United States Patent [19]

Ege

[11] **3,805,206**

[45] **Apr. 16, 1974**

[54] **SWITCH**

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[73] Assignee: **Underwriters Safety Device Co.,** Chicago, Ill.

[22] Filed: **June 13, 1973**

[21] Appl. No.: **369,566**

[52] **U.S. Cl.** ..... **337/9,** 200/51.11, 339/19, 339/272 R, 200/162

[51] **Int. Cl.** **H05h 85/00**

[58] **Field of Search** ..... 200/51.11, 162; 339/19, 339/272 R, 222; 337/7, 8, 9

[56] **References Cited**

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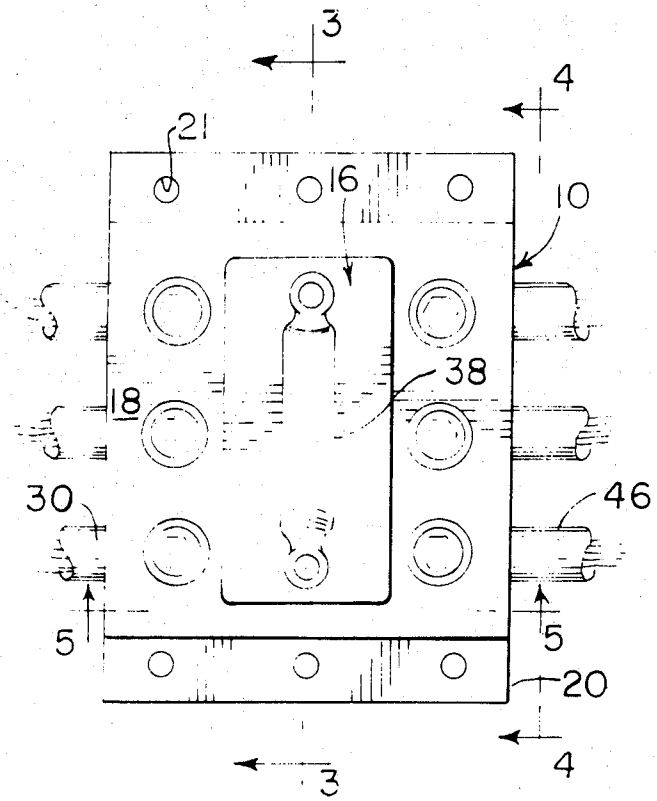
Primary Examiner—David Smith, Jr.
Attorney, Agent, or Firm—Lockwood, Dewey, Zickert & Alex

[57] **ABSTRACT**

An economical switch utilizing a triple function extrusion which is preferably immovably confined in an insulating housing is disclosed. The extrusion provides connector, terminal, and contact functions. Two preferred embodiments are disclosed. One disclosed embodiment is a switch comprising a pair of contact-terminals which are secured with respect to a base and which are physically separated by an insulating barrier fixed to said base and which are electrically connected by a straddle-saddle connecting element comprising an elongated conductor having at the ends thereof a pair of electrically connecting saddle portions extending downwardly on either side of said barrier, and contacting the respective contact-terminals, said end saddles being electrically connected by a connecting base portion thereof which bridges said barrier.

In a second embodiment, a switch in accordance with this invention is adapted as part of a cartridge-fuse panel.

10 Claims, 8 Drawing Figures



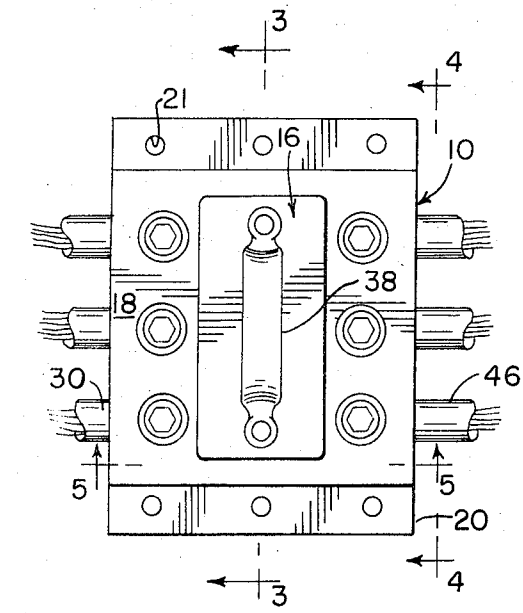


FIG-1

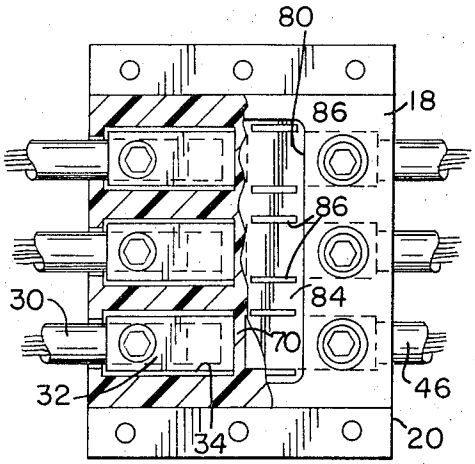


FIG-2

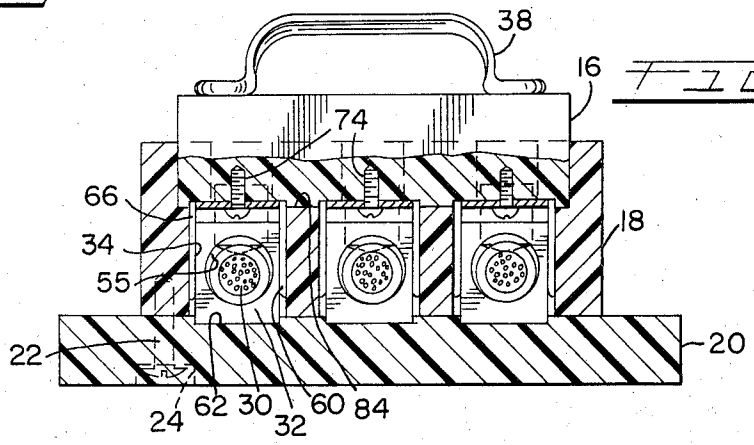


FIG-3

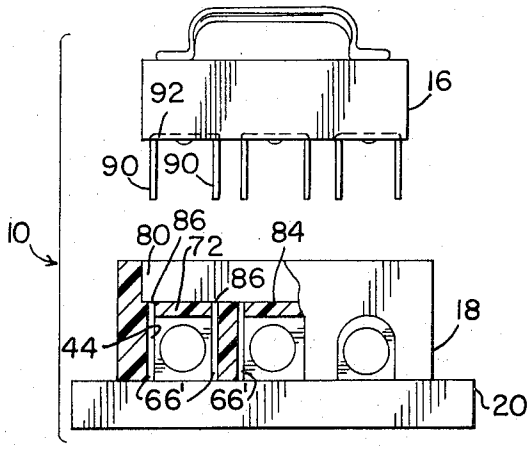


FIG-4

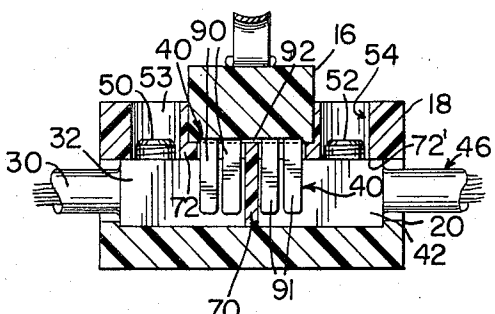


FIG-5

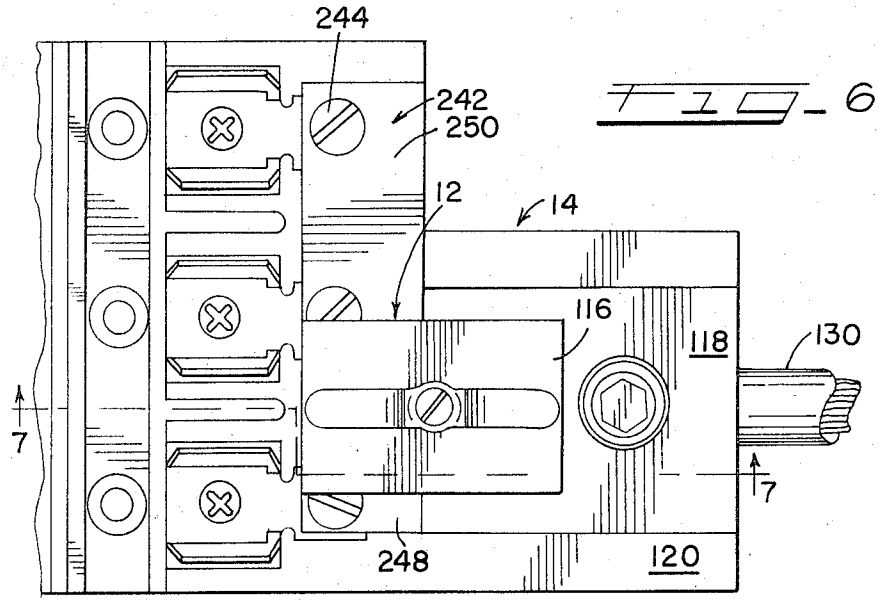


FIG. 6

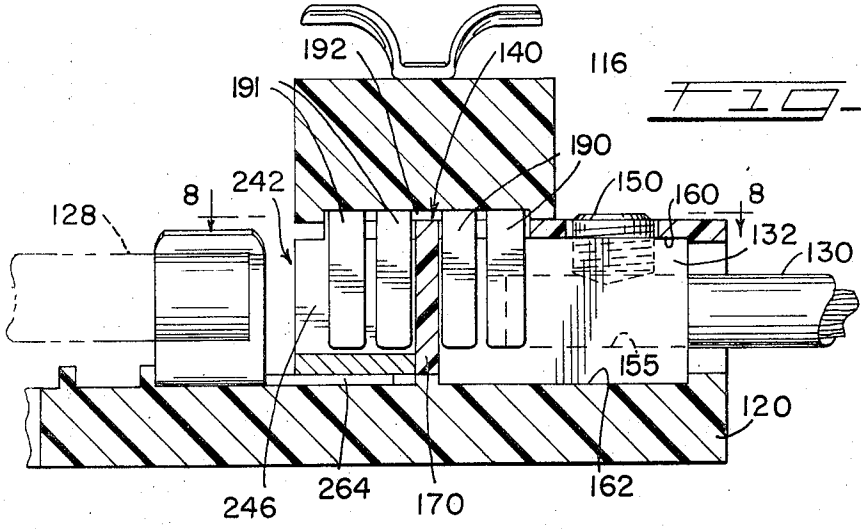


FIG. 7

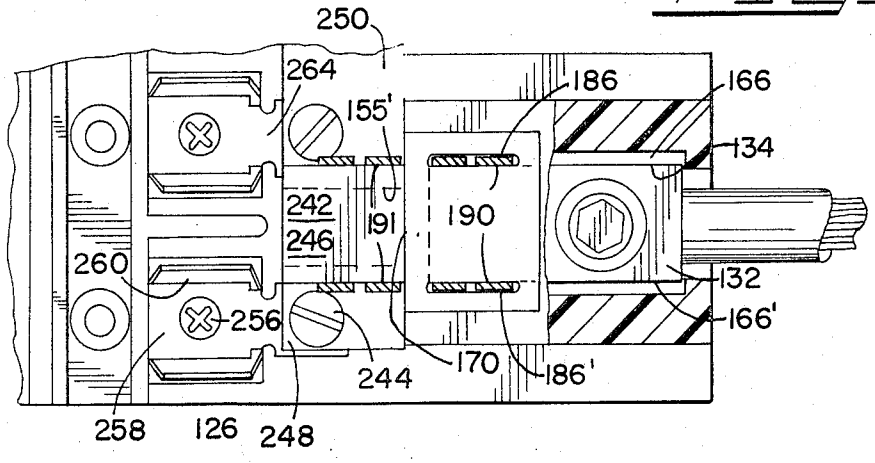


FIG. 8

SWITCH

This invention relates to an electrical switch or circuit interrupter for interrupting appreciable amperage currents.

It is an object of the present invention to provide such a switch which can be easily and economically manufactured, and which can be assembled with a minimum of labor expense.

It is a further object of the present invention to provide a switch for interrupting appreciable amperage current in which the switch has major electrically conducting components which can be manufactured from extrusions, and has major insulating components which can be manufactured by injection molding.

It is another object of the preferred embodiment of the present invention to provide a switch for interrupting appreciable amperable current in which a minimum of fastening of electrically-conducting components to the insulating components is required.

It is another object of the present invention to provide a switch for interrupting appreciable amperage current in which the supply-energized components can be hidden, and in which all of the circuit-closing element is completely deenergized when the switch is open.

It is an additional object of the present invention to provide a switch for interrupting appreciable amperage current and which is particularly adaptable for use in connection with fuse panels.

It is an additional object of a preferred embodiment of the present invention to provide a fuse panel having associated therewith an easily and economically assembled switch which is particularly suitable for interrupting appreciable amperage current, and in which the supply energized components are hidden, and in which fuse panel in which the cartridge-fuse clips at both ends of the cartridge fuse can be de-energized prior to the changing of the cartridge fuse.

These and other objects which will be apparent hereinafter are all achieved in accordance with the present invention which is described herein in connection with two particularly preferred embodiments, and with the aid of the accompanying drawings, in which:

FIG. 1 is a top plan view of a switch assembly in accordance with the present invention.

FIG. 2 is a partially cutaway top plan view of the switch assembly shown in FIG. 1 with the circuit closer removed.

FIG. 3 is a corss-sectional elevational view taken approximately along the line 3—3 of FIG. 1.

FIG. 4 is a partially cutaway side taken approximately along the line 4—4 of FIG. 1.

FIG. 5 is a cross-sectional view taken approximately along the line 5—5 of FIG. 1.

FIGS. 6, 7, and 8 relate to an alternative embodiment of the present invention.

FIG. 6 is a top plan fragmentary view of an embodiment in accordance with the present invention.

FIG. 7 is a cross-sectional side elevational fragmentary view taken approximately along the broken line 7—7 of FIG. 6.

FIG. 8 is a top sectional fragmentary view taken approximately along the line 8—8 of FIG. 7.

Two preferred embodiments are illustrated in the accompanying drawings, the first embodiment being described with the aid of FIGS. 1 through 5, and a second

embodiment being described with the aid of FIGS. 6 through 8. In the embodiment shown in FIGS. 1 through 5, a plurality of the switch assemblies 10, in accordance with the present invention, are provided for simultaneous interrupting three separate circuits. In the alternative embodiment shown in FIGS. 6 through 8, a single switch assembly 12, in accordance with this invention, is shown in a fuse panel assembly generally indicated by the numeral 14 in which the switch interrupts the supply to three fused circuits. These two embodiments will be discussed in detail hereinafter for illustrative purposes only, and the invention is not to be construed to be unduly limited thereto.

Switch assembly 10 includes three cooperating blocks of insulating material namely, insert block 16, housing block 18, and base block 20. Base 20 is secured to housing block 18 by means of suitable fasteners 22 passing between base 20 and housing 22 from a recess 24, for example, in base 20 from the bottom of base block 20 making it impossible to expose internal elements while assembly 10 is mounted e.g. by passing conventional mounting fasteners (not shown) through holes 21 in base block 20.

As indicated above, switch assembly 10 is designed to provide a switch function in three separate circuits simultaneously, and it is to be understood that the component elements which are provided in connection with each of the three separate circuits are identical. Hence to avoid undue clutter of reference numerals in the drawings, those components which are provided in connection with one of the circuits will be discussed in detail and it is to be understood that the switch components in the other two circuits are identical.

Electrically conducting portions of the switch assembly 10 includes an input lead 30 secured in first connector-terminal block 32 which is secured in a chamber 34 formed between base block 20 and housing block 18. An integral straddle-saddle switch 40 is secured to insert block 16. A second conector-terminal block 42 is retained in a second chamber 44 which is a mirror image of chamber 34. Second electrical lead 46 is received and secured in terminal connector 42. Respective set screws 50, 52 bind wires 30, 46, respectively, in connectorterminals 32, 42, respectively. It is to be understood that, in the embodiment illustrated in FIGS. 1 through 5 herein, the connector-terminals 32, 42 are identical and provide a triplicate function because of the arrangement in accordance with this invention — namely — they are connectors, terminals and switch contacts all in one piece 32, 42. They are preferably manufactured from an extrusion having the general cross-section which is illustrated in FIG. 3, namely, a cross-section such that the exterior configuration of the connector-terminal 32, 42 is generally rectangular with respect to exterior configuration, and has a circular or other passageway 55 through the mid-portion. Thus, the individual terminal-connectors 32,42 constitute cut-off segments of an elongated extrusion having the cross-section seen in FIG. 3, and each of the segments are drilled transversely to the direction of the interior passageway 55 and are tapped to receive respective set screws 50, 52, for binding respective wires 30, 46. Set screws 50, 52 are received in respective passageways 53, 54, and are adjusted by a driver, for example.

It is noted that connector-terminals 32, 42 are closely received above and below (see FIG. 3) in their respective chambers 34, 44. It is also noted that chamber 34

is formed by two opposing recesses, namely, recess **60** in housing block **18**, and recess **62** in base block **20**. It is further noted that recess **62** is so dimensioned as to snugly receive respective connector-terminal **32** therein, and snugly secure connector-terminal **32** above and below in chamber **34**, so that connector-terminal **32** is substantially immovable in chamber **34**. Nonetheless (see FIG. **3**) the dimensions of recess **60** are such that substantial gaps **66** exist between the sides of connector-terminal **32** and recess walls **60**. Chambers **34** and **44** are separated by barrier wall **70** at the innermost end thereof. The tops of connectors **32, 42** bear against an upper wall **72, 72'**, respectively.

Referring now to FIGS. **1** and **2**, insulator insert block **16** has an operator handle **38** secured thereto on an exposed portion thereof, and on the opposite side therof has a plurality of straddle-saddle switch circuit closers **40** secured thereto by suitable fasteners **74**. Block **16** is received in housing block **18** in recess **80**. In bottom **84** of recess **80**, a plurality of elongated passageways **86, 86**, are provided, and these extend into the respective chambers **34, 44** below and are positioned to be vertically aligned with the gaps **66** at either side of the respective connector-terminals **32, 42**, respectively.

Referring now to FIG. **4**, the ends of straddle-saddle circuit closer **40** have the cross-section of an inverted U, and comprises blades **90**, extending from the sides of elongated base **92**. Blades **92** are so sized, aligned, and positioned as to be insertable in respective openings **86** when insert block **16** is seated in recess **80** as shown in FIG. **3**. Blades **90** pass into gap **60** at either side of the respective connector-terminals **32, 42**, and the spacing between each set of blades **90** is such as to snugly engage the respective connector-terminal blocks **32, 42** therebetween for secure electrical contact. The individual blades **90, 91** shown herein are shown "split" whereby each blade has a plurality of strips thereby assuring more actual contact area for electrical connection.

Straddle-saddle switch circuit closer **40** comprises two sets of blades **90, 91**. Blades **90** with base **92** has the cross-sectional configuration of a saddle, or of an inverted U, and blades **91** with base **92** also provide a cross-sectional configuration of a saddle, or of an inverted U. Blades **90** are so positioned as to pass through respective openings **86** into the gaps **66** at either side of connector-terminal **32** snugly engaging said connector-terminal **32**, and respective blades **91** are so positioned as to pass through opposing openings **86** into the gaps **66', 66'**, and snugly engage connector-terminal **42** therebetween. It is noted (see FIG. **5**) that blades **90** pass through respective openings **86** on the other side of barrier **70**. However, straddle-saddle switch circuit closer **40** includes base portion **92** thereof which extends between respective sets of blades **90, 91**. Thus, when the insert block **16** is seated in recess **80** connector blocks **32, 42** are electrically connected through blades **90**, bridging base portion **92**, and opposing blades **91**.

It will be appreciated that barrier **70** is essential, in accordance with the present invention, in that it assures that wires **30, 46**, respectively, passing through central passageways **55** of the connector-terminals **32, 42** cannot be inserted a sufficient distance to contact the other connector-terminals, thus short-circuiting the switch assembly at that point. Thus, blades **90**, with base **92** can be regarded as a saddle closely seated on bottom **84** of recess **80** and closely engaging sides of a connector-terminal **32**, and blades **91**, in cooperation with base **92** can be regarded as a second saddle seated on bottom **84** and closely engaging either side of connector-terminal **42**. These saddles are seated on their respective connectors **32, 42** on opposite sides of barrier **70**, but nonetheless are electrically connected due to the fact that base portion **92** of straddle-saddle switch connector **40** is integral with and extends between both sets of blades **90,91**.

In the preferred embodiment illustrated in FIGS. **1** through **5**, connector-terminals **32, 42** are aligned along a line, and passageways **55, 55'** in connector-terminals **32, 42** are aligned so that their axes or directions fall along a common line; barrier **70** is transverse to that axis or direction, and circuit closer **40** is oriented so that the line or direction between its saddles passes between the respective legs of each saddle and is positioned to be parallel to the direction of the passageways **55, 55'**. It will be appreciated that the assembly of the housing block **18** and base block **18** is utterly simple, requiring no fastening of any of the electrically conducting elements **32, 42** to the insulators **18** or **20**.

In assembly, connector-terminals **32, 42** (which are all identical) are seated in respective recesses **62** with set screws **50, 52** positioned at the outside, and housing block **18** is seated thereover. This assures instant positioning of all elements within block **18**, the blocks **18, 20** are then held together and inverted and fasteners **22** driven home. Thus, conductor-terminals **32, 42** are maintained in operating position, even against pulling of wires **30, 46** or of blade sets **90, 91**, even though no fastener directly secures blocks **32, 42** to blocks **18,20**.

Referring now to FIGS. **6** through **8**, another embodiment of the invention is illustrated. However, it will be appreciated from a consideration of the foregoing, and from the following description, that these embodiments have certain elements in common. The elements described in connection with FIGS. **6** through **8** will be referred to by numbers in the one hundred series, the second and third digits of which will be the same number used to refer to the similar part or structure in FIGS. **1** through **5**. Switch assembly **12** is shown in conjunction with cartridge fuse panel **14** which is shown in fragment form in FIGS. **6** through **8**. Assembly **14** includes insert block **116**, housing block **118** and base block **120**, which are analogous to blocks **16, 18** and **20** in FIGS. **1** through **5**. Housing block **118** is secured to base block **120** by suitable fasteners (not shown) in the same manner as shown in FIG. **3**.

Base block **120** also constitutes a mounting plate for a plurality of catridge-fuse receiving clips **126, 126**. It is to be understood that base plate **120** is shown in fractional view, in FIGS. **6** through **8**, and it is to be understood that other conventional fuse cartridge-receiving clips, (not shown) are aligned with clips **126, 126** to cooperate with clips **126, 126** for the purpose of operatively receiving respective cartridge fuses **128** therebetween, and that the conventional cartridge fuse-receiving clips which are not shown are, in turn, connected to respective other electrical circuits (not shown because conventional). Assembly **14** includes electrical supply lead **130** which is secured to connector-terminal **132** by set screw **150**. Connector-terminal

132 is identical in every respect to connectors 32, 42 which have been described in detail hereinbefore, and will not be described further. Connector 132 is received in a chamber 134 formed by opposing recesses 160 in housing block 118, and recess 162 in base block 120. The relative configuration of recess 134 and connector-terminal 132 is identical to the relative sizing and structural relationships discussed hereinbefore in connection with connector-terminals 132, and recess 34, whereby a gap 166, 166' exists on either side of connector-terminal 132. Elongated openings 186, 186' in the top of housing block 118 are positioned to be aligned above gaps 166, 166' and pass through block 118 into chamber 134. Barrier 170 extends downwardly to base 120 defining one wall of the recess 134.

Straddle-saddle switch circuit closer 140 is substantially identical to straddle-saddle switch circuit closer 40 described in detail hereinbefore, and the description will not be repeated. Suffice it to say that switch connector 140 includes bridging base portion 192, having two sets of blades 190, 190, and 191, 191 at the ends thereof, and the relative configurations of these elements 190, 191, and 192 is the same as the relative configuration of elements 90, 91, and 92 discussed hereinbefore.

Blades 191, 191 are snugly received over extrusion 242 which is secured at the other side of barrier 170 to base block 120 by means of suitable fasteners 244, 244. Extrusion 242 has an elevated medial portion 246 extending upwardly between opposing blades 191, 191 (see FIG. 8), and an integral base portion thereof extending on either side of raised medial portion 246 to provide the relatively short extension 248 extending downwardly as shown in FIG. 6 and relatively long extension 250 shown extending upwardly in FIG. 6 and FIG. 8. Extrusion 242 has identical cross section from one end to another, and preferrably has a large passageway 155' passing through enlarged portion 246. The passageway affords less weight, greater cooling, and less raw material metal expense.

A plurality of identical cartridge fuse-receiving clips 126, 126 are secured to base plate 120 by means of fasteners 256, and these fuse clips include a base portion 258 and upwardly extending fuse-receiving arcuate portions 260. Base portion 258 includes a tongue or an extension 264 (see FIG. 7) which extends under the bottom of extrusion 242 and is in electrically conductive contact therewith as a result of its compression between extrusion 242 and base plate 120 as a consequence of the seating of fasteners 244 through extrusion 242 into base plate 120.

Thus, it will be appreciated that the cartridge fuse-receiving clips 126 are energized through integral extrusion 242 which, in turn, is energized through blades 191, 191 which closely and snugly receive raised medial portion 246 therebetween.

When block 116 is pulled clear of the remaining portion of the assembly, blades 191, 191' and 190, 190' are withdrawn from contact with respective connecting portion 132, 246, thus, breaking the electrical connection therebetween, and circuit closer 170 is also thereby de-energized. It will be appreciated that barrier 170 is essential to maintain the extrusion 242 electrically separated from connector-terminal 132, and furthermore to assure that the passage of electrical supply wire 130 into the passageway 155 can continue only until wire 130 engages barrier 170, thereby assuring that the assembly 14 will not be connected to the power supply in such a way that the switch assembly 12 will be short circuited.

As in the embodiment shown in FIGS. 1 through 5, connector-terminal 132 is aligned with circuit closer 140 so that the line drawn between the respective sets of legs 190, 190, 191, 191, is parallel with the direction of the passageway 150 in connector-terminal 132.

It is preferred that openings 53, 54, 153, 154 be plugged with an insulating filler after the respective wires are secured. Also, it is apparent that, in accordance with this invention, the block 116 carrying circuit closer 140 can be integral with or secured to an insulating cover extending over all the fuses 128 and fuse-contacting elements 126, 242, 248 fuse panel assembly 14 whereby switch assembly 14 would be operated, upon opening of the fuse cover, to automatically withdraw circuit closer 140 to de-energize the fuses and all fuse clips 126 and other elements, e.g., 250, while the cover is open, and render it impossible to re-energize unless and until the cover is closed.

Although the use of aluminum connector-terminals 32, 42, 132, 242 are satisfactory for non-current interrupting disconnect applications, copper and brass is the preferred material for connector-terminals 32, 42, 132, 242 for interrupting appreciable to high amperage, e.g. 50 amps and up in normal voltage systems. Copper and brass have been found eminently satisfactory under overload test conditions, for example, articles 32, 42 rated for 60 amps have been entirely satisfactory for 50 interrupt-close cycles at 300 amps when made from copper or brass.

It will be appreciated, from a consideration of the foregoing description, that, by the present invention, applicant has provided a switch structure, important electrically conducting components of which can be manufactured from extrusions, and important insulating components which can be made from injection molding, for example. Furthermore, it will be appreciated that major portions of the structures described hereinbefore can be assembled without the necessity of attaching the extrusions to the non-conducting elements, if desired, thus providing a greatly simplified assembly technique. Furthermore, in accordance with the preferred embodiment of the present invention, energized part of the circuit being interrupted by the switch of the present invention can be substantially completely hidden from inadvertent contact when the circuit is interrupted by withdrawal of the circuit closers 40, 140. Moreover, these advantages can be achieved in conjunction with an additional important advantage, namely the reduction of the number of parts inherent in the triple role performed by the single connector-terminal elements 32, 42, 132, namely as terminals, connectors and switch contacts. Furthermore, by providing the triple function extrusions with a passageway 55, 155 through a mid-portion thereof, the cost of the connector-terminal parts 32, 42 is substantially reduced because less metal is consumed in their manufacture, and the wire-receiving openings are formed by the extrusion die.

I claim:

1. A switch comprising a fixed connector-terminal and a movable circuit closing element which can be moved to and from contact with said fixed connector-terminal; said fixed connector-terminal consisting es-

sentially of a body of electrically conducting material having substantially the same cross section from one end to the other, and having a passageway completely through a mid-portion thereof and extending from one end to the other end thereof; said body including set screw means passing transversely with respect to the axis of said passageway and being adapted to bind a wire received in said passageway, said connector-terminal being substantially immovably confined in a recess in an enclosure of insulating material, said enclosure having first port means extending therethrough to said recess and aligned with said passageway and adapted for the passage of a wire therethrough, second port means aligned with said set screw, and a third port means aligned with said connector-terminal and adapted for the passage of a portion of said movable circuit closer element therethrough; said connector-terminal, said housing and said circuit closer being adapted for the passage of electrically conducting portions of said circuit closer means into said recess and into an electrically conducting engagement with said connector-terminal.

2. The switch of claim **1** wherein said circuit closer comprises a saddle-shaped portion thereof adapted to firmly engage a portion of said connector-terminal, wherein a line drawn transversely to a line connecting respective sides of said saddle passes in a direction which is parallel to the wire-receiving passageway in said connector-terminal.

3. An electrical switch comprising a pair of fixed, identical connector-terminals and a straddle-saddle circuit closer, which can be moved to and from contact with said fixed connector-terminals, an insulating base and an insulating barrier; each of said identical connector-terminals having the same cross-section from one end thereof to the other and having a passageway through a mid-portion thereof extending from one end to the other, set screw wire-fastening means extending transversely into said passageway and adapted for binding a wire residing in said passageway; said connector-terminals being aligned end-to-end; means for fixing the position of said connector-terminals with respect to said insulating base; said insulating barrier extending transversely between said connector-terminals and being fixed with respect to said base; and wherein said straddle-saddle circuit closer consists essentially of an integral bridge portion extending a sufficient distance to overlap a portion of each of said connector-terminals and having a saddle-shaped extension near the ends thereof for contacting said connector-terminals.

4. The switch of claim **3** wherein the assembly includes an insulating housing secured to said base by means of fasteners passing therebetween, said housing including a top and sidewalls, ports at opposite sidewalls aligned with said passageways in said connector-terminals for receiving wire therethrough, second port means in the top of said housing aligned with said set screw means for operator-adjustment of said set screw means by passage of a tool through said second port means; and third port means positioned in the top of said housing and aligned with each of said connector-terminals for passage of portions of said circuit-closer therethrough, said circuit-closer comprising an electrically conductive bridging element having means for extending into said recess on opposite sides of said barrier and electrically contacting each of said connector-terminals.

5. The circuit closer of claim **4** wherein the straddle-saddle circuit closer is fixed to an insulating insert block having means for withdrawal of said block by an operator, and wherein said insert block is snugly received in a recess in said top of said housing block.

6. A cartridge-fuse panel assembly comprising spaced-apart fuse holder means including a pair of fuse holders adapted for releasably electrically connecting opposite ends of a cartridge fuse, switch means for electrically connecting one of said fuse holders to an electrical supply wherein said switch means comprises a pair of electrical contacts, and a movable electrically conducting bridge means for electrically connecting said contacts, operator controlled and means for moving said bridge means to and from contact with said contacts, wherein a first of said electrical contacts consists essentially of an electrically conducting body having the same cross-section from end to end, and having a substantial passageway extending in a mid-portion thereof from end to end, said body including set screw means for binding an electrical conductor therein in said passageway; second contact means consisting essentially of an extrusion having the same cross-section from end to end having an enlarged portion, and a relatively thin portion extending laterally therefrom, said switching means including insulating barrier means positioned between said first and second contacts; said circuit closer means including an integral conductor having a pair of saddle elements at either end thereof, said saddle elements being adapted for electrically contacting respective first and second contacts, said second contact being electrically connected to one of said cartridge fuse holders.

7. The fuse panel of claim **6** wherein said enlarged portion of said second contact element has a passageway extending therethrough from end to end.

8. The fuse panel of claim **6** wherein the second closer is fixed with respect to a removable cover which covers the fuses and fuse holders, and other switch-energized elements which are exposed to an operator upon removal of said cover.

9. A switch comprising a fixed connector-terminal and a movable circuit-closing element which can be moved to and from a contact with said fixed connector-terminal; said fixed connector-terminal consisting essentially of a body of electrically conducting material having substantially the same exterior configuration from one end to the other, and having a passageway extending into a mid-portion thereof from at least one of said ends; said body including operator-releasable fastening means for making electrical contact with and securing an electrical conductor in said passageway, said connector-terminal being substantially immovably confined in a recess in an enclosure of insulating material, said enclosure having port means extending therethrough to said recess and aligned with said passageway and adapted for the passage of said conductor therethrough, port means for operating said operator-releasable fastening means, and a third port means aligned with said connector-terminal and adapted for the passage of a portion of a movable circuit closer element therethrough; said connector-terminal, said housing, and said circuit closer being adapted for the passage of electrically conducting portions of said circuit

closer means into said recess and into electrically conducting engagement with said connector-terminal.

10. A switch comprising a fixed connector-terminal and a movable circuit closing element which can be moved to and from contact with a fixed connector-terminal; said fixed connector-terminal consisting essentially of a body of electrically conducting material having substantially the same external configuration from one end to the other, and having a passageway extending from at least one of said ends into a mid-portion thereof; said body including fastener means in said passageway being adapted to bind a conductor received in said passageway, said connector-terminal being substantially immovably confined in a recess in an enclosure of insulating material, said enclosure having first port means extending therethrough to said recess and aligned with said passageway and adapted for the passage of said conductor therethrough, and second port means aligned with said connector-terminal and adapted for the passage of a portion of said movable circuit closing elements therethrough; said connector-terminal, said housing and said circuit closer being adapted for the passage of electrically conducting portions of said circuit closer means into said recess and into an electrically conducting engagement with said connector-terminal.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,805,206 Dated April 16, 1974

Inventor(s) Hans Ege

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In column 2, line 39, "conector-terminal" should be --connector-terminal--.

In column 2, line 44, "connectorterminals" should be --connector-terminals--.

In column 3, line 17, "therof" should be --thereof--.

In column 3, line 53, delete "respective" and insert after "86" --at one side of barrier 70, and blades 91 pass through respective openings 86--.

Signed and sealed this 24th day of September 1974.

(SEAL)
Attest:

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ORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.

UNITED STATES PATENT OFFICE
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Signed and sealed this 24th day of September 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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