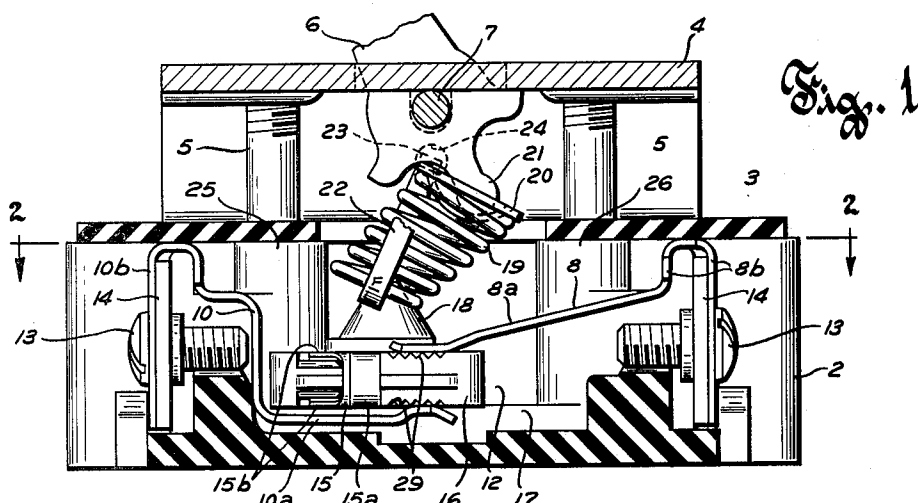
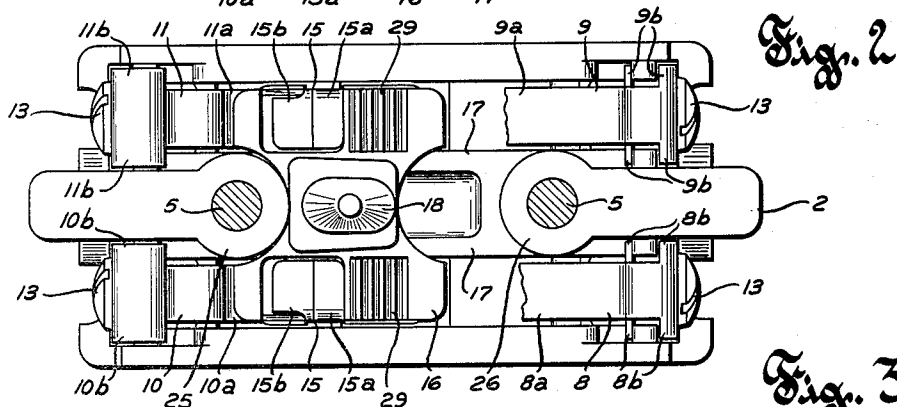
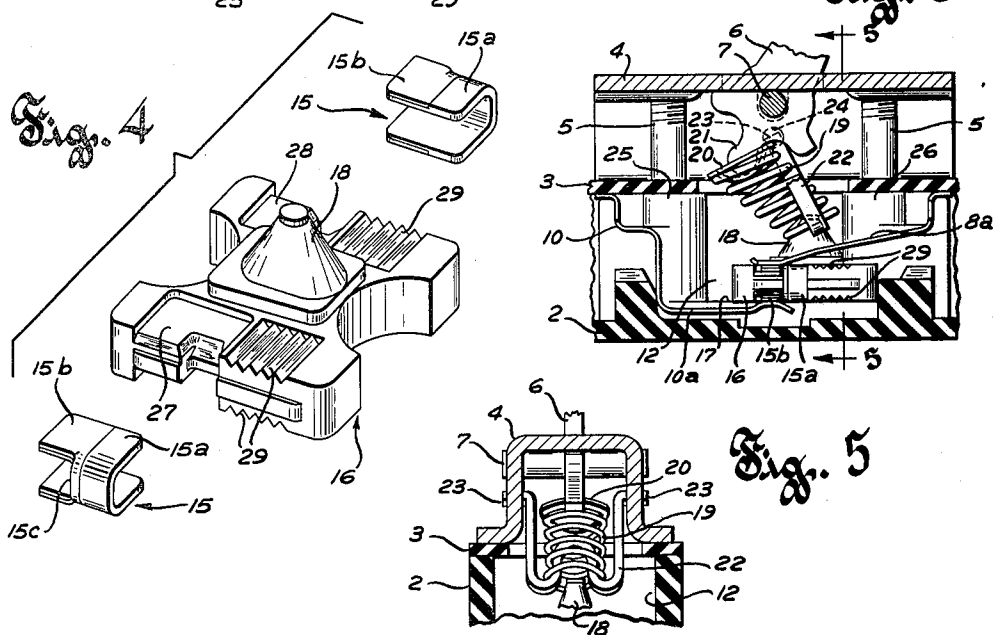


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SWITCH HAVING IMPROVED MOVABLE CONTACT HOLDING
MEANS AND CONTACT CLEANING MEANS
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ELECTRICAL SWITCH HAVING IMPROVED MOVABLE CONTACT HOLDING MEANS AND CONTACT CLEANING MEANS

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2 Claims. (Cl. 200-166)

This invention relates to electrical switches and more particularly to sliding contact holders therefor.

It is an object of this invention to provide an improved sliding contact assembly comprising movable bridging contact means and a sliding holder therefor.

It is a more specific object of this invention to provide a molded movable contact holder with means for improvement of creepage distance between contacts, arc interrupting and extinguishing characteristics, lubrication, contact cleaning and other desirable characteristics.

Other objects and advantages of this invention will hereinafter appear.

While the device hereinafter described is effective to fulfill the stated objects, it is not intended that the invention be confined to the particular preferred embodiment disclosed since it is susceptible of various modifications without departing from the scope of the appended claims.

In the drawings:

FIGURE 1 is a sectional view of a switch which embodies the present invention;

FIG. 2 is a sectional view taken on line 2-2 of FIG. 1;

FIG. 3 is a fragmentary sectional view of the switch similar to FIG. 1 but with the mechanism in the opposite operating position;

FIG. 4 is an isometric view of the movable contacts and the sliding contact holder for the switch; and

FIG. 5 is a fragmentary sectional view taken on line 5-5 of FIG. 3.

Referring to the drawings, the preferred form of switch incorporating the invention has a housing generally comprising a base 2 molded from suitable electrically insulating material, an insulating plate 3 closing the open top of the base, and a metallic inverted U-shaped cover 4 positioned on top of plate 3 and secured to the base 2 by screws 5. A toggle actuator 6 has a shaft 7 pivotally mounted on cover 4 and extends upwardly through an aperture in cover 4. Within base 2 are located laterally spaced apart pairs of resilient combination terminal and stationary contact members, comprising upper members 8 and 9 and lower members 10 and 11.

Members 8 and 9 have contact arms 8a and 9a extending generally horizontally partially across a central cavity 12 in base 2 from one end thereof. At the other end of members 8 and 9, projecting edges 8b and 9b engage recesses in the interior walls of base 2 to hold members 8 and 9 in place. Lower contact members 10 and 11 have horizontal cantilever contact arms 10a and 11a extending partially across the bottom of cavity 12. Members 10 and 11 are secured at their other ends by the engagement of projecting edges 10b and 11b with recesses in the interior walls of base 2. Electrical connecting means are provided at the vertical outward facing portion of each contact member by screws 13 which pass through apertures in each of members 8, 9, 10 and 11 to engage threaded apertures in plates 14.

The two movable bridging contacts 15 are generally U-shaped metallic strips comprising base metal portions 15a and inlaid metal portions 15b. A recess 15c (FIG. 4) is formed in the bight of each of contacts 15. Portion 15a is made of a metal such as copper having good arc interrupting characteristics while the metal of portion 15b is

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coin silver or a similar metal having low contact resistance.

A movable contact holder 16, a one-piece molding of insulating phenolic resin, is horizontally slidable on parallel upstanding ribs 17 formed in the bottom of recess 12 and engages overlapping aligned contact portions of arms 8a, 9a, 10a and 11a at the top and bottom surfaces thereof. With contact holder 16 interposed between contact arms 8a, 9a, 10a and 11a, the opposing spaced apart pairs of arms are resiliently biased toward one another and into firm contact with holder 16. A generally frusto-conical member 18 projects from the top surface of contact holder 16 to be engaged and driven by an overcenter spring mechanism which includes a spring 19. Member 18 is integrally formed of insulating material rather than a separate metallic piece to increase the electrical isolation between the two poles of the switch. The lower turn of coiled compression spring 19 seats against member 18 adjacent the apex of the latter. A hemispherical cup-shaped spring guide 20 seats against and extends into the coils of spring 19 at the upper end thereof. The projecting lower end 21 of actuator 6 bears against the inner surface of the cup of guide 20. A spring holding bail 22 has outwardly extending journal portions 23 which seat on aligned bearing openings 24 (FIG. 1). Downwardly depending parallel legs of bail 22 straddle spring 19 and the lower end of bail 22 is provided with a generally W-shaped form (see FIG. 5) so that the lower end coil of spring 19 is gripped in the saddles with bail 22 clearing the top of member 18.

As best shown in FIG. 2, contact holder 16 is provided with semi-circular recessed in the opposite ends thereof so a greater range of rectilinear movement is afforded member 16 between the semi-circular bosses 25 and 26 which extend from the bottom of recess 12 to the upper end thereof.

As may be best seen in FIG. 4, member 16 is provided with a pair of roughly saddle-shaped contact holding recesses 27 and 28 which traverse the opposite edges of contact holder 16 and conform generally with the shapes of contacts 15. When pressed into recesses 27 and 28, the upper and lower legs of contact 15 are spread slightly to snugly engage the corresponding surfaces of recesses 27 and 28 to thereby hold contacts 15 in place, straddling the edge of holder 16. Contacts 15 may be additionally clinched or otherwise further fastened to holder 16 for additional strength if desired. The depth of recesses 27 and 28 is such that the upper and lower contact making surfaces of contacts 15 are flush with the corresponding upper and lower surfaces of contact holder 16, to reduce vertical flexing of the stationary contact arms 8a, 9a, 10a and 11a as the holder 16 moves between its opposite positions.

Adjacent the contact making surfaces of contacts 15, there are molded into the top and bottom surfaces of contact holder 16 rectangular areas having closely spaced grooves 29 formed thereon perpendicular to the direction of movement of contact holder 16.

FIG. 1 shows the switch mechanism in the "off" position with the actuator 6 rotated to its extreme counterclockwise position and the lower end of spring 19 holding sliding contact holder 16 in its most leftward position. In this position contacts 15 are to the left and clear of the opposed contact members 8a and 10a. Grooves 29 are then interposed between and in contact with the opposing pairs of stationary contacts. When actuator 6 is moved in a clockwise direction to its opposite position, the projection 21 moves the upper end of spring 19 to the left. As the upper end of spring 19 passes the center position with respect to bail 22, the lower end of spring 19 swings suddenly to the right and by its engagement with member 18 slides contact holder 16 rapidly to the

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right to the "on" position. As holder 16 moves to the right, initial contact is established between the upper and lower stationary contacts through that portion 15a of the bridging contact which has the superior arc interrupting characteristics. As the holder 16 moves further to the right to abut against boss 26, portions 15b, which have the better contact resistance characteristics, moves between the stationary contacts 8a, 9a, 10a and 11a.

When actuator 6 is moved in the counterclockwise direction from its "on" position, contact holder 16 is moved by means of the overcenter spring mechanism previously described toward the left with a snap action to the "off" position. As movable contacts 15 move from between the stationary contacts, the resultant arcs occur on those portions 15a of movable contacts 15 which exhibit the superior arc resistant qualities.

The grooved areas 29 contribute to improved switch performance in several ways. First, as contact carrier 16 moves between its two positions the mildly abrading action of the relatively sharp peaks or ridges between the grooves help to clean the contact making surfaces of stationary contact arms 8a, 9a, 10a and 11a and the grooves provide space for deposition of the abraded contaminants. These stationary contacts are thereby kept free of corrosion products, dirt and other substances which would otherwise increase contact resistance. Grooves 29 are also useful for holding lubricants when desired and distributing such lubricants over the contact making surfaces. Further, when an arc is drawn between movable and stationary contacts upon opening of the contacts, grooves 19 provide an adjacent source of cooling lubricant or air to aid in extinguishing the arc. In the "off" position the grooves increase the creepage distance on the surface of the molding 16 between stationary and movable contacts. Also, when holder 16 is in the "off" position the presence of the sharply pointed grooves 19 reduces the amount of phenolic or other molding material of the holder 16 which is in contact with the contact making surfaces of the stationary contact arms 8a, 9a, 10a and 11a and thereby reduces any tendency toward contamination of the contact surface with insulating material.

I claim:

1. In an electric switch a housing, a pair of resilient

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spaced apart stationary contacts mounted in said housing, a bridging contact movable between said stationary contacts into and out of bridging contact with said stationary contacts, a molded insulating holder between said stationary contacts holding said bridging contact and being movable in sliding engagement with said stationary contacts, said holder further having a plurality of parallel closely spaced grooves substantially perpendicular to the direction of movement of said holder and formed on the surface of said holder adjacent said bridging contact on the surfaces of said holder which slidably engage said stationary contacts, said grooves having relatively sharp edges formed therebetween for mildly abrading the contact making surfaces of said stationary contacts.

2. In an electric switch, in combination, a housing, a pair of resilient stationary contacts mounted in said housing and insulated from but biased toward each other, a movable bridging contact, an insulating movable contact holder between said stationary contacts holding said movable contact and rectilinearly movable in said housing in opposite directions to move said movable contact between said stationary contacts in and out of bridging contact making engagement with said stationary contacts, said contact holder serving to hold said stationary contacts apart when said movable contact is out of contact with said stationary contacts, and a plurality of parallel closely spaced grooves formed in said holder substantially perpendicular to the direction of movement of said holder and on the surfaces on opposite sides of said holder which engage said stationary contacts, said grooves having relatively sharp edges formed therebetween for mildly abrading the contact making surfaces of said stationary contacts.

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