

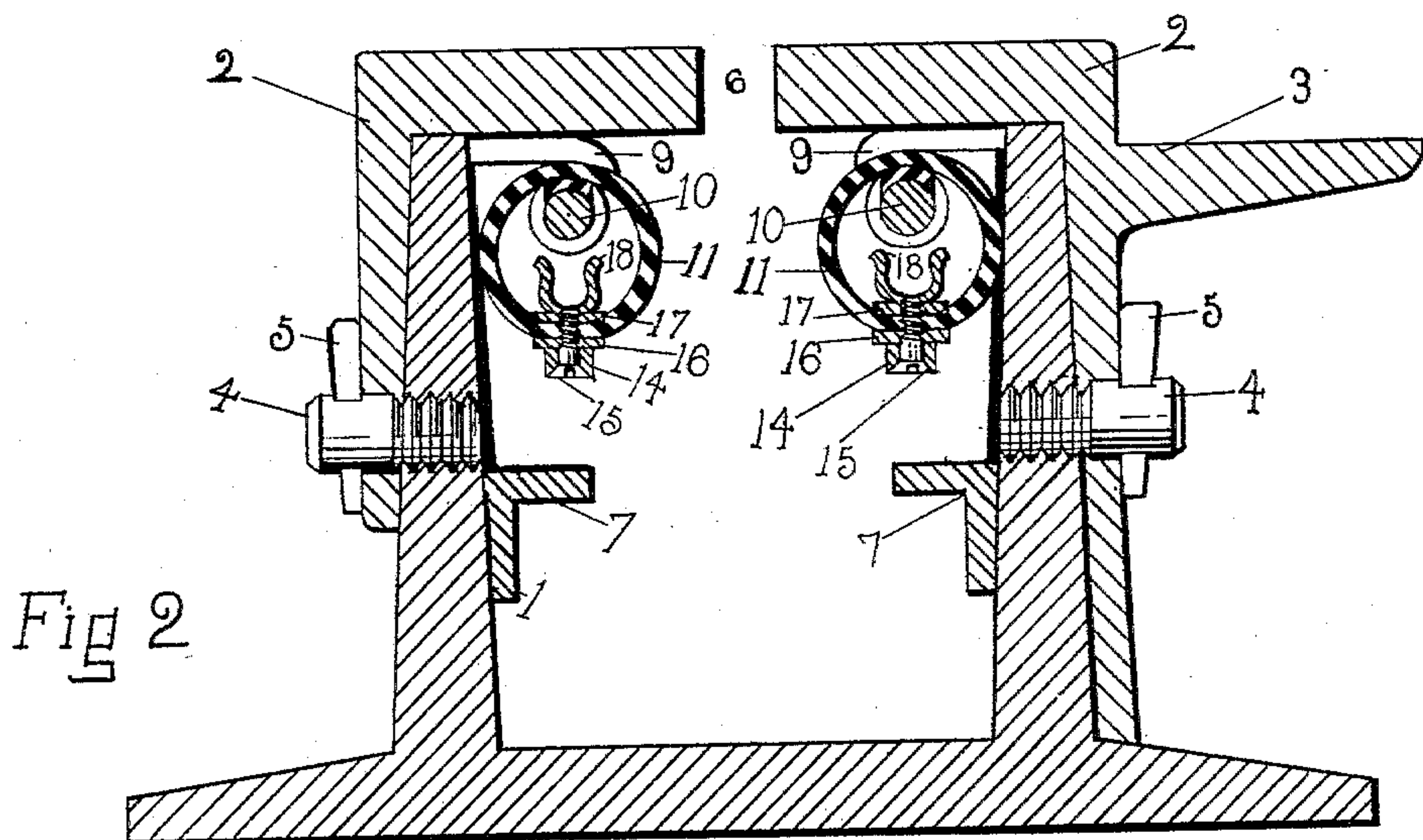
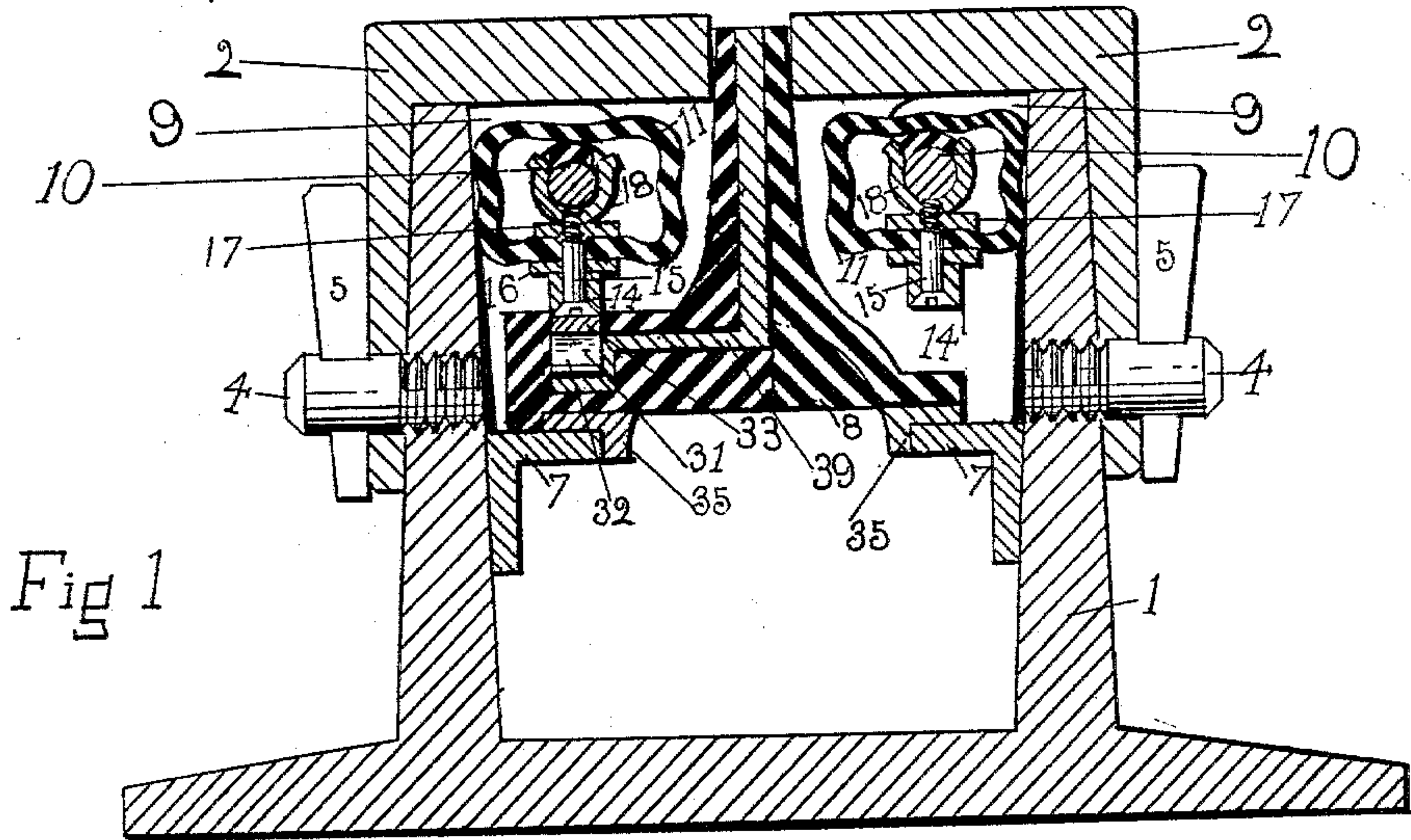
(No Model.)

4 Sheets—Sheet 1.

H. BRANDENBURG.  
ELECTRIC RAILWAY.

No. 562,796.

Patented June 30, 1896.



WITNESSES:  
Wm. A. Goumans  
Daniel M. Simmons

INVENTOR  
Henry Brandenburg

(No Model.)

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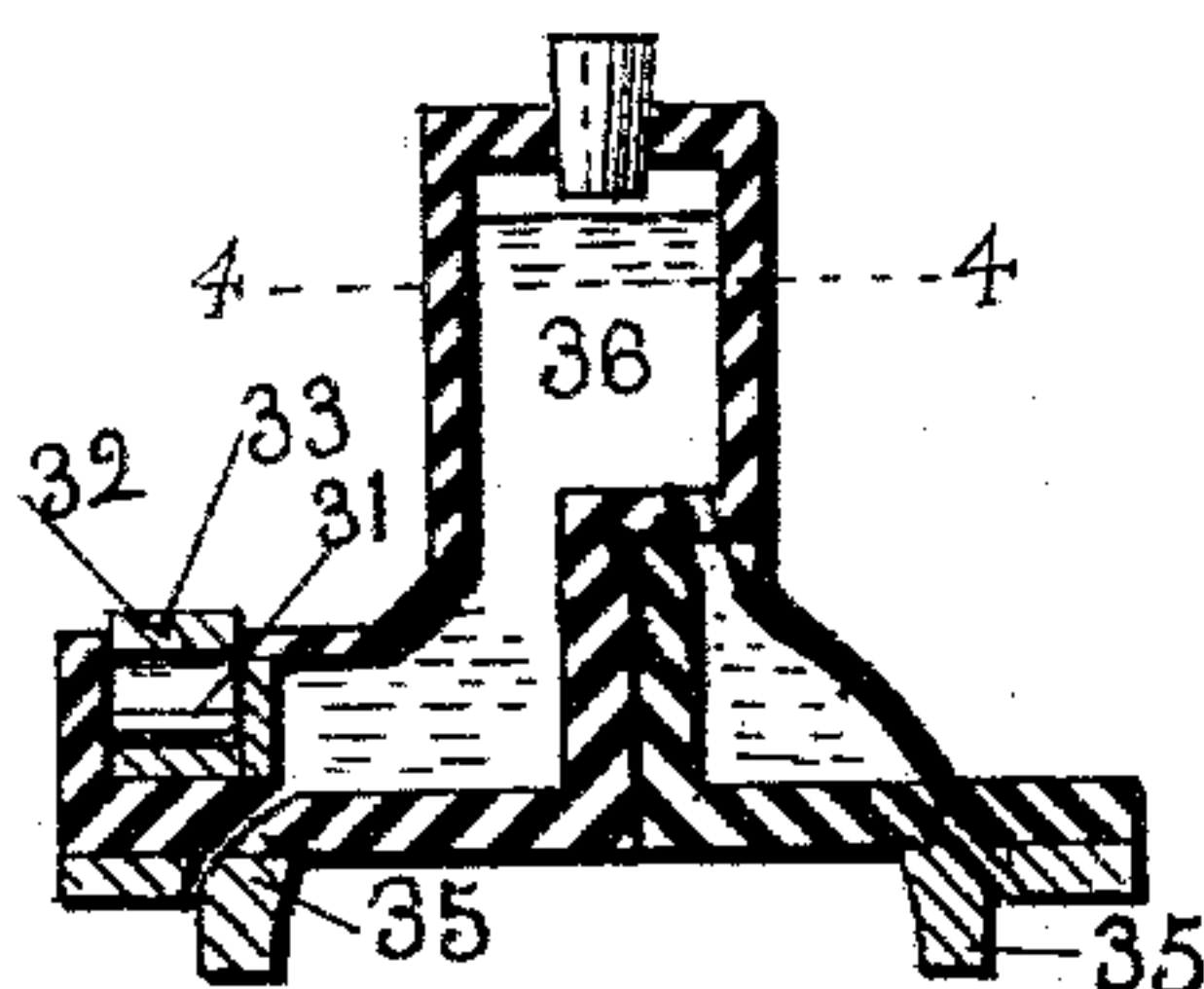
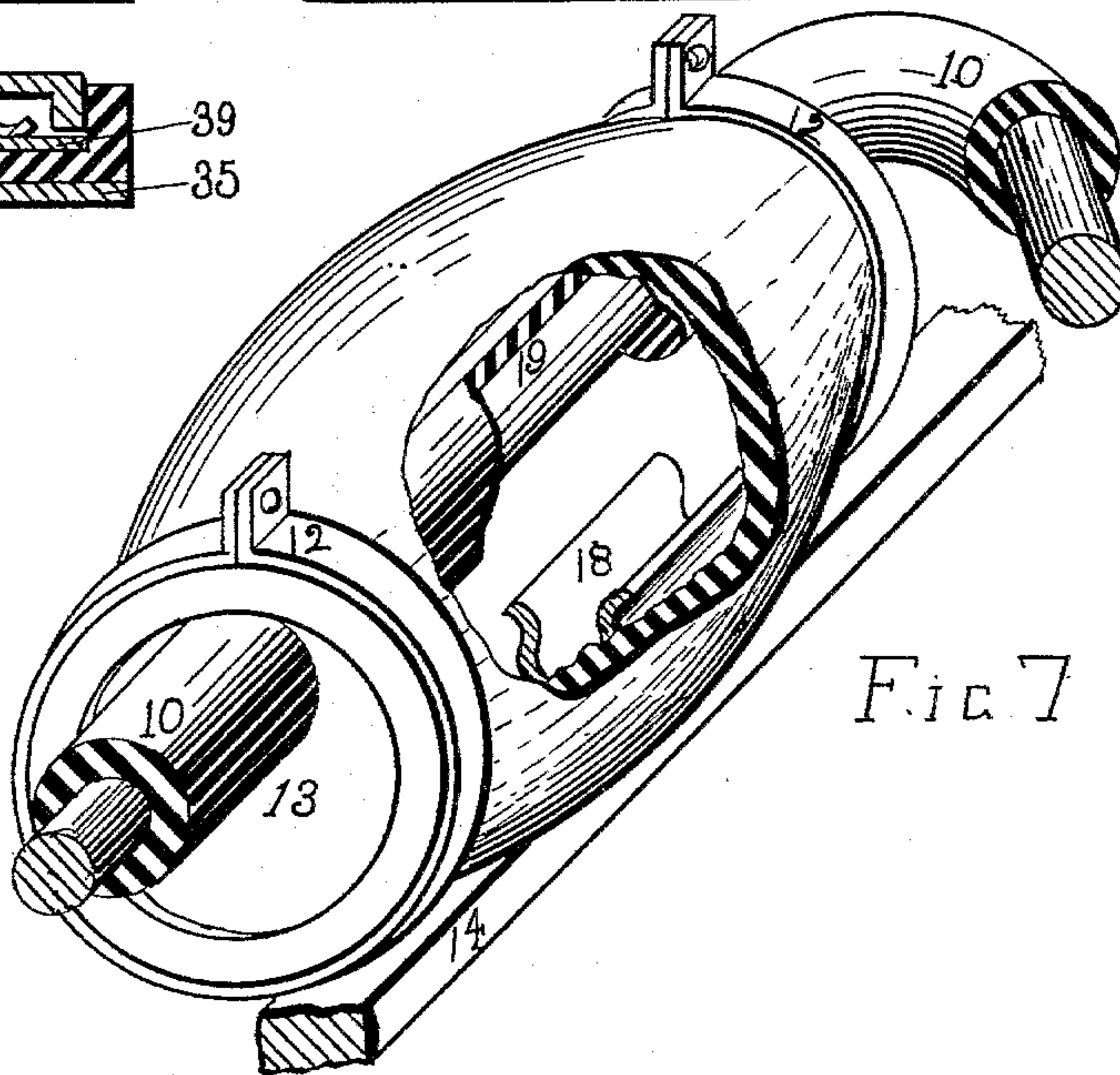
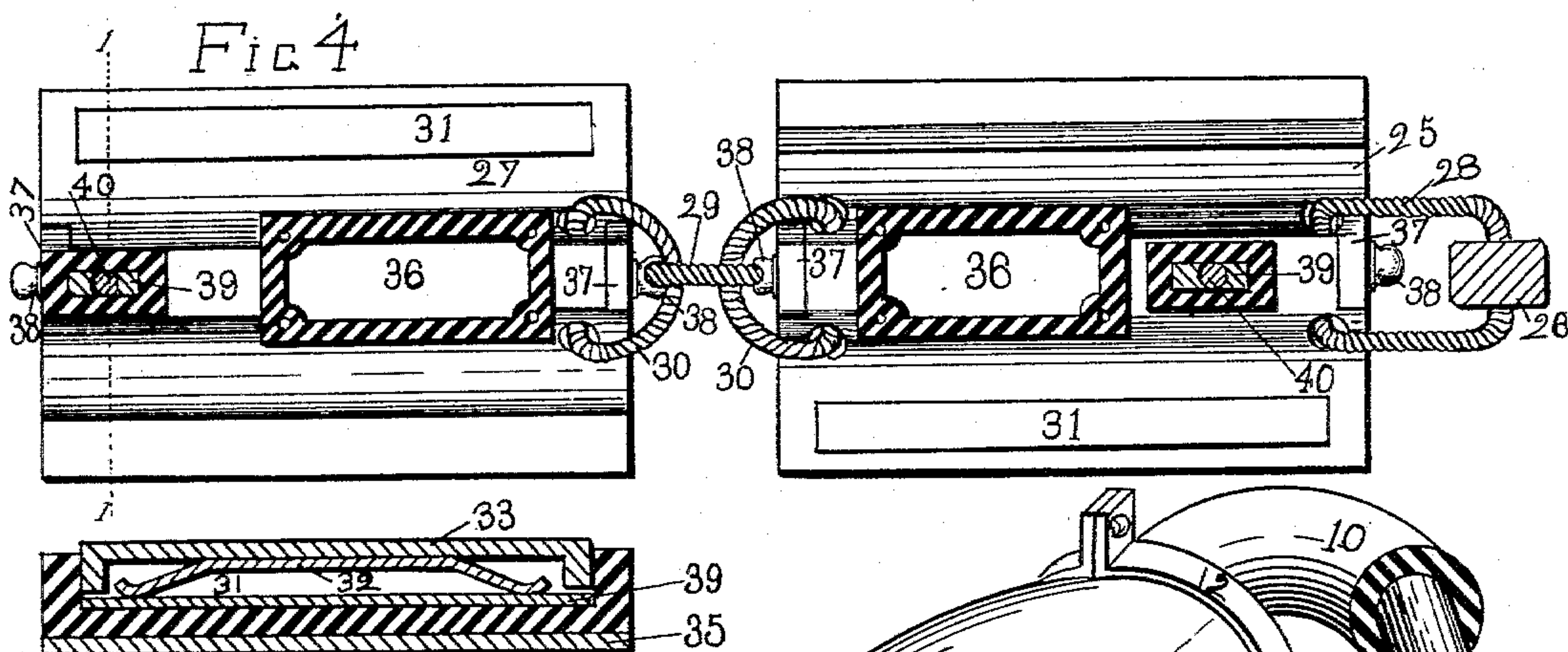
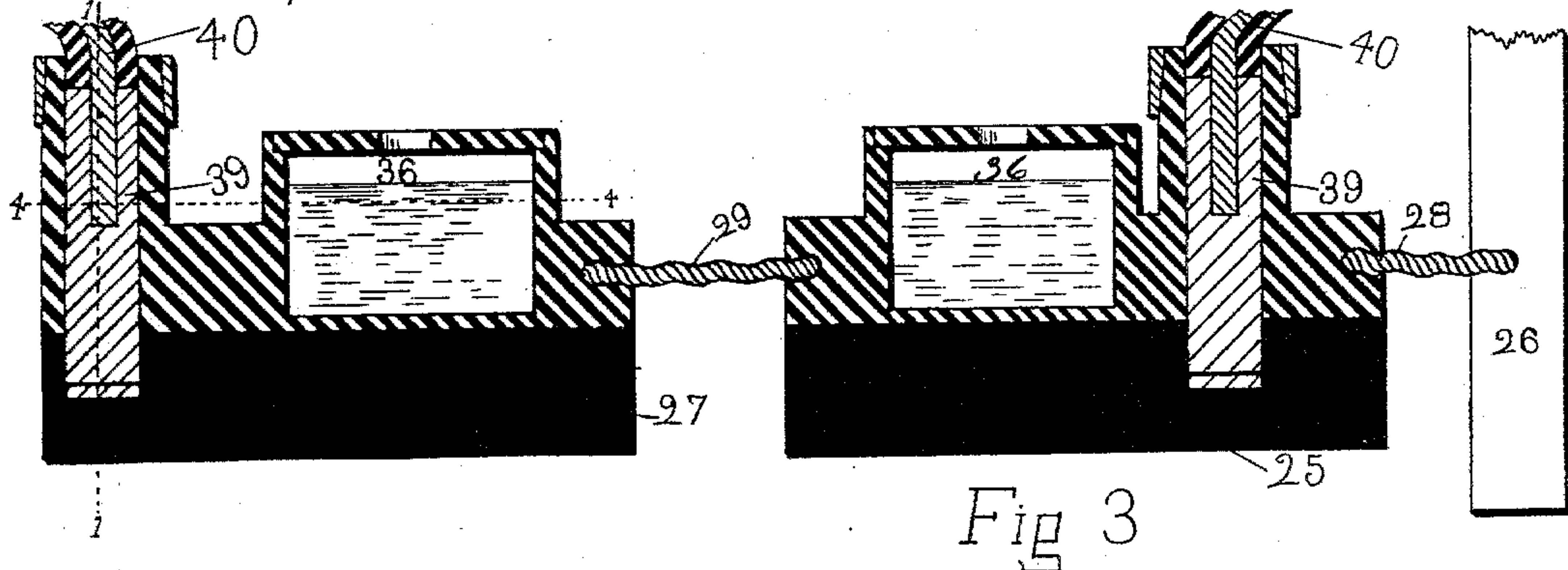


Fig 6  
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(No Model.)

4 Sheets—Sheet 3.

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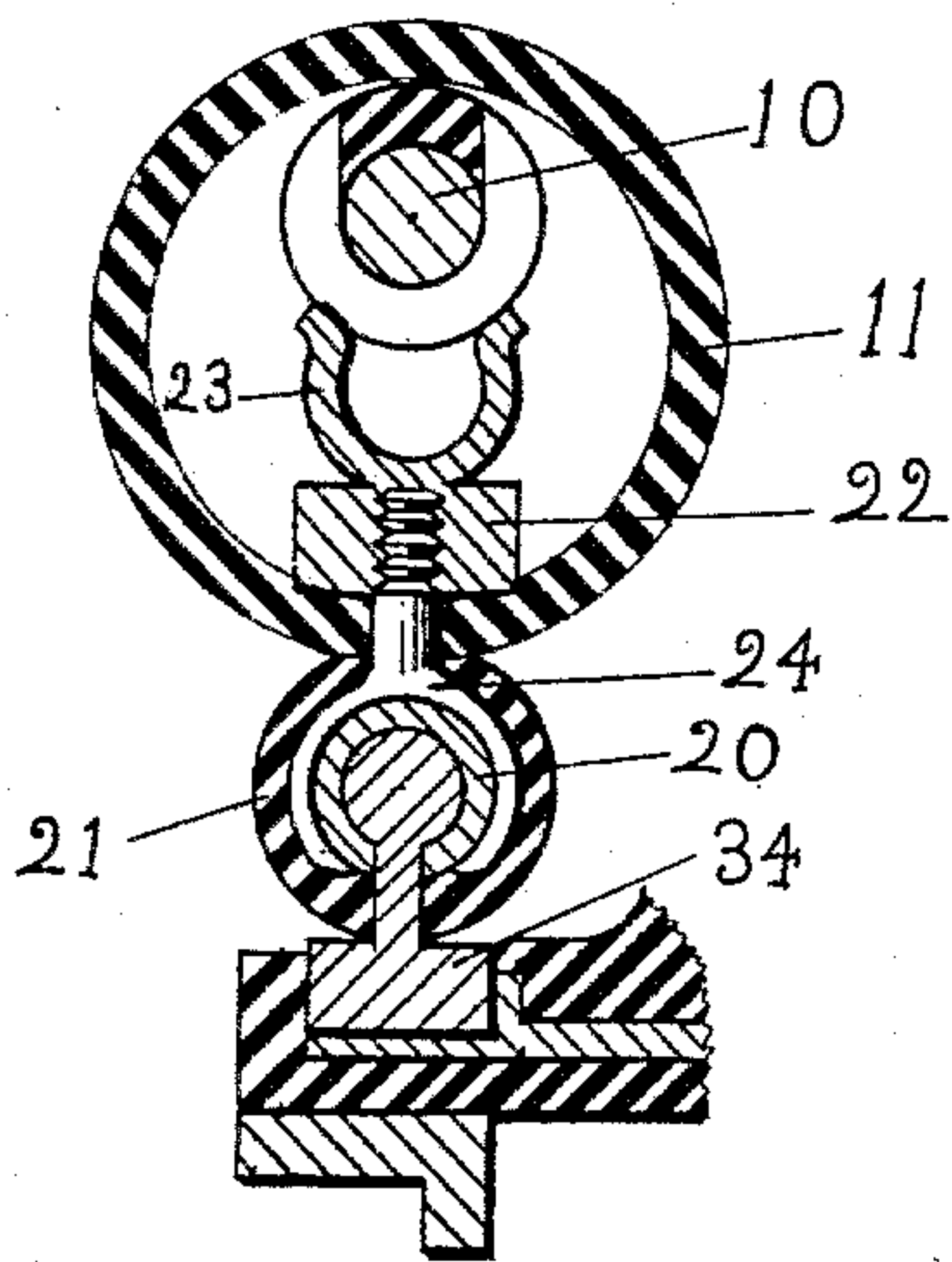


Fig 8

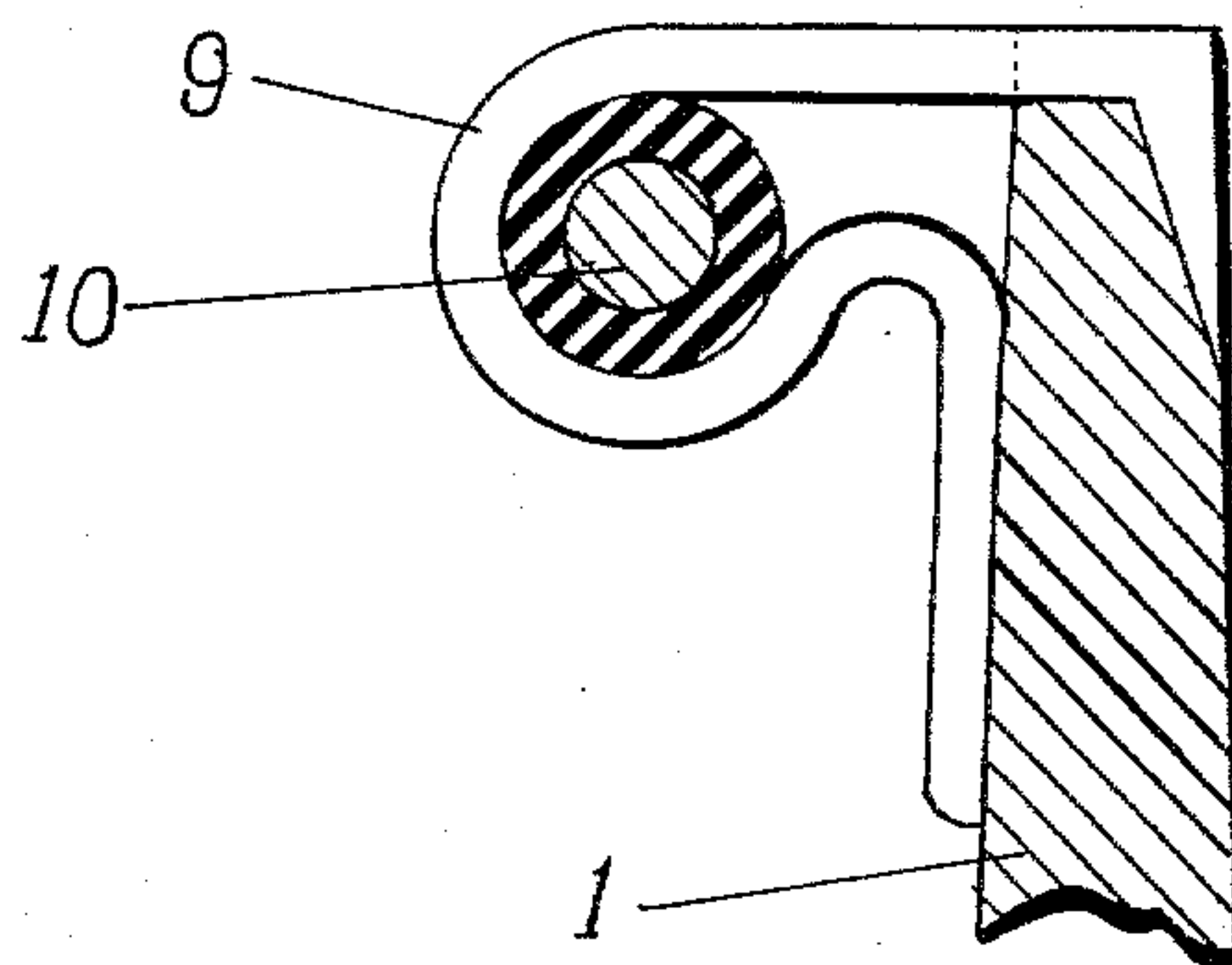


Fig 9

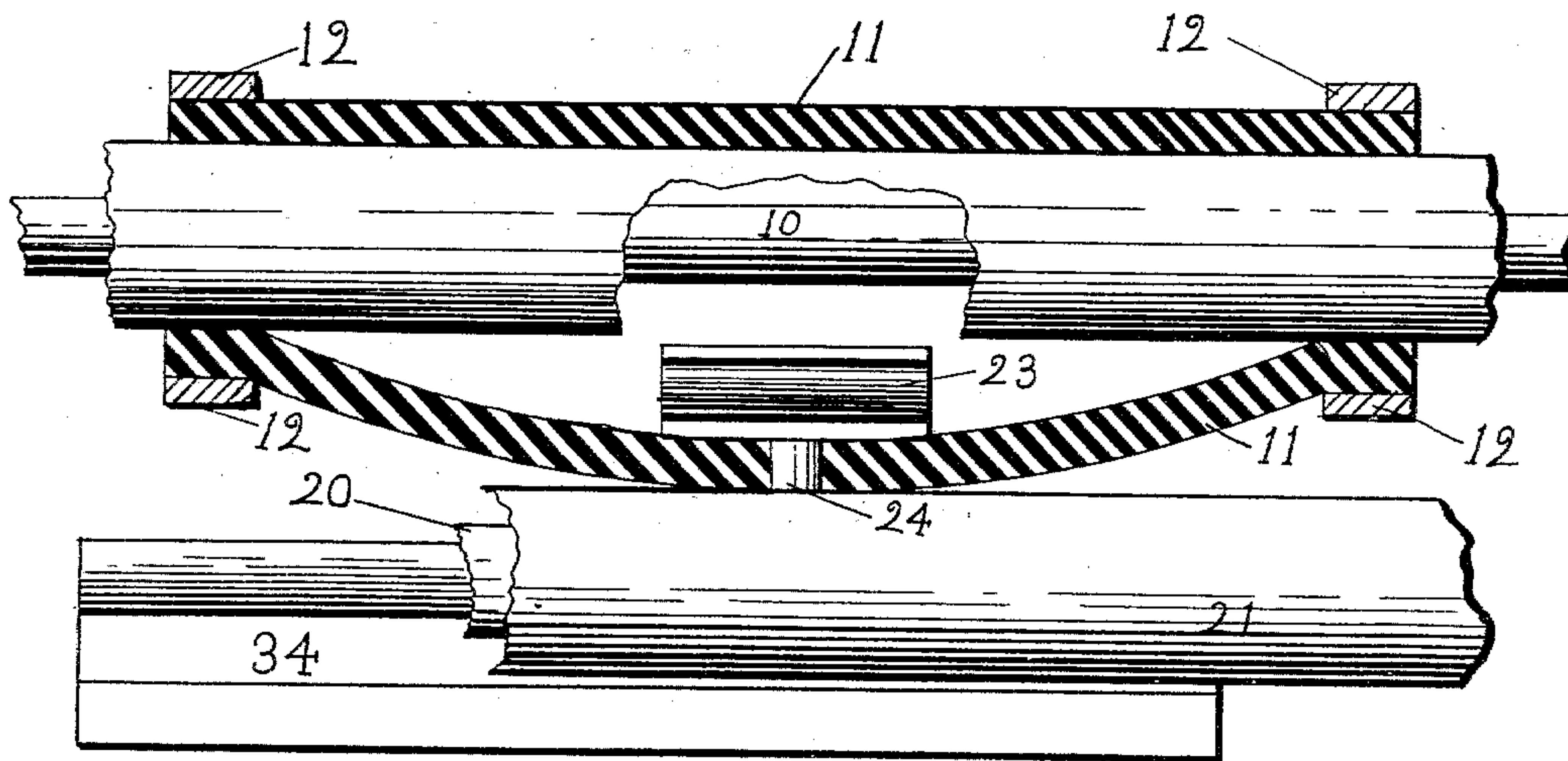


Fig 10

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(No Model.)

4 Sheets—Sheet 4.

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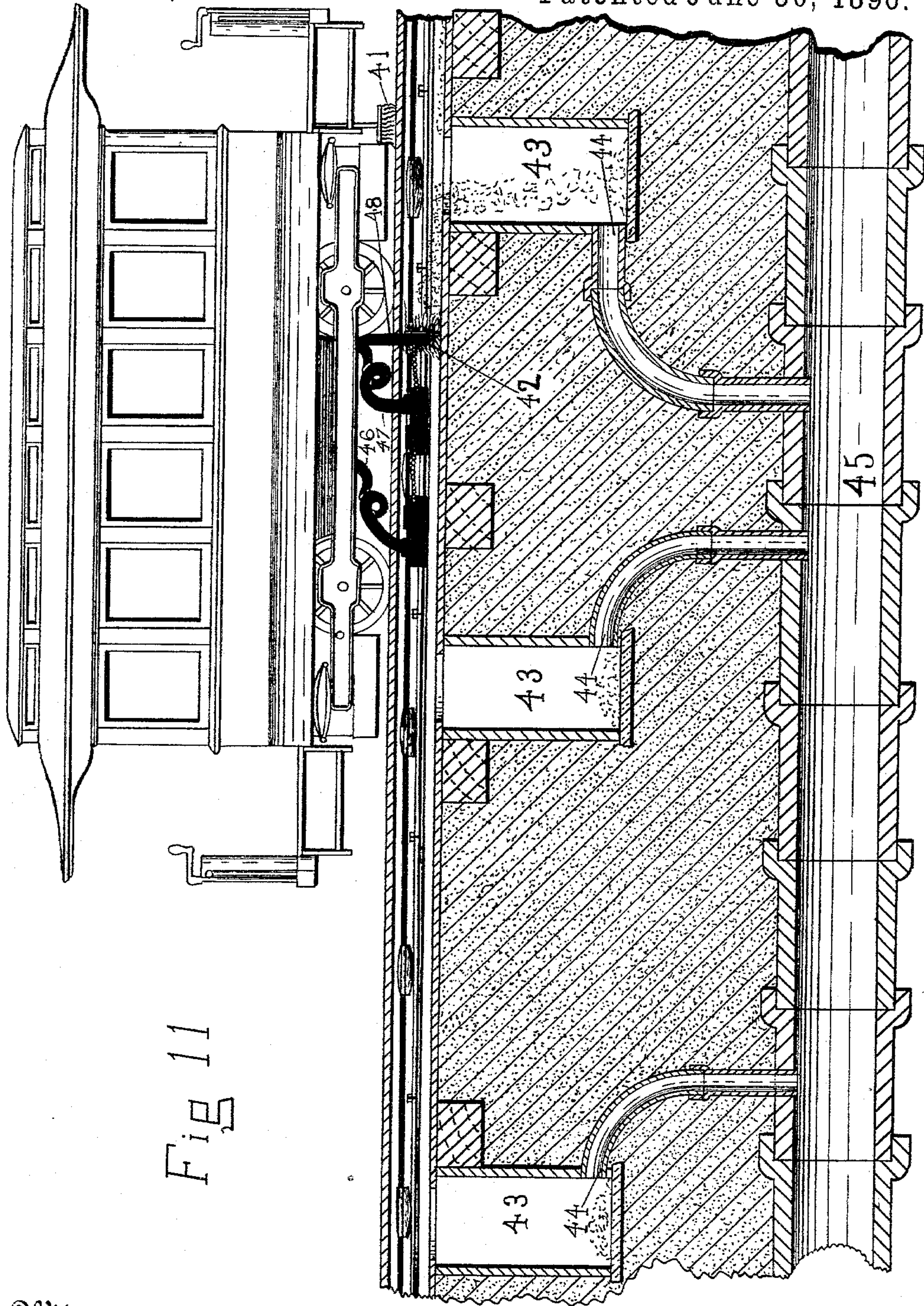


Fig 11

Witnesses  
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# UNITED STATES PATENT OFFICE.

HENRY BRANDENBURG, OF CHICAGO, ILLINOIS, ASSIGNOR TO CHARLES AUSTIN BATES.

## ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 562,796, dated June 30, 1896.

Application filed March 11, 1895. Serial No. 541,384. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY BRANDENBURG, a citizen of the United States, residing at Chicago, Illinois, have invented certain new and useful Improvements in Electric Railways, of which the following is a specification.

I am aware that the best interests of the general public in cities demand that electric railways should be supplied by electricity from underneath the car instead of by the overhead-wire system now in use; and the principal object of my invention is to furnish a system, under the cars, which shall be simple, certain, strong, and durable, requiring but little repair, easy of access, danger-proof, working free and easy, adapted to all conditions of climate, and all at a cost not greater than necessary to construct and maintain the present overhead-wire system.

To attain the object of my invention, I construct a shallow conduit adapted to rest upon the cross-ties of any railroad, for city or country traffic, having portable covers of angle-irons, forming a continuous slot on the top, always of an exact width, and conveying the electric conductors and necessary feed-wires therein.

For the sake of economy I utilize, when desired, the conduit for one of the rails or tracks of a railway for the car-wheels to run along upon. By simple arrangements of a sliding trolley, composed principally of insulation and in two parts, electrically disconnected and towed or pulled by a forward bar running in the slot, having a brush attached thereto, I take up the current by means of insulated contacts to the motor in the car while running at any rate of speed, and return it to the power-house from whence it came without undue loss or leakage of the electric current, and, at the same time, the iron trolley-bar, traveling ahead and pulling or towing connected trolleys, with the brush supported on and extending beyond the end thereof in the conduit, removes all debris to openings at intervals in the bottom of the conduit, which then drops into catch-basins underneath and between the cross-ties and which are connected with the sewers or other drains.

I do not wish to limit my present invention to the precise form of details shown, as the

same results may be attained by changing the form of the structures without departing from the invention in the least.

In order that those skilled in the arts may be enabled to construct and operate my invention, I herewith specify its component parts and method of operation in detail specifically.

Figure 1 represents a cross-section of the conduit (center form) and the working parts in operation, the trolley being divided on the dotted line 1 1, Figs. 3 and 4. Fig. 2 exhibits a cross-section of the conduit with a rail-cover and with the working parts dormant. Fig. 3 develops a lateral sectional view of the trolleys along the division-line between the sections of the trolley. Fig. 4 is a view of the top of the trolley, cut on the line 4 4, Figs. 3 and 6. Fig. 5 is a transverse view of the trolley through the pocket and spring. Fig. 6 is a cross-section of the trolley through the oil-cup. Fig. 7 is an isometrical view of the bulb and its connections. Fig. 8 is a transverse section of the bulb and its connections and the modified form of sectional conductor and contact-plate. Fig. 9 exhibits the supporting hook or bracket with the continuous conductor in position. Fig. 10 is a lateral section of the bulb with the modified connections. Fig. 11 represents the drainage system.

I construct a trough-conduit of metal, either rolled or cast, as the case demands, the shape and character of which are shown in 1, Figs. 1 and 2, reference being made to the drawings. These troughs are made of variable and suitable length. To inclose the space between the risers of the trough, I cover them in the manner shown in 2, Figs. 1 and 2, with angle-irons, if it is desired to place the conduit in the center of the track between the rails, or if it should be put in position so that it can be used for a rail I substitute the rail-cover 3, Fig. 2, in place of one of the angles, either of which is secured to the conduit-frame 1 by the stud 4, Figs. 1 and 2, or by a simple bolt occupying the same position. In general, I prefer a stud or bolt having a wedge, key, or cotter, as shown in 5, Figs. 1 and 2. It is assumed that the cover angles or rails will lap joints with the conduit-frame, thus securely binding and lining up the track or



conduit. The cover-angles I leave a distance apart, thus forming a slot 6, Figs. 1 and 2.

The conduit trough or frame 1, Figs. 1 and 2, is bolted or spiked to the ordinary railroad-tie, though it is advisable to gain or house it into the tie slightly.

To the interior walls of the conduit-frame I fasten angle-irons 7, Figs. 1 and 2, to serve as a track for the trolley-slide 8, Figs. 1, 3, and 6. At intervals I form a cross-groove and outside-incline groove in the top of the riser, as shown in Fig. 9, and suspend from or through them a metal bracket 9, Figs. 1, 2, and 9, and rest within the ring thereof the insulated, continuous electric conductor 10, Figs. 1, 2, 7, 8, 9, and 10. This conductor passes through the bulb 11, Figs. 1, 2, 7, 8, and 10, which is of flexible material, and which at the ends is hermetically sealed by the compression of the spring-bands 12, Figs. 7 and 10, tightly compressing the walls of the bulb upon the end filling 13, Fig. 7, and incidentally upon the conductor 10, Fig. 7. Beneath the continuous conductor and the bulbs that are located at available intervals lies a sectional or series of sectional conductors 14, Figs. 1, 2, and 7, and modified as in Figs. 8 and 10. In the first form it consists of a metal strip separated into sections by an insulated connection. Where this strip passes the center of the bulb, it is connected by a metal screw 15, Figs. 1 and 2, with or through a compression-plate or washer 16, Figs. 1 and 2, with an interior compression-plate 17, Figs. 1 and 2, and a contact-spring 18, Figs. 1, 2, and 7, the insulation being removed immediately above the spring, as exhibited in 19, Fig. 7. The modified sectional conductor, shown in Figs. 8 and 10, consists of a spring-metal slotted tube 20, Figs. 8 and 10, incased in a flexible insulation slotted tube 21, Figs. 8 and 10, attached to the contact-spring and plate 23 and 22 by the prolonged screw 24, Figs. 8 and 10, which, after it is firmly screwed into place, is secured to the spring-tube 20 by removing the surrounding insulation 21, and clenching the screw-prongs, the insulation being afterward replaced.

A sliding trolley 8, Fig. 1, and further shown in its different parts in Figs. 3, 4, 5, 6, 8, and 10, is the means of operating this system. It consists of a double body of insulating material 25 and 27, Figs. 3 and 4, attached by a cable or connection 28, Figs. 3 and 4, to an upright rod 26, Figs. 3 and 4, that is attached to the car-truck alone, and towing another similar but reversed body of insulation 27, Figs. 3 and 4, by another cable or connection 29, Figs. 3 and 4, being of any chosen length and attached to the loops 30, Fig. 4. A pocket in the top of one side of the trolley 31, Figs. 1, 4, 5, and 6, affords room for placing a metal contact-plate 33, Figs. 1, 5, and 6, supported by a flat spring 32, Figs. 1, 5, and 6. A modification of the contact can be made by extracting the contact-plate 33 and the spring 32 and substituting a bead or bulb contact-

plate 34, Figs. 8 and 10, in order to operate the modified sectional conductors shown in those figures. Aside from the sections mentioned, the trolley will consist of the shoe-angles 35, Figs. 1, 6, and 8, and the oil-cup 36, Figs. 3, 4, and 6, and each trolley shown is divided laterally for convenience in inserting in the conduit and united by the housed laps 37, Fig. 4, through which pins 38, Fig. 4, pass into the opposite section. Connection is made through the spring 32 to a metal conductor 39, Figs. 3, 4, and 5, to an ordinary insulated wire conductor 40, Figs. 3 and 4.

To transmit an electric current from the continuous conductor to the motor on the car or vehicle, the trolley operates in passing to lift the sectional conductor and bring the spring within the bulb in contact with the conductor by which a current is diverted through the spring 18, the screw 15, conductor 14 or 20, plate 39, either via the contact-plate 33 and spring 32 or the bead 34, thence via the conductor-wire 40 to the motor above, or in case of a negative current the route is simply reversed.

By the employment of the double form of trolley or two trolleys I secure several advantages, among which may be mentioned the adaptability of the trolley in turning short curves in a very small conduit, and secondly, the contact-plates may be comparatively long in each trolley and the conductors carried up to the vehicle without danger from bringing them in juxtaposition. This of itself is no small advantage and it becomes more important when it is noted that each trolley may with this system be constructed with the special object in view of making contact with but one of the trolley-conductors, thereby simplifying the construction and adjustments necessary.

For the purpose of explaining the method of removing water and debris from the conduit I present Fig. 11, showing a car with a trolley and cleaners attached, also showing the cleaning and drainage system. The surface-brush cleans the top of the conduit, fills the cavity of the conduit and brushes all water and debris therein into the catch-basins 43, which have covered manholes at the top for the admission of cleaning implements, while water is drained off near the bottom by the pipes 44 into the street-sewer 45.

The trolleys are shown in Fig. 11 by 46 and 47, the trolley-bar by number 48.

I am aware that prior to my invention systems of drainage for street-railways, conduits similar to that shown in Fig. 11 have been in general use, and therefore disclaim it as an invention, and exhibit it for the purpose of showing the manner in which the conduit can be cleaned.

Having thus described my invention, what I claim as new, and desire Letters Patent on, is—

1. In an electric railway the combination



with the conduit having the integral substantially parallel upwardly-extending webs, of the removable angle-irons secured to the outer sides of said webs with their horizontal portions projecting toward each other and slightly separated to form a slot and one of said angle-irons having the flange for the wheel formed integral therewith and projecting outside of the web; substantially as described.

2. In an electric railway, the combination with the continuous insulated feed-conductor having the insulation removed from the body thereof at intervals, of elastic-walled chambers or "bulbs" cylindrical in cross-section entirely surrounding the uninsulated portions of the body of the conductor, contacts mounted within the bulbs in position to engage the uninsulated body of the feed-conductor, and a mechanically-continuous trolley-conductor movably supported on the outside of the bulbs with electrical connections with the contacts, and adapted when moved by the trolley to move the contacts into engagement with the body of the feed-conductor; substantially as described.

3. In an electric railway the combination with the insulated feed-conductor having the insulation removed at intervals, of inclosing chambers for said uninsulated portions formed of tubular flexible material clamped to the insulation of the conductor at each side of the uninsulated portions, and contacts carried by said chambers with electrical connections extending to the outside of the chambers; substantially as described.

4. In an electric railway, the combination with the insulated feed-conductor having the

insulation removed at intervals, of insulating-chambers for said uninsulated portions formed of tubular flexible material, clamps surrounding the ends of said chambers for confining the same against the insulation of the conductors and contacts located within the chambers with electric connections extending to the outside of the chambers; substantially as described.

5. In an electrical railway, the combination with the slotted conduit having the trolley rails or guides supported therein at a point above the bottom of the conduit and an insulated feed-conductor suspended in the top of the conduit and having the insulation removed at intervals, of chambers surrounding said uninsulated portions formed tubular in cross-section with the ends clamped to the insulation of the conductor on each side of the uninsulated portion, contacts mounted in said chamber in position to make electrical contact with the conductor, with electrical connections extending from said contacts to the outside of the chamber and a trolley for compressing the chamber and establishing the circuit; substantially as described.

6. In an electric railway, the combination with the conduit having the inwardly-projecting trolley rails or guides and the conductor above the same, of the trolley having the contact for coöperation with the conductor and the insulated wear-plates resting on the rails or guides; substantially as described.

HENRY BRANDENBURG.

Witnesses:

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