

[54] **RETAINERS FOR ELECTRICAL COMPONENTS**

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[51] Int. Cl. **H01r 13/50, H01r 13/12**

[58] Field of Search **337/213, 215; 339/22 B, 339/59, 50, 52, 57, 150 R, 150 F, 252, 253 F, 256, 258, 259, 262 F, 242**

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Primary Examiner—Bobby R. Gay

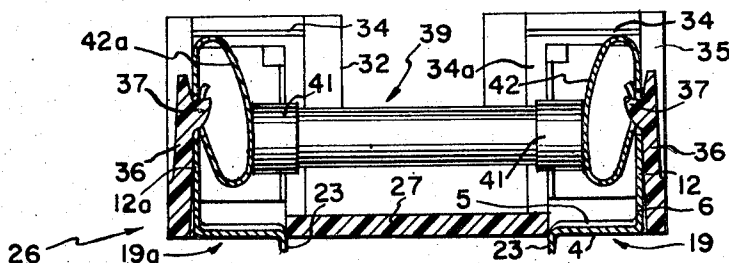
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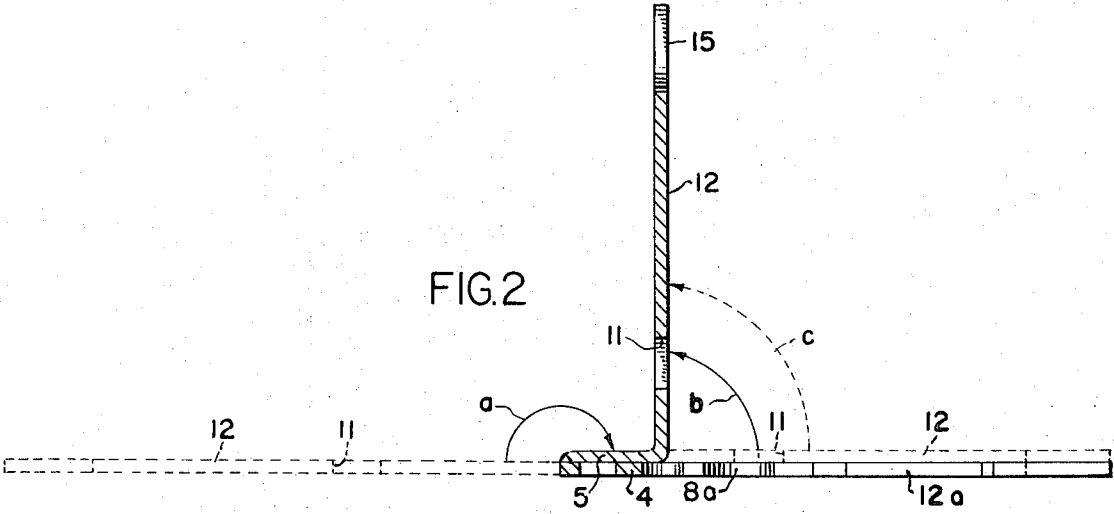
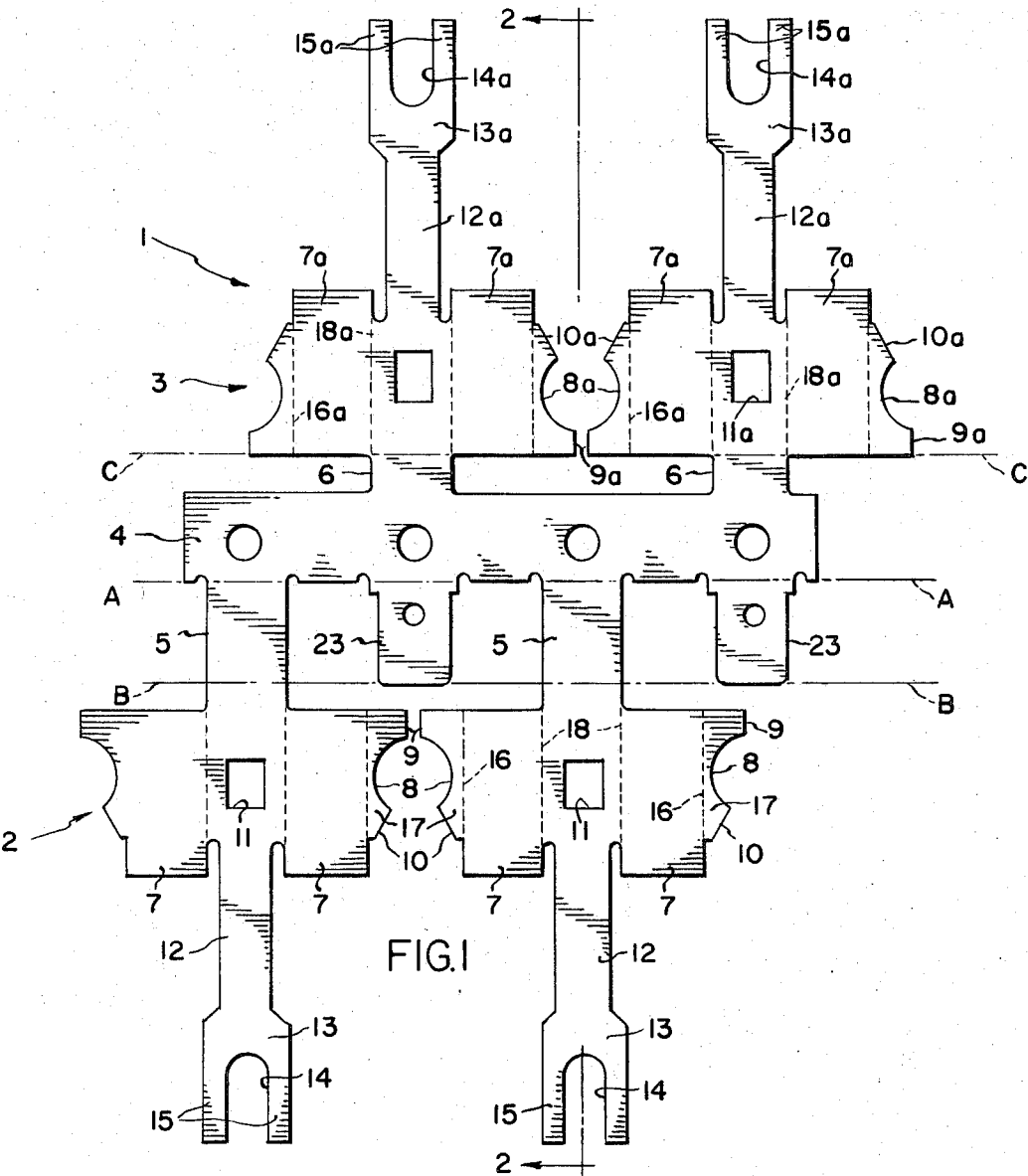
Attorney, Agent, or Firm—Learman & McCulloch

[57] **ABSTRACT**

Apparatus for retaining an electrical component such as a fuse comprises a walled, hollow body the front of which is split to form a yieldable socket for the accommodation of one end of the component and including a resilient arm extending from the rear wall to form a loop having a portion thereof lying between the front and rear walls in a position to engage the end of the component. The arm terminates in a free end which bears against the rear wall of the body. Retainers constructed according to the invention are adapted to be used in pairs and may be mounted in an insulated carrier block having resilient latch fingers which project into openings formed in the rear wall of each retainer. The retainer bodies may be used either in pairs or in gangs of pairs. When the bodies are ganged, each body is connected to a common conductor incorporating means for connecting it to an electrical circuit.

16 Claims, 12 Drawing Figures





SHEET 2 OF 3

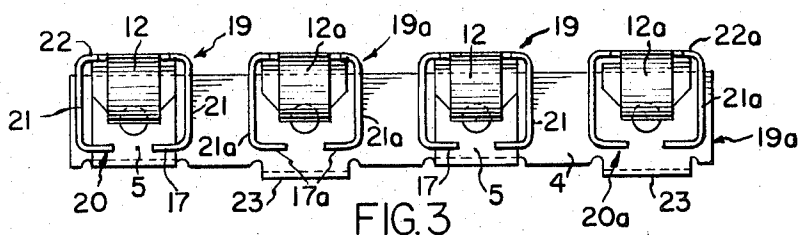


FIG. 3

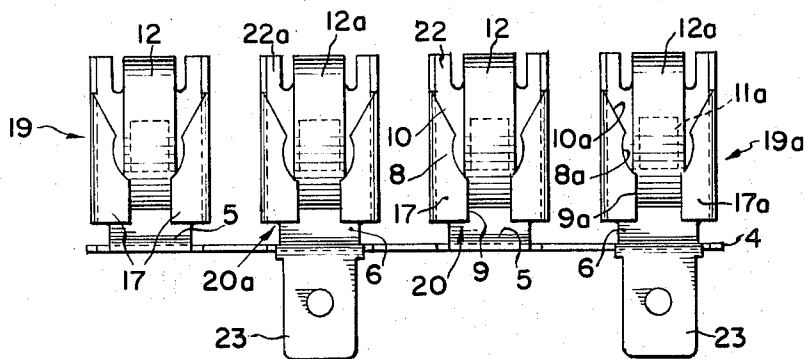


FIG. 4

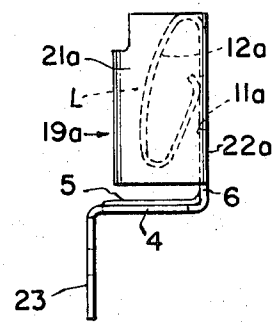


FIG. 5

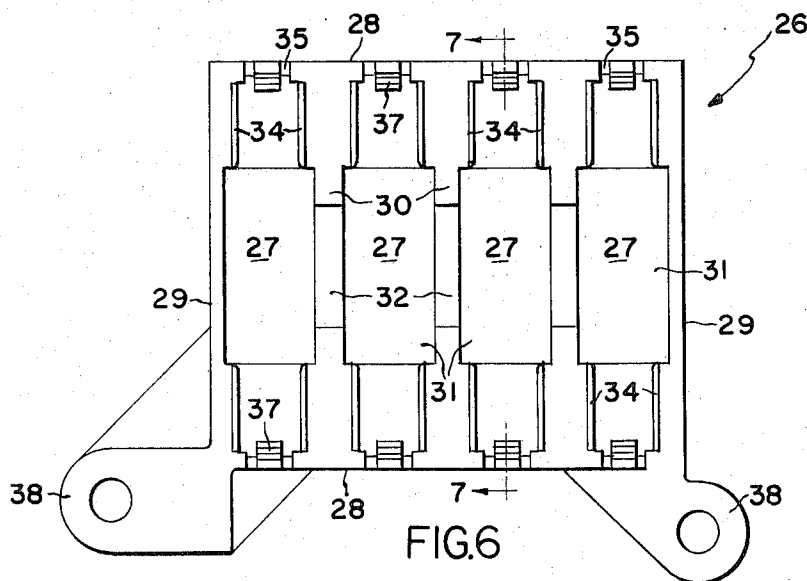


FIG. 6

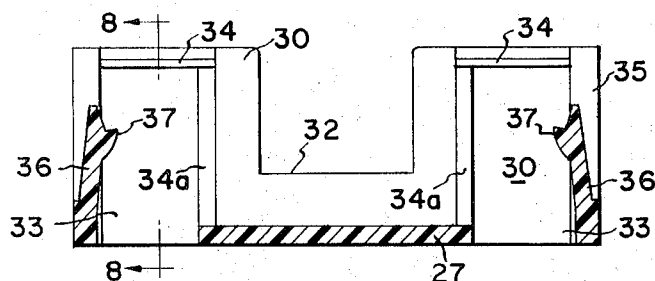


FIG. 7

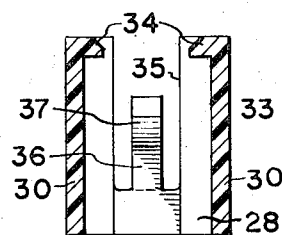
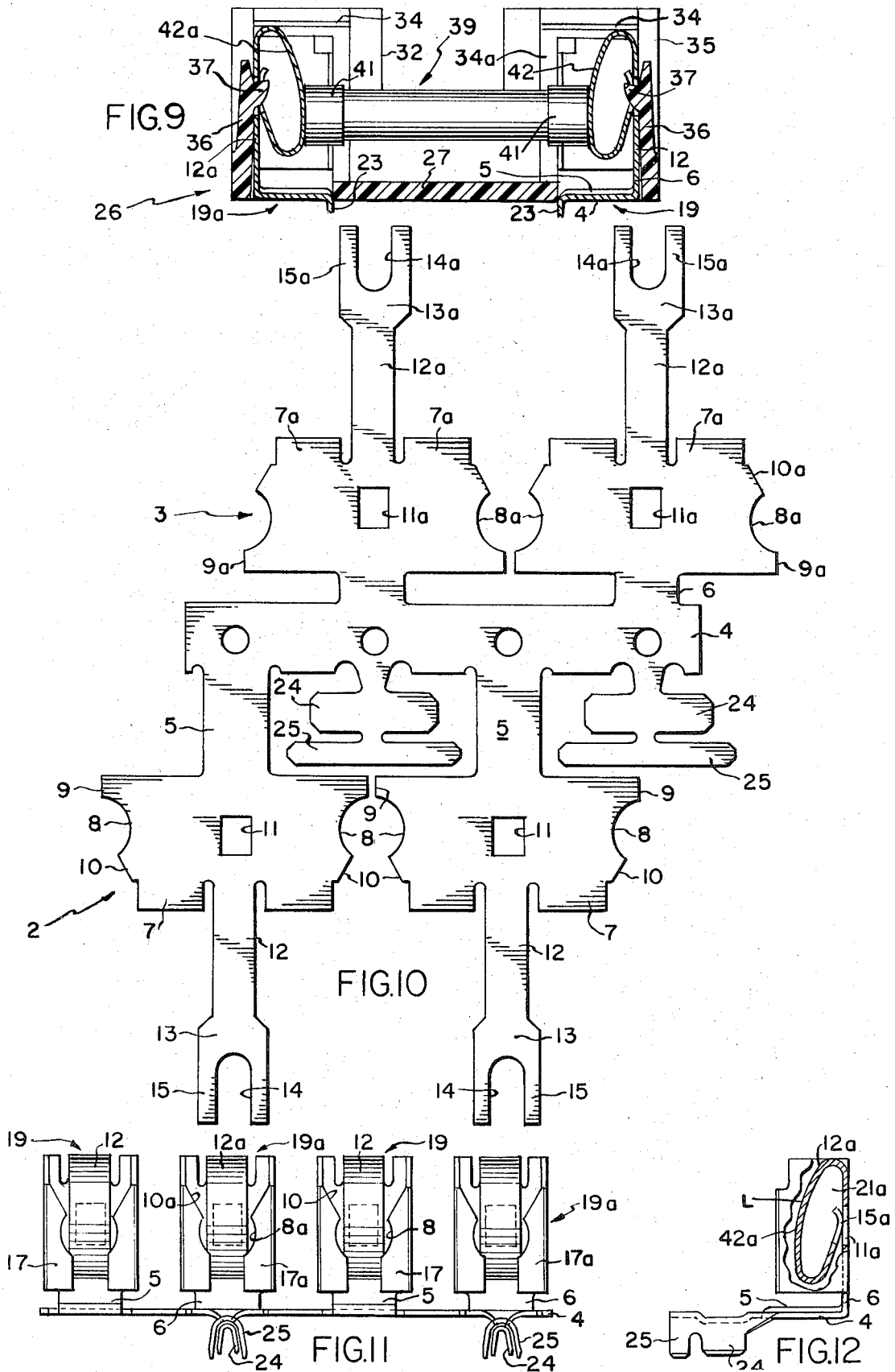


FIG. 8

SHEET 3 OF 3



RETAINERS FOR ELECTRICAL COMPONENTS

The invention disclosed herein relates to retainers for electrical components such as fuses and more particularly to retainer clips of the kind adapted for use either in individual pairs or in gangs of pairs.

A fuse of the kind in connection with which retainers constructed in accordance with the invention are adapted for use comprises a thermally sensitive conductor extending through a tubular, insulated member and having its ends joined to electrically conductive end caps adapted to be gripped by sockets formed in electrically conductive retaining members which are connected in electrical circuits to be protected by the fuse. Fuse retainers of the kind predominantly in use have spring arms adapted to embrace the end caps of the fuse and are riveted or otherwise secured to an insulated support member which also supports an electrical terminal adapted to establish connection between the spring arms and the circuit of which the fuse is a part. Retainers of this kind have many objectionable characteristics. For example, the greatest heat generated in a fuse is at the juncture of the conductive element with the end caps, but a retaining clip which does not engage the endmost walls of the end caps cannot dissipate heat therefrom as rapidly as is desired. Accordingly, the rate at which heat may be dissipated from the ends of the fuse has a limiting factor on the current value which may be accommodated by the fuse.

Another disadvantage of conventional fuse retainers is that they are made of multiple parts and, in many cases, of different materials. The manufacture of a retaining clip from multiple parts is expensive, not only because of the need for manufacturing a number of different parts, but also because of the need to assemble such parts.

Different materials have different thermal and electrical properties and, consequently, the value of current which may be conducted by a fuse may be limited by the electrical and thermal conductivities of the materials from which the clip is formed.

An object of this invention is to provide a fuse retainer construction which overcomes the disadvantages referred to above.

Another object of the invention is to provide a fuse retainer construction which is adaptable for use in pairs of individual retainers or in pairs of ganged retainers.

A further object of the invention is to provide a fuse retainer which is formed of a single piece of material and which requires no rivets or other fastening devices to assemble it with a supporting device.

Another object of the invention is to provide a fuse retainer construction of the character described and which enables a relatively large surface of the end cap of a fuse to be engaged so as to facilitate dissipation of heat from the ends of the fuse.

A further object of the invention is to provide an improved method of manufacturing fuse retainers of the kind referred to above.

Other objects and advantages of the invention will be pointed out specifically or will become apparent from the following description when it is considered in conjunction with the appended claims and the accompanying drawings, in which:

FIG. 1 is a plan view of a blank from which fuse retainers constructed in accordance with one embodiment of the invention may be formed;

FIG. 2 is a sectional view taken on the line 2—2 of FIG. 1 and illustrating the preliminary steps of forming retainers from the blank;

FIG. 3 is a top plan view of a gang of retainers formed from the blank of FIG. 1;

FIG. 4 is an elevational view of the gang of retainers;

FIG. 5 is an end elevational view of the retainers shown in FIG. 4;

FIG. 6 is a top plan view of a support in which the gang of retainers may be mounted;

FIG. 7 is a sectional view taken on the line 7—7 of FIG. 6;

FIG. 8 is a sectional view taken on the line 8—8 of FIG. 7;

FIG. 9 is a view similar to FIG. 7, but illustrating a pair of fuse retainers assembled with the support and illustrating a fuse accommodated in the pair of retainers;

FIG. 10 is a plan view of a blank from which fuse retainers according to another embodiment of the invention may be formed;

FIG. 11 is an elevational view of a gang of retainers formed from the blank of FIG. 10; and

FIG. 12 is a side elevational view, partly in section, of the construction shown in FIG. 11.

Fuse retainers according to the embodiment of the invention shown in FIGS. 1—5 are adapted to be formed from a blank 1 cut from a flat sheet of resilient, electrically conductive material such as that described by the Copper Development Association as alloy No. 230 and commonly known as red brass. Other materials may be used, however. The blank 1 may be stamped from a sheet of such material and comprises a pair of similar, but oppositely arranged blank sections 2 and 3 and an intermediate or mounting section 4. The section 2 is joined to the section 4 by spaced, parallel legs 5 and the section 3 is joined to the section 4 by spaced, parallel legs 6, the legs 6 being shorter than the legs 5 and staggered with respect to the latter.

The blank section 2 includes a plurality of body-forming panels 7 extending laterally a uniform distance on opposite sides of the associated connecting leg 5. The opposite end of each panel 7 has a generally semi-circular notch 8 terminating at one end in an edge 9 which parallels the connecting leg 5 and terminating at its other end in an oblique edge 10. Each panel 7 has a substantially centrally located, rectangular aperture 11.

Extending from each panel 7 in axial alignment with the associated connecting legs 5 is an arm 12 terminating at its free end in an enlargement 13 which is slotted or bifurcated as at 14 to form a pair of parallel fingers 15.

The blank section 3 is shaped to conform exactly to the shape of the blank section 2, and those parts of the blank section 3 which correspond to the parts of the blank section 2 are identified by the same reference characters, followed by the suffix *a*. The panels 7*a* of the blank section 3 are staggered with respect to the panels 7 of the blank section 2, but the panels 7*a* otherwise form a mirror image of the panels 7.

Following forming of the blank 1, the section 2 is bent through 180°, as indicated by the arrow *a* in FIG.

2, about the line A—A so that the connecting legs 5 overlie the mounting member 4 and the section 2 overlies the section 3. The legs 5 then are bent upwardly through 90°, as indicated by the arrow *b* in FIG. 2, about the line B—B so that the major portions of the legs 5 remain in overlying relation with the mounting section 4 and the panel 7 extends normal to the section 4.

Either before or after the folding of the legs 5 along the line B—B, the arms 12 may be shaped to form a loop L. The end portions of the panels 7 then may be bent through 90° along the lines 16 to form wall portions 17. The panels 7 also are bent through 90° along the lines 18 which extend in prolongation of the edges of the connecting legs 5, whereupon the panels 7 form a hollow body 19 (FIG. 3) having a vertically slotted front wall 20 formed by the confronting wall portions 17, a pair of parallel side walls 21, and a rear wall 22. The body 19 overlies the mounting section 4 and the adjacent edges of the body walls are spaced from the section 4 and from the overlying legs 5 so as to enable the front wall-forming portions 17 to move toward and away from one another.

Each of the arms 12 is bent into substantially oval shape (see FIG. 5) and in such manner that the fingers 15 straddle the aperture 11 and bear against the rear wall 22 of the associated body 19.

Following the formation of the bodies 19, the arms 12a may be bent in a manner similar to the arms 12 and each of the panels 7a may be bent along the lines 16a and 18a in the same manner that the panels 7 were bent. The blank section 3 then may be bent upwardly through 90°, as indicated by the arrow *c* in FIG. 2, along the line C—C so that the bodies 19a alternate and are in alignment with the bodies 19. See FIGS. 3 and 4. The lower edges of the walls of the bodies 19a are located at the same level as the lower edges of the bodies 19 and are spaced from mounting section 4 by the connecting legs 6.

In the embodiment of the invention shown in FIGS. 1–5, the mounting section 4 has a plurality of blade terminals 23 which alternate with the connecting legs 5 and which may be bent downwardly along the line A—A for connection with other terminals (not shown) forming part of an electrical circuit.

The embodiment of the invention shown in FIGS. 10–12 is quite similar to that earlier described, and corresponding parts are designated by the same reference characters. The difference between the two embodiments is that, in the FIGS. 10–12 embodiment, the mounting section 4 has joined thereto flanges 24 and 25 which are adapted to be rolled into cylindrical terminals so as to permit the flange 24 to be crimped to a conductor (not shown) and the flange 25 to be crimped to insulation (not shown) which encircles the conductor. In all other respects the apparatus shown in FIGS. 10–12 is the same as the apparatus earlier described.

Supporting apparatus for retainers constructed in accordance with the invention is shown in FIGS. 6–9 and comprises a block 26 formed of nylon or other suitable insulating material. The block 26 has a centrally located bottom 27 and upstanding side and end walls 28 and 29, respectively, the side walls 28 being spaced from the adjacent sides of the bottom 27. A plurality of partitions 30 span the side walls 28 and form a plurality of open top, parallel cavities 31 in the body 26. Each

of the partitions 30 is provided with a deep notch 32 in its central portion.

The partitions 30 extend the full width of the block 26, but since the bottom 27 terminates short of both end walls 28, a pair of parallel rows of open top and open bottom cavities 33 is provided at the opposite sides of the block. The end walls 29 and the end portions of the partitions 30 have flanges 34 which confront one another and overlie the cavities 33. The wall 29 and the partitions also have vertical shoulders 34a adjacent the sides of the bottom 27. The side walls 28 are vertically slotted as at 35 adjacent each partition 30 and each slot is occupied by a resilient finger 36 formed integrally with the wall 28 and having a latching pawl 37 which projects into the associated cavity 33.

The body 26 preferably includes integral means, such as apertured ears 38, for the accommodation of screws (not shown) by means of which the block may be mounted on any suitable support.

To condition the apparatus for operation, a gang of retainer bodies 19, 19a is introduced to one row of cavities 33 of the block 26 from the bottom thereof and is pushed inwardly. As the gang of retainer bodies is pushed into the cavity, the rear wall 22, 22a of the respective bodies will engage the pawls 37 and cam them outwardly of the associated cavity until such time as the aperture 11, 11a registers with the pawl. The resilience of the fingers 36 then will move the pawls into the associated apertures, whereupon the retaining bodies will be removably supported in the block. A second set of ganged bodies 19, 19a may be inserted in the other row of cavities 33 of the block 26 in the same manner so that the split front walls 20, 20a of the two sets of retaining bodies confront one another as is shown in FIG. 9. The overhanging flanges 34 and the ends of the partitions 30 prevent movement of the retainer bodies through the upper ends of the cavities, the flanges 34a prevent movement of the bodies toward one another, and the pawls 37 prevent inadvertent movement of the bodies through the lower ends of the cavities.

Following assembly of the ganged retainers with the block 26, a plurality of fuses may be fitted into the confronting retainers. As is shown in FIG. 9, each fuse 39 comprises a tubular body 40 formed of insulating material and within which is a thermally sensitive conductor (not shown). At each end of the body 40 is a metallic end cap 41 of cylindrical configuration and to which the ends of the conductor are joined. The diameter of the end caps 41 is such as to enable them to be engaged snugly by the socket formed by the arcuate edges of the front wall portions 17, 17a. The oblique edges 10, 10a form a tapered throat to facilitate introduction of the fitting of the end caps into the retainers. The width of each retainer body is sufficiently less than the width of its associated cavity 33 to permit the body side walls 21, 21a to be spread apart as the end caps of the fuse pass through the throats into the sockets.

The length of each fuse 39 and the loop formed by the arms 12, 12a are such that each terminal end of the end caps 41 bears against that portion 42, 42a of the respective arms 12, 12a which lies between the front and rear walls of the retaining bodies and forcibly compresses the loop so as to provide snug engagement between the loops and the end of each cap 41. The ability of the fingers 15, 15a at the ends of the respective arms 12, 12a to slide enables the looped arms 12, 12a to exert a force on the fuse 40 along the longitudinal axis

of the latter, thereby avoiding the imposition of a force on the fuse which would tend to eject it from the socket.

When the fuse retaining bodies are assembled in the block 26 the terminals 23 extend below the bottom 27 of the block for connection in a circuit to be controlled by the fuses. It will be understood that the terminals 23 of the gang of fuse retainers at one side of the block 26 will be connected to a source of electrical potential, such as a battery (not shown) and the terminals 23 of the other gang of retainers will be connected to electrical devices to be protected by the fuses. The mounting member 4, in each instance, thus constitutes a bus for all fuse retainers of a gang.

When gangs of fuse retainers of the kind shown in FIGS. 11 and 12 are used, they may be assembled with the block 26 in the same manner previously described, but in this instance the terminal flanges 24, 25 will be crimped to insulated wires which connect the opposing gangs of retainers to a source of electrical potential and to electrical components to be protected by the fuses.

Although a gang of four retaining bodies 19, 19a is disclosed in the drawings, it will be understood that a fewer or greater number of such bodies may be incorporated in a gang if desired. Moreover, individual retainer bodies may be formed according to the invention, or individual bodies may be formed by cutting the connecting member 4 between adjacent bodies.

The disclosed embodiments are representative of presently preferred methods and apparatus, but are intended to be illustrative rather than definitive thereof. The invention is defined in the claims.

We claim:

1. Apparatus for retaining an electrical component such as a fuse comprising a walled, hollow body having first and second spaced apart, opposed walls, said first wall being split to form confronting wall portions each of which is notched to form a socket for the accommodation of said component; and a conductive, resilient arm carried by said body and bent to form a loop having a first portion located in a position wholly between and spaced from said first and second walls for engagement with said component and having a second, free end portion extending from said first portion to said second wall and in bearing engagement with the latter.

2. Apparatus according to claim 1 wherein said free end of said arm is slotted.

3. Apparatus according to claim 1 including means carried by said body for connecting the latter in an electrical circuit.

4. Apparatus according to claim 1 including support means having a cavity therein for the reception of said body.

5. Apparatus according to claim 4 including cooperable latch means carried by said support means and

said body for latching the latter in said cavity.

6. Apparatus according to claim 5 wherein said latch means comprises a latch pawl carried by said support means and an aperture in a wall of said body for reception of said pawl.

7. Apparatus according to claim 6 wherein said aperture is in said second wall of said body.

8. Apparatus according to claim 7 wherein said free end of said arm is bifurcated and straddles said aperture.

9. Apparatus for retaining corresponding ends of a plurality of electrical components such as fuses, said apparatus comprising a plurality of identical walled bodies, each of which includes first and second spaced apart, opposed walls, the first wall of each body being split to form confronting wall portions each of which is notched to form a socket for the accommodation of one end of one of said components, each of said bodies carrying a resilient arm bent to form a loop having a first portion located wholly between and spaced from said first and second walls in a position to engage the end of the associated component, each of said arms having a second portion extending from said first portion to said second wall and bearing against said second wall of the associated body; and a common mounting member connected to all of said bodies.

10. Apparatus according to claim 9 including terminal means carried by said mounting member for connecting the latter in an electrical circuit.

11. Apparatus according to claim 10 wherein said terminal means comprises at least one blade member.

12. Apparatus according to claim 10 wherein said terminal means comprises at least one tubular member.

13. Apparatus according to claim 9 wherein all of said bodies, all of said arms, and said mounting member are integral.

14. Apparatus according to claim 9 wherein said mounting member is connected to said second wall only of each of said bodies whereby the confronting wall portions of each of said bodies are movable toward and away from one another.

15. Apparatus according to claim 9 including support means for supporting all of said bodies, said support means comprising a block having therein a number of cavities corresponding to the number of said bodies, each of said cavities accommodating one of said bodies therein, and cooperable latch means carried by said block and said bodies for latching the latter in said cavities.

16. Apparatus according to claim 15 wherein said latch means comprises a pawl carried by said block adjacent each of said cavities and an opening in a wall of each of said bodies for accommodation of the associated pawl.

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