(No Model.) 3 Sheets—Sheet 1.

C. A. STARK.

CLOSED CONDUIT ELECTRIC RAILWAY.

No. 489,835. Patented Jan. 10, 1893.

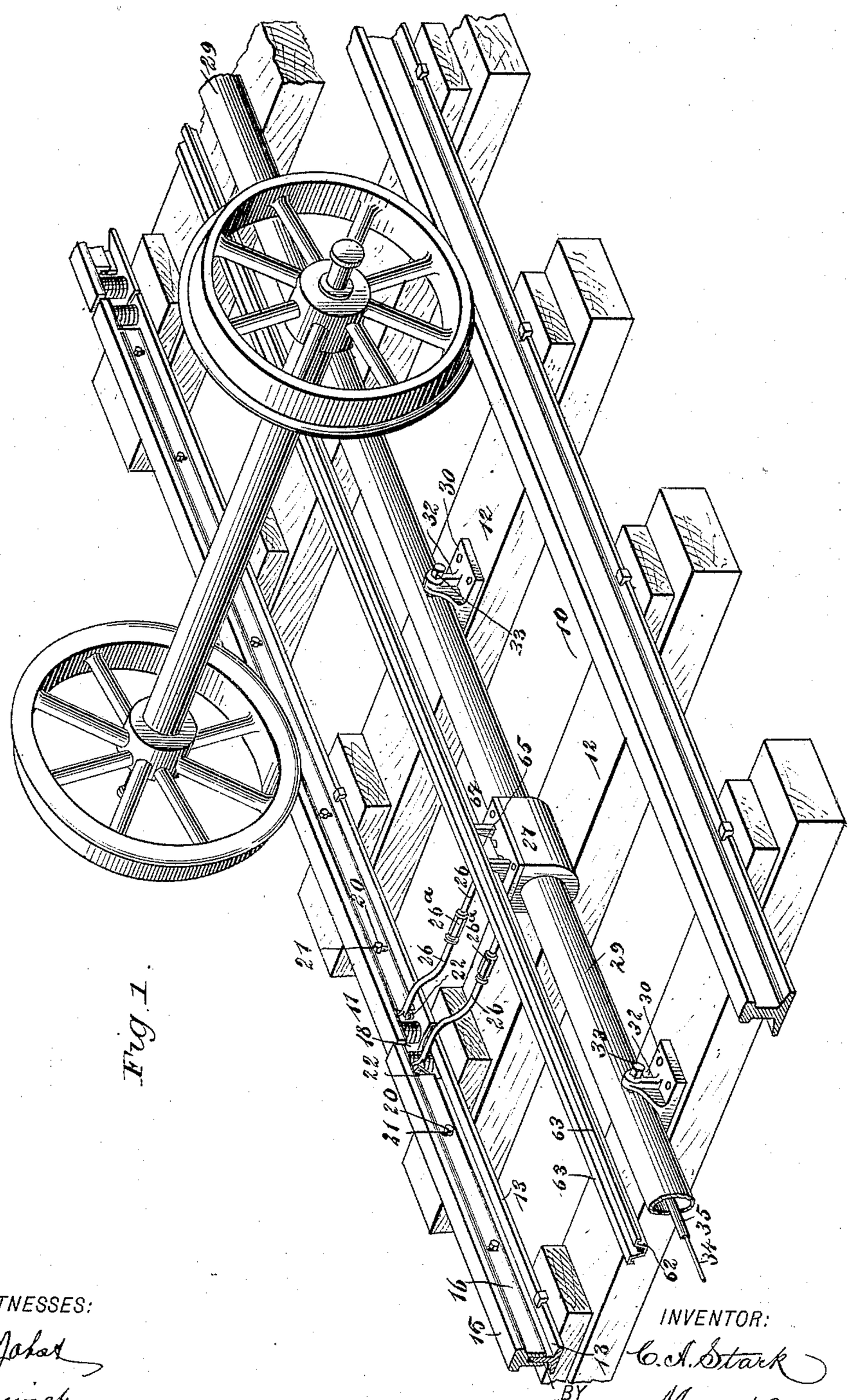

Fig. 1.

WITNESSES:

Paul Johns

C. Sedgwick

INVENTOR:

C. A. Stark

Munn & Co

ATTORNEYS.

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Fig. 2

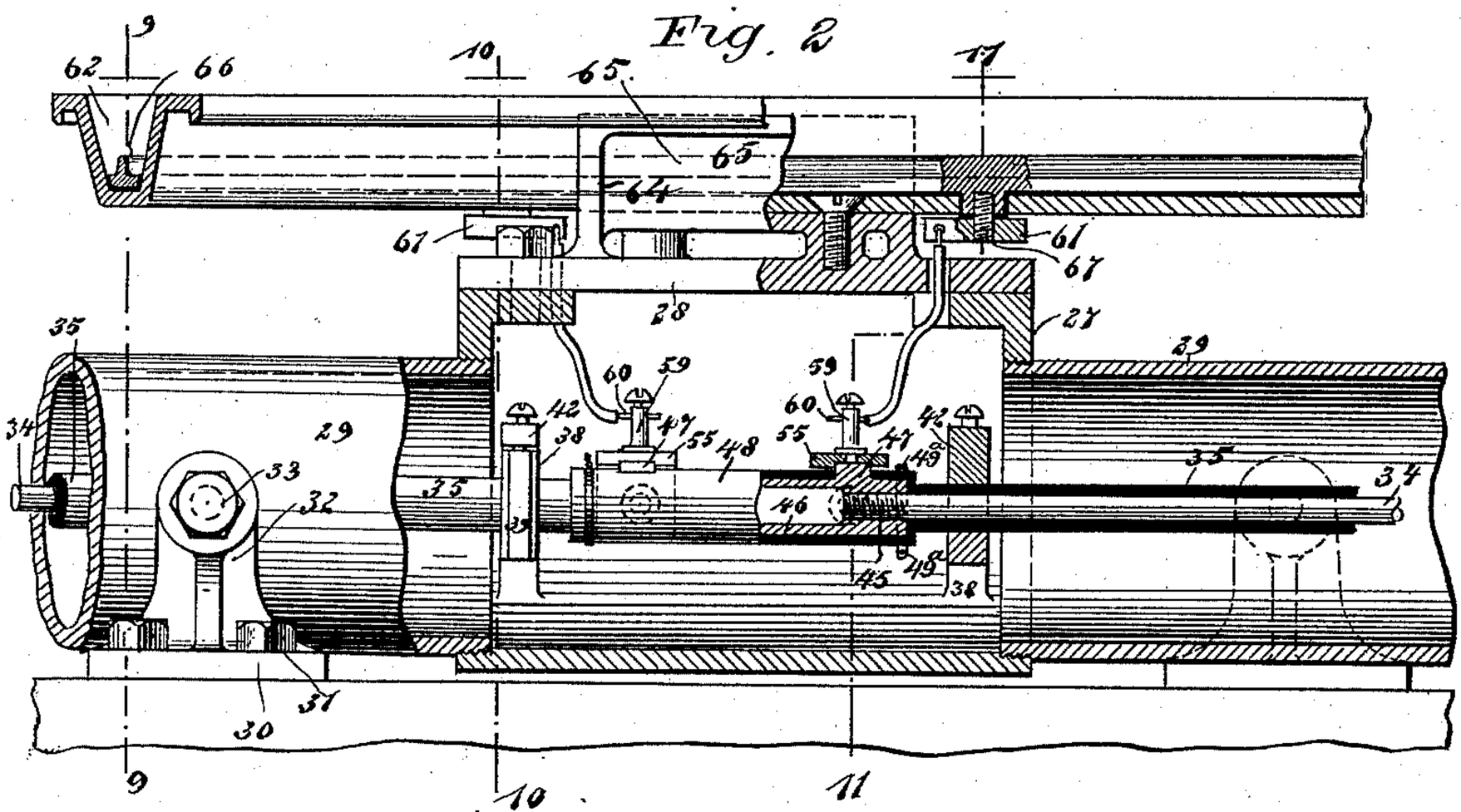

Fig. 3.

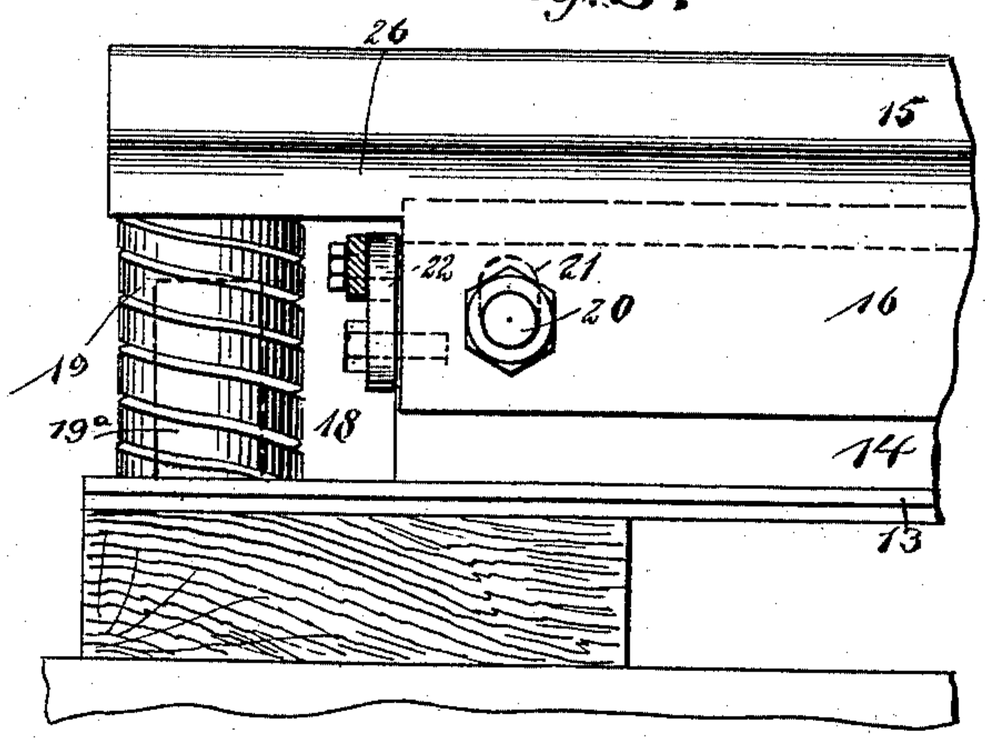

Fig. 4

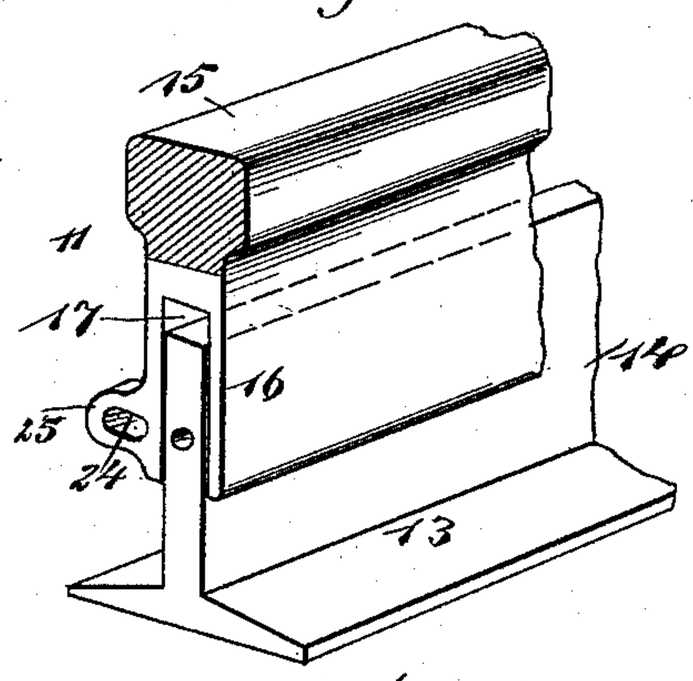

Fig. 5.

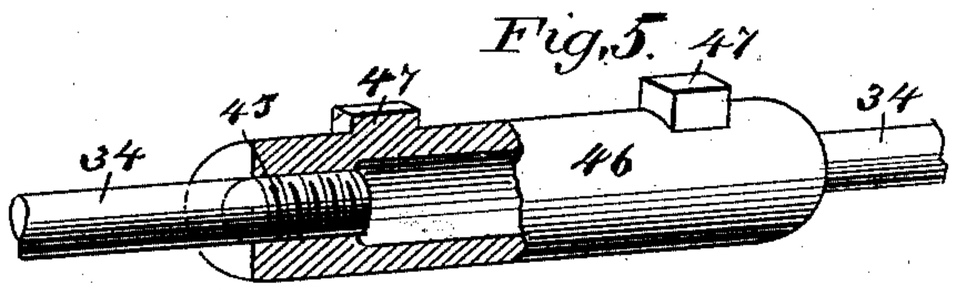

Fig. 6

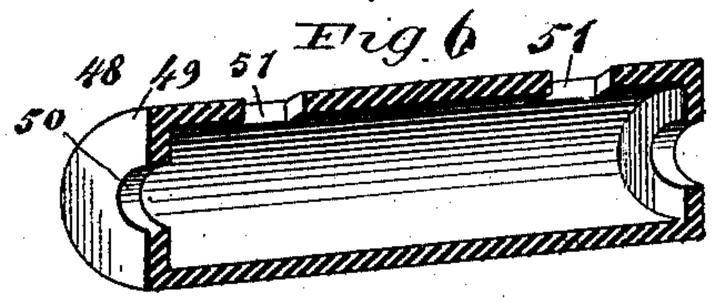

Fig. 8.

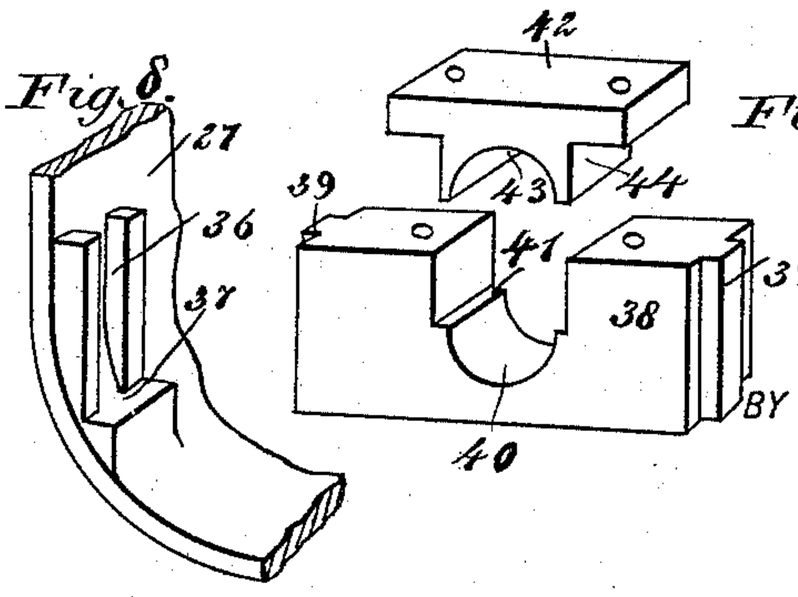

Fig. 7.

WITNESSES:

Paul Johnston

C. Sedgwick

INVENTOR:

C. A. Stark

BY

Munn & Co

ATTORNEYS.

(No Model.) 3 Sheets—Sheet 3.

C. A. STARK.

CLOSED CONDUIT ELECTRIC RAILWAY.

No. 489,835. Patented Jan. 10, 1893.

Fig. 9.

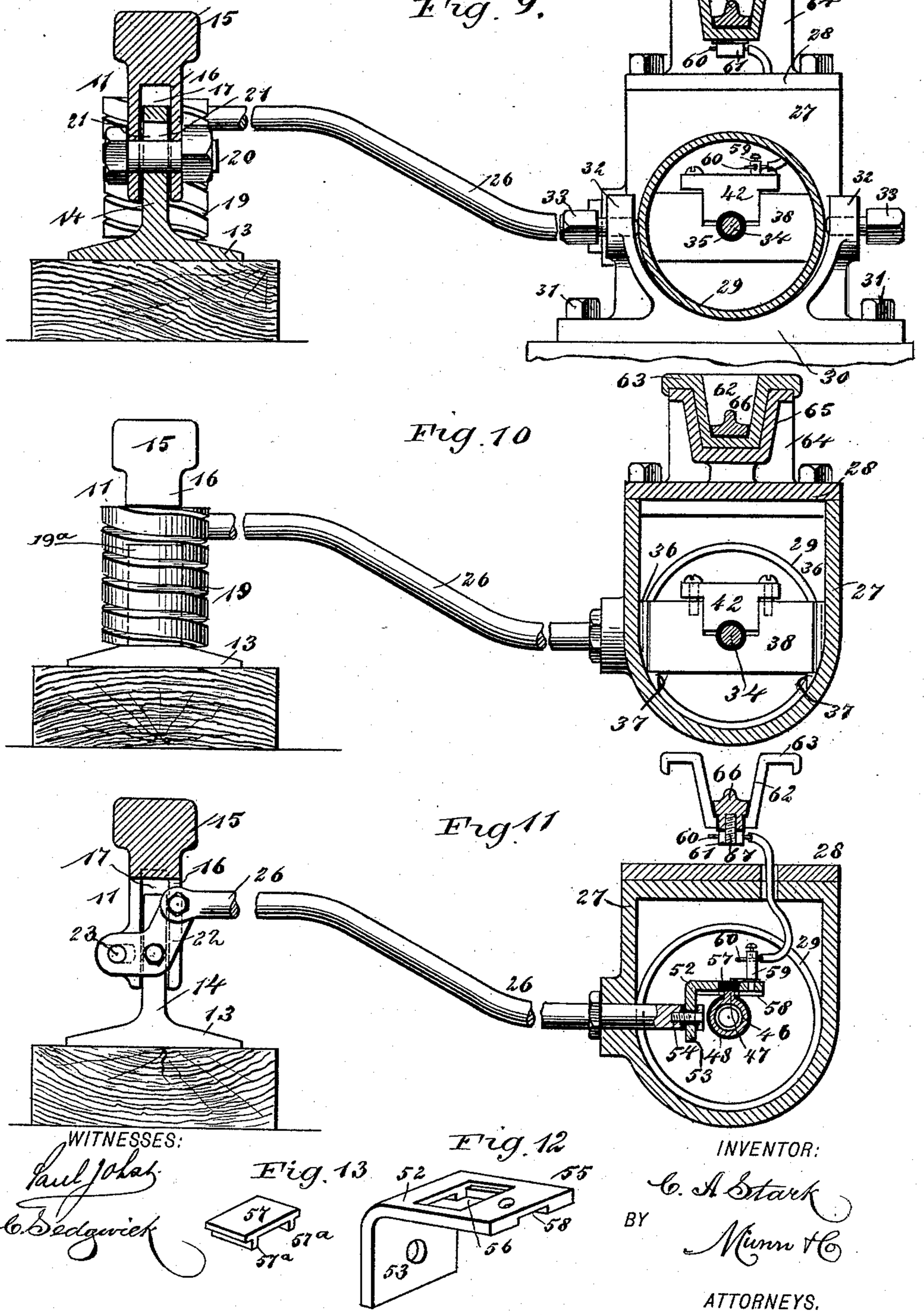

Fig. 10

Fig. 11

Fig. 12

Fig. 13

WITNESSES:

Paul Johab

C. Sedgwick

INVENTOR:

C. A. Stark

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

CHARLES A. STARK, OF DULUTH, MINNESOTA.

CLOSED-CONDUIT ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 489,835, dated January 10, 1893.

Application filed March 23, 1892. Serial No. 426,089. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. STARK, of Duluth, in the county of St. Louis and State of Minnesota, have invented a new and Improved Electric Railway, of which the following is a full, clear, and exact description.

My invention relates to improvements in electric railways, and the object of my invention is to produce a simple, practical, and comparatively inexpensive railway, in which the trolley conductor is carried upon the surface of the ground, the line conductor carried beneath the surface, and the circuit closed through the trolley couductor only at the points opposite the cars, and this construction enables the line conductor to be safely carried without danger of grounding, and it also reduces the liability of accidents, as under ordinary circumstances, the trolley wire or conductor will carry no electricity.

To this end, my invention consists in certain features of construction and combinations of parts, which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a broken perspective view of a railway constructed in accordance with my invention, showing the track wheels thereon; Fig. 2 is a broken longitudinal section partly in elevation, of the main conduit, the trolley conductor carrier, and the connections between the trolley conductor and the line wire; Fig. 3 is an enlarged side elevation of one end portion of the compressible track rail; Fig. 4 is a broken perspective view, partly in section, of the compressible rail; Fig. 5 is a broken detail view, partly in section, of the line wire and its tightening and contact device; Fig. 6 is a perspective view of one half of the insulating sleeve which incloses the tightening tube of the line wire; Fig. 7 is a perspective view of the hanger attachments for supporting the line wire; Fig. 8 is a broken perspective view, showing the slide-way in which the hanger block is held; Fig. 9 is a cross section on the line 9—9 in Fig. 2, showing the connections between the compressible rail and the line wire; Fig. 10 is a vertical section on the line 10—10 in Fig. 2; Fig. 11 is a vertical section on the line 11—11 in Fig. 2; Fig. 12 is a detail perspective view of the contact plate which is actuated by the compression of the rail: and Fig. 13 is a detail perspective view of the insulating block adapted to fit in a recess of the contact plate.

The railway is provided with two parallel track rails 10 and 11, which are secured to sleepers 12 in the usual way, and the rail 10 is the ordinary track rail, being composed of a single piece, and it may be made in any of the usual shapes. The rail 11 is provided with a base portion 13, having a central vertical web 14, the web and base piece comprising the lower portion of the rail, and the upper portion comprises a solid tread 15, having a central longitudinal rib 16, on the under side, which rib is vertically and longitudinally recessed, as shown at 17 in Fig. 4, and the web 14 of the lower portion of the rail fits in this recess. It will be seen that the upper part of the rail 11 may move vertically in relation to the lower part. The upper portions of the rail overlap the lower portions at the ends, as shown at 18 in Fig. 3, and beneath these overlapping upper portions are stiff spiral springs 19, which normally hold the tread of the rail in an elevated position, but the springs are compressed when a car passes over the rails, so as to permit the circuit to be closed through the trolley conductor, as will be hereinafter described. Within the spring 19 is a post 19^a, shown by dotted lines in Figs. 3 and 10, on which the upper part of the rail strikes when the spring is compressed. The upper and lower portions of the rail 11 are fastened together by bolts 20, which extend through the rib 16 and web 14, and the web 14 is slotted vertically to receive the bolts, as shown at 21 in Figs. 3 and 9, thus permitting the necessary vertical movement downward, and limiting the movement of the upper portion of the rail.

At each end of the rail 11, is a vertically swinging elbow lever 22, which is pivoted at its elbow on the web 14 of the rail, as best shown in Fig. 11, and the lower arm of the lever has a stud 23, which enters a slot 24, which is produced in a lug 25 on the outer side of the rib 16, of the movable part of the rail, as shown in Fig. 4. This arrangement permits the necessary movement of the lever,

and it also causes the lever to be tilted by the depression of the upper part of the rail, but it will be understood that the lug 25 may be dispensed with, to facilitate the easy rolling of the rail, and the elbow lever held in any convenient way. The upper arm of the lever 22 is pivotally connected with an inwardly-extending rod 26, which rod may be adjusted longitudinally by means of an ordinary tightening nut 26ª, which connects the sections of the rod in a common and well known manner, as shown in Fig. 1, and the inner end of the rod enters a casing 27, which is placed centrally between the track rails, and which has a removable top plate 28, adapted to carry the hangers which support the trolley wire carrier. A case 27 is arranged opposite the adjacent ends of every two rails, and the case contains the circuit closing mechanism which will be described below.

The main conduit 29, extends centrally between the rails, and the conduit is made up in sections, each section having its ends screwed into the cases 27, as best shown in Fig. 2. The conduit consists of a simple pipe, which is held in hangers consisting of a base plate 30, adapted to be secured to a sleeper or other support by bolts 31, the upwardly-extending side arms 32, formed integrally with the base plate and adapted to receive the conduit between them, and the inwardly-extending bolts 33, which are held to turn in the upper ends of the arms 32, and are adapted to impinge upon the conduit pipe, so as to hold the same securely in place. That portion of the hanger between the arms is made semi-cylindrical, so that it will fit snugly upon the conduit. The line wire 34, extends longitudinally through the conduit, and is held in suitable insulating hose or covers 35. The wire is held in hangers which are secured in the cases 27 of the conduit, and each case has on its inner wall and on opposite sides, vertical slide-ways 36, which terminate at the bottom in horizontal shoulders 37. Transverse hanger blocks 38 are held in the cases, the blocks having tongues 39 at the ends, which fit snugly in the slide-ways 36. The blocks 38 have central recesses in their upper sides, the lower portion of each recess being semi-cylindrical, as shown at 40 in Fig. 7, so as to fit snugly upon the line wire, and the sides of the recess are vertical and terminate in horizontal shoulders 41 at the bottom. The hanger is also provided with a cap 42, adapted to fit upon the block 38, and the cap has a depending central portion 44, which has a semicylindrical recess 43 in its under side, and this depending portion is adapted to fit in the recess of the block 38, the side edges of it resting upon the shoulders 41 in said block. The two parts of the hanger thus form a clamp which is adapted to securely hold the line wire, and when the parts are together, the cap is held to the block by means of suitable screws.

The line wire is made up in sections, the ends of which are screw-threaded, as shown at 45, and adapted to fit threads in the ends of the tightening and contact tubes 46, as shown in Fig. 5, these tubes being held in the cases 27, as shown in Fig. 2, but similar tightening devices may be provided at more frequent intervals if necessary. The tightening tube 46, has on its upper side, and near its ends, projecting contact lugs 47, and the tube is held in an insulating case 48, which is composed of two half sections 49, of semicylindrical shape, the sections having end recesses 50, to receive the line wire, and having recesses 51, on their upper sides through which the lugs 47 of the tube 46 may project, as shown in Figs. 2 and 11. The half sections 49, are held together by hose clamps 49ª. Contact lugs 47 are adapted to contact with the sliding elbow contact plates 52, which are shown in detail in Fig. 12, and one of these plates is secured to the inner end of each rod 26, which enters the case 27, the lower or vertical portion 53 of the plate being secured to the rod by a screw 54 or its equivalent, as shown in Fig. 11. The upper horizontal portion 55 of the plate 52, is provided with a recess 56, in which is held an insulating block 57, this being adapted to rest normally upon one of the contact lugs 47 of the tube 46. A slide-way 58 is produced on the under side of the horizontal portion 55 of the contact plate and at right angles to the recess 56, this slide-way being adapted to move on the lug 47, and the lug is also adapted to fit between the parallel insulating ribs 57ª on the block 57, these ribs forming continuations of the sides of the slide-way. The inner end of the horizontal portion 55 is adapted at times to contact with the lug 47, and it carries a binding screw 59, which binds the block 57 in place and to which a conducting wire 60 is attached, and this wire extends upward through the top of the case 27 and connects with a conducting plate 61, which is held on the under side of the trolley wire carrier 62. This carrier 62 is of an essentially U-shape, as is shown in Figs. 9 to 11, and it has top flanges 63, which are supported on the uprights 64, which are formed integrally with the tops 28 of the cases 27, and which also carry a trough 65 of similar shape to the trolley wire carrier, this trough being adapted to form a secure support for the carrier, as shown in Figs. 2 and 10. The trolley wire 66 extends longitudinally through the bottom part of the U-shaped or trough-like carrier 62, and is suitably insulated therein. It is connected with the conducting plates 61, by means of screws 67, which extend upward through said plates and into the bottom of the wire. The wire may be made of any approved shape, but it is preferably shaped somewhat like a rail, as shown in the drawings, and any ordinary trolley wheel may be made to run upon it in the usual manner.

The operation of the railway is as follows:

In its normal condition, the upper portion of the compressible rail will be raised by the spring 19, and this will tilt the levers 22, so as to push inward on the rods 26, and cause the insulating blocks 57 to be held upon the lugs 47 of the tubes 46, as shown in Figs. 2 and 11, and when the parts are in this position, the electric current flows uninterruptedly through the line wire 34. When, however, a car comes upon a particular rail, it compresses the spring and forces down the upper portion of the compressible rail, and this movement tilts the adjacent lever 22, thus drawing out the rod 26, and sliding the contact plate 52, so that the inner conducting end of the plate will contact with a lug 47. The current will then flow upward through the wire 60, to the trolley wire 66, from whence it will pass through the ordinary trolley and the car motor to the ground.

It will be understood that the conductor carrier 62, which carries the trolley conductor, may be provided with means for draining it at necessary intervals, and it will be seen that the upwardly-extending sides of the carrier will serve as a guide for the trolley and prevent it from easily leaving the wire.

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

1. An electric railway, comprising a surface conductor, a line wire held in a conduit adjacent to the surface conductor and adapted to connect therewith, a compressible rail, and means for closing the circuit through the surface conductor by the movement of the rail, substantially as described.

2. An electric railway, comprising a surface conductor, a circuit closer arranged adjacent thereto and adapted to connect an electric current therewith, a compressible track rail, and means for operating the circuit closer by the movements of the rail, substantially as described.

3. An electric railway, comprising a surface conductor, a line wire arranged essentially parallel with the surface conductor, a series of circuit closers to connect the line wire and surface conductor, compressible track rails, and a lever mechanism for operating the circuit closers by the movements of the rails, substantialiy as described.

4. An electric railway, comprising a surface conductor, a line wire held in a conduit beneath the surface conductor, insulating contact tubes connected with the wire and having projecting contact lugs, circuit closers connected with the surface conductor and adapted to connect with the contact lugs, compressible track rails, and a lever mechanism for operating the circuit closers by the movements of the rails, substantially as described.

5. An electric railway, comprising a surface conductor, an insulated line wire held beneath the same, contact tubes secured to the line wire and having projecting contact lugs, sliding contact plates adapted to engage the lugs, said plates being in connection with the surface conductor, and having insulating blocks to contact with the lugs, compressible track rails, and a lever mechanism adapted to move the sliding contact plates by the movements of the rails, substantially as described.

6. In an electric railway, the combination of the compressible rail, an insulated line wire extending between the track rails and having contact lugs at intervals, the surface conductor, the circuit closer connected with the surface conductor and adapted to connect with the contact lugs of the line wire, the elbow lever pivoted on the stationary part of the rail and pivotally connected with the movable part thereof, and an operative rod connection between the elbow lever and the circuit closer, substantially as described.

7. In an electric railway, the combination of the compressible rail, the insulated line wire extending between the track rails and having contact lugs at intervals, the surface conductor, the sliding contact plate connected with the surface conductor and having an insulating block to connect with a lug of the line wire, the elbow lever pivoted on the fixed portion of the rail and pivotally connected with the movable part thereof, and a rod pivoted to the elbow lever and secured to the sliding contact plate, substantially as described.

8. In an electric railway, the combination, with the main conduit having cases at intervals, with removable tops for the cases, of a line wire carried in the conduit, a surface conductor carrier supported on the top of the contact cases, a surface conductor held in the carrier, a compressible track rail and a circuit closer operated by the movement of the rail and adapted to close the circuit between the line wire and the surface conductor, substantially as described.

9. In an electric railway, the combination with the conduit having vertical slideways in its sides and a line wire extending through the conduit, of a two part hanger, the base portion of which is recessed adjacent to the wire and has end tongues to fit the slideways of the conduit and the top portion of which is thickened in the middle so as to enter the recess of the base portion and provided with end flanges to rest upon the base portion, substantially as described.

CHARLES A. STARK.

Witnesses:
FRED W. PARSONS,
A. B. CHAPIN.