

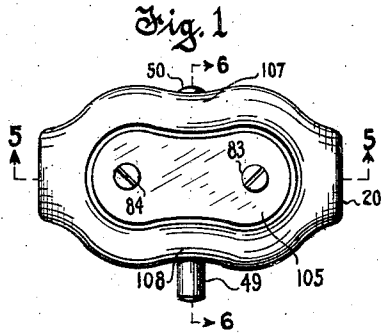
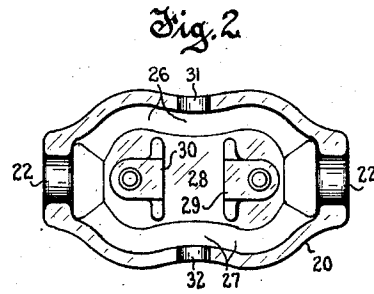
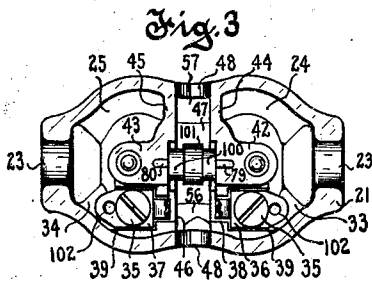
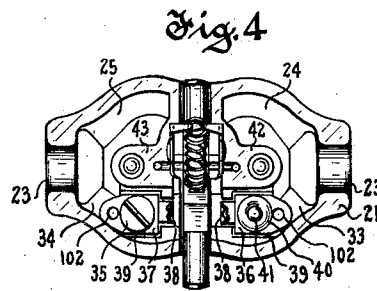
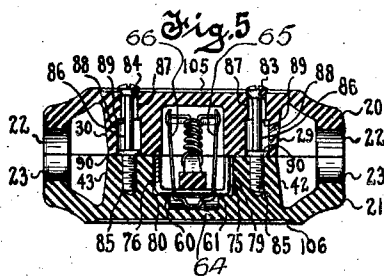
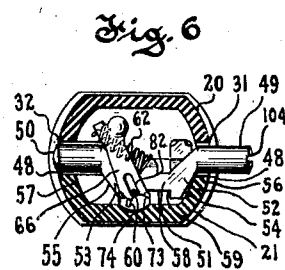
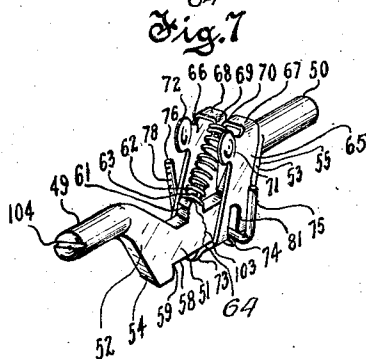
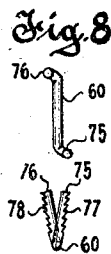
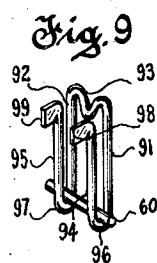
Dec. 2, 1930.

W. C. TREGONING

1,783,635

ELECTRIC SNAP SWITCH

Filed March 3, 1928



INVENTOR.

William C. Tregoning.
BY Frank A. Hubbard
ATTORNEY.

UNITED STATES PATENT OFFICE

WILLIAM C. TREGONING, OF MILWAUKEE, WISCONSIN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CUTLER-HAMMER, INC., A CORPORATION OF DELAWARE

ELECTRIC SNAP SWITCH

Application filed March 3, 1928. Serial No. 258,838.

This invention relates to improvements in electric snap switches.

An object of the invention is to provide an improved and simplified switch of the aforementioned character wherein the number of switch parts is reduced and assembly thereof is facilitated.

Another object is to provide a novel snap switch mechanism the movable parts of which may be readily assembled as a unit, together with a novel supporting and enclosing casing for such switch mechanism.

Other objects and advantages of the invention reside in improvements in the details of construction of the several switch parts, as will be pointed out in the course of the following description.

While I have herein shown my invention as applied to the construction of a feed-through snap switch, it is to be understood that my improved mechanism is likewise adaptable for use in the production of various other types of snap switches wherein a rectilinearly movable actuator is employed; and certain of the novel features herein disclosed are applicable to switches having other types of actuators.

In the drawings, Figure 1 is an elevational view of a sectional insulating casing adapted to support and house a push button snap switch mechanism embodying my invention.

Fig. 2 is an interior view of the top or cover section of the casing illustrated in Fig. 1.

Fig. 3 is a similar view of the base section of the casing with the stationary contacts and terminals attached thereto.

Fig. 4 is a view similar to Fig. 3 with the movable parts of the switch mechanism in assembled relation with respect to the insulating base.

Figs. 5 and 6 are sectional views on the lines 5—5 and 6—6, respectively, of Fig. 1.

Fig. 7 is a detail perspective view of several parts of the switch mechanism which may be assembled as a unit prior to insertion thereof into the recessed insulating base.

Fig. 8 includes top and side views, respectively, of one form of pivot for the switching member; and

Fig. 9 is a detail perspective view of an

other form of switching member and pivot means therefor which may be employed in my improved switch mechanism.

Referring first to Figs. 1 to 6, the numeral 20 designates one section of the insulating casing and 21 designates the other section of said casing. The casing sections are respectively provided at each end thereof with semicircular grooves 22 and 23 which co-operate to provide for ingress and egress of the wires of a multi-wire cord in the usual manner. Also as is usual in such devices, the base section 21 is grooved as indicated at 24 and 25, for co-operation with either of the grooves 26 or 27 in the top section 20 of the casing, to provide a through passage for one wire of the cord. Thus it will be noted that the top section 20 of the casing is of symmetrical design, the cavity 28 in the inner surface thereof being unobstructed except for the provision of the symmetrically arranged abutments 29 and 30 which are of substantially T-shape in cross section. Section 20 is also provided with aligned semicircular grooves 31 and 32 in the edges of the opposite side walls thereof, to assist in guiding and supporting the push button operating means, as hereinafter described. Casing section 20 is therefore reversible end for end with respect to the base section 21. In this manner assembling of the casing sections is facilitated, as will be obvious.

Base section 21 is also grooved as indicated at 33 and 34 to provide passages for the adjacent ends of a severed conductor, whereby such ends may be fastened through the medium of binding screws 35 to the respective terminal plates 36 and 37. Each of the terminal plates 36 and 37 is preferably provided with an integral outwardly and upwardly extending contact portion 38, which portions form the stationary contacts of the switch. Moreover, by the arrangement just described the outwardly extending portions of said contacts co-operate with the binding screw heads to retain the terminal wires in position, thus obviating the necessity for the struck-up ears usually employed for this purpose. Said terminal plates are adapted to rest on suitable ledges 39 formed on the

base section 21 and arranged slightly below the upper surface of the latter. Terminal plates 36 and 37 are also provided with openings (not shown) to accommodate the projecting ends of tubular rivets embedded in the base,—said projecting ends being then spun over or upset, as indicated at 40 (Fig. 4), to permanently fasten the plates in position. The rivets are internally threaded, as indicated at 41 (Fig. 4), to receive the binding screws 35.

Base 21 is also provided with abutments 42 and 43 which co-operate with the abutments 29 and 30 in top section 20 in the manner hereinafter described. Extending from the abutments to one of the side walls of base 21 is a pair of ribs or walls 44 and 45 the adjacent faces of which assist in guiding the push button actuating means. The material of the base in which the aforementioned ledges 39 are formed is likewise shaped to provide similar guide surfaces 46 at the opposite side of the abutments 42 and 43.

Thus, as best shown in Fig. 3, the base 21 is provided with a recess 47 extending from one side wall thereof to the other, said side walls being also provided with aligned semi-circular grooves 48 to accommodate the actuating push buttons.

The push button actuating means, as best shown in Figs. 6 and 7, preferably comprises a single molded piece formed at opposite ends thereof to provide push buttons 49 and 50, said push buttons being connected with a downwardly offset portion 51 by means of the arms 52 and 53, respectively. Said arms are provided with outer angular surfaces 54 and 55 adapted to co-operate with the beveled or angular wall surfaces 56 and 57 (Figs. 3 and 6) to limit the range of reciprocating movement of the push buttons. The lower surface of the offset portion 51 is preferably cut away as indicated at 58 to provide a pair of substantially right angled shoulders, one of which is shown at 59. Said shoulders 59 are respectively adapted, in opposite extreme positions of the push button actuating member, to engage with a transversely arranged pin or pivot member 60,—thus additionally limiting the movement of said actuating member. The offset portion 51 is further provided on its upper surface at a point intermediate of its length with a projection or abutment 61 preferably formed integrally therewith.

Said abutment 61 is adapted for engagement by one end of a helical compression spring 62,—a tubular rivet 63 being preferably inserted in the end of spring 62 to provide a sort of ball and socket connection between said parts. The switching member as best shown in Fig. 7 may comprise a single sheet metal stamping having a bottom portion 64 and a pair of integral upwardly extending arms 65 and 66. The upper ends of

said arms are of reduced width, and the same are bent toward each other, as shown at 67 and 68, and then downwardly in parallel relation, as shown at 69 and 70, to jointly provide an abutment for the other end of coiled spring 62. Integral with and extending forwardly of the respective arms 65 and 66 are a pair of contact portions 71 and 72 having convex outer surfaces adapted for engagement with and disengagement from the stationary contacts 38 upon oscillation of the switching member in opposite directions respectively.

The bottom portion 64 of the switching member is provided at opposite sides thereof with lugs or ears 73 and 74 extending downwardly at an angle therefrom. Thus assuming fixed positioning of the pivot pin 60, upon movement of the push button 49 to the left in Fig. 6 (or to the right in Fig. 7) the abutment 61 is likewise moved to effect an additional storage of energy in the compression spring 62. After the abutment 61 has been moved a substantial distance beyond the pivot pin 60, the shoulder 59 comes into engagement with the angularly arranged lug 73 of the switching member, thus providing a positive "kick-off" which brings said member into a position to render the spring 62 effective for snapping the same to its opposite extreme position,—which under the conditions assumed is the circuit making position. Reverse movement of the actuator through the medium of push button 50 likewise effects snap movement of the switching member to circuit breaking position,—the lug 74 on the switching member being similarly engaged by the opposite shoulder 59 to provide the initial positive movement or "kick-off" of said member as aforedescribed.

As best illustrated in Figs. 5, 6 and 7, the pivot pin 60 is arranged between the cut away surface 58 of the offset portion 51 and the upper surface of the bottom portion 64 of the switching member, and said pin projects laterally on each side of said member through perforations in the arms 65 and 66 of the latter. The pivot pin will therefore be clamped in proper relative position, even though it comprises only the single straight portion as shown in Fig. 9. However, I prefer to make said pivot member of substantially U-shape as illustrated in Figs. 7 and 8, wherein the arms 75 and 76 extend upwardly at relatively different angles, and have their respective outer sides roughened or serrated as shown at 77 and 78. As shown in Figs. 3, 4 and 5 the abutments 42 and 43 are provided on their adjacent faces with aligned notches 79 and 80 extending downwardly from the top surfaces of said abutments. The pivot pin 60 and the arms 75 and 76 of the latter are adapted to fit snugly into said notches, thus providing a stationary support for said pivot pin. Also it will be apparent that upon

insertion of the pivot pin into said notches the arms 75 and 76 are forced into substantial alinement with each other, thus setting up a twisting strain in the pivot member 60 which causes the serrated edges or sides of the arms to take into the respective side walls of the notches. In this manner the pivot pin 60 may be held in proper assembled relation with respect to the base 21 in the absence of any further fastening means. However, (as best illustrated in Fig. 5) the abutments 29 and 30 in casing section 20 are adapted to overlie the notches 79 and 80 and the vertical arms 75 and 76 to positively maintain the pin 60 in position.

It will also be apparent to those skilled in the art that a similar temporary locking effect for the pivot pin 60 may be obtained by arranging the arms 75 and 76 in an outwardly divergent relation to each other but in alinement with each other longitudinally of the pivot pin. In this case the outer sides of the arms 75 and 76 would preferably be roughened or serrated in the manner aforedescribed.

Moreover, as shown in Fig. 6, the semicircular grooves or notches 31 and 32 in section 20 and the corresponding grooves 48 in section 21 provide a relatively close fit around the respective push buttons, and hence it will be apparent that pivot pin 60 will be held in proper position by the actuating member upon assembly of the casing sections, even though the arms 75 and 76 are omitted. In order to facilitate assembly of the U-shaped pivot member with respect to the switching member, the arms 65 and 66 of the latter are provided with closed slots 81 and 82, respectively, through which the pivot pin 60 and either of its arms 75 or 76 may be threaded.

A pair of screws 83 and 84 (Fig. 5) are preferably employed to secure the two casing sections together. Each of said screws likewise preferably comprises a threaded end portion 85 adapted to take into a threaded recess which is molded or otherwise formed in the material comprising the abutments 42 and 43, respectively, of base 21. In this way the necessity for metallic inserts in the base is obviated, and the outer surface of the latter is left uninterrupted and unmarred by the usual type of fastening means.

The screws 83 and 84 are preferably formed intermediate the threaded portions 85 and the heads thereof with reduced unthreaded shank portions 86; and the abutments 29 and 30 of the casing section 20 are each perforated by alined openings 87 and 88,—the opening 87 being of a size to permit free passage of the threaded portion 85 of the screw and the opening 88 being of slightly larger size, whereby a shoulder 89 is provided. Moreover, during assembly of the screws 83 and 84 with respect to section 20, the threaded portions 85 of the former are forced through

suitable washers 90 of fiber or metal, whereupon said washers are adapted to engage the shoulders 89 formed in the insulating section 20 and the shoulders formed at the junction of the threaded and reduced portions 85 and 86 of the screws to prevent accidental separation or removal of the screws from said section 20. A similar result may likewise be obtained by making the openings 87 of reduced size and tapping the same to require threading of the portions 85 therethrough,—in which case the shoulders formed at the junction of the threaded and reduced portions 85 and 86 will directly engage the shoulders 89; thus obviating the necessity for interposed washers 90.

The modified form of switching member illustrated in Fig. 9 preferably comprises a single piece of relatively stiff wire, which may be of circular cross section, as shown, or of any other desired cross section. Said piece of wire comprises two arm portions 91 and 92 connected by an inwardly bent portion forming an abutment 93 for one end of the spring 62 aforementioned. Each of the arms 91 and 92 is bent back upon itself, or reflexed, as indicated at 94 and 95, respectively, thus providing loop portions 96 and 97 for engagement with the pivot pin 60. The two end portions 98 and 99 of the wire are then bent forwardly at substantially right angles to the portions 94 and 95,—said ends or tips being preferably flattened or beveled as shown to provide for co-operation thereof with the stationary contacts of the switch. It will be noted that in each form of switching member illustrated the contact portions of the latter are spaced forwardly of the spring abutments thus insuring ample clearance for the actuating spring, while protecting the latter from the temperature effect of arcs which may be drawn between the switch contacts.

The manner of assembling the movable parts of the switch as a unit may be best described with reference to Fig. 7. Thus, the pivot pin 60 may be assembled with respect to the switching member by threading one arm thereof (say 76) through the slots 81 and 82 in the arms 65 and 66. Thereafter one end of the push button actuating member is passed through the switching member to provide for engagement of the cut away portion 58 with the pivot pin, and the spring 62 may then be interposed between the abutments 61 and 69, 70 as aforeindicated. The parts just described are therefore assembled as a unit which may thereupon be inserted bodily into the recess provided in the base section 21 of the casing.

As best shown in Figs. 3 and 6 the inner surface of the base 21 is preferably cut away, as indicated at 100, to provide clearance for the bottom portion 64 of the switching member upon oscillation of the latter, and a rela-

tively deeper cut away portion is similarly adapted to provide clearance for the lugs 73 and 74 on said bottom portion 64. The sub-assembly including the switching member shown in Fig. 9 will be substantially like that
 5 aforedescribed, except that the pivot pin 60, either with or without the additional arm portions, may be merely dropped or hooked into engagement with the loop portions 96 and 97.

10 The terminal plates 36 and 37 may be of any usual or well known construction but as shown the same are preferably provided with relatively small perforations 102 located adjacent to the respective binding screws.
 15 These openings respectively permit insertion of the straight ends of the severed conductor, whereupon the conductor may be bent to provide for looping thereof around the shank of the binding screw. The provision of this
 20 means for engaging the wire ends greatly facilitates wiring of the switch, inasmuch as the usual difficult or tedious wire looping operation is obviated. Moreover, by the simple means described for positively engaging
 25 the angularly bent end of the wire, an effective strain relief is provided, inasmuch as any tendency of the wire to unwind from the terminal screw shank under a pulling strain results in a snubbing action which locks the
 30 wire more tightly to the screw.

It is customary to provide distinctive colors for the respective push buttons,—the push button 49 for closing the switch being red,
 35 for instance, and the push button 50 for opening the switch being of another color, say, black. The actuating member might therefore be molded in one piece from material of one of the aforementioned colors, and one of
 40 the push buttons thereafter coated or painted with material of the other color. In practice, however, it is found that such a coating is undesirable for the reason that most materials adapted for the purpose are liable to
 45 crack or peel off within a short time, thus rendering the switch as a whole rather unsightly, and perhaps entirely losing the desired indicating function of the initial distinctive colors. I therefore propose to form
 50 the actuating member from two portions of plastic material respectively having the desired distinctive or contrasting colors, said differently colored materials being positioned
 55 at opposite sides of the mold and simultaneously compressed to provide an integral member as shown, the line of cleavage between the differently colored materials being located at some point between the two push buttons, as indicated at 103 (Fig. 7).

Also if desired one of the push buttons, such as 49, may have a contour or configuration differing from that of the other push button to distinguish the same to the touch.
 65 As shown, said distinguishing means may

comprise a notch 104 in the end of the push button.

It will be noted that the insulating casing shown herein is provided with top and bottom flat faces 105 and 106, whereas the contour of said casing between said flat faces is rounded laterally (see Fig. 6), and of undulating form longitudinally of the casing. This novel shape not only improves the appearance of the switch casing, but due to reduction of the width of the same at an intermediate point in its length (107, 108, Fig. 1) manipulation or handling of the switch and operation of the push button actuator is facilitated.

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

1. In an electric snap switch, in combination, an insulating base, a substantially loop-shaped switching member adapted for oscillating movement, an actuating member extending on each side of said switching member and adapted for rectilinear movement, integral abutments on each of said members, a helical compression spring interposed between said abutments to cause oscillating movement of said switching member upon rectilinear movement of the actuating member, said members having integral interengaging portions to provide for assembly of the same and said spring as a unit prior to attachment thereof to said base, and cooperating means on said base and said switching member to provide a fixed pivotal connection therebetween.

2. In an electric snap switch, in combination, an insulating base having a recess, a switching member adapted for oscillating movement, an actuating member adapted for reciprocating movement, a coiled spring directly engaging each of said members and forming an operative connection therebetween, said members having integral interengaging portions providing for assembly of the same and said spring as a unit prior to insertion thereof into said recess, and means projecting laterally from said switching member for engagement with co-operating shoulders on said base to provide a fixed pivotal connection therebetween.

3. In an electric snap switch, in combination, an oscillatable switching member of substantially loop shape, a reciprocable actuating member extending through said switching member in a plane parallel to the plane of oscillation of the latter, an integral abutment on each of said members, a freely flexible coiled compression spring interposed between said abutments and providing the sole means for holding said members in assembled relation with respect to each other, pivot means projecting from opposite sides of said switching member, and an insulating base which is recessed to receive said assembled

parts as a unit and to provide a fixed bearing for said pivot means.

4. In an electric snap switch, in combination, an oscillatable switching member of substantially loop shape, a reciprocable actuating member extending through said switching member in a plane parallel to the plane of oscillation of the latter, an integral abutment on each of said members, a freely flexible coiled compression spring interposed between said abutments and providing the sole means for holding said members in assembled relation with respect to each other, pivot means projecting from opposite sides of said switching member, and an insulating base which is recessed to receive said assembled parts as a unit, said insulating base having means integral therewith to insure a fixed axis of oscillation of said switching member while permitting a predetermined range of reciprocation of said actuating member.

5. In an electric snap switch, in combination, an insulating base having a recessed upper surface, stationary contacts arranged in spaced relation on said surface adjacent to the recess, mechanism comprising a switching member, a pivot pin therefor, a reciprocating actuating member, and a freely flexible spiral compression spring interposed between said actuating member and said switching member, the parts of said mechanism being capable of assembly as a unit whereby the same may be jointly inserted in said recess, and means comprising an insulating member overlying said recess and engaging parts of said mechanism to hold the latter in assembled relation to said base.

6. In an electric snap switch, in combination, an insulating base having a recessed upper surface, the opposite walls of said recess having lateral notches, mechanism comprising a switching member, a pivot pin therefor, a reciprocating actuating member and a spring interposed between said actuating member and said switching member, the parts of said mechanism being capable of assembly as a unit whereby the same may be jointly inserted in said recess, said pivot pin being of substantially U-shape and the ends of the upwardly extending arms thereof being substantially flush with said surface of the base, an insulating cap overlying said recess and having abutments engaging the ends of said arms, whereby said pivot pin is maintained in proper position with respect to said base, the walls of said recess being adapted to limit the oscillating movement of said switching member upon reciprocation of said actuating member, and spaced stationary contacts on said base adapted for co-operation with said switching member.

7. In a feed-through snap switch, the combination with a two part insulating casing adapted to house the switch mechanism, said casing having exterior flattened faces par-

allel to the plane of division thereof, switch actuating means comprising a single insulating member forming opposed push buttons located between the sections of the casing and adapted to project alternately beyond the latter, said casing being of relatively reduced cross sectional contour adjacent the location of said push buttons to facilitate manipulation of the latter.

8. In combination, a longitudinally divided insulating casing for snap switch mechanisms, said casing having exterior flattened faces parallel to the plane of division thereof, said casing being also of curved and longitudinally undulating contour between the parallel faces thereof to provide an intermediate portion of relatively reduced cross sectional contour, and an insulating member forming opposed push buttons located between the sections of the casing at said intermediate reduced portion of the latter, the ends of the respective push buttons being movable alternately into and out of substantial alignment with the exterior surface of said casing.

9. In an electric snap switch, the combination with an insulating base, of a combined stationary contact and terminal plate secured thereto, a binding screw associated with said terminal plate, and said terminal plate having a recess at one side of said binding screw for insertion of and engagement by one end of a conductor, whereby winding of the latter about the shank of said binding screw is facilitated.

10. In an electric snap switch, in combination, a metallic terminal plate having a plurality of openings therethrough, a binding screw the shank of which is adapted to penetrate one of said openings, and another of said openings being adapted to receive and anchor a conductor end, whereby the conductor may be readily looped around said binding screw.

11. In an electric switch, in combination, a loop-shaped oscillating contactor, pivot means extending laterally from said contactor adjacent one end thereof, a rectilinearly movable operating member of insulating material arranged between said pivot means and the other end of said contactor, and a helical compression spring interposed between said operating member and the last mentioned end of said contactor, said spring being adapted to hold all of said parts in assembled relation to provide for insertion thereof as a unit into a suitable insulating base.

12. In an electric switch, in combination, an insulating base, a pair of stationary contacts mounted on said base, a loop-shaped oscillating contactor, a reciprocating operating member, a helical compression spring interposed directly between said contactor and said operating member to effect oscillation of the former with a snap action upon reciprocation of the latter.

cation of the latter, said spring being adapted to hold said contactor and said operating member in assembled relation whereby said parts may be freely inserted as a unit into said base, and means comprising an insulating cap adapted to maintain said parts in assembled relation with respect to said base.

13. In an electric switch, in combination, an insulating base, a pair of stationary contacts mounted on said base, an oscillating contactor, a rectilinearly movable operating member for said contactor, a helical compression spring interposed between said contactor and said operating member to effect oscillation of the former with a snap action upon reciprocation of the latter, said spring being adapted to hold said contactor and said operating member in assembled relation whereby said parts may be freely inserted as a unit into said base, means comprising an insulating cap adapted to maintain said parts in assembled relation with respect to said base, said cap being reversible end for end with respect to said base, and fastening means comprising screws freely insertable in openings through said cap, said base having threaded recesses to be engaged by said screws.

14. In an electric snap switch, in combination, an oscillatable switching member of substantially loop shape, a reciprocable actuating member extending through said switching member in a plane parallel to the plane of oscillation of the latter, an integral abutment on each of said members, a coiled compression spring interposed between said abutments and providing the sole means for holding said members in assembled relation with respect to each other, pivot means projecting from opposite sides of said switching member, an insulating base which is recessed to receive said assembled parts as a unit, said insulating base having means integral therewith to insure a fixed axis of oscillation of said switching member while permitting a predetermined range of reciprocation of said actuating member, and means comprising integral inclined shoulders on said base for limiting the degree of oscillating movement of said contactor in either direction.

15. In a feed-through snap switch, the combination with a two part insulating casing adapted to house the switch mechanism, said casing having exterior flattened faces parallel to the plane of division thereof, and said casing being of alternately reduced and enlarged lateral cross section at said plane of division, switch actuating means comprising a single insulating piece having integrally molded parts of differently colored plastic materials forming opposed push buttons, said push buttons being located between the sections of said casing at an intermediate point of reduced cross section, a switching member comprising an integral metallic ele-

ment having contact portions arranged in parallel relation to each other, bearing portions formed in said element and a pivot pin against which said last mentioned portions are adapted to bear, said insulating piece having a portion between said push buttons adapted to engage said pivot pin, abutments on said insulating piece and said switching member, a compression spring interposed between said abutments to effect oscillating movement of said switching member on said pivot pin upon rectilinear movement of said insulating piece, one of said casing sections being recessed to receive said switching member, insulating piece, pivot pin and spring as an assembled unit, shoulders on said casing section to maintain said pivot pin in a given position, and stationary contacts mounted on said casing section for co-operation with said switching member.

16. In an electric switch, in combination, a substantially loop-shaped oscillatable contactor having pivot means extending laterally therefrom adjacent one end thereof, a rectilinearly movable operating member extending through said contactor adjacent the last mentioned end thereof, a helical compression spring interposed between said operating member and the other end of said contactor, said spring being adapted to hold said operating member and said contactor in operative engagement with each other to provide for insertion thereof as a unit into a suitable insulating base, and cooperating means integral with said contactor and said operating member to positively initiate movement of the former upon a predetermined degree of movement of the latter.

17. In an electric switch, in combination, a substantially loop-shaped oscillatable contactor having pivot means extending laterally therefrom adjacent one end thereof, a rectilinearly movable operating member extending through said contactor and having sliding engagement with the last mentioned end thereof, a helical compression spring interposed between said operating member and the other end of said contactor, and means comprising integral angularly extending lugs at the first mentioned end of said contactor and cooperating spaced shoulders integral with said operating member to positively initiate oscillatory movement of said contactor upon a predetermined degree of movement of said operating member in either direction.

In witness whereof, I have hereunto subscribed my name.

WILLIAM C. TREGONING.