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LOCKING MEANS FOR ELECTRICAL PLUGS

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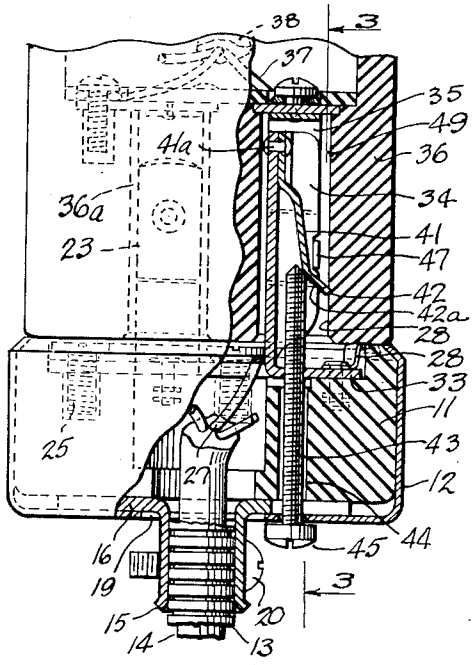


Fig. 2.

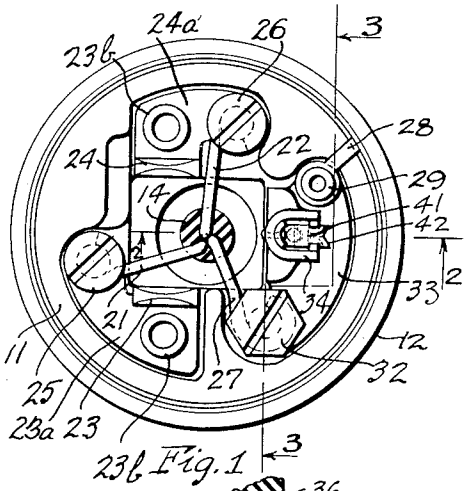


Fig. 1

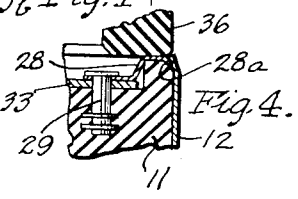


Fig. 4.

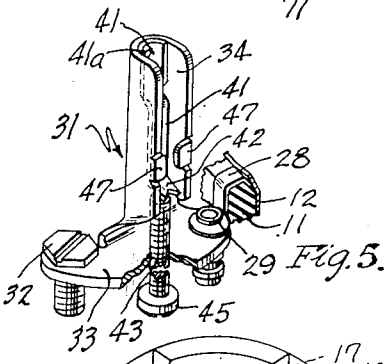


Fig. 5.

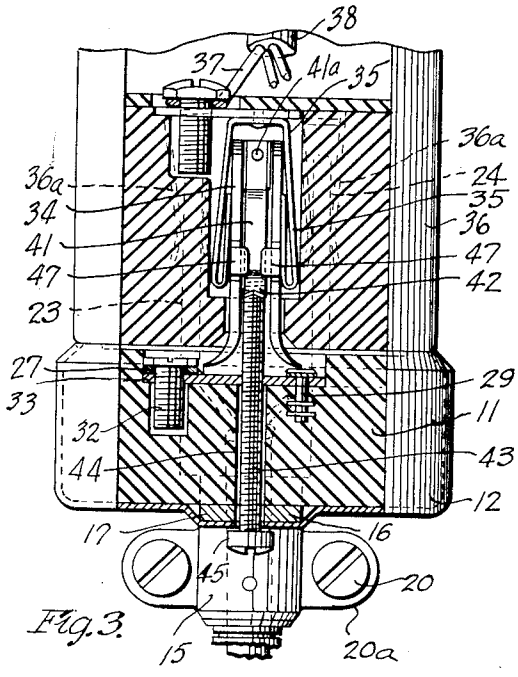


Fig. 3.

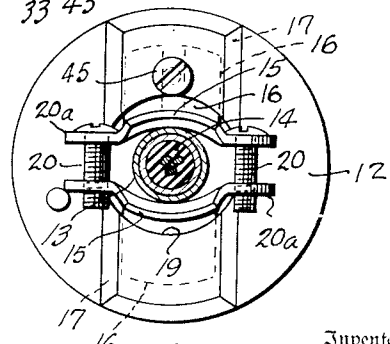


Fig. 6.

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LOCKING MEANS FOR ELECTRICAL PLUGS

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This invention relates to plug connectors for electric circuits, particularly to locking devices for securing such plugs against withdrawal from their associated receptacles, and an object is to provide an improved locking device for use with plug type connectors.

A further object is to provide a locking device for plug connectors having an improved safety construction which avoids any exposure of live parts on the exterior either of the plug or the associated receptacle, so that there is no danger of any such parts being touched by a user.

One specific aspect of the invention relates to locking devices for plugs used with three conductor cables which frequently have metallic sheaths, and a further object is to provide a locking device constructed and arranged to form part of the grounding connection between the neutral contact blade of the plug and the metallic shell on the plug and the metallic cable sheath, thereby grounding the locking mechanism and eliminating the possibility of exposed live parts on the plug.

With the foregoing and other objects in view, we have devised the construction illustrated in the accompanying drawing forming a part of this specification. It is, however, to be understood the invention is not limited to the specific details of construction and arrangement shown, but may embody various changes and modifications within the scope of the invention.

In this drawing:

Fig. 1 is an end view or elevation of a plug connector constructed in accordance with one embodiment of this invention;

Fig. 2 is a partial section on the line 2—2 of Fig. 1;

Fig. 3 is a transverse section on the line 3—3 of Figs. 1 and 2;

Fig. 4 is a section showing a ground connection to the metallic cover on the plug of Figs. 1 and 2;

Fig. 5 is a perspective view of the locking mechanism shown in Figs. 1, 2 and 3 with parts broken away, and

Fig. 6 is an elevation looking from the bottom of Figs. 2 and 3, showing the associated cable in section.

The illustrated embodiment of the invention is shown in connection with an electric plug having a body 11 of insulating material surrounded by a metallic cover or shell 12 electrically and mechanically connected to the metallic sheath 13 of an associated conductor cable 14. For this purpose a pair of gripping jaws 15 are formed on oppositely disposed, radially movable plates 16

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slidable in radial grooves 17 formed in the cover 12. Each plate has a gripping jaw 15 which projects through an axial opening 18 in the cover around the cable 14, which also extends through the opening into the plug body 11. Clamping screws 20 extend through ears 20a on each side of each jaw 18.

The cable 14 is shown as a three conductor cable. Two live conductors 21, 22 are connected to two contact blades 23, 24 respectively by binding screws 25, 26 in connecting base plates 23a and 24a to which the contacts are connected and which are secured to the body by the rivets 28 molded in the body. Contacts 23b and 24 are adapted to engage receptacle contacts 36a. The third conductor 27 is neutral and is grounded as hereafter described.

The neutral conductor 27 is connected to a contact blade 31 by a binding screw 32. The contact blade includes a base portion 33 and a projecting blade portion 34 which is of U-shaped cross section, and is arranged to engage a blade-receiving contact 35 in a receptacle 36. The receptacle contact 35 is connected to the neutral conductor 37 of a three conductor cable 38 to which the receptacle is connected. The neutral blade contact 31 of the plug, and the conductor 27 connected thereto are grounded to the plug cover 12 and through it to the cable sheath 14 by a ground-connecting strip 29 riveted at one end to the base 33 of the blade 31 by the rivet 29 and electrically connected to the cover 12 at the other end 29a by being inserted between the cover and the plug body.

The plug locking mechanism of the present invention is connected to and supported upon the neutral contact blade 31, whereby it is effectively grounded and no live elements form any part of the mechanism. As illustrated, a flexible receptacle-engaging spring finger 41 of bronze or other suitable material is secured at one end to the U-shaped blade between the sides and adjacent the projecting end thereof by any suitable means, such, for example, as the rivet 41a. The finger includes an outwardly projecting free end 42 which is inclined outwardly to provide a cam face 42a adapted to be engaged by the end of a threaded bolt or screw 43 extending through an opening 44 in the plug body 11 which is shown as extending parallel to the axis thereof. The screw is threaded through the base 33 of the neutral blade 31 and has a projecting head 45 accessible at the outside of the plug body, the head having a screw slot or other means for easy manipulation. Outward movement of the end 42 of the re-

taining finger 41 into operative locking position is limited by a pair of restraining lugs 47 extending inwardly across the open side of the U-shaped blade from the side walls thereof. By this means the finger is held against being pulled out of the blade by a pull on the plug when the finger is in locking position.

Before inserting the plug in the receptacle the operating screw 43 is retracted to permit the resilience of the locking finger to retract the end 42 thereof into the confines of the U-shaped contact blade where it is in inoperative position and will not engage the surface of the receptacle. After the plug is inserted into the receptacle the screw 43 is advanced to cam the end 42 of the finger outwardly into engagement with the adjacent surface 48 of the receptacle slot 49 into which the blade 31 projects, as shown in Fig. 1. In this operative position the finger holds or locks the plug against retraction or removal from the receptacle until the screw 43 is withdrawn sufficiently far to permit the finger 41 to retract under its own resilience and free the receptacle from engagement thereby. As the locking means is inclined as shown the greater the pull on the plug to withdraw it the greater the grip on the receptacle.

Inasmuch as the locking mechanism is supported upon and electrically connected to the neutral conductor and is grounded on the sheath, there is no exposure of any live part on the outside of the plug or the receptacle, and no danger of the user touching any live element.

Although we have described a specific embodiment of the invention, it will be apparent that it can be variously modified and adapted within the scope of the invention.

Having thus described our invention, we claim:

1. An electrical plug comprising a body of insulating material and a projecting contact blade mounted thereon, locking means for retaining said plug against removal from an associated receptacle provided with a recess into which the blade is inserted comprising a spring member secured to said contact blade and provided with a free edge facing toward the body to engage and grip a side wall of said recess, said spring tending to shift said edge away from said side wall to release the plug, the free end portion of the spring being inclined to form a cam surface, and a screw extending through the plug body and accessible for operation from the exterior thereof and arranged with its inner end engaging said cam surface to shift said free edge into locking engagement with said side wall and hold it there to retain the plug in place.

2. An electrical plug comprising a body of insulating material and a projecting contact blade mounted thereon, locking means for retaining said plug against removal from an associated receptacle provided with a recess into which the blade is inserted comprising a spring member secured to said contact blade and provided with a free edge facing toward the body to engage and grip a side wall of said recess, said spring tending to shift said edge away from said side wall to release the plug, means extending through the plug body and accessible from the exterior thereof for shifting said free edge into locking engagement with said side wall and holding it there to retain the plug in place, and an ear on said contact extending over the outer side of said spring member to limit outward movement of said member.

3. An electric plug comprising a body of insulating material and a projecting contact blade mounted thereon, a metal sheath enclosing said body, locking means for retaining said plug against removal from an associated receptacle provided with a recess into which the blade is inserted comprising a spring member secured to said contact blade and provided with gripping means adjacent its free end to engage and grip a side wall of the recess to retain the contact therein, said spring tending to shift said gripping means away from said side wall to release the plug, and a screw extending through the plug body and grounded on the sheath, said screw being accessible for operation from the exterior of the plug and engaging and having a camming action on said spring to ground the contact on the sheath and to shift said gripping means into engagement with said side wall and hold it there to retain the plug in place.

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