(No Model.) 2 Sheets—Sheet 1.

# T. COOPER.

## TROLLEY.

No. 531,837. Patented Jan. 1, 1895.

FIG. 1.

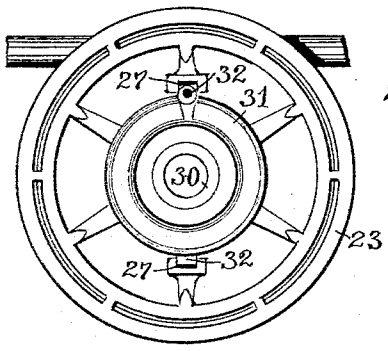



FIG. 2.

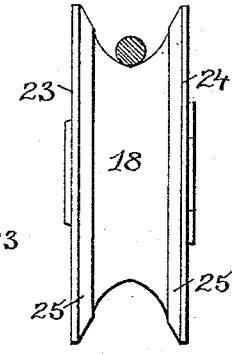



FIG. 3.

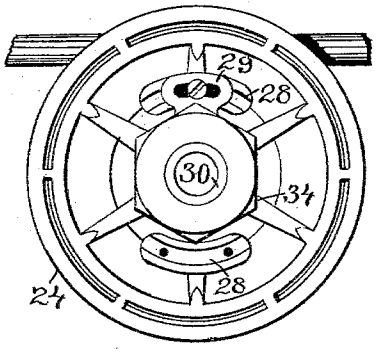



FIG. 4.

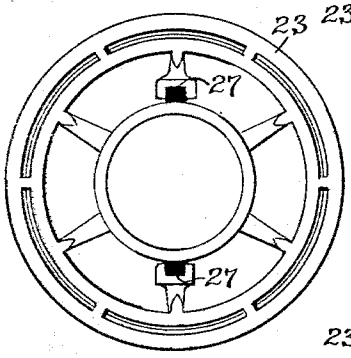



FIG. 5. FIG. 6. FIG. 7.

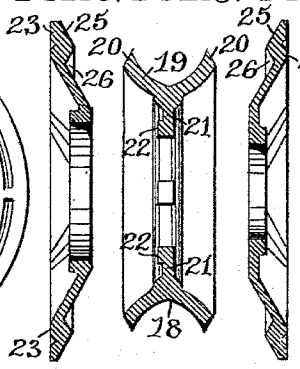



FIG. 8.

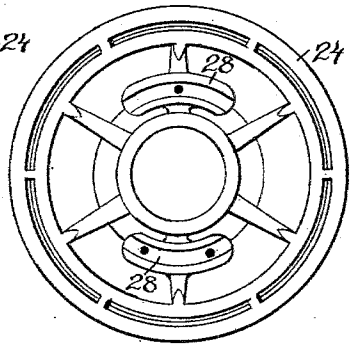
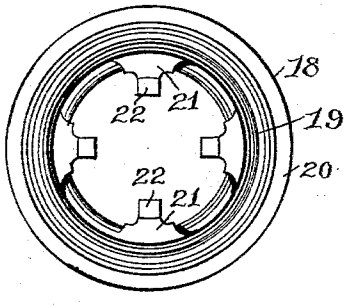



FIG. 9.

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(No Model.) 2 Sheets—Sheet 2.

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## TROLLEY.

No. 531,837. Patented Jan. 1, 1895.

FIG. 10.

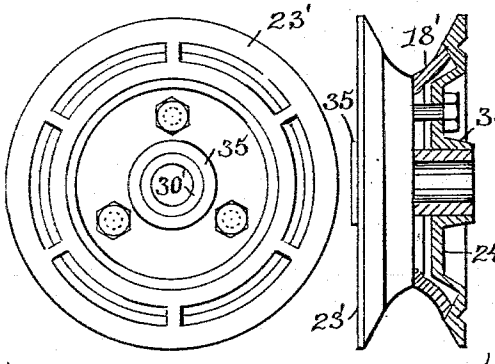



FIG. 11.

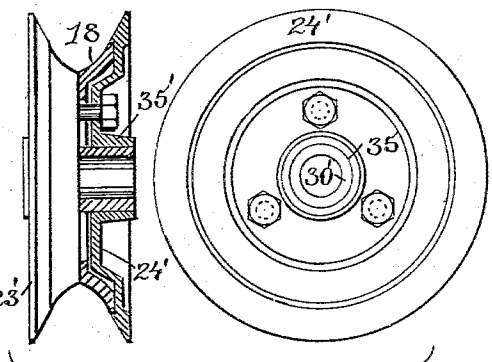



FIG. 12.

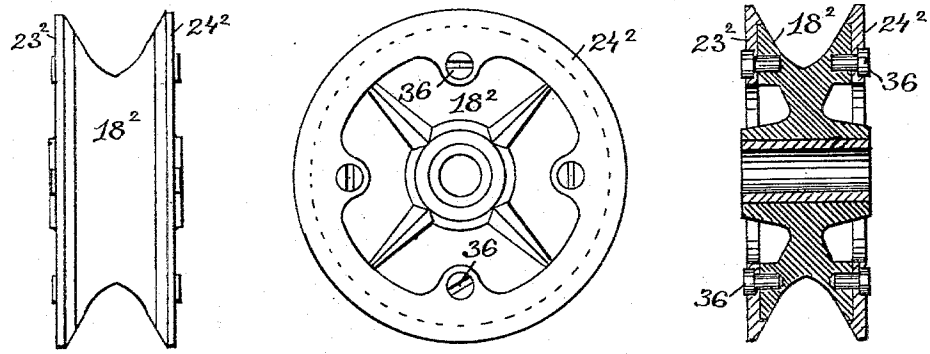



FIG. 13.

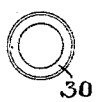



FIG. 14.

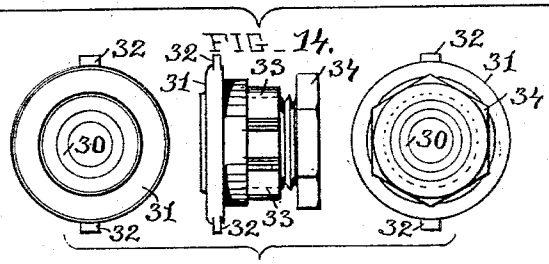
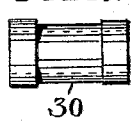



FIG. 15.

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# UNITED STATES PATENT OFFICE.

THEODORE COOPER, OF PROVIDENCE, RHODE ISLAND.

## TROLLEY.

SPECIFICATION forming part of Letters Patent No. 531,837, dated January 1, 1895.

Application filed September 17, 1894. Serial No. 523,198. (No model.)

*To all whom it may concern:*

Be it known that I, THEODORE COOPER, of the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Trolleys; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to improvements in rotatable electrical contacts or trolleys.

One object of the invention is to so construct a trolley, having a removable contact, that the contact may be held from rotation, independent of the side-plates, by positive mechanical means not dependent on frictional contact.

Another object of the invention is to so construct a trolley, having a removable contact, that the edges of the contact will be more fully protected, while reducing the cost of manufacture, and providing means for securely fastening the parts together.

The invention consists in the novel side-plates, the contact removably secured between the same, and means for positively preventing the independent rotation of the contact without reference to the frictional contact of the same with the side-plates.

The invention also consists in the peculiar construction of the trolley and in the combination therewith of a bushing or bearing in electrical connection with the contact surface of the trolley.

The invention likewise consists in such other novel features of construction and combination of parts as may hereinafter be more fully described and pointed out in the claims.

Figure 1 represents a side view of the improved trolley in contact with a trolley-wire. Fig. 2 represents a face view of the same. Fig. 3 represents a similar view to that of Fig. 1 showing the opposite side of the trolley. Fig. 4 represents a view of the side-plate, through which the bushing is inserted, removed from the trolley. Figs. 5, 6 and 7 represent vertical sections taken respectively through the side plates and the contact. Fig. 8 represents a view of the side-plate, to which the lock-nut is secured, removed from the trolley. Fig. 9 represents a side view of the contact. Figs. 10 and 11 represent side views of modified forms of the improved trolley with face views, partly in section, showing details of construction. Fig. 12 represents face and side views with a vertical section showing further modifications. Fig. 13 represents an end view of the bearing used in connection with the construction shown in Figs. 1 to 9 inclusive. Fig. 14 represents a side and two end views of the bushing and oiling chamber used in the same construction. Fig. 15 represents a side view of the bearing.

Similar numbers of reference designate corresponding parts throughout.

In the drawings 18 represents the contact formed of material having a high degree of conductivity and consisting of an annular concaved-rim 19 having beveled edges 20—20 and inwardly-extending arms 21—21 furnished at their ends with thickened portions 22—22.

The side-plates 23 and 24 are preferably formed of a material considerably harder than that of the contact, or one which possesses better wearing qualities, as where brass, or copper, is used for the contact a similar material may be used for the side-plates, but of a harder quality. The side-plates may, however, be constructed of any suitable material. These side-plates 23 and 24 are of a larger diameter than that of the contact 18, being generally concaved on the outer surfaces and having the outwardly-beveled edges 25—25 and the recesses 26—26 into which the beveled edges 20 of the contact 18 are seated to protect the edges of the contact. Each of the side-plates has a central opening, that of the plate 23 being somewhat larger than that of the plate 24.

In the outer surface of the plate 23 are formed the recesses 27—27 to receive projections on the oiling-chamber, while on the outer surface of the side-plate 24 are formed the guides 28—28 to either of which the lock-nut 29 may be secured.

The oiling-chamber or bushing-holder, shown in Fig. 14, has a central bore in which the bushing 30 is secured. Where this bushing-holder is constructed to serve as a lubricator reservoir its internal construction may

be any usual for this purpose. At one end this bushing-holder has a plate 31 having the projections 32—32 which fit into the recesses 27 of the side-plate 23. Within this plate 31 the diameter of the bushing-holder is such as to closely fit the opening in the plate 23, steps 33—33 being formed in this portion to receive the ends of the arms 21—21 on the contact. Beyond these steps 33—33 the diameter of the bushing-holder is reduced and it is furnished with a screw-thread on which, when the parts are assembled, the nut 34 is screwed firmly holding the parts together and itself being prevented from unscrewing by the engagement of the nut-lock 29 with the nut.

In the modification shown in Figs. 10 and 11 the contact 18′ is secured between the side-plates 23′ and 24′ by means of bolts passing through the side-plates and firmly securing the edges of the annular contact-rim in the recesses 26′ or $26^2$, as in the preferred form, the bushing 30′ in this case being secured through the central sleeves 35 or 35′. While in the modified construction shown in Fig. 12 the side-plates $23^2$ and $24^2$ are shown as fastened to the contact $18^2$ by means of screws 36—36 passing through the side-plates and secured in the material of the contact, in this form the contact is furnished with a hub having a bore in which the bushing 30′ is secured.

It is obvious that the screws 36, or the bolts in Figs. 10 and 11, may represent rivets by means of which the side-plates are permanently secured in place. By this construction the centrally located contact is protected from sharp blows by the extension of the side-plates, the contact is in position to bear on the trolley-wire and to form an electrical connection therewith, while when the contact becomes worn it can be readily removed from between the side-plates and a new contact substituted in its place.

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

1. In a trolley, the combination with circular side-plates, of an annular contact removably secured between the side-plates, and means adapted to interlock with portions of the contact to prevent the independent rotation thereof.

2. In a trolley, the combination with side-plates having annular recesses in their inner surfaces, outwardly-beveled edges and central openings, of an annular contact having edges adapted to be seated in the recesses of the side-plates and inwardly-extending arms, and an oil-reservoir, extending through the central openings of the side-plates, for securing these plates together, as described.

3. The combination with the side-plates 23 and 24 each having an edge 25 and the annular recess 26 and each being provided with a central opening, the plate 23 having the recesses 27, and the plate 24 having the guides 28, of the contact 18 having the annular concave-rim 19, the beveled edges 20 adapted to fit the recesses 26 of the side-plates, and the inwardly-extending arms 21—21, an oil-reservoir or bushing-holder, adapted to fit the central openings in the side-plates, having projections 32 at one end adapted to be engaged in the recesses 27 of the plate 23, and having a screw-threaded portion, a nut adapted to fit this screw-threaded portion, and a nut-lock secured in one of the guides 28 for locking the nut, as described.

In witness whereof I have hereunto set my hand.

THEODORE COOPER.

Witnesses:
HENRY J. MILLER,
JOSEPH A. MILLER.