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WIRING DEVICE

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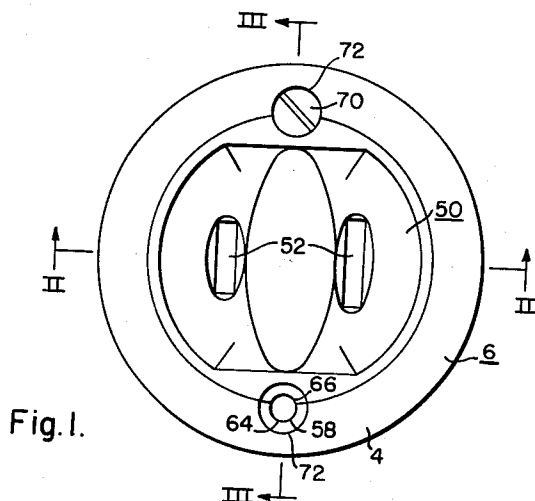


Fig. 1.

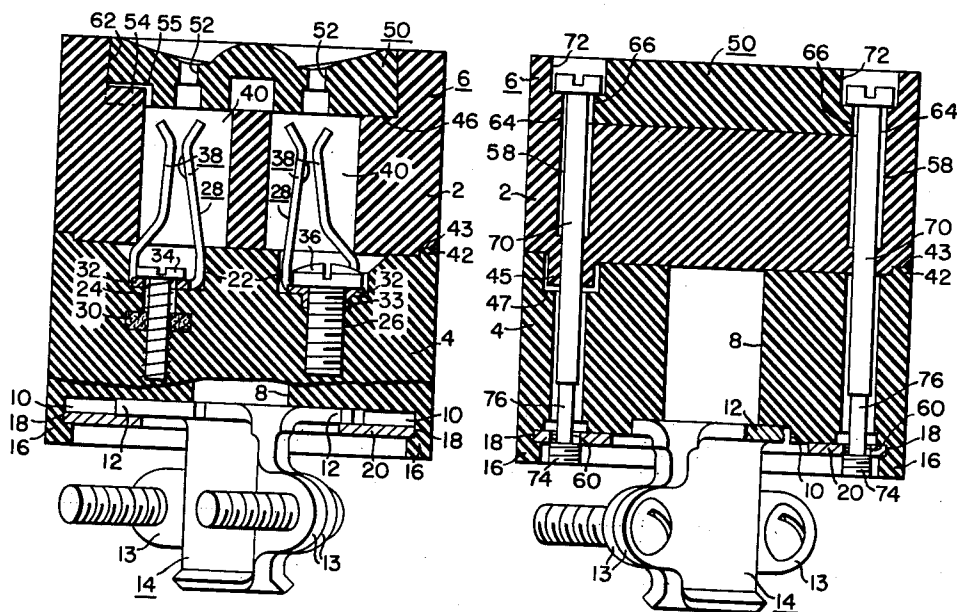


Fig. 2.

Fig. 3.

WITNESSES

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WIRING DEVICE

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The present invention relates to a wiring device, and more particularly to a new and improved casing assembly for such a device.

In many wiring devices having a body formed from a low dielectric strength material, such as the rubber body cord connectors, it has been found to be desirable to provide a high dielectric strength insert adjacent electrically separable members of the device to minimize the effect of carburization, due to arcing upon the making and breaking of electrical contact, and to prevent dielectric breakdown on the body between the prong engaging members which occurs when the entire body is formed from such low dielectric strength materials. Such inserts have normally been molded from a plastic material in order to reduce their cost; however, due to the brittleness of plastic materials, many of the inserts have been broken during assembly and in the field by applying too great a holding force on the insert.

Accordingly, one object of the invention is to provide a new and improved means for holding a frangible member into engagement with the body of a wiring device.

Another object of the invention is to provide a new and improved means for holding a frangible member into engagement with the body of a wiring device which incorporates a structure so as to limit the stress that may be produced upon the frangible member.

Still another object of the invention is to provide screws for securing a frangible member to the body of a wiring device each of which has a threaded end engageable with a backing member and the shank of which is undercut adjacent the threaded portion.

A more specific object of the invention is to provide screws for securing an insert to the body of a wiring device which has a threaded end engageable with a backing member and the shank of which is undercut adjacent the threaded portion to prevent tightening of the screws beyond a certain point determined by the location of the innermost thread.

These and other objects of the invention will become more apparent upon consideration of the following detailed description of a preferred embodiment thereof, when taken in conjunction with the following drawings in which:

FIGURE 1 is an enlarged top plan view of a wiring device constructed in accordance with the principles of my invention in which one securing screw has been removed;

FIG. 2 is a cross sectional view of the wiring device as shown in FIG. 1 taken substantially along lines II-II thereof with parts thereof shown in elevation and with the lower portion broken away; and

FIG. 3 is a cross sectional view of the wiring device as shown in FIG. 1 taken substantially along the lines III-III thereof with parts thereof shown in elevation.

Referring to the drawings, it will be noted that a wiring device constructed in accordance with the principles of my invention comprises a cylindrical body 2 which is securable to a cylindrical cap 4 to form a unitary elongated circular housing 6. The body 2 and cap 4 may be made from any suitable insulating material; however, they are preferably formed from a resilient insulating material, as will become apparent herein. One such resilient insulating material for the body 2 and the cap 4 is molded rubber which may readily be provided with the necessary structure as hereinafter described. As

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shown, the cap 4 is provided with a central opening 8 which extends axially therethrough. The outer end of the cap 4 is provided with a slot 10 which extends diametrically outward from opposite sides of the opening 8 and is of a width to slidably receive the opposed L-shaped legs 12 of a two-piece wire clamping member 14. The cap 4 is also provided on its periphery at its outer end with an axially outwardly extending flange 16 having an annular notch 18 extending laterally outwardly therein at its junction with the outer end of the cap 4 and outwardly of but adjoining the slot 10.

In assembling this portion of the connector, the legs 12 of the clamping member 14 are initially inserted within the slots 10 so as to extend radially outwardly from the opening 8 in the cap 4. A ring-shaped backing member 20, of a thickness approximately equal to the width of the notch 18 and having an outer diameter greater than the diameter of the inner surface of the flange 16 and less than the diameter of the bottom of the notch 18, is then forced inwardly from the outer end of the cap 4 by forcing the flange 16 outwardly. With such a construction, the backing member 20 is held securely in engagement with the lower surface of the cap 4 due to the resiliency of the flange 16. When so located, the backing member 20 also captively retains the legs 12 of the clamping member 14 in the slot 10 with the other legs of each piece of the clamping member 14 extending outwardly through the center opening of the backing member 20. In order to suitably secure a two-wire conductor to the housing 6, the other legs of each piece of the clamping member 14 may be provided with any suitable securing means such as integral ears 13 which are screwed together in the well known manner. The clamping member 14 and the backing member 20 may be formed from any suitable material having sufficient structural strength, and for such purposes, an alloy of steel has been satisfactory.

The inner end of the cap 4, engageable with the inner end of body 2, is provided with an elongated slot 22 on diametrically opposed sides of the opening 8 which slots 22 are generally parallel to each other. The cap 4 is provided with an opening 24 adjacent one end of each slot 22 and an opening 26 adjacent the other end of each slot 22 each of which extends axially from the bottom of the slots 22 toward the outer end of the cap 4. In order that suitable electrical contacts 28 may be secured to the cap 4, an insert 30, having a central opening therein, is molded integral with the cap 4 in alignment with each opening 24. The insert 30 may be formed from any suitable material, such as a fiber material, and is located approximately centrally between the inner and outer ends of the cap 4.

As shown, contacts 28, formed from any suitable electrical conducting material, such as an alloy of copper, are secured within the slots 22, respectively. Each contact 28 has a flat plate portion 32 which is of a size to be closely received within one of the slots 22. Each contact 28 is secured to the cap 4 by any suitable means such as a self-tapping screw 34 extending through the flat portion 32 of the terminal 28, the opening 24 in the cap 4 and threadedly engaging the insert 30. In order that electrical connections may be readily made to the contacts 28, the opposite end of the flat portion 32 of each contact 28 is provided with a threaded opening 33 in alignment with the opening 26 thereunder for threadedly receiving a binding screw 36, the shank of which extends freely into opening 26. Thus, the supply conductors extending through the central opening 8 may have their ends bared and placed under the heads of the binding screws 36 in the well-known manner. In order to facilitate such connection of the conductors a recess (not shown) may be provided on the inner side

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of each of the slots 22 which extends inwardly in the cap 4 to the central opening 8 so that the conductors may be placed therein. As shown, the screws 34 and 36 are located at opposite ends of each contact 28 and are reversed from each other so that one of each appears in FIG. 2. Intermediate the screws 34 and 36 of each contact 28, each contact 28 is provided with a pair of integral spaced axially outwardly extending prong engaging members 38 which are formed in the well-known manner to receive the prongs, not shown, of an inserted male plug.

As indicated, the body 2 is of a size so as to receive the cap 4 to form a unitary connector. Thus, it will be noted that the body 2 is provided with a pair of spaced chambers 40 extending completely through the central portion of the body 2 which are spaced diametrically so as to receive the prong engaging members 38 therein. In order to insure a smoother external appearance, it will be noted that the cap 4 and the body 2 are provided with a cooperable annular tongue 42 and groove 43 construction, respectively, at their outer periphery. In order to insure that the cap 4 can only be located upon the body 2 in one manner, the body 2 and the cap 4 are provided (FIG. 3) with a cooperable projection 45 and recess 47, respectively.

It will also be noted that the outer end of body 2 is provided with an inwardly extending circular recess 46 in which a circular face plate or insert 50 is closely received. The insert 50 is constructed from a high dielectric strength material so that no voltage breakdown will occur between the prong engaging members 38 and for such purposes a molded construction has been found to be satisfactory. As has been indicated, such molded inserts have heretofore been unsatisfactory due to the fact that they are brittle and are subject to breaking in the field. As shown, the recess 46 and the insert 50 extend to each side of the prong engaging members 38 of the cap 4. In order that the prongs of a male plug (not shown) may engage the prong engaging members 38, the insert 50 is provided with laterally spaced slots 52 in alignment with the prong engaging members 38 so that such connection may be made in the well-known manner. In order to insure that the insert 50 may be located in one definite position with relation to the body 2, the inner edge of the recess 46 is provided (FIG. 2) with an outwardly extending projection 54 which is cooperable with recess 55 in the lower surface of the insert 50.

Referring to FIG. 3, it will be noted that the housing 6 is provided with a pair of diametrically opposed openings 58 which extend axially from the bottom of the recess 46 in the body 2 to the lower surface of the cap 4 and which are substantially parallel to each other. Although as shown, the openings 58 are preferably diametrically opposed from each other and one passes through the projection 45, such construction is optional in that the openings 58 may be located at various points on the circumference as hereinafter specified. The backing member 20 is also provided with threaded openings 60 in alignment with the openings 58, respectively. In particular, however, it will be noted that the openings 58 are located so that the arc of the inner circular side wall 62 of the recess 46 intersects the center of the opening 58. With such a location of the openings 58, a portion of the outer end of body 2 and the outer face of the insert 50 would normally be located so that the openings 58 would be covered thereby. In order to permit securing means comprising elongated screws 70 to extend through openings 58, the inner side of the side wall 62 in alignment with the openings 58 is provided with an outwardly extending half circular upwardly open ended slot 64, and the outer edge of the insert 50 is provided with an inwardly extending upwardly open ended half circular slot 66 in alignment with each opening 58. The slots 64 and 66 are located opposite each other when the insert 50 is located within the recess 46

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so as to form a circular opening substantially the same size as the openings 58 in alignment with each of the openings 58. With such a construction, the under surface of heads of the screws 70 will engage portions of both the outer end of the cap 4 and the face of the insert 50 adjacent each of the slots 64 and 66 when the screws 70 are inserted into the openings 58. In order to provide a smoother outer surface on the device an enlarged circular recess 72 may be provided around the upper portions of the slots 64 and 66 for receiving the heads of the screws 70.

As shown, the shank of the screw 70 is provided with a threaded portion 74 at its free end and a recessed or undercut portion 76 axially upward from the threaded portion 74. Each undercut portion 76 has a diameter less than the smallest diameter of the threaded opening 60 in the plate 20 and a length greater than the thickness of the plate 20 so that the undercut portions 76 may be freely received within the openings 60. With such construction the engagement of the threaded portions 74 with the threaded openings 60 is limited, as the screws 70 can only be tightened to the degree the threaded portions 74 and 60 engage each other. Further turning of the screws 70 results only in slippage of the undercut portions 76 within the openings 60 due to the lack of thread engagement on the undercut portion 76. Thus, the total force which can be exerted by the heads of the screws 70 on the insert 50 is limited, as once slippage of the screws 70 occurs no further axial force can be transmitted by the screws 70 to the insert 50. Accordingly, the length of the threaded portions 74 must be initially determined to provide a limited force which will not cause fracture of the insert 50.

In addition, due to the natural resiliency of the cap 4 and the body 2, the axial movement of the screws 70 compresses the cap 4 and the body 2 which causes forces to be built up within the cap 4 and the body 2 which oppose the movement of insert 50 toward the backing plate 20 and at the same time provides for securely connecting the parts. Such compression forces act to bias the threaded portions 74 upwardly toward the threaded openings 60. Thus, disassembly of the device can easily be accomplished by merely counter-rotating the screws 70 from the direction in which they are rotated to assemble the device. The length of the threaded portions 74 must be sufficient to provide sufficient force in the upward direction to cause the threaded portions 74 to reengage the threaded openings 60 from the undercut portions 76. In any case the threaded portions 74 cannot be of a length to cause fracture of the insert 50.

Accordingly, having described a preferred embodiment of the invention in accordance with the patent statutes, it is desired that the invention be not limited to the specific construction illustrated, inasmuch as it will be apparent to those skilled in the art that many modifications thereof may be made without departing from the broad spirit and scope of the invention. Accordingly, it is desired that the invention be accorded an interpretation consistent with the spirit and scope of its broad principles.

I claim as my invention:

1. A wiring device comprising a hollow multi-part housing adapted to receive electrical contact members therein, means for securing said housing parts together including a frangible and a rigid member, said frangible member being positioned against a face side of said housing and including spaced prong receiving apertures there-through, at least one resilient compressible part being located intermediately of said members, said members and at least said resilient housing part having aligned openings, a screw extending through said aligned openings and having a head engaging one of said members and a threaded end which threadedly engages the other of said members to draw said members together and to compress said resilient part when said screw is taken up, and the part of said screw inwardly adjacent said threaded

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end being reduced in cross section, the force exerted by said screw on said members being limited to that amount which exists when said threaded end is threaded completely through the other of said members.

2. A wiring device comprising a hollow resilient body for receiving electrical contacts therein, a relatively frangible member and a backing member respectively located in engagement with a face side and a back side of said body, said frangible member having spaced prong receiving apertures therethrough, said members and said body having aligned openings, means for securing said members and said body together including an elongated fastener extending through said aligned openings and having a portion extending laterally outward at one end to engage an outwardly facing portion of one of said members, said fastener having a threaded portion of limited longitudinal extent at the other end thereof, said threaded portion being threadable through the other of said members, the inward extent of said threaded portion limiting the force with which said fastener secures said members and said body together, and said body being compressed when said members and said body are secured together so as to provide resilient force responsive to the limitable force of said fastener and thereby facilitate removal of said fastener.

3. A wiring device comprising a hollow resilient body for receiving electrical contacts therein, a relatively frangible member and a relatively rigid backing member respectively located in engagement with a face side and a back side of said body, said frangible member having spaced prong receiving apertures therethrough, said members and said body having aligned openings, an elongated

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securing member having a shank portion insertable into said aligned openings, a shoulder extending laterally outwardly from said securing member and being engageable with the outer surface of one of said members, said shank portion of said securing member having a free end provided with threads for threadedly engaging the other of said members through its opening, said shank portion inwardly adjacent said threads being undercut for free passage through the opening in the other of said members, the force exerted by said securing member on said frangible member being limited by the passing of said threaded free end through the opening in the other of said members, and said threads being of a length so that when said securing member is taken up the forces securing said body between said members are sufficient in magnitude to compress said body which in turn provides resilient forces responsive to the limitable forces of said securing member and thereby facilitates removal of said securing member.

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