

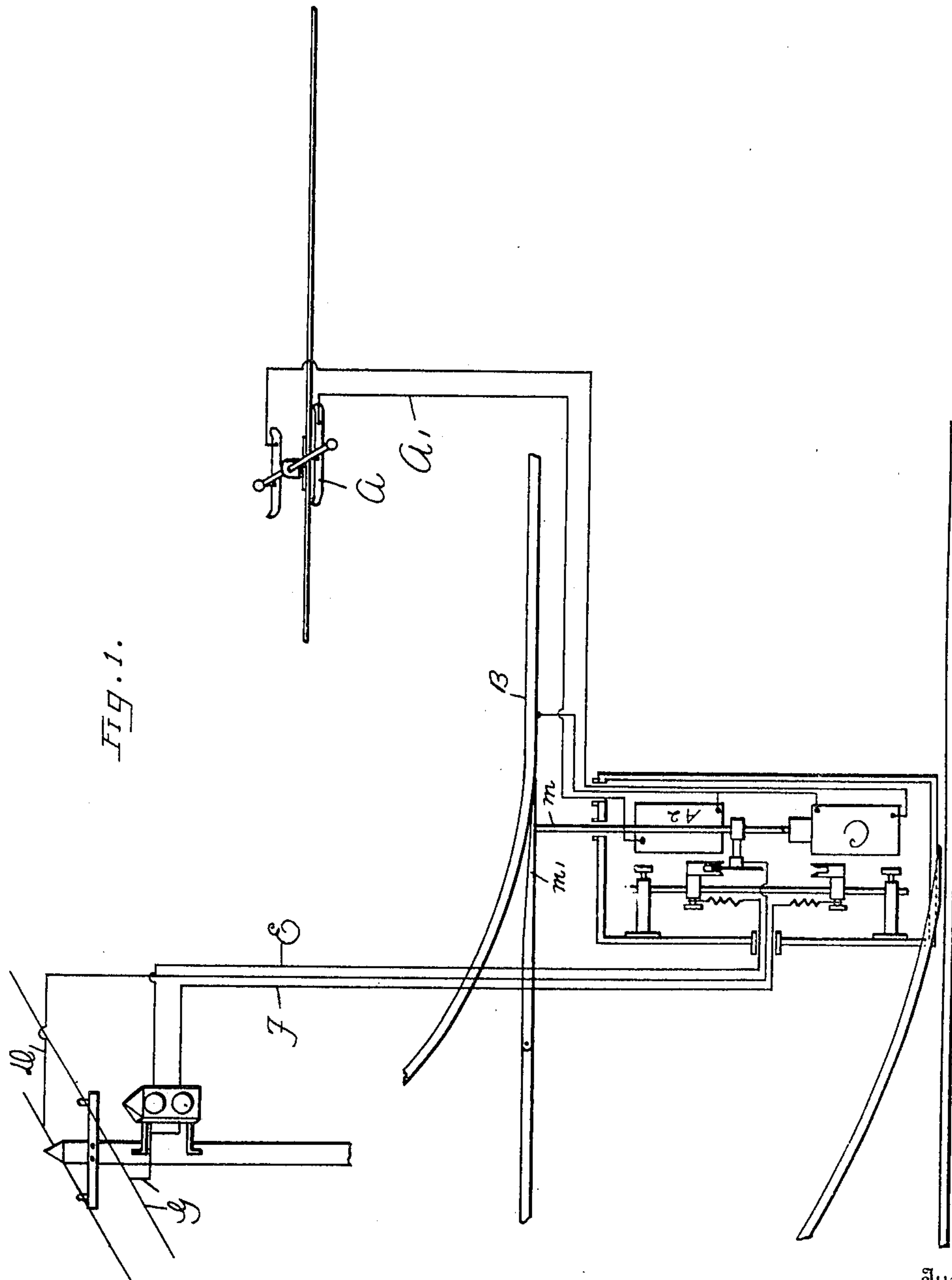
No. 818,561.

PATENTED APR. 24, 1906

E. P. ROBBINS.
SWITCH.

APPLICATION FILED OCT. 20, 1905.

3 SHEETS—SHEET 1.



Witnesses

Fred A. Schlosser
Calvin Keith.

Inventor

Edward Platt Robbins.

By

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Attorney

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3 SHEETS—SHEET 2.

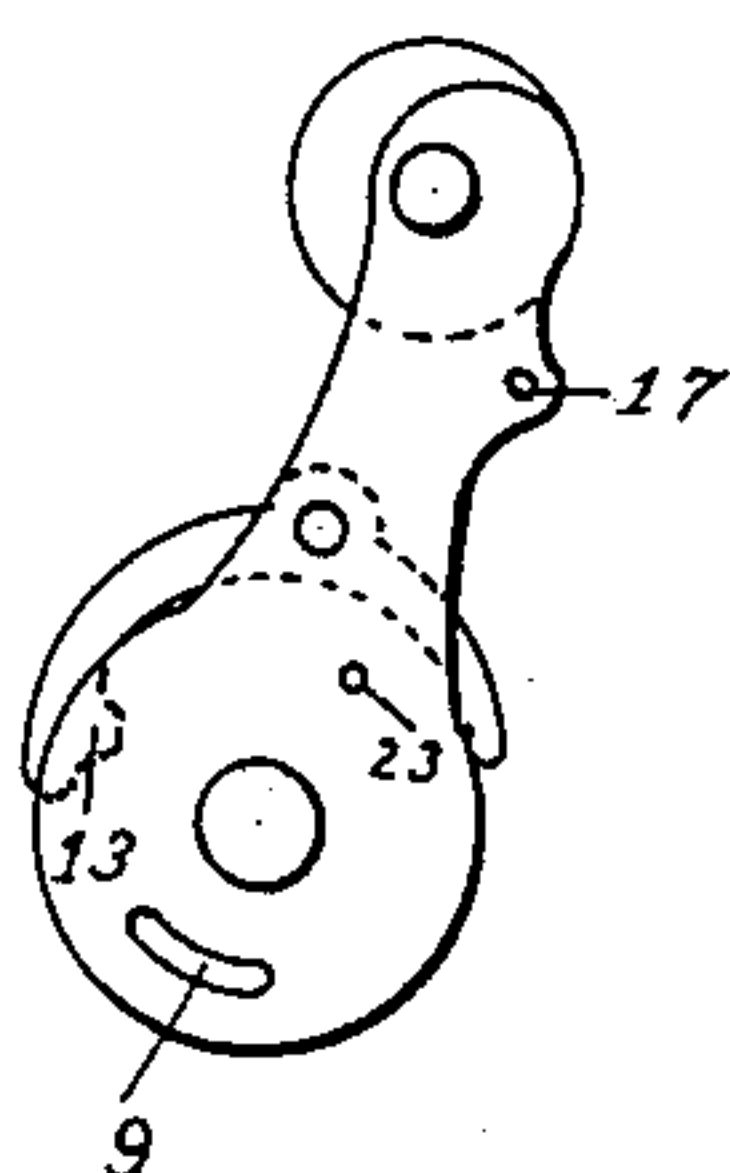
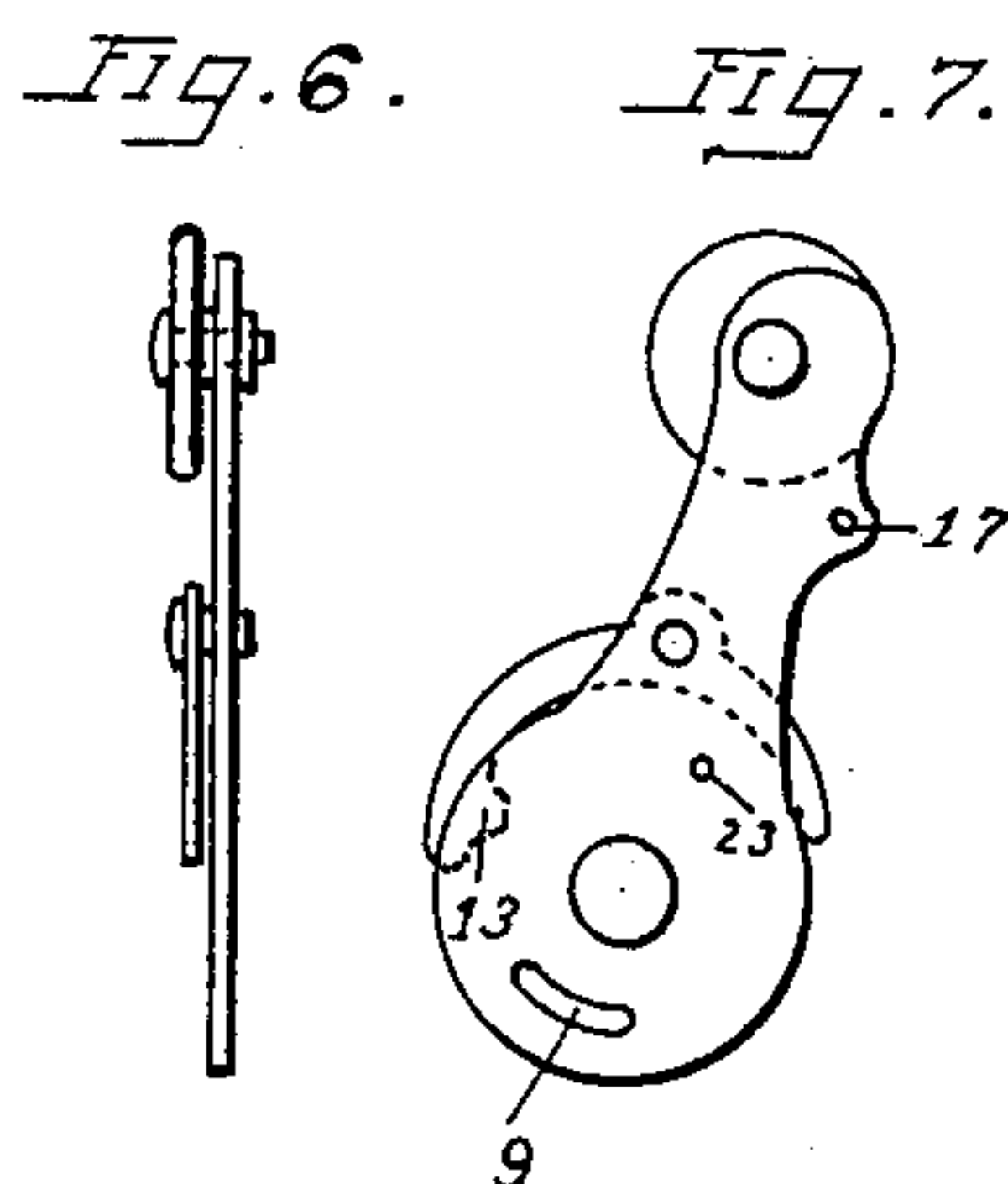
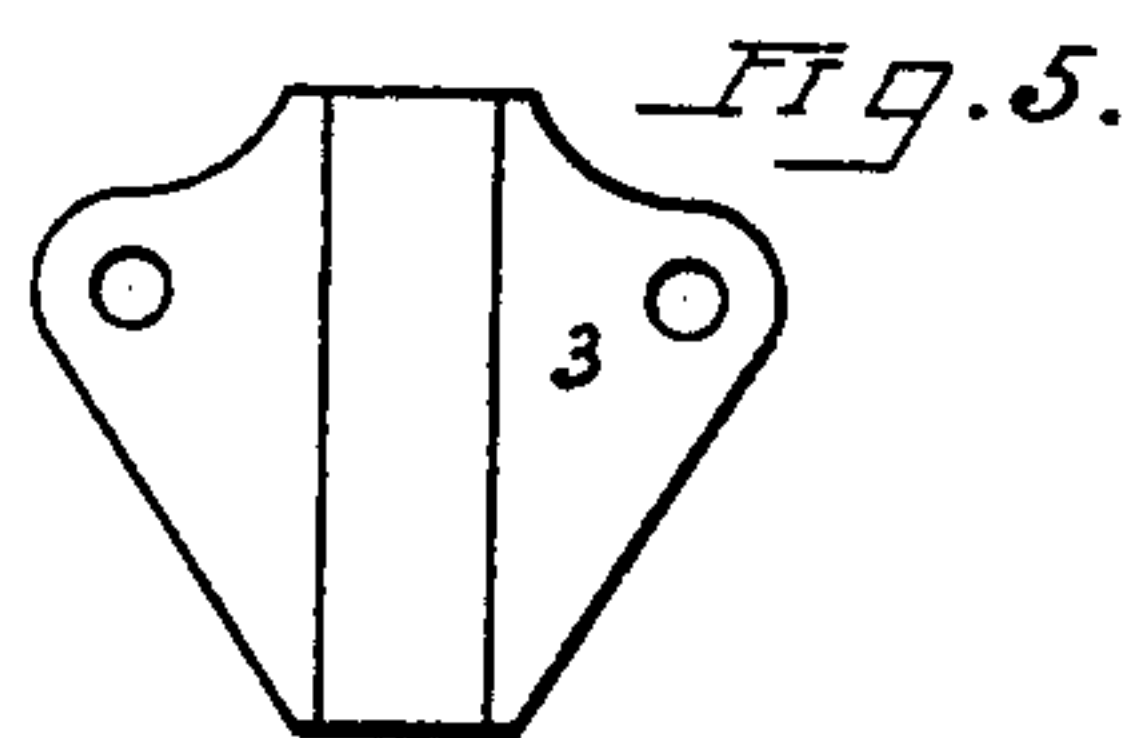
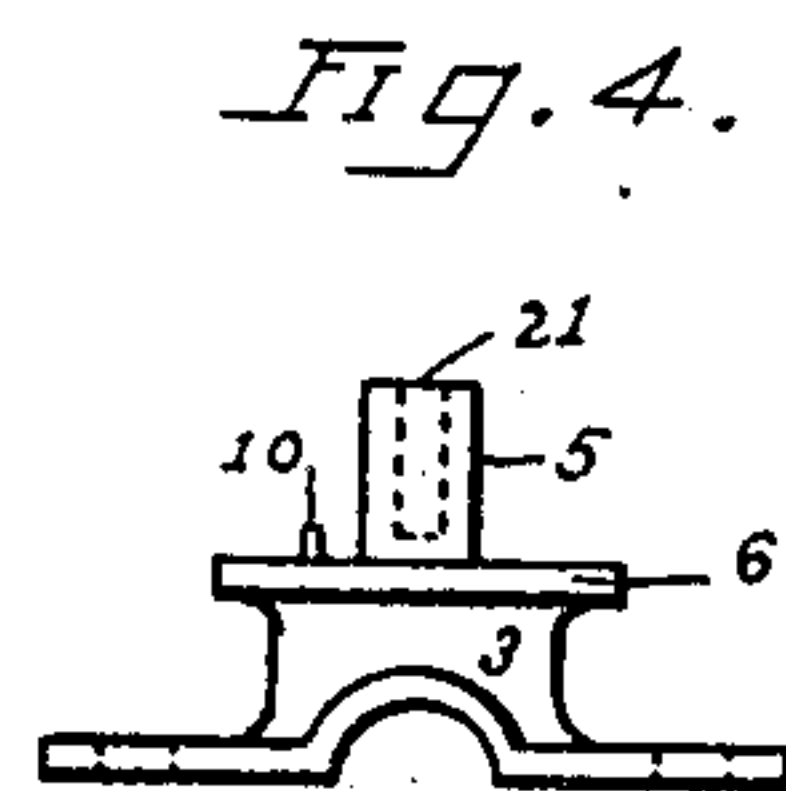
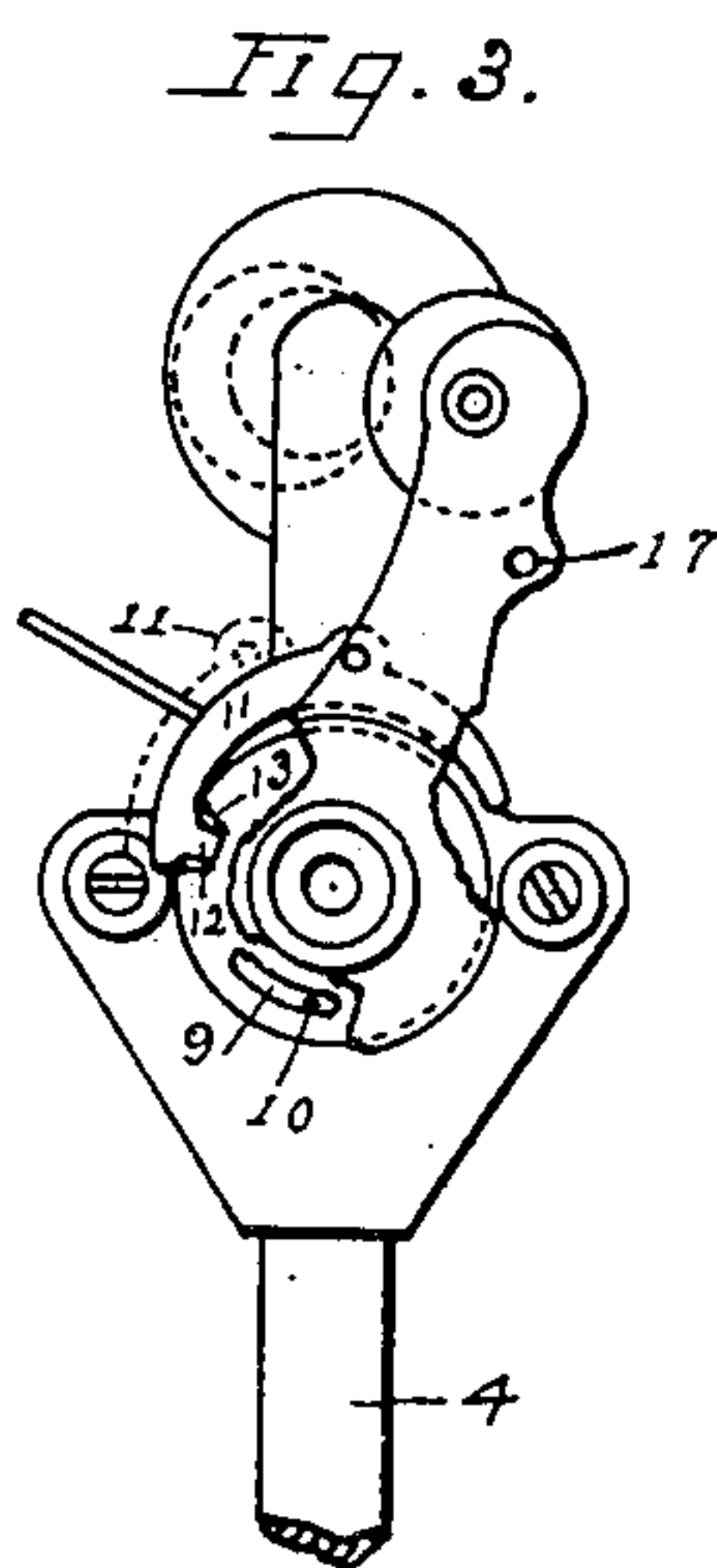
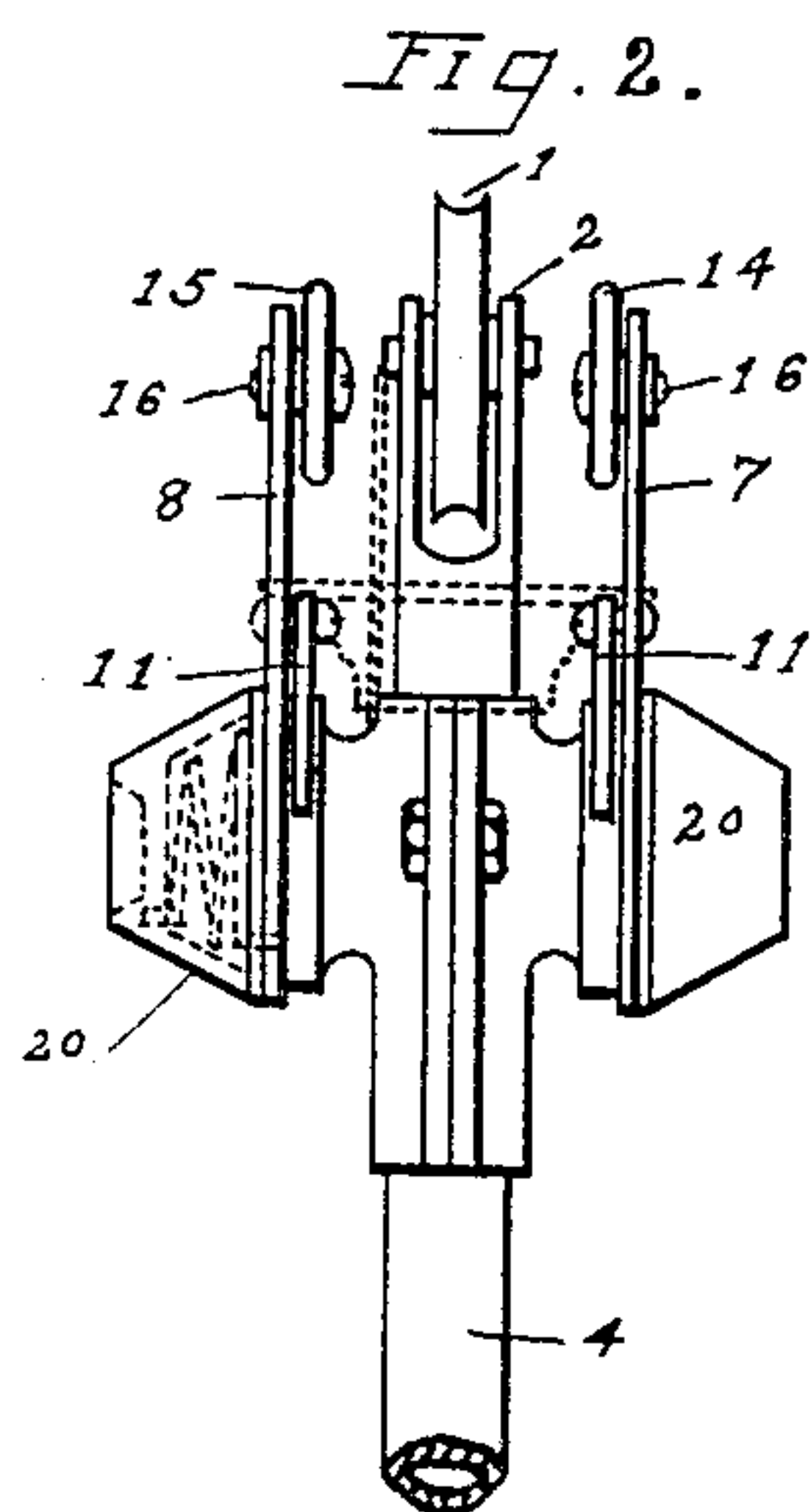


Fig. 8.

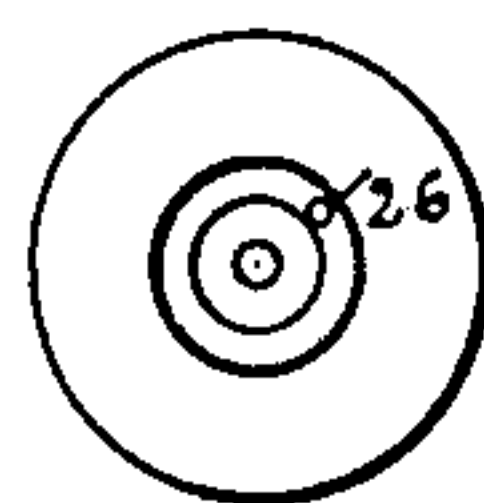


Fig. 9.



Fig. 10.



Fig. 11

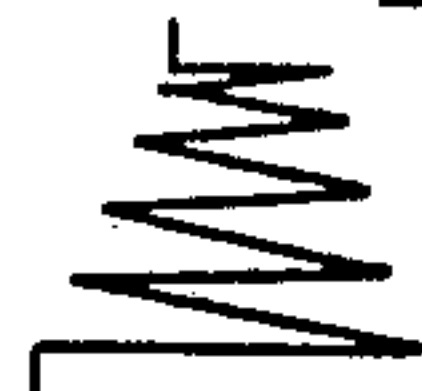


Fig. 26.

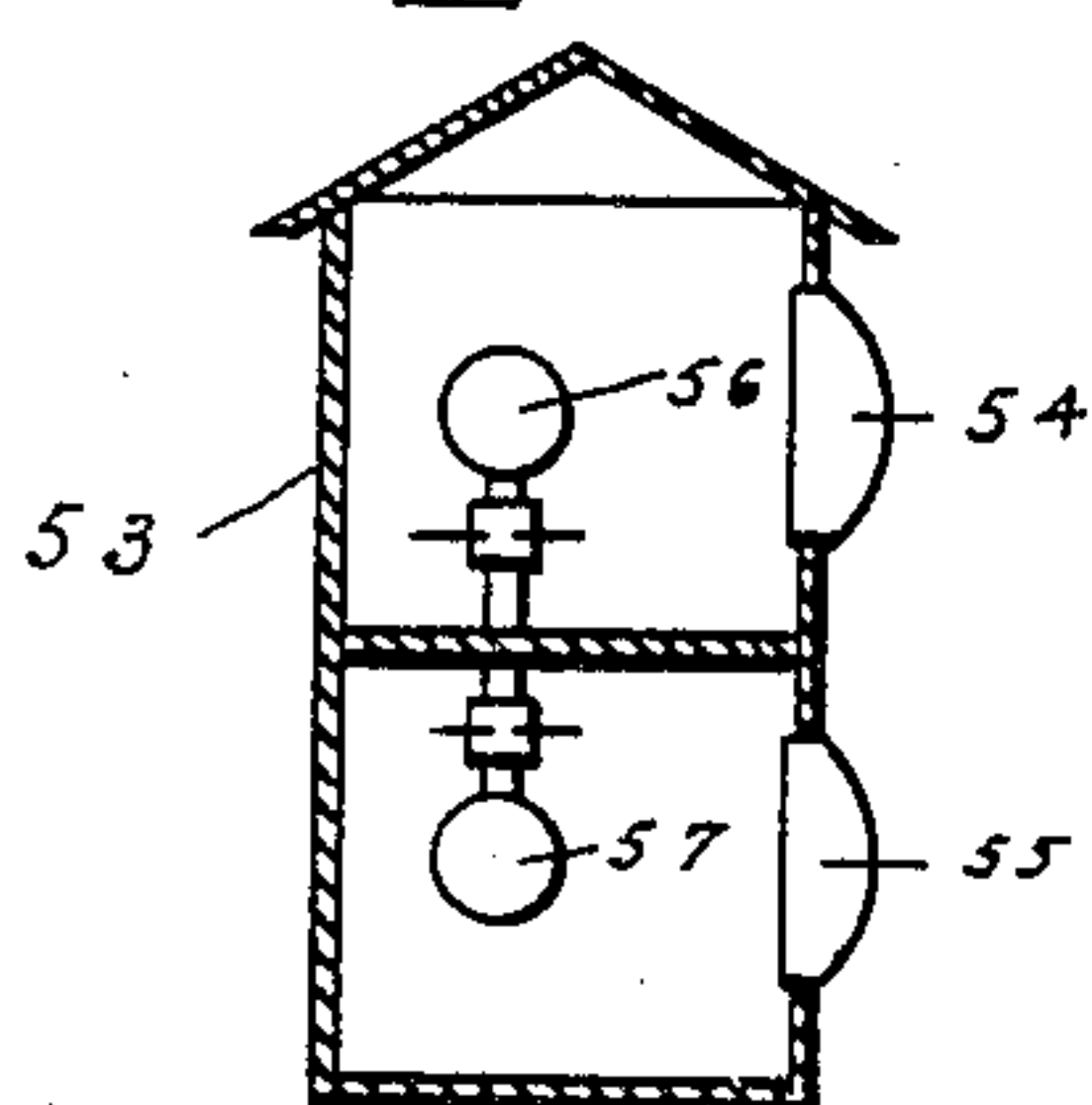


Fig. 13.

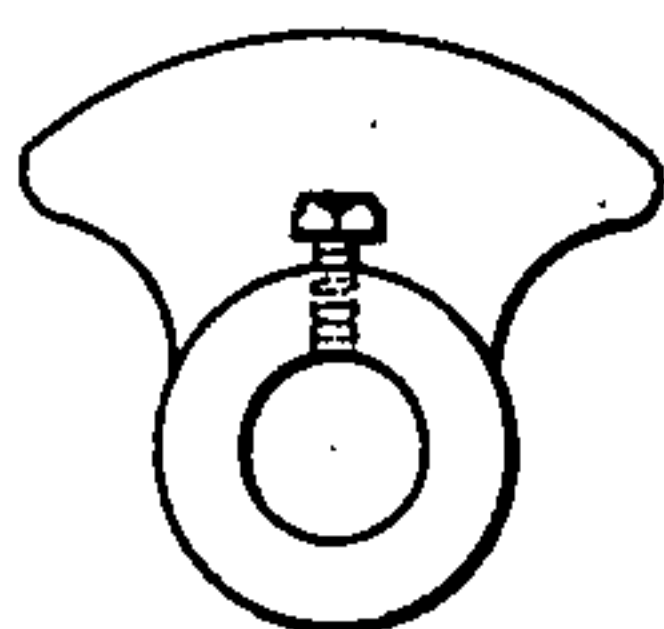
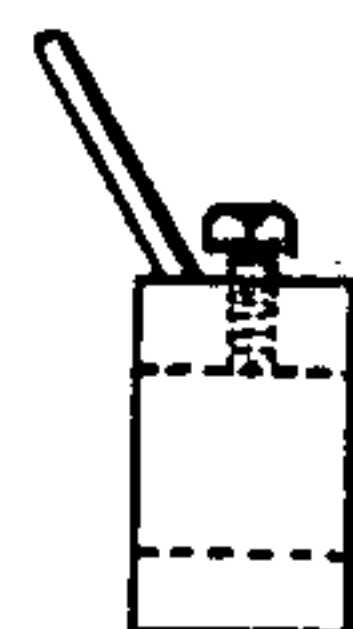


Fig. 12.



Witnesses

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3 SHEETS—SHEET 3.

Fig. 24.

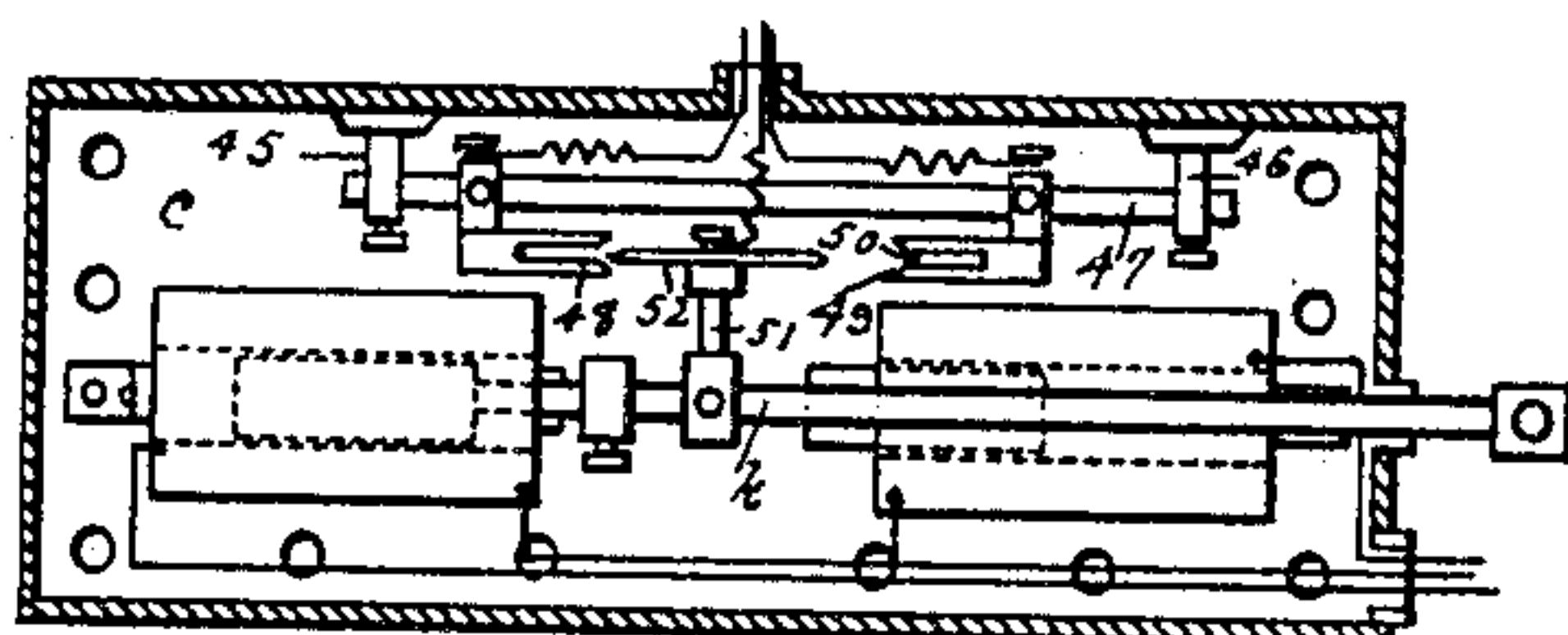


Fig. 25.

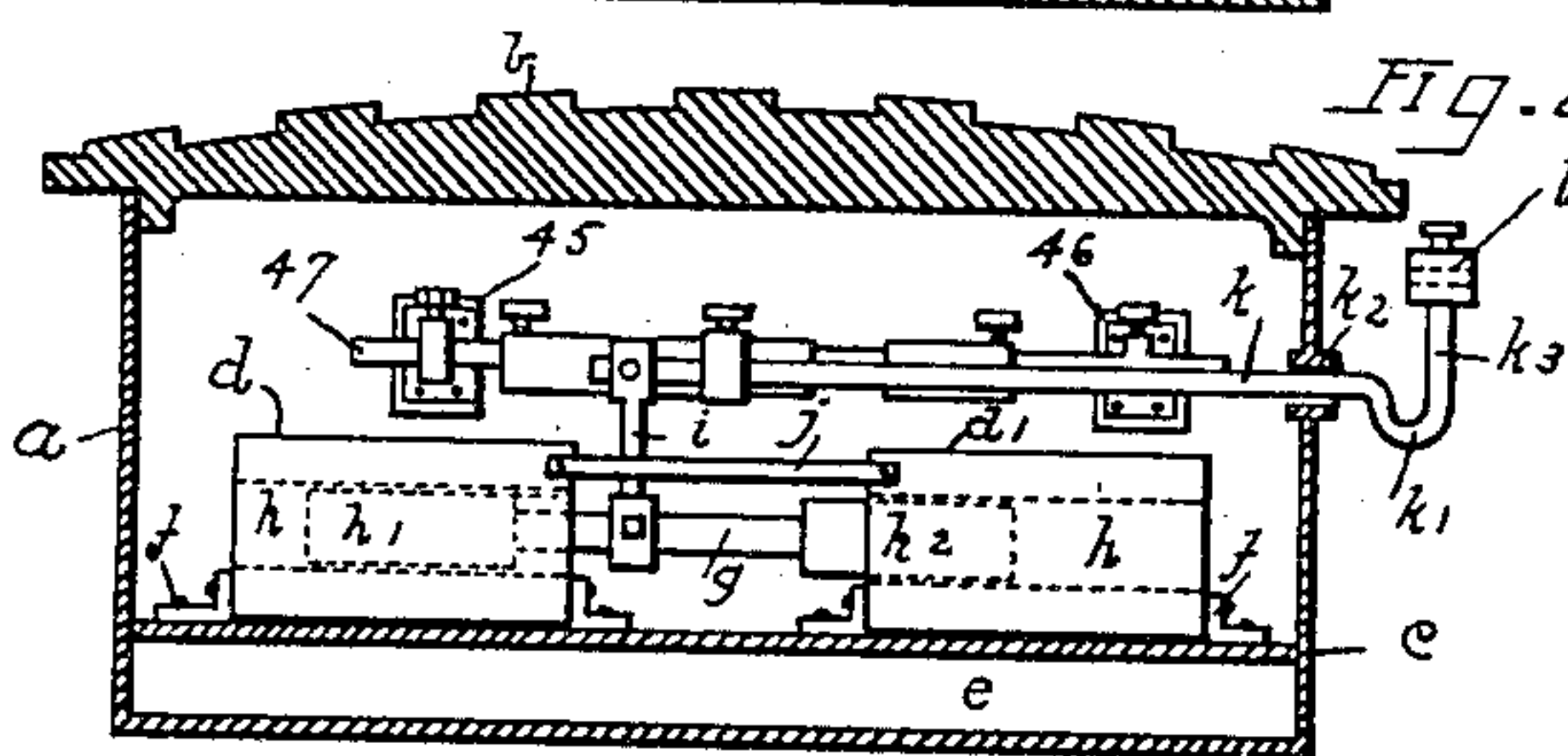


Fig. 18.

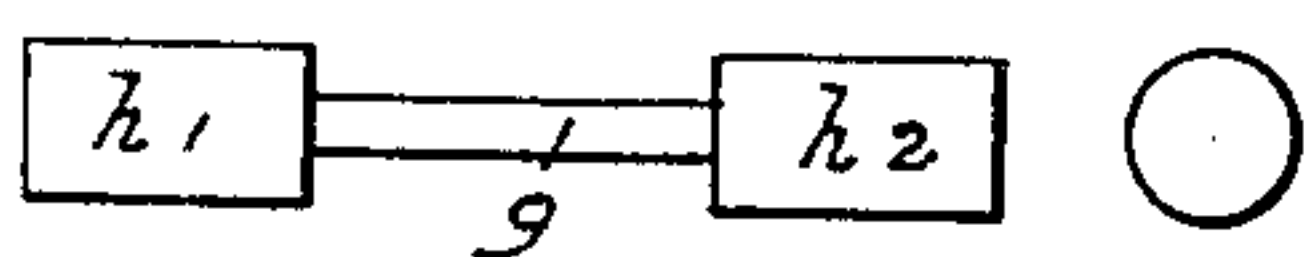


Fig. 19.

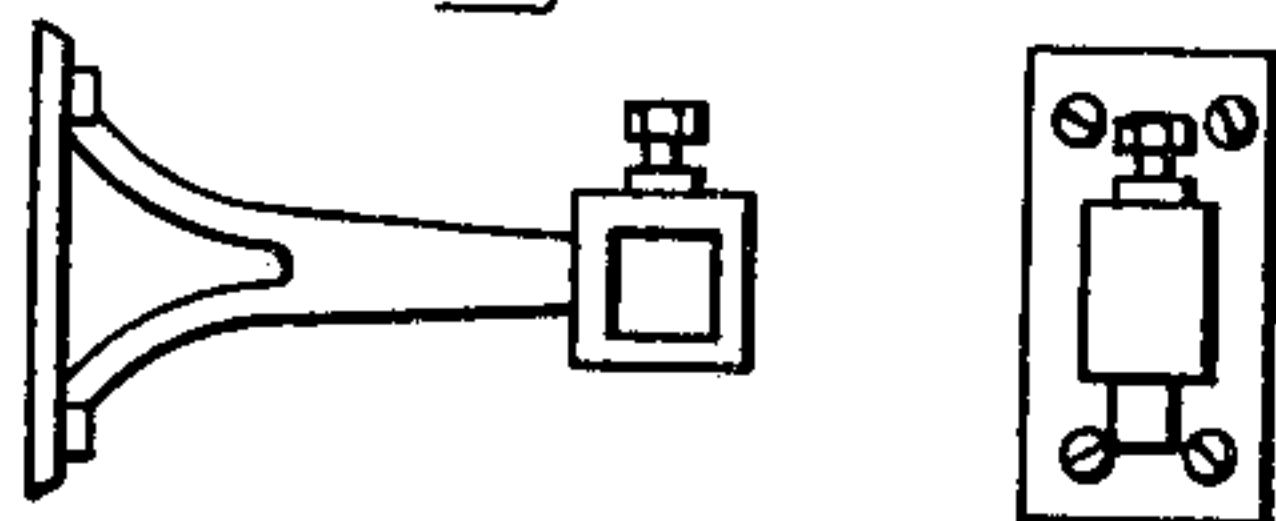


Fig. 20.

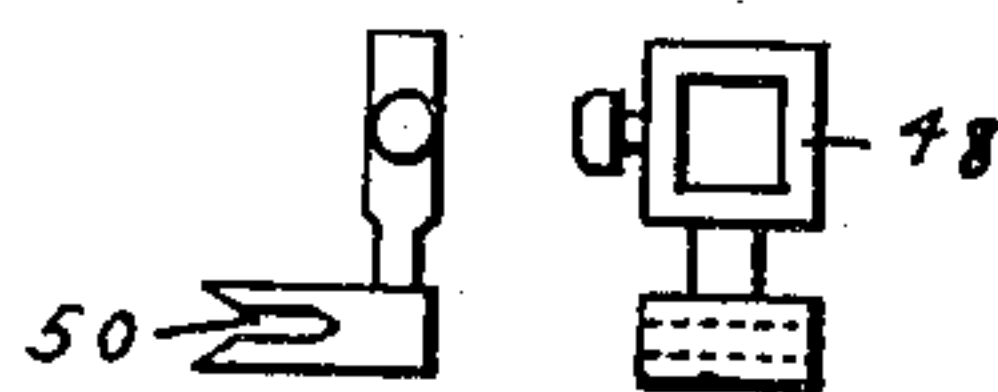


Fig. 21.

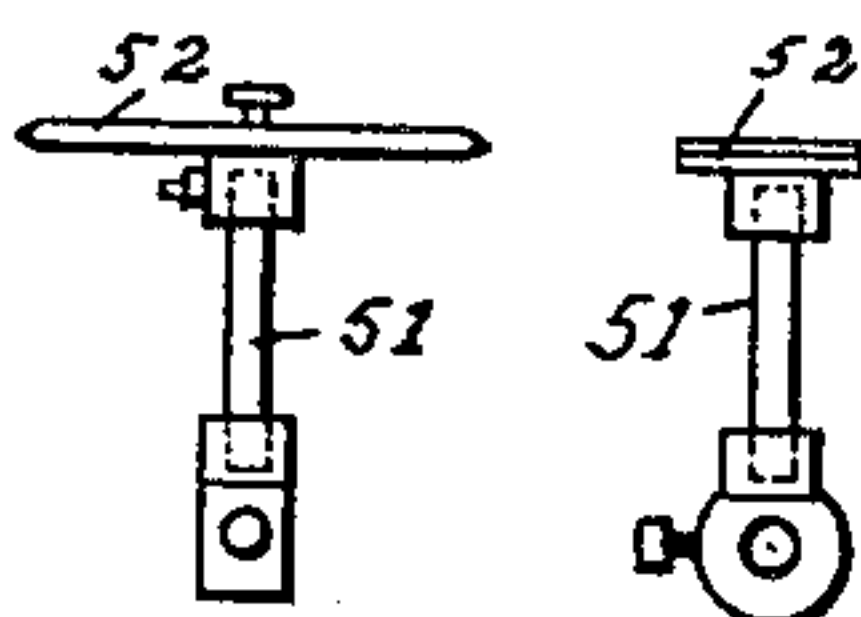


Fig. 22.

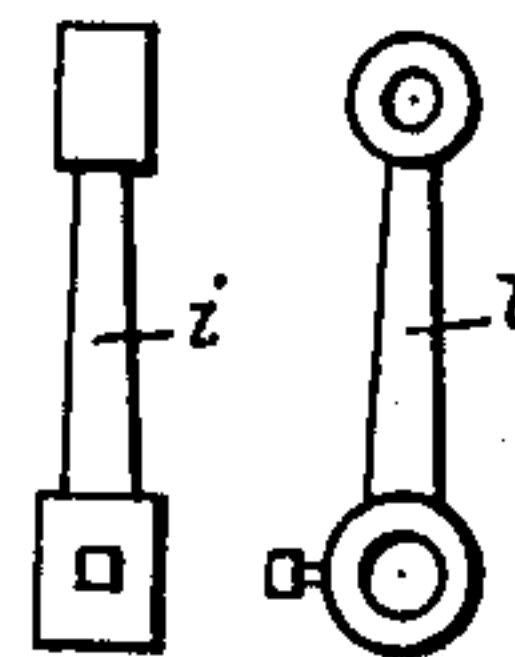


Fig. 23.

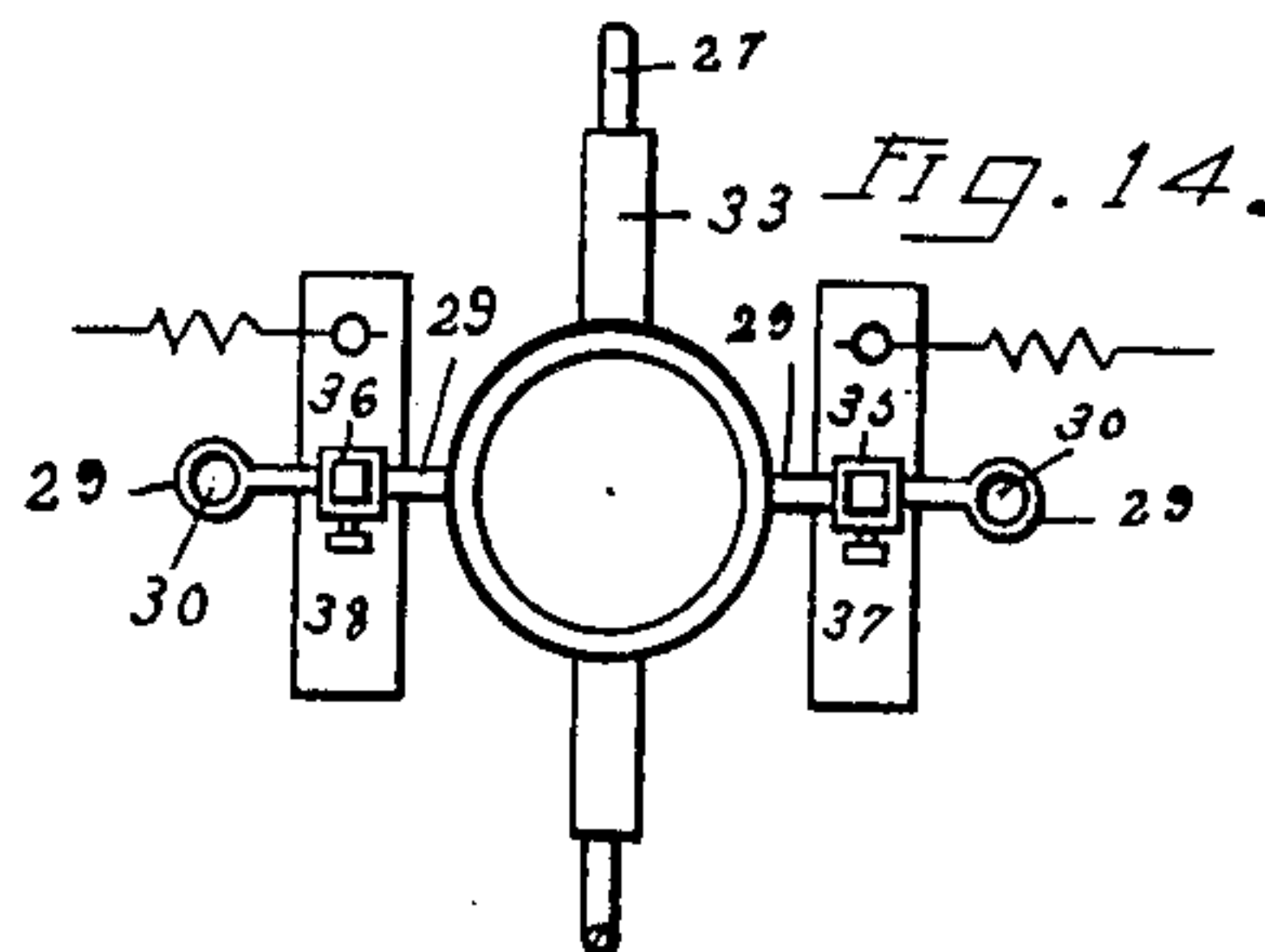
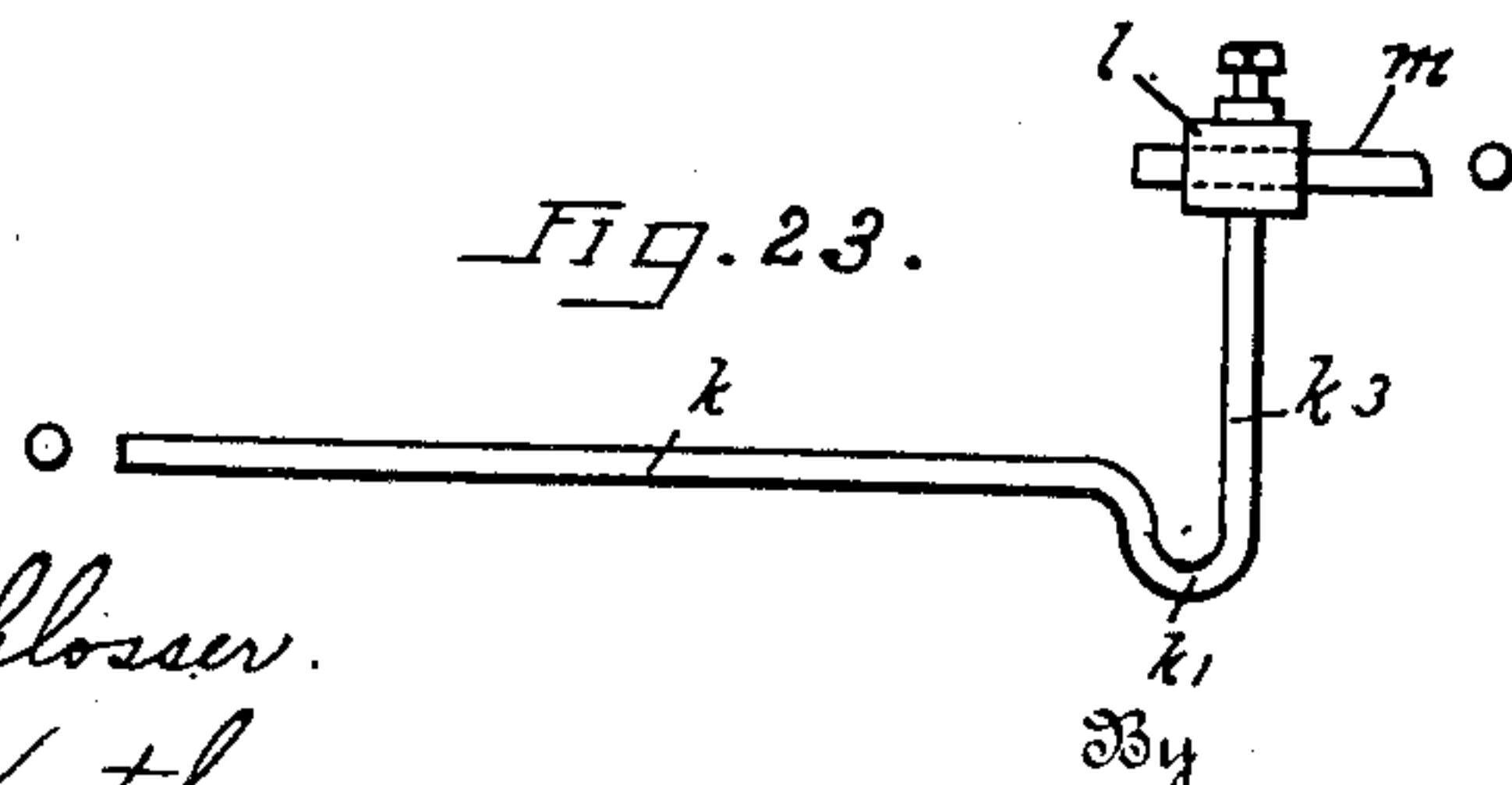


Fig. 14.

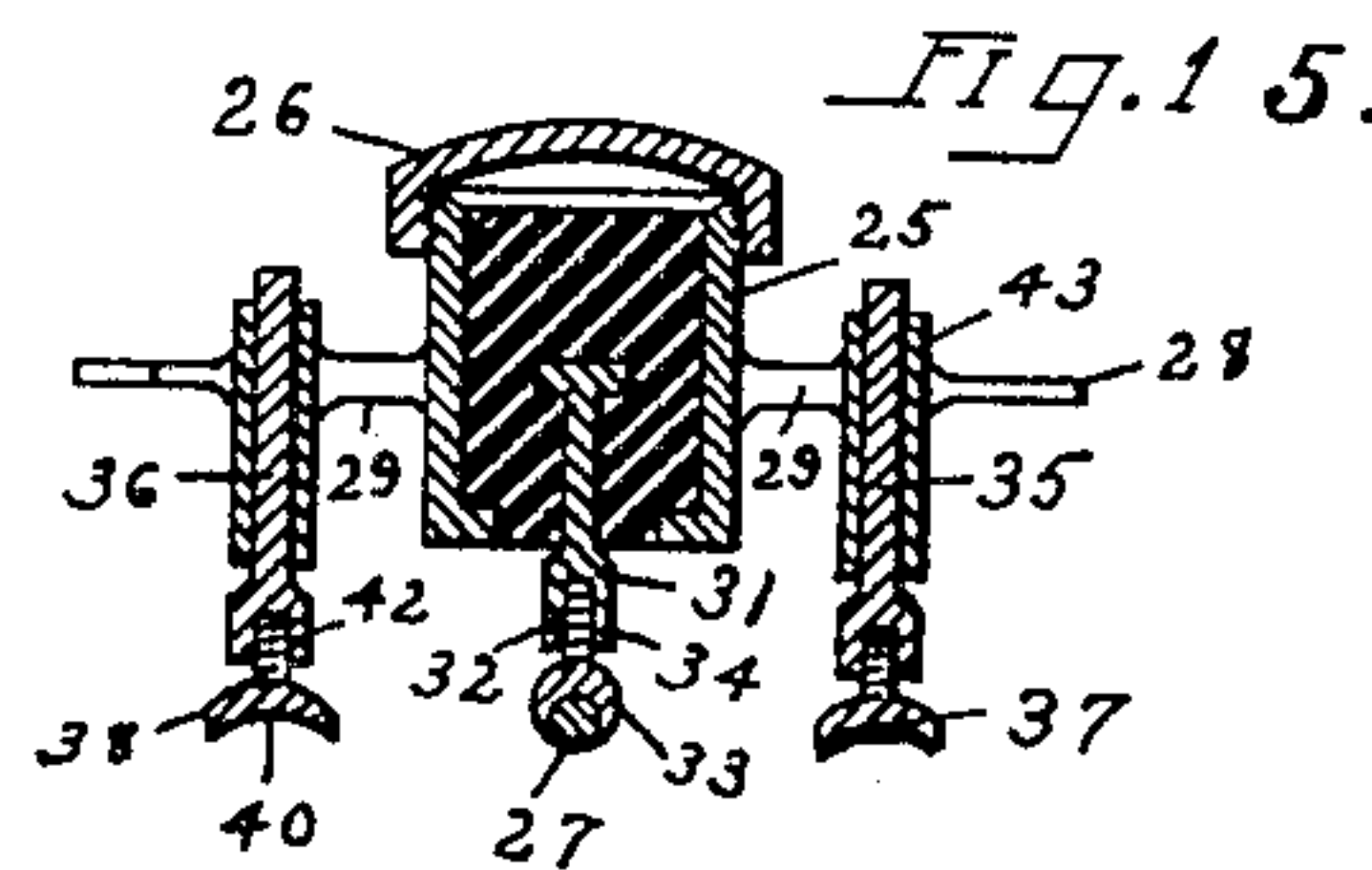


Fig. 15.

Fig. 16.

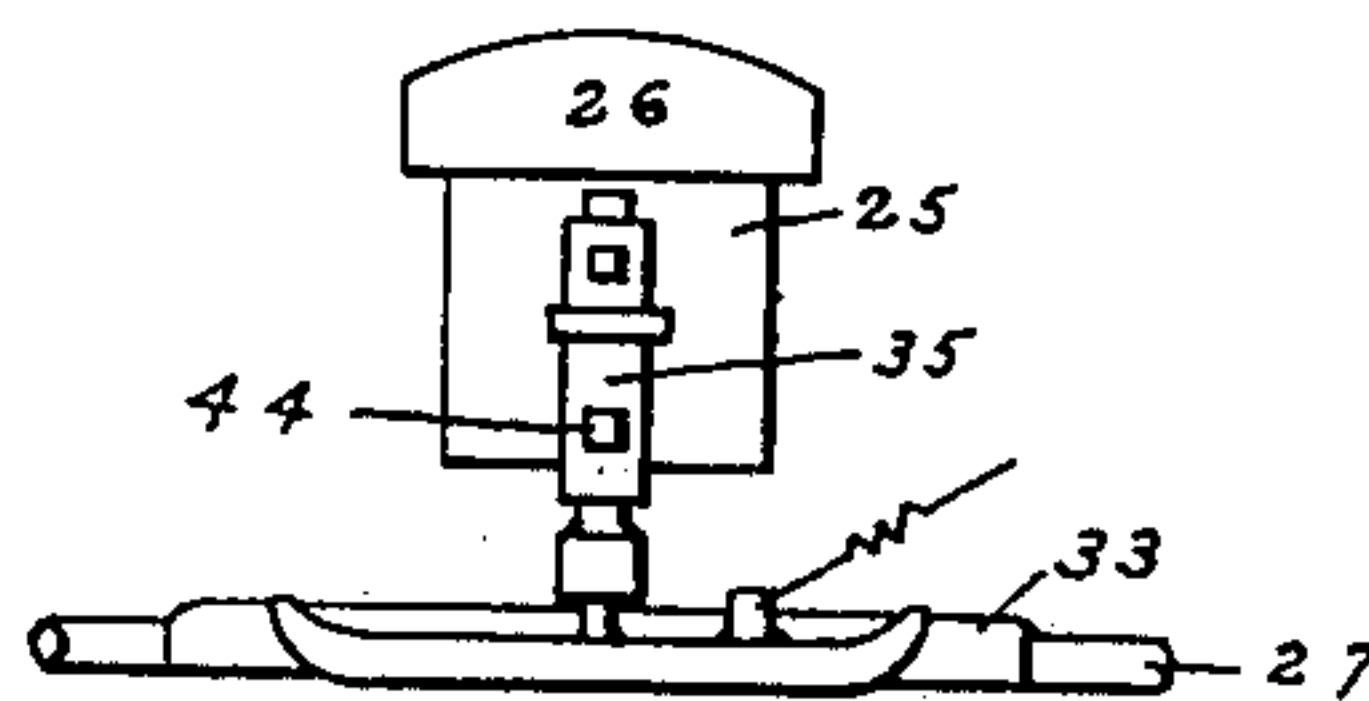
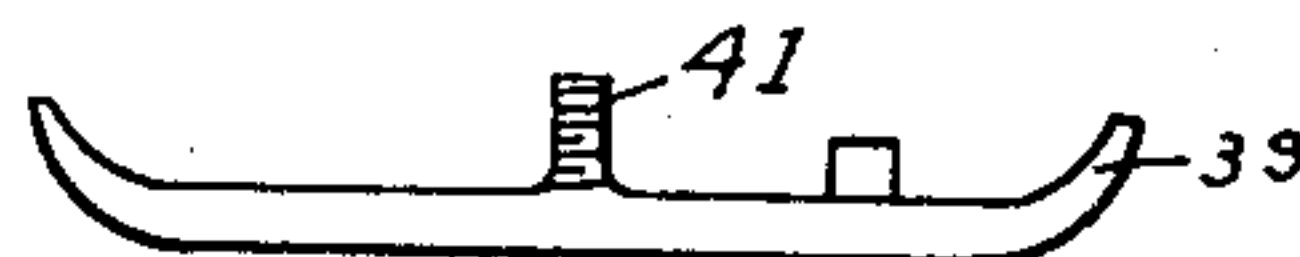


Fig. 17.



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UNITED STATES PATENT OFFICE.

EDWARD PLATT ROBBINS, OF MANSFIELD, OHIO, ASSIGNOR OF ONE-HALF TO HERMAN E. HOMBERGER, OF MANSFIELD, OHIO.

SWITCH.

No. 818,561.

Specification of Letters Patent.

Patented April 24, 1906.

Application filed October 20, 1905. Serial No. 283,690.

To all whom it may concern:

Be it known that I, EDWARD PLATT ROBBINS, a citizen of the United States of America, and a resident of Mansfield, Richland county, Ohio, have invented certain new and useful Improvements in Switches, of which the following is a specification.

My invention relates to switches, and is especially adapted to be used in the equipment of street-railways; and it consists, primarily, in an automatic device for shifting the pivotal rail of the switch, by means of which the course or travel of the car is changed or diverted and made to travel in a different direction or shifted to a siding, switch, or intersecting tracks.

It is well known that in order to switch the car from the tracks that it is running on to parallel tracks or tracks intersecting the tracks upon which it is running a portion of one rail is pivotally connected to one end of the adjacent rail, with the end tapered and adapted to lie in close contact with the opposite parallel rail, and when it is desired to switch the car it is necessary for the motorman to stop the car and throw the switch or pivotal portion of the rail in or out of contact with the rail, which is usually accomplished manually by the motorman with an iron rod kept on the car-platform for that purpose.

The objects of my device are to afford facilities for running a car from the main tracks onto a switch, siding, parallel tracks, or to switch the car to the tracks of an intersecting street at the will of the motorman and without leaving or stopping the car.

A further object of my device is to arrange signal-lights so that they can be operated simultaneously and in conjunction with the switch for the purpose of indicating to the motorman the open or closed position of the switch, so that the motorman can ascertain without stopping the car the position of the switch, and to change it, if necessary, so as to divert the travel of the car to a switch, siding, or tracks of an intersecting street from the platform of the car automatically.

The invention primarily consists of an electrically-operated mechanism for shifting the switch or pivotal rail which receives the current from the trolley-wire through the medium of a trolley mechanism adapted to be brought in contact with contact-plates suspended on each side of the trolley-wire

and means of indicating by signal-lights the position of the pivotal rail of the switch.

I attain these and other objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a plan view showing the relative position of the shifting mechanism signal-lights, contact-plates, and method of conducting the current of electricity from the trolley-wire to the shifting mechanism and method of conducting the current to the signal-lights. Fig. 2 is an end view of the trolley mechanism. Fig. 3 is a side view of the trolley mechanism, showing the throw of the levers upon which the contact-rollers are mounted in dotted lines, also one pawl in mesh with a notch cut in the periphery of one collar formed on one side of the trunnion-support. Figs. 4 and 5 are top and side views of the trunnion-support, which is made in two parts and adjustably clamped to the trolley-pole. Figs. 6 and 7 are end and side views of one of the twin levers, showing slot into which a pin projects to regulate the throw of the levers. Figs. 8 and 9 show bottom and cross-sectional views of the hollow cones which are secured to the trunnion-support. Figs. 10 and 11 are bottom and side views of volute helix-springs which are compressed and inserted in the hollow cones. Figs. 12 and 13 are top and side views of the trolley-guard. Fig. 14 shows a top view of the cylindrical shell and contact-plates. Fig. 15 is a cross-sectional view of the cylindrical shell, taken on a line through the center of Fig. 14, showing the method of attaching and suspending the shoe-contact plates on each side of the trolley-wire and method of insulating the trolley-wire from the hangers. Fig. 16 is a side view of the cylindrical shell, trolley-clamp, and shoe-contacts. Fig. 17 is a side view of one of the shoe-contacts, showing the curvatures of the ends. Fig. 18 shows a side and end view of the solenoid-plunger. Fig. 19 shows a side and end view of the rectangular bar-brackets. Fig. 20 shows a side and end view of the tension forked contacts. Fig. 21 shows a side and end view of an arm which is secured to the plunger and carries the knife-contact pieces. Fig. 22 is a side and front view of the arm that supports the shifting-rod which is attached to the pivotal rail. Fig. 23 is a side view of a section of the shifting-rod, showing curved portion of

water-drip. Fig. 24 is a top plan view showing detail of shifting and signal-light mechanism with plunger shown in dotted lines and fitted to reciprocate in the apertures of the solenoids, which are attached to the auxiliary bottom of the casing by brackets. Fig. 25 is a side elevation of Fig. 24. Fig. 26 is a side elevation of a box containing the signal-lights and colored "bull's-eyes."

In the drawings, *a* represents a box provided with a removable cover *b*, which is placed below the surface of the ground or pavement and is adapted to completely inclose the shifting-rod mechanism except the projecting portion of the rod. The box or casing is preferably made of galvanized iron and is provided with an auxiliary perforated bottom, upon which the solenoids *d* and *d'* are securely mounted in direct alinement with each other. The purpose of perforating the bottom is to allow any water that might find its way into the box to drip through the apertures into the chamber *e*, preventing it from coming in contact with the mechanism. The solenoids are secured to the auxiliary bottom by the brackets *f*. The apertures *h* in the center of the solenoids are lined with brass bushing of suitable gage and size. A plunger *g*, having both ends *h'* and *h''* enlarged, is fitted to the inner periphery of the bushings and adapted to reciprocate therein when the solenoids are charged successively by an electric current, as will be described hereinafter. A bracket-arm *i* is adjustably secured to the central portion of the plunger *g*, which is smaller in diameter than its ends. The arm *i* is secured to the plunger in vertical position and travels between the guides *j* and the inner ends of the solenoids when movement is imparted to the plunger. The guides prevent lateral movement of the arm *i*. The free end of the arm *i* is provided with an aperture into which one end of a shifting-rod *k* is adjustably secured. The opposite end of the shifting-rod projects outside of the box or case with the end *k* looped just outside the end wall and supported and journaled in the box *k'*. The looped end *k''* is bent at right angles with the body portion with a socket *l*, formed or made integral with the end, to receive and adjustably secure one end of a connecting-rod *m*, the opposite end of the connecting-rod being loosely attached to the pivotal switch portion *m'* of the rail. This completes the description of the shifting mechanism which is operated through the medium and in conjunction with the trolley mechanism which I will now describe.

To the trolley-pole immediately underneath the trolley-wheel 1 and the harp 2 a trunnioned support 3, made in two parts, is adjustably secured to the pole 4. Contiguous with the projecting trunnions 5 enlarged collars 6 are formed on each side or part of the trunnioned support. Twin levers 7 and

8, having an enlarged lower portion corresponding with the diameter of the collars 6, are journaled upon the lugs 5 and adapted to rotate thereon. Slots 9 are cut in the enlarged portion of the levers meshing with the pins 10, thereby regulating the throw of the levers and providing a stop to limit the rotation of the levers and the trunnions. Hooked semicircular pawls 11 are pivotally secured to inner faces of the levers partially encircling the periphery of the collars. The front ends of the hooked portion are tapered and adapted to mesh with the dovetailed faces of the notches 13, holding and retaining the levers in a predetermined position. To the upper portion of the free ends of the levers 7 and 8 rollers 14 and 15 are journaled on the projecting ends of bolts 16, which extend toward and on each side of the trolley-wheel. Ears 17 are made integral with the levers, having apertures therein into which different-colored ropes are inserted, leaving the free ends hanging down in close proximity to the trolley-rope. (Not shown in drawings.)

When it is desired to release the pawl for the purpose intended, the operator pulls down on the rope with a quick or rapid movement, in which case the pawl will not catch in the notch, but rotate on the lug to a vertical position and will be held in said position by the stop-pin 10. After the pivotal rail is thrown to the desired position the operator again pulls the rope downward, but with a slow movement, when the pawl will fall into the notch and hold the lever in off position or at an inclination with the trolley-pole.

The levers through the pawls are retained in mesh with the notches on the collars under spring tension as follows: Helical volute springs 18 are compressed and inclosed within the hollow portions 19 of the cones 20, which are secured to each end of the trunnions 5 by ordinary bolts, which engage with the screw-threaded apertures 21, inclosing the trunnions 5. The springs surround the lugs, with the bottom or large coil resting on the face of the enlarged portion of the levers. The end 22 of the wire forming the large coil of the springs is hooked or looped around a pin 23 attached to the lower portion of the levers. The small coil of the springs rest against the inner faces 24 of the top of the cones, with the end of the wire forming the top or small coil bent at right angles and inserted in the apertures 26, provided in the top of the hollow cones. This arrangement connects the levers and cones together, and when the cones are rotated on the trunnions the springs are tightened or wound closer, creating more or less tension. The pressure of the springs are exerted to draw or partially rotate the levers when the pawl is released from engagement with the notch.

When the levers are held in off position, as shown in Fig. 3, they are held in place under

tension by the engagement of the pawls with the notch, as shown.

It will be observed that the levers are held under tension at inclination with the trolley-pole, so that when they are released and are forced to partially rotate by the springs the rollers reach the highest point of their travel or throw when the levers aline with the trolley-pole.

A cylindrical shell 25, having a screw-threaded cap 26, is suspended over the trolley-wire 27 at a suitable distance from the switches, sidings, or intersecting streets by guy-wires, which are secured to the arms 29 by attaching the ends of the wire to the eyes 30. The arms 29 are attached to the exterior of the shell by any well-known fastening means. A hanger 31 is inserted in the center of the shell, and any well-known insulating material is poured or pressed around the upper portion of the hanger, filling the shell retaining the hanger and insulating it from the shell. The lower portion of the hanger is enlarged and provided with a screw-threaded aperture 32. A trolley-clamp 33 is secured to the hanger by the screw-threaded boss 34, which engages with the screw-threaded aperture 32. Adjustable twin brackets 35 and 36 are secured to the arms 29 on each side of the shell. Contact-plates 37 and 38, with both ends 39 curved upward, and contact-faces 40, made concave to afford facilities for the rollers contacting with the plates readily and without undue friction, are secured to the hangers 35 and 36 by the screw-threaded apertures 42 in the ends of the hangers. The hangers are adjusted in the sleeves 43 and retained in place after adjustment by set-screws 44.

The mechanism used to operate the signal-lights is as follows, (see Fig. 24:) To the side of the casing or box a two brackets 45 and 46 are secured. The ends of the brackets are provided with rectangular apertures, into which a bar 47 is fitted. Two forked contacts 48 and 49 and insulated from each other are adjustably mounted on the bar with the slotted ends 50 in alinement with each other. A bracket-arm 51 is adjustably secured to the plunger *g* of the solenoid, carrying a knife-contact piece 52, which is secured to the end of and insulated from the bracket-arm. When the plunger is reciprocated, the knife-contact piece is alternately brought in and out of contact with the forked contacts, completing and breaking the light-circuits running to lights placed behind bull's-eyes of different colors, which are connected in an ordinary light series on the pole in the box 53.

Reference-figures 54 and 55 represent the bull's-eyes placed in the box, which are made of different colors.

Reference-numerals 56 and 57 indicate the lights secured to the interior of the box behind the bull's-eyes.

The operation of my device is as follows, (see Fig. 1:) When the car approaches a switch, siding, or an intersecting street, the conductor observes the color of the bull's-eye that is lighted up by the electric light behind it, which indicates the position of the switch. If the position of the switch is such that it will not direct or shift the travel of the car in the direction the conductor is required to run, he pulls downward on the rope that is attached to the lever he desires to operate. The downward throw of the lever releases the hooked pawl from its engagement with the notch on the collar, and the lever rotates or is thrown forward, carrying the roller which is secured to the lever with it. The lever is held at a higher point of its travel or throw than it is held when it is locked by the pawl, and when the moving car reaches the point where the contact-plates are suspended on each side of the trolley the roller contacts with the contact-plate A and the current of electricity is conducted through the wire A' from the trolley-wire to the solenoid A², magnetically charging or exciting it, and thence to the rail B, making a complete circuit, and the plunger is drawn into the solenoid A². When the lever on the opposite side is released, the plunger is drawn or attracted to the solenoid C, moving the shifting mechanism in the opposite direction in the same manner as described.

A flexible wire D is connected to an ordinary light-circuit on one end, and the opposite end is connected to the knife-contact pieces carried by the arms. The return-wires E and F are connected to the signal-lights and to the wire G, which connects each light-circuit alternately as the contact-piece is brought in and out of contact with the forks.

It will be noted that the signal-light mechanism and shifting-switch mechanism operate in conjunction with each other and simultaneously. The ropes through which the levers of the trolley mechanism are operated are preferably made light in weight and of different colors to correspond with the bull's-eyes in the box.

The guard is adjustable on the trolley-pole and so located as to prevent the trolley mechanism from coming in contact with the wire when the trolley-wheel leaves or jumps the wire. If the car travels the same route, the levers can be retained in a fixed position.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a switch, a trunnioned support secured to the trolley-pole underneath the trolley-wheel, rotating levers mounted thereon, rollers secured to the free ends of the levers, pawls pivoted to said levers, means for retaining said levers in a predetermined position under tension, means for releasing said

levers permitting them to rotate, means for conducting an electric current to a shifting-rail mechanism connected to the pivotal rail of the switch alternately closing and opening said switch at the will of the operator as described and set forth.

2. In an automatic electric switch for street-railways, a trolley mechanism secured to the trolley-pole, contact-plates suspended on both sides of the trolley-wire, means for bringing the trolley mechanism in contact with the plates, solenoids secured to a case or box in alignment with each other, a plunger fitted to reciprocate in apertures in said solenoids, an arm secured to said plunger, a shifting-rod attached to said arm, a connecting-rod secured to one end of the rod with the opposite end secured to the pivotal rail of the switch, means for conducting an electric current to the solenoids exciting them alternately, and forcing the shifting-rod to reciprocate and throw the switch to correspond with the direction it is desired to move the car in, signal-lights connected to and operated in conjunction with the shifting mechanism as described and set forth.

3. In an automatic electric switch for street-railways, a trolley mechanism secured underneath the trolley-wheel, contact-plates suspended on each side of the trolley-wire, a box placed underneath the surface of the ground having an auxiliary bottom, solenoids attached to said bottom, a plunger having enlarged ends fitted to reciprocate in suitable apertures provided therein, means for charging said solenoids alternately with an electric current, connecting mechanism secured to the pivotal rail and the plunger, brackets attached to the side of the box, a bar mounted therein, forked contacts adjustably mounted on said bar, an arm attached to the shifting-rod, a knife-contact attached to the end and adapted to be brought in and out of contact with the forked contacts, means for making an electrical connection with a light series.

4. In an electrically-operated switch, a trolley mechanism secured to the trolley-pole, contact-plates having the under portion made concave with both ends curved upward, said plates being hung on each side of the trolley-wire, a trolley-clamp suspended from an insulated shell resting on the wire, a box placed under the surface of the ground, solenoids attached to an auxiliary bottom, a plunger fitted to apertures provided therein, an arm secured to said plunger, a shifting-rod adjustably secured to the free end of said arm, a connecting-rod secured to the projecting end of the shifting-rod on one end and the pivotal rod on the opposite end, an arm secured to the shifting-rod having a knife-contact attached to the free end, forked contacts secured to a bar and adapted to contact

therewith when the plunger is operated said contacts being wired to a light series.

5. In an automatic switch, a trunnioned support clamped to the trolley-pole, levers mounted thereon having their free ends projecting upwardly at an incline, rollers journaled to bolts passing through apertures in the free ends, pawls pivotally secured to the inner faces of each lever, collars made contiguous with the journals of the trunnioned support having notches formed in the periphery thereof and adapted to mesh with the hooked portion of the pawls, stop-pins secured to the face of the collars meshing with slots formed in the lower portion of the levers, volute helix springs attached to the end of the levers, cones adapted to inclose said springs, one end of said cones being connected to the bent end of the small coil in such a manner as to connect the cone and levers together under tension with means of decreasing or increasing the tension of the spring, whereby the levers are made to rotate when the pawls are released as described and set forth.

6. In an automatic electric switch, comprising a trunnioned support adjustably secured to the trolley-pole, rotating levers secured to said support under tension means for releasing said levers, means for limiting the rotation of said levers, contact-plates suspended on each side of the trolley-wire, means for regulating the throw of the levers to contact with the plates and conduct the currents from the trolley to excite or charge the solenoids operating the shifting mechanism as described and set forth.

7. In an electric switch comprising a trolley mechanism, contact-plates, a shifting mechanism, brackets, a rod, forked contacts secured to said rod, an arm carrying a knife-contact, means for alternately making a circuit with lights placed in a box behind different-colored bull's-eyes, as described and set forth.

8. An automatic switch for street-railways, comprising a support having projecting lugs made integral forming a trunnion, levers journaled on said lugs, pawls pivotally secured to said levers, collars having notches formed in the periphery thereof, a guard secured to the trolley-pole, a spiral spring connected to the levers, cones adapted to inclose the lugs and springs, said springs being compressed and exerting a pressure against the lower portion of the levers preventing lateral motion.

9. In an automatic switch, a trunnioned support secured to the trolley-pole, levers journaled on said trunnions with the free ends extending on each side of the trolley-wheel, pawls pivotally secured to said levers, volute helix springs, cones inclosing said springs, ears made integral with said levers, contact-plates suspended on each side of the

trolley-wire, means of conducting an electric current to a shifting-rail mechanism as described and set forth.

10. In an electric-switch mechanism, comprising a trolley mechanism, contact-plates suspended on each side of the trolley-wire, a shifting-rail mechanism adapted to impart movement to the switch-rail, brackets secured to one side of a box placed under the ground, a bar supported by said brackets, forked contacts adjustably secured to said bar, an arm secured to the shifting mechanism, a knife-contact secured thereto and adapted to be moved in and out of contact with the forked contacts whereby an electrical connection is made with a light series connected to lights placed in a suitable box as described and set forth.

11. In an automatic electric switch, a trunnioned support, levers rotatably mounted

thereon under tension, pawls secured thereto and adapted to retain said levers in a predetermined position, contact-plates, means for bringing the trolley mechanism in and out of contact with said plates, a shifting mechanism connected to the switch-rail, means for operating said mechanism by an electric current transmitted from the trolley with a signal-light mechanism operated in conjunction with said shifting mechanism whereby the position of the switch is indicated by lights placed in a box behind bull's-eyes of different colors, said light mechanism being electrically connected with light series alternately.

Signed at Mansfield, Ohio, this 17th day of October, 1905.

EDWARD PLATT ROBBINS.

Witnesses:

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NELLIE CASEY.