Dec. 10, 1963 W. G. SCHINSKE 3,113,553

CONNECTOR WITH INDICATOR

Filed July 24, 1961

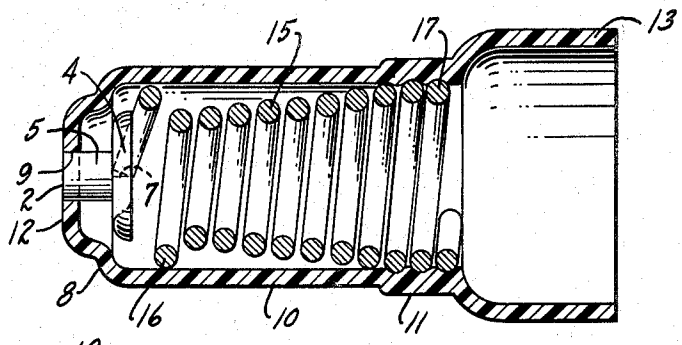


Fig. 1.

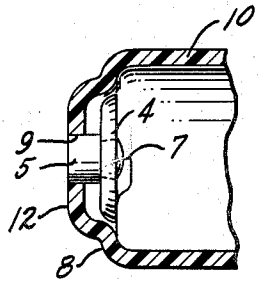


Fig. 3.

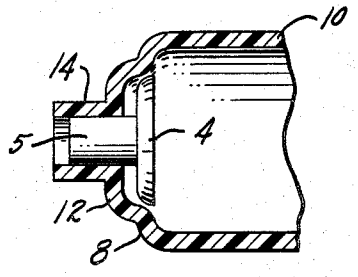


Fig. 4.

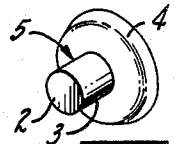


Fig. 8.

Fig. 5.

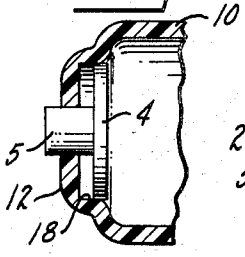


Fig. 6.

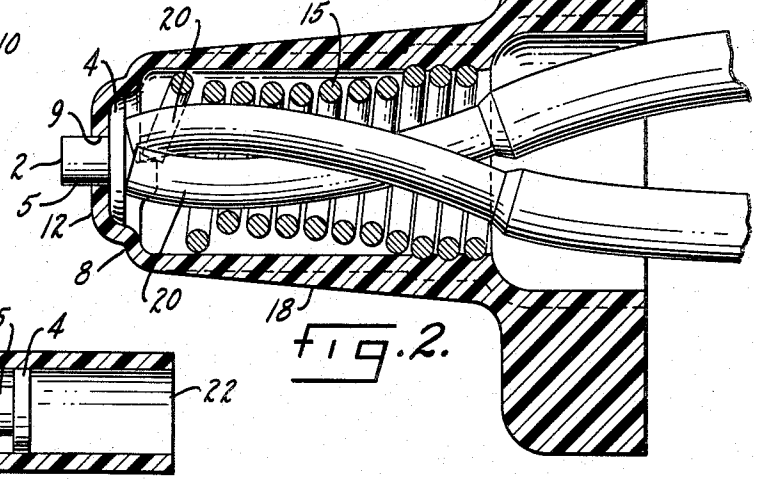
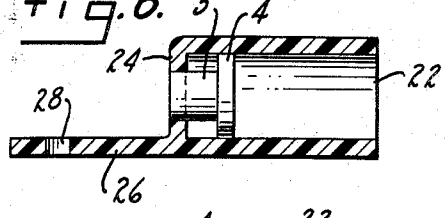


Fig. 2.



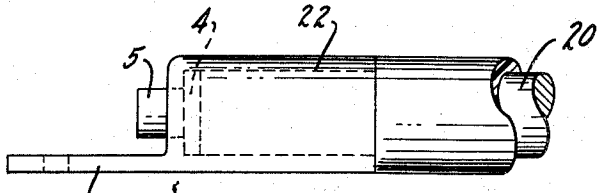


Fig. 7.

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CONNECTOR WITH INDICATOR

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This invention relates generally to electrical connector assemblies, and, in particular, to a connector assembly with an indicator to inform the operator when the ends of electrical wires and the like are fully inserted.

It is a primary object of my invention to provide an indicator for a connector cap and the like which informs the operator when wires and the like are fully and correctly inserted.

It is another object of my invention to provide an indicator which is built into a connector cap and which is responsive to contact by the tips of electrical wires inserted therein.

Yet another object of my invention is to provide an indicator that can be economically produced and easily fitted into a connector cap.

Another object of my invention is to provide an indicator which informs the operator when the ends of electrical wires are fully seated independent of the resistance to the inward progress of said wires.

Another object of my invention is to provide an indicator which quickly informs the operator with the help of contrasting colors that the ends of the wires are fully seated.

A still further object of my invention is to provide a movable indicator situated in the end of a connector and responsive to contact by the ends of electrical wires.

A further object of my invention is to provide a movable indicator which projects beyond the connector to inform the operator that the stripped ends of wires are fully inserted.

I have attained the foregoing objects and other objects by the present invention which will be described in detail and which are illustrated in the attached drawings wherein:

FIGURE 1 is a side view in section of the connector and indicator;

FIGURE 2 is a side view in section showing the stripped ends of electrical wires fully inserted and the indicator repositioned in extension beyond the end wall;

FIGURE 3 is a partial side view in section showing a modified indicator means;

FIGURE 4 is a side view of a modified structure showing the indicator in a recessed position;

FIGURE 5 is a partial side view in section showing a modified indicator means;

FIGURES 6 and 7 show the indicator in a modified terminal connector; and

FIGURE 8 is a perspective view of the indicator.

Electrical insulating connectors are widely used, especially connectors of the screw-on type. The connectors may be made from a variety of materials such as rubber, porcelain, thermosetting and thermoplastic materials and the like. Such connectors commonly have connecting means such as a coil spring to receive in close association the ends of electric wires, cables and the like. Sometimes the connector is not applied correctly because the connector has not been screwed in the electrical wires fully, but with my indicator the electrician making the assembly will know when the connector has been applied correctly. The indicator will also prevent the operator from inserting electrical wires too far and piercing the soft ends of some connectors.

In FIGURE 1, the indicator is shown in a connector

of the screw-on type. The indicator has a plug 5 and a base or disk 4. The connector consists of a cap, insulation or cover 10 open at one end and closed at the other end by an end wall 12. The connector has a bore which houses a connector means to guide the stripped ends of wires together as they are inserted. The connector means shown here is a generally tapered coil insert 15 which may taper to a throat centered in the cap possibly by one expanded turn 16 and a large end 17 disposed generally at the open end of the cap 10. The enlarged or thickened portion 11 may be formed of a threaded portion or relief section on the inner surface.

The end wall 12 is shown offset from the side walls of the cap 10 by a rounded portion 8, but the end wall 12 may be joined to the side walls by a perpendicular alignment or by other alignments. On the inside of this offset, an abutment 7 may be placed to engage the end of the large turn 16 of the coil 15. The illustrated cap 10 can be formed or fitted with various external structures such as ears, as shown in FIGURE 2, to provide leverage for turning the cap 10 down on the wires, but since such structures are not important to the invention they will be merely illustrated or mentioned without elaboration.

The indicator is movably mounted in the end wall 12 of the connector cap 10, and is positioned so that it will be responsive to the end of wires inserted through the coil 15.

As seen in FIGURE 8, the plug 5 of the indicator has a forward face 2 and side walls 3. A disk 4 is connected to the plug 5. In FIGURES 1–4, the disk 4 is shown as extending from the plug 5 substantially perpendicular to it. The base or disk 4 may assume a plurality of forms and shapes so long as it offers a contact surface to the ends of wires whereby insertion of the wires moves the plug 5 in at least partial extension beyond the end wall 12 of the cap 10. It is not essential for the disk 4 to extend beyond the side walls 3 of the plug, in fact, when I speak of the base of the indicator, I may be referring merely to that portion of the body plug 5 which is located within the bore of the cap 10 proximate to the end wall 12. The disk 4 is preferably made to have a large area and thereby provide a long dielectric path.

In FIGURE 2, the plug 5 is shown extended beyond the end wall 12 of the connector cap 10 after being moved by the ends of wires 20 acting against the disk 4. The plug 5 in extended position beyond the end wall 12 of the cap 10 clearly informs the operator that the ends of the wires 20 are fully seated, as shown in FIGURE 2.

FIGURE 3 shows the plug 5 joined to the base 4 in an alternative manner. The plug 5 may be other than round in cross-section to fit a correspondingly shaped hole in the end wall with the end of the plug projecting through the disk 4 and upset on the other side. The disk 4 and plug 5 may conveniently be chosen from different materials in such an arrangement or may be made from the same material.

In FIGURE 5 a modified indicator is shown in which the disk 4 frictionally slides in a recessed shoulder 18 in the side walls of the cap 10. The plug 5 is positioned in the opening 9 in the end wall 12 and is responsive to contact by the base 4 after inserted wires have moved the base 4.

In all forms preferably the plug 5 is movably mounted in an opening 9 of the end wall 12 preferably by providing a plug 5 of such dimensions as to provide a close frictional fit between the side walls 3 of the plug and the edges of the opening. In such an arrangement, the frictional fit of the plug 5 in the opening 9 of the end wall 12 is sufficiently tight to securely hold the plug 5 when the connector cap 10 is not in use, but yet provides easy forward movement in response to the ends of wires

20 contacting the disk 4 and repositioning the plug 5. The inserted wires may be stripped by the operator or may be self-stripping.

FIGURE 4 shows a connector cap 10 with a modified end wall 12 having a projecting sleeve 14. In the recess of the sleeve 14 the plug is seated. When the ends of wires 20 contact the disk 4, the forward face 2 of the indicator moves to a position flush with the terminating edge of the sleeve 14 or extends partially beyond the terminating edge of the sleeve 14.

The plug 5 may have a color which contrasts with the color of the end wall of the connector cap. In this way, a red plug 5 against a white end wall 12 provides sharp contrast to enable the operator to immediately know when the ends of the wires 20 are fully seated. A suitable material for the connector caps is a hard resilient plastic material such as nylon or polyethylene which can be milky white, semitransparent or fully transparent structures, therefore, the indicator can be given almost any color and still provide a sharp contrast against the milky white, semi-transparent or fully transparent material.

While I have described my indicator as particularly suited for connector caps 10 manufactured from insulating materials, such as polyethylene, nylon, porcelain and the like, it is also understood that such an indicator can fully function and operate in metal connectors. In such connectors the indicator can be optionally constructed from non-conducting, insulating material, or the indicator can be constructed from a conducting material in the event any external connection to the indicator is desired.

The indicator has been described as having its plug 5 in close frictional fit with the edges of an opening 9 in the end wall 12 or with the interior of projecting sleeve 14. It is, of course, understood that arrangements other than the close frictional fit between the body plug 5 and the end wall 12 may be devised by those skilled in the art. By way of example, the plug 5 may freely slide in the opening 9 in the end of wall 12, and the disk 4 can be supported by the side walls of the cap. The disk 4 may also be modified to form a Belleville type disk, that is, a dome-shaped disk with the outer edge fixed to the side walls of the cap. Such a disk is adapted to flex back and forth over-center in response to the ends of the inserted wires on one hand, and in response to an inward force against the repositioned indicator on the other hand.

Other types of connectors may also be used to advantage with my indicator. Crimp connectors can have such an indicator to inform the operator that the wires have been fully and correctly inserted before the crimps are impressed in the connector sleeve. Also, push-in type connectors which have inwardly tapered bores can be fitted with my indicator. The indicator can be placed on a connector adapted to fit a sleeve with a set-screw which holds electrical wires at a given exposed length. The indicator in such a connector will confirm the proper wire exposure in the underlying sleeve.

I also intend the indicator to comprise an element in electrical housings other than the particular connector caps illustrated herein, for instance, electrical terminals widely used in aircraft construction. Thus, FIGURES 5 and 6 show a connector cap 22 with the indicator positioned adjacent the end wall 24. Such terminals have an extending tab 26 with a hole 28 to receive a screw or rivet.

While it is preferred that the face 2 of the plug 5 is flush with the end wall 12 of the connector 10 prior to use, the advantages of this invention can still be attained with indicators whose plugs 5 are partially extended beyond the end wall 12 prior to use. In such case, the operator will know when the ends of wires 20 are fully inserted by the increased extension following insertion of the wires in the connector cap 10. Accordingly, indicators with plugs 5 of various dimensions can be made to meet any particular demand or design.

Whereas I have shown and described the preferred form and suggested several variations of my invention, it should be understood that additional modifications, changes, substitutions and alterations may be made. For example, I have shown a free spring screw-on type connector in FIGURES 1 and 2, but it might be otherwise. For this reason, I have shown no particular connecting means in the insulating cap in FIGURES 3 through 7. It should be understood that the connectors might be crimp type in which a metal sleeve or coil is positioned in the cap. It might be of the pre-insulated crimp type which acounts somewhat for the diagrammatic showing of FIGURES 6 and 7.

I find it desirable to pilot the disk into a socket in the end wall, such as in FIGURES 1 through 6, to thereby provide an otherwise longer dielectric path. While I have shown the plug or indicator in all forms as being round in cross-section, it should be understood that it could be otherwise, for example, elliptical, square, triangular, or what have you. I also show the plug and disk as separate parts joined together in any suitable manner, but it should be understood that they could be integrally molded or formed as one piece.

With these and other modifications in mind, I wish that the invention be unrestricted, except as by the appended claims.

I claim:

1. In a connector assembly for joining the ends of electric wires, a cap with a generally central bore open at one end and sealed at the other end by an end wall, connecting means in the cap for engaging and forcing the ends of the wires into close association, an indicator movably positioned in the end wall, and said indicator moved by the ends of the wires as they approach the end wall.

2. The structure of claim 1 in which the connecting means includes a coil wire mounted in the bore of the cap.

3. The structure of claim 1 further characterized in that the indicator is a plug having a base, said plug movably mounted in an opening in the end wall, and the base adapted to be contacted by the ends of the wires when they approach the end wall to move the plug in extension beyond the end wall.

4. The structure of claim 1 further characterized in that the cap is made of insulating plastic material.

5. The structure of claim 1 further characterized in that the indicator is of a color different from the end wall.

6. In a connector assembly for joining the ends of electric wires, an insulating cap with a generally central bore open at one end and sealed at the other end by a wall, a coil wire mounted in the bore of the cap for engaging and guiding the ends of the wires together, a plug movably mounted in an opening of the end wall, the plug responsive to a base member which is located in the central bore proximate to said end wall, whereby the base is contacted by the ends of the wires when they approach the end wall to move the plug into extension beyond the end wall.

7. The structure of claim 6 further characterized in that the cap is made of insulating and stiffly flexible plastic material.

8. The structure of claim 6 further characterized in that the plug has side walls and a forward face, and the base is substantially perpendicular to the plug and extends from the plug.

9. The structure according to claim 8 wherein the indicator is of a color different from the end wall.

10. In a connector assembly for joining the ends of electric wires, an insulating cap of plastic material, a generally central bore in the cap open at one end and sealed at the other end by an end wall of the cap, a coil wire mounted within said bore for engaging and forcing the stripped ends of the wires into close association, an

opening in the end wall, a plug having a forward face and side walls, the side walls in close frictional contact within said opening and movably mounted therein, a base extending substantially perpendicular to the side walls of the plug, the base located within the bore of the cap adjacent the end wall, and the forward face of the plug extending beyond the face of the end wall when the ends of stripped wires contact and move the plug.

11. The structure of claim 10 further characterized in that the plug is of a color different from the end wall.

12. The structure of claim 10 wherein the plastic material is stiffly flexible, generally white and the plug is of a different color.

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