

No. 706,478.

Patented Aug. 5, 1902.

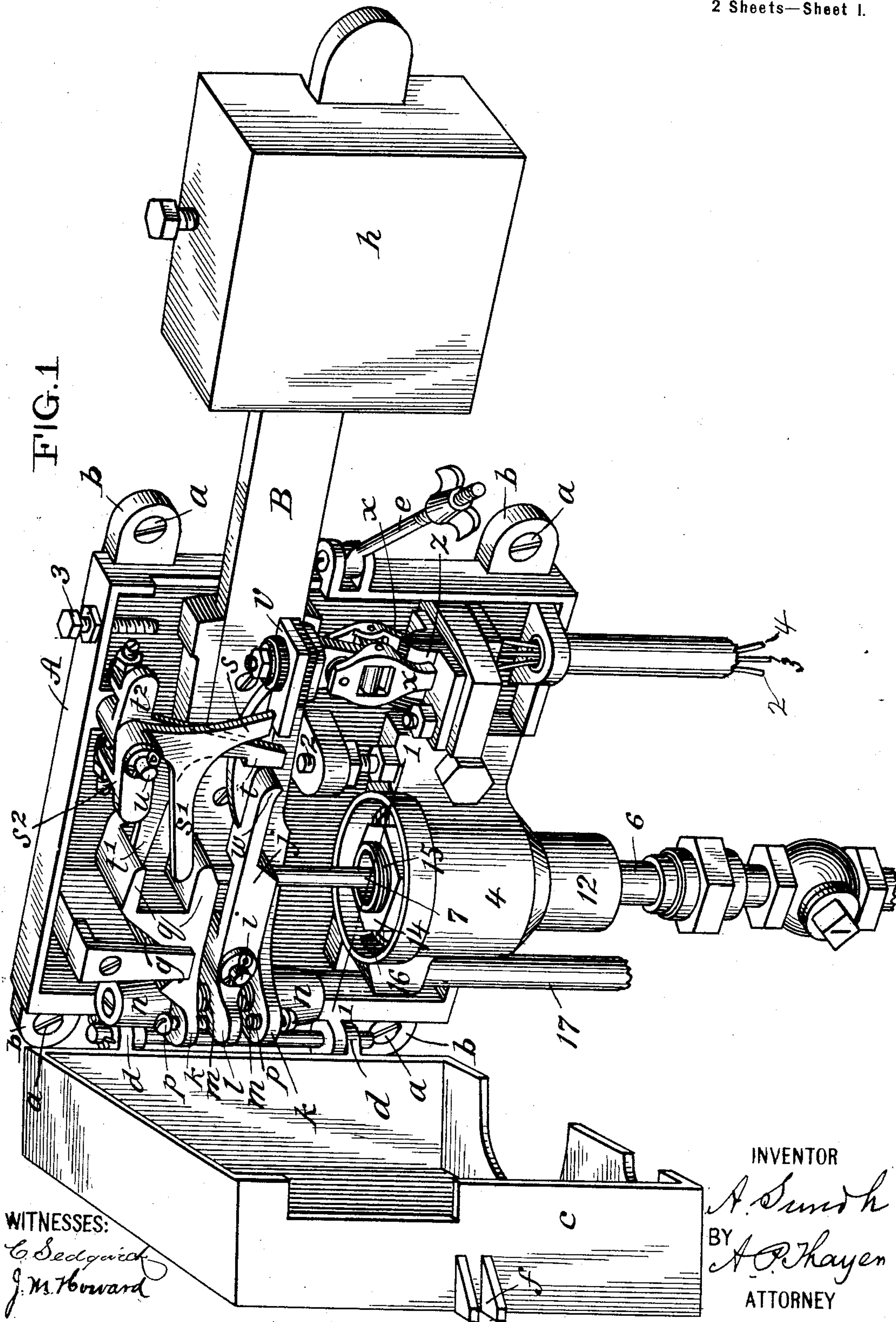
A. SUNDH.

FLUID PRESSURE ELECTRIC SWITCH CONTROLLING APPARATUS.

(Application filed Dec. 18, 1901.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:
C. Sedgwick
J. M. Howard

INVENTOR
A. Sundh
BY
A. P. Hayden
ATTORNEY

UNITED STATES PATENT OFFICE.

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

FLUID-PRESSURE ELECTRIC-SWITCH-CONTROLLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 706,478, dated August 5, 1902.

Application filed December 16, 1901. Serial No. 86,066. (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, Westchester county, and State of New York, have invented certain new and useful Improvements in Fluid-Pressure Electric-Switch-Controlling Apparatus, of which the following is a specification.

My invention relates to electric switches of the kind known as "snap-switches" and contrived for quick action to avoid sparking, and is in this example of my invention adapted for being automatically operated by variable fluid-pressure and a gravitating weight, or it may be a spring, for making and breaking the electric circuit of power apparatus of any kind as the fluid-pressure varies; and my invention consists of improvements in the apparatus of the switch especially designed for easy operation to avoid friction, for sensitive action by slight variations of pressure, as well as for general efficiency and durability, and mounted in an inclosing case designed particularly for the protection of other adjacent instruments with which the switch may be associated on the switchboard in case of failure of the fluid-pressure apparatus and escape of the fluid, all as hereinafter described, reference being made to the accompanying drawings, in which—

Figure 1 is a perspective view of my improved switch apparatus with the cover of the protective case open, the apparatus being about in the positions for breaking the circuit. Fig. 2 is a front view with the cover detached and a part of the apparatus in vertical section on line 1 1 of Fig. 1, with the apparatus about in the positions for closing the circuit.

A represents the base whereon the various parts of the switch are mounted for being installed by securing said base in an upright position to the switchboard or any suitable support, as by screws *a* and the lugs *b*, to which base an inclosing cover *c* is hinged at *d* with a swing clamp-bolt *e*, hinged to the base, and the fork-bracket *f* on the cover for fastening the cover when closed.

B is a fluid-pressure and gravity-operated lever which works on a knife-edge pivot-lug of the base A at *g* and carries on its long arm

an adjustable weight *h* for graduating its action, or it may be a spring having means for varying its tension. This lever carries a pivot *i* under its pivot *g*, whereon the switch-lever *j* is fulcrumed. It also carries rearward projections *k* respectively above and below the rear extremity of the switch-lever, and it also carries spring-seating sockets *n*, one on each of said projections *k*, in which spiral compression-springs *m* under some tension act on extension *l* of the switch-lever in opposite directions, and the projections *k* carry temper-screws *p* to positively limit the range of the switch-lever carried by said springs. The lever B also carries the fixed jaws *q* at a point a little forward of its pivot *g*, so as to have slight rise and fall as the lever vibrates. A couple of gravitating switch-lever stops, as *s t*, are mounted independently of each other on a stationary pivot *u* some distance above the switch-lever and along lever B from pivot *g*, whereof stop *s* gravitates over one extremity of a stop-catch *v*, carried on the switch-lever, when the switch-lever is down and the circuit is closed, and the hook of stop *t* gravitates under the extremity of stop-catch *w*, also carried on the switch-lever, to hold the switch-lever up when the circuit is broken. These switch-lever stops have an arm *s' t'*, respectively, ranging between the jaws *q*, carried on the lever B between pivot *g* and said stop-pivot, whereby through the upward-and-downward movement of lever B automatic escape of the stops from the stop-catches is effected, allowing the switch-lever *j* to be quickly shifted by the power stored in the springs *m* by the movement of lever B while said switch is restrained by the stops, thus causing quick snap action of the contacts, said contacts being the movable jaws *x*, carried by the switch-lever *j*, and the stationary contacts *z* of the common form in so-called "knife-switches." It will be seen that by the location of the stop-actuating jaws *q* near the fulcrum-pivot of lever B very easy action of the stops is provided for with but little friction. The temper-screw 2 limits the fall of the lever B, and the temper-screw 3 limits the rise of said lever. The circuit-wires are indicated at 2, 3, and 4. By providing independent stops they may be adjusted differ-

ently from each other to cause more or less range of the switch-lever one way than the other, which is desirable in some cases. The switch-lever stops are counterweighted at s^2 and t^2 , respectively, to cause their gravitating action, and they have regulating temper-
 5 screws s^3 and t^3 . It will be seen that owing to the switch-lever pivot i being located eccentrically to the pivot g of lever B the con-
 10 tacts x and z have sliding and rubbing contact, preventing lodgment of non-conducting mat-
 ters between them.

The fluid-pressure apparatus for operating the lever B consists in this example of my
 15 invention of the cup 4, closed near the top by a flexible diaphragm 5, into which the fluid-conducting pipe 6 is connected below the diaphragm, admitting a fluid substance
 20 under pressure and subject to variation of pressure, as when said pipe is connected to an accumulator which is to be replenished from time to time by a compressing-engine
 25 operated by an electric current having the switch in its circuit for automatically closing and opening the circuit as the fluid-pres-
 30 sure rises and falls in the accumulator. The diaphragm carries a lifting-rod 7, on which the lever B rests, by one of its jaws q , or it may be any other convenient part, so as to be
 35 lifted for raising lever B when pressure rises under the diaphragm, the effect of which is to first compress the upper spring m against
 40 rear end l of the switch-lever j and later trip switch-lever stop s , allowing said spring to quickly shift said lever and break the elec-
 45 tric connection with a snap action, and thus stop the compressor, and when pressure falls under the diaphragm and it is desirable that the compressor be started again said lever B
 50 will by its gravitating action descend and in like manner will first compress lower spring m and later trip switch-lever stop t to close the circuit again. The rod 7 is mounted on the diaphragm by a step-bearing 8 in a socket
 55 9 of a guide-stem 10, extending downward from the diaphragm and having a guide-hub 11 working in a cylindrical guideway 12 in the bottom of the cup and at a suitable distance below the diaphragm to afford a reliable and
 60 accurate bearing-point for the rod and to prevent cramping deviation of the diaphragm. The guide-stem 10 is clamped to the diaphragm by the flange 13 under the diaphragm and a nut 14 on an upward screw-threaded
 65 extension 15 of the stem with an intermediate washer 15. Thus a fluid-pressure operator for the switch is provided having advantage for the purpose, because of the accuracy and durability in operation. An overflow is pro-
 70 vided at 16 for the escape of any fluid that may leak past the diaphragm to be conducted away through a pipe 17, and the pressure-cup being located within the protective case is also an especial advantage, because in case
 75 of accidental disruption of the diaphragm or other part and an overflow of fluid the case is an essential check to prevent damage by

the escaping fluid and to cause escape of the same through the overflow-passage.

What I claim as my invention is—

1. In a fluid-pressure-controlled snap-switch, the combination with the stationary and movable contacts, and a lever carrying said movable contacts, of a fluid-pressure-operated lever whereon the contact-carrying lever is pivoted, and having opposing springs for actuating said contact-carrying lever in opposite directions, gravitating contact-lever stops respectively engaging said contact-lever and opposing the operating-springs of said lever for augmenting their tension for quick action, and tripping-jaws of the fluid-pressure-operated lever respectively releasing the contact-carrying lever from the stops.

2. In a snap-switch, the combination with the movable and stationary contacts, of a lever carrying the movable contacts, an operating-lever whereon the contact-carrying lever is pivoted, compression-springs for transmitting the power of the operating-lever to the contact-carrying lever, and means for stopping and releasing the contact-carrying lever for augmenting the tension of the springs, said contact-carrying lever pivoted on the operating-lever eccentrically to said operating-lever pivot for causing rubbing action of the contacts.

3. In a snap-switch, the combination with the movable and stationary contacts, of a lever carrying the movable contacts, an operating-lever whereon the contact-carrying lever is pivoted, compression-springs for transmitting the power of the operating-lever to the contact-carrying lever, means for stopping and releasing the contact-carrying lever for augmenting the tension of the springs, said contact-carrying lever carried on the operating-lever, and means carried by said operating-lever for tripping the contact-lever stops to release the contact-carrying-lever-actuating springs.

4. In a snap-switch, the combination with the movable and stationary contacts, of a lever carrying the movable contacts, an operating-lever whereon the contact-carrying lever is pivoted, compression-springs for transmitting the power of the operating-lever to the lever carrying the movable contacts, means for stopping and releasing the contact-carrying lever for augmenting the tension of the springs, said means consisting of the gravitating stops, stop-catches on the contact-carrying lever, and the jaws of the operating-lever engaging the arms of the stops.

5. In a snap-switch, the combination with the movable and stationary contacts, of a lever carrying the movable contacts, an operating-lever whereon the contact-carrying lever is pivoted, compression-springs for transmitting the power of the operating-lever to the contact-carrying lever, means for stopping and releasing the contact-carrying lever for augmenting the tension of the springs, said means consisting of the gravitating stops,

stop-catches on the contact-carrying lever, and the jaws of the operating-lever engaging the arms of the stops, said jaws located immediately of the stops and the operating-lever pivot.

6. In a snap-switch, the combination with the movable and stationary contacts, of a lever carrying the movable contacts, an operating-lever whereon the contact-carrying lever is pivoted, compression-springs for transmitting the power of the operating-lever to the contact-carrying lever, means for stopping and releasing the contact-carrying lever for augmenting the tension of the springs, said means consisting of the gravitating stops, stop-catches on the contact-carrying lever, and the jaws of the operating-lever engaging the arms of the stops, said stops mounted independently of each other and arranged to gravitate in reverse directions for engaging the stop-catches of the contact-carrying lever, with their tripping-arms both ranging in the same direction, and in relation to the tripping-jaws of the operating-lever located one above another and in approximately the same relation to the pivot of said operating-lever, whereby the stops are respectively operated by the reverse movements of the operating-lever.

7. In a snap-switch, the combination with the movable and stationary contacts, of a lever carrying the movable contacts, an oper-

ating-lever whereon the contact-carrying lever is pivoted, means for operating the contact-carrying lever through the instrumentality of the operating-lever, and effecting snap action of the contacts, variable fluid-pressure apparatus for actuating the operating-lever, and a protective case inclosing the switch apparatus and the fluid-pressure apparatus.

8. In a snap-switch, the combination with the movable and stationary contacts, of a lever carrying the movable contacts, an operating-lever whereon the contact-carrying lever is pivoted, means for operating the contact-carrying lever through the instrumentality of the operating-lever, and effecting snap action of the contacts, and variable fluid-pressure apparatus for actuating the operating-lever, through the instrumentality of a pressure-actuated diaphragm and a rod mounted on said diaphragm, said diaphragm having a pendent socket guide-stem in which said stem is seated near the lower end of said stem, and said stem, having a guideway for its lower extremity.

Signed at New York city this 11th day of November, 1901.

AUGUST SUNDH.

Witnesses:

A. P. THAYER,
C. SEDGWICK.