

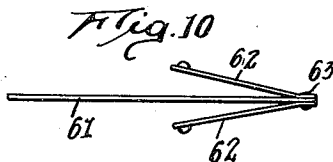
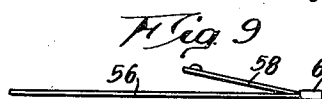
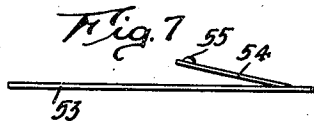
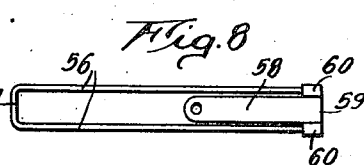
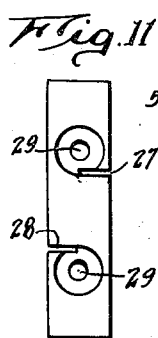
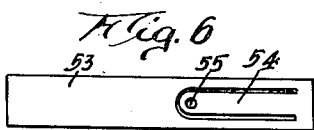
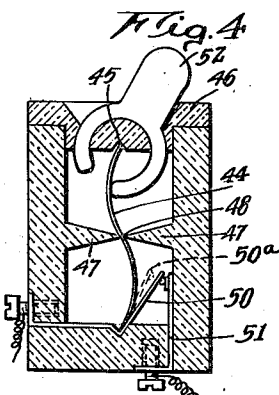
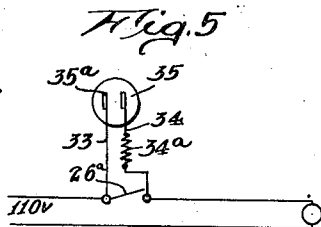
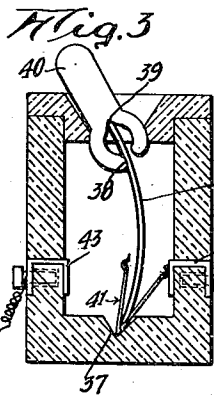
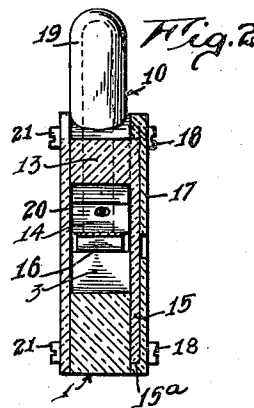
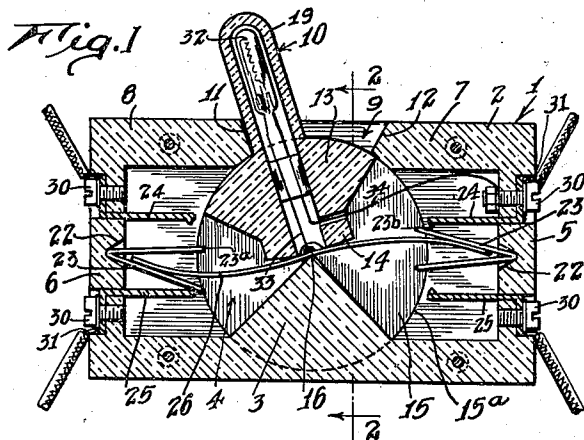
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ELECTRIC SWITCH

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ELECTRIC SWITCH

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7 Claims. (Cl. 200—67)

This invention relates to electric switches, and one object of the invention is to produce a switch of simple construction, having few parts, and in which the use of metal parts is avoided except as employed in the contacts of the switch that are involved in closing the circuit through the same.

As is well known, when an electric circuit is suddenly opened, if the potential in the line is sufficiently high, a spark will be drawn at the point where the circuit is opened. Such a spark is destructive to the material employed at the contacts. One of the objects of this invention is to produce an electric switch that is so constructed, and which has a mode of operation which will reduce sparking to a minimum.

It is a fact also, that if two contacts in an electric circuit are suddenly separated, the sparking effect will be reduced if the pressure between the contact points is relatively high, and the separating movement is sudden; in other words, if the switch has a "snap action." One of the objects of this invention is to produce an electric switch meeting this requirement, and having a mode of operation in which the separation of the contact points is so sudden that the length of time at which a spark could be maintained if one is formed, would be relatively short. This, of course, is a factor in reducing the destructive action of a spark.

Another object of the invention is to produce a switch of this type, of simple construction, in which a glowing lamp not employing a regular lamp filament, can be employed to indicate the position of the switch operating to reduce the glow when the switch is in its open position, but which is shorted out of the circuit by closing of the switch.

One of the characteristics of this switch is the use of a leaf spring that is controlled by the lever of the switch so as to develop a snap action that controls the engagements between, and the separating movements of, the switch points to control the circuit; and one of the objects of my invention is to provide improved means for supporting this snap action member in the switch housing, which will operate to give an effective contact area when the switch points are in engagement with ample pressure between the same, at the same time, which will operate to give quick separation of the contact points when the circuit is opened through them.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combination of parts to be described hereinafter,

all of which contribute to produce an efficient electric switch.

A preferred embodiment of the invention is described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

In the drawing:

Fig. 1 is a longitudinal section through a switch, capable of controlling two circuits, and embodying my invention.

Fig. 2 is a vertical section taken about on the line 2—2 of Fig. 1.

Fig. 3 is a view similar to Fig. 1, but illustrating a single type of switch for controlling a single circuit, but embodying the quick snap-over characteristics of my invention.

Fig. 4 is a view similar to Fig. 3, but illustrating a type of switch in which the resilient snap-over member is of the same type as shown in Fig. 1, but in which its manner of controlling the movable contact of the switch, differs from that illustrated in Figs. 1 and 3.

Fig. 5 is a diagrammatic view illustrating the circuit through the glow lamp in the switch lever, and indicating the manner in which it is shorted out of the circuit by closing the switch of the circuit.

Figs. 6 and 7 are respectively, a plan view and an edge elevation, illustrating a type of combined snap-over spring and contact in which the contact is struck from the material of the leaf spring.

Figs. 8 and 9 are views similar to Figs. 6 and 7, but illustrating another detail of construction in which the snap-over member is in the form of a resilient wire, and the contact member is formed with a base that is connected to the ends of the wire.

Fig. 10 is a side elevation, and illustrating a construction in which two movable contacts are located on opposite sides of the snap spring, and connected to the ends of the same by the same rivet or rivets.

Fig. 11 is an end elevation of a block that constitutes a body of the housing.

In practicing the invention, I provide an insulating switch housing having a switch chamber therein with one or more fixed contacts mounted in the wall of the housing; I also provide a movable contact within the chamber, and an operating lever of insulating material, which is movably supported within the housing. On the interior of the housing the construction presents a pair of oppositely disposed sockets preferably in the form of V-shape notches. The ends of the snap-over member or spring, are received in, or

adjacent to, these notches, but the spring is too long to fit into the space between the notches without becoming flexed. The movement of the lever moves the spring to snap it over from one extreme position to another. In one of these positions the switch will be open, and in the other position, closed. The spring may be operated as a simple flexing bow that can be snapped over between two extreme bowed positions, but in other embodiments of the invention, the spring has the form of a rudimentary S, that is to say, one end portion of the spring is bowed or flexed in one direction, while the other end portion of the spring is bowed or flexed in the other direction. This adapts the switch for controlling two circuits.

Referring now particularly to Figs. 1 and 2, the switch includes a housing 1, which is preferably formed of an insulated material such as plastic or other suitable insulation, and includes a body portion or block 2 having a bottom wall from which an integral abutment 3 extends upwardly at an intermediate point on the length of the switch chamber 4 that is formed within the housing. This block 2 has end walls 5 and 6 integral with the bottom wall, and also integral with upper wall sections 7 and 8 that extend toward each other, but with a space 9 between them, in which the handle of the switch lever 10 is received, and in which it swings to and fro between the limiting inclined faces 11 and 12. The body of the switch lever 10 is also in the form of a block 13 of dovetail form having a substantially rectangular boss or head 14 at its inner end, and on one of its side faces the block 13 has an integral circular disc 15, the axis of which operates as a pivot on which the lever swings, and this axis substantially coincides with the vertex 16 of the abutment 3, which tapers up to this point as indicated in Fig. 1.

In order to enable the rotation to be effected on this axis, the disc 15 is countersunk in a circular socket 15^a formed in the inner face of a side plate 17 that is attached by a plurality of screws 18 to the side of the block 2. The switch lever 10 is formed with an operating handle 19 of tubular form, which extends out radially from the axis of the disc 15. On the side opposite to the side plate 17, a similar side plate 20 is provided, but this side plate is simply secured against the side of the block by a plurality of screws 21 similar to the screws 18.

The inner faces of the end walls 5 and 6 are provided with sockets 22 in the form of horizontally extending notches, and in these notches, I provide rocking contact members 23 which are preferably in the form of plates of conductive material such as metal, bent into the form of a V, so that these contacts present two limbs 23a and 23b. The limb 23a cooperates with an upper fixed contact 24, and the lower one cooperates with a lower fixed contact 25 mounted in the end walls 5 and 6, in a manner that will be described hereinafter. Between the notches 22, and with its ends received in the V-shaped space between the limbs 23a and 23b, of each rocking contact, I provide a contact actuator 26 which, in the present instance, operates as a conductor for carrying current in a general diagonal direction through the housing, that is to say, in the position in which the switch is shown in Fig. 1, this member 26 which is the snap member of the switch, connects the lower left-hand fixed contact 25, to the upper right-hand fixed contact 24.

This snap member 26 is too long to fit into

this space between the outer ends of the rocking contacts 23, so that this snap member will be in a state of compression, and will be flexed so as to assume a rudimentary S form, as illustrated in Fig. 1, with the middle portion of this member resting on the back of the abutment 3, with one end portion of this member flexed or bowed upwardly, and the other end portion bowed downwardly. Of course, the end portion that is bowed downwardly, will maintain the lower limbs of the rocking contacts 23, in engagement with the lower first contacts 25, and vice versa.

With the organization described above, it is evident that if the handle 19 is pulled over to the right from the position in which it is shown in Fig. 1, the right-hand portion of the boss or inner head 14 of the lever 10, will bear down on the right end portion of the snap member 26, and when sufficient pressure is exerted, it will cause this portion to bow downwardly and simultaneously cause the end portion of this snap member on the other side of the axis at 16, to bow upwardly.

The fixed contacts 24 and 25 are preferably small pieces of metal bent to angular form, so that the body portion of each contact can be slid into a corresponding notch 27 or 28, which are illustrated in Fig. 11, and which are cut into the end walls 5 or 6 from opposite sides. Adjacent to each notch, a threaded opening 29 is provided, to receive a small screw 30 which can be clamped down on the end of a wire 31 that connects up to the contact.

If desired, a glow lamp or fluorescent lamp 32 may be provided within the tubular socket that is formed in the handle 19. This bore or socket extends all the way in to the inner end of the lever 10 so as to permit the glow lamp 32 to be inserted at that point, and pushed outwardly to a point near the end of the handle.

Two leading in wires 33 and 34 are provided, leading in to the terminals 35a within the gas chamber 35 of this bulb, one of these wires being connected to the snap member 26, and the other leading over to one of the contacts, for example, the contact 24, through a low resistance 34a. The existing wiring circuit to this glow lamp, is illustrated in Fig. 5, and in that view 26a indicates diagrammatically, the switch for carrying the current. When this switch is open as indicated in Fig. 5, the lamp will glow, but when the switch 26a is closed, the lamp is short-circuited and will not glow. Of course, as this switch has only two positions, the glowing of the lamp, or its failure to glow, will be a signal to indicate in the dark, what the condition of this switch is.

In the embodiment of the invention illustrated in Fig. 3, I employ a "bow type" snap member 36 which, if unrestrained, would be a straight spring. In this embodiment of the invention, the inner end of this snap member 36, thrusts into a V-shaped notch 37 in the bottom wall of the switch housing, and its upper end extends through a narrow throat 38 into a notch 39 formed at the pivot head of a lever or handle 40. When the switch is in the position illustrated, the snap member 36 will hold the rocking contact 41 up against the right-hand fixed terminal 42, but if the lever 40 is swung toward the right, the snap member 36 will be bowed in the opposite direction, and hold the rocking switch member 41 up against the other fixed contact 43 on the opposite wall of the housing.

The switch illustrated in Fig. 4, is a single switch

like the one illustrated in Fig. 3, but instead of using a bow-shaped snap member, I prefer to use a snap member 44 which assumes a rudimentary S form that is characteristic of Fig. 1. In this case, however, the upper notch 45 is formed in the cover 46 of the housing, and the two side walls of the housing are formed with tapering abutments 47 between the tips of which a narrow throat 48 is formed, which operates as the "node" for this snap member 44. In this embodiment of the invention I may not employ a rocking contact such as the contact 41 illustrated in Fig. 3, but I may provide a spring contact 50 that may be constrained by the bowed lower portion of the snap member 44, so as to hold it over against a fixed contact 51; but this contact 50 would naturally tend to bend itself by its own resiliency, away from the contact 51, so as to assume the position in which it is indicated in dotted lines in 50a. The operating lever 52 in this switch, would be constructed of the same general form as the switch lever 40 of Fig. 3.

In Figs. 6 and 7 I illustrate a construction for a snap member 53, in which the contact member 54 is formed as an integral tongue struck out from the body of the snap member and bent out of the plane of the snap member, as indicated in Fig. 7. The end of this contact tongue 54 may be punched out to form a contact point 55.

The construction shown in Figs. 8 and 9, is substantially the same as that shown in Figs. 6 and 7, except that instead of forming the snap member of a plate, it may be of bifurcated wire form, presenting two forks 56 connected together integrally at one end by a cross bar 57; and in this construction the contact member 58 is in the form of a tongue formed as an integral extension from a base 59 formed of plate metal integral with the tongue 58, and bent around to form two sockets or sleeves 60 in which the ends of the forks 56 are secured.

In the construction illustrated in Fig. 10, the snap member 61 is mounted between two contact members 62, to which it is riveted by common rivets such as the rivet 63, the two contact members 62 diverging from each other toward the middle portion of the snap member, so that the effective form of this construction is the equivalent of the V-form rocker contact 41 illustrated in Fig. 3. The action of this snap member and combined contacts when placed in a switch such as the switch shown in Fig. 3, would have substantially the same action as the snap member 36 illustrated in that figure.

Many other embodiments of the invention may be resorted to without departing from the spirit of the invention.

What I claim is:

1. In an electric switch, the combination of an insulating switch-housing having a switch-chamber therein, and having an abutment located at substantially the middle portion of said chamber, an insulating switch-lever mounted to rock on said housing, the end walls of said housing presenting a pair of oppositely disposed sockets, an actuator including a spring with its ends received in said sockets and maintained in a state of compression, said actuator capable of assuming two extreme positions in which the portion of the actuator on one side of said abutment is flexed in one direction, and the portion of the actuator on the other side of said abutment is flexed in the opposite direction, said lever having means for engaging said actuator to move the same alternately into its extreme positions; and con-

tacts mounted in said housing and controlled by said actuator to open or close an electric circuit through said contacts.

2. In an electric switch, the combination of an insulating switch-housing having a switch-chamber therein, the end walls of said housing having sockets therein, a contact actuator including a leaf spring having its ends engaged in said sockets and maintained thereby in a state of compression, said housing having an abutment projecting into said chamber at an intermediate point along the length thereof for engaging one side of the actuator, and a switch-lever mounted to rock within said housing, having means for engaging the actuator adjacent said abutment, said actuator being capable of assuming two extreme positions in which the portion of the actuator on one side of said abutment is flexed in one direction, while the portion of the actuator on the other side of said abutment is flexed in the opposite direction; and movable contacts controlled by the ends of said actuator for closing a circuit through the same.

3. In an electric switch, the combination of an insulating switch-housing having a switch-chamber therein, a switch-lever rotatably mounted in said housing at an intermediate point on the length thereof, and having a handle projecting outwardly from said housing, said housing having an abutment projecting into the switch-chamber from its wall on the side thereof remote from said handle, said housing having sockets in the form of notches formed in insulating material adjacent the ends of said chamber substantially in line with each other, and in line with the end of said abutment, fixed contacts supported on said housing adjacent the ends of said chamber, a movable contact of substantially V form received in each notch and capable of rocking on each notch as a pivotal axis, so as to move to and fro across the medial plane in said chamber, passing through said notches, a flexible resilient leaf extending longitudinally within said chamber, with its ends received in the angle of the V of said movable contacts, and maintained by the pressure on its ends in a curved condition of rudimentary S form, with the material of said leaf on one side of the axis of said lever flexed in an opposite direction from the material of said leaf on the other side of the axis of rotation of the lever, said lever having means for exerting lateral pressure on said leaf to reverse the condition of the leaf and snap the said leaf so that the end portions thereof will move over to the opposite side of said medial plane; and relatively fixed contacts carried on the housing, cooperating with said movable contacts.

4. A switch construction, comprising: a housing structure defining opposed notches in its end walls and an abutment having a fulcrum apex located between said notches, a switch lever tiltably mounted in said housing about said fulcrum apex; a leaf spring compressed between said notches and extending between said lever and abutment, said lever and abutment adapted to cause said leaf spring to assume an S configuration, and said lever in tilting adapted to reverse the curvature of said S and contact means adapted to be opened and closed by movement of said leaf spring.

5. A switch construction, comprising: a leaf spring; means engaging the ends to axially compress said spring, and means engageable with the central portion of said spring to cause said spring to assume a reversible S configuration; a switch-

lever for reversing the S configuration of said leaf spring; and contact means actuated by said leaf spring.

6. A switch construction, comprising: a housing structure defining opposed notches in its end walls and an abutment having a fulcrum apex located between said notches, a switch-lever tiltably mounted in said housing about said fulcrum apex; a leaf spring compressed between said notches and extending between said lever and abutment, said lever and abutment adapted to cause said leaf spring to assume an S configuration, and said lever in tilting adapted to reverse the curvature of said S; a V-shaped contact clip interposed in at least one of said notches around

the corresponding end of said leaf spring and forming legs diverging along opposite sides thereof; and at least one contact bracket positioned for engagement by a leg of said clip.

7. A switch construction, comprising: a leaf spring; means engaging the ends to axially compress said spring, and means engageable with the central portion of said spring to cause said spring to assume a reversible S configuration; a switch-lever for reversing the S configuration of said leaf spring; a V-shaped contact clip embracing at least one end of said leaf spring and caused to rock by movement of said spring; and a contact element engageable by said contact clip.

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