

No. 749,261.

PATENTED JAN. 12, 1904.

T. COPE.  
SWITCH.

APPLICATION FILED AUG. 20, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

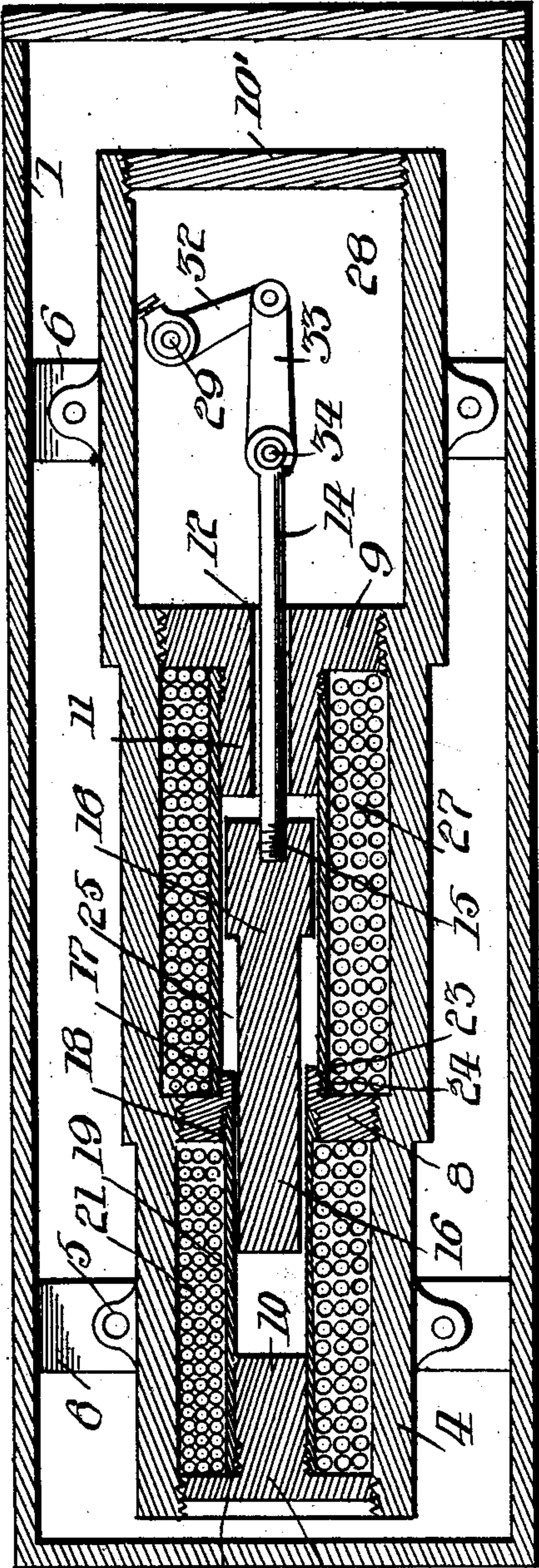


Fig. 1.

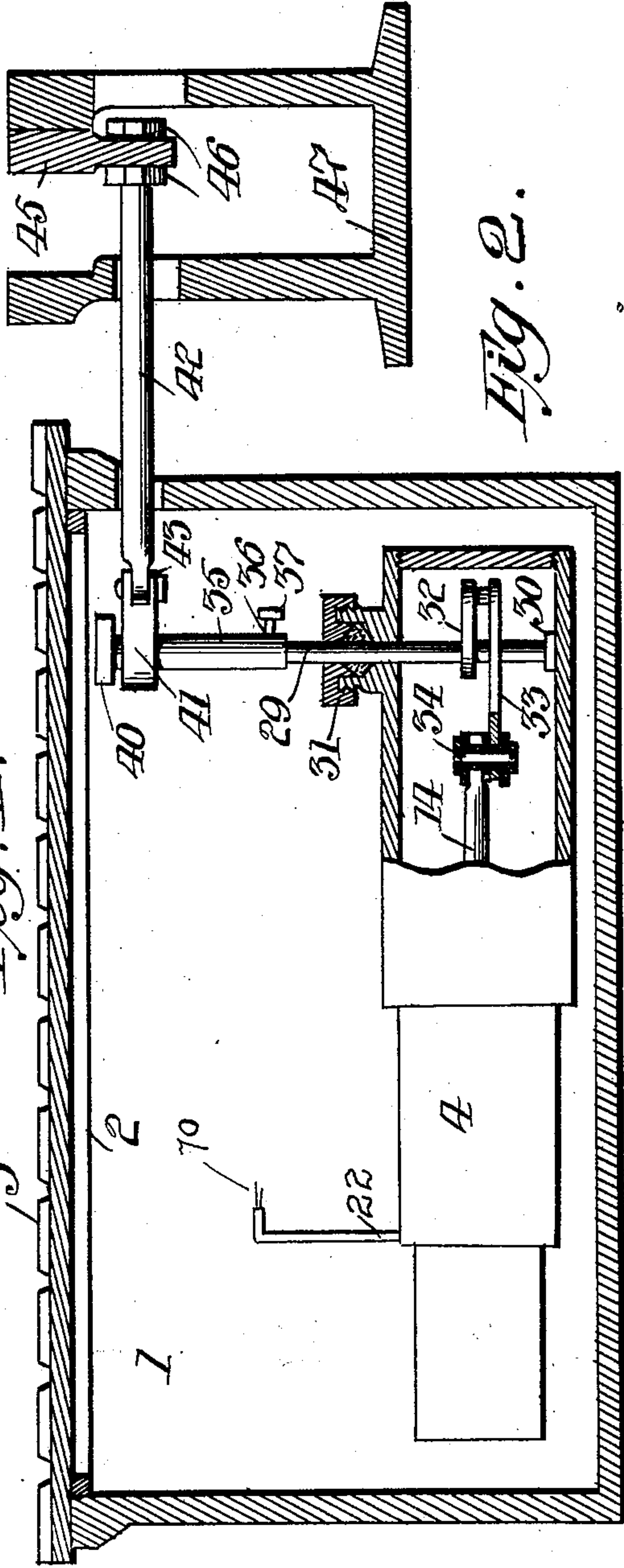


Fig. 2.

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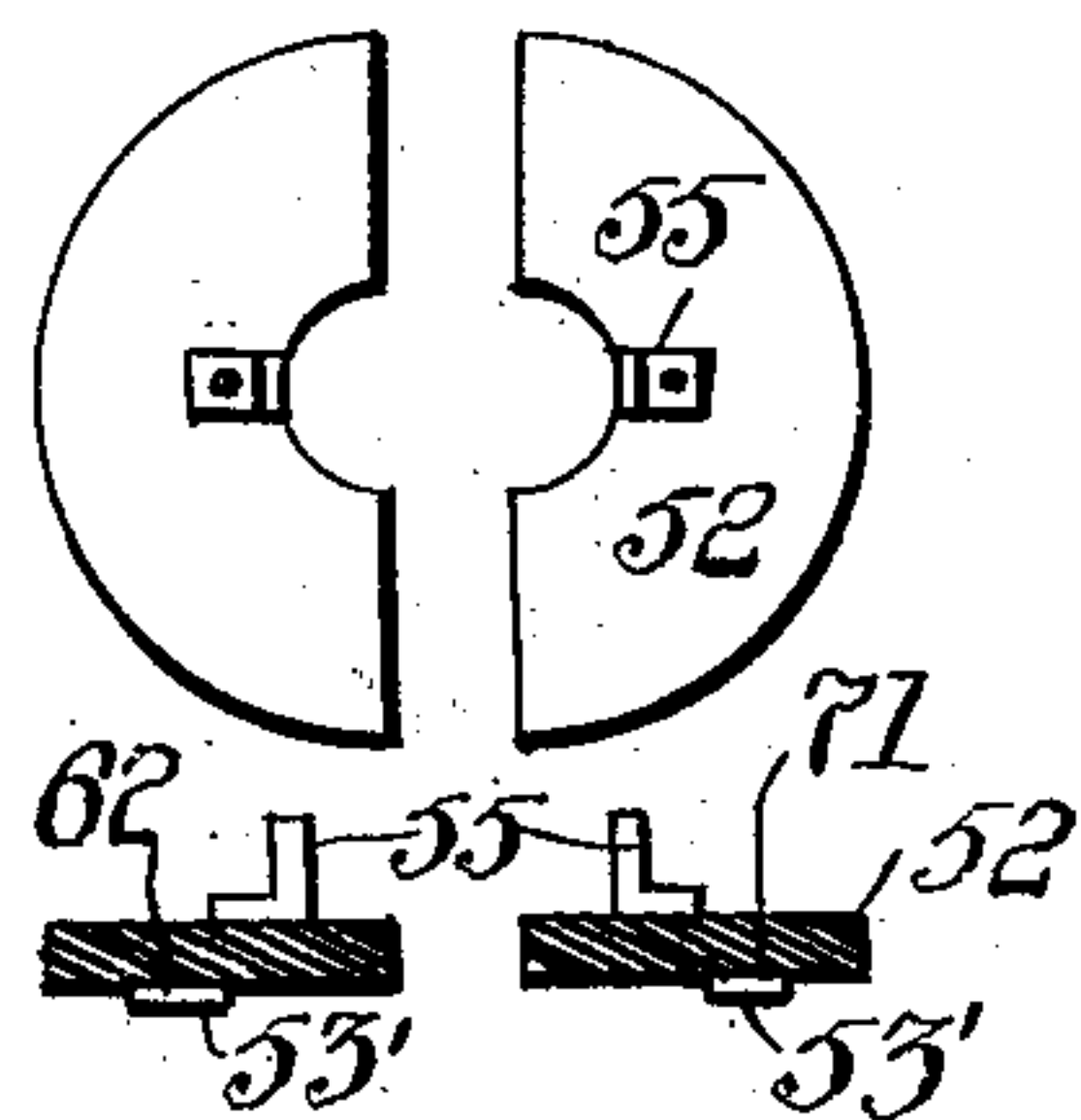
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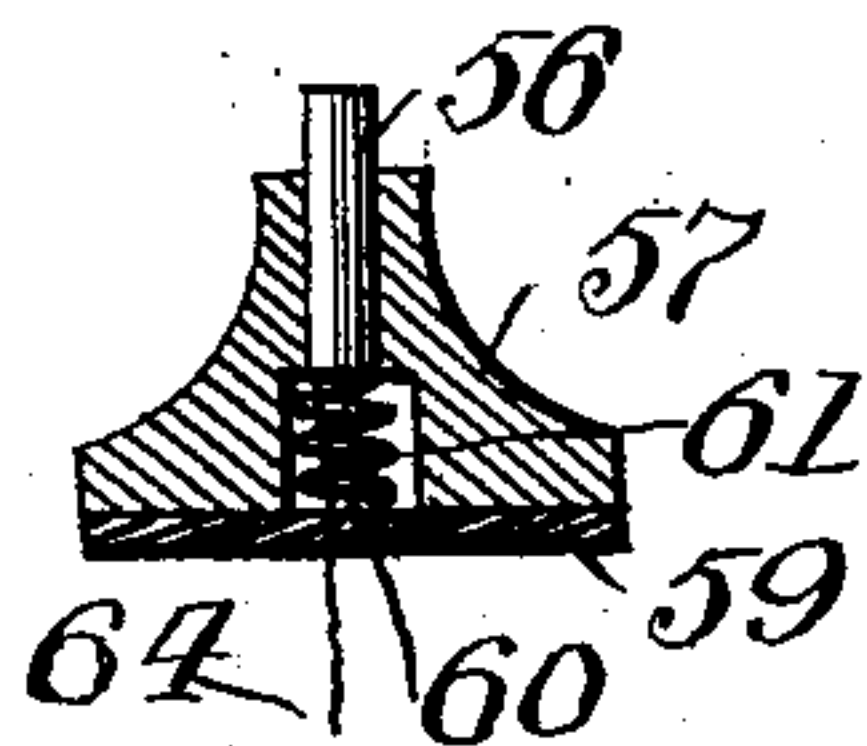
NO MODEL.

2 SHEETS—SHEET 2.

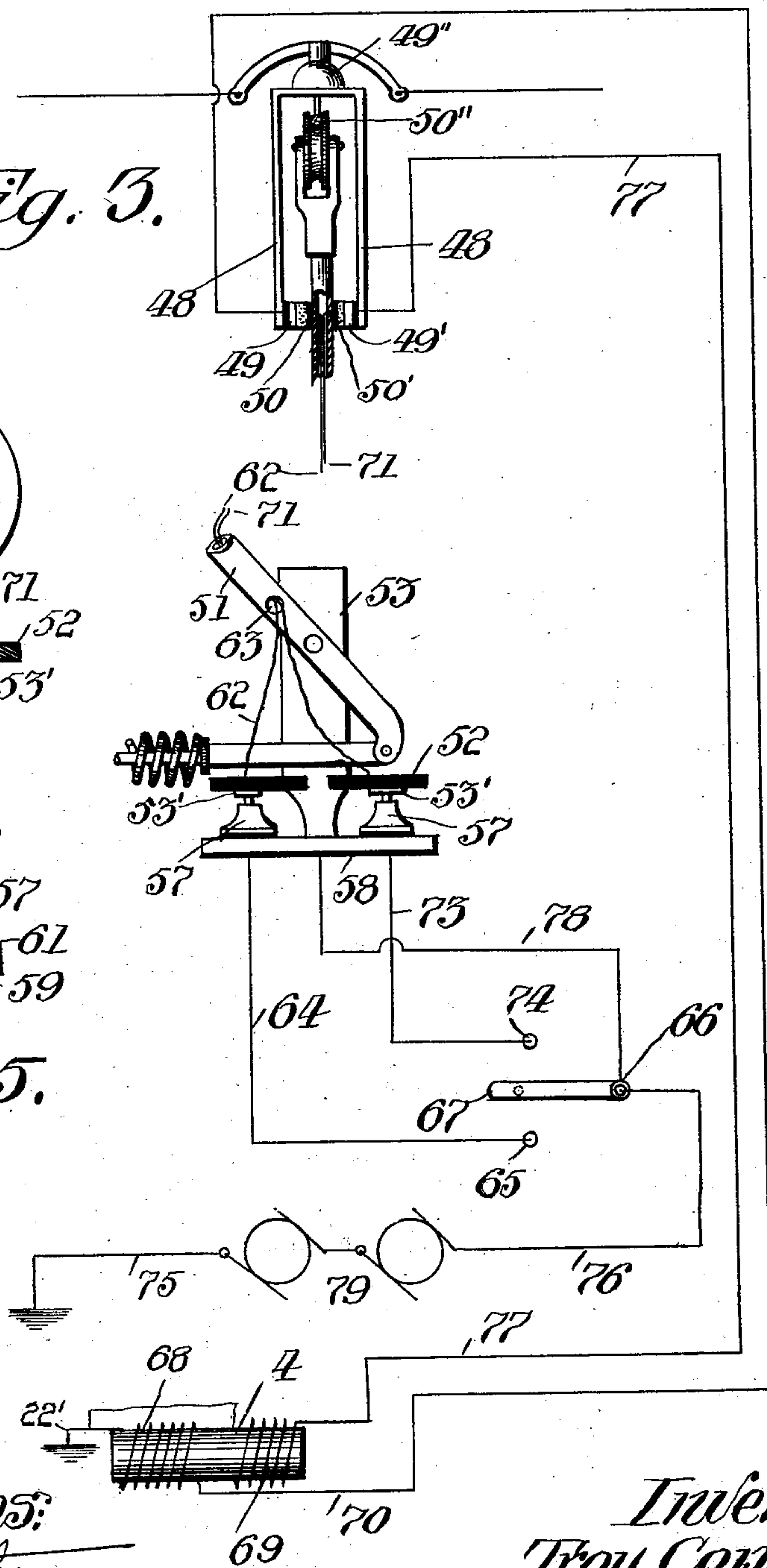
*Fig. 3.*



*Fig. 4.*



*Fig. 5.*



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# UNITED STATES PATENT OFFICE.

TROY COPE, OF NEW WATERFORD, OHIO.

## SWITCH.

**SPECIFICATION** forming part of Letters Patent No. 749,261, dated January 12, 1904.

Application filed August 20, 1903. Serial No. 170,112. (No model.)

*To all whom it may concern:*

Be it known that I, TROY COPE, a citizen of the United States of America, residing at New Waterford, in the county of Columbiana and State of Ohio, have invented certain new and useful Improvements in Switches, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in switch-throwing devices, and has for its object to provide a switch-throwing device which will be electrically operated, said switch-throwing device being placed adjacent to the switch-tongue, whereby as the car approaches the same the switch-tongue will be thrown in either one or the other direction.

Another object of my invention is to provide means located adjacent to the switch-tongue and upon the trolley-wire located above, whereby when the car forms a circuit between the same the switch-tongue will be operated as desired, the same being controlled by the motorman of the car.

A further object of my invention is to provide a switch-throwing device which may be located adjacent to the switch-tongue, the construction of which is comparatively simple, and when a current of electrical energy is conducted to the same the mechanism carried therein will be easily, quickly, and effectually operated.

Heretofore considerable trouble has been experienced in this type of switch-throwing devices on account of the water and dampness entering the same and acting as a conductor for the electricity, whereby the devices are rendered inoperative.

It is the object of my invention to provide a switch-throwing device which will be entirely waterproof, strong and durable, and highly efficient when used.

Trouble has also been experienced with electric switches where it is necessary to operate the controller to throw the switch, and it is one of the objects of my invention to provide a switch-throwing circuit entirely independent of the car-circuit, whereby the closing of the car-circuit will not be necessary when running over the switch, as is now the case.

In describing the invention in detail reference is had to the accompanying drawings, forming a part of this specification, and wherein like numerals of reference indicate like parts throughout the several views, in which—

Figure 1 is a longitudinal sectional view of the casing which contains the switch-throwing mechanism. Fig. 2 is a vertical sectional view of the same, showing the switch-throwing mechanism as connected to the tongue of a switch. Fig. 3 is a diagrammatic elevation of a portion of the trolley, showing the same as wired in connection with the controller and the solenoid. Fig. 4 is a detail view of the circuit contact-strip employed by me; and Fig. 5 is a sectional view of one of the standards, showing the contact-pins.

To put my invention into practice, I provide a casing 1, which is preferably rectangular in shape, and said casing is adapted to be located in the ground adjacent to the switch-tongue, whereby the mechanism carried therein may be readily connected to the switch-tongue for operating the same.

The reference-numeral 2 indicates a suitable top or lid, which has its one side roughened, as indicated at 3, said lid or cover being adapted to be exposed, and in securing the same upon the casing 1 cement or any suitable locking means may be employed to secure the lid thereon. Within this casing I secure the switch-throwing mechanism, which consists of a solenoid 4, which is secured in the casing by means of lugs 5, said lugs being secured to the side projections 6 of the casing 1. This solenoid consists of the cylindrical casing 4, which is adapted to be partitioned into separate compartments by means of the screw-threaded caps 7, 8, 9, and 10, respectively, the screw-threaded caps 7 and 9 being formed with the annular projections 10' and 11, which serve as magnets, the screw-threaded cap 11 having a central aperture 12 formed therein, through which passes a rod 14, the one end of which is adapted to be connected to the switch-tongue, as will be hereinafter described, while the other end, 15, is screw-threaded, and adapted to be held thereon is the core 16. The central screw-threaded cap 8 has an aperture 17 formed therein, through which passes the core



16, and the aperture 17 is interiorly screw-threaded, as indicated at 18, to receive a tube 19, the other end of said tube being screw-threaded upon the magnet 10, as indicated at 20. Between the outer periphery of this tube and the cylindrical casing 4 is located the coil-wires 21, said coils being insulated and the one end thereof adapted to pass out of the casing through tube, as indicated at 22, and the other end of the coils will be grounded to the casing. The central cap 8 of partition carries an annular flange 23 upon its one side, and adapted to be secured upon said flange by means of screw-threads 24 is a tube 25, the other end of which is adapted to be secured upon the magnet 11 by the screw-threads 26. Between this tube 25 and the cylindrical casing 4 another coil or wire 27 is adapted to be located, the one end of said wiring adapted to pass without the casing through the tube indicated at 22. Between the caps 9 and 10 is formed a compartment 28, in which is mounted a shaft 29, the one end of which is secured to the casing, as indicated at 30, while the other end thereof passes through the casing and through a stuffing-box 31, connected to the casing. Mounted upon this shaft 29 is a crank-arm 32, which is connected to a crank-arm 33, which is then connected to the rod 14, as indicated at 34.

To the end of the shaft 29 which projects without the cylindrical casing 4 a stub-shaft 35 is connected thereto by means of the telescopic joint 36, a set-screw 37 being employed to secure the stub-shaft 35 upon the shaft 29. This stub-shaft is mounted in a suitable standard 40, and secured upon said shaft 36 is the crank-arm 41, which is pivotally connected to the tongue-rod 42, as indicated at 43, this tongue-rod passing through an aperture 44, formed in the end of the casing. The tongue-rod 42 is suitably connected to the tongue 45, as indicated at 46, said tongue 45 being of the ordinary construction and located within the rail member 47.

Located upon the trolley-wire above the switch-throwing device is adapted to be secured the contact-arms 48, said arms being supported by the mushroom 49'', which supports the trolley-wire 50''. These contact-arms 48 project downwardly a suitable distance and are insulated from the trolley-wire, and upon the ends thereof are secured the blocks 50 and 50', carried by the trolley-pole 51 when the same is passing the contact-arms 48. Located at the base of the trolley-pole I provide contacts comprising insulation-plates 52, having the metallic strips 53' secured thereto, said plates being secured to the standard 53 by means of the angle-irons 55. Adapted to be in continual engagement with the metallic strips 53' are the contact-pins 56, which are mounted within the cone-shaped standards 57. These standards are supported upon a plate 58, which is

insulated from the standards 57 by the insulation 59. The contact-pins 56 are held in engagement with the metallic plates 53 by a spiral spring 60, carried in the recess 61 of the standard 57.

In Fig. 3 of the drawings I have illustrated a diagrammatic view, showing the circuits as employed by me to accomplish the operation herein described, and I will assume that the trolley-pole is in position upon the trolley-wire and the contact-blocks 50 and 50' are in engagement with the contact-strips 49 and 49', carried by the arms 48. When the trolley is in this position and it is desired to throw the switch-tongue in one direction, the switch 67 is placed in connection with contact 74. Then current passes from main car-circuit wire 78 to contact 74, then through wire 73 to contact-pin 56, from whence it passes to contact-strip 53' and to wire 71, carried inside the hollow trolley-pole. From wire 71 it passes to contact-blocks 50', (said block being insulated from trolley-pole,) then to contact-strip 49', carried by the arm 48, (said strip being also insulated from the supporting-arm 48.) The current then passes from strip 49' to wire 77, then to coil 69 of solenoid 4, the other end of said coil being grounded to casing of the solenoid, thereby completing the circuit between the wire and ground. It being desired to throw the switch-tongue in the other direction, the circuit is through switch-contact 65, wire 64, contact-pin 56, conducting-strip 53', wire 62, contact-blocks 50', contact-strip 49, wire 70, then to coil 68 of solenoid 4, the other end of said coil being grounded to casing in same manner as coil 69, thus completing circuit.

In order to provide proper insulation, the tubes 19 and 25 are preferably made of rubber or other equivalent material and the solenoid is made of iron or some other magnetic metal, as it forms part of the magnetic circuit, whereby the magnets 10 and 11 will be properly energized. The contact-switch 67 is connected to car-running circuit at 66, whereby the switch-operating circuit is independent of the car-running circuit. It will be noted that the solenoid-casing 4 is practically air and water tight, whereby the mechanism contained therein will be insulated from the effect of water and dampness, which has caused considerable trouble in apparatuses of this class heretofore used. It will also be seen that my improved switch-throwing device may be employed upon switch-tongues of most any construction; also, the wiring illustrated in Fig. 3 may be applied to trolley-poles of numerous constructions.

While I have herein shown and described a practical embodiment of my invention, yet it will be obvious that various changes may be made in the details of construction without departing from the general spirit of my invention.



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

1. In an electrically-operated switch-throw-  
5 ing device, a double casing located near the switch-tongue, a double solenoid mounted in said casing, the core of the solenoid being adapted to actuate the switch-tongue, contact-  
10 arms carried by the trolley-wire, means connecting each coil of the solenoid with one of said arms, means carried by the trolley-pole adapted to contact with the arms to actuate the solenoid, means carried by the car where-  
15 by either of the coils of the solenoid may be energized comprising a pair of contact-plates mounted at the base of the trolley-pole, means for alternately connecting each of said plates with the car-circuit, and means whereby said  
20 plates are put in circuit with the contact-arms carried by the trolley-wire, substantially as described.

2. In a switch-throwing device, a double solenoid having its core connected with the switch-tongue, contacting arms carried by the trolley-wire, each arm being connected with 25 one of the coils of the solenoid, and means for energizing either one of the coils to throw the switch in either direction comprising contact-blocks carried at the upper end of the trolley-  
30 pole, wires leading down from the said blocks within the pole, contact-plates carrying the lower terminals of said wires mounted at the base of the trolley-pole, and means connected with said plates adapted to alternately place  
35 the same in circuit with the car-running circuit, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

TROY COPE.

Witnesses:

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W. J. W. COPE.