900,736.

H. H. HOWARD.

QUICK BREAK ELECTRIC SWITCH.

APPLICATION FILED OCT. 24, 1902.

Patented Oct. 13, 1908.

2 SHEETS—SHEET 1.

Fig. 1.

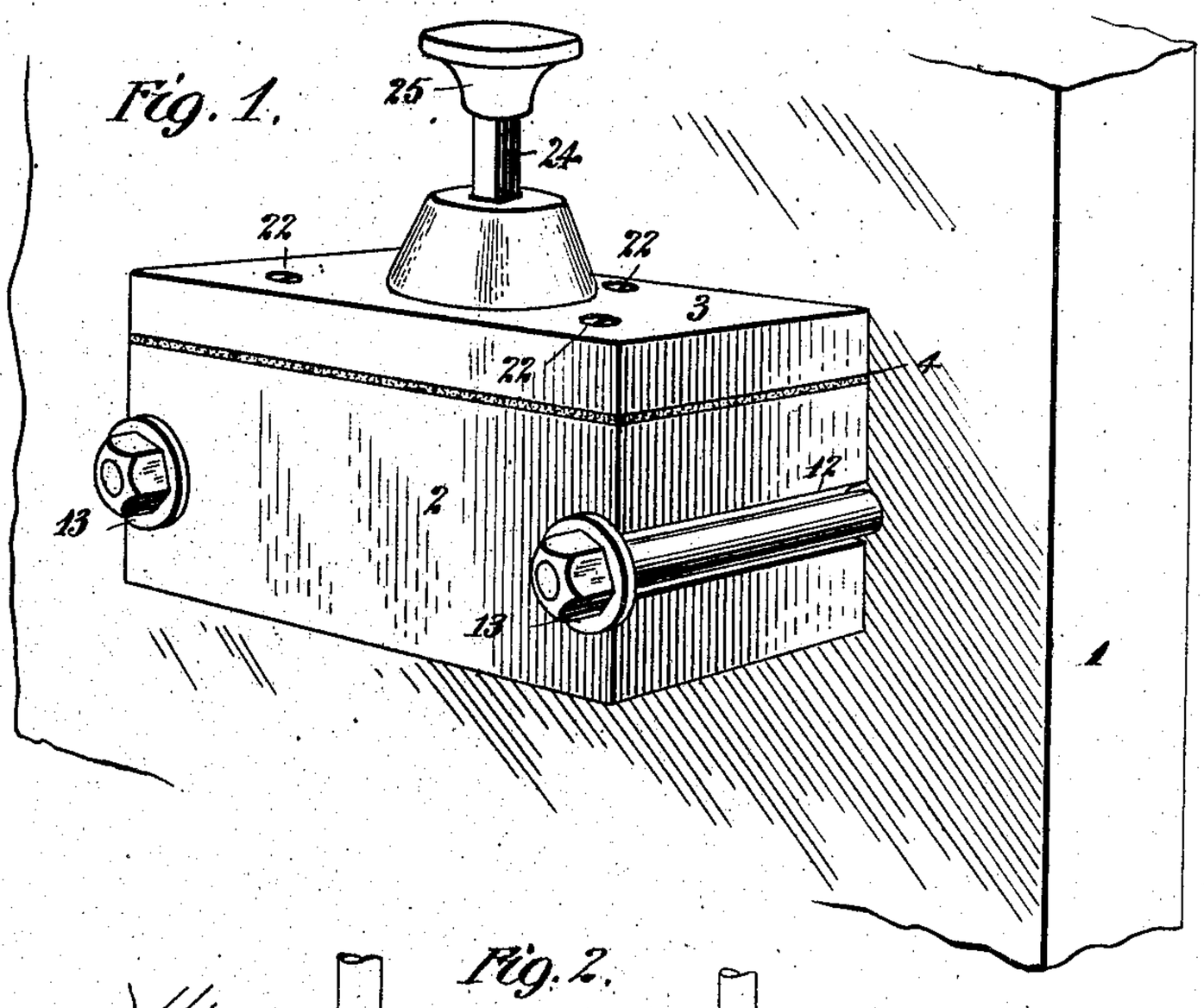


Fig. 2.

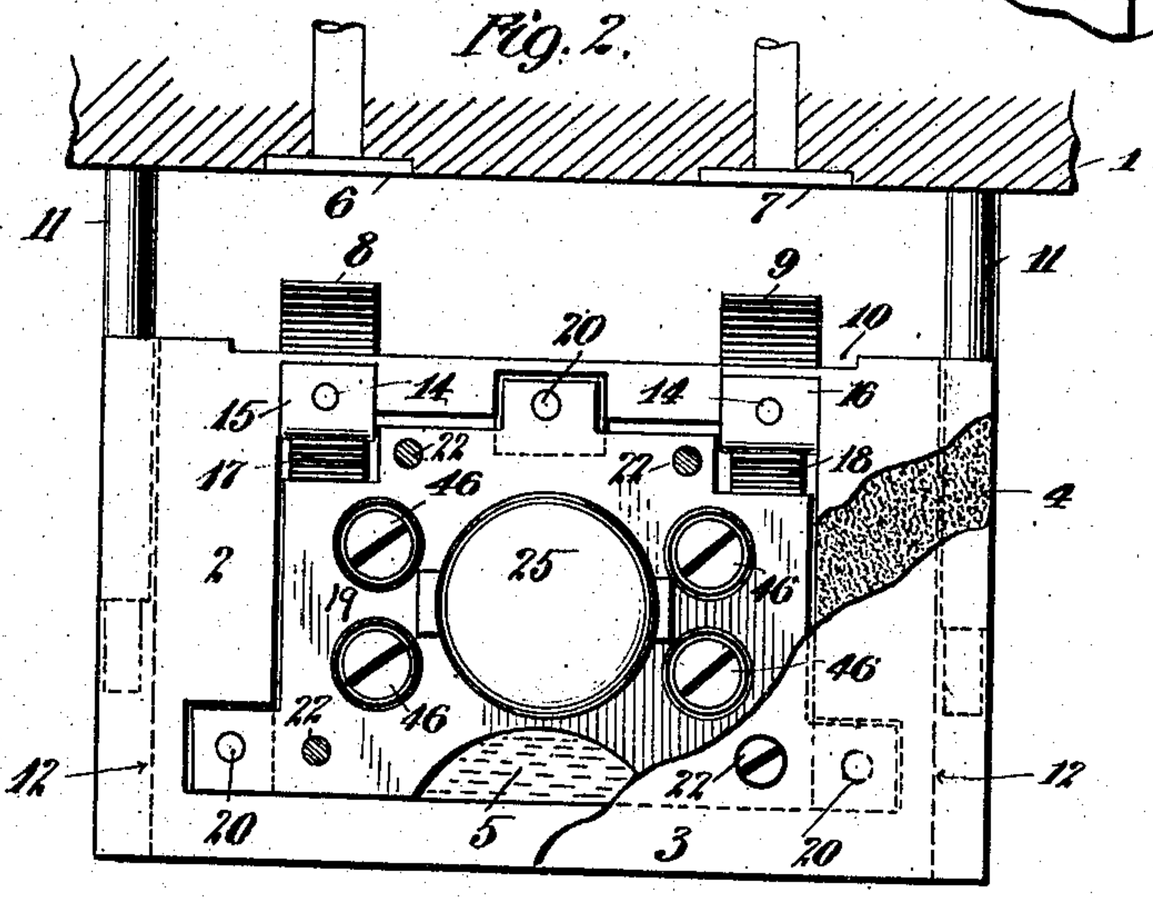
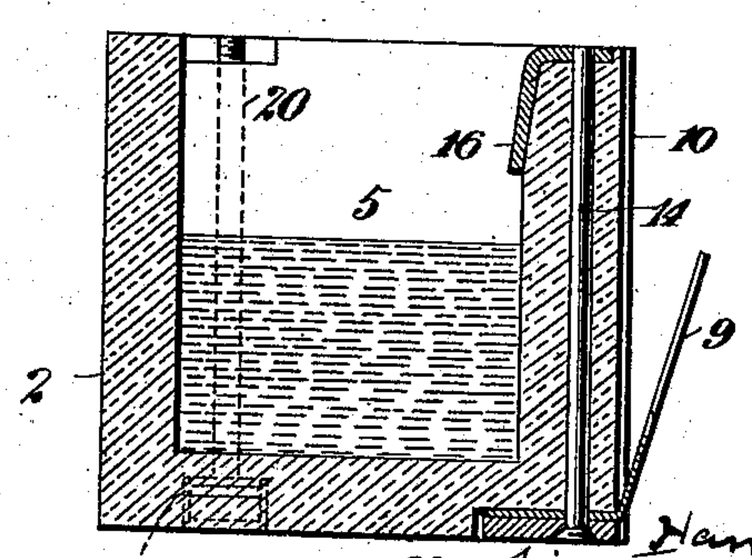


Fig. 3.



Witnesses
Frank A. Ober
George H. Strickland

Inventor
Harry H. Howard
By his Attorney
Charles A. Terry

H. H. HOWARD.

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2 SHEETS—SHEET 2.

Fig. 4.

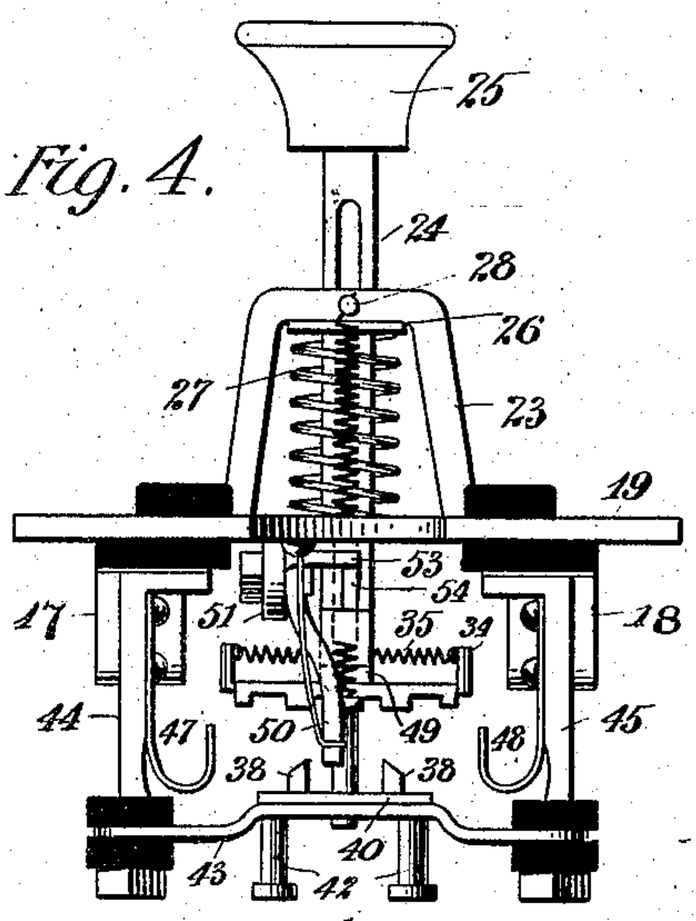


Fig. 5.

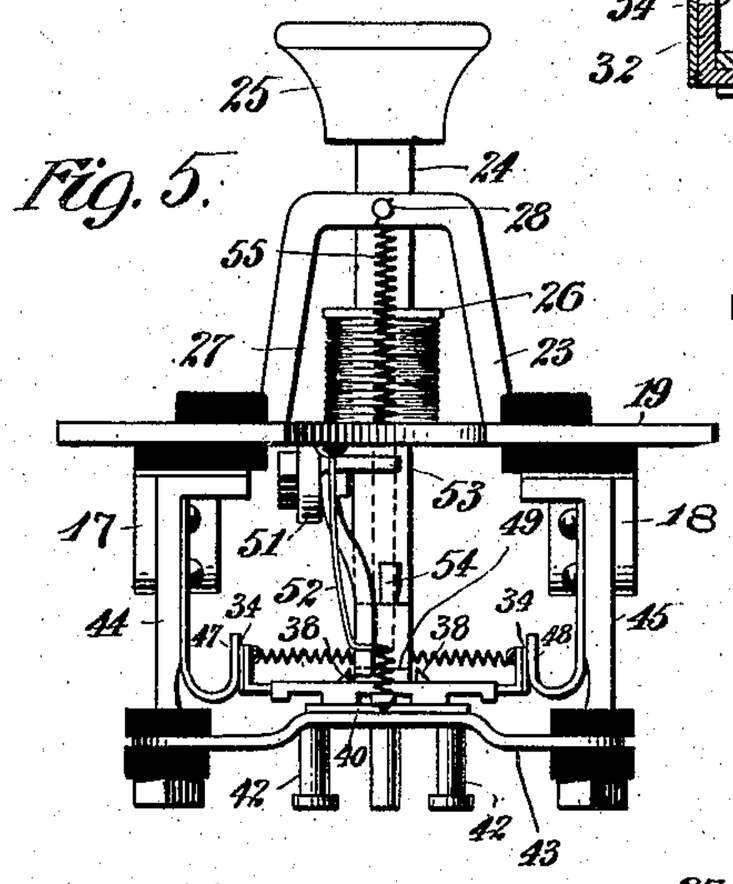


Fig. 8.

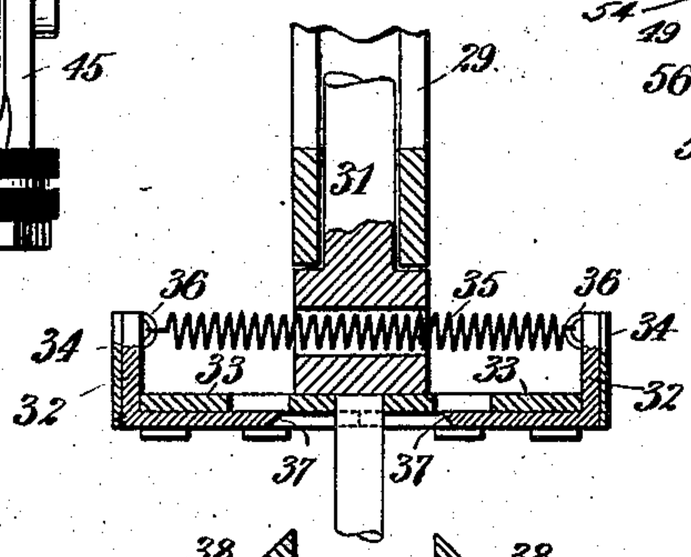


Fig. 9.

Fig. 6.

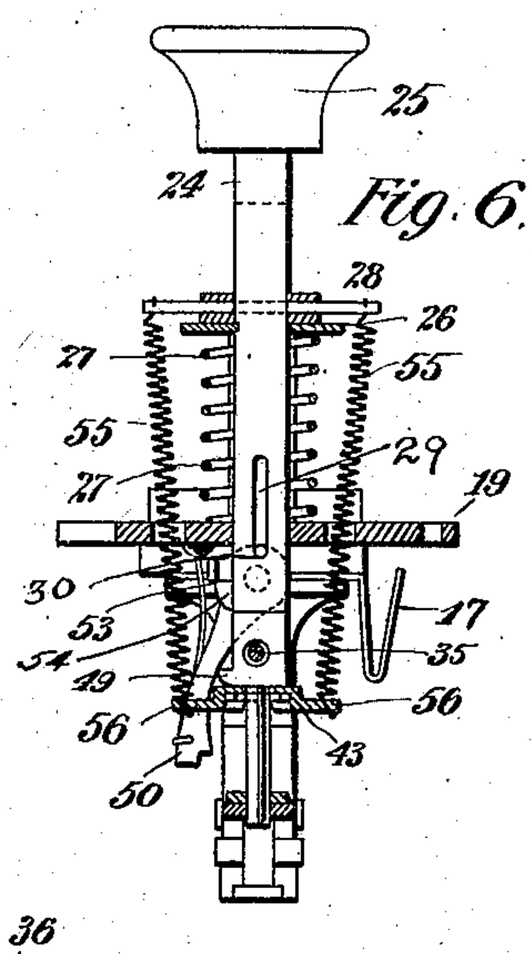


Fig. 7.

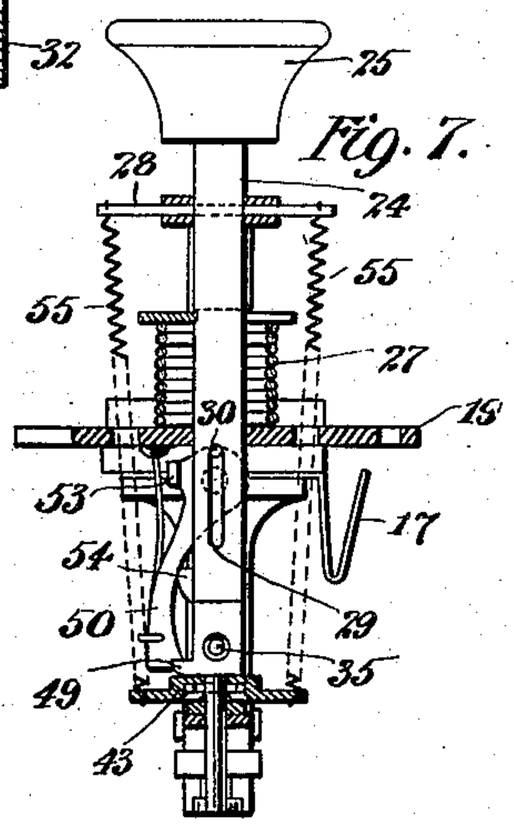
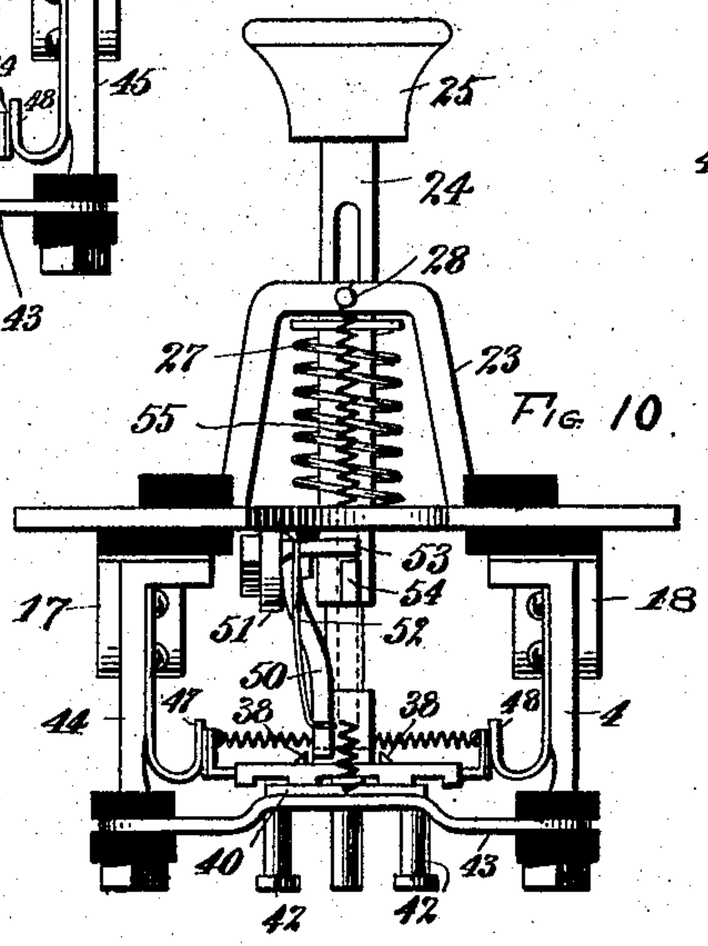


Fig. 10.



Witnesses

Frank S. Ober.

George W. Breckenridge

Inventor

Harry H. Howard

By his Attorney

Charles A. Terry

UNITED STATES PATENT OFFICE.

HARRY H. HOWARD, OF PLAINFIELD, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO COOPER HEWITT ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

QUICK-BREAK ELECTRIC SWITCH.

No. 900,736. Specification of Letters Patent. Patented Oct. 13, 1908.

Application filed October 24, 1902. Serial No. 128,531.

To all whom it may concern:

Be it known that I, HARRY H. HOWARD, a citizen of the United States, and a resident of Plainfield, in the county of Somerset and State of New Jersey, have invented certain new and useful Improvements in Quick-Break Electric Switches, of which the following is a specification.

The present invention relates to improvements in quick break oil switches adapted to cause the rupture of electric circuits by a quick movement.

One of the uses to which my switch is adapted is that of rupturing the starting circuit of gas or vapor electric lamps of the Cooper Hewitt type; but I do not wish to limit myself to the single use mentioned.

In the use referred to, and in other uses within the province of my invention, it is desirable that the circuit of the switch should remain open after the switch has done its work, and one of the principal features of my invention resides in providing means whereby it is impossible to leave the switch circuit closed after operation.

I am aware that the broad idea of providing such means, is not new; but the device which I have invented has many advantages over any switch for the same purpose with which I am familiar.

The advantages of my invention reside not only in making the rupture take place automatically under the operation of a spring and in the employment of wiping contacts which keep the surface clean, but also in providing means whereby the shock of the moving part or parts is received by one of the strongest portions of the mechanism; whereby the break takes place between sharp edges; whereby the fly-piece or quickly moving part of the switch is very light and small, offering little resistance to the force of the operating spring and displacing a comparatively small quantity of oil; whereby the main portion of the fly-piece is of steel, thus adding strength to the structure; whereby the stationary spring contacts are pressed upon along their entire width, thus providing for long wear or durability; whereby there is an appreciable time element in the making of the contacts, sufficient to permit the saturation of the coils of the magnet or reactance device which it acts upon when applied to the purposes of a Cooper Hewitt lamp; and whereby other features of advantage are secured in the structure and operation of the switch as such. Moreover, by special constructions applied to the inclosing box, holder, or container, I secure other advantages which are of no small importance. For example, I make the box with a cover and interpose between the cover and the box a packing of absorbent material such as cardboard saturated with a gum or cement, such as shellac, impervious to oil. The screws which join the cover and the box are provided with bushings of similar material to maintain the oil-tight character of the box; and the whole box is glazed on its surface.

I provide very simple means for attaching the box to a vertical or other support, and I generally make contact at the rear of the box by means of wing contact pieces which can be bent back into a cut-away portion of the box so as to take up no appreciable room in the body of the support.

My invention will be understood by reference to the accompanying drawings, in which

Figure 1 is a perspective of one of my switches secured to a vertical support; Fig. 2 is a horizontal section through a portion of the said support, showing the switch and its box mainly in full lines, and in the act of being placed upon its horizontal support; Fig. 3 is a transverse vertical section through a portion of my switch; Fig. 4 is an elevation of the main operating portions of the switch and its metallic frame, removed from the box; Fig. 5 is an elevation thereof showing the parts in the position which they occupy when the operating handle or lever of the switch is pushed downward; Figs. 6 and 7 are views corresponding to Figs. 4 and 5, except that they are taken at right angles to the positions illustrated in the said figures, and with the further exception that some of the parts in the Figs. 5 and 6 are shown in the section; Figs. 8 and 9 are detail views; and Fig. 10 is an elevation showing the position of the parts just before the fly-piece leaves the position of contact with the stationary contact pieces.

Referring more particularly to the drawings, 1 is a suitable support for my switch, in this instance a vertical support.

2 is a box, holder or container, preferably of porcelain, or similar substance, glazed on the outside.

The cover of the box is shown at 3, and between the cover and the box proper is a packing, 4, of a material that is impervious to oil. This material may be cardboard or other absorbent material saturated with glue or cement.

The box 2, as shown in Fig. 3, is filled with oil, 5, up to a point above the point of rupture between the movable and the stationary contacts of the switch. In this way, the rupture takes place under oil, and the danger of excessive or deleterious sparking is avoided.

In the front wall of the support 1 are mounted circuit terminals, 6 and 7, with which terminals 8 and 9 on the back of the switch box 2 are, respectively, adapted to coöperate. The contacts 8 and 9, as appears most clearly from Figs. 2 and 3, are flat spring or wing contacts, which are adapted to be folded back into a notched or cut-away portion, 10, of the box 2. Thus, the surface of the support 1 may be unbroken or uninterrupted, without preventing a good contact between the respective terminals, 6, 8, and 7, 9.

From the support 1 project horizontally rods or bolts, 11, 11, over which fit grooves or slots, 12, 12, in the box 2. By sliding the box along the rods or bolts 11, 11, as indicated in Fig. 2, and afterwards applying to the ends of the rods or bolts, the nuts, 13, 13, the box 2, with its contained parts, may be securely held in position against the wall of the support 1 under conditions which provide good electrical contact between the main switch terminals and the circuit terminals mounted in or on the support.

Each of the terminals, 8 and 9, is connected by a rod or bolt, 14, running up through the walls of the box 2, with a metallic contact piece, 15 or 16, as the case may be, at the upper inner edge of the rear wall of the box 2. The contact pieces 15 and 16, coöperate, in their turn, with spring contact pieces, 17 and 18, respectively. The last named contact pieces are supported upon, but insulated from, a metallic frame, 19, which forms a support for those portions of the switch which are not permanently connected with the box 2. The frame 19 is joined to the box by means of bolts, 20, 20, inserted from the bottom of the box and entering openings—that is to say screw-threaded openings—in the frame. The bolts 20, 20, are provided with bushings, 21, 21, to assist in making the box oil-tight. All the said bolts pass, however, up through the walls of the box, where they are comparatively little exposed to the danger of permitting leakage.

The box cover, 3, is secured to the frame 19, by screws, 22, 22, 22, 22.

Above the frame 19 projects a yoke, 23, having an opening at the top through which a slotted and squared shaft, 24, projects. The top of the shaft 24 is rounded and screw threaded to receive an insulating button, 25, through the medium of which the switch is operated.

The cover 3 sets over the shaft 24, and the button 25 is put on above the cover, with room enough between the button and cover to allow considerable play between them. On the shaft 24, below the top of the yoke 23 is a collar, 26, between which and the frame 19 is placed a rather strong spiral spring, 27, which surrounds the shaft 24, and resists the downward movement of the same. Through the head or top of the yoke 23, and through the slot in the shaft 24, runs a pin, 28, which limits the upward and downward movement of the shaft 24. In the shaft 24, is another slot, 29, transverse to the first named slot in direction, and traversed by a pin, 30, running through an inner shaft, 31, forming a longitudinally movable extension of the shaft 24. That is to say, the shaft 31 has a capacity for longitudinal movements independently of the shaft 24. Now, the shaft 31 supports a fly-piece, 32, the main portion, 33, of which is of steel, faced, however, with copper contact ends, 34, 34, secured to the steel pieces, 33, 33. The contact pieces with their steel supports are adapted to slide towards and away from each other, and they are normally held towards each other by a retractile spring, 35, attached to staples, 36, 36, on the respective movable terminals.

The inner ends of the movable parts are beveled, as shown at 37, 37, in Fig. 8, and these bevels are arranged in line with and directly above corresponding beveled rods or pieces, 38, 38. The latter are secured to or formed in one piece with a plate, 40, having an opening, 41, through which the shaft 31 passes, and mounted upon guide rods, 42, 42, which themselves pass through openings in a yoke or plate 43. The latter is supported upon, but insulated from, two posts, 44, and 45, the upper ends of which posts are connected, with interposed insulating material, to the frame 19. The means of connection are the insulated screws, 46, 46, 46, 46.

On the post 44 is supported a spring contact piece, 47, and on the post 45 a similar contact piece, 48, is mounted. These contact pieces constitute what I call the stationary spring contacts of my switch. The former is connected through the post 44, with the spring contact 17 already described, and the latter is connected through the post 45 with the spring contact 18. These connections are brought about by mounting the horizontal portion of the spring 17 at the top of the post 44 and the horizontal portion of the spring contact 18 at the top of the post 45.

Inasmuch as the spring contacts 17 and 18 are provided with connections which join them through the contact pieces 8 and 9, when the switch is in position, with the line contact pieces 6 and 7, it follows that the

stationary spring contacts 47 and 48 may be regarded as the contacts on which, in cooperation with the movable contacts, the action of the switch depends. Accordingly the action of the apparatus as a switch resides in bringing the contacts 34, 34, against the stationary spring contacts 47 and 48 and removing them therefrom by a quick movement.

Now, it is obvious that the shafts 24 and 31 can be moved downward by pressing on the button 25, the downward movement being a positive movement due to sufficient pressure. Such movement carries with it the depression of the fly-piece, 33, and brings the bevels on the movable or sliding parts, 32, 32, into contact with the bevels on the rods, 38, 38, thus causing the slides to move outward when they have nearly or quite reached their lowermost position, making firm but elastic contact with the stationary spring contacts 47 and 48.

At the top of the fly-piece is a catch, 49, with which a trigger, 50, is adapted to engage when the fly-piece has been pushed down into its lowermost position. The trigger 50 is pivoted to a lug, 51, secured to the frame 19, and a spring, 52, attached at one end to the said frame presses the trigger 50 towards the catch 49 so as to insure engagement when the fly-piece is far enough down.

At the upper end of the trigger is a trip, 53, adapted to be engaged by a lug, 54, on the shaft 24 so as to release the trigger from engagement with the catch 49 when the shaft 24 has reached a given point in its return movement after depression.

It only remains to mention the springs, 55, 55, which extend from opposite ends of the pin 28 to lugs, 56, 56, at opposite sides of the fly-piece. These springs serve to carry the fly-piece upward with a quick movement as soon as the trigger 50 is released from the catch or detent 49.

The action of the switch can now be readily explained: By pressing down on the button 25, the shafts 24 and 31 are depressed, the spring 27 is compressed, and the springs 55, 55 are put under tension by being lengthened. When the downward movement has continued to a certain point the sliding pieces in the fly-piece are pressed outward by the action of the bevels, as above described, and good electrical contact is made between the contact portions of the fly-piece and the stationary spring contacts 47 and 48. After such contact has been made, the trigger 50 is forced by the spring 52 into engagement with the catch or detent 49, thus preventing, temporarily, the return of the fly-piece, and the separation of the switch contacts. This condition exists even after the button has been released, although, when such release takes place, the reaction of the spring 27 immediately begins to lift the shaft 24, as will be readily understood. The shaft 31 does not immediately follow, but remains for a time in the position illustrated in Fig. 10. When, however, the lug 54 on the shaft 24 has been moved up far enough to engage with the trip 53, the trigger 50 is moved out of engagement with the catch 49, and the fly-piece is then drawn quickly upward under the influence of the springs 55, 55.

Even with a rapid operation of the switch in the manner described, the element of time comes in to a sufficient extent to cause a contact of appreciable duration between the switch terminals proper, as described above. On the other hand, even an ignorant manipulator of the switch would find it impossible to leave the switch circuit closed, as the rupture of the circuit is automatically inaugurated the moment the operator lets go.

The other described advantages are present in the switch by reason of a switch construction which is obvious from the drawings or which have been specifically pointed out in the description. The end contacts of the fly-piece are made practically as wide as the spring contact pieces 47 and 48, in contradistinction to certain structures wherein moving parts under somewhat similar conditions are made so much narrower than the coöperation circuit-terminals as to cause serious wear and ultimate fracture.

I claim as my invention:

1. In an electric switch, a pair of stationary switch terminals, a fly-piece having sliding terminals adapted to make contact therewith, a spring tending to hold the terminals of the fly-piece towards each other, the inner ends of the sliding terminal pieces being beveled, and beveled lugs arranged in the path of movement of the said terminal pieces, whereby, when the fly-piece is pushed inward, the sliding pieces are moved outward into firm electrical contact with the stationary switch terminals.

2. In an electric switch, a pair of stationary switch terminals, a fly-piece having sliding terminals adapted to make contact therewith, means for pressing the terminals of the fly-piece into contact with the said stationary terminals, and means brought into action after the removal of the power applied for pressing the terminals together, whereby the fly-piece is thrown into the power of a master spring adapted to break the contact.

3. In an electric switch, a pair of stationary switch terminals, a fly-piece having sliding terminals adapted to make contact therewith, a spring tending to hold the terminals of the fly-piece towards each other, the inner ends of the sliding terminal pieces being beveled, beveled lugs arranged in the path of movement of the said terminal pieces, whereby, when the fly-piece is pushed in-

ward, the sliding pieces are moved outward into firm electrical contact with the stationary switch terminals, and means for breaking contact between the terminals of the fly-piece and the stationary switch terminals when the power applied to the switch for making the described contact is removed.

Signed at New York, in the county of New York, and State of New York, this 22nd day of October, A. D. 1902.

HARRY H. HOWARD.

Witnesses:

WM. H. CAPEL,

GEORGE H. STOCKBRIDGE.