March 17, 1959 C. N. EHRLICH 2,878,336

ELECTRIC SWITCH

Filed April 21, 1958

2 Sheets-Sheet 1

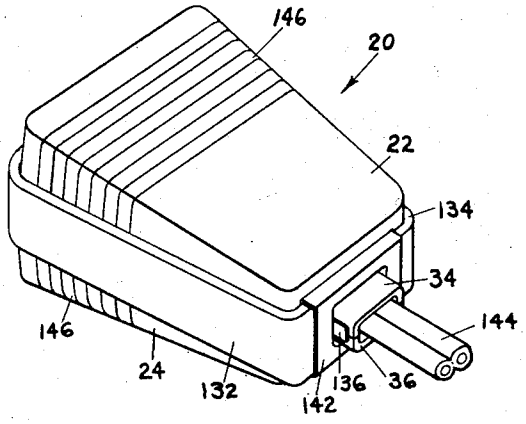

FIG. 1

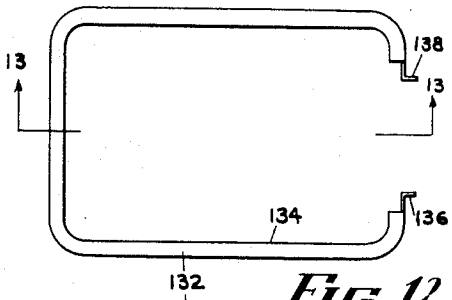

FIG. 12

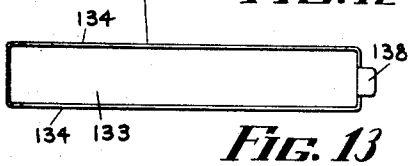

FIG. 13

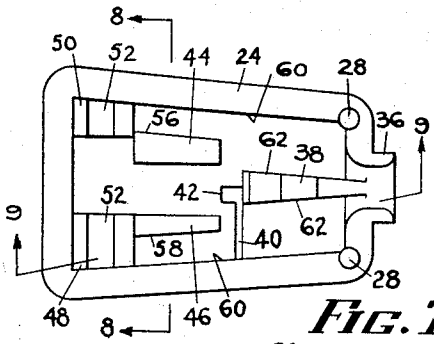

FIG. 7

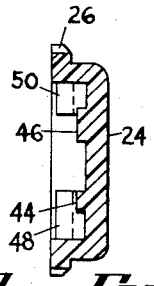

FIG. 8

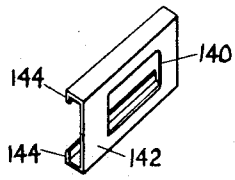

FIG. 14

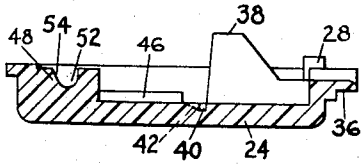

FIG. 9

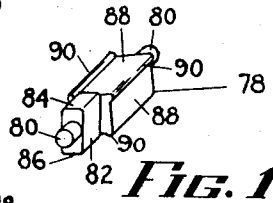

FIG. 15

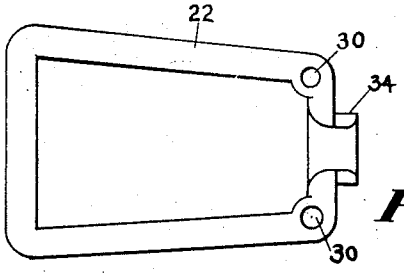

FIG. 10

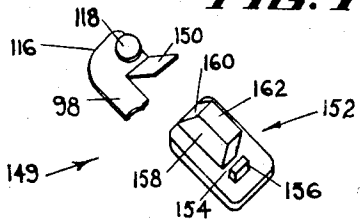

FIG. 18

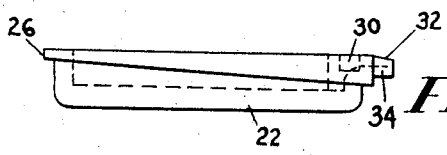

FIG. 11

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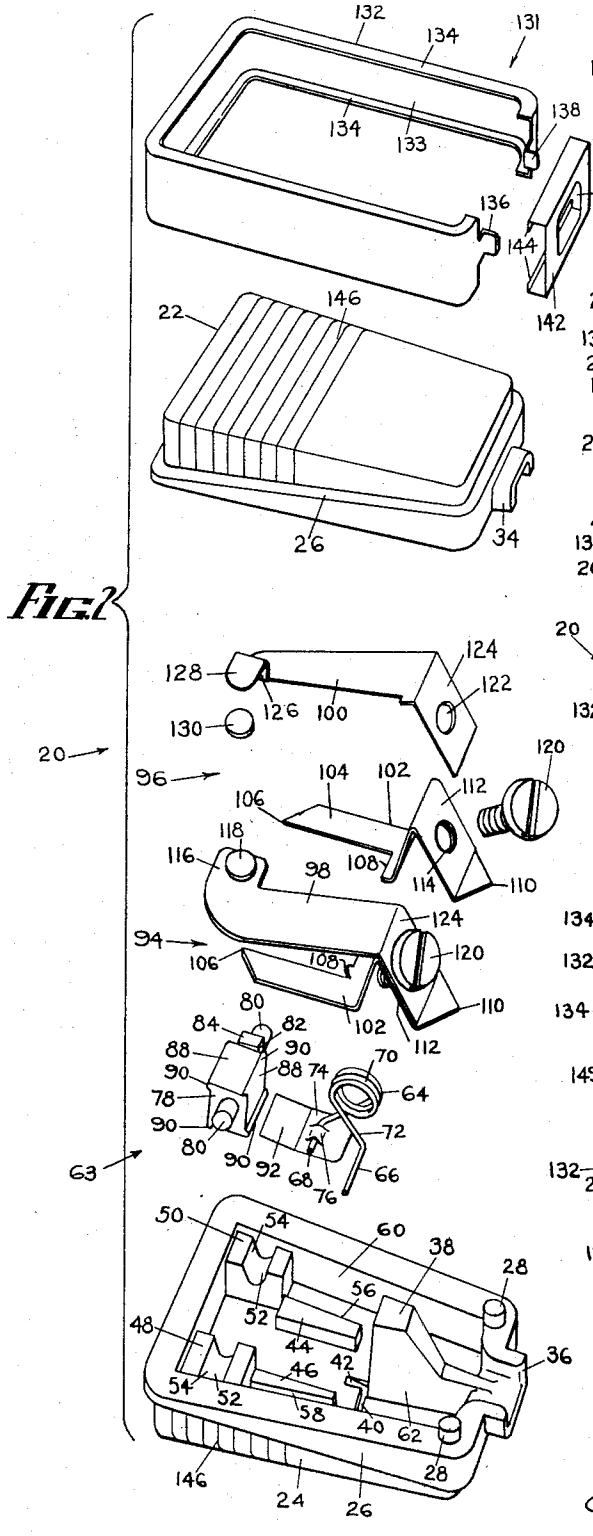
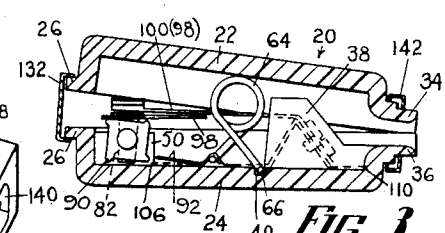
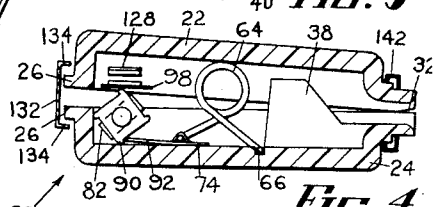
March 17, 1959 C. N. EHRLICH 2,878,336

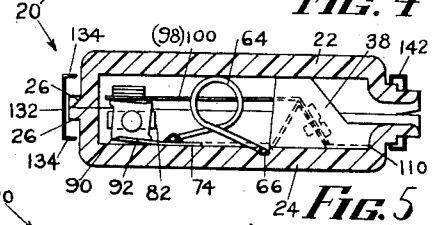
ELECTRIC SWITCH

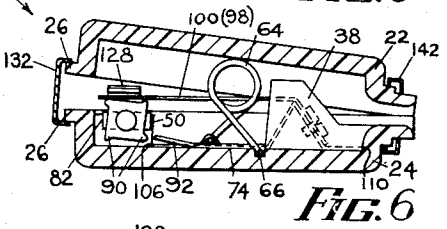
Filed April 21, 1958 2 Sheets-Sheet 2

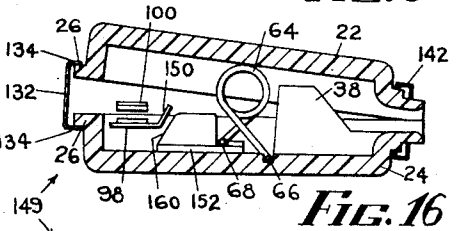


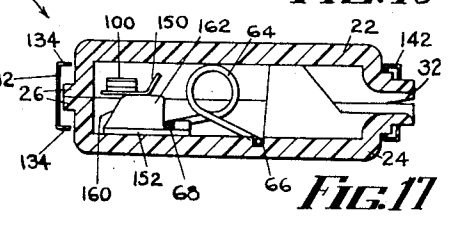












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United States Patent Office 2,878,336 Patented Mar. 17, 1959

2,878,336

ELECTRIC SWITCH

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Application April 21, 1958, Serial No. 729,917

20 Claims. (Cl. 200—86.5)

This invention relates to electric switches, and more particularly to switches of the type that are operated by the application of pressure to the sides thereof.

The desired result of this invention is to provide a switch that may be operated by the application of pressure either by foot, hand, or any other convenient means, to the sides of the body thereof to effect a maintained electrical circuit after the removal of such pressure or to effect a momentary electrical circuit that is continued for only as long as pressure is applied.

In carrying forth the purpose of the invention, it is an object thereof to provide a switch of the type that is operated by pressure but which distinguishes over prior known devices of the same kind in that it is completely enclosed and all spaces or openings are concealed from view, thereby presenting a desirable, decorative symmetrical appearance that is appealing and pleasing to the eye, and wherein the structural elements are protected from damage by preventing the entry of dirt or other foreign matter into the interior of the switch.

It is an object of the invention to provide a pressure operated switch that incorporates the teaching of non-overlapping yet relatively movable normally spaced shell members that combine to form a composite housing within which the operating structure is enclosed and completely concealed by a novel encircling structure that secures the members together to limit their relative separation and to retain them in position for hinged relative movement.

Another object of the invention is to provide a switch that is easily constructed and the elemental details of which are uniquely arranged so that it can be assembled quickly and inexpensively by the use of novel preassembled units mounted in but one of a plurality of members which comprise the switch housing.

It is another object of the invention to provide a switch that is sturdy in construction; one that will withstand the application of great forces and pressures and one that is long-lasting since it comprises relatively few moving parts.

Another object of the invention is the provision of a novel actuating structure that includes a cam device which is caused to operate circuit closing or opening electrical contacts in response to the relative movements of the shell members of the composite housing in which the same are enclosed.

Other and further objects of my invention reside in the structures and arrangements hereinafter more fully described with reference to the accompanying drawings in which:

Fig. 1 is a perspective view of the electric switch constructed in accordance with the teaching of the invention.

Fig. 2 is an exploded view of the elemental details of a switch that will provide a maintained electrical circuit.

Fig. 3 is a section of the side of the switch shown in Fig. 2 with the contacts in open circuit breaking position.

Fig. 4 is a view similar to Fig. 3 wherein the housing and actuator structure are moved to an intermediate contact closing position.

Fig. 5 shows the housing compressed closed and the electrical contacts in their closed position.

Fig. 6 shows the housing in its released normally open position and the contacts in their maintained closed position.

Fig. 7 is a plan view of the lower shell member of the housing.

Fig. 8 is a section taken of Fig. 7 along lines 8—8.

Fig. 9 is a section of Fig. 7 taken along lines 9—9.

Fig. 10 is a plan view of the upper shell member of the housing.

Fig. 11 is a side view of the shell member in Fig. 10.

Fig. 12 is a plan view of the strap.

Fig. 13 is a section of Fig. 12 taken along lines 13—13.

Fig. 14 is a perspective view of the strap clip.

Fig. 15 is a perspective view of the actuator ratchet and cam.

Fig. 16 is a sectional side view of a momentary switch with the housing and contacts in their normally open separated position.

Fig. 17 is a sectional side view similar to Fig. 16 with the housing compressed closed and the contacts in their engaged position, and

Fig. 18 is a perspective view of the actuator and contact member of the momentary switch.

Referring now to the drawings, Figs. 1 to 15 inclusive relate to the switch for effecting a maintained electrical circuit and is generally identified by the numeral 20. Switch 20 comprises a plurality of oppositely disposed upper and lower hollow bodies or shell members 22 and 24. The members 22 and 24 are substantially alike in outer appearance and therefore may be said to have mirror-hand exteriors.

The upper and lower shells hingedly cooperate at their rear portions to define a composite housing wherein each shell member 22 and 24 is provided with an encompassing shelf 26 extending laterally from the exterior of the body. The shelf is symmetrical on the opposite sides of each shell member and tapers upwardly from the front toward the rear end thereof wherein it is widest. A pair of spaced locating or positioning pins 28 project upwardly from the face at the rear portion of the lower shell member 24 for cooperating joining engagement with a similarly spaced pair of recesses 30 that are provided in the face of the rear portion of the upper shell member 22.

The positioning means 28 and 30 serve to locate the rear portions of their respective members for hinged relative movement thereabout. In order to aid in this hinged relative movement, the upper shell member is tapered at 32 (Fig. 11) along its wire receiving extension 34, while the wire receiving extension 36 of the lower shell member 24 remains substantially planar.

Both the upper and lower shell members may be compression molded of non-conductive phenolic or other insulating material. The lower shell member 24 is provided with a separator 38 that is molded integral with and projects upwardly from the base of the interior thereof. It extends longitudinally forward beginning at the rear of the member from the wire receiving extension 36 so as to provide an insulator between the two separated contact units to be described.

Located at the forward end of the separator 38, is a groove 40 which extends from a side wall of the interior of the member 24 to substantially the midpoint of the width of the hollow interior of such member. A longitudinally extending groove 42 slopes upwardly from the undercut 40 to the base surface of the interior of the member and is located on one side of the midpoint of the

width of the hollow interior of the member 24. Equally spaced on opposite sides of the longitudinal center line of the member 24 and projecting upwardly from the base of the interior of the member to form a guide opening therebetween are a pair of spaced guides 44 and 46.

The forward ends of the guides 44 and 46 terminate at pivotal mounting blocks 48 and 50 respectively. The mounting blocks 48 and 50 are similar in detail in that each of them includes a pivot mounting slot 52 that has a surface 54 preferably tapered at its forward end. The guides 44 and 46 each have their lateral outer surfaces 56 and 58 arranged substantially parallel with the adjacent interior rearwardly tapered side walls 60 of the lower shell member 24, as are also the side walls 62 of the separator 38, for a purpose to be described.

The upper and lower shell members 22 and 24 are oppositely positioned for coincident relative movement at their rear portions by the coinciding cooperation of the locating pins 28 and the corresponding recesses 30. The tapered surface 32 defined on the wire receiving extension 34 of the upper shell member 22, enables the members to move smoothly along their rear portions without obstruction.

The shell members 22 and 24 are normally urged into spaced relationship to assume the relative position as shown in Figs. 1, 3 and 6 by an actuating structure 63 (Fig. 2) interposed within the housing. The actuating structure 63 comprises a yieldable means in the form of a coil spring 64 that has its ends 66 and 68 bent normally perpendicular to the plane of the coils 70. The leg 66 is adapted to be pivotally seated in the groove 40 defined in the interior of the lower shell 24 and retained therein against removal in a manner to be described. The arm 72 tapering upwardly from the bent end 66, is adapted to fit and swing within the sloped groove 42 that coincides with the end of the groove 40. Hence, one end of the coil spring 64 is adapted to be pivotally but non-removably mounted within the lower shell member 24.

The other end 68 of the coil spring 64 is secured in a slidable pawl 74 that is provided with a struck portion 76 within which the free spring end 68 is received to secure the pawl and spring together. The pawl 74 is mounted between the upwardly projecting laterally spaced guides 44 and 46 for guided sliding movement therebetween. The parallel inner facing sides of the guides 44 and 46 thus prevent sideward movement of the pawl and direct the same for forward or rearward movement within the slot therebetween in response to the yielding movement of the free leg 68 of the spring 64.

Rotatably mounted in the pivot mounting slots 52 of the mounting blocks 48 and 50 respectively, is a ratchet device 78 having a pair of pivots 80 extending from the ends thereof. The ratchet 78 is included in the actuating structure 63 which comprises also the yieldable means 64 and the actuating pawl 74. A cam 82 is fixed to the ratchet to rotate therewith and, in the instant embodiment, is formed as an integral part thereof. The cam is elongated in opposite directions to provide a pair of radially opposed cam surfaces 84 and 86.

The ratchet device 78 is provided with four flat or planar faces 88 of which terminate in a ratchet tooth or jutting lip 90 adapted for engagement with a bent forward end 92 of the pawl 74. The forward end 92 of the pawl 74 is bent slightly upward for successive engagement with the teeth 90 of the ratchet to rotate the ratchet and the cam that is fixed thereto. The manner of engagement of the forward end 92 of the pawl with the teeth or jutting lips 90 of the ratchet device 78, is shown more clearly in Figs. 3, 4, 5, and 6, to be described presently.

The switch 20 comprises a plurality of preassembled electrical contact units generally identified by the numerals 94 and 96 (Fig. 2). The contact unit 94 may be termed the "lower" contact unit while the unit 96 may be termed the "upper." Each contact unit 94 and 96 is substantially alike in that they comprise lower and upper spring contact members or elements 98 and 100 respectively. Included in each contact unit is a securing or fastening bracket 102. The brackets 102 of each unit are of mirror-hand construction; hence, the description of one should suffice for both.

The bracket 102 has a forwardly extending leg 104 that terminates in a locking point 106. The brackets 102 may be of spring-tempered material and are provided with a widening surface 108. The opposite end of each bracket terminates in a locking point 110, while interposed between the point 110 and the abutment 108 is an inverted V-shaped yieldable force applying formation 112 that is provided with a threaded opening 114 on its rearward surface.

The lower contact member 98 is substantially planar, terminating in a laterally offset leg 116 having secured thereto an electrical silver contact element 118. The opposite end of the lower contact member 98 is bent downwardly at its rear so that the same may mate with the rear surface of the inverted V-shaped formation 112 of the bracket 102 to be made unitary therewith, as by spotwelding or soldering. A screw 120, passing through a suitable opening 122 provided in the contact element and threadedly engaging with the threads 114 of the bracket, provides a mechanical means to fasten the electrical line or cord to the contact element 98. The upper contact unit 96, comprising the spring contact member 100, is similarly preassembled.

To insure a proper overlapping arrangement of the spring contact members 98 and 100, the upper spring contact member 100 is provided with a leg 126 that is bent upward normal to the plane of the spring contact member. The end 128 of the leg 126 is then again bent laterally into overlapping relationship with the offset leg 116 of the lower spring contact member 98. A silver contact element 130 is suitably secured thereto for electrical circuit engagement with the lower contact element 118 on the member 98.

Hence, it will be recognized by those skilled in the art, that the contact units 94 and 96 may be preassembled in production operations prior to their assembly in shell 24. Each contact unit is locked in position in the lower shell member 24 after the actuating mechanism 63 has been assembled into the same shell member, by causing the oppositely pointed locking ends 106 and 110 of the brackets 102 to piercingly engage the molded material of the shell member.

With the actuating structure 63 mounted in position in the lower shell 24, as previously described, the lower contact unit is forcibly pressed into the lower shell member. This causes the inverted V-shaped formation of the bracket of the lower contact unit to squeeze together automatically to move the pointed ends 106 and 110 closer together. The forward narrow leg 104 of the bracket of the unit 94 is inserted in the space between the parallel tapered walls of the guide 46 and the corresponding side wall 60 of the lower shell member. Its widened body portion immediately beyond the abutment 108 will overlap the end 66 of the spring 64 seated within the groove 40, while the rear pointed end 110 thereof will be situated between the wall 62 of the separator 38 and the corresponding parallel tapered wall 60 of the shell member.

The V-formation exerts a force to expand the bracket back to its normal length. The expansion causes the pointed forward end 106 to dig into the block 48 while the rear pointed end 110 simultaneously digs into the rear wall of the shell member. The bracket 102 is thus locked securely in position at its forward end to the block 48, prevented from sideward movement by engaging along its leg 104 between the tapered walls of the guides 46 and 60, against sideward movement at its rear by the tapered wall 62 of the separator 38 and the corresponding wall 60 of the shell member.

At the same time, the bottommost surface of the

bracket will seat against the base of the shell to retain the end 66 of the spring 64 in the groove 40. The forward end 116 of the contact member 98 is so arranged as to constantly bear against and apply a pressure to the ratchet device 78 pivotally mounted in the slots 52 of the blocks 48 and 50 to retain the same therein, thereby insuring that the ratchet device will not be dislodged from its pivot seat. This normal arrangement of elemental details is more clearly shown in Fig. 6.

The upper contact unit 96 is similarly secured in position between the guide block 44 and its corresponding wall 60 of the shell member, and also between the wall 62 of the separator 38 and the same shell wall 60, in the manner described with respect to the lower contact unit 94 except, however, that the offset leg 128 of the upper spring contact member 100, will be in overlying relationship and biased into constant yieldable engagement with the contact element 118 of the lower contact member 98.

It will be noted that the coils 70 of the spring 64 project upward through the lateral spacing between the contact elements 98 and 100 of the two units for engagement with the inner surface of the upper shell member 22. Its two perpendicularly disposed legs 66 and 68 maintain the coils 70 upright to constantly apply a pressure to urge the forward portion of the upper shell member into normal separation and spaced relationship with the forward portion of the lower shell member. This normal clam-like spaced relationship of the shell members is shown in Figs. 3 and 6 and, thus, under usual conditions, would permit the entry of dirt or other foreign matter into the interior of the switch to cause damage to the elemental details thereof. Moreover, the separation also presents an ugly, unsightly appearance.

To eliminate the entry of dirt, to fully conceal the interior from view, to secure the shell members together for hinged relative movement, and to limit their separation, there is provided a strap construction generally identified by the numeral 131. The strap construction 131 comprises a channel-shaped member 132 having a body 133 and legs 134. The body 133 is shaped in the form of a C to completely encircle both shell members 22 and 24 and to engage with the shelves 26 thereof. The strap 132 encompasses the full periphery of the shells by engaging with the shelves thereof and terminating at the rear relatively movable portions of the members 22 and 24 adjacent the wire receiving extensions 34 and 36 thereof. The ends of the strap body terminate in perpendicularly disposed relatively spaced fingers 136 and 138 that are adapted to fit into a slot-shaped elongated aperture 140 of a resilient channel-shaped enclosing clip 142.

With the body strap 132 completely encircling the shells 22 and 24 and engaging the shelves 26 thereof, the terminating fingers 136 and 138 will abut against the opposite side of the lateral walls of the wire receiving extensions 34 and 36. The clip 142 is then moved over the extensions 34 and 36 to accommodate the same in its aperture 140, along with the projecting fingers 136 and 138. Being resilient, the clip 140 will yield at its upper and lower ends 144 to flex over and about the leg portions 134 of the body 132 adjacent its fingers 136 and 138 to complete the strap construction and secure the same to the shelves 26. Although the ends 144 may be assembled over the legs 134 by hand, they cannot be removed from engagement therewith without the use of a tool that will fit beneath the ends to flex them off the legs.

Thus, the strap construction 131 serves to secure the shells 22 and 24 together for their hinged relative movement about their rear portions located by the cooperating pins 28 and recesses 30. It serves to secure the two shell members together to form the composite switch housing and to limit their relative spacing which results from the normal urging of the yieldable means 64. It also completely encloses any openings or spaces between the shell members to conceal the internal construction thereof from view, rendering the interior invisible and resulting in an unusually decorative appearance. The tapered rear end 32 of the upper shell 22 remains in surface engagement with the corresponding portion of the lower shell 24 when the two shells are in their normally open position while the tapered shelves 26 permit the hinged movement at their narrowed forward end, but remaining in hinged contact with the strap 131 at their widest rear ends.

The operation of the instant invention is clearly shown in Figs. 3 to 6 inclusive wherein Fig. 6 shows the arrangement of detailed elements in their normal relationship. The shells 22 and 24 of the switch housing are normally urged spaced apart at their forward ends by the yielding spring means 64, while their spacing is limited by the encompassing strap construction 131 that has its legs 134 in complete peripheral encircling engagement with the shelves 26. The strap construction thus completely seals and conceals the interior of the switch and the space between the shell members.

A two-wire line or cord 144 (Fig. 1) entering the switch 20 at the rear thereof, is secured between the wire receiving extensions 34 and 36 of the strapped shell members. One of the two wires of the line 144 will serve as an electrical conductor for the upper contact unit 96, while the other wire will form the conductor for the lower contact unit 94. This is accomplished by winding the stripped end of each one of the lines of the wire 144 about the threads of a screw 120 after the screw heads have been backed off of the inclined legs of their respective contact members. With the stripped end of the wire securely wrapped about the threads of their respective screws, the screws are again threaded tightly into their brackets.

Under normal conditions, the spring contact members 98 and 100 are biased into circuit engagement, with the lower contact member resiliently bearing upon a flat surface 88 of the ratchet device 78 to maintain the same in the pivot slots 52. Hence, under normal conditions, a circuit is closed across the two lines of the wire 144 by way of the engaging contact elements 118 and 130 of the lower and upper contact units 94 and 96 respectively. When in this normal position, the actuator 74 is withdrawn away from the ratchet tooth or jutting lip 90 of the ratchet device while the spring 64 has its perpendicularly disposed legs 66 and 68 in normal closed relationship.

In order to release the maintained circuit of the normally closed lower and upper contact units 94 and 96, the shell members 22 and 24 are compressed toward each other by the simple application of pressure applied to their outer surfaces 146 (Figs. 1 and 2). The applied pressure only need be of sufficient force to overcome the normal urging of the spring 64 serving to separate the shells. As the shells are moved toward each other by the application of pressure, they pass through the intermediate closing position shown in Fig. 4, causing the spring coils to contract, to correspondingly displace the movable leg 68 forwardly along the base of the lower shell member between the guides 44 and 46.

Accordingly, the pawl slide 74 is displaced with its connected displaceable leg 68 of the spring 64. The upwardly bent forward end 92 of the sliding pawl 74 is thus moved into engagement with the facing jutting lip 90 of the ratchet device 78 to progressively engage therewith as the shell members are moved closed toward each other and as the spring 64 is compressed and the legs thereof moved further apart in response to the relative closing movement of the shells.

Continued closing movement of the shells will thereby serve to operate the actuator structure 63 until the

pawl rotatably actuates the ratchet device 78 to present a new flat face 88 to the undersurface of the lower contact member 98 that bears thereagainst. The rotative movement of the ratchet device accordingly serves to rotate the cam 82 that is predeterminately positioned thereon and designed to move into engagement with the undersurface of the forward portion of the upper contact member 100 to forcefully and positively lift the same out of engagement with the lower contact member 98.

It will be recognized that each time the shell members 22 and 24 are compressed together to close the space therebetween at their forward ends, the actuating mechanism 63 will operate in response thereto to rotate the ratchet device 78 one-quarter turn. Because the cam surfaces 84 and 86 are arranged in alignment with alternate ratchet surfaces 88, each quarter turn of the ratchet will cause the contact members 98 and 100 to move into or out of closing circuit engagement alternately in response to sucessive closing movements of the shell members of the housing.

Assuming that the structural details of the maintained switch 20 are originally in the relative positions as shown in Fig. 6, the actuating structure will operate in response to a closing movement of the shell members 22 and 24, to cause the rotation of the ratchet and cam 82. As the cam is rotated from its inactive position in Fig. 6 toward its active position in Fig. 3, it will engage with the undersurface of the upper contact member 100, separating the same from the lower contact member to open the circuit therebetween. When pressure on the shells is relaxed, the legs of the spring 64 will again move back to their normal position and the shells will be expanded and spaced from each other to assume the position shown in Fig. 3 in response to the normal urging of the spring.

With the contacts open as shown in Fig. 3, a further successive compression of the shells will cause the actuator mechanism 63 to assume the intermediate position as shown in Fig. 4. Fig. 4 shows the contact disengaging cam surface partially moved out of engagement with the upper contact member 100. Continued compression of the shells toward each other will cause them to assume the closed position as shown in Fig. 5 wherein the disengaging cam surface is moved fully out of engagement with the contact 100 and is substantially perpendicular to the upper contact member. The contact member is thus permitted to resume its normally closed circuit engaging position with the lower contact member 98. Relaxation of pressure on the shells automatically will permit them to resume their normally spaced relationship in response to the normal urging of the spring 64.

A momentary circuit may be effected for the duration of the compressed closed relationship of the shell members 22 and 24 simply by revising the previously described structure in a manner to be described.

Referring now to Figs. 16, 17, and 18, it will be noted that the structural details of the switch generally identified 149 are basically the same as those described with respect to the switch 20. It differs therefrom only in the provision of an inclined finger 150 that is provided on the lower contact member 98 of the lower contact unit 94. The inclined surface 150 is adapted to be engaged and caused to move upwardly by the operation of an actuator slide 152 more clearly shown in Fig. 18. The slide 152 is substituted for the pawl 74 of the previously described maintained switch.

The displaceable end 68 of the spring 64 is secured to the slide 152 in a notched opening 154 defined between an abutment 156 and cam means 158. Slide 152 is adapted to be guided for sliding movement between the guide blocks 44 and 46 in the same manner as in the pawl 74. The cam means 158 is provided with an actuating cam surface 160 that is inclined for complementary engagement with the inclined surface 150 provided on the lower contact member 98. The sliding displacement of the actuator slide 152, in response to the displacement of the spring end 68 in accordance with and in response to the closing and opening hinged movements of the shells 22 and 24, is accomplished much in the same manner as the pawl 74 previously described.

However, in the instantaneous or momentary switch shown in Figs. 16 to 18, the lower and upper spring contact members 98 and 100 are normally biased apart into spaced relationship rather than into contact circuit engaging relationship as in the maintained switch 20 previously described. Hence, to close a circuit across the contact members 98 and 100 in the instant embodiment 149, it is necessary to physically and positively move the contact members into engagement. This engagement is effected each time that the shell members 22 and 24 are hingedly moved closer toward each other to assume the position as shown in Fig. 17.

As the shells are compressed closed, the movable leg 68 of the spring is displaced, moving the slide 152 with it. The forward cam surface 160 is progressively moved toward and into complementary engagement with the inclined surface 150 of the lower contact member 98. Continued forward displacement of the slide will positively lift the contact member 98 to cause the same to move into engagement with the upper contact member 100 until its topmost cam surface 162 is in seating engagement with the underside of the lower contact member 98. This seating engagement will retain the contact member 98 in circuit closing engagement with the upper contact member 100 for as long as the shells 22 and 24 are compressed into their closed relationship as shown in Fig. 17.

Relaxation of pressure on the shells thus allows the normal force applied by the yieldable means 64 to again automatically urge the shells into their spaced separated relationship as shown in Fig. 16. The movement of the spring 64 toward its normal position retracts and displaces its movable end 68 closer to the immovable end 66 to move with it the slide 152. As the slide is moved away from and out of engagement with the undersurface of the lower contact member 98 and progressively out of camming engagement with the inclined surface 150, the lower contact member is caused automatically to resume its open position with respect to the upper contact member 100.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to several preferred embodiments thereof, it will be understood that various omissions and substitutions and changes in the form and details of the devices illustrated and in their operations may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.

I claim:

1. An electric switch comprising oppositely disposed normally spaced members joined about a portion thereof for relative movement, strap means enclosing the space between said members and joining the same together at said portion for said relative movement, electrical contact means between said members to open or close a circuit, and actuator means including means normally spacing said members and responsive to their relative movement to open or close said contact means.

2. An electric switch comprising a pair of shells coacting for hinged opening or closing relative movement, electric contact means between said shells engageable to close a circuit therebetween, actuator means to urge said shells to a normally open-sided relationship and responsive to the relative movements of said shells to cause said contact means to assume open or closed positions, and means engaging said shells to fully enclose the normally open sides thereof and retain the same together for said coacting hinged relative movement.

3. In an electric switch, a housing defined by upper

and lower oppositely disposed members of mirror-hand exteriors, said members each having a body and an encompassing shelf extending from the exterior of said body, said shelf being symmetrical on the opposite sides of each of said bodies and tapering upwardly from the front end toward the rear end thereof, said members being normally spaced from each other at their front ends and coacting at their rear ends for hinged relative movement, strap means encircling said members and engageable with said shelves to retain the members together for said coacting hinged relative movement and to conceal the space therebetween.

4. In a switch as in claim 3, a pair of electrical contact means fastened in said lower member for circuit engagement, and actuator means responsive to the closing movement of said members to cause said contact means to move into or out of circuit engagement and including means yieldable to constantly urge said members into said normally spaced relationship.

5. In a switch as in claim 3, said strap means being in the form of a channel having a substantially C-shaped body terminating at the respective ends thereof in perpendicularly disposed relatively spaced fingers and including a channel-shaped resilient clip having an opening therein to receive said fingers and secure said strap about said shelves.

6. An electric switch comprising a housing having upper and lower shells hingedly movable at one of their ends and normally spaced from each other at the other of their ends, strap means encircling said shells to seal said space therebetween and engageable therewith to retain the same together for said hinged movement, contact means in said housing, actuator means to cause said contact means to move between open and closed positions, said actuator means including means yieldably urging said shells into said spaced relationship and responsive to the movement thereof to operate said actuator means.

7. An electric switch as in claim 6, means to fasten said contact means in said lower shell, said actuator means being mounted in said lower shell and including means engageable with said contact means to cause the same to move between open and closed positions alternately in response to successive shell closing movements.

8. An electric switch as in claim 6, means to fasten said contact means in said lower shell, said actuator means being mounted in said lower shell and including means engageable with said contact means to close the same in response to the closing movement of said shells.

9. An electric switch comprising a housing including oppositely disposed normally spaced members hingedly moved closed in response to pressure applied thereto, strap means encircling said members and engageable therewith to conceal the space therebetween and to retain the same together for said hinged movement, electrical contacts in said housing, an actuator in said housing to cause said contacts to move between closed and open positions, and spring means included in said actuator and having a normal position to constantly urge said members into their normal spaced relationship and displaceable by the closing of said members to operate said actuator.

10. A switch as in claim 9, wherein said actuator comprises a ratchet rotatably mounted in one of said members and having predeterminately arranged cam means engageable with a certain one of said contacts to open the same or permit the same to close alternately in response to successive closing movements of said members, and pawl means connected with said spring means and responsive to the displacement thereof to successively engage said ratchet to rotate the same and said cam means.

11. An electric switch as in claim 9, said actuator comprising a slide connected with said spring means and having cam means thereon engageable with a certain one of said contacts to close said contacts in response to the displacement of said spring means.

12. An electric switch comprising a housing including normally spaced upper and lower relatively movable members, means urging said members into spaced relationship and displaceable in said housing in response to their relative movement, means encircling said housing and coacting with said members to limit the space therebetween, upper and lower contact members, and actuating means including said urging means to cause the operation of said contact members between open and closed positions in response to the displacement of said urging means.

13. An electric switch as in claim 12, said urging means being a coil spring having an end thereof immovably mounted in said lower housing member and the other end thereof being connected with said actuating means, and its coil being engageable with said upper housing member.

14. An electric switch as in claim 13, upper and lower preassembled contact units, said units each including a bracket having means to fasten the same to said lower housing member and means cooperable with said bracket to secure a respective one of said contact members thereto.

15. A momentary switch comprising upper and lower normally spaced relatively movable shells each having a shelf, cooperating positioning means on each of said shells, strap means engaging said shelves to limit the separation of said shells and concealing the space therebetween, a cam slide longitudinally displaceable in said lower shell and having a cam face, a coil spring connected at its one end with said slide and seated on said lower shell at the other end thereof, the coils of said spring applying a force to said upper shell normally to space the same from said lower shell, normally open upper and lower contact units each including a contact member, a bracket secured to each of said contact members, one of said brackets immovably securing said other end of said coil to said lower shell, means on said brackets to secure its respective contact unit to said lower shell, and one of said contact members having a cam face engageable with said cam face of the cam slide whereby relative closing movement of said shells will close said contact members and spacing movement of said shells will permit said contact members to open.

16. A maintained switch comprising upper and lower normally spaced relatively movable shells each having cooperating positioning means, strap means engaging said shells to limit the separation thereof and to conceal the space therebetween, upper and lower contact units each including a contact member, a bracket, each bracket being secured to its respective contact member, said contact units each being secured in one of said shells by their respective brackets, a coil spring between said contact units having one of its legs immovably secured to said one shell by one of said brackets and its coils applying a force on the other of said shells to space the shells from each other, rotatable cam means mounted in said one shell and adapted to engage said contact members to open the same and to permit the same to close alternately in response to successive space closing movements of said shells, and means between said cam means and the other leg of said spring to rotate said cam means in response to the space closing movements of said shells.

17. A switch comprising upper and lower normally spaced shells arranged for hinged relative movement, strap means engaging said shells to limit their separation and to conceal the space therebetween, upper and lower contact units each including a contact member, a bracket included in each of said units and having means to secure its respective unit to one of said shells yieldable means immovably secured to said one shell by one of said brackets and constantly urging the other of said shells away from said one shell, cam means mounted on said one shell and movable to cause the movement of said contact members between open and closed positions, said yieldable means having displacing movement in

response to the relative movement of said shells, and means connected to said yieldable means to move said cam means in response to the displacing movement thereof.

18. A switch comprising a composite housing defined by oppositely disposed normally spaced shells of mirror-hand exterior having hinged relative movement, means encircling said shells to limit and conceal the space therebetween and to retain the same together for said hinged relative movement, operable cam means, a plurality of contact members movable between open and closed positions in response to the operation of said cam means, and means yieldingly urging said shells into their normally spaced relationship and movable in response to their hinged relative movement to operate said cam means.

19. A switch as in claim 18, rotatable ratchet means to operate said cam, and pawl means connected with said yielding means for movement therewith to rotate said ratchet means.

20. A switch as in claim 18, means slidable in said one of said shells and connected with said yielding means for movement therewith to operate said cam means.

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