No. 692,217. Patented Jan. 28, 1902.

A. SUNDH.

SNAP SWITCH.

(Application filed July 31, 1901.)

(No Model.) 4 Sheets—Sheet 1.

FIG. 1.

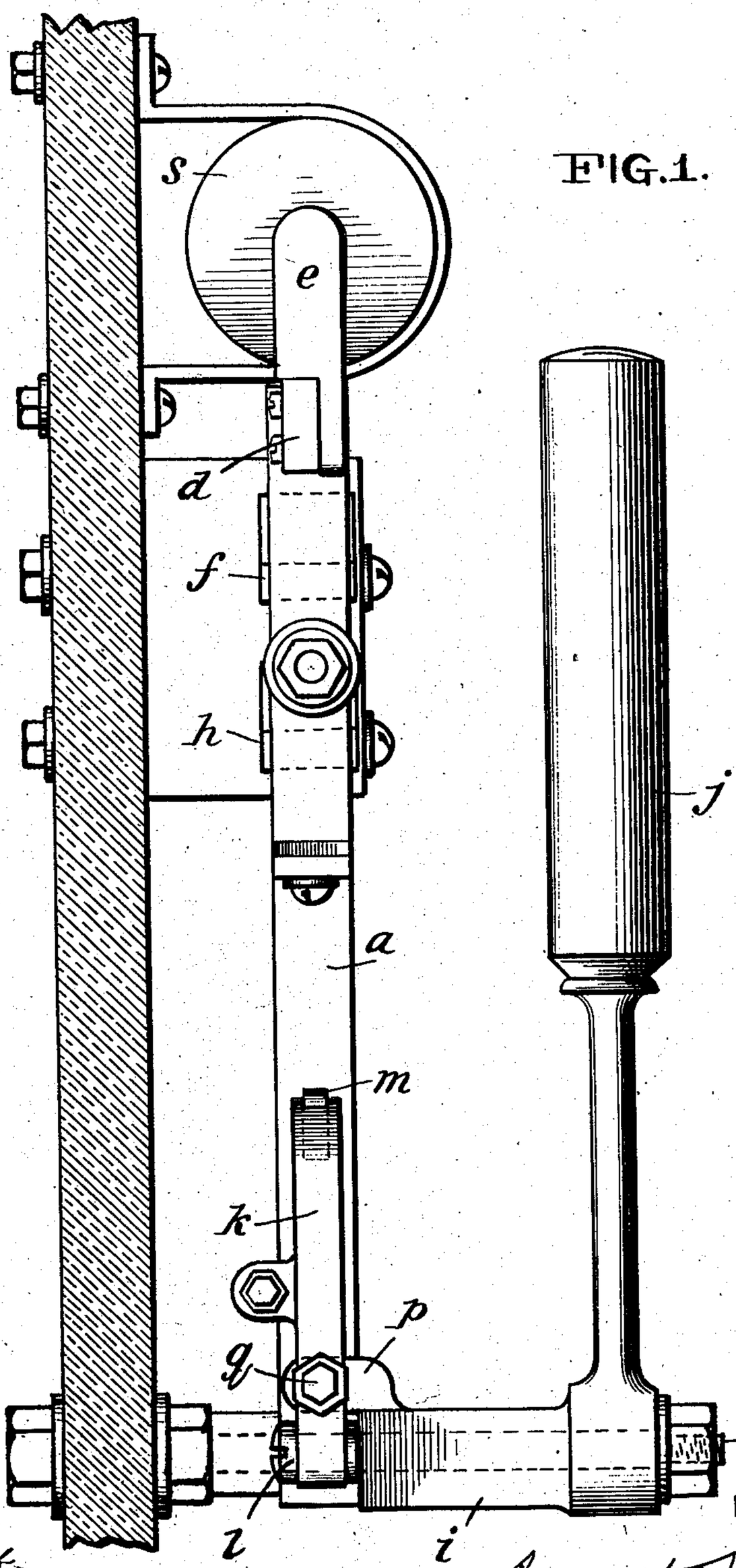

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FIG. 2.

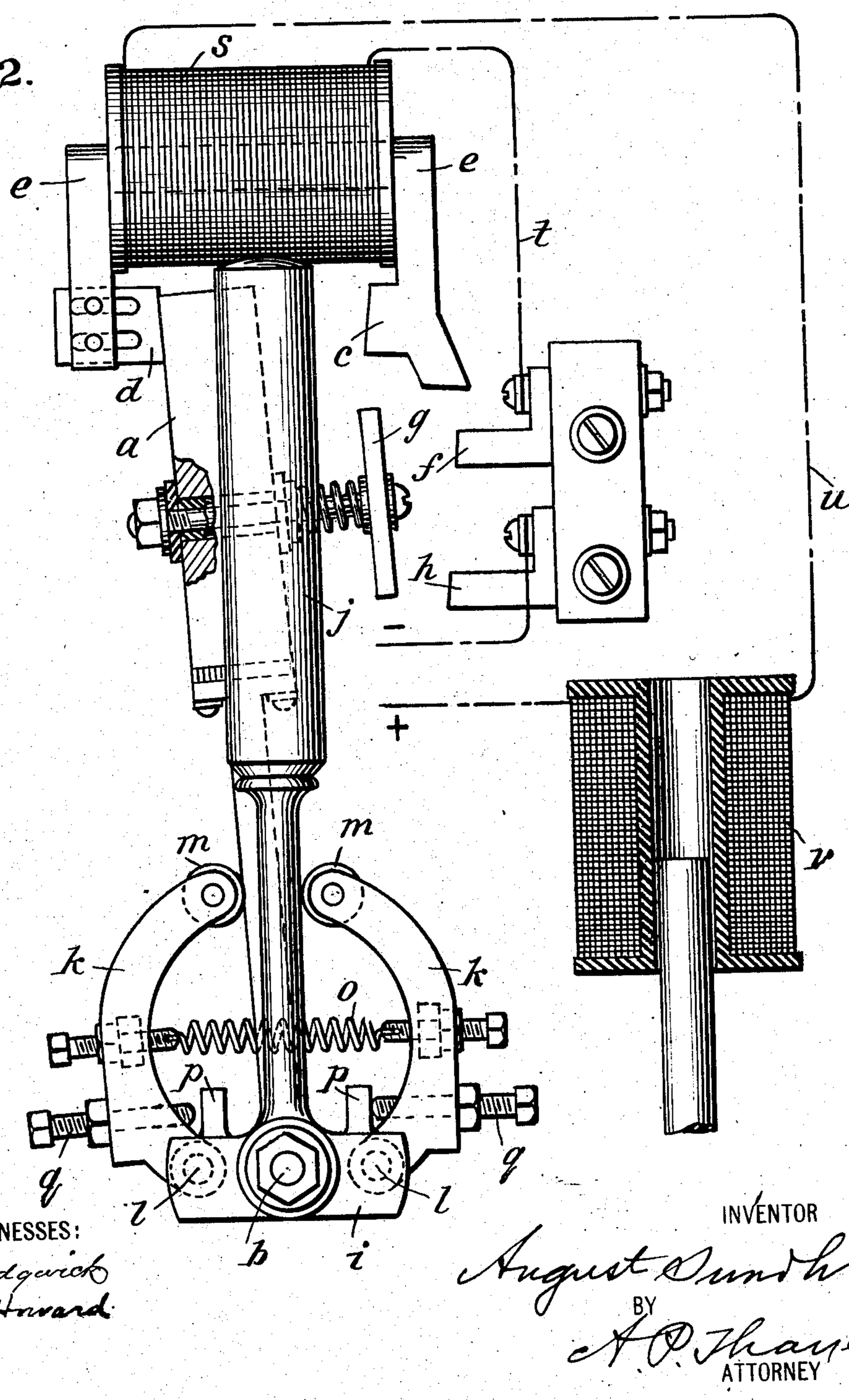

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FIG.3.

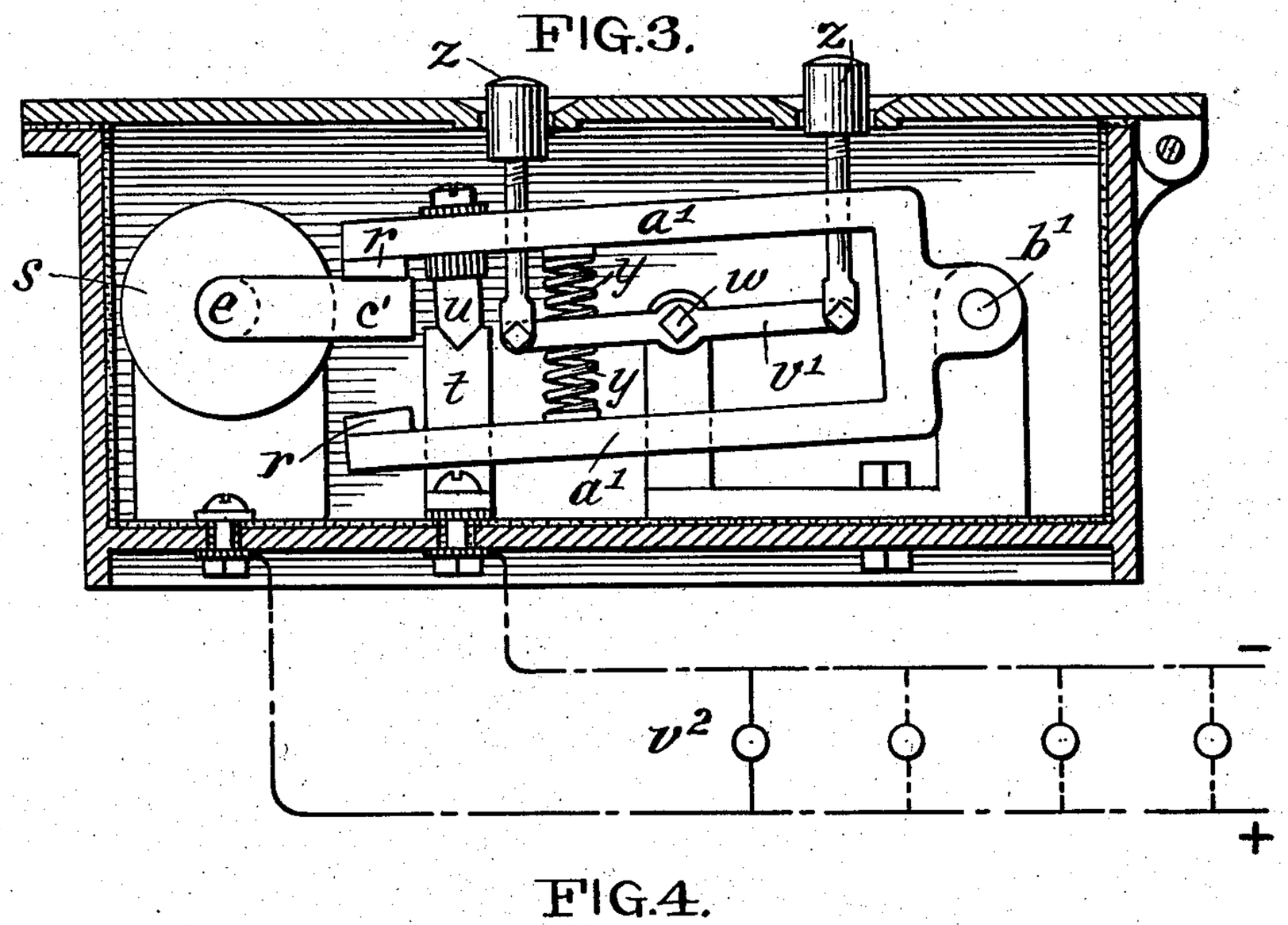

FIG.4.

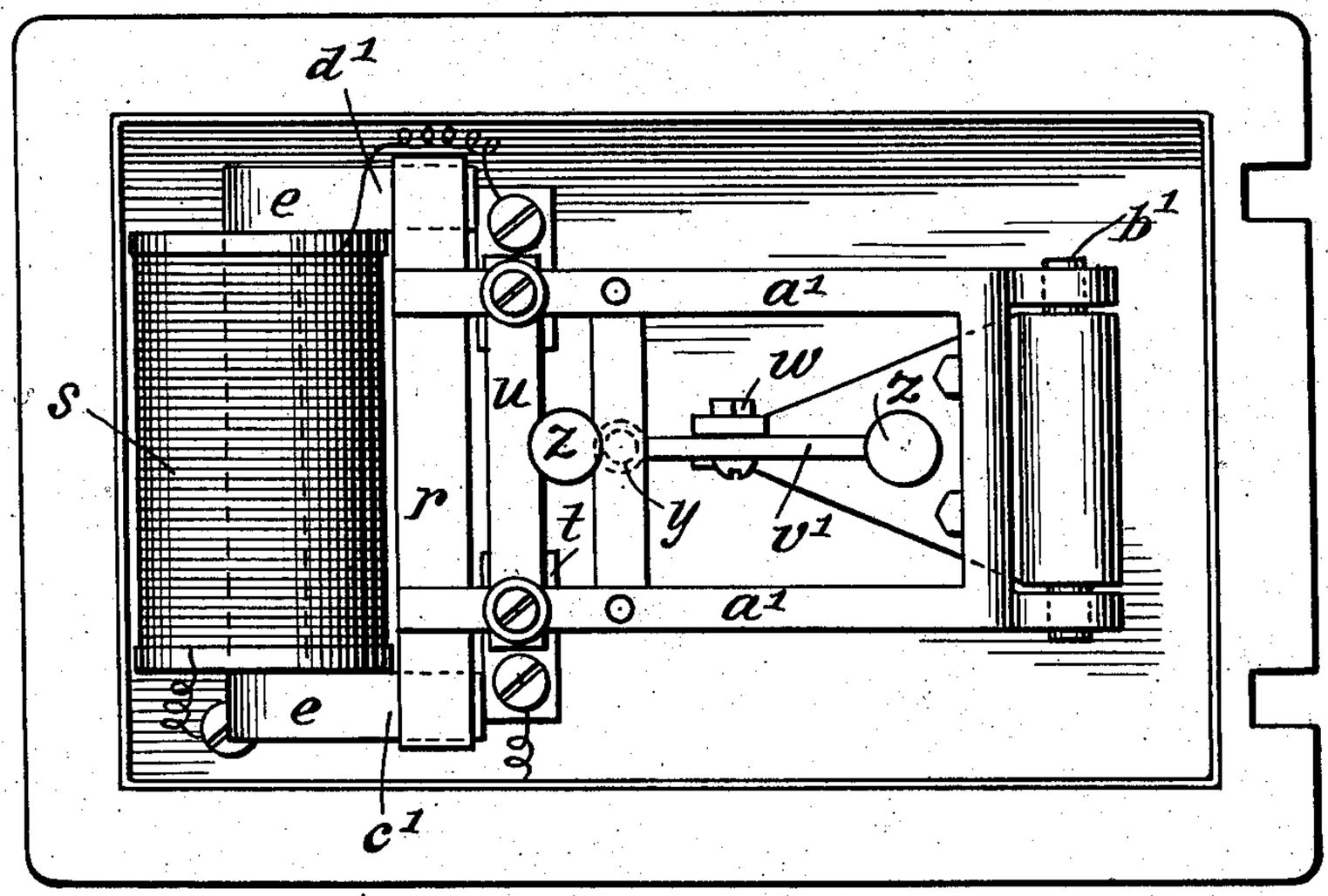

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FIG.5.

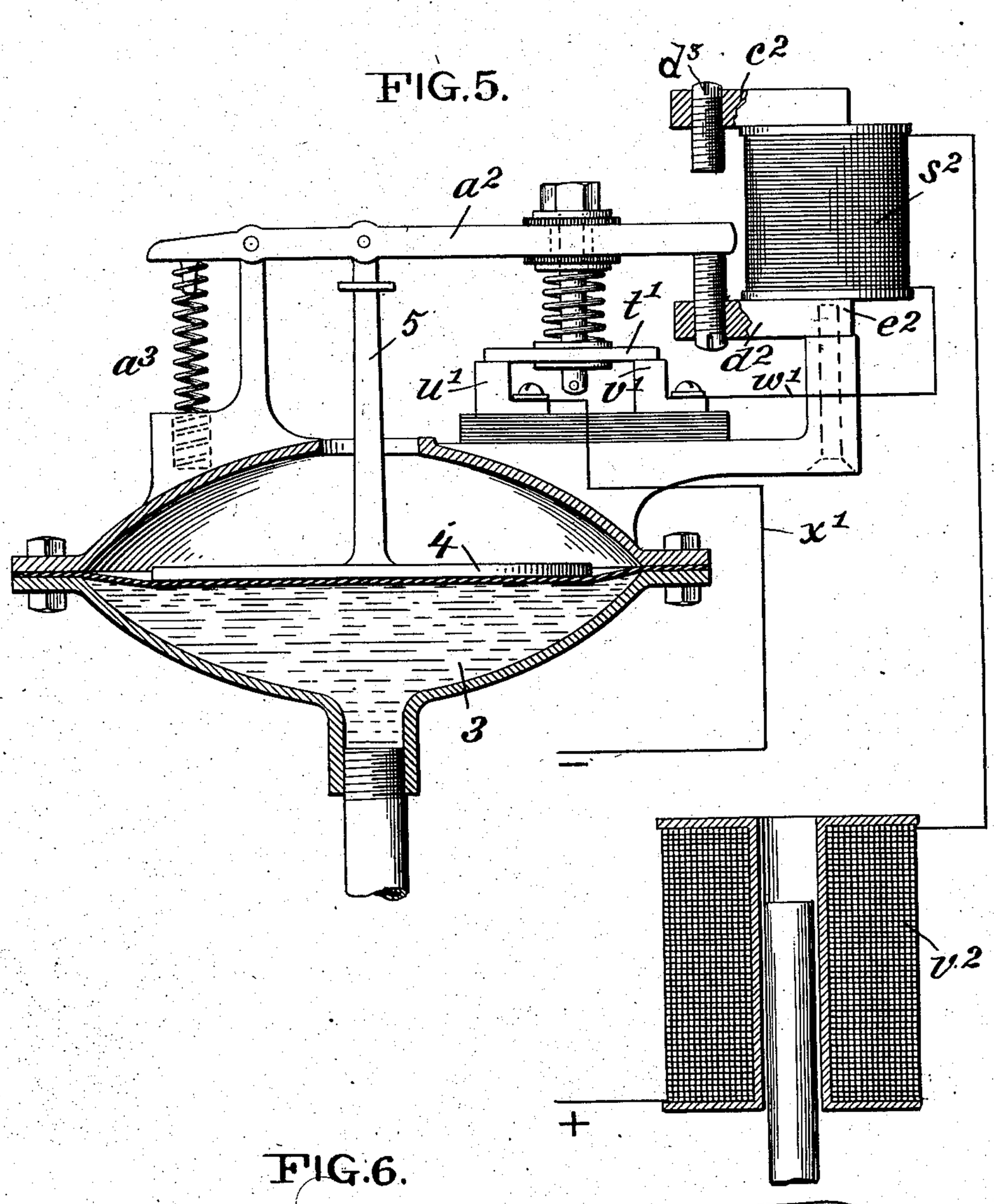
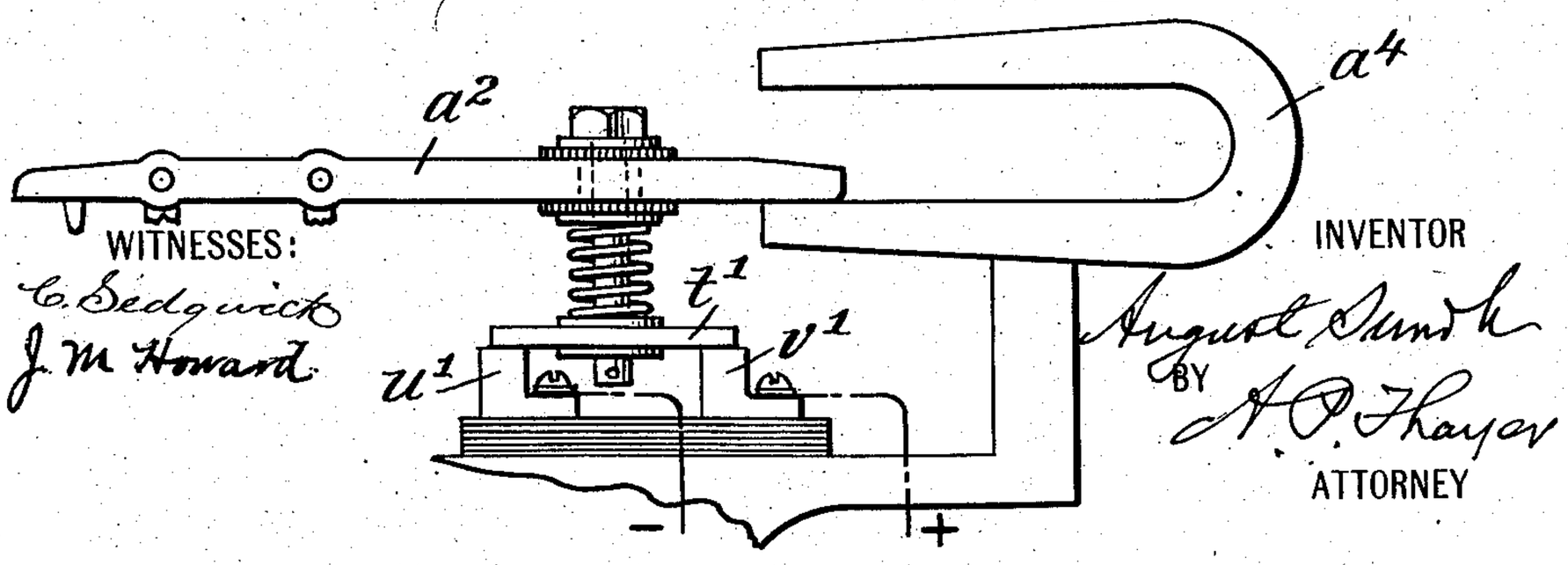


FIG.6.



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UNITED STATES PATENT OFFICE.

AUGUST SUNDH, OF YONKERS, NEW YORK, ASSIGNOR TO ELECTRITE COMPANY, OF NEW YORK, N. Y.

SNAP-SWITCH.

SPECIFICATION forming part of Letters Patent No. 692,217, dated January 28, 1902.

Application filed July 31, 1901. Serial No. 70,424. (No model.)

To all whom it may concern:

Be it known that I, AUGUST SUNDH, a citizen of the United States of America, and a resident of Yonkers, county of Westchester, and State of New York, have invented certain new and useful Improvements in Snap-Switches, of which the following is a specification.

My invention relates to the means for causing resistance by the switch for accumulation of power in the switch-operating device for effective "snap" action of the switch on release of the switch from the retaining or resisting device in what are known as "snap-switches," in which it is for well-known reasons desirable to employ such resistance in both the opening and closing movements. My invention is not designed for operating the switch for opening and closing it, but is an improvement in snap-switches, consisting of appliances to the switch whereby the switch may be respectively held in both of the positions it occupies when at rest by magnetic influences to restrain the operating device for accumulation of force to overcome the magnetic influences, and thus have quick snap action when let free to avoid or at least materially reduce the sparks, such being more desirable means than the mechanical contrivances now employed for the same purpose.

My invention also consists in the adaptation of such magnet to blow out the arcs of the circuit closing and opening contacts, as hereinafter described, reference being made to the accompanying drawings, in which—

Figure 1 is a side elevation of one form of switch in which my improvements are represented with parts in positions illustrative of the shifting operation. Fig. 2 is a front elevation, and in addition thereto it represents a vertical section of a solenoid-magnet as the device to be controlled by the switch. Fig. 3 is a side elevation of another form of switch embodying the said improvements and also showing an electric-light system as the device to be controlled. Fig. 4 is a plan view of the apparatus represented in Fig. 3. Fig. 5 is a vertical section of another form of switch with my improvements applied and also showing a solenoid-magnet as the object to be controlled. Fig. 6 represents a permanent magnet such as may be used together with parts of the switch represented in Fig. 5.

In Figs. 1 and 2, *a* represents the switch for opening and closing the electric circuit through contacts *f g h* by swinging on its pivot *b* in the usual manner, said switch being in this case operated by a handle *j*, with levers *k* pivoted at *l* to a block *i*, which is an integral part of handle *j*, and said levers are connected to each other by a spring *o* for storing power in the spring preparatory to the release of the switch for quickly throwing it thereafter. The free ends of levers *k* bear against opposite sides of the switch at *m*, preferably by means of friction-rollers. Said levers carry temper-screws *q*, which bear against lugs *p* of the block to apply the power of the handle *j* through one lever for pulling the other lever by the spring to throw the switch when the contacts are to be shifted from one position to the other. This, however, does not constitute the invention that I claim. It is merely illustrative of the means represented in this case for operating the switch. As previously stated, I employ magnetic appliances whereby magnetic influences may be utilized in lieu of the mechanical apparatus heretofore used for holding the switch in its respective positions and resisting the switch-actuating devices for the accumulation of an amount of force which when let go effects the quick transfer of the switch, that is desirable for minimizing the arcs. To this end I arrange a magnet of any suitable character, as *e*, in such relation to the switch that in either position of the switch it will be subject to the attractive influence of the magnet and be held there with some force, said attraction being the means of resisting the switch-actuating device and accumulating the necessary force for the quick throw of the switch when overcome and the switch is let free. Thus in this example of Figs. 1 and 2, *c* represents one pole of such a magnet, and *d* another pole, between which the free end of the switch plays in shifting from one position to another and on which it is held for the accumulation of force to cause the snap action. It will be noticed that the pole *c* of the magnet is located in suitable proximity to the contacts *f*, *g*, and *h* to serve at the same time as a blow-out magnet for

disrupting the arcs to which they are subject to some extent even in a quick-acting snap-switch. The magnet may be a permanent hard-steel magnet, such as a^4, Fig. 6, or one pole or a part of it, as the attached pole-piece d, Figs. 1 and 2. Also the attached pole-piece d^3, Fig. 5, may be of hard steel for retaining the magnetism for holding the switch in the open position when the electric circuit is broken, and the other—the one for blowing out the arcs—may be of soft iron, if so preferred, such magnets being of the character shown in Figs. 1 to 5, inclusive, consisting of a core e and a wire-spool s and connected in the electric circuit $t\,u$, in which the switch is used, or any other form of magnet suitable for the purpose may be employed. The wire-spool is employed and connected in the circuit to magnetize the soft-iron part of the core and to restore the magnetism of the permanent magnet or the permanent part, which lose their magnetism in time. The solenoid-magnet v is indicated merely as the electric device to be controlled by the switch.

In Figs. 3 and 4 practically the same application of my invention is represented in connection with a switch to be operated by push-studs, as z and z, the said switch comprising yoke members a', pivoted at b' and carrying bars r on opposite sides, respectively, of the poles c' d', with circuit closing and opening contacts $t\,u$. The push-studs act on the switch through the rock-lever v', pivoted at w, between one arm of which and the yoke members, respectively, of the switch is a spring y, through which the power of the push-studs is transmitted for first accumulating force and then quickly shifting the switch, as in other described apparatus. The proximity of the magnet-pole c' to the contacts $t\,u$ illustrates in this case the blow-out function of the switch-controlling magnet. An electric-light system v^2 is shown in connection with this switch as the device to be controlled by the switch. In this case, however, I have not represented the hardened attached pole-piece; but it is to be understood that its application will here be the same as in Figs. 1, 2, and 5.

In Fig. 5 I illustrate the application of my invention to another form of switch. a^2 is the switch-lever; t', u', and v', the contacts of the circuit w' x' to be opened and closed; c^2 and d^2, the poles of the magnet e^2 for controlling the switch, and a^3 the spring for throwing the switch when released from the contacts of the magnet-poles. The pole c^2 carries an attached hardened-steel piece d^3 to hold the switch when the circuit through spool s^2 is broken. The spool s^2 is used in this case for the same purpose as in Figs. 1 and 2. The blow-out arrangement is omitted in this case; but it is obvious that the pole-piece d^2 may be so placed relatively to the switch-contacts for effecting this purpose. In this particular form of switch the actuator consists of a fluctuating water column 3, or it may be compressed air operating a float 4, connected to the switch by the float-standard 5; but, as in the other example shown, it is not the apparatus of the switch that is the subject of the claims, these being represented merely to illustrate the general application of the invention. The solenoid-motor v^2 here shown is again introduced merely as the object to be controlled by the switch.

In Fig. 6 a hard-steel permanent magnet is represented, but without the wire-spool, which may be omitted in the case of small apparatus, especially when the poles are close together, as here shown, as alike applicable for my purpose and is arranged in connection with parts of like switch apparatus, as shown in Fig. 5; but it may of course be used with any form of snap-switch.

In Figs. 1, 2, and 5 the switch is arranged between the poles of the magnet, so as to shift from one to the other, and the pole on which the switch bears when the circuit is broken, and consisting of the permanently magnetic piece before described, is arranged adjustably toward and from the other pole to vary the effect of the magnetic action for regulating the action of the switch, which must be carefully graduated for successful operation.

Some of the advantages of my improvement are simpler and cheaper construction, less liability to get out of order, and particularly more positive, uniform, and reliable operation, and it affords convenient application of a blow-out magnet without specially providing it.

What I claim as my invention is—

1. The combination with the switch bar or lever and the means for shifting said bar or lever, of a magnet with its poles adapted for holding the bar in its open and closed positions respectively by magnetic influences for causing the snap action in both directions.

2. The combination with the switch bar or lever, and the means for shifting said bar or lever, of a magnet with its poles adapted for holding the bar in the open and closed positions respectively, for causing the snap action in both directions, said bar being arranged to vibrate between the two poles of the magnet, one of said poles being a permanent magnet to hold the said bar or lever in the open position.

3. The combination with the switch bar or lever and the means for shifting said bar or lever, of a magnet with pole-pieces adapted for holding the bar in the open and closed positions for causing the snap action, said bar arranged to vibrate between the two poles of the magnet, one of said poles being a permanent magnet to hold the said bar or lever in the open position, and means to vary the distance between the poles to vary the effect of the magnetic action.

4. The combination with a pivoted switch bar or lever and means for shifting said bar or lever, of a magnet with pole-pieces adapted for holding the bar or lever in its open

and closed positions respectively by magnetic influences for causing the snap action in both directions, said means for shifting said bar or lever consisting of levers bearing at one end on opposite sides respectively of said bar or lever, and pivoted on a support having rotating movement on the axis of said bar or lever, and being connected together by a tension-spring, temper-screws and stops on said support limiting the movement of said levers in the direction of said bar or lever, and means for imparting rotatory movement to said support.

5. The combination with the switch bar or lever and the means for shifting said bar or lever, of a magnet with pole-pieces adapted for holding the bar by magnetic influence of its respective poles in its open and closed positions respectively for resistance to the shifting device, to cause the snap action, one of the poles of said magnet arranged with relation to the circuit-closing contacts for blowing out the arcs.

6. The combination with the switch bar or lever, and a permanent magnet, said magnet having poles adapted for holding the bar or lever in its open and closed positions respectively, of a wire-spool connected in the circuit to restore the waste of magnetism from the magnet.

7. The combination with the switch bar or lever, of a magnet having one pole of hard steel and one of soft iron, the poles of said magnet adapted for holding the bar in its open and closed positions respectively, of a wire-spool connected in the electric circuit, to restore the magnetism of gradual loss in the hard pole and to generate magnetism in the soft-iron pole.

8. The combination with the switch bar or lever, of a magnet having one of its poles consisting of hardened steel, and the poles of said magnet being adapted for holding the bar or lever in its open and closed positions respectively, of a wire-spool connected in the circuit to restore the waste of magnetism from the hardened pole and to magnetize the other pole.

Signed at New York city this 26th day of July, 1901.

AUGUST SUNDH.

Witnesses:
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