This invention relates to improvements in electric snap switches of the toggle type.

The primary object of the invention is to provide a relatively small switch of the aforementioned character having a relatively high current carrying and arc rupturing capacity.

Another object is to provide novel means for electrically separating or insulating the contact elements of the switch from the actuating mechanism.

Another object is to reduce the cost of construction and assembly of the parts of a switch of the aforementioned character.

Another object is to minimize the number of fastening elements required to retain the switch parts in assembled relation.

Another object is to generally improve the details of construction and the operation of switches of the aforementioned character.

Another and more specific object is to provide a base having a novel form of arcing chamber for the contact elements of the switch.

Other objects and advantages of the invention will hereinafter appear.

The accompanying drawing illustrates certain embodiments of the invention which will now be described, it being understood that the invention is susceptible of embodiment in other forms without departing from the scope of the appended claims.

In the drawing, Figure 1 is a vertical sectional view, on an enlarged scale, of a switch constructed in accordance with my invention, certain of the switch parts being shown in elevation.

Fig. 2 is a vertical sectional view on the broken line 2—2 of Fig. 1.

Fig. 3 is a view, partly in side elevation and partly in vertical section, showing a switch of the character illustrated in Figs. 1 and 2, but having a one-hole mounting means and a modified form of actuating lever to be supported thereby.

Fig. 4 is a view, in separated relation, of the parts of the switch shown in Figs. 1 and 2, the plate and the attaching screws thereof being omitted.

Fig. 5 is a top plan view of the switch shown in Figs. 1 and 2, a portion of the top plate being broken away.

Fig. 6 is a side elevational view of the metal switch frame and the parts carried thereby, and Fig. 7 is a perspective view of a separate insulating block formed of relatively soft rubber.

Referring first to Figs. 1, 2 and 4 to 6, the numerals 10 and 11 designate the two parts of the molded insulating base of the switch, said base as shown being divided in the plane of its greatest dimensions. The adjacent faces of said base parts are complementally recessed at 10a, 11a to provide an upper chamber to accommodate the switch actuating mechanism and at 10b, 11b to provide a lower chamber to accommodate the stationary and movable contact elements of the switch, said base parts being also formed as indicated at 10c, 11c to provide a slot affording restricted communication between the aforementioned chambers, for a purpose hereinafter described.

The switch actuating mechanism is supported by a frame 12 which comprises a sheet metal member bent to substantially U-shape in horizontal cross section. The arms 12a, 12b of said frame are provided intermediate the length thereof with integral downward extensions 12c, 12d, and said arms are provided with openings 12e, 12f of keyhole shape. The enlarged upper 20 ends of said openings are adapted to provide bearings for the opposite ends of a pivot pin 13, as best illustrated in Fig. 2. Pin 13 is freely insertable through an opening 14 provided in the insulating actuating lever 14 of the switch and through the opening (Fig. 1) provided in the metal member 15 embedded or molded in said lever. Member 15 is provided with a curved or rounded lower end 15a to provide an abutment for cooperative engagement with the cupped metal member 16 carried by the upper end of a coiled compression spring 17.

The yoke or U-shaped member 18 is preferably formed from a suitable length of spring wire, and the outwardly bent ends 18a, 18b thereof 35 are adapted to be hooked into bearing engagement with the reduced lower ends of said openings 12a, 12c, this operation requiring a slight degree of inward bending of the arms of yoke 18, as will be obvious. Prior to attachment of yoke 18 to the switch frame 1 attach to the yoke 18 a flat punched plate 19 of insulating material, said plate having an opening 19a to provide for pivotal support thereof by the connecting portion 18b of the yoke. The upper end 19c of plate 19 is formed to provide an abutment for the lower end of spring 17. The lower portion of said plate 19 is preferably of substantially elliptical contour, and said portion is provided with an opening 19b at the end thereof which is remote from the stationary contacts in the off position of the switch (see Fig. 1). The shank of a headed rivet 20 is passed through the opening 19b, and said shank is upset as shown at 20a in Fig. 2.
to provide a contact surface corresponding in shape to the rivet head aforesaid.

The walls of the complementary recesses 10a, 11a are so shaped as to provide for a snug interlocking of the shanks of the screws with the recesses 10, 11, thereby to provide for clearance of the oscillatory movement of plate 10, and to provide against any looseness of the combined contact and wiring terminal members. Also as will be apparent from consideration of Fig. 1, the insulating plate 19 is adapted in one extreme position thereof to abut the angular face 25a of said block, if formed of relatively soft rubber, will act as a cushion for plate 19 to reduce the wear and decrease the degree of sound produced by operation of the latter. Plate 19 upon movement thereof to its opposite extreme position is adapted to abut or engage the left-hand end walls (Fig. 1) of the complementary recesses 10b, 11b.

The outer ends of terminal portions 23 and 24 are provided with tapped openings 23c, 24c, respectively, to accommodate the usual terminal screws 23d and 24d—where said screws are longest—while a smear of said terminal portions 23 and 24 are preferably bent upwardly in an angle, in the usual manner, to provide wire guards above mentioned.

The base parts 10 and 11 are provided with pairs of aligned openings 10e, 11e, 11f, through which extend a pair of relatively soft rubber is employed the thickness thereof may be made slightly greater than the normal distance between the terminal portions 23 and 24, whereby upon assembly of base parts 10 and 11, the contacting end faces 23c and 24c are in direct contact and the base parts are a pair of nuts 28 and 29, preferably square.—said base parts being complementarily recessed, as indicated at 10b, 10c, to receive and retain said nuts. Said base parts are additionally recessed to accommodate the threaded shanks of bolts 30 and 31 which extend downwardly through suitable spaced openings 32a, 32b in a metal top plate or supporting plate 32.

Top plate 32 is provided with a rectangular opening 32c to fit a rather close fit on the complementary flanges or upward extensions 10f, 11f which define the lever opening 10g, 11g in the base parts 10 and 11. Top plate 32 is provided at opposite ends thereof with openings 32d, 32e to accommodate the countersunk heads of a pair of screws or bolts (not shown) for flush mounting of the switch as a unit with respect to a suitable support. Lever 14 may be provided as shown with legends indicating the “on” and “off” positions of the switch.

The switch shown in Fig. 3 is substantially like that aforementioned, except that I have shown a top plate 33 whose dimensions are preferably the same as the dimensions of the top face of the two-part base 10, 11. Plate 33 is provided with a slightly raised or bulged central portion having a circular opening 33a to accommodate the reduced lower end 34a of an externally threaded hollow metal bushing 34, said reduced lower end 34a being upset over the lower face of said bushing portion to form complemental parts in assembled relation. Bushing 34 is preferably provided with the usual vertical groove to insure proper positioning of a suitable “on” and “off” indicating plate (not shown), and the plate 33 is provided with a lug 33b which fits into the lower portion of said groove 34b to pos-
Bushing 34 is preferably provided at its upper end with an inwardly extending annular flange 34C defining an opening 34D whose walls are adapted to limit the degree of oscillatory movement of the actuating lever 35. Lever 35 is provided with a substantially spherical enlargement 35A having a diametrically extending opening to receive the pivot pin 36 which is fixed in any well known manner to the opposite walls of bushing 34. The lower end 35B of lever 35 is preferably provided with a spherical end 35C to engage the member 46 at the upper end of spring 17. The other parts of the switch shown in Fig. 3 are identical with the parts aforesaid and have been given like numerals of reference. Thus the frame 12 may be identical with the frame aforesaid, even though the openings (one of which is shown at 12D) in the frame are not utilized as bearings for the pivot pin.

It may be noted that Fig. 1 is drawn to a scale of one and one-half times the actual size of the switch. Nevertheless a switch of the actual size just mentioned has an arc rupturing capacity and full time rating of 15 amperes, at 125 volts. The advantages of my invention will therefore be apparent to those skilled in the art.

What I claim as new and desire to secure by Letters Patent is:

1. In an electric snap switch, in combination, a two-part molded insulating base, the adjacent faces of said base parts having complementary recesses formed therein to provide a switch chamber and a substantially closed contact chamber, said switch actuating mechanism being interlocked with the two sections of said base, the two sections of said base having sets of stationary and movable contact elements, said sections being adapted to receive said contactors, each of said contactors being movable by said plate with a snap action into and out of bridging engagement with said contacts, and the walls of said lower set of complementary recesses being located so closely adjacent to said plate and said contactor as to effect extinguishment of any arcs drawn between the latter and said contacts as an incident to disengagement thereof.

2. In an electric snap switch, in combination, a molded insulating base divided in the plane of its greatest dimensions, the two sections of said base having sets of upper and lower complementary recesses formed therein, switch actuating mechanism located within and supported solely by the walls of the upper set of complementary recesses, said sections being also formed to provide a slot affording restricted communication between the upper and lower sets of complementary recesses, a pair of combined stationary contact and terminal members, each of said sections being adapted to retain the latter in spaced relation to each other and in interlocked relation to the respective base sections, said insulating member being interlocked with each of said base sections when the latter are secured to each other, said switch actuating mechanism including an insulating plate which is oscillatable within said lower set of complementary recesses and having its terminal portion exposed at one end of said base, said members each having a loose interlocking connection with its respective base section to facilitate assembly of said parts, a separately molded insulating member interposed between said combined contact and terminal members and adapted to retain the latter in spaced relation to each other and in interlocked relation to the respective base sections, said insulating member being located between the latter and said contacts as an incident to disengagement thereof.

3. In an electric snap switch, in combination, a molded insulating base divided in the plane of its greatest dimensions, the two sections of said base having sets of upper and lower complementary recesses formed therein, switch actuating mechanism located within and supported solely by the walls of the upper set of complementary recesses, said sections being also formed to provide a slot affording restricted communication between the upper and lower sets of complementary recesses, a pair of combined stationary contact and terminal members, each of said sections being adapted to retain the latter in spaced relation to each other and in interlocked relation to the respective base sections, said insulating member being located between the latter and said contacts as an incident to disengagement thereof.

4. In an electric snap switch, in combination, a molded insulating base divided in the plane of its greatest dimensions, the two sections of said base having sets of upper and lower complementary recesses formed therein, switch actuating mechanism located within and supported solely by the walls of the upper set of complementary recesses, said sections being also formed to provide a slot affording restricted communication between the upper and lower sets of complementary recesses, a pair of combined stationary contact and terminal members, each of said sections being adapted to retain the latter in spaced relation to each other and in interlocked relation to the respective base sections, said insulating member being located between the latter and said contacts as an incident to disengagement thereof.

In the off position of the switch, said contactor being movable by said plate with a snap action into and out of bridging engagement with said contacts, and the walls of said lower set of complementary recesses being located so closely adjacent to said plate and said contactor as to effect extinguishment of any arcs drawn between the latter and said contacts as an incident to disengagement thereof.

10. In an electric snap switch, in combination, a molded insulating base divided in the plane of its greatest dimensions, the two sections of said base having sets of upper and lower complementary recesses formed therein, switch actuating mechanism located within and supported solely by the walls of the upper set of complementary recesses, said sections being also formed to provide a slot affording restricted communication between the upper and lower sets of complementary recesses, a pair of combined stationary contact and terminal members, each of said sections being adapted to retain the latter in spaced relation to each other and in interlocked relation to the respective base sections, said insulating member being located between the latter and said contacts as an incident to disengagement thereof.
secured to each other, said switch actuating mechanism including an insulating plate which is oscillatable within said lower set of complementary recesses, the walls of said slot affordig clearance for said plate, a contactor comprising a metal member penetrating said plate at the end of the latter which is remote from the stationary contacts in the off position of the switch, said contactor being movable by said plate with a snap action into and out of bridging engagement with said contacts, the walls of said lower set of complementary recesses co-operating with said plate and said contactor to effect extinguishment of any arcs drawn between the latter and said contacts as an incident to disengagement thereof, and a pair of rivets each penetrating the respective base sections and upset to rigidly and permanently secure all of said parts in assembled relation.

5. As an article of manufacture, a two-part vertically divided molded insulating base for electric snap switches of the toggle type, the parts of said base having sets of upper and lower complementary recesses formed therein, said parts being also formed to provide a slot to afford restricted communication between said upper and lower sets of complementary recesses, said parts having like extensions formed at one end thereof, said extensions having openings formed therein, said openings providing for insertion and loose interlocking connection of a pair of combined contact and terminal members with the respective casing parts, and a separate insulating member interposed between said base parts to afford a positive interlocking connection between said combined contact and terminal members and said base parts upon securement of the latter to each other.

6. As a article of manufacture, a two-part vertically divided molded insulating base for electric snap switches of the toggle type, the parts of said base having sets of upper and lower complementary recesses formed therein, said parts being also formed to provide a slot to afford restricted communication between said upper and lower sets of complementary recesses, said parts having like extensions formed at one end thereof, said extensions having openings formed therein, said openings providing for insertion and loose interlocking connection of a pair of combined contact and terminal members with the respective casing parts, and a separate insulating member interposed between said base parts to afford a positive interlocking connection between said combined contact and terminal members and said base parts upon securement of the latter to each other, said separate insulating member comprising a molded body of relatively soft rubber.

7. In an electric snap switch of the toggle type, in combination, a frame comprising a sheet metal member bent to substantially U-shape in horizontal cross section, the arms of said U-shaped member each having an integral downward extension, said arms having affixed openings of substantially elliptical contour and having an opening formed therein at one side of its point of pivotal support, a metal member penetrating said last mentioned opening and having its ends exposed on opposite sides of the plate, an actuating lever located between the arms of said frame, said lever being pivotally supported at said pivot opening, a spring interposed between said lever and the abutment formed on said insulating plate.

8. An electric snap switch as set forth in claim 9, including a molded insulating base divided in a plane parallel to the plane of oscillation of said lever, the two parts of said base having sets of upper and lower complementary recesses formed in the adjacent faces thereof, said parts being formed to provide a slot affording restricted communication between the upper and lower sets of recesses, said upper set of recesses being formed to receive said frame with a snug interlocking fit and to provide oscillating clearance for said yoke, said insulating plate extending downwardly into said lower set of recesses, a pair of resilient stationary contacts located at one end of the lower set of recesses, said insulating plate being continuously interposed between and engaged by said contacts, said contactor being movable by said plate into and out of engagement with said contacts, and said contacts having terminal elements exposed at one end of said base at a point intermediate the depth of the latter.

9. An electric snap switch of the character set forth in claim 9, including a molded insulating base divided in a plane parallel to the plane of oscillation of said lever, the two parts of said base having sets of upper and lower complementary recesses formed in the adjacent faces thereof, said parts being formed to provide a slot affording restricted communication between the upper and lower sets of recesses, said upper set of recesses being formed to receive said frame with a snug interlocking fit and to provide oscillating clearance for said yoke, said insulating plate extending downwardly through said slot into said lower set of recesses, a pair of combined stationary contacts having loose interlocking connection with one of said base parts, the contact portions of said members being located at one end of the lower set of recesses and between which contact portions said insulating plate is continuously interposed, a separately molded insulating member interlocked with the base parts and interposed between the terminal portions of said members to retain the latter in assembled position, said insulating plate being movable with a snap action between opposite extremities thereof to effect engagement of said contactor with and disengagement thereof from said contact portions, said insulating plate being adapted to abut the complementary end walls of the lower set of recesses upon movement thereof in one direction, and said yoke being adapted to abut said separately molded insulating member upon movement thereof in the opposite direction.

10. In an electric snap switch, in combination, a molded insulating base vertically divided in the plane of its greatest dimensions, the adjacent faces thereof being complementarily recessed to provide upper and lower ends with a communicating slot formed therebetween,
switch actuating mechanism interlocked with and supported by the walls of the upper chamber, said mechanism including a flat punched plate of insulating material extending downwardly through said slot and oscillatable within a lower chamber, a contact portion of said members being adapted upon tilting thereof to pass freely through the respective openings to a predetermined extent, said terminal portions and said base parts being cooperatively formed to provide interlocking connections therebetween, a separately formed insulating member interposed between said terminal portions to space said metal plate and to maintain the same in assembled position, the contact portions of said members being located in spaced relation at one end of said lower chamber, said insulating plate being interposed between said contact portions in said positions. The contactor being movable by said plate into and out of bridging engagement with said contact portions.

11. An electric snap switch of the character set forth in claim 10, in which the walls of the lower chamber are formed for cooperation with the insulating plate to insure extinguishment of any arc drawn upon disengagement of the contactor from the contact portions.

12. An electric snap switch of the character set forth in claim 10, in which the walls of the lower chamber are formed for cooperation with the insulating plate to insure extinguishment of any arc drawn upon disengagement of the contactor from the contact portions, the parts of the base being formed to provide a flange upstanding around the opening in the upper end thereof, a supporting top plate having an opening formed therein to accommodate said flange with a fair surface against the means for engaging said top plate to said base parts, and a plurality of fastening members penetrating said base parts and rigidly and permanently attached thereto to retain said parts in assembled relation.

13. In an electric snap switch of the toggle type, in combination, a two-part vertically divided molded insulating base, said parts having like extensions formed at one end thereof, said extensions having openings formed therein respectively, a pair of combined contact and terminal members, the terminal portion of each of said members comprising a substantially rigid flat punched sheet metal plate having a cutout opening formed therein adjacent to one end thereof, the other end of each plate having notches formed in its upper and lower edges, said terminal portions being insertable into the respective openings in said extensions, the walls of said notches having interlocking engagement with the respective base parts, a separate insulating block interposed between said terminal portions to restrain the same against relative lateral displacement upon securing of the base parts to the switch, the contact portions of said members comprising resilient sheet metal elements rigidly attached to the respective outer sides of said metal plates at the notched ends of the latter, the respective free ends of said resilient contact portions being of arcuate formation, said free arcuate ends each being bent at two points along parallel vertical lines to provide for location of the tips thereof in normal planes offset inwardly from the planes of said plates respectively, and said tips each being also bent outwardly along a third parallel vertical line to facilitate joint engagement thereof by an oscillatable contactor of suitable form.

14. In an electric snap switch of the toggle type, in combination, a frame comprising a punched strip metal member bent along two spaced vertical lines to substantially U-shape in horizontal cross section, the arms of said member each having an integral downward extension located in the plane thereof, said arms and extensions having openings of keyhole shape formed therein in alignment with each other, the relatively large upper ends of said openings providing substantially closed supporting bearings, an actuating lever located between the arms of said frame, said lever having a pivot opening formed therein, a pin of circular cross section insertable through the upper ends of said keyhole openings and said pivot opening, the lower ends of said keyhole openings being of relatively narrow elongated form to provide upwardly opening bearings, a wire member bent to substantially U-shape to provide a stop for the arms of said yoke having outwardly bent ends in pivotal engagement with said last mentioned bearings, a molded insulating base divided in a plane parallel to the plane of oscillation of said lever, the two parts of said base being recessed to receive with a snug interlocking fit the arms and extensions of said frame, a contactor carried by but insulated from said yoke, and a plurality of resilient contacts carried by said base and adapted for cooperation with said contactor.

15. In an electric snap switch of the toggle type, in combination, a metal member of substantially U-shape providing a yoke, the arms of said yoke having outwardly projecting ends, means providing a fixed pivotal support for said projecting ends, a flat punched plate of insulating material, said plate having an opening formed therein to provide for engaging said pivotal support thereof by the connecting portion of said yoke, said plate being formed to provide a spring abutment above the point of pivotal support thereof by said yoke, the lower portion of said plate being formed to extend a substantial distance on each side of the point of pivotal support thereof, a contactor attached to said lower portion of the plate adjacent to one end of the latter and exposed on opposite sides thereof, a pair of resilient stationary contacts between which said plate is continuously interposed, and means including a coiled compression spring for effecting snap movements of said yoke and said plate between opposite extended positions thereof, whereby said contactor is engaged with and disengaged from said stationary contacts.

16. In an electric snap switch of the toggle type, in combination, a metal member of substantially U-shape providing a yoke, the arms of said yoke having outwardly projecting ends, means providing a fixed pivotal support for said projecting ends, a flat punched plate of insulating material, said plate having an opening formed therein to provide for pivotal support thereof by the connecting portion of said yoke, said plate being formed to provide a spring abutment above the point of pivotal support thereof by said yoke, the lower portion of said plate
being formed to extend a substantial distance on each side of the point of pivotal support thereof, a contactor attached to said lower portion of the plate adjacent to one end of the latter and exposed on opposite sides thereof, a pair of resilient stationary contacts between which said plate is continuously interposed, means including a coiled compression spring for effecting snap movements of said yoke and said plate between opposite extreme positions thereof, whereby said contactor is engaged with and disengaged from said stationary contacts, and means comprising a molded insulating casing recessed to provide a pocket into which said contactor is moved by said plate upon disengagement of said contactor from said contacts, whereby arcing between said contactor and said contacts is minimized.

ALVIN W. KRIEGER.
CERTIFICATE OF CORRECTION.


ALVIN W. KRIEGER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, second column, lines 15 and 37, claims 8 and 9 respectively, for the claim reference numeral "9" read 7; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of March, A.D. 1937.

(Seal)

Henry Van Arsdale
Acting Commissioner of Patents.