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J. D. KINNEAR

3,171,002

ELECTRICAL FUSE MOUNTING

Filed April 8, 1959

2 Sheets-Sheet 1

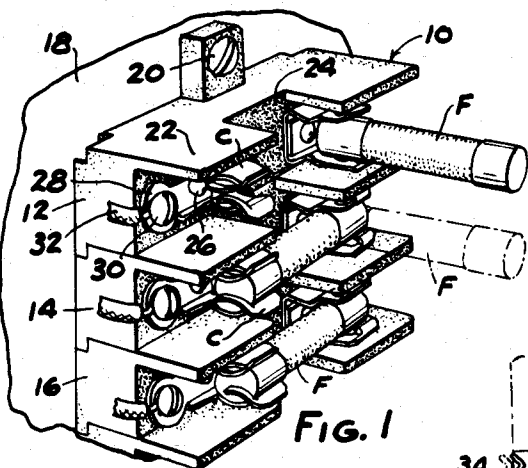


FIG. 1

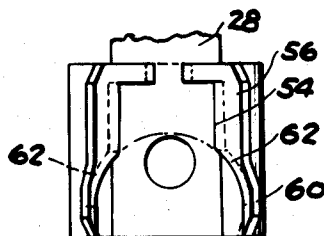


FIG. 3

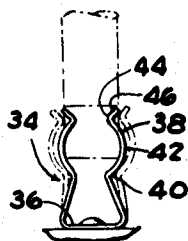


FIG. 1a

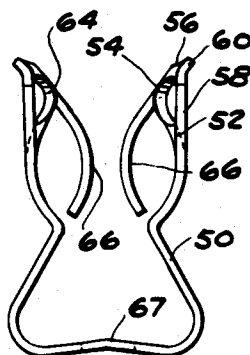


FIG. 2

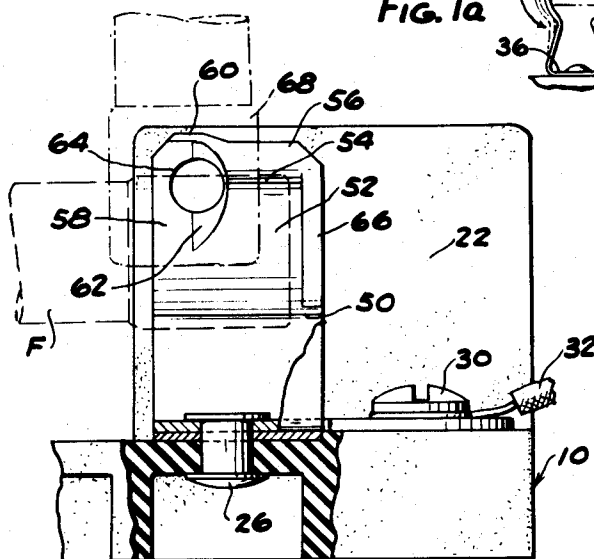


FIG. 4

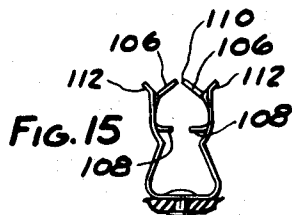


FIG. 15

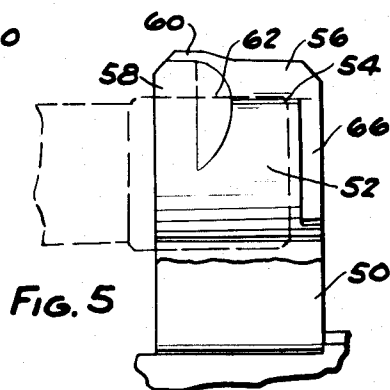


FIG. 5

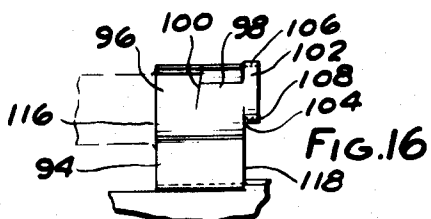


FIG. 16

INVENTOR.
JOSEPH D. KINNEAR
BY

Barnes, Kinell, Raich & Chote
ATTORNEYS

Feb. 23, 1965

J. D. KINNEAR
ELECTRICAL FUSE MOUNTING

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2 Sheets-Sheet 2

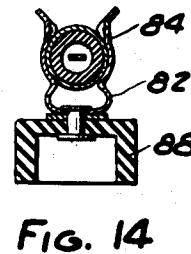
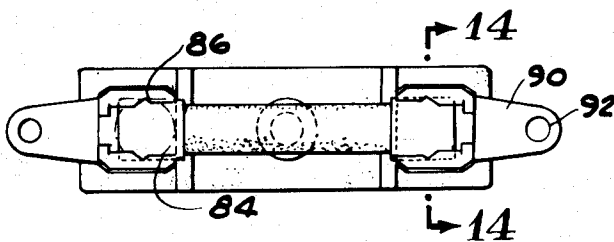
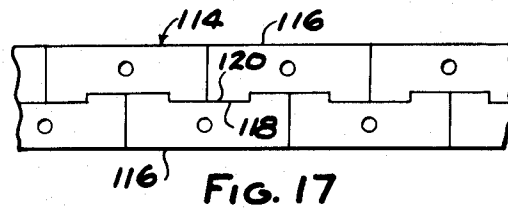
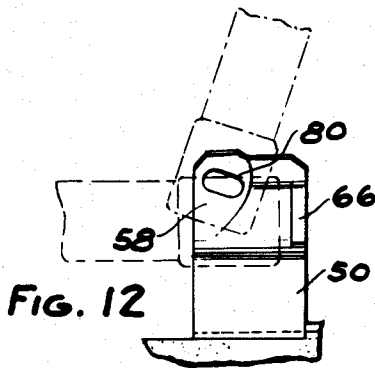
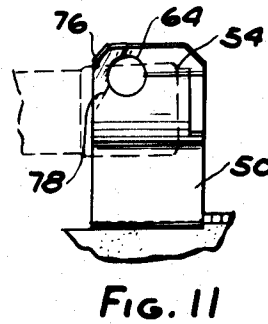
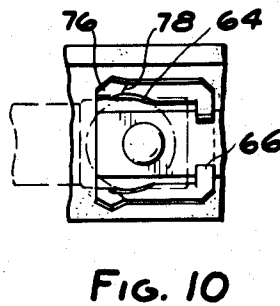
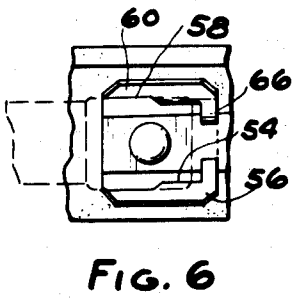
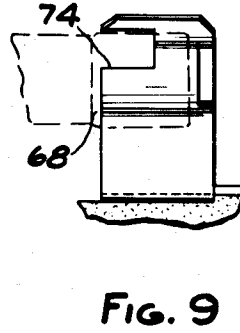
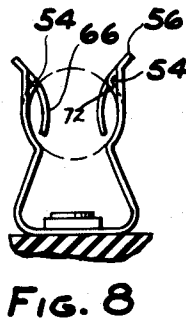
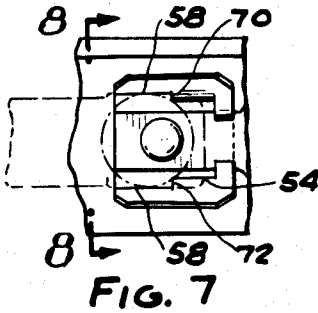


FIG. 13

INVENTOR.
JOSEPH D. KINNEAR
BY

Barner, Kinsella, Kirsch & Choate
ATTORNEYS

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3,171,002

ELECTRICAL FUSE MOUNTING
Joseph D. Kinnear, 1894 Severn Road,
Grosse Pointe Woods, Mich.
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21 Claims. (Cl. 200—133)

This invention relates to electrical fuse mountings and more particularly to a clip for electrically engaging the terminals or end ferrules of a cartridge-type fuse.

In many industrial applications, on machine tools, for example, a great many fuses are mounted in rows on a fuse block in a control panel. To conserve space, the fuses are spaced apart rather closely and usually only sufficiently to enable the fuses to be inserted and retracted from the mounting clips on the fuse block. In case of a break down of the machine tool, it frequently becomes necessary to check the various circuits protected by the numerous fuses. This usually involves disconnecting the particular circuits to be checked by temporarily removing the fuses from the circuits.

Removal of the fuses from the fuse block presents several problems. In the first place, because of the crowded space conditions and the firm grip of the clips with the end terminals or ferrules on the cartridge, the removal of such fuses is sometimes difficult. In the second place, the successive fuses are more likely than not to be of different electrical sizes; and there is always a possibility that a fuse of the wrong electrical size might be inserted in one or more pairs of fuse clips.

It is an object of this invention to provide a fuse clip construction which permits a ready and positive disconnect of the circuit controlled by any particular fuse. More specifically, the invention has to do with a fuse clip which is constructed such that when one end of the fuse is pried loose from its associated fuse clip on the block, the fuse automatically rotates or flips outwardly or upwardly about its opposite end to a position wherein the fuse is generally transversely disposed with respect to its disposition when normally engaged in the fuse block.

Clips for cartridge-type fuses are normally U-shaped in configuration and are provided with outwardly bowed spring legs which are arranged to extend circumferentially around opposed cylindrical surface portions of the fuse terminal or ferrule. At their free ends, the spring legs are usually flared outwardly apart to facilitate insertion of the fuse into the clips. With a fuse block having a pair of fuse clips of the conventional type mounted thereon, when the fuse is tilted outwardly at one end to disengage one terminal from its associated clip, the fuse pivots outwardly about the other clip only with difficulty and does not pivot outwardly beyond that position to which it is positively pivoted by the serviceman. Furthermore, with conventional clips, when the fuse is tilted outwardly at one end, there is a tendency for the fuse clip at the other end to squeeze the fuse outwardly to a position wherein the fuse pops out of engagement with the fuse clip entirely.

With a fuse clip constructed in accordance with the present invention, when one end of the fuse is pivoted outwardly out of engagement with its associated clip, the fuse automatically flips outwardly or upwardly to a position wherein it is generally perpendicular to its normal position when engaged with the fuse clips in the block. Furthermore, the fuse clip of this invention is designed such that the fuse is not only automatically flipped upwardly or outwardly, but is forcibly retained in engagement with the clip about which the fuse is pivoted at one end.

In the drawings:

FIG. 1 is a perspective view of a fuse block incorporating clips of the present invention.

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FIG. 1a is an end view of a fuse clip of conventional construction.

FIG. 2 is an end view of one form of fuse clip embodying the present invention.

FIG. 3 is a top plan view of the clip shown in FIG. 2.

FIG. 4 is a fragmentary side view with parts broken away of a fuse block incorporating the clip illustrated in FIGS. 2 and 3.

FIGS. 5 and 6 are side and top plan views, respectively, of another form of fuse clip embodying the present invention and showing a fragmentary portion of the fuse block.

FIG. 7 is a top plan view of still another form of fuse clip according to the invention with a fragmentary portion of the fuse block illustrated.

FIG. 8 is a sectional view along the line 8—8 in FIG. 7.

FIG. 9 is a side view of still another form of fuse clip according to the present invention.

FIGS. 10 and 11 are top, plan and side elevational views, respectively, of another modified form of clip according to the present invention.

FIG. 12 is a side elevational view of still another form of clip according to the present invention.

FIG. 13 is a top plan view of a fuse block incorporating another form of clip according to the present invention.

FIG. 14 is a sectional view taken along the line 14—14 in FIG. 13.

FIGS. 15 and 16 are end and side elevational views, respectively, of still another form of fuse clip according to the present invention, a portion of the fuse block also being illustrated.

FIG. 17 is a plan view of a strip of spring metal showing the manner in which the fuse clip illustrated in FIGS. 15 and 16 is blanked therefrom.

Referring to FIG. 1, there is illustrated a fuse block generally designated 10 which comprises a plurality of similar individual sections 12, 14 and 16 which are nested together and secured to a mounting panel 18 by screws, one of which is shown at 20. The individual sections of block 10 are formed of an electrically insulating material and are fashioned with shielding side walls 22 which are cut away at the central portion thereof as at 24 to permit access to the fuses F retained on the block by the clips C. The clips C are arranged in pairs as illustrated and secured to the individual sections of the block 10 by suitable fastening means such as the rivets 26. The outer ends of the clips are fashioned with base extensions 28 in which are threaded screws 30 for securing the wire leads 32 to the clips.

The present invention is directed specifically to the construction of the clips such that when fuses retained engaged by the clips in their normal position (as indicated by the two lower fuses shown in solid lines in FIG. 1) are pried or pivoted outwardly from the clips at one end or either end, they automatically flip to a positive disconnect position wherein the fuse is held in an upright or outwardly projecting position generally perpendicular to its normal position when engaged with the fuse clips. The position to which the fuses are automatically flipped by the clip construction of the present invention is illustrated by the uppermost fuse shown in FIG. 1.

I have determined that fuse clips embodying the present invention may take one of numerous different forms, all of which, however, accomplish the object of this invention. Thus, all of the fuse clips illustrated and described herein have at least one common feature which accounts for the fact that when one end of the fuse is disengaged from its associated clip, the fuse automatically pops out or flips to the positive disconnect position shown in FIG. 1. This common feature resides in the forming of the fuse clip so that the two spring legs of the fuse clip are somewhat relieved along one side edge thereof.

In order to illustrate clearly the difference in construc-

tion and operation between a fuse clip of conventional construction and a fuse clip according to the present invention, there is illustrated in FIG. 1a a fuse clip of conventional form engaging a fuse. A conventional fuse clip generally designated 34 is of generally U-shape having a base portion 36 and a pair of spring legs 38. Legs 38 are bent inwardly as at 40, are then bowed outwardly into cylindrical shape as at 42 and then turned outwardly as at 44 to provide a pair of outwardly flaring lips 46 which facilitate insertion of the fuse into the clip. When a fuse engaged by a pair of clips of the type illustrated in FIG. 1 is pivoted outwardly or upwardly at one end, the opposite end of the fuse inclines upwardly and bears against the inwardly turned portions 44. The spring tension on the legs of the clip thus resists tilting of the fuse, and this spring tension resisting tilting of the fuse continues to exert a restraining influence on the tilting movement until such time as the spring legs of the clip have been sprung outwardly to the position illustrated in broken lines in FIG. 1a, at which point the inwardly turned portions 44 engage diametrically opposite surface portions of the cylindrical end of the fuse.

Thus, if the clips C shown in FIG. 1 were of conventional construction and it were desired to flip the center fuse from the solid line position to the broken line position, the inwardly turned portions 44 of the clip at the right would tend to resist such movement until the fuse had assumed practically the position shown in broken lines. I have determined that the fuse can be flipped substantially automatically to the broken line position when it is pried loose from the clip at the left by relieving the inwardly turned portions 44 on the clip at the right such that the upper half portions of the spring legs offer substantially no resistance to the upward or outward tilting of the fuse.

One method of relieving these spring legs is illustrated by the form of clip shown in FIGS. 2, 3 and 4. The outer end portion of the clip shown in these figures, that is the end adjacent base extension 28, is substantially the same as a conventional clip. The two legs are formed with the inwardly bent lower portions 50, the outwardly bowed cylindrical portions 52, the inwardly bent upper portions 54 and the outwardly flaring lips 56. This standard configuration extends the full axial extent of the clip at the lower half portion thereof (see FIGS. 2 and 3), but only about half the axial extent of the clip at the upper portion thereof. At the inner side edge of the clip, that is, the side edge facing the other clip in each pair, the inwardly bent portion 54 is flattened out so that the inner half portion of each leg of the clip is substantially flat as indicated at 58 in FIG. 2 from about the center of the bowed portion upwardly to almost the upper ends of these legs. The upper ends of the legs at the inner portion thereof are only slightly flared as indicated at 60. This change in cross sectional shape between the inner and outer portions of the clip is blended together at generally the axial central portion of each leg as indicated at 62.

The clip illustrated in FIGS. 2, 3 and 4 is also provided with a round aperture 64 located generally in the area of the flattened portion 58 and the curved blending portion 62 of each leg. The clip shown in these three figures is also provided at the outer end thereof with a pair of inwardly turned fingers 66 which are conventional and serve as end stops for the cartridge fuse inserted in the clips.

The base 67 is bowed upwardly as illustrated in FIG. 2 so that the two legs can be drawn inwardly toward each other in assembly to an extent determined by the degree to which the bow is flattened when the clip is riveted to the fuse block.

Referring to FIG. 4, it will be noted that when the fuse F is retained by the clip in its normal electrically contacting position, the cylindrical ferrule or terminal 68 at the end of the fuse is snugly embraced by the two outwardly bowed cylindrical spring portions 52 of the clip; and thus, good electrical contact is insured. However, when the

end of the fuse opposite that illustrated in FIG. 4 is pried upwardly, the inner edge portion of the clip illustrated in FIG. 4 offers substantially no resistance to the tilting movement of the fuse. The ferrule 68 pivots between the two spring legs generally at the mild portion thereof. The fuse is caused to pop up automatically to the upright position by the action of both clips in the pair on the ferrules of the fuse.

This is brought about by reason of the fact that the clip illustrated in FIG. 4 offers substantially no resistance to the pivoting movement of the fuse and the legs of the other clip, when the fuse is pried upwardly therefrom, are distended to the maximum diameter of the fuse so that the resilience thereof produces a substantial squeezing action on the lower half portion of the ferrule which imparts substantial velocity to the one end of the fuse sufficient to tilt the fuse to the upright position. In this instance, the round aperture 64 engages the curved cylindrical surface of the ferrule 68 to retain the fuse in a more or less upright position.

Although the provision of the aperture 64 is desirable since it forms a positive fulcrum point about which the ferrule 68 pivots, it is not absolutely essential. In FIGS. 5 and 6, there is illustrated a clip substantially identical with the clips shown in FIGS. 2, 3, and 4 with the exception that the aperture 64 is not provided therein. The action of the fuse in the clip shown in FIGS. 5 and 6 is generally the same as the previous clip described.

In the clips thus far described, the flared upper ends 60 of the relieved portions of the spring legs appear to be raised with respect to the flared upper edges 56 of the outer portion of the spring legs. These upper flared edges would appear as indicated if the blank from which the clip is fashioned were perfectly rectangular in shape because while the rear end of the clip is curved as illustrated, the front end of the clip is flattened. The blank could be originally shaped so as to compensate for this and thus produce a clip, the upper edges of which would appear to be perfectly straight in side elevation.

The clip illustrated in FIGS. 7 and 8 is substantially the same as the clip illustrated in FIGS. 5 and 6 with the exception, however, that instead of fashioning the clip so that the flattened edge portions 58 at the inner end thereof are connected with the inwardly bent upper portions 54 by the curved or blending portion 62, the legs of the clip are lanced vertically as at 70 to form abrupt shoulders 72 between the flattened portions 58 and the inwardly bent portions 54. The shoulders 72, as will be seen from FIG. 7, provide stops against which the outer cylindrical surface of the ferrule engages to retain the fuse in a generally upright position when pried loose from the other clip. In other respects, the clip illustrated in FIGS. 7 and 8 is substantially the same in construction and operation as that shown in FIGS. 5 and 6.

In the clips illustrated in FIGS. 2 through 8, the inner edge portion is relieved by flattening as indicated. The relief required to permit free tilting of the fuse can be produced by means other than flattening these edge portions of the clip. For example, there is illustrated in FIG. 9 a clip which functions substantially as those previously described wherein the freedom of pivoting is provided other than by flattening the inner edge portions of the spring legs.

In the embodiment illustrated in FIG. 9, the inner edge portions of the spring legs are relieved in an upwardly direction from a level just above the vertical center of the bowed portions 52 by forming a generally rectangular notch 74 therein. By removing the metal from the spring legs as illustrated, the obstruction to the upward tilting movement of the fuse, that is, the clockwise rotation of the ferrule 68 as viewed in FIG. 9, is substantially eliminated.

The inner edge portions of the spring legs of the clip can also be relieved to permit free tilting movement of the fuse in the manner illustrated in FIGS. 10 and 11.

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In this embodiment, the inner edges of the spring legs are tapered or flared laterally outwardly as at 76 along a line inclining upwardly from generally the vertical central portion of the bow in the spring legs toward the outer end of the clip. This line is designated 78 in FIG. 11.

In the particular clip illustrated in FIGS. 10 and 11, the circular aperture 64 is located so that it is intersected along one side by the line 78. Thus, the aperture 64 also adds to the relief required to permit free tilting movement of the clip. If the aperture 64 were eliminated from the clip shown in FIGS. 10 and 11, then it would be advisable to shift the line 78 a greater extent toward the outer end of the clip illustrated.

The fuse clip illustrated in FIG. 12 is substantially identical with that illustrated in FIGS. 2, 3 and 4 with the exception, however, that the aperture 80 is elongated in generally a horizontal direction. As the fuse flips upwardly the clearance provided by this elongated aperture allows the spring legs to spring onwardly towards each other thus causing the edges of aperture 80 to impart an added impetus to the upward pivoting movement of the fuse.

In the arrangement shown in FIGS. 13 and 14, the fuse clips generally designated 82 have generally flattened inner edge portions 84 which provide the vertical relief necessary to permit the fuse to automatically flip up to the upright position when pried loose from one of the clips. However, the clips shown in FIGS. 13 and 14 are provided, in addition, with vertically extending V-shaped grooves 86 at the junction between the flattened portion 84 and the remaining curved portions of the clip. The V-shaped grooves 86 on the two legs of the spring clip cooperate to provide a vertical socket for snugly embracing and retaining the cylindrical ferrule at the end of the fuse when the fuse is pried loose from one end and automatically flipped outwardly or upwardly to the upright position. In other words, the V-shaped grooves 86 provide substantially the same function as the horizontally elongated opening 80 in the clip illustrated in FIG. 12, but in a more positive manner.

The fuse block 88 illustrated in FIGS. 13 and 14 differs from that shown in FIG. 1, but in no significant way insofar as the present invention is concerned. Likewise, the clips 84 shown in FIG. 13 are provided with base extensions 90 at their outer ends which are apertured as at 92 to permit wire leads to be soldered thereto.

In FIGS. 15 and 16 I have illustrated a clip generally similar to that shown in FIG. 7. The clip 94 is provided with the flattened portions 96 at the inner ends of the spring legs and the junction between these flattened portions and the remaining curved portions 98 of the spring legs is defined by the lanced edge 100. However, the outer edge of both spring legs of the clip is vertically lanced from above and below as at 102 and 104, respectively, to form tabs 106 and 108. Both sets of these tabs are bent inwardly toward one another as clearly shown in FIG. 15. Tabs 106 have a slightly greater vertical extent than tabs 108 and contact one another as at 110 generally in the horizontal plane of the flared edges 112 of the clip. Tabs 108 extend horizontally inwardly toward one another generally at the vertical mid portion of the cylindrical socket formed by the two spring legs of the clip.

As indicated previously, the tabs 66 specifically designated in FIG. 4 form end stops for the fuse. These tabs, as shown in FIG. 2, merge with the flared edges 56 of the fuse; and with such an arrangement, which is conventional, it is possible to insert the fuse in the clip with the outer end of the fuse engaged between the tabs 66. With the clip illustrated in FIGS. 15 and 16, the tabs 108 provide end stops similar in function to the tabs 66. However, tabs 106 form a barrier at the upper edge of the outer end of the clip; and therefore, with this arrangement, a proper insertion of the fuse in the clip is assured.

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While the blank from which clip 94 is fabricated is not perfectly rectangular in shape, I have illustrated in FIG. 17 the manner in which such blanks can be sheared from a strip of spring material with absolutely no waste. The strip of spring material from which clips 94 are blanked is designated 114 in FIG. 17 and has a width corresponding generally to twice the width of clips 94. The inner edges 116 of the clips are defined by the outer edges of the strip while the outer edges of the clip are defined by the notched arrangement along the central portion of the strip illustrated in FIG. 17. The clips 94 are blanked from the strip 114 in opposed staggered relation so that the lower portion 118 of the outer end of the clip is in the form of a notch which conforms in shape to the projection 120 formed by the upper end of the outer edge of the spring legs of two adjacent clips. Thus, the clip illustrated in FIGS. 15 and 16 actually requires less material than the other clips illustrated when of identical size.

I claim:

1. A clip for releasably engaging the cylindrical end ferrule of a cartridge fuse comprising a base having a pair of upstanding, similarly shaped spring legs, each terminating in a free end, each spring leg having intermediate its ends an outwardly bowed portion cooperating to define a generally cylindrical, radially yieldable socket for circumferentially engaging a substantial portion of the ferrule, each spring leg having one axial end portion thereof relieved from generally the center of the outwardly bowed portion upwardly to adjacent the free end of the leg so that at said end portion of the clip, the spring legs are adapted to engage the ferrule of the fuse only around the generally lower half portion thereof.

2. A fuse clip as called for in claim 1 wherein the base of said clip at the opposite axial end thereof is provided with means for securing an electrical conductor thereto.

3. A fuse clip as called for in claim 1 wherein the relieved portion comprises means forming an aperture in each spring leg of the clip.

4. A fuse clip as called for in claim 1 wherein the relieved portion of each leg comprises a vertically extending generally flat section.

5. A fuse clip as called for in claim 1 wherein the relieved portion of each leg comprises a generally flat section extending upwardly in a generally tangential relation from the vertical central portion of the outwardly bowed portion of the leg.

6. A fuse clip as called for in claim 1 including means on said spring legs adjacent said relieved portions for yieldably limiting the upward pivotal movement of a fuse therein to a generally upright position.

7. A fuse clip as called for in claim 1 wherein the opposite axial end portion of the clip is provided adjacent the free ends of the spring legs with means forming a barrier extending between the spring legs.

8. A clip for releasably engaging the cylindrical end ferrule of a cartridge fuse comprising a U-shaped member having a base and a pair of spring legs extending upwardly from opposite side edges of the base, said spring legs extending upwardly from said base toward one another and then diverging outwardly and upwardly to form a generally semi-cylindrical seat for the lower half portion of the cylindrical ferrule, said legs at one vertical side edge portion thereof converging inwardly and upwardly from the upper ends of said semi-cylindrical seat to form a complementary, generally semi-cylindrical portion for engaging the upper half portion of the cylindrical ferrule and then flaring outwardly and upwardly to provide a pair of lips at the free ends of said legs for facilitating insertion of the ferrule into the spring socket formed by said two semi-cylindrical portions, the opposite vertical side edge portions of the spring legs being relieved above the upper ends of the semi-cylindrical seat so as to offer substantially no obstruction to vertical withdrawal of the cylindrical ferrule therefrom.

9. A fuse clip as called for in claim 8 wherein the

width of said spring legs in a direction axially of the semi-cylindrical seat corresponds generally with the length of the cylindrical ferrule and the relieved portions of the spring legs extend generally to the axially central portion of the spring legs.

10. A fuse clip as called for in claim 8 including means on the spring legs forming a generally vertically extending socket for retaining the cylindrical ferrule in a generally axially upright position.

11. A fuse clip as called for in claim 8 wherein the relieved portions of the spring legs comprise generally flattened sections extending vertically upwardly from the upper end of said semi-cylindrical seat.

12. A fuse clip as called for in claim 11 wherein the spring legs include portions which incline inwardly towards each other in an axial direction from the flattened portion to the upper inwardly converging portions of the spring legs.

13. A fuse clip as called for in claim 11 wherein the flat portions of the spring legs are separated from the upper inwardly converging portions of the spring legs by generally vertically extending shear lines.

14. A fuse clip as called for in claim 11 wherein the zone of each leg defining the adjacent portions of the flattened and the upwardly, inwardly converging portions includes means defining an aperture.

15. A fuse clip as called for in claim 11 wherein the flattened portion of each spring leg is provided with an elongated opening therein.

16. A fuse clip as called for in claim 15 wherein said opening is elongated in a direction generally axially of the spring legs.

17. In a fuse block for a cartridge fuse of the type having cylindrical ferrules at the opposite ends thereof, the combination comprising a pair of generally U-shaped spring clips spaced apart to receive the cylindrical end ferrules of the fuse, one of the spring clips including a pair of upright spring legs shaped to define a generally cylindrical socket for one of the ferrules, said legs being yieldably separable to permit insertion and withdrawal of said cylindrical ferrule from between the free ends of said legs, the other spring clip also having a pair of upright spring legs having an inner or lower portion forming

a generally semi-cylindrical socket for reception of the other ferrule on the fuse, the vertical side edge portions of the legs of the last mentioned clip adjacent the first mentioned clip being relieved above the upper ends of said semi-cylindrical socket so as to offer substantially no obstruction to upward or outward tilting movement of the fuse in the second mentioned clip when the end of the fuse engaged in the first mentioned clip is pried upwardly or outwardly from between the spring fingers thereof.

18. A fuse clip formed of a single strip of metal comprising; a horizontal base and a pair of spaced oppositely facing arms vertically extending from the base, each of said arms having a portion with a horizontally extending arcuate concave surface arranged for receiving the cylindrical surface of a fuse for supporting the fuse between the arms in a position horizontal to the base, a portion having a horizontally extending arcuate convex surface with an apex extending along an axis parallel to the base located between the concave portion and the free end of the arm and means vertically centered along an axis in a plane parallel to the base and through the apexes of each arm and horizontally centered along an axis in a plane normal to the base and the surfaces of each of said portions for receiving the cylindrical surface of the fuse for supporting the fuse between the arms in a position vertical to the base.

19. A fuse clip as called for in claim 18 wherein said last mentioned means comprise an opening in each arm.

20. A fuse clip as called for in claim 18 wherein said last mentioned means comprise a generally vertically extending groove in each arm.

21. A fuse clip as called for in claim 18 wherein said last mentioned means comprise a flattened portion on each arm.

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