

F. SCHNEIDER & J. C. DUNFEE.

ELECTRIC SWITCH.

APPLICATION FILED DEC. 8, 1910.

Patented Aug. 8, 1911.

2 SHEETS—SHEET 1.

999,883.

Fig. 1

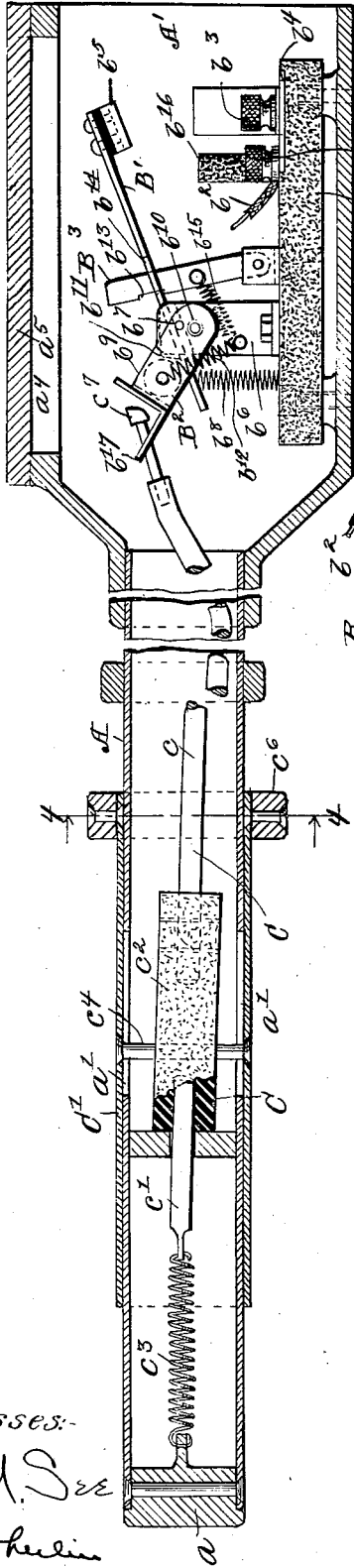


Fig. 2

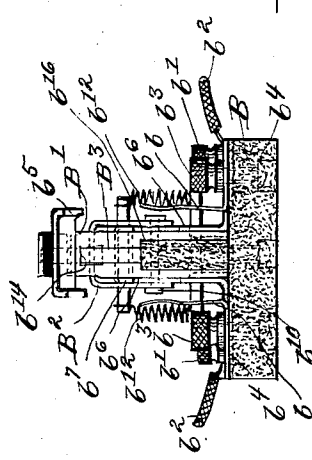


Fig. 3

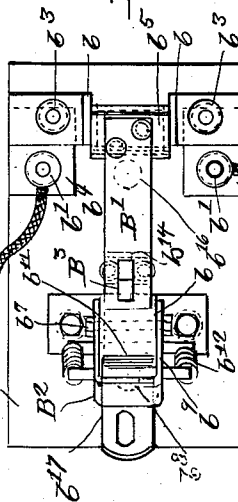
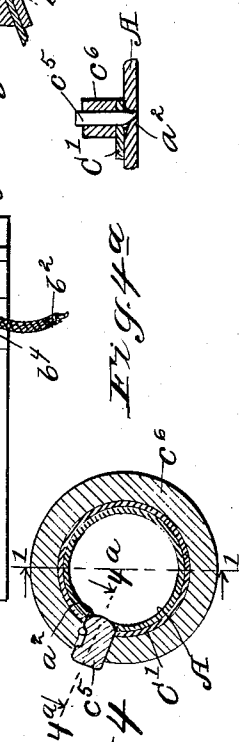


Fig. 4



Witnesses:  
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 Jno. F. Oberlin

Inventors:  
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2 SHEETS—SHEET 2.

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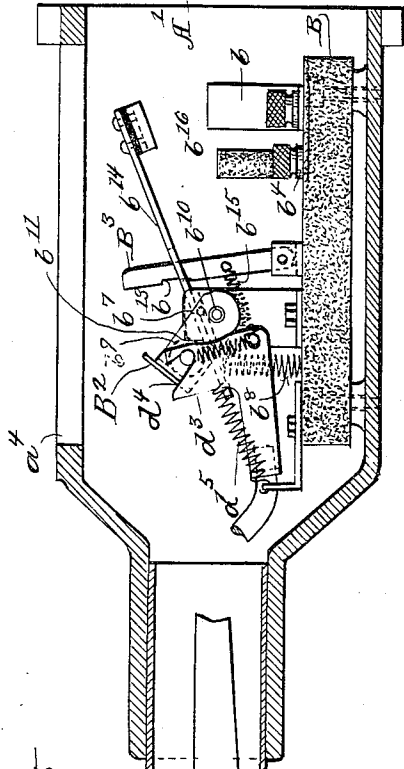


Fig. 5

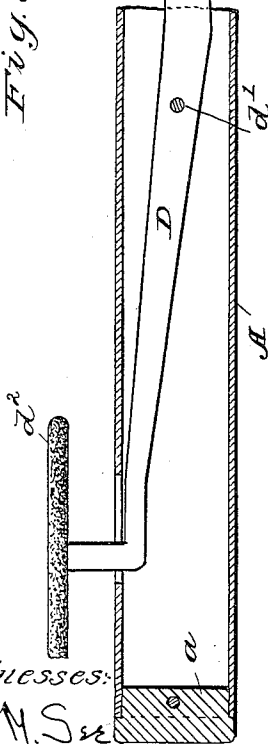


Fig. 6

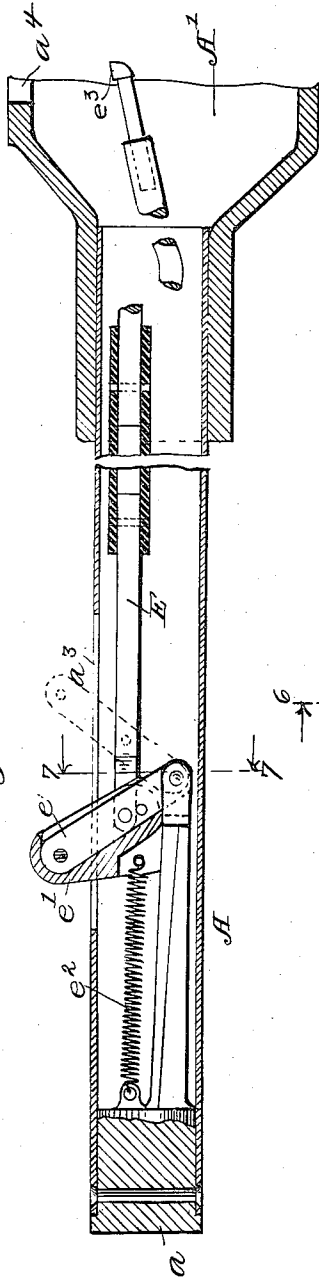
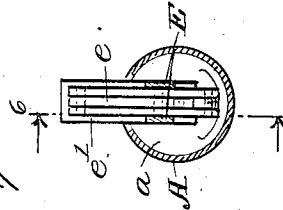


Fig. 7



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By J. B. Fay Attorney.

# UNITED STATES PATENT OFFICE.

FRANKLIN SCHNEIDER AND JOHN C. DUNFEE, OF CLEVELAND, OHIO, ASSIGNORS TO THE VAN DORN & DUTTON COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

## ELECTRIC SWITCH.

999,883.

Specification of Letters Patent.

Patented Aug. 8, 1911.

Application filed December 8, 1910. Serial No. 596,208.

To all whom it may concern:

Be it known that we, FRANKLIN SCHNEIDER and JOHN C. DUNFEE, citizens of the United States, and residents of Cleveland, county of Cuyahoga, and State of Ohio, have jointly invented a new and useful Improvement in Electric Switches, of which the following is a specification, the principle of the invention being herein explained and the best mode in which we have contemplated applying that principle, so as to distinguish it from other inventions.

In the case of electrically operated drills and like tools designed to be handled and controlled directly by the workman using the same, it is desirable that means be provided for absolute and instantaneous control of the electric circuit, while at the same time the convenience and safety of the operator in turning the current on and off must likewise be considered.

The object of the present invention is the provision of a switch and suitable controlling, or operating, mechanism therefor, for use in the connection noted, which shall accomplish the several results; and to this end the said invention 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 several of the various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—Figure 1 is a central longitudinal section of a handle member typical of those found in connection with electrically operated drills and like tools and showing within such member our improved construction of switch with one form of mechanism for actuating the same; Fig. 2 is an end elevational view of the switch; Fig. 3 is a plan view of the same; Fig. 4 is a transverse section through the handle member on the line 4—4, Fig. 1; Fig. 4<sup>a</sup> is sectional detail on the line 4<sup>a</sup>—4<sup>a</sup>, Fig. 4; Fig. 5 is a view similar to Fig. 1, but showing a different construction of switch and actuating mechanism therefor; Fig. 6 illustrates yet another construction of actuating mechanism, the switch being omitted; Fig. 7 is a sectional view of this last con-

struction showing a portion only of the same; and Fig. 8 is a broken sectional view of one member of the mechanism.

As has been indicated, and as shown in the foregoing drawings, it is designed to incase or house our present improved construction of switch directly within the handle member A of the drill, or rather within a hollow base A' that forms a continuation thereof, and is itself designed to be attached to the body or casing of such drill, or other similar tool. At the same time we incorporate in this handle structure suitable mechanism for operating the switch by the same hand that grasps the handle. The detailed construction of the switch itself may be first noticed, before proceeding to describe this latter mechanism, of which several variant forms are shown. Referring then particularly to Figs. 1, 2 and 3, it will be seen that the operative parts of the switch are supported on a base or foundation B of fiber or other insulating material attached to the inner face of the handle portion A'. Such parts include two spring clips, or contact pieces b, associated with which are suitable binding posts b' for attachment thereto of lead wires b<sup>2</sup>, so that by electrically joining the clips, the circuit will be closed. Clips b are secured to the base B by means of screws b<sup>3</sup>, that pass through the same plate b<sup>4</sup> against which wires b<sup>2</sup> are pressed by means of screws constituting binding posts b'. By this construction either or both of the clips may be removed and replaced without breaking the circuit connections. Closure of the circuit is effected by means of a contact piece b<sup>5</sup> that is carried at the outer end of a pivotal arm B', upon depression of which, such piece bridges the space between the two clips b. Contact piece b<sup>5</sup> is, of course, electrically insulated from the arm B' so that it simply closes the circuit between the clips and nothing more. Arm B' is thus pivoted between two uprights b<sup>6</sup> by means of a pivot pin b<sup>7</sup> passing through the latter and the rear portion of the arm. The arm, however, extends rearwardly beyond its pivotal axis to permit the introduction between the same and the base B of a compression spring b<sup>8</sup>, the tendency of which will obviously be to force the contact piece on its outer end downwardly, and thus close the circuit. This action however is con-

trolled and, in the inoperative condition of the device, entirely restrained by means of a roller  $b^9$  that is carried in an oscillatory U-shaped frame  $B^2$  pivotally attached to the same uprights  $b^9$  that carry the arm, but having its pivotal axis  $b^{10}$  below that of said arm. The latter, moreover, is provided on its upper face with a block  $b^{11}$  forming an off-set adjacent to its axis of oscillation, across which the roller  $b^9$  passes as the frame carrying the same is oscillated. Springs  $b^{12}$  tend to throw the frame  $B^2$  to one side or the other of a vertical plane passing through its axis and so to exert a pressure downwardly upon the arm  $B'$  in excess of that exerted by the compression spring  $b^8$  upwardly against the same when in the position illustrated in Fig. 1. The result, accordingly, is to "open" the switch. Upon the frame being thrown so as to carry the roller along the arm to the other side of its axis, the effect of the same springs is to "close" the switch.

During the initial stage of the roller's movement, its action to close the switch is resisted by means of a pivotal catch  $B^3$  that extends upwardly through a slot  $b^{14}$  in the arm  $B'$  and is drawn by means of a spring  $b^{15}$  to bring a notch  $b^{13}$  on its rear face into engagement with the arm whenever the latter is raised. It is only, accordingly after the roller has advanced far enough to knock such catch out of engagement, and thus release the lever, that the latter is free to respond to the tension springs  $b^{12}$  attached to the roller, and close. As the springs  $b^{12}$ , by this time, will be exerting their full tension effect, such closure will be correspondingly sudden and sharp, as is highly desirable in order to prevent arcing and the resulting burning out of the contact members. The opening of the switch will be similarly sudden, as it is only after the roller passes over the off-set provided by the block  $b^{11}$  on the upper face of the arm  $B'$  that the rear end of the latter is depressed so as to raise the contact piece out of engagement with the clips. Upon the opening of the switch by the raising of the lever arm, the catch or trigger  $B^3$  again springs forward into operative position. Undue downward movement of the arm, in the closed position of the switch, is prevented by means of a staff or post  $b^{16}$ , preferably of insulating material, that extends upwardly from the base intermediate between the clips  $b$  and the uprights  $b^9$  which support the arm.

While the foregoing construction of switch is susceptible of general application, any suitable means being provided for oscillating the frame, that carries the roller, or such oscillation being effected directly if desired, in which event a suitable handle might be added thereto, said switch is shown as more particularly adapted for operation

by an actuating device capable of being housed in the hollow handle A and so arranged as to be operated by the workman without releasing his hold on such handle.

In the form of actuating device illustrated in Fig. 1, a longitudinally reciprocable rod C is provided, such rod being made up of two sections  $c$  and  $c'$ , separated from each other by a block  $c^2$  of insulating material. The inner end of the one rod-section  $c$  engages a projecting plate  $b^{17}$ , forming part of the roller carrying frame, and has a lost-motion connection therewith. Normally the rod is positioned as shown in said figure, (whereby the switch is held open) by means of a tension spring  $c^3$ , attached to the outer end of section  $c'$  and to the cap  $a$  that closes handle A; but when desired, it may be reciprocated inwardly to close the switch by means of a sleeve  $C'$  slidably mounted upon the handle and connected with the block  $c^2$  by means of a pin  $c^4$  that passes through longitudinally extending slots  $a'$  in said handle. Inasmuch as it would be a matter of inconvenience to the operator to constantly maintain an inward pressure on this sleeve sufficient to overcome the spring  $c^3$ , which otherwise opens the switch, a plunger  $c^5$  is provided in a collar  $c^6$  that forms the inner terminus of the sleeve, which plunger is adapted to engage a slot or recess  $a^2$  in the handle and is adapted, upon very slight pressure thereon by the operator's thumb, to prevent the sleeve from returning to its normal position. The engaging faces of the slot in the handle and this plunger are so formed (see Fig. 4<sup>a</sup>) that immediately upon release of pressure on the plunger the sleeve will be retracted by the spring, such plunger sliding out of the slot.

In Fig. 5 we show an oscillatory, instead of a reciprocating, member for actuating the swinging frame that opens and closes the switch. Said member D is pivoted to the handle A at a point  $d'$  intermediate between its ends, and of such ends the outer one bears a pad  $d^2$  adapted to be pressed toward the handle when the latter is seized by the operator; while its inner end is provided with an inwardly projecting plate  $d^3$  having a cam-notch  $d^4$  formed in its upper edge so disposed as to engage the pivot pin of the roller  $b^9$  in the frame  $B^2$  and throw the latter in one direction, or the other, as the case may be. A tension spring  $d^5$  normally retains the member D in its illustrated position, corresponding with the inoperative position of the switch.

Finally in Fig. 6 is shown yet another variation in the reciprocatory arrangement of actuating member shown in Fig. 1. In the structure thus last referred to, an arrangement somewhat resembling a toggle is utilized to press inwardly a reciprocable rod E corresponding with former rod C, so as to

close the switch. Such toggle comprises simply a link *e* oscillatorily held in the handle A and connected with the reciprocable rod to force the same inwardly. Connected with such first link is a second link *e'* to which in turn is secured a spring *e<sup>2</sup>* that normally retains the parts in the position shown in the figure of reference. The latter link, however, projects without the handle, through a suitable slot *a<sup>3</sup>* therein, and may be moved inwardly by pressing against its outer face. The effect of this movement will be to swing link *e* over, where it is easily held by the operator, although free to swing back the moment it is released.

The side of the handle case A' opposite to the wall to which the switch base B is attached is cut out so as to provide an opening *a<sup>4</sup>* of such dimensions as to permit the entire switch to be inserted or removed there-through. As the operating parts of the switch are furthermore directed toward this opening they are obviously presented in readily accessible position by simply removing the cover-plate *a<sup>5</sup>* that normally closes the opening in question. In the case of the reciprocable actuating devices of Figs. 1 and 6, respectively, provision for the ready separation of the switch from such device, is found in the terminal headed engaging element *c<sup>7</sup>* or *e<sup>3</sup>*, as the case may be, which is threaded in the end of the corresponding rod C or E, so as to be readily removable when occasion demands it. In the type of actuating device shown in Fig. 5, the switch may clearly be removed without more ado upon simply loosening it from its fastening in the handle base.

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

We therefore particularly point out and distinctly claim as our invention:—

1. In a device of the character described, the combination of two spaced spring clips connected in the circuit to be controlled; an oscillatory arm; a contact piece carried thereby and adapted to fit between said clips to close such circuit; a pivoted member, a roller carried by said member and movable along said oscillatory arm across its axis of oscillation; and tension means pulling downwardly upon the free end of said pivoted member, whereby said arm may be actuated to open or close such circuit as desired.

2. In a device of the character described, the combination of two spaced spring clips connected in the circuit to be controlled; an oscillatory arm; a contact piece carried thereby and adapted to fit between said clips to close such circuit; a member pivotal about

an axis below that of said arm; a roller carried by said member and movable along said arm across its axis of oscillation; and a tension spring tending to throw said member to one side or the other of said arm's axis of oscillation.

3. In a device of the character described, the combination of two spaced spring clips connected in the circuit to be controlled; an oscillatory arm; a contact piece carried thereby and adapted to fit between said clips to close such circuit, said arm being formed with an offset on its upper face to one side of its axis of oscillation; a member pivotal about an axis below that of said arm; a roller carried by said member, said roller being movable along said arm and across such offset; and a tension spring tending to throw said member to one side or the other of said arm's axis of oscillation.

4. In a device of the character described, the combination of two spaced spring clips connected in the circuit to be controlled; an oscillatory arm; a contact piece carried thereby and adapted to fit between said clips to close such circuit; a spring connected with said arm and tending thus to close the circuit; a catch adapted to retain said arm against actuation by said spring; and means adapted to release said catch and aid said spring to actuate said arm.

5. In a device of the character described, the combination of two spaced spring clips connected in the circuit to be controlled; an oscillatory arm; a contact piece carried thereby and adapted to fit between said clips to close such circuit; a spring connected with said arm and tending thus to close the circuit; a catch adapted to retain said arm against actuation by said spring; and a resiliently held element movable along said oscillatory arm across its axis of oscillation, and adapted to release said catch.

6. In a device of the character described, the combination of two spaced spring clips connected in the circuit to be controlled; an oscillatory arm; a contact piece carried thereby and adapted to fit between said clips to close such circuit; a spring connected with said arm and tending thus to close the circuit; a catch adapted to retain said arm against actuation by said spring; a roller movable along said oscillatory arm across its axis of oscillation, and adapted to release said catch; and tension means pulling downwardly upon said roller.

7. In a device of the character described, the combination of two spaced spring clips connected in the circuit to be controlled; an oscillatory arm; a contact piece carried thereby and adapted to fit between said clips to close such circuit; a spring connected with said arm and tending thus to close the circuit; a catch adapted to retain said arm against actuation by said spring; a

member pivotal about an axis below that of said arm; a roller along said arm across its axis of oscillation, said roller being adapted to release said catch; and a tension spring  
5 tending to throw said member to one side or the other of said arm's axis of oscillation.

8. In a device of the character described, the combination of two spaced spring clips connected in the circuit to be controlled; an  
10 oscillatory arm; a contact piece carried thereby and adapted to fit between said clips to close such circuit; a spring connected with said arm and tending thus to close the circuit; a catch adapted to engage said arm  
15 on one side of its axis of oscillation to retain the same against actuation by said spring; an offset on the upper face of said arm to the opposite side of its axis from said catch; a roller movable along said arm  
20 and across said offset, said roller being also adapted to release said catch; and tension means pulling downwardly upon said roller.

9. In a device of the character described, the combination of two spaced spring clips  
25 connected in the circuit to be controlled; an oscillatory arm; a contact piece carried thereby and adapted to fit between said clips to close such circuit; a spring connected with said arm and tending thus to  
30 close the circuit; a catch adapted to engage said arm on one side of its axis of oscillation to retain the same against actuation by said spring; an offset on the upper face of said arm to the opposite side of its axis from  
35 said catch; a member pivotal about an axis below that of said arm; a roller carried by said member and movable along said arm across its axis of oscillation, said roller being adapted to release said catch; and a tension  
40 spring tending to throw said member to one side or the other of said arm's axis of oscillation.

10. In a device of the character described, the combination of two spaced contact mem-  
45 bers connected in the circuit to be controlled; an oscillatory member; a contact piece carried thereby and adapted to fit between said contact members to close such circuit; a pivoted member; resilient means pulling  
50 downwardly on the free end of the pivoted member; an element carried by said pivoted member and movable along said oscillatory member across its axis of oscillation; and means for swinging said pivoted member,  
55 whereby said oscillatory member may be actuated to open or close such circuit as desired.

11. In a device of the character described, the combination of two spaced contact mem-  
60 bers connected in the circuit to be controlled; an oscillatory member; a contact piece carried thereby and adapted to fit between said contact members to close such circuit; a pivoted member; resilient means pulling down-  
65 wardly on the free end of said pivoted mem-

ber; an element carried by said pivoted member and movable along said oscillatory member across its axis of oscillation; and a reciprocable member having a lost-motion connection with said pivoted member, whereby  
70 said oscillatory member may be actuated to open or close such circuit as desired.

12. In a device of the character described, the combination of two spaced contact mem-  
75 bers connected in the circuit to be controlled; an oscillatory member; a contact piece carried thereby and adapted to fit between said contact members to close such circuit; a resiliently held element movable  
80 along said oscillatory member across its axis of oscillation; a reciprocable member having a lost-motion connection with said element, whereby said oscillatory member may be actuated to open or close such circuit  
85 as desired; and means tending to retain said last-named member in position to open the circuit.

13. In a device of the character described, the combination of two spaced contact mem-  
90 bers connected in the circuit to be controlled; an oscillatory member; a contact piece carried thereby and adapted to fit between said contact members to close such circuit; a resiliently held element movable  
95 along said oscillatory member across its axis of oscillation; a reciprocable member having a lost-motion connection with said element, whereby said oscillatory member may be actuated to open or close such circuit as  
100 desired; and a spring tending to retain said reciprocable, and thereby said oscillatory, member, in position to open the circuit.

14. In a device of the character described, the combination of two spaced contact mem-  
105 bers connected in the circuit to be controlled; an oscillatory member; a contact piece carried thereby and adapted to fit between said contact members to close such circuit; a resiliently held element movable  
110 along said oscillatory member across its axis of oscillation; a reciprocable member composed of two sections, the one being insulated from the other and having a lost motion connection with said element, where-  
115 by said oscillatory member may be actuated to open or close such circuit as desired; and a spring connected with the other section of said reciprocable member and tending to retain the same, and thereby said oscillatory member, in position to open the  
120 circuit.

15. In a device of the character described, the combination of two spaced contact mem-  
125 bers connected in the circuit to be controlled; an oscillatory member; a contact piece carried thereby and adapted to fit between said contact members to close such circuit; a resiliently held element movable along said oscillatory member across its axis of oscil-  
130 lation; a reciprocable member composed of

two sections, the one being insulated from the other and having a lost motion connection with said element, whereby said oscillatory member may be actuated to open or close such circuit as desired; a handle for reciprocating the member just named but insulated from the section thus connected with said oscillatory member; and a spring connected with the other section of said reciprocable member and tending to retain the same, and thereby said oscillatory member, in position to open the circuit.

16. In a device of the character described, the combination of two spaced contact members connected in the circuit to be controlled; an oscillatory member; a contact piece carried thereby and adapted to fit between said contact members to close such circuit; a resiliently held element movable along said oscillatory member across its axis of oscillation; a reciprocable member composed of two sections, the one being insulated from the other and having a lost motion connection with said element, whereby said oscillatory member may be actuated to open or close such circuit as desired; a handle for reciprocating the member just named but insulated from the section thus connected with said oscillatory member; a spring connected with the other section of said reciprocable member and tending to retain the same, and thereby said oscillatory member, in position to open the circuit; and pressure operable means for re-

taining said handle with such parts in position to close the circuit.

17. In a device of the character described, the combination of two spaced contact members connected in the circuit to be controlled; an oscillatory member; a contact piece carried thereby and adapted to fit between said contact members to close such circuit; a resiliently held element movable along said oscillatory member across its axis of oscillation; a reciprocable member composed of two sections, the one being insulated from the other and having a lost motion connection with said element, whereby said oscillatory member may be actuated to open or close such circuit as desired; a handle for reciprocating the member just named but insulated from the section thus connected with said oscillatory member; a spring connected with the other section of said reciprocable member and tending to retain the same, and thereby said oscillatory member, in position to open the circuit; and a pressure operable thumb piece adapted to retain said handle with such parts in position to close the circuit.

Signed by us this 28th day of November, 1910.

FRANKLIN SCHNEIDER.  
JOHN C. DUNFEE.

Attested by—  
ANNA H. GILL,  
JNO. F. OBERLIN.