United States Patent

Borzoni et al.

[15] **3,699,500**

[45] **Oct. 17, 1972**

[54] **FUSE HOLDER ASSEMBLY**

[72] Inventors: **John J. Borzoni,** 972 Third Ave., Des Plaines, Ill. 60016; **Edward A. Swichard,** 3231 North Ellen Dr., Arlington Heights, Ill. 60004; **John A. Burek, Jr.,** 223 No. Warrington Rd., Des Plaines, Ill. 60016

[22] Filed: **Dec. 15, 1970**

[21] Appl. No.: **98,230**

[30] **Foreign Application Priority Data**

Dec. 19, 1969 Germany.....P 19 63 648.7

[52] **U.S. Cl.**.....**339/91 R,** 337/196, 339/128, 339/147 P

[51] **Int. Cl.**.....**H01r 13/54**

[58] **Field of Search** ..339/64, 91, 128, 147; 337/194, 337/196, 201, 206, 212

[56] **References Cited**

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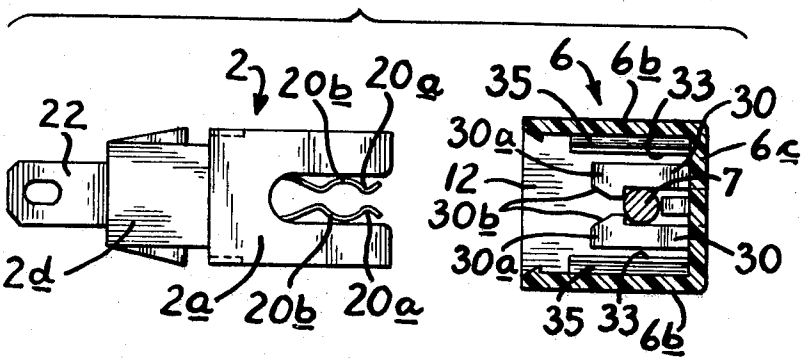
Primary Examiner—Joseph H. McGlynn

Attorney—Wallenstein, Spangenberg, Hattis & Strampel

[57] **ABSTRACT**

A fuse holder assembly comprising a box-like receptacle and a box-like fuse carrying cover member or insulating hood slidably telescoping over the open front end of the receptacle. The receptacle has a pair of laterally spaced apart contact clips adapted to engage the longitudinally spaced terminal portions of an elongated fuse removably carried by transversely flexible fuse retainer means in the fuse carrying cover member when the cover member is fully mounted on the receptacle. The fuse retaining means in the cover member holds the fuse more securely than the contact clips so removal of the cover member from the receptacle will pull the fuse from the contact clips.

3 Claims, 8 Drawing Figures



PATENTED OCT 17 1972

3,699,500

FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

FIG. 6

FIG. 7

FIG. 8

INVENTORS
JOHN J.M. BORZONI
EDWARD A. SWICKARD
JOHN ANDREW BUREK, JR.

by: Wallenstein, Spangenberg, Hattis & Strampel
ATTYS.

FUSE HOLDER ASSEMBLY

This invention relates to fuse holder assemblies of the type which comprise a receptacle made of insulating material mountable on or behind an opening in a panel or the like and a fuse carrying cover member made of insulating material insertable into an opening in the front of the receptacle.

In fuse holder assemblies of the type just described developed prior to the present invention, the fuse commonly projects from an opening at the rear of the fuse carrying cover member with an end terminal exposed at the projecting end of the fuse to engage a contact in the receptacle. The fuse carrying cover member has a contact engaged by the terminal at the inner front end of the fuse. The cover member is usually provided with a threaded shank which threads around or into a connector on the receptacle. When the cover member is fully inserted over or into the receptacle, the fuse extends into the receptacle where the previously exposed terminal thereof engages the contact of the receptacle. The inner terminal of the fuse is electrically coupled to another contact of the receptacle by insulated conductors in the cover member which make connection to the latter receptacle contact through the threaded receptacle connector or other engaging members in the receptacle and cover member.

It is the principal object of the present invention to provide a fuse holder assembly of the type which includes a fuse-receiving receptacle and the fuse carrying cover member which forms as insulating cover over the receptacle and which is of much simpler and economical construction than fuse holder assemblies of this type heretofore developed. A related object of the invention is to provide a fuse holder assembly as described wherein the fuse carrying cover member is more easily mountable upon and re-movable from the receptacle than the fuse holder assemblies of this type heretofore developed.

In accordance with one of the features of the invention, the fuse carrying cover member, which is an insulating cover or hood open at the rear thereof, is devoid of any contacts which make electrical connection to the fuse terminals. The fuse carrying cover member has a fuse-containing compartment with fuse retainer means therein for removably retaining the fuse therein. The fuse retainer means may most desirably be a fuse retaining clip formed by projections of the insulating material forming the front wall of the fuse carrying cover member. Although other fuse orientations are contemplated within the broader aspects of the invention, the fuse retainer means most advantageously holds the fuse in a position where the entire fuse in enclosed by the walls of the fuse carrying cover member and so that the fuse is supported in a position where it extends, and the terminal portions thereof are spaced, laterally within the fuse carrying cover member (i.e., transverse to the rearward direction in which the fuse carrying cover member compartment opens to the outside thereof). The receptacle has a fuse-receiving compartment opening onto the front of the receptacle into which opening the fuse passes as the fuse carrying cover member is mounted upon the receptacle.

The fuse carrying cover member and the receptacle are most desirably designed so that the fuse carrying cover member can be slidable into telescopic relation with the receptacle only when the cover member extends in one direction with respect thereto. When the fuse carrying cover member is fully mounted upon the receptacle, the spaced terminal portions of the fuse are in contact with a pair of contacts within the receptacle which contacts extend to terminals for electrically connecting the fuse into an external electrical circuit. The receptacle contacts preferably are contact clips which removably engage opposite sides of the terminal portions of the fuse to make good electrical contact therewith. The interfitting fuse carrying cover member and receptacle preferably include releasably locking means, such as projections extending from either the receptacle or the fuse carrying cover member which snap into recesses in the other of same when the cover member reaches its fully mounted position on the receptacle. The fuse retainer means of the fuse carrying cover member is designed to hold onto the fuse with a greater force than the contact clips as the cover member is pulled from the receptacle so the fuse will then be pulled from the receptacle contact clips and remain with the cover member.

Such a fuse holder assembly construction as just described, which does not have any electrical contacts in the fuse carrying cover member or threaded connectors between the fuse carrying cover member and the receptacle, can be manufactured at a much lower cost than the known prior art fuse holder assemblies of the type involved.

Other aspects of the invention to be described deal with various features and details of the fuse carrying cover member and receptacle for ensuring the easy and reliable interfitting of the cover member and the receptacle and the proper alignment of the terminal portion of the fuse with the contact clips so that good electrical contact is assured between the fuse and the contact clips.

The above mentioned and other objects, features and advantages of the invention will become apparent upon making reference to the specification to follow, the claims and the drawings wherein:

FIG. 1 is an exploded perspective view of the different basic parts making up the fuse holder assembly of the present invention;

FIG. 2 is an exploded longitudinal sectional view of the assembly shown in FIG. 1, with the fuse mounted in position in the fuse carrying cover member or insulating hood;

FIG. 3 is an exploded transverse sectional view of the assembly shown in FIG. 2, taken along section line 3—3;

FIG. 4 is a view into the open front of the receptacle portion of the fuse holder assembly shown in FIGS. 1 through 3, as seen along the viewing plane 4—4 in FIG. 2;

FIG. 5 is a view into the open rear of the fuse carrying cover member or insulating hood portion of the fuse holder assembly of FIGS. 1 through 3, as seen along viewing plane 5—5 in FIG. 2;

FIG. 6 is a transverse sectional view through the receptacle and fuse carrying cover member or insulating hood in their assembled condition, with the receptacle shown mounted upon a panel;

FIG. 7 is a sectional view through the assembly of FIG. 6 taken along section line 7—7 therein; and

FIG. 8 is a greatly enlarged sectional view through the assembled receptacle and fuse carrying cover member or insulating hood showing the manner in which the cover member or insulating hood is locked upon the receptacle.

As best shown in FIGS. 1 through 3, the fuse holder assembly of the invention includes a fuse-receiving receptacle 2 mountable on a panel, such as a vertical panel 4 shown in FIG. 6, and a fuse carrying cover member preferably in the form of an insulating hood 6 which encloses a fuse 7 (FIGS. 2 and 3) and is mountable in telescopic relationship with the receptacle 2. In the most preferred form of the invention as illustrated, the insulating hood 6 telescopes over the receptacle 2 (FIG. 6) so that the insulating hood 6 forms an effective dust cover. Also, in the most preferred form of the invention, the receptacle and insulating hood 6 are elongated rectangular box-like structures most advantageously formed of molded synthetic plastic material, such as polysulfone. The receptacle 2 has an elongated opening 10 extending over the entire portion of the front end thereof. The insulating hood 6 has an opening 12 extending over the entire portion of the rear end thereof.

The front opening 10 of the receptacle 2 opens onto a fuse-receiving compartment 12 defined by end walls 2*a*—2*a* and side walls 2*b*—2*b*. The rear of the compartment 12 is closed by an inner wall 2*c* from which rearwardly extend a pair of longitudinally spaced terminal member-receiving bosses 2*d*—2*d* and transversely spaced mounting lugs 2*e*—2*e*. For reasons to be explained, the side walls preferably have an irregular or stepped configuration. The end walls 2*a*—2*a* have fuse clearance openings 14—14 which open onto the front end of the receptacle. (In accordance with the broadest aspects of the invention, however, it should be understood that such an irregular configuration for the receptacle is not required, although desirable for reasons to be explained.)

The rear opening 12 of the insulating hood 6 opens upon a fuse-holding compartment 16 defined by end walls 6*a*—6*a* and side walls 6*b*—6*b*. The front end of the insulating hood 6 is closed by a front closure wall 6*c*.

Positioned adjacent the ends of the compartment 12 contiguous to the end walls 2*a*—2*a* are a pair of contact clips 20—20, the contact clips forming integral extensions of terminal-forming blades 22—22 passing through the aforementioned bosses 2*d*—2*d*. The terminal-forming blades 22—22 project rearwardly from the bosses 2*d*—2*d* to form convenient means for making electrical connection into an external circuit by wires (not shown) which may be soldered directly to the ends of the terminal-forming blades 22—22 or by a socket which fits over the projecting ends of the terminal-forming blades 22—22 (not shown). The contact clips 20—20 are laterally spaced in the receptacle. As previously indicated, by "laterally spaced" is meant a spacing of the clips in a direction at right angles to the direction in which the compartment 12 opens onto the outside of receptacle.

In a manner to be described, the fuse 7 has terminal end portions 7*a*13 7*a* removably supported within the insulating hood 6 so that the terminal end portions 7*a*—7*a* also are laterally spaced within the compartment 16 therein. In the fuse holder assembly illustrated, when the insulating hood 6 is oriented so that the long dimension thereof extends in a longitudinal direction parallel to the long dimension of the receptacle 2 the insulating hood 6 can be slid into position on the receptacle 2. When the insulating hood 6 is fully mounted in operative position upon the receptacle as shown in FIG. 6, the fuse 7 will snap into position within the contact clips 20—20 to make good electrical contact therewith. A slide fit is provided between the insulating hood 2 and the receptacle 6 so the receptacle guides the hood into position where the fuse 7 therein enters the contact clips 20—20. The force with which the fuse 7 is held in place within the insulating hood is greater than the holding force of the contact clips 20—20 so that, when the insulating hood 6 is pulled from the receptacle 2, the fuse 7 will be pulled from the contact clips 20—20 and remain within the insulating hood 6. Locking means to be described respectively formed in the receptacle 2 and insulating hood 6 come into engagement with one another when the insulating hood 6 is fully mounted upon the receptacle, so that the insulating hood can be pulled with a small force from the receptacle to release the insulating hood therefrom.

The bosses 2*d*—2*d* of the receptacle 2 have pass-through openings 24—24 (FIG. 2) of much greater width than the corresponding thickness of the terminal-forming blades 22—22. Anchoring tabs 26—26 are struck from the terminal-forming blades 22—22 which tabs frictionally engage the defining walls of the pass-through openings 24—24. Similar anchoring tabs 28—28 are struck from the terminal-forming blades 22—22 to engage the outer faces of the bosses 2*d*—2*d* to lock the terminal-forming blades 22—ω°—22 against forward movement within the receptacle 2. The contact clips 20—20 have portions 20′—20′ offset from the ends of the terminal-forming blades 22—22 so the inner end portions thereof seat against the inner surface of the wall 2*c* facing the compartment 12. These offset portions 20′—20′ of the contact clips 20—20 prevent movement of the assembly of the contact clips and the terminal-forming blades rearwardly of the receptacle.

Each contact clip 20 includes a pair of confronting jaws 20*a*—20*a* spaced transversely of the length of the fuse to be received thereby. The jaws 20*a*—20*a* define outwardly flaring inlet opening into the contact clips. These outwardly flaring openings communicate with fuse contact making portions 20*b*—20*b* which conform generally to the shape of the fuse 7 to be accommodated in the receptacle. As illustrated, the fuse 7 comprises an elongated cylindrical body of fuse-forming material which will melt when an excess current of a given value continuously flows longitudinally thereof. However, the fuse 7 can have other configurations and constructions, such as the well-known wound or straight filament type fuses. The terminal end portions 7*a*—7*a* of the fuse 7 which are adapted to fit within the contact clips 20—20 are sometimes referred to as terminal portions of the fuse.

Although the means for retaining the fuse 7 within the insulating hood 6 may take a variety of forms, in the preferred form of the invention such retaining means comprises two pairs of fuse retainer clip-forming projections 30—30 extending rearwardly from the front

wall 6c of the insulating hood. Each pair of fuse retainer clip1forming projections 30—30 are spaced apart transversely of the length of the insulating hood 6 and the fuse to be retained therein a distance such that they are out of alignment with the contact clips 20—20 of the receptacle 2. Thus, where the contact clips 20—20 are adjacent the ends walls 2a—2a of the receptacle as illustrated, the two pairs of fuse retainer clip-forming projections 30—30 are positioned to pass between the contact clips when the insulating hood is mounted in operative position upon the receptacle 2. As best shown in FIG. 3, each pair of retainer clip-forming projections 30—30 have fuse overhanging end portions 30a—30a which overlap the fuse 7 to hold the same releasably against fuse seating bosses 32—32 projecting from the front wall 6c. The fuse overhanging end portions 30a—30a have outwardly flaring confronting surfaces 30b—30b which form a convenient outwardly expandable entryway for the reception of the fuse 7. The fuse retainer clip-forming projections 30—30 are readily flexible outwardly of each other to permit ready insertion of the fuse therebetween and are both readily flexed together to one side or the other of the fuse to enable the fuse 7 to occupy a position within the contact clips 20—20 so the confronting jaws 20a—20a of the clips make good contact on opposite sides of the fuse even under conditions of slight transverse misalignment between the contact clips 20—20 and the fuse retainer clip-forming projections 30—30.

While the fuse retainer clip-forming projections establish the transverse position of the fuse 7 within the insulating hood compartment 16, the longitudinal position of the fuse 7 therein is best determined by the end walls 6a—6a thereof. Thus, the spacing between the end walls 6a—6a of the insulating hood is made only slightly greater than the length of the fuse 7 so the ends of the fuse are adjacent the end walls 6a—6a. This spacing of the insulating hood end walls 6a—6a is also made slightly greater than the spacing between the outer surfaces of the end walls 2a—2a of the receptacle 2. The openings 14—14 in the latter end walls are thus necessary to provide clearances for the end portions of the fuse 7 when the insulating hood 6 is mounted upon the receptacle 2.

It is preferable that the insulating hood 6 make a slide fit upon the receptacle 2 in a manner which does not require any substantial force to mount the insulating hood 6 upon or move the insulating hood from the receptacle 2. Although this could be achieved by closely controlling tolerances between a preferably rectangularly shaped receptacle and a perfectly rectangularly shaped insulating hood, such a result is much more easily achievable without the need for close tolerances by providing engaging portions on the insulating hood and receptacle which are ribs or projections on one of these members engaging flat surfaces on the other of same. In such case, the friction and the area of contact between the receptacle and the insulating hood are substantially reduced from the condition where these parts slide one with respect to the other over most of their confronting surface areas. Accordingly, a pair of central ribs 33—33 are provided which project inwardly a given distance from the plane of the inner surface of the side walls 6b—6b of the insulating hood 6, and a pair of shorter ribs 35—35 are provided which project inwardly to a lesser degree from the inner surface of each side wall 6b at points on opposite sides of the central rib 33. The ribs 33 and 35—35 of each side wall 6b extend in the direction between the front wall 6c and the opening 12 at the rear of the insulating hood, that is in the direction of movement of the insulating hood upon the receptacle 2.

The irregularly shaped side walls 2b—2b of the receptacle include innermost central side wall portions 36—36 against which slides the outer surfaces of the ribs 33—33 of the insulating hood. Each innermost central side wall portion 36 joins short outwardly offset wall portions 38—38 on the outer surfaces of which the shorter ribs 35—35 of the insulating hood makes sliding engagement. The offset wall portions 38—38 join outwardly offset wall portions 40—40 which are not engaged by the inner wall surfaces of the insulating hood. Similarly, the end walls 2a—2a of the receptacle 2 are generally spaced from or at best make only loose engagement with the corresponding end walls 6a—6a of the insulating hood 6.

There is provided adjacent the marginal edges of the insulating hood side walls 6b—6b a pair of locking projections or nibs 45—45 (FIGS. 2 and 8) which are compressed inwardly somewhat as the insulating hood 6 is mounted upon the receptacle 2. These locking projections or nibs snap outwardly within recesses 47—47 (FIGS. 1 and 8) formed adjacent the rear ends of the receptacle side wall portions 40—40 when the insulating hood is fully mounted in position over the receptacle 2.

It should be apparent that the present invention provides an exceedingly inexpensively constructed fuse holder assembly which need not be made to close tolerances and which provides for the easy mounting of the insulating hood upon or removal of the insulating hood from the receptacle 2.

It should be understood that numerous modifications may be made in the preferred form of the invention described above without deviating from the broader aspects thereof.

We claim:

1. A fuse holder assembly for holding a fuse with spaced terminal portions, the fuse holder assembly comprising: a receptacle made of insulating material to be mounted on a support panel or the like, said receptacle defining a fuse-receiving compartment which opens onto the front of the receptacle, said receptacle compartment having a pair of contacts positioned and laterally spaced apart a distance to make contact with said spaced fuse terminal portions where the fuse is inserted into said receptacle, and an insulating fuse carrying cover member slidable into guided telescoping relation with said receptacle into an operative position from the front thereof, said fuse carrying cover member having an opening in the rear portion thereof and fuse retaining means for removably retaining said fuse in a position where said spaced fuse terminal portions are laterally spaced therein to contact said spaced contacts in said receptacle when said fuse carrying cover member is mounted in said operative position on said receptacle, and said fuse retaining means in said fuse carrying cover member being laterally spaced clasps which removably receive said fuse at points spaced from said terminal portions thereof, said clasps

being positioned out of alignment with the laterally spaced contacts of said receptacle so the clasps and contacts do not make interfering contact when the fuse carrying cover member is fully positioned on said receptacle.

2. A fuse holder assembly for holding a fuse with spaced terminal portions, the fuse holder assembly comprising: a receptacle made of insulating material to be mounted on a support panel or the like, said receptacle defining a fuse-receiving compartment which opens onto the front of the receptacle, said receptacle compartment having a pair of contacts positioned and laterally spaced apart a distance to make contact with said spaced fuse terminal portions where the fuse is inserted into said receptacle, and an insulating fuse carrying cover member slidable into guided telescoping relation with said receptacle into an operative position from the front thereof, said fuse carrying cover member having an opening in the rear portion thereof and fuse retaining means for removably retaining said fuse in a position where said spaced fuse terminal portions are laterally spaced therein to contact said spaced contacts in said receptacle when said fuse carrying cover member is mounted in said operative position on said receptacle, said receptacle and fuse carrying cover member being box-like structures, said fuse carrying cover member telescoping over said receptacle, said receptacle and fuse carrying cover member having longitudinally spaced end walls in contiguous relation, the spacing between the inner surfaces of said end walls of said fuse carrying cover member being only slightly greater than the length of the fuse carried thereby so the ends of the fuse will be adjacent the latter end walls, and said end walls of said receptacle having clearance openings extending to the front marginal edges thereof so the ends of the fuse can pass into said clearance openings as said fuse carrying cover member is slid over said receptacle.

3. A fuse holder assembly for holding a fuse with spaced terminal portions, the fuse holder assembly comprising: a receptacle made of insulating material to be mounted on a support panel or the like, said receptacle defining a fuse-receiving compartment which opens onto the front of the receptacle, said receptacle compartment having a pair of contacts positioned and spaced apart a distance to make contact with said spaced fuse terminal portions where the fuse is inserted into said receptacle, and an insulating fuse carrying cover member slidable into guided telescoping relation with said receptacle into an operative position from the front thereof, said fuse carrying cover member having an opening in the rear portion thereof and fuse retaining means for removably retaining said fuse in a position where said spaced fuse terminal portions contact said spaced contacts in said receptacle when said fuse carrying cover member is mounted in said operative position on said receptacle, and said receptacle and fuse carrying cover member being box-like structures having sliding telescoping guide surfaces formed by projections on one of the structures engaging surfaces on the other of said to minimize the friction and area of contact while ensuring a good slide fit therebetween.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,699,500 Dated October 17, 1972

Inventor(s) John J. Borzoni et al.

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

On the cover sheet [72] "Edward A. Swichard" should read -- Edward A. Swickard --; same cover sheet insert -- [73] Assignee: Littelfuse, Inc., Des Plaines, Ill. --.

Signed and sealed this 25th day of December 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

RENE D. TEGTMEYER
Acting Commissioner of Patents

UNITED STATES PATENT OFFICE

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