

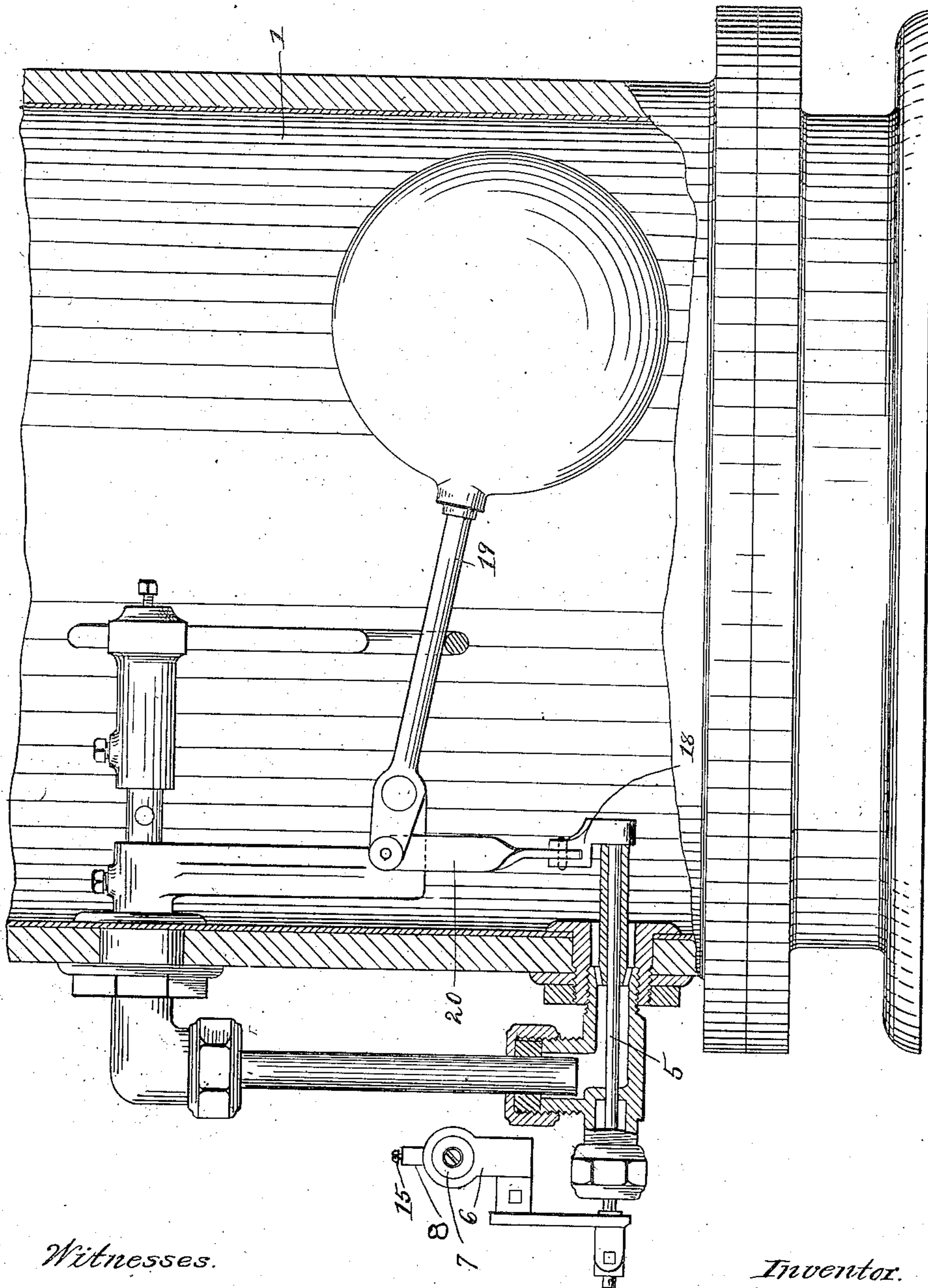
J. H. CHAMP.
ELECTRIC SWITCH.
APPLICATION FILED MAR. 28, 1910.

995,767.

Patented June 20, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses.

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2 SHEETS—SHEET 2.

Fig. 2.

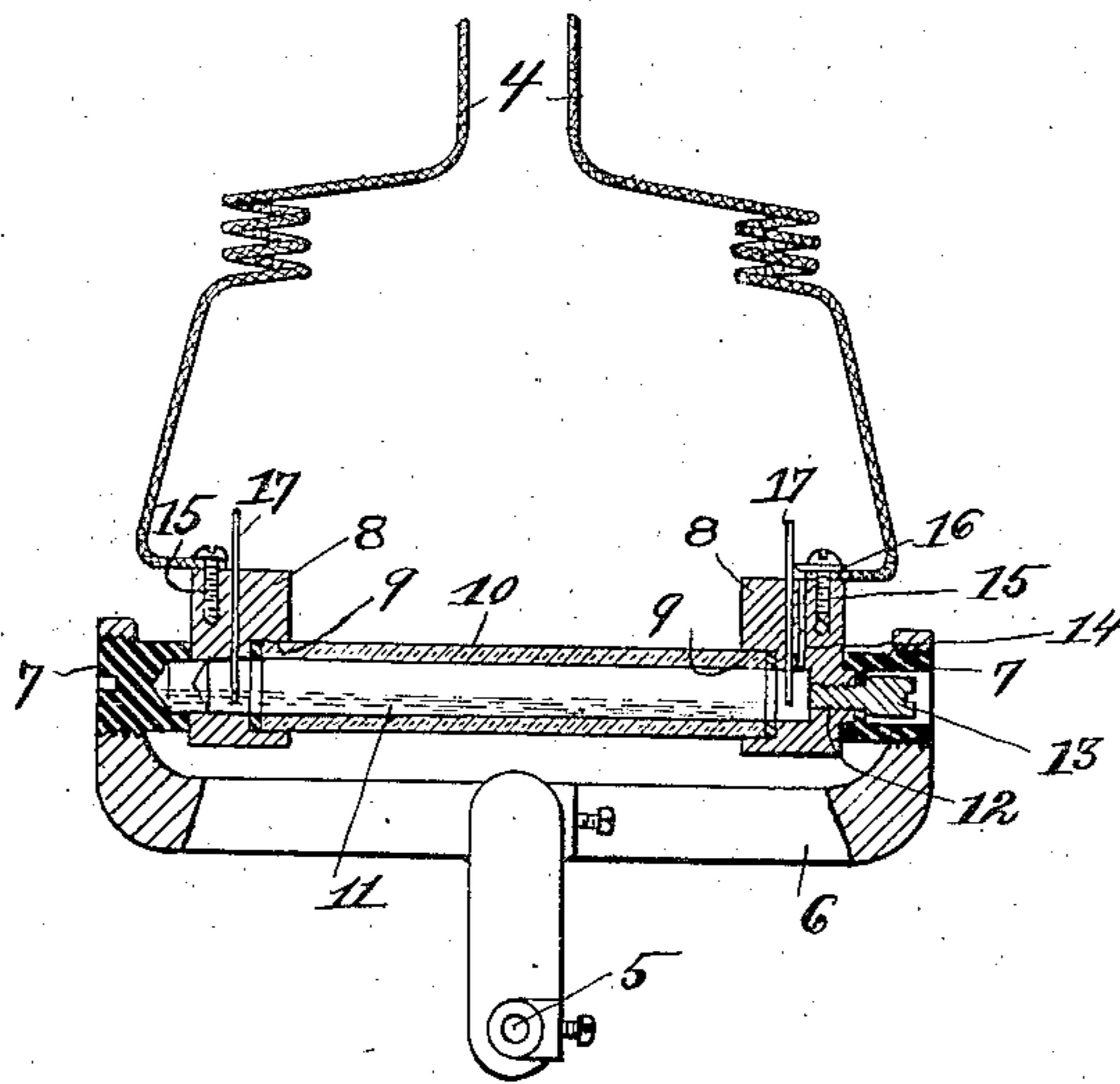
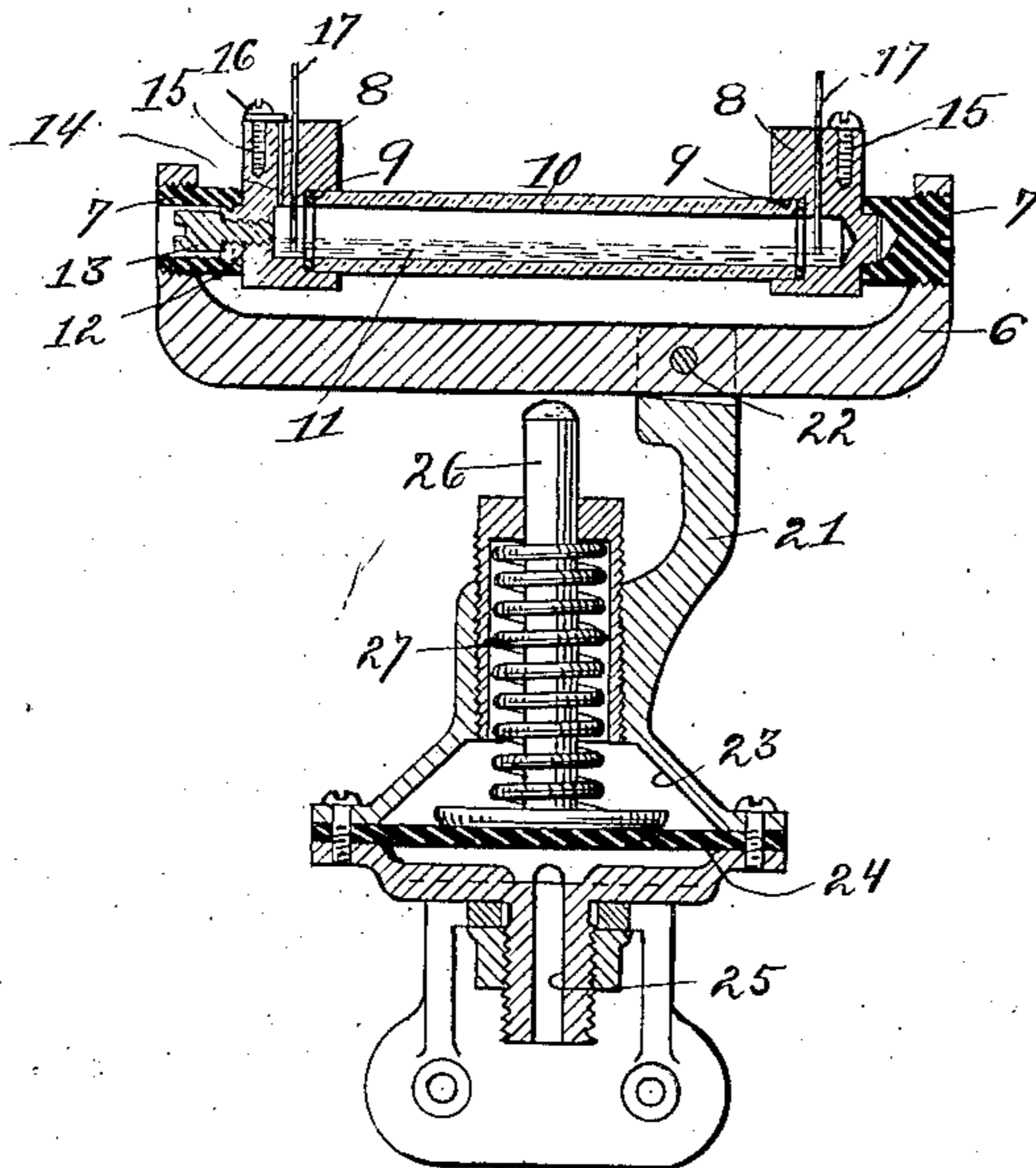


Fig. 3.



Witnesses.

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ELECTRIC SWITCH.

995,767.

Specification of Letters Patent. Patented June 20, 1911.

Application filed March 28, 1910. Serial No. 551,947.

To all whom it may concern:

Be it known that I, JOSEPH H. CHAMP, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, State of Ohio, have invented new and useful Improvements in Electric Switches, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention, relating in general to electric switches, is designed more particularly to provide a suitable switch for automatically controlling an electric motor and thus the mechanism operated thereby. The character of the control will, of course, depend upon the use to which the motor is put. Thus one instance would be with a carbonator or similar apparatus wherein it is desired to maintain a predetermined level of liquid; while another would be with a compressor or vacuum pump, where it is desired to maintain a substantially constant degree of pressure.

The object of the invention is the provision of a switch of the type referred to that, while simple and inexpensive in construction, will readily lend itself to use in these various connections, and that will require practically no attention or repairs.

To the accomplishment of these and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—Figure 1 is partly a broken elevation and partly a sectional view of the lower part of the carbonator; Fig. 2 is a vertical section through the switch proper; Fig. 3 is a vertical section of the switch proper and of a modified form of actuating mechanism.

The carbonator, in connection with which I have illustrated my invention in Figs. 1, 2 and 3, comprises a receptacle 1, on which is superposed a pump driven by an electric motor. The lead wires 4 of the motor are connected to the terminals of the switch, hereafter described, and through which con-

trol of the operation of the motor is had. Near the base of the carbonator a horizontal oscillatory shaft 5 is journaled in the receptacle wall, and keyed to its outer end is a yoke 6 which forms the supporting member for the switch proper. In each of the two arms of the yoke 6 is threaded an insulator 7 which will preferably be formed of hard rubber. Such insulators in turn respectively support blocks of conducting material 8. The blocks 8 are formed on their inner faces with recesses 9 into each of which is inserted one end of a tube 10 formed of glass or other non-conducting material. The tube 10 is partly filled with a fluid conductor 11, preferably mercury. The mercury may be inserted in the tube conveniently through an aperture 12 in one of the blocks 8, and the aperture then closed by a plug of conducting material 13.

It is found in practice that the passage of the current through the mercury in the tube, with resulting change in temperature may cause an expansion of the air or other gaseous contents of such tube; accordingly, in order to allow the free flow of this gas in and out, a vent opening 14 is formed through one of the blocks. The blocks are further formed with holes into which the lead wires to the motor may be inserted, such lead wires being secured in place by binding screws 15. The binding screw in the block that is formed with the vent opening 14, is provided with a fiber washer 16, and such screw and the hole into which it threads are so proportioned that if a lead wire is not inserted and the screw is turned down tight, the fiber washer 16 securely closes the vent opening 14. If, however, a lead wire is inserted the screw 15 cannot be depressed so far as before, and the upper end of the vent opening 14 is therefore left open.

It may be found in actual use that a coating will be formed upon the surfaces of the conductor blocks, so that an appreciable resistance will be met by the current, although this possibility is extremely small. I have provided as a safeguard, steel pins 17 driven through the conductor blocks and extending down into the tube far enough to dip below the surface of the mercury when the tube is horizontally disposed.

Within receptacle 1 a crank 18 is keyed to shaft 5. A float lever 19, provided with the

usual ball float, is pivoted to swing within adjustable limits and is connected by a link 20 with crank 18.

In operation, the desired amount of carbonic acid gas is led into the receptacle and a manually operable switch is so thrown as to complete the motor control circuit whereupon the pump is operated to spray water in upon the gas. At this time the float lever is in depressed position and the tube of the switch is in horizontal position. Obviously then, the mercury within the tube is in contact with both of the conductor terminals and the electric circuit is complete. When, however, the carbonated water formed within the receptacle rises to a predetermined level, it carries with it the float lever which, by means of the connecting link and crank oscillates the horizontal shaft and thereby moves the mercury tube into an angular position. When this is done the mercury flows from the upper end of the tube and out of contact with the conductor terminal at that end. Consequently the electric circuit is broken and the motor will cease to operate the pump, and hence the spray of water into the receptacle will be stopped. When sufficient of the carbonated water has been withdrawn from the receptacle so that the level of the water falls below the predetermined limit the shaft is oscillated again to return the tube to its horizontal position and hence to again complete the electric control circuit and start the pump.

In Fig. 3 I have illustrated the same switch proper which has been described above, but have shown it in connection with a modified actuating device. In this form actuation of the switch is responsive to the pressure in a supply line instead of to the level of the liquid within the receptacle. In this form of the device the yoke 6 is pivoted to a bracket 21 on an axis 22 eccentric to the two ends of the yoke. Immediately below the yoke 6 a diaphragm chamber 23 is provided, within which is a diaphragm 24, and a passage 25 leads into the chamber below the diaphragm and is connected with a pressure line whose pressure it is desired to control. A plunger 26 is connected with the diaphragm 24 and a spring 27 normally holds the plunger 26 in its lower position. Obviously then, if the pressure in the supply line rises above a predetermined force, it moves the diaphragm upwardly and hence the plunger is moved and oscillates the yoke on its eccentric axis. The ultimate result obviously is to break the electric circuit controlling the motor as in the form first described.

The many advantages to be derived from a use of my invention may be briefly summed up. The switch proper comprises very few parts and yet its control of the circuit in which it is connected is absolutely posi-

tive. It is contemplated that the switch will be assembled, including the filling of the tube with mercury, before it leaves the manufacturer's establishment. It is necessary then under these conditions that the vent opening through one of the terminal blocks be closed, in order to prevent the escape therethrough of the mercury within the tube. This is done by the washer carried by one of the binding screws, and as the latter is screwed completely into the block, the washer effectively closes the vent opening. When, however, the user inserts the lead wires in the terminals, the wire prevents the binding screw coming down far enough to allow the washer to close the opening.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any one of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a device of the character described, the combination of an oscillatory tube of non-conducting material open at its ends, blocks of conducting material closing the ends of said tube, said blocks being provided with recesses in which the ends of said tube are inserted, and one of said blocks being provided with a hole extending from its recess outwardly through the block, a plug removably secured in said hole, and a fluid conductor within said tube.

2. In a device of the character described, the combination of an oscillatory tube of non-conducting material open at its ends, blocks of conducting material closing the ends of said tube, said blocks being provided with recesses in which the ends of said tube are inserted, and one of said blocks being provided with a hole extending from its recess outwardly through the block, a plug removably secured in said hole, said blocks being further provided with holes designed to receive lead wires, binding screws adapted to secure said wires in said holes, and a fluid conductor within said tube.

3. In a device of the character described, the combination of an oscillatory tube of non-conducting material open at its ends, blocks of conducting material closing the ends of said tube, said blocks being provided with recesses in which the ends of said tube are inserted and with holes designed to receive lead wires, and one of said blocks having an aperture extending from its recess outwardly through the block, and one of said blocks having a vent opening therethrough, binding screws adapted to secure said wires in said holes, a washer on one of said screws adapted to close said

vent opening when a wire is not inserted in the block and to leave it open when a wire is secured in the block, a plug removably secured in said aperture, and a fluid
5 conductor within said tube.

4. In a device of the character described, the combination of an oscillatory tube of non-conducting material open at its ends, blocks of conducting material closing the
10 ends of said tube, said blocks being provided with recesses in which the ends of said tube are inserted and with holes designed to receive lead wires, and one of said blocks having an aperture extending from its recess outwardly through the block, and one
15 of said blocks having a vent opening there-through, binding screws adapted to secure said wires in said holes, a washer on one of said screws adapted to close said vent opening when a wire is not inserted in the block
20 and to leave it open when a wire is secured in the block, a plug removably secured in said aperture, a fluid conductor within said tube, and pins of conducting material extending through said blocks and into said
25 tube.

5. In a device of the character described, the combination of an oscillatory mounted yoke, blocks of conducting material secured to, but insulated from, the respective
30 arms of the yoke, said blocks being provided with recesses and with holes designed to receive lead wires, and one of said blocks having an aperture extending from its recess outwardly through the block, and one
35 of said blocks having a vent opening there-through, binding screws adapted to secure said wires in said holes, a washer on one of said screws adapted to close said vent opening when a wire is not inserted in the block
40 and to leave it open when a wire is secured in the block, a plug removably held in said aperture, a tube of non-conducting material open at its ends and having said ends inserted in said recesses, and a fluid conduc-
45 tor within said tube.

Signed by me this 25th day of March, 1910.

JOSEPH H. CHAMP.

Attested by:

F. L. HINDS,

E. H. VAGELPOHL.