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Cetola et al.

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[54] **FUSE RETAINER AND EXTRACTOR**

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[52] **U.S. Cl.** ..... **337/245**, 174/138 F, 174/138 G, 337/186, 337/213, 337/215, 337/264

[51] **Int. Cl.** **H01h 85/14**

[58] **Field of Search** ..... 337/186, 194, 215, 245, 337/202, 209, 138, 213, 264; 174/138 G, 138 F

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[57] **ABSTRACT**

A fuse holder constructed from a dielectric material which is also elastic or partly elastic, such as plastic, formed to provide a cylinder split longitudinally and chamfered at either end to receive a cartridge fuse, such cylinder having attached thereto a handle to facilitate grasping of the fuse holder. At the distal ends, the handle extends to form insulating chambers partly surrounding the respective connector end caps of the fuse and opening along one lateral surface thereof to receive the corresponding spring clips of a fuse clip. The distally opposite surfaces of the respective housings are pierced to form openings concentric with the axis of the cylinder, said openings being sized to pass the fuse into the interior cavity of the cylinder. In another embodiment, the handle is formed to provide a second fuse holder substantially shaped in a similar manner as the first fuse holder, for holding a spare fuse for replacement.

9 Claims, 5 Drawing Figures

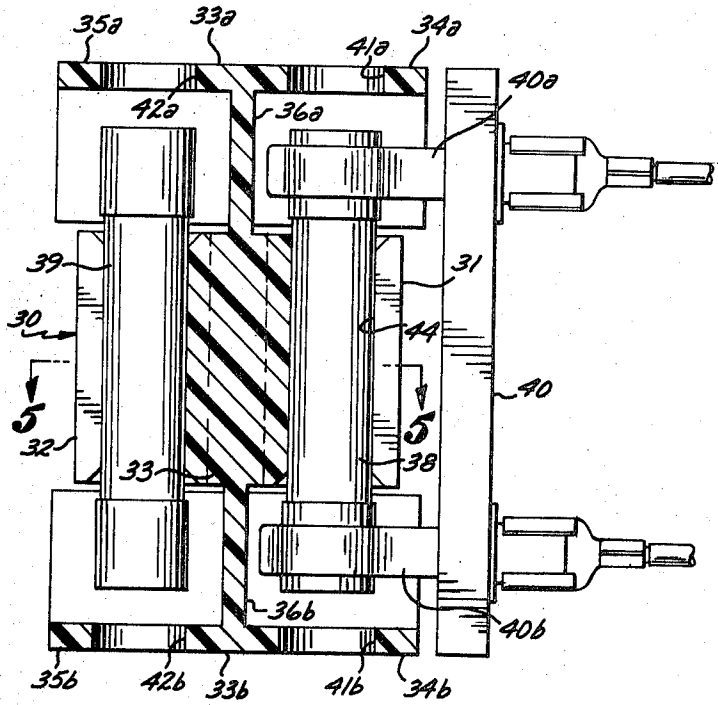


FIG. 1

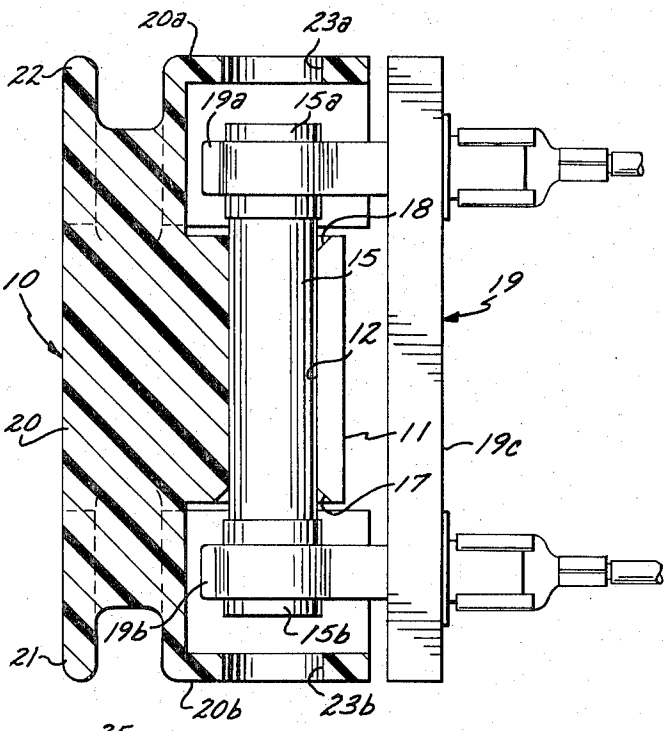
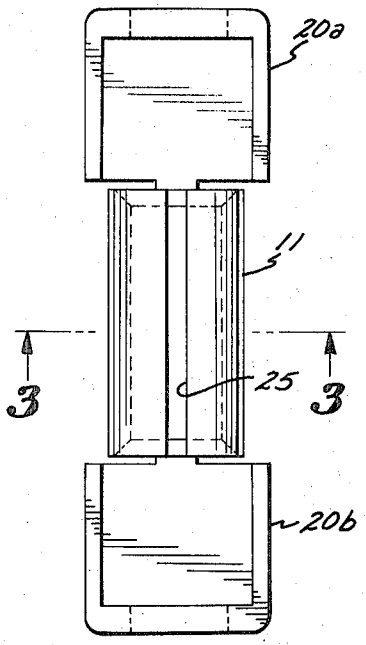


FIG. 2



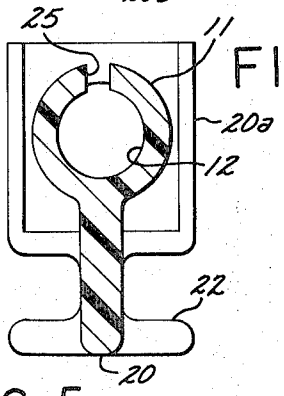


FIG. 3

FIG. 4

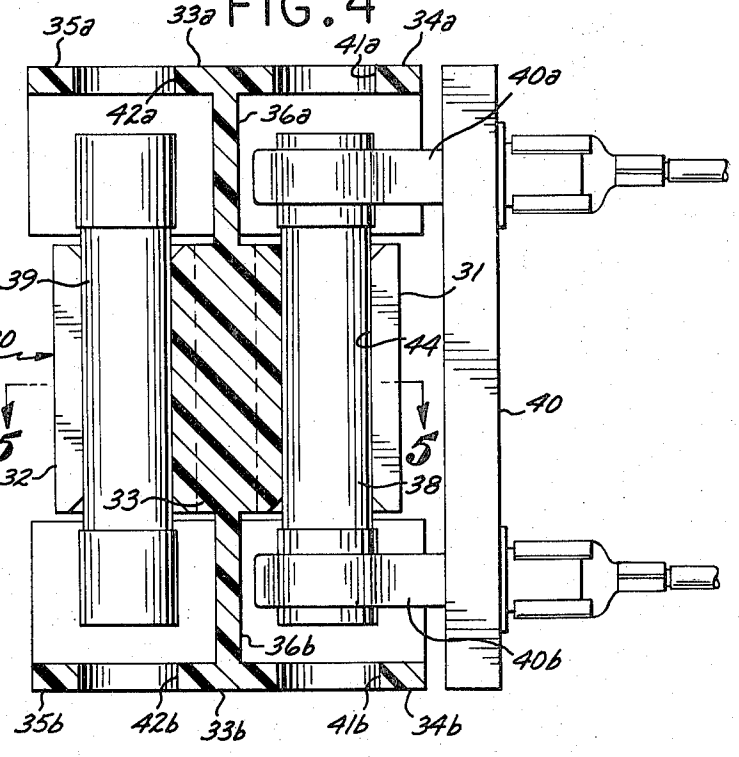
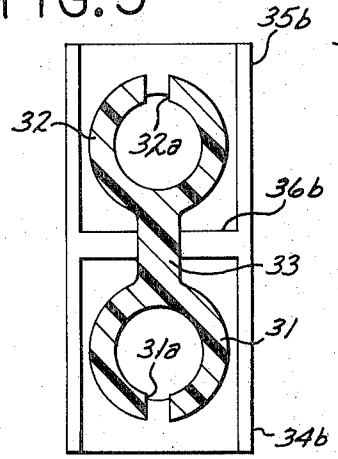


FIG. 5



FUSE RETAINER AND EXTRACTOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to fuse holders, and more particularly to fuse holders adapted to receive fuses of the cartridge type for a manual installation and extraction thereof in corresponding fuse clips.

2. Description of the Prior Art

In the electrical art it has been the common practice to provide fuse protection to various elements of a circuit in order to insure that any current overload in the circuit will first destroy the fuse, thereby opening the circuit and protecting other more critical or expensive items on the line. Very often such critical components are designed to operate at different power levels, thus having different levels of tolerance to current overload, and it has been the general practice to provide a number of fuse devices designed to open at corresponding safe current levels along isolated sections of the electrical circuit. Furthermore, very often such circuits include a plurality of circuit elements drawing in parallel power from a common power source and separate fuse protection of each circuit element is required in order to limit the element to a safe current load. Thus, it has been the general practice in the prior art to provide a plurality of fuses in any one circuit, conveniently located in one centralized location, for protection and diagnosis. Physical space considerations, particularly in circuits having a large number of circuit elements and therefore a large number of fuses, often dictates small fuse dimensions, and for such applications, fuses of the cartridge type have had most prevailing application. Such cartridge fuses generally comprise an insulator tube closed at both ends by conductive end caps, having disposed therebetween a fuse bus connecting the end caps. The end caps engage respective fuse clips connected to the ends of respective leads. In this manner, the fuse closes the circuit between the respective end clips and upon removal thereof at least one of the end clips is usually energized, presenting a hazard of shock and injury to the manual installer. Thus, there have been many prior art devices developed in the past which are specifically adapted to provide a means for insulated manual grasping of the cartridge fuse without unnecessarily exposing the installer to shock hazard. Heretofore, all such devices provided extensions or handles by which the cartridge fuse could be grasped without providing any insulation or protection between the installer and the exposed clips, thus presenting a hazard of shock and shorting across the adjacent clips during installation. Since most usually when a fuse is removed it is for diagnosis purposes, it is generally desirable to have in convenient arrangement a replacement fuse of the same rating and dimensions to replace the removed fuse if such fuse appears to have burned out. Heretofore, the prior art devices generally did not provide such a replacement, thus requiring that the installer carry an inventory of assorted fuses for replacement.

SUMMARY OF THE INVENTION

Accordingly, it is the general purpose and object of the present invention to provide a fuse holder including protective insulators formed thereon to isolate the installer from the exposed terminals of the fuse clips. Other objects of the invention are to provide within the general confines or dimensions of the fuse holder, a second or replacement fuse disposed for immediate insertion in the fuse clip.

Briefly these and other objects are accomplished within the present invention by forming of a resilient or partly resilient material having high dielectric or insulating properties a fuse holder including a fuse holding hollow cylinder having the interior diameter thereof conformed to receive the insulated portion of a standard cartridge fuse, the interior opening being further chamfered at either end and split longitudinally to permit expansion thereof, thus allowing the larger diameter end caps to be passed therethrough. Formed along one side of the cylinder, and in longitudinal alignment therewith, is a handle for manual grasping. Formed at the distal ends thereof are end shields which are disposed to surround the respective end caps of the fuse when such fuse is inserted. The end shields are open at the bottom to permit insertion of the fuse for retention thereof by fuse clips. The distally opposed surfaces of the respective end shields are pierced to form circular openings in concentric relationship with the central axis of the cylinder, the diameters thereof conforming to the largest diameter of the cartridge fuse.

In one other embodiment of the present invention, the handle has formed thereon a second cylinder, also split and chamfered to receive a cartridge fuse including end shields disposed to surround fuse clips in the manner described above. In this embodiment, it is contemplated that cartridge fuses of the same rating and size be inserted in their respective cylinders, such that a replacement fuse is immediately available by turning the fuse holder and inserting it in the opposite direction.

These and other objects and advantages of the present invention will become apparent from a consideration of the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view in partial cross section of a fuse holder embodying the present invention;

FIG. 2 is a bottom view of the fuse holder shown in FIG. 1;

FIG. 3 is a cross sectional view taken along line 3—3 of FIG. 2;

FIG. 4 is a side view in partial cross section of yet another embodiment of a fuse holder of the present invention; and

FIG. 5 is a cross sectional view taken along line 5—5 of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIG. 1, a fuse holder **10**, formed of an elastic or partly elastic material having high dielectric or insulating properties, such as plastic and the like, comprises a fuse retaining cylinder **11** enclosing a cylindrical cavity **12** sized to conform with the dimensions of the insulator barrel of a conventional cartridge fuse **15**. At either end the cavity **12** forms chamfered annular surfaces **17** and **18** diverging at the outer edges thereof to a diameter greater than the diameter of end caps **15** *a* and **15***b* of fuse **15**. Fuse **15**, at end caps **15***a* and **15***b*, is insertable into associated terminals or spring clips **19***a* and **19***b* attached to the mounting structure **19***c* of a conventional fuse clip **19**. Formed on

one side of cylinder **11**, in longitudinal alignment therewith and in substantial opposing relationship with fuse clip **19** is a handle **20**, shaped substantially as planar structure projecting radially away from cylinder **11**. At the free edge, and proximate the ends thereof, handle **20** expands to form in perpendicular arrangement surfaces or lips **21** and **22** to facilitate grasping of the fuse holder **10** and for removal of fuse **15** from fuse clip **19** and to provide surfaces for exerting pressure during installation. At the juncture with cylinder **11** handle **20**, at both ends thereof, extends to form insulator housings **20***a* and **20***b*, forming walls to surround the exposed end caps of fuse **15** and opening at the surface adjacent fuse clip **19** to receive spring clips **19***a* and **19***b*. The distally opposed surfaces of housings **20***a* and **20***b* are pierced to form circular openings **23***a* and **23***b* aligned concentrically with the central axis of cavity **12** and sized to pass fuse **15** into cavity **12**.

As shown in more detail in FIGS. **2** and **3**, cylinder **11** is split longitudinally to form a separation **25** thereby allowing circumferential expansion of the cylinder to allow passage of the larger end caps of fuse **15** therethrough. The respective insulator housings **20***a* and **20***b* are sized substantially to accommodate the respective ends of fuse **15** and the corresponding fuse clips (not shown in this figure) allowing for successive replacement of fuses where one fuse expells the preceding fuse. In this manner, housings **20***a* and **20***b*, when installed, provide shielding in all areas at which spring clips **19***a* and **19***b* would be accessible by the installer during installation of an adjacent fuse.

Yet another embodiment of the present invention is illustrated in FIG. **4** showing a fuse holder **30** including a first and second fuse retaining cylinder **31** and **32** constructed substantially similar to cylinder **11** of FIG. **1**. Cylinders **31** and **32** extend from a central planar member **33** in a substantially parallel alignment, where the distal ends of member **33** extend to form a first and second opposed insulative shield housing **33***a* and **33***b* forming opposing chambers **34***a*, **35***a* and **34***b* and **35***b* across respective common walls **36***a* and **36***b*. Walls **36***a* and **36***b* form a plane across the ends of member **33** in a substantially equidistant position from the central axes of cylinders **31** and **32**, separating the respective chambers **34***a* and **34***b* and chambers **35***a* and **35***b* from each other.

As previously described, cylinder **31** forms a cavity **44** dimensioned to conform with the insulator barrel of a first cartridge fuse **38**, the respective end caps of fuse **38** engaging spring clips **40***a* and **40***b* of a conventional fuse clip **40**. Similarly, cylinder **32** encloses a spare fuse **39**, of a size and power rating equal to fuse **38**, providing an immediately replacement available upon failure of fuse **38**. The distally opposite surfaces of chambers **34***a* and **34***b* and chambers **35***a* and **35***b* are pierced with circular openings **41***a* and **41***b* and openings **42***a* and **42***b* each respectively formed in concentric alignment with the central axes of the corresponding cylinders **31** and **32**. Openings **41***a* and **41***b* and **42***a* and **42***b* are sized to pass the end caps of the fuses **38** and **39**, allowing for insertion of the fuses into cylinders **31** and **32**. As shown in more detail in FIG. **5**, cylinders **31** and **32** are split longitudinally to form separations **31***a* and **32***a*, allowing the respective cylinders to expand or enlarge while passing the end caps of fuses **38** or **39**. In a similar manner to that shown in FIG. **1**, the distal ends of cylinders **31** and **32** are chamfered to a diameter greater than the diameter of the respective end caps, accommodating insertion of the fuse and expanding of the respective cylinder chambers.

In operation, the respective clinders **31** and **32** receive fuses through the coaxial opening formed in the distally opposed walls of the shield housings **33***a* and **33***b* being pressed to a position where the respective end caps of the fuses are exposed for insertion into the corresponding spring clips. The removal and reinsertion of any fuse can be accomplished by any conventional tool such as a round bar (not shown) of sufficiently small diameter to pass through the openings. Furthermore, the concentric alignment of the openings and the respective cylinders allows for a sequential replacement of successive fuses where one fuse is used to force out the previous fuse. Installation and withdrawal of the fuse retained in the first fuse holder is facilitated by lips or surfaces **21** and **22** extending from the handle. Similarly, withdrawal and installation of fuses contained in the second fuse holder is facilitated by the enlargements of the respective cylinders, where one cylinder can be used as a handle to force installation or withdrawal of the fuse contained in the other cylinder.

Some of the many advantages of the present invention should now be readily apparent. In one of its embodiments, the present invention provides for a fuse holder, easily manufactured or cast from any partly elastic or elastic material, such as plastic and the like, which also has a high dialectric or insulative quality, providing the insulator shielding around the exposed spring clips and thereby protecting the installer from shock or any possibility of shorting. Furthermore, the expansive character of the respective cylinders of the fuse holders allows for a relatively low accuracy method of construction such as, for example, a casting while at the same time providing a convenient method of installation of a cartridge fuse.

Various modifications and changes may be made with regard to the foregoing detailed description without departing from the spirit of the invention.

What is claimed is:

1. A fuse holder for receiving cartridge fuses disposed for insertion in fuse clips, comprising in combination:

a first resilient cylinder incuding a first central cavity conformed to longitudinally receive the insulative cylinder of a first cartridge fuse;

handle means attached to said cylinder and disposed longitudinal therewith in radial projection for providing insulative manual grasping and pressing surfaces; and

first end insulator means attached to said handle means at both ends thereof formed to partly surround the exposed ends of the first fuse receivable in said cylinder and adapted to receive corresponding terminals of a fuse clip disposed for attachment with said first fuse for providing insulative walls thereabout, said walls including openings for passing said first fuse into said first central cavity.

2. A fuse holder according to claim **1**, wherein:

said first end insulator means is formed with an opening disposed in substantially opposing relationship with said handle means for receiving the terminals of said fuse clip.

3. A fuse holder according to claim **2**, wherein:

said first resilient cylinder further includes annular chamfers formed in the distal ends of said first cen-

tral cavity and diverging to a diameter greater than the end diameter of the receivable fuse at the end surfaces of said first cylinder, and a separation formed longitudinally in the wall of said first cylinder.

4. A fuse holder according to claim 3 wherein:
said openings further include circular apertures formed in the distally opposed walls of said first end insulator means in concentric alignment with said first cylinder and of a diameter greater than the exterior diameter of said fuse.

5. A fuse holder according to claim 4, wherein:
said handle means further includes a first insulative planar member attached at one edge thereof to said cylinder and projecting readially therefrom and a second planar member attached in substantially normal alignment with said first planar member proximate the distal ends of the other edge thereof.

6. A fuse holder according to claim 2, wherein:
said handle means further includes a second resilient cylinder formed in parallel alignment with said first resilient cylinder and including a second central cavity conformed to longitudinally receive the insulative cylinder of a second cartridge fuse and second insulator means attached to said handle means at both ends thereof formed to surround the exposed ends of the second fuse receivable in said second cylinder including openings on the distally opposed surfaces thereof for passing said fuse into said first and second cavity and adapted to receive corresponding terminals of a fuse clip in substantially opposing relationship with said first end insulator means for providing insulative walls thereabout.

7. A fuse holder according to claim 6, wherein:
said first and second end insulator means is formed with an opening disposed in substantially opposing relationship for receiving the terminals of said fuse clip.

8. A fuse holder according to claim 7, wherein:
said first and second resilient cylinders further include annular chamfers formed in the distal ends of said first and second central cavities diverging to a diameter greater than the end diameter of the receivable fuse at the end surfaces of said first and second cylinders and a separation formed longitudinally in the wall of said first and second cylinders.

9. A fuse holder according to claim 8, wherein:
said openings in said first and second end insulator means further include circular apertures formed in the distally opposed walls thereof in concentric alignment with said first and second cylinders and of a diameter greater than the exterior diameter of said fuse.

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