as the tramways commonly called "light railways," which are principally used for light-goods traffic.

The parts of the electrical apparatus necessary for the working of the tramway which I have not described or represented are such as are in common use and constitute no part of my invention.

Having now particularly described and ascertained the nature of my invention and in what manner the same is to be performed, I declare that I claim as my invention—

The combination with cars of a double-track electric railway, and a single overhead electric conducting-wire, of an inclined arm adjustably supported on each car and carrying at its outer end a vertical rod or contact-maker provided with rotatable disks or buttons at top and bottom, the contact-maker on the arm of the car most distant from the overhead wire being adapted to pass with a sliding or rolling motion over the contact-maker on the arm of the other car, when two cars are passing, and pressure mechanism for preserving substantially continuous contact of the contact-maker with the side of the overhead wire, substantially as shown and described.

WILLIAM EDWARD KENWAY. [L. S.]

Witnesses:
GEORGE SHAW,
RICHARD SKERRETT.