(No Model.) 2 Sheets—Sheet 1.

B. & A. KOCHS.

ELECTRIC RAILWAY TROLLEY.

No. 491,361. Patented Feb. 7, 1893.

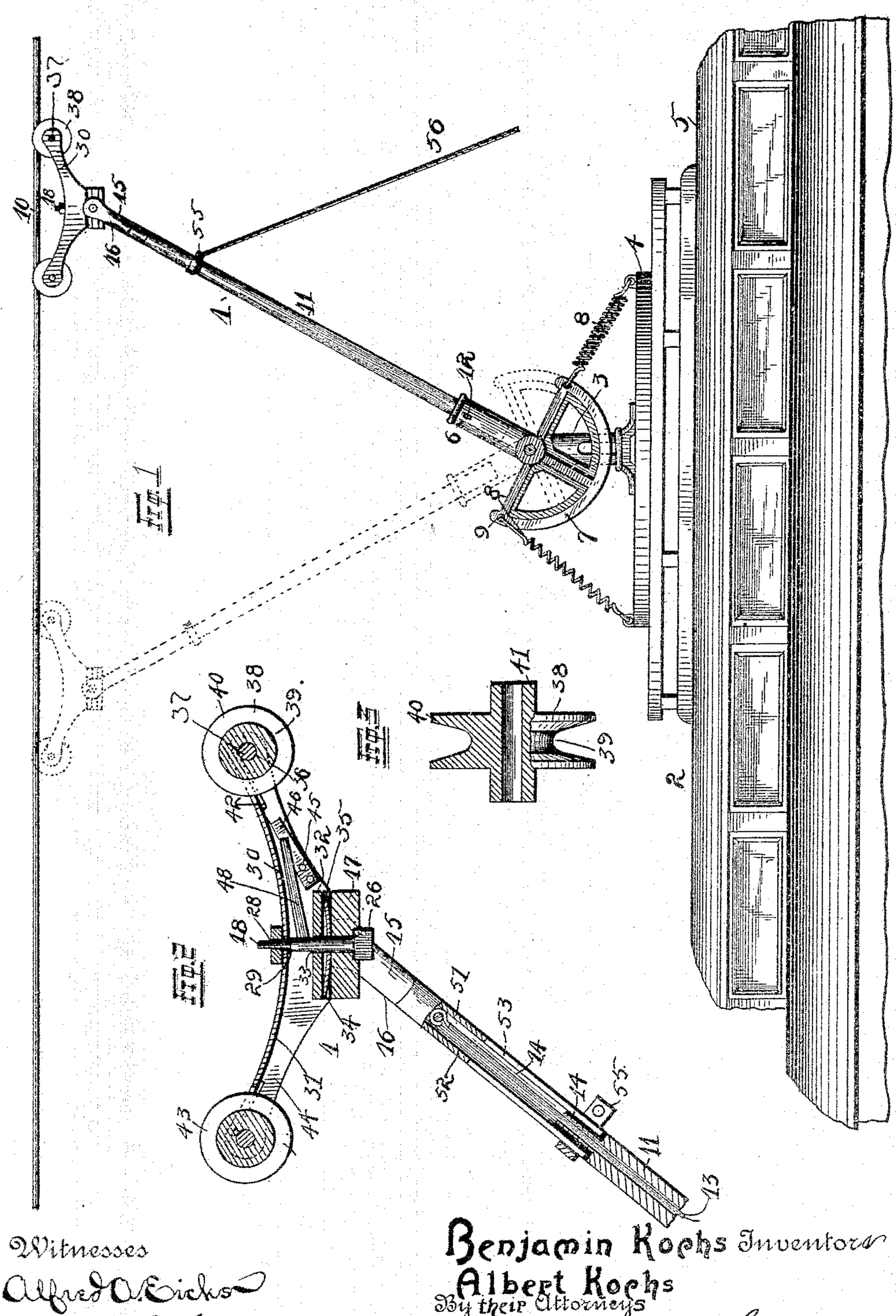

FIG. 1.

FIG. 2.

FIG. 3.

Witnesses
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(No Model.) 2 Sheets—Sheet 2.

B. & A. KOCHS.

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FIG. 3.

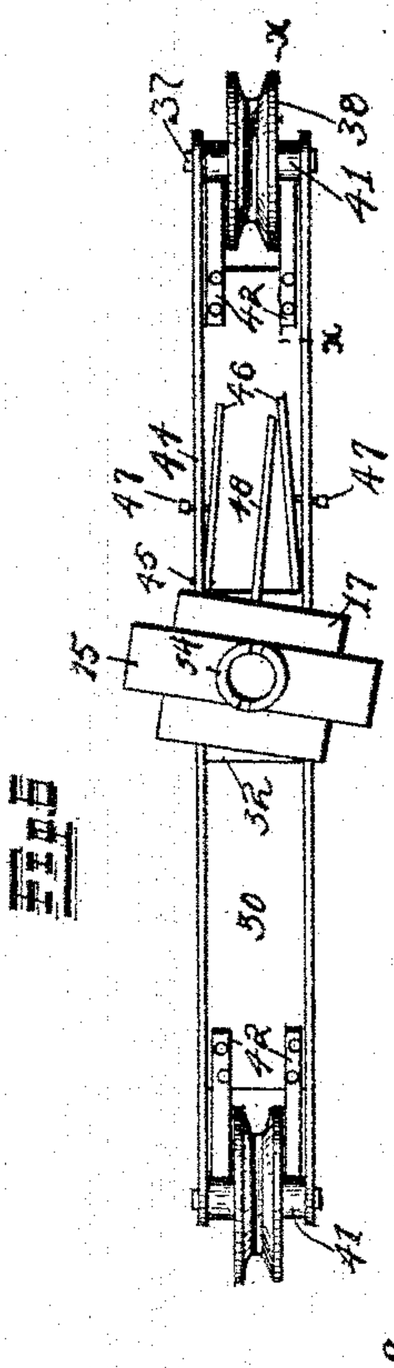


FIG. 7.

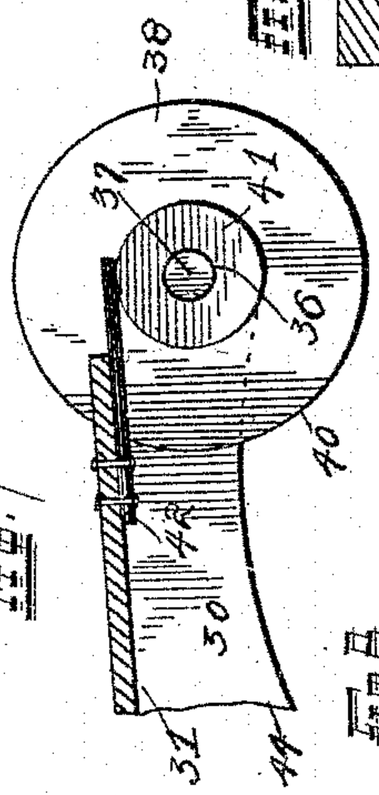


FIG. 8.

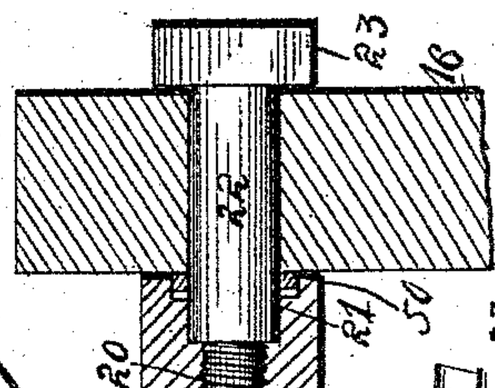


FIG. 10.

FIG. 11.

FIG. 9.

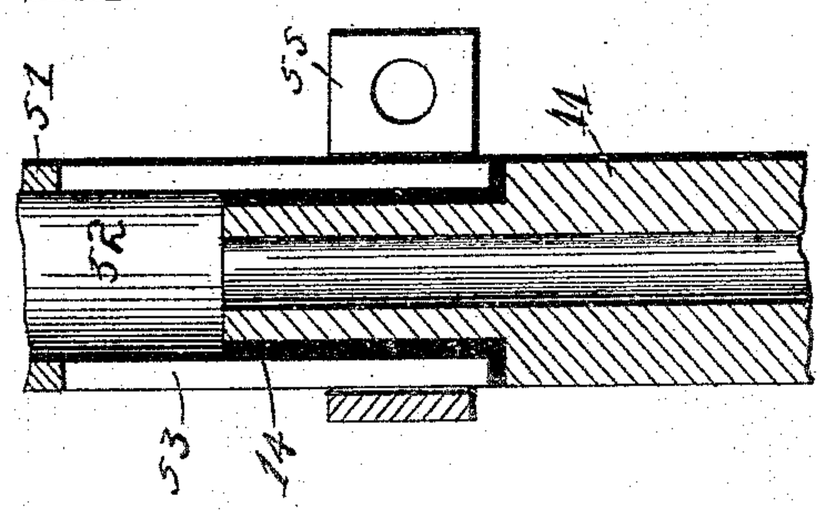


FIG. 5.

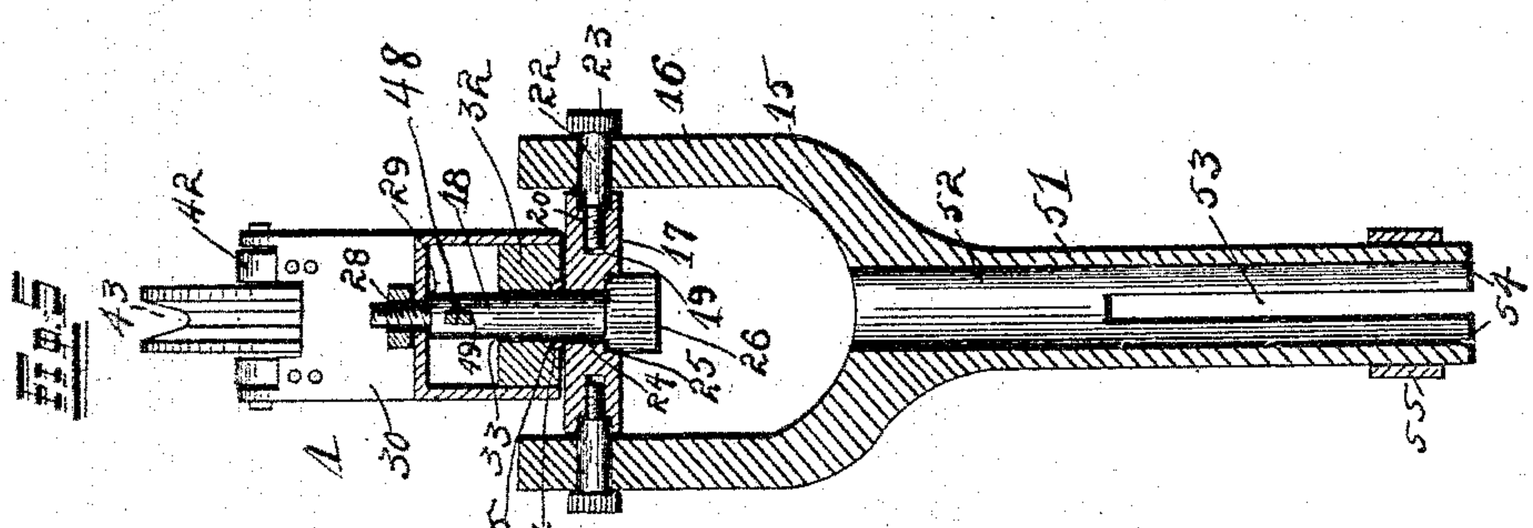
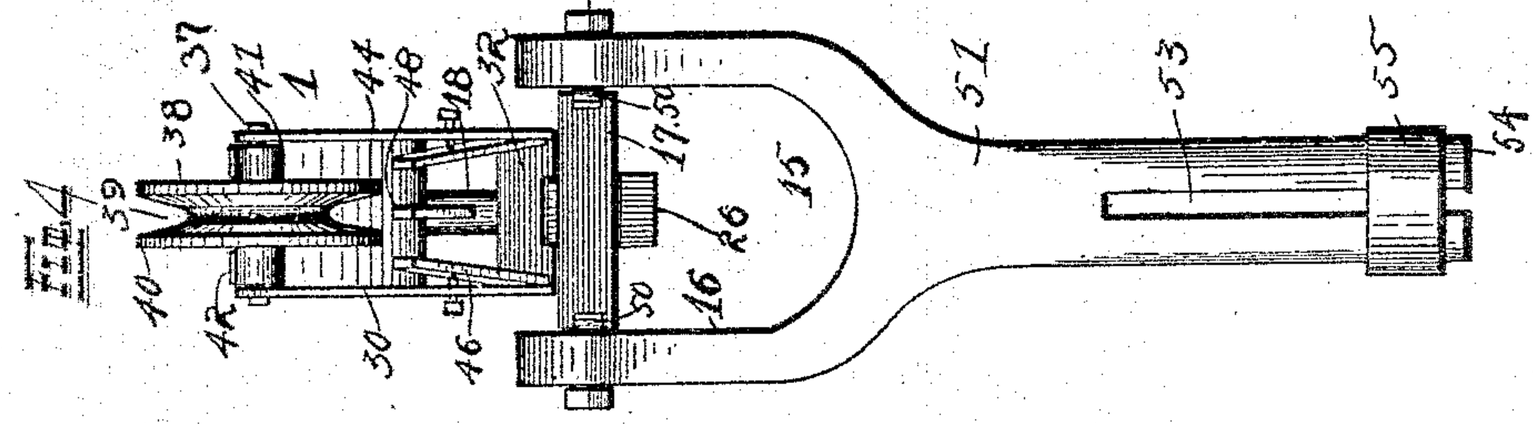


FIG. 4.



Witnesses
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UNITED STATES PATENT OFFICE.

BENJAMIN KOCHS AND ALBERT KOCHS, OF ST. LOUIS, MISSOURI.

ELECTRIC-RAILWAY TROLLEY.

SPECIFICATION forming part of Letters Patent No. 491,361, dated February 7, 1893.

Application filed July 25, 1892. Serial No. 441,193. (No model.)

To all whom it may concern:

Be it known that we, BENJAMIN KOCHS and ALBERT KOCHS, of the city of St. Louis and State of Missouri, have invented certain new and useful Improvements in Overhead Trolleys for Electric Railways, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

Our invention relates to improvements in "over-head trolley for electric railways," and consists in the novel arrangement and combinations of parts as will be more fully hereinafter described and designated in the claims.

In the drawings: Figure 1 is a side elevation of our complete invention as applied to an ordinary street railway car. Fig. 2 is a transverse section view of the contacts and their supports and a portion of the trolley-pole. Fig. 3 is a detail vertical section view of one of the trolley-wheel contacts. Fig. 4 is a detail end view of our invention. Fig. 5 is a vertical section view of the parts shown in Fig. 4. Fig. 6 is a bottom plan view of the device. Fig. 7 is an enlarged section taken on a line $x\,x$ of Fig. 6. Fig. 8 is an enlarged vertical section of the yoke, its connection with the trolley-pole and the proper insulation and fastenings. Fig. 9 is an enlarged section view showing the manner in which the yoke is held to the pivot-block. Fig. 10 is an enlarged section view of the pivot-block, and Fig. 11 is a modification view of the contact-support.

It is an acknowledged fact that in the general construction under which the principle of motion applied in our invention, is included that one wheel will keep to an allotted track or wire better with the aid of an auxiliary-wheel than by itself. In other words two wheels will travel upon a wire or track a greater length of time, and adapt themselves to the different conditions of the wire or track better than one wheel will. Therefore, we have taken advantage of this knowledge already proven by experience, and included the principle in the construction of our improved trolley for over-head electric railways.

The present styles of trolley, as generally used, have but one contact or wheel, and the fact that the side flanges upon the contact wheel do not always hold said wheel to the wire when passing curves is the main objection in the use of the present styles. In the use of a trolley having two contacts indirectly working upon self-adjusting parts, the said contacts are readily self-adjustable to the condition and curve of the wire, and materially lessen the wear upon the wheels caused by their inability to continuously travel in alignment with the trolley-wire. The time consumed in re-adjusting the trolley to the wire each time it leaves same is necessarily great, and the "sparking" caused by the attempt of the operator of the car to replace the wheel is detrimental to the life of both the wire and the contact. A large amount of sparking is also caused by the irregular contact maintained between the wheel and the wire at points where the sections of wire have been spliced and also upon the curve, and it is believed that by the use of two wheels that this sparking to a great extent will be obviated as a continual contact is guaranteed.

One of the main features of our invention lies in the fact that the trolley-pole, if mounted upon a reversible base-stand, need only be reversed in position to re-adjust itself to the wire in a different direction. As is well known this is necessary when the car has reached the terminus of the road, and in most of the present styles of trolley in use, the base-stands are revoluble or oscillating, and it is necessary for the operator to take the trolley-guide-rope in hand and walk around the car in order to reverse the position of the trolley-pole.

Another point in our invention is the fact that our invention proper may be applied to any style of trolley-pole at present in use. This is done by cutting off the upper portion of the trolley-pole and clamping the split portion of the yoke over the pole after the proper electrical connections have been made.

Referring to the drawings: 1 indicates our complete invention applied to an ordinary street railway car 2. The trolley base-stand 3 is suitably mounted and secured to a platform 4, which is built upon the roof 5 of said car 2. A rocking pivoted trolley-pole socket 6 is pivoted to the upper end of the base 3. As shown in the drawings, it consists essentially of a skeleton frame-work in the form of

a semi-circle 7, and located upon each side of the base 3, and the socket 6 is preferably formed therewith at right angles with the cross piece of said frame-work. Springs 8 are secured between the platform 4 and the ends 9 of the semi-circle 7, and serve to keep the trolley when complete in continuous contact with the trolley-wire 10.

In Fig. 1 the car to which our invention is applied is traveling in the direction as shown by the arrow, but if the motion were reversed, the trolley and its parts would be in position as shown by the dotted lines. A trolley-pole 11 is secured by a thumb-screw 12 in said socket 6, and normally projects upward, that is when the trolley is not in contact with the wire 10. The trolley-pole 11 is sometimes constructed entirely of wood, sometimes of a round pipe or some other suitable construction, but as far as this is concerned the application of our complete invention thereto is not affected. In all cases the trolley-pole 11 is provided with a center-wire 13, with proper insulating material 14, protecting the pole from induction. The connection between the wire in the trolley-pole 11 and our improvement will be more fully hereinafter described.

Our invention proper consists of a yoke 15, provided with arm 16, and which is practically fork-shaped in cross-section. Into said arms or forks 16 at a point near their ends is pivoted a self-adjusting pivot-block 17 capable of adjustment in two different directions. In speaking of its being capable of its adjustment in two different directions, we mean that the block itself as mounted upon an upright bolt or pivot 18 more fully hereinafter described, is capable of lateral motion, while its pivotal connection with the forks 16 of the yoke 15 give it an up and down movement.

In order that the fork 16 may not be clamped upon the block 17 tight enough to retard its operation, we have provided the following construction as best shown in Fig. 9 of the illustrations. Before going any farther to facilitate a clear understanding of our descriptions, we desire to state that all of the parts specifically described herein are made of brass or some equally good conducting material. The pivot-block 17 is provided with a perforation 19 in which is run an interior screw-thread 20. A counter-bore 21 larger than the bore 19 receives the enlarged smooth shank 22 of a tap-screw 23. The tap-screw 23 can only enter the distance prescribed by the length of the shank 22. Thus it will be seen that it is impossible to get the forks 16 in close enough contact with the pivot-block 17 to retard its operation.

The pivot-block 17 is provided with a central perforation 24, which is surrounded by a square cavity 25 which is formed in the under side of said pivot-block 17 for the reception of the square-head 26 of a bolt 18 which projects upwardly. The thread 28 upon the end of said bolt 26 is considerably smaller than the shank of the bolt, and forms a shoulder 29 for the purpose hereinafter set forth. This bolt passes through the center of a beam or arm 30 which is substantially of the shape shown in Fig. 2 of the illustration. It is preferably constructed in the form of a hollow casting, and the shoulder 29 previously mentioned is adapted to engage the under side 31 of the top of the casting or arm 30. This is to prevent the locking of said arm 30 against the pivot-block 17.

Secured between the two sides of the arm 30 is a block 32, provided with a central perforation 33 through which the bolt 18 passes, said block being adapted to turn on said bolt and permit lateral play of the beam or arm 30. Said block 32 has a longitudinal depression 34 in its under side in which a curved spring plate 35 preferably made of flat steel is placed, and the tension of said spring is also a preventive against the locking of the arm 30 and the pivot-block 17. Near both ends of said arms 30 are bearings 36 receiving a shaft 37 upon which the contact wheel 38 is keyed. Said wheel 38 has an annular depression 39 in its periphery, said depression forming two projecting flanges 40, which retain the wheel upon the wire. Upon either side of said wheels are round lugs or projections 41 which serve as contacts for the transmission of the electricity received from the wire by the wheel 38 of which said contact lug is a part. Brushes such as 42 are secured to the casting 30 so that they bear directly upon said commutators 41 to insure a continuous contact. The grooves 39 upon the wheel 38 just described, and upon the similar wheel 43 which is secured at the other end of the arm 30 are in exact alignment, and are similar in construction.

The sides 44 of the arm 30 have secured by rivets 45, to their inner sides flat steel springs 46, which are controlled by set-screws 47 as to the distance from said sides at which they must be. A rod 48 is secured in a slot 49 in the bolt 18, and is not quite the length of said springs 46. The object of this construction is to facilitate the following of the wheel 38 when the wheel 43 enters upon a curve. The operation of this will readily be seen, as the bolt 18 by reason of its securance in the pivot-block 17 is stationary so that rod 48 is also stationary or in alignment with the movement of the pivot-block. Thus when the wheel 43 enters upon a curve, the movement imparted to the trolley-pole turns the pivot-block 17, and the rod 48, and said rod 48 comes in contact with the spring opposite the direction in which the wheel 43 is going and helps to turn the wheel 38 revolving in the other end of the arm 30 so that it will keep in alignment upon the curve. The operation of this will be more readily understood by referring to Fig. 6 of the illustrations. In the sides of the pivot-block 17 are provided spring-plates 50, which bear against the inner sides of the forks 16 of the yoke 15 to insure a permanent contact at that point.

The shank 51 of the yoke 15 is provided with a longitudinal central bore 52 into which the trolley-pole is adapted to fit and be secured. In order to provide for any trolley-pole which may be larger than said interior bore 52, we have provided the shank 51 with slots 53 in the periphery of said shank, and as the complete yoke 15 is made of brass or some equally yielding material, the arms 54 may be spread apart and fit over the trolley-pole 11.

As before stated the trolley-pole has a wire 13 running through its center by means of which the current is connected indirectly to the motor.

A suitable means for securing the wire to the yoke 15 is provided so that the connection will be complete. The connection between said yoke 15 and the trolley-pole 11 must be well insulated in order that there will be no danger in handling the pole 11.

A clasp of any suitable design is provided to secure the arms 54 around the trolley-pole 11 and which we have indicated by the numeral 55. As is usual a rope 56 passes from the trolley-pole to which it is secured to the car by means of which the operator may manipulate the trolley.

It will be seen by the foregoing description, and by reference to the illustrations that the current from the wire 10 passes into the contact wheels 38 and 43, thence into the arms 30 by reason of their connection therewith and the brushes 42, thence through the bolt 18 upon which said arm 30 operates, through the pivot-block 17, plates 50 and bolts 23 into the forks 16 of the yoke 15, and into the wire 13, within the trolley 11 down to the base-stand 3, and thence by wiring into the motor.

In Fig. 11 we have shown a modification of the arm 30, the same consisting in constructing the same of a yielding, springing material which will assist in keeping the contact wheels 38 and 43 in continuous contact with the wire 10.

Having fully described our invention, what we claim is,

1. In an overhead electric trolley, the combination, with a fork-shaped yoke adapted to be mounted on the upper end of a trolley-pole, of a block pivoted horizontally between the arms of said yoke and capable of a vertical oscillatory movement independent of said yoke, and a laterally-movable frame pivoted upon said block and carrying contact wheels; substantially as set forth.

2. In an overhead electric trolley, the combination, with a laterally-movable frame carrying a contact wheel at each end and provided at its sides with two springs 46, of a bar 48 fixed against independent lateral movement and adapted to bear against one of said springs when the frame is turned; substantially as set forth.

3. In an overhead electric trolley, the combination, with a laterally-movable frame, and contact wheels journaled at the ends thereof, of means fixed against independent movement and adapted to assist the alignment of the follower wheel when said frame is turned; substantially as and for the purpose set forth.

4. In an overhead electric trolley, the combination, with a pivot block 17, of a frame 30 carrying contact wheels and comprising a block 32 mounted above said pivot-block and provided in its under side with a recess or depression, a bolt 18 pivotally connecting said blocks together, and a flat spring 35 mounted on said bolt between the blocks and in said recess or depression; substantially as and for the purpose set forth.

5. In an overhead electric trolley, the combination, with a fork-shaped yoke 15, of a pivot-block 17 mounted between the arms of the latter, bolts 23 for securing the block to said arms, and spring plates 50 interposed between the arms and the respective ends of the block; substantially as and for the purpose set forth.

6. In an overhead electric trolley, the combination, with a frame 30, of contact wheels journaled at the ends thereof and provided with cylindrical projections, and brushes secured to the frame and having their free ends bearing upon said projections; substantially as and for the purpose set forth.

7. In an overhead electric trolley, the combination, with a laterally-movable frame carrying a contact wheel at each end and provided at its sides with two adjustable springs 46, of a pivot-block 17, a bolt 18 keyed to said block and forming the bearing for the frame, and a rigid arm 48 projecting from said bolt and between the springs 46; substantially as and for the purpose set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

BENJAMIN KOCHS.
ALBERT KOCHS.

Witnesses:
HERBERT S. ROBINSON,
JNO. C. HIGDON.