Oct. 2, 1962 D. KOLTON 3,056,872

PLUG-IN FUSE RECEPTACLE

Filed Dec. 30, 1959 2 Sheets-Sheet 1

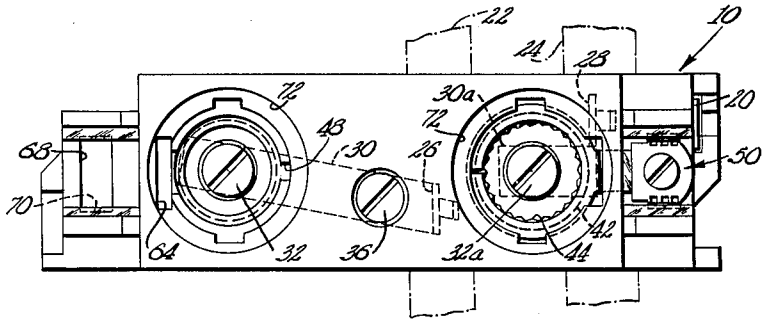


FIG. 1

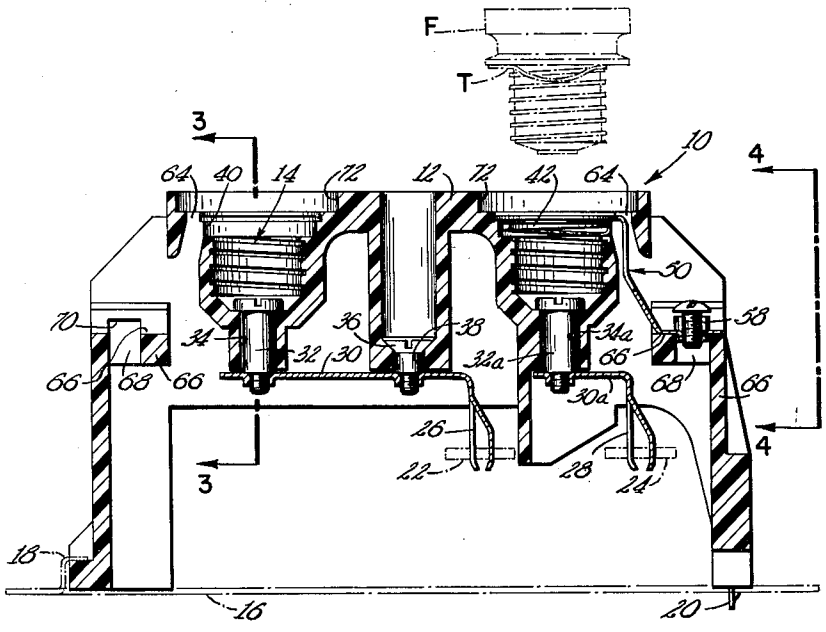


FIG. 2

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Oct. 2, 1962 D. KOLTON 3,056,872

PLUG-IN FUSE RECEPTACLE

Filed Dec. 30, 1959 2 Sheets-Sheet 2

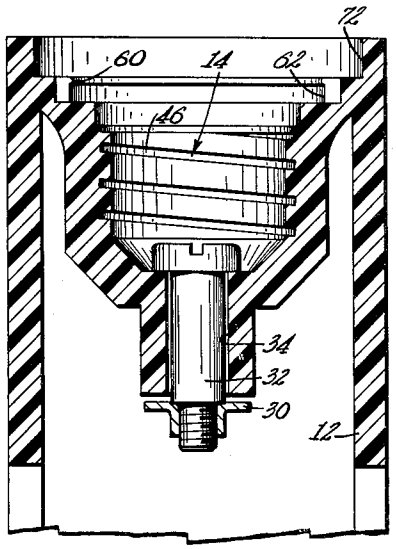


FIG. 3

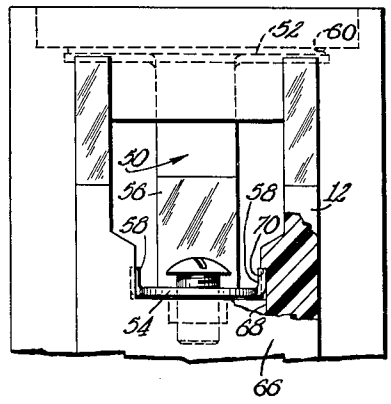


FIG. 4

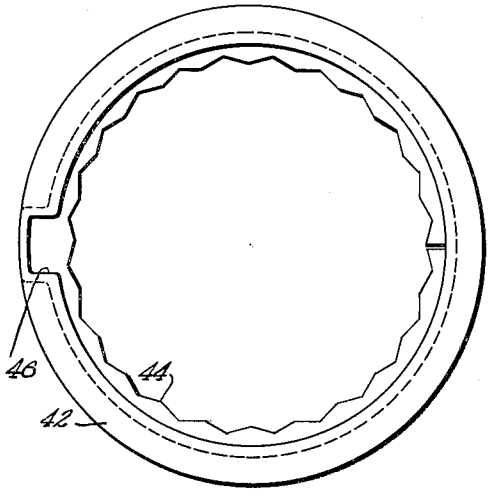


FIG. 5

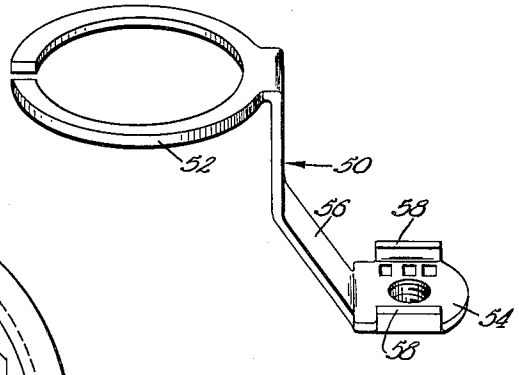


FIG. 6

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PLUG-IN FUSE RECEPTACLE

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9 Claims. (Cl. 200—133)

The present invention relates to plug-fuse receptacles, and more particularly to receptacles for the so-called "Fustat" form of fuse having a bottom center contact and a second contact in the form of a resilient interrupted ring near the top of the fuse, with a threaded body of insulation between the contacts. The ordinary way of mounting such fuses is to employ a screw-shell adapter so that they will be received into a standard receptacle for the more common type of interchangeable screw-shell fuses. An object of the present invention resides in provision of a novel fuse receptacle for "Fustat" fuses that will eliminate the need for adapters. A further object of this invention is to provide a novel assembly of an insulating base and the metallic components for "Fustat" receptacles. A still further object of the invention relates to novel features of the contacts of fuse receptacles and plug-in terminals for plug-in fuse-receptacle units.

The illustrative embodiment of the invention described in detail below in connection with the accompanying drawings which form part of this disclosure represents the present preferred embodiment; and this embodiment contains the novel features in exemplary form. In providing the connection for the resilient upper contact of the "Fustat" fuse, a snap-ring contact is provided which is retained in the insulating body forming the base of the fuse receptacle by means of an overhang, entirely eliminating the space requirements of all forms of fastening structures such as might normally be required for this purpose; and this snap-ring has an integral extension to a screw-terminal or solderless connector for circuit wiring. As a further feature involving an additional aspect of the invention, both the snap-ring portion and the screw-terminal portion of this one-piece terminal contact and wire connector, are retained in place by overhangs that form a unitary portion of the fuse receptacle base. In this manner, the ultimate in simplicity and minimized number of parts is obtained for this portion of the fuse receptacle.

As an additional aspect of the invention, also present in this illustrative fuse receptacle, a second contact for a fuse in the fuse receptacle is arranged to extend to a plug-in terminal that is to engage a panel-board companion terminal resiliently. It has heretofore been proposed that such plug-in terminal may, for example, take the form of resilient stab contacts to enter slots in the bus of a panelboard. A limited extent of accommodation between the plug-in terminal and the bus can be obtained in reliance on the resilience of the parts. This accommodation is enhanced by making the terminal contact of the fuse receptacle and the plug-in contact as a rigid metallic unit forming a reliable current path from the bottom of the fuse to the bus that is engaged by the plug-in terminal of the fuse receptacle.

The nature of the invention will be better appreciated from the following detailed disclosure of the illustrative embodiment which is shown in the accompanying drawings, in which:

FIG. 1 is a plan view of a dual plug-in fuse receptacle, omitting one of the two terminal contacts of the left-hand fuse receptacle to reveal the underlying insulator structure;

FIG. 2 is a cross-sectional elevation substantially along the longitudinal medial plane of the fuse receptacle in FIG. 1;

FIG. 3 is an enlarged cross-sectional view at the line 3—3 in FIG. 2;

FIG. 4 is an enlarged fragmentary elevation of the device in FIG. 1 partly in section, viewed from the right-hand end thereof;

FIG. 5 is a greatly enlarged plan view of a component of the embodiment in FIGS. 1 and 2; and

FIG. 6 is an enlarged perspective view of another component of the apparatus in FIGS. 1 and 2.

Referring now to the drawings, dual fuse receptacle 10 is shown having a unitary body 12, as of molded phenolic insulation. This body includes a pair of cavities 14 which, with the necessary metal parts, forms a fuse receptacle. The unit illustrated is a plug-in dual fuse receptacle of a form suitable to be mounted on a panel 16 that has locating elements 18 at regularly spaced positions. Additionally the panel 16 has regularly spaced holes for receiving resilient mounting clips 20 for location and retention. Suitably supported above panel 10 is a pair of bus bars 22, 24 having slots for receiving the resilient plug-in terminals 26 and 28 of the fuse receptacle. These plug-in terminals 26 and 28 are of a resilient high-conductivity copper alloy so as to make excellent contact with the edges of the slots in bus bars 22 and 24, despite the dimensional variations that may be expected in usual manufacturing practice.

Plug-in resilient terminal 26 extends integrally along a connector 30 to a shouldered screw 32 whose head forms the center contact of the left-hand fuse receptacle of the device illustrated. This screw fits loosely in an oversize bore 34 in the insulating body 12. The length of the screw between its head and its shoulder is somewhat greater than the axial length of bore 34; and as a result the screw when tightened into the threaded portion of connector 30 forms a solid rigid electrical path from the fuse to the plug-in terminal 26. Nevertheless the assembly of connector 30, plug-in terminal 26, and screw contact 32 is loosely supported as a connection between the fuse and the bus 22. In further locating connector 30 there is a further screw 36 which is shouldered and of greater axial length than the axial length of the bore 38 in which that screw is positioned. Thus the mechanical support provided by screws 32 and 36 is a floating support even though these screws are firmly tightened into connector 30.

Resilient plug-in terminal 28 extends via conductor 30*a* to a shouldered screw 32*a* whose head forms the center contact of the right-hand fuse receptacle in FIGS. 1 and 2. Screw 32*a* is shouldered and of greater axial length than the bore 34*a* that receives this screw; and the bore is of greater diameter than the screw. As a result, the assembly 28—30*a*—32*a* is a rigid unit forming a solid electrical path between bus 24 and the fuse in the right-hand receptacle, and nevertheless this electrical unit is loosely supported in the insulating base 12 so that plug-in terminal 28 can float and align itself to best advantage for good electrical connection in the slot in bus 24.

The floating connections achieved by the foregoing construction are of considerable advantage in achieving minimum contact resistance and minimizing the temperature rise at the plug-in contacts 26 and 28. Nevertheless they form reliable electrical paths from the panel-board bus bars to the fuses that are to be received in the screw receptacles.

The screw-threaded portions of cavities 14 that receive the fuses (one of which is illustrated at F in FIG. 2) are relieved at portion 40 for receiving a threaded serrated protective ring 42 (FIG. 5). This ring has a helical portion 44 that forms a continuation of the helical thread 46 in the body 12, and these helical portions in the body 12 and in the protective ring 42 are held in continuous

alignment by virtue of a locating indentation 46 that is received in a corresponding recess 48 (FIG. 1).

FIG. 6 illustrates a combined unit 50, including a split-ring contact for the fuse receptacle and a screw terminal for connecting an external wire, one unit 50 being shown in FIG. 1 and the other removed for purposes of clearer viewing. This combined member 50 has an upper resilient split-ring portion 52, a screw-terminal portion 54, and a connecting strip 56. A pair of ears 58 form part of the screw-terminal portion 54, for a purpose that will become clear as the description proceeds.

As seen in FIG. 8, the molded base 12 includes an overhang 60 whose inner diameter may be no more than .007 inch less than the diameter of recess 62, and this overhang overlies the horizontal shoulder represented by the bottom of recess 62.

Member 50 (FIG. 6) is inserted into the position assumed in FIG. 2 by lowering the terminal portion 54 and strap 56 through a passage 64 in molded base 12. As the final portion of the inserting stroke, the snap-ring portion 52 is forced under the overhang 60 so that the split ring is locked in recess 62. Further, the portion 54 is driven down against its seat 66 so that its threaded portion extends into a passage 68 in the molded base 12. When this is completed, the ears 58 (that are resilient to the necessary extent) snap underneath the shoulders 70 at the top of passage 68 as best shown in FIG. 4.

It will be noted at the right in FIG. 1 that split-ring 52 occupies only a restricted radial dimension in the assembly and requires no separate structure for retaining it in place. However, it acts not only as a contact of the fuse receptacle but also as a retainer for the anti-tampering ring 42. This tamper-proof ring is of itself well known, for preventing the use of a metal foil wrapping around a blown fuse as a dangerous substitute for a fuse of proper rating.

It has been mentioned that insulating base 12 is of molded phenolic. It is nevertheless quite practical, and it has in fact been achieved, to provide the integral overhang 60 in the molding operation. The male member of the mold must be withdrawn after molding the cavity 14; but this is feasible because the material is of sufficiently plastic character while hot so to allow this withdrawal of the molding member. The material resumes the molded configuration in the illustration, and becomes rigid when cool.

Above the retaining overhang 60 there is a further enlargement 72 of sufficient diameter for the top of a fuse to enter into its fully inserted position. When this is done, tampering access to the snap-ring contact 52 is rendered all but impossible, and accidental contact with fuse receptacle contact 52 is most unlikely. Any screw or like fastener that might be used for holding split-ring contact 52 in place may reasonably he expected to extend outside the diameter of the present split-ring contact. A fastening screw could not be positioned so as to extend within the inner diameter of split-ring contact 52. Any such arrangement would of course obstruct the fuse.

The foregoing represents the presently preferred embodiment of the invention in its various aspects. Various modifications and varied application of the novel features will occur to those skilled in the art and therefore this invention should be broadly construed in accordance with its full spirit and scope.

What is claimed is:

1. A plug-in fuse receptacle having a unitary body of insulation including a fuse-receiving cavity having integral threads cooperable with an inserted fuse; a center contact in the bottom thereof, a helical saw-edged safety ring adjacent the top thereof, a ring overlying the safety ring and retaining said safety ring in position, a detent formed in said safety ring and received in said body preventing rotation of the safety ring, said body including an overhang of limited radial extent overlying outer marginal portion of said ring, and ring including an integral connecting strip and a screw-terminal portion, a terminal-supporting shoulder in said body, integral abutments formed in said body spaced from and overlying said terminal-supporting shoulder, said screw-terminal portion being disposed on said shoulder and including opposed lateral extensions underlying said abutments, respectively, and said central contact including a threaded member loosely received in an enlarged bore in said body and said threaded member having a head within said fuse-receiving cavity and having a shoulder, a mechanically floating connector tightly fixed to said shoulder of said threaded member, and a projecting resilient plug-in terminal contact extending integrally from said connector for self-aligning engagement with a companion plug-in bus-bar formation.

2. A plug fuse receptable, including a body of insulation having a fuse-receiving cavity with integral threads for cooperation with an inserted fuse, a center contact at the bottom of the cavity, and a ring forming a second contact, said body having a shoulder about the entrance to said cavity supporting said ring, said body further having an integral overhang overlying an outer marginal portion of the ring; a screw terminal supported by said body and disposed remote from said ring, and a connection extending integrally from said ring to said terminal.

3. A plug fuse receptacle, including a body of insulation having a fuse-receiving cavity with integral threads for cooperation with an inserted fuse, a center contact at the bottom of the cavity, and a ring forming a second contact, said body having a shoulder about the entrance to said cavity supporting said ring, said body further having an integral overhang overlying an outer marginal portion of the ring, a screw terminal supported by said body and disposed remote from said ring, said body having a terminal seat and an overhang adjacent said seat, said terminal extending integrally to said seat and having a portion thereof underlying said last-named overhang.

4. A plug fuse receptacle, including a body of insulation having a fuse-receiving cavity with integral threads for cooperation with an inserted fuse, a center contact at the bottom of the cavity, and a ring forming a second contact, said body having a shoulder about the entrance to said cavity supporting said ring, said body further having an integral overhang overlying an outer marginal portion of the ring, a screw terminal supported by said body and disposed remote from said ring, and a serrated helical tamper-proof ring underlying and retained by said ring.

5. A plug fuse receptacle, including a body of insulation having a fuse-receiving cavity with integral threads for cooperation with an inserted fuse, a center contact at the bottom of the cavity, and a ring forming a second contact, said body having a shoulder about the entrance to said cavity supporting said ring, said body further having an integral overhang overlying an outer marginal portion of the ring, a screw terminal supported by said body and disposed remote from said ring, and a serrated tamper-proof ring underlying said ring to be retained thereby and said serrated ring having a detent portion interlocked with a mating recess in said body for preventing rotation thereof.

6. A plug-in fuse receptacle having a molded base including a female fuse-receiving cavity with integral threads for cooperation with an inserted fuse, a center contact in the bottom thereof, a helical saw-edged tamper-proof ring adjacent the top thereof, a ring overlying and retaining said tamper-proof ring, a detent formed in said tamper-proof ring and received in a recess in molded base for maintaining alignment of the helical saw-edged ring with the thread of said cavity, said insulating body including an overhang of limited radial extent overlying only a peripheral portion of said ring, and an integral terminal strip extending from said ring.

7. A plug-in unit, including a body of insulation, a pair of terminals, one of which is in the form of a plug-in terminal member, and a fuse receptacle having a pair of

fuse contacts, means uniting said plug-in terminal to one of said contacts rigidly, said means including a connecting element extending through a hole in the said body, a head at one end of said element inside said receptacle forming one of said contacts, said element having a shoulder spaced from said head by a greater distance than the length of said hole, means fixing said terminal member against said shoulder, and said hole being of greater diameter than said connecting element, thereby providing mechanical floating support for said plug-in terminal member while providing a rigid electrical connection between said one contact and said plug-in terminal member.

8. A plug-in unit, including a body of insulation, a pair of terminals, one of which is in the form of a plug-in terminal member, and a fuse receptacle having an annular contact and a center contact and a plug-in terminal, a connecting part uniting said center contact rigidly to said plug-in terminal, said connecting part extending through a hole in the said body, a shoulder on said part remote from said center contact and means fixing said terminal member to said connecting part, and said hole being of greater diameter than said part, thereby providing mechanical floating support for said plug-in terminal member while providing a rigid electrical connection between said one contact and said plug-in terminal member.

9. A plug-in unit, including a body of insulation, a pair of terminals including a plug-in terminal member, and a threaded receptacle for a plug fuse, said receptacle comprising a cavity formed in said body of insulation, an annular contact assembled to said cavity and extending

to one of said pair of terminals other than said plug-in terminal member, and a headed stud having the head thereof at the bottom of said cavity and said stud extending through a hole in said body to a shoulder at the opposite end of the hole from said head, the space between said head and said shouldered portion being greater than the axial length of the hole and the diameter of the hole being greater than the portion of said stud extending therethrough and means fixing said terminal member to said stud whereby said plug-in terminal member is free to shift a limited extent relative to said body of insulation, thereby providing for limited self-alignment with a companion mating plug-in terminal while maintaining a rigid current path from said terminal member to said head of said stud.

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