

[54] **CONTACT HOLDER WITH ADJUSTABLY MOUNTED SWITCH**

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[22] Filed: **Mar. 22, 1973**

[21] Appl. No.: **343,851**

[52] U.S. Cl. **337/6, 337/143, 337/148,**
337/198, 337/254

[51] Int. Cl. **H01h 85/00, H01h 71/20**

[58] Field of Search **337/6, 7, 143, 146, 148,**
337/253, 254, 194, 195, 197, 198, 227

[56] **References Cited**

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[57]

ABSTRACT

A female-type clip or holder removably engages a terminal of an electrical device having an ejectable pin means. The terminal is engaged by the spaced arms of the holder, with one of these arms being relatively stiff and the other being relatively flexible. Biasing means acting on the flexible arm provides pressure between the holder and the terminal held therein. A normally open switch is mounted to the relatively stiff arm so as to be adjustable for differently sized electrical devices.

10 Claims, 7 Drawing Figures

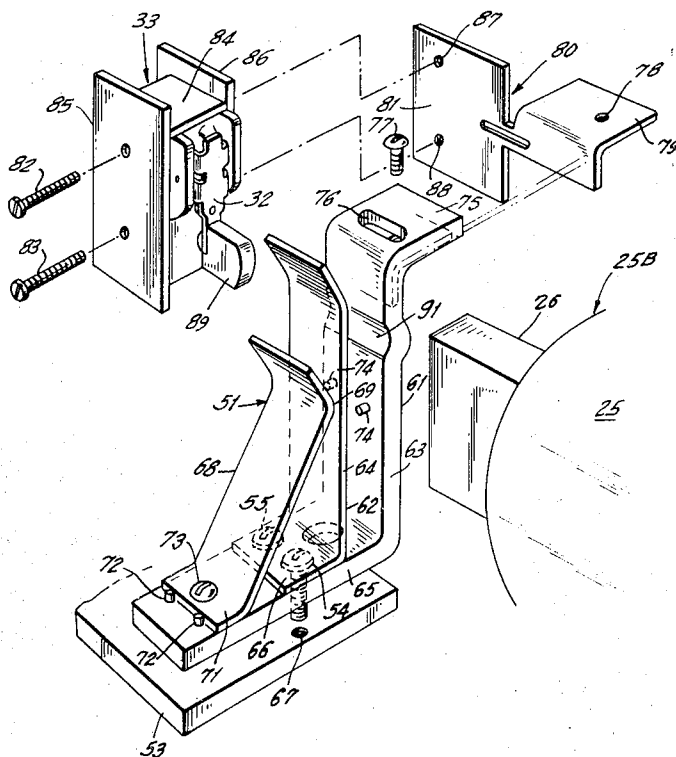


FIG. 1

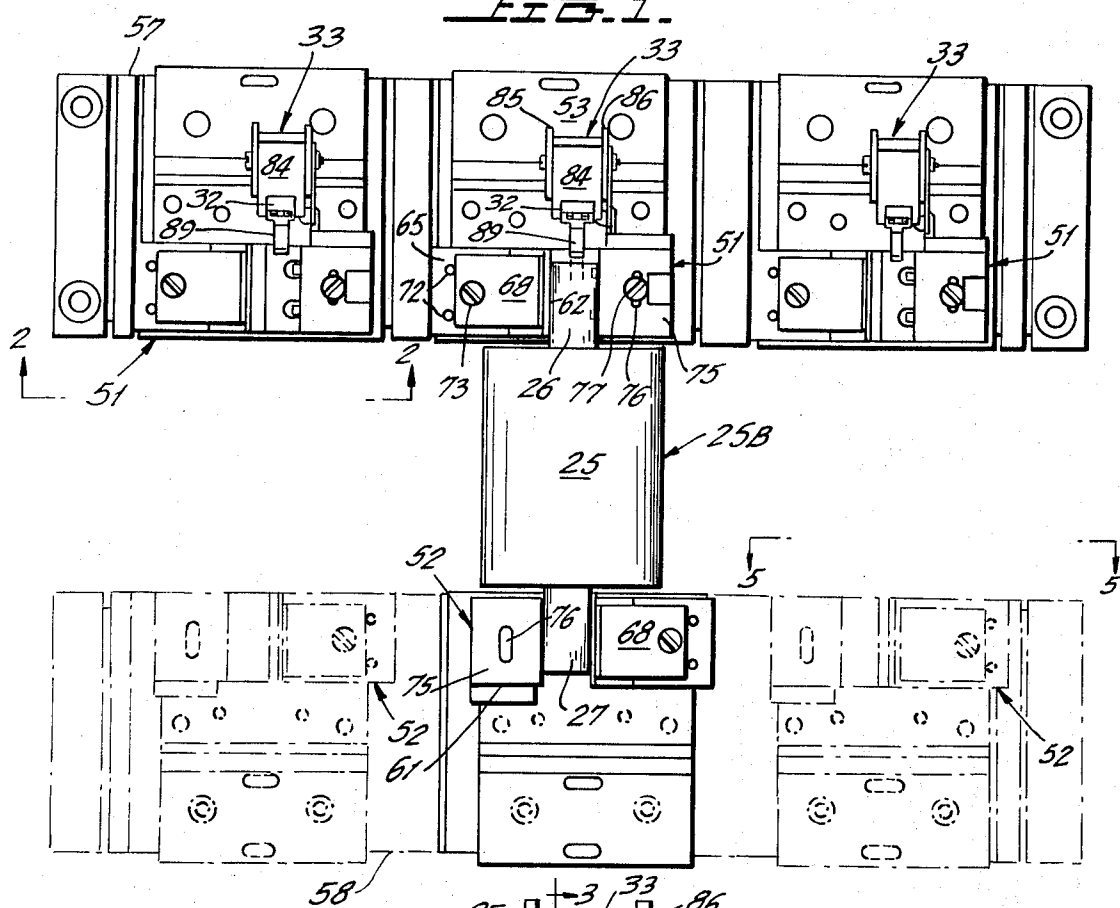
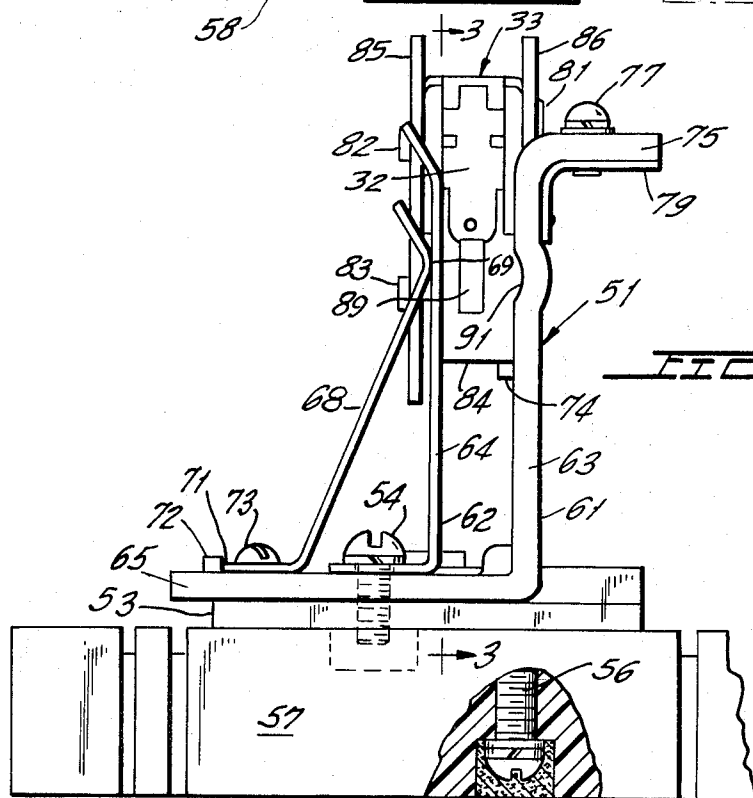


FIG. 2



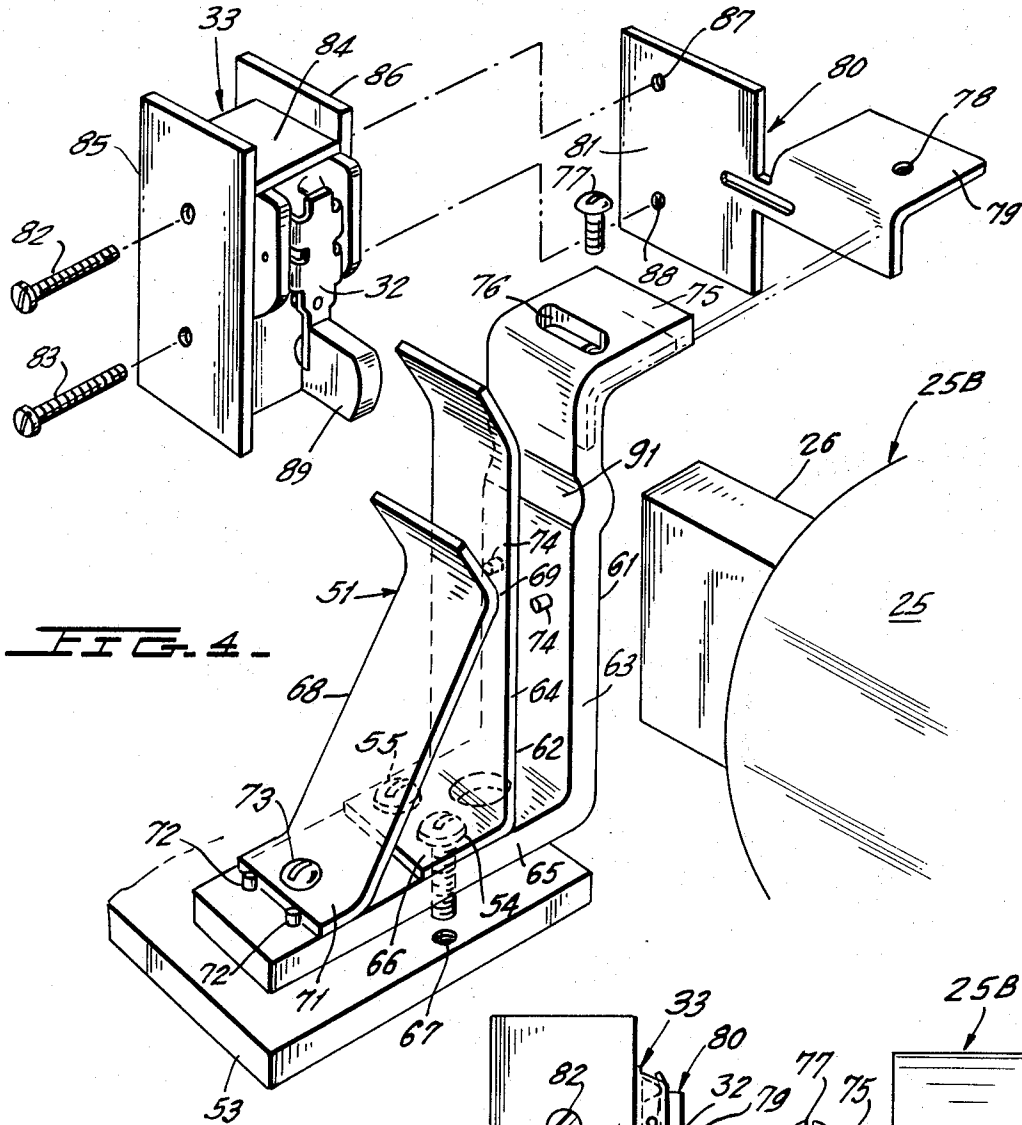
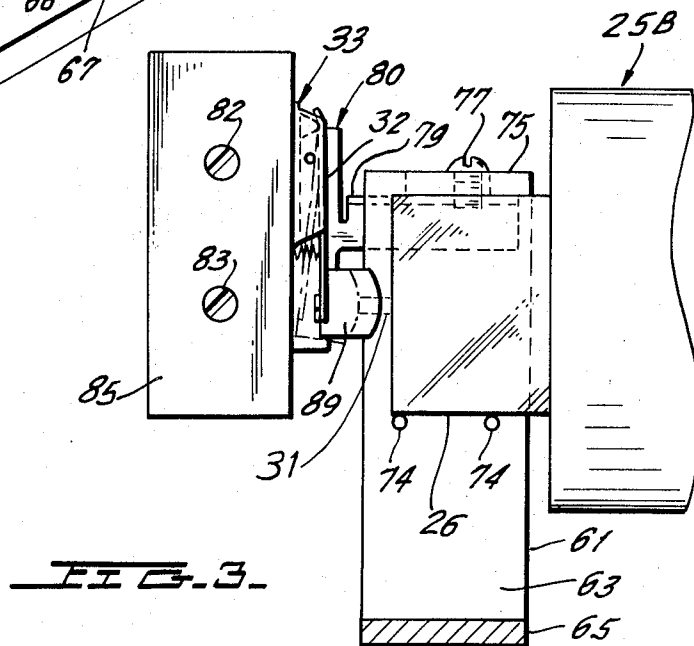


FIG. 7.

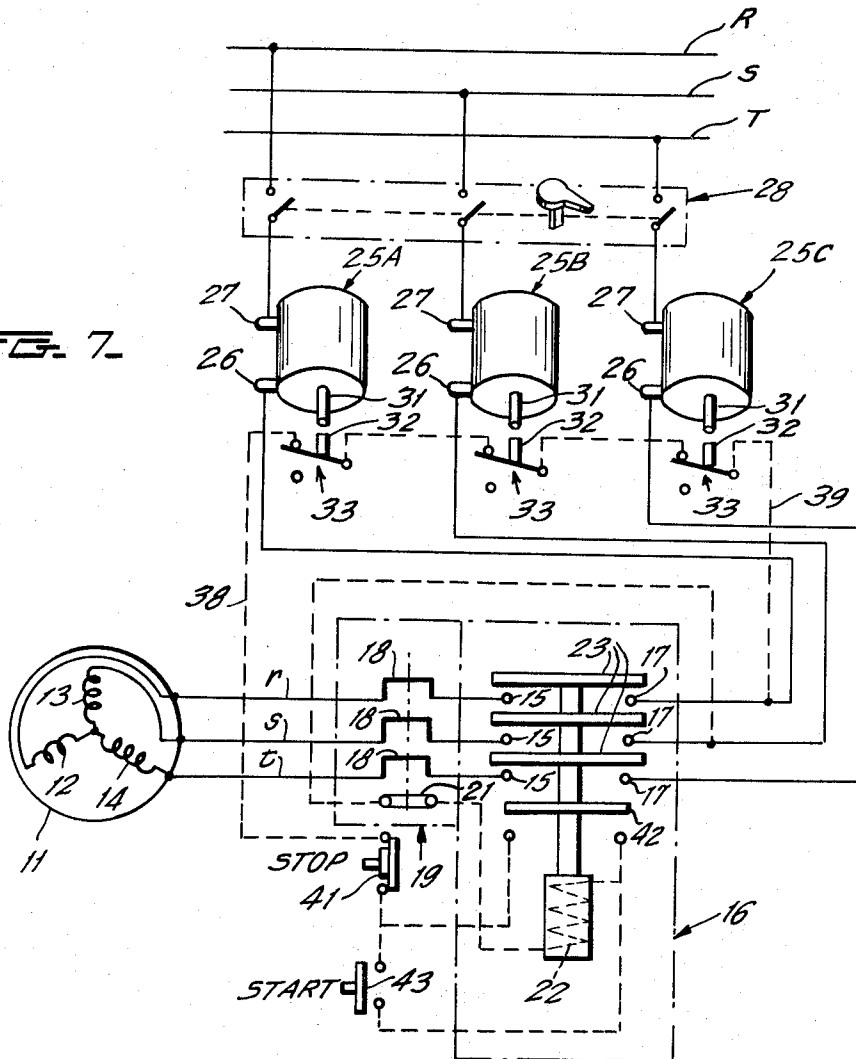


FIG. 5.

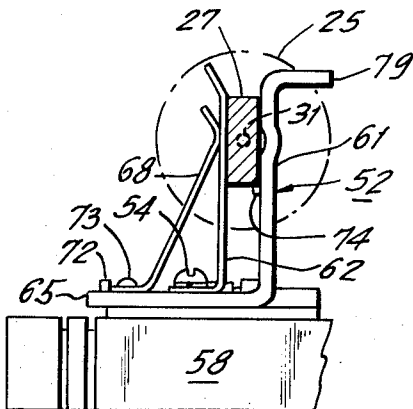
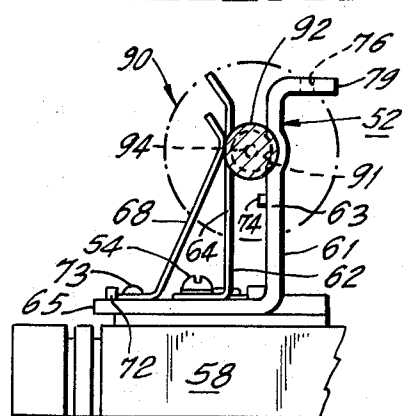


FIG. 6.



CONTACT HOLDER WITH ADJUSTABLY MOUNTED SWITCH

This invention relates to fuse-type clips or holders in general and more particularly relates to holders of this type having a switch adjustably mounted thereon for operation thereof by the electrical device in the holder.

Copending application Ser. No. 248,859, filed May 1, 1972, by J. B. Cataldo and F. W. Kussy, for a Motor Protecting Means, and assigned to the assignee of the instant invention, describes a motor controller consisting of an electromagnetic contactor and its associated overload relays coordinated with fast-acting fusible elements known as motor short-circuit protectors. Each protector (hereinafter "MSCP") is provided with a normally restrained striker pin that is released when the MSCP blows. In the aforesaid copending application Ser. No. 248,859, the MSCPs of all phases are positioned so that the striker pins, when released, act on a common trip bar to open a normally closed switch in the energizing circuit for the contactor coil, thereby de-energizing the coil and bringing about opening of the contactor whenever any one of the MSCPs blows.

In accordance with the instant invention, an electromagnetic contactor and its associated overload relays are coordinated with MSCPs, with the striker pin of each MSCP acting to open an individual normally closed switch when the particular MSCP blows. All of these normally closed switches are series connected in the energizing circuit for the contactor coil, so that opening any one of them deenergizes the contactor coil. Each of these switches is adjustably mounted on the jaw of a contact clip or holder that removably receives a contact at one end of the MSCP. With the MSCP mounted in the holder, the MSCP striker pin is aligned with a switch actuator. The switch is adjustable with respect to the holder for compatibility with differently sized MSCPs, so that the switch actuator is engageable by the striker pin upon ejection thereof to open the normally closed switch.

Accordingly, a primary object of the instant invention is to provide a novel construction for a holder that removably receives either blade or cylinder-type contacts.

Another object is to provide a switch means mounted to a holder and positioned so as to be actuated by a striker pin of a fusible device mounted to the holder.

Still another object is to provide a switch means adjustably mounted to a jaw-type holder that removably mounts one end of a fusible element having a releasable striker pin for actuating the switch.

These objects as well as other objects of this invention will become readily apparent after reading the following description of the accompanying drawings in which:

FIG. 1 is a plan view showing holders constructed in accordance with the instant invention for removably securing three MSCPs.

FIG. 2 is an end view looking in the direction of arrows 2—2 of FIG. 1, showing a holder having a switch mounted thereon. FIG. 3 is a cross-section of the holder taken through line 3—3 of FIG. 2, looking in the direction of arrows 3—3.

FIG. 4 is an exploded perspective showing the relationship between a fuse holder, a switch adjustably mounted thereto, and a blade-type MSCP terminal.

FIG. 5 is an end view looking in the direction of arrows 5—5 of FIG. 1, showing a holder having a blade-type terminal mounted therein.

FIG. 6 is an end view of the holder of FIG. 5, with a cylinder-type terminal mounted therein.

FIG. 7 is an electrical schematic of an electromagnetic contact, its overload-relay means, and a set of MSCPs.

Now referring to the figures and more particularly to FIG. 7. Three-phase motor 11 includes wye-connected winding 12, 13, 14, connected through lines *r*, *s*, *t* and individual heaters 18 to individual load terminals 15 of electromagnetic contactor 16 having three movable contacts, each designated 23. Heaters 18 are part of three-phase overload relay 19 of a type described in U.S. Pat. No. 3,288,964, issued Nov. 29, 1966, to J. B. Cataldo et al., for a *Spring Trip Multi-Phase Overload Relay Having A U-Shaped Bimetal With A Pivot Pin At Its Web Portion*. In a manner well known to the art, when any of the heaters 18 becomes sufficiently heated, bimetal means (not shown) is effective to open normally closed switch 21 and, in so doing, opens the energizing circuit for contactor coil 22. The latter, when energized, causes main bridging contacts 23 to engage their respective load and line contacts 15 and 17.

Contacts 17 are connected through other sections of conductors *r*, *s*, and *t* to load terminals of the respective MSCPs, whose respective MSCPs, whose respective line terminals 27 are connected through individual poles of three-phase disconnect switch 28 to the respective energizing lines *R*, *S*, and *T*. Each MSCP is of a construction illustrated in U.S. Patent application Ser. No. 98,423, filed Dec. 15, 1970, and assigned to the assignee of the instant invention. In particular, MSCPs 25A, 25B, 25C are identical, with each of them including a fusible element which, upon rupturing, releases striker pin 31 for axial movement to engage actuator 32 of normally opened switch 33 to open the contacts thereof. MSCP 25B also includes a cylindrical body 25 having axially extending blade-type terminals 26, 27 (FIG. 1) at opposite ends thereof. Striker pin 31 is also located along the longitudinal axis of body 25. Prior to tripping or blowing of MSCP 25B, its striker pin 31 is retained within terminal 26.

All three switches 33 are connected in a series combination that is connected through lines 38, 39 to stop switch 41 and line *r*, respectively. Thus, switch 33 is in the energizing circuit for contactor operating coil 22, said circuit also including normally closed stop switch 41 and holding contact 42, the latter being operated to closed position by energization of coil 22. Normally opened start switch 43 parallels holding switch 42.

Since all of the MSCPs 25A, 25B, 25C are mounted in the same manner, only the mounting of MSCP 25B will be described in detail, with particular reference to FIGS. 1—5. Axially extending blade-type terminals 26, 27 of MSCP 25B are removably engaged by spaced female-type contact clips or holders 51, 52, respectively, of essentially identical construction. Each holder 51 is secured to the upper surface of an individual terminal pad 53 by a pair of screws 54, 55. Screws 56, extending upward from the bottom of insulation strip 57, secure terminal pads 53 to the upper surface of elongated insulator 57. In a similar manner, holders 52 are mounted to insulating strip 58 that extends parallel to insulator 57 and in spaced relationship.

Holder 51 includes L-shaped jaw members 61, 62 having spaced upwardly extending generally parallel legs 63, 64, respectively. Extending generally at right angles to legs 63, 64 are feet 65, 66 respectively, with the latter being seated on top of the former. Screws 54, 55 extend through clearance apertures in feet 65, 66 and are received by threaded apertures 67 in terminal 53. Member 61 is considerably thicker than member 62, so that the former is relatively rigid and the latter is relatively flexible. Leaf-spring 68 is diagonally positioned, so that bend 69 at the upper end thereof bears against the outer surface of leg 64, and the offset lower portion 71 of spring 68 is seated on the upper surface of foot 65 outboard of foot 66. The outboard edge of offset 71 bears against protrusions 72 extending upward from foot 65 to assist in positioning spring 68 as it is being fastened to foot 65 by screw 73 that passes through a clearance aperture (not shown) in the lower offset of spring 68 and is received by a threaded aperture (not shown) in foot 65. The normal angle of offset 71 is such that the tightening force exerted by screw 73 causes upper bend 69 of spring 68 to bear firmly against leg 64, urging the latter from its normal position toward leg 63. The normal spacing between legs 63, 64 is slightly less than the width of terminal blade 26, so that insertion of the latter between legs 63, 64 deflects leg 64 away from leg 63, whereby loading biasing spring 68 so that legs 63, 64 firmly engage the sides of contact blade 26 therebetween. Protrusions 74, extending from leg 63 toward leg 64, are engaged by the lower edge of blade 26 for operative positioning thereof.

The upper end of leg 63 is provided with ear 75 that extends generally parallel to foot 65, but in the direction opposite thereto. Ear 75 is provided with elongated adjusting slot 76 that provides clearance and guidance for clamping screw 77 that is received by threaded aperture 78 in horizontal ear 79 of bracket 80. Ear 78 bears against the lower surface of ear 75, so that by tightening screw 77 bracket 80 is frictionally held in an adjusted position with respect to holder 51. Main section 81 of bracket 80 extends generally at right angles to ear 79 and is positioned forward thereof. Screws 82, 83 extend through transverse clearance apertures in molded housing 84 of switch 33 and through clearance apertures in insulating sheets 85, 86 positioned on opposite sides of housing 84 to be received by the respective threaded apertures 87, 88 in the main section 81 of bracket 80, so that switch 33 is positioned forward of holder 51. Insulating tip 89 of switch actuator 32 is positioned in alignment with the space between legs 63, 64 and aligned with striker pin 31. Clamping screw 77 is positioned within slot 76, so that striker pin 31 upon release thereof engages extension 89 of switch actuator 32 to operate switch 33 to its open position.

Leg 63, at a point intermediate its upper end and locating protrusions 74, is provided with transverse arcuate depression 91 that serves to receive cylindrical terminal 92 of MSCP 90 (FIG. 6). In an appropriately rated device, MSCP 90 is removably mounted to spaced holders 51, 52 and the operative position of switch 33 is adjusted so that the pin 94 of MSCP 90, upon ejection thereof, will open switch 33. It is noted that neither MSCP terminal 27 nor 92 contains a striker pin even though striker pins 31 and 94 of the other MSCP terminals are shown in FIGS. 5 and 6.

Thus, it is seen that the instant invention provides a novel construction for a holder or clip means that removably engages the terminal of an electrical device. Means are provided to adjustably mount a switch to the clip means, so that the switch may be mechanically operated by a pin ejected from an electrical device mounted by the holder means.

Although in the foregoing there have been described preferred embodiments of this novel invention, many variations and modifications will now become apparent to those skilled in the art, and it is preferred therefore that the instant invention be limited not by the disclosure contained herein but only by the appending claims.

The embodiments of the invention in which an exclusive privilege or property is claimed are defined as follows:

1. Electrical protective apparatus including first and second spaced mounting devices, a fused interrupter having terminals at opposite ends thereof removably held by said mounting devices; said first mounting device including first and second jaw members having respective first and second legs positioned in closely spaced relationship, biasing means urging said second leg toward said first leg to exert pressure clamping one of said terminals between said legs; a switch unit mounted on said first jaw member; said fused interrupter including a normally restrained striker pin that is released and ejected through an aperture in said one of said terminals when said fused interrupter blows; said switch unit including a contact actuator operatively positioned to be engaged and operated by said striker pin upon ejection thereof; said switch unit being repositionable with respect to said first mounting device to adjust the position of said contact actuator relative to said striker pin prior to ejection thereof.

2. Electrical protective apparatus as set forth in claim 1 in which the fused interrupter is elongated and the striker pin moves axially when ejected, said actuator being positionable between said legs and being movable axially as the switch unit is repositionable with respect to the first mounting device.

3. Electrical protective apparatus as set forth in claim 1 in which the surface of said first leg facing said second leg is provided with protrusion means for positioning a blade-type terminal relative to the actuator and a curved depression for positioning a cylindrical terminal relative to the actuator.

4. Electrical protective apparatus as set forth in claim 3 in which the first leg is relatively stiff and the second leg is relatively flexible, said biasing means comprising a leaf spring that deflects said second leg toward said first leg when said one terminal is removed from between said first and second legs.

5. Electrical protective apparatus as set forth in claim 4 in which said first jaw member at one end thereof includes an outwardly extending ear to which said switch unit is mounted, said first jaw member having an outwardly extending first foot at the other end thereof, said second jaw member having an outwardly extending second foot resting on said first foot and secured thereto, said leaf spring having a foot at one end thereof and having the other end thereof bearing against the surface of said second leg remote from said first leg, said foot of said leaf spring resting on said first foot and secured thereto.

6. Electrical protective apparatus including first and second spaced mounting devices, a fused interrupter having terminals at opposite ends thereof removably held by said mounting devices; said first mounting device including first and second jaw members having respective first and second legs positioned in closely spaced relationship, biasing means urging said second leg toward said first leg to exert pressure clamping one of said terminals between said legs; a switch unit mounted on said first jaw member; said fused interrupter including a normally restrained striker pin that is released and ejected through an aperture in said one of said terminals when said fused interrupter blows; said switch unit including a contact actuator operatively positioned to be engaged and operated by said striker pin upon ejection thereof; said switch unit being repositionable with respect to said first mounting device to adjust the position of said contact actuator relative to said striker pin prior to ejection thereof; said first jaw member at one end thereof including an outwardly extending ear to which said switch unit is mounted.

7. Electrical protective apparatus as set forth in claim 6 in which the switch unit is repositionably secured to said ear by a screw extending through an elongated slot.

8. Electrical protective apparatus including first and second spaced mounting devices, a fused interrupter having terminals at opposite ends thereof removably held by said mounting devices; said first mounting device including first and second jaw members having respective first and second legs positioned in closely spaced relationship, biasing means urging said second leg toward said first leg to exert pressure clamping one of said terminals between said legs; a switch unit

mounted on said first jaw member; said fused interrupter including a normally restrained striker pin that is released and ejected through an aperture in said one of said terminals when said fused interrupter blows; said switch unit including a contact actuator operatively positioned to be engaged and operated by said striker pin upon ejection thereof; the surface of said first leg facing said second leg being provided with protrusion means for positioning a blade-type terminal relative to the actuator and a curved depression for positioning a cylindrical terminal relative to the actuator; said first leg being relatively stiff and the second leg being relatively flexible, said biasing means comprising a leaf spring that deflects said second leg toward said first leg when said one terminal is removed from between said first and second legs; said first jaw member at one end thereof including an outwardly extending ear to which said switch unit is mounted, said first jaw member having an outwardly extending first foot at the other end thereof, said second jaw member having an outwardly extending second foot resting on said first foot and secured thereto, said leaf spring having a foot at one end thereof and having the other end thereof bearing against the surface of said second leg remote from said first leg, said foot of said leaf spring resting on said first foot and secured thereto.

9. Electrical protective apparatus as set forth in claim 8 in which the first foot includes protrusion means engaging said foot of said leaf spring at the free edge thereof to operatively position said leaf spring.

10. Electrical protective apparatus as set forth in claim 9 in which the switch unit is repositionably secured to said ear by a screw extending through an elongated slot in said ear of said first jaw member.

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