Oct. 15, 1963 W. G. SCHINSKE ETAL 3,107,273

INSULATING CAP FOR ELECTRICAL CONNECTORS

Filed July 8, 1960 2 Sheets-Sheet 1

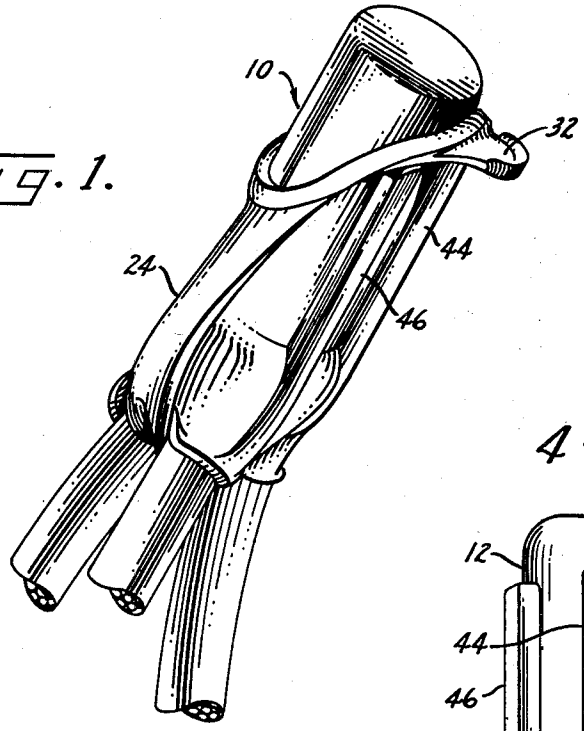


Fig. 1.

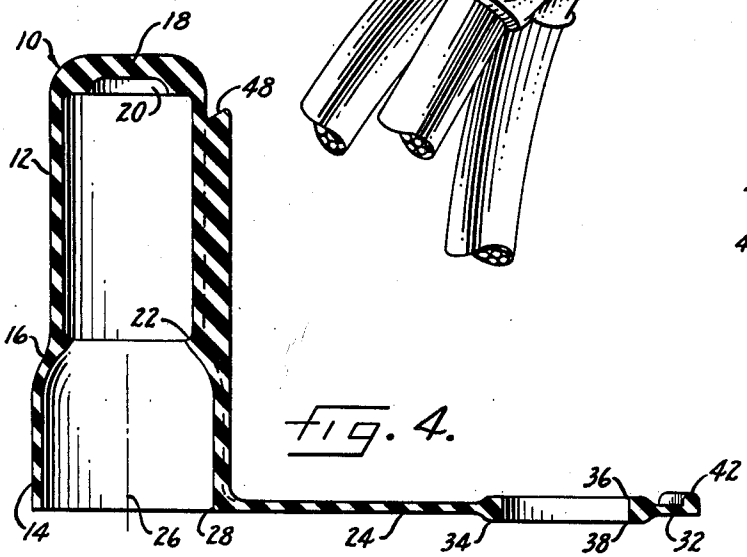


Fig. 4.

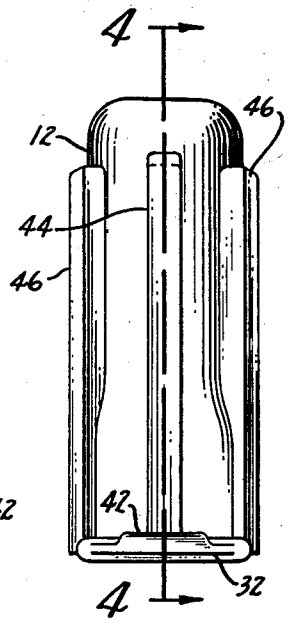


Fig. 3.

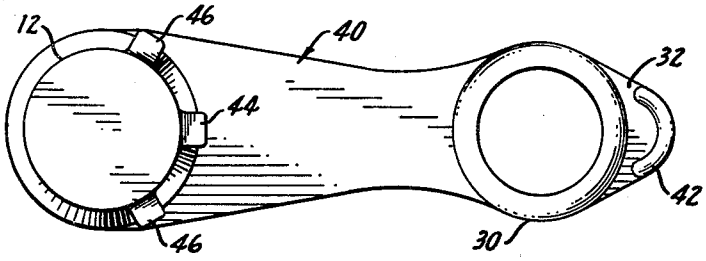


Fig. 2.

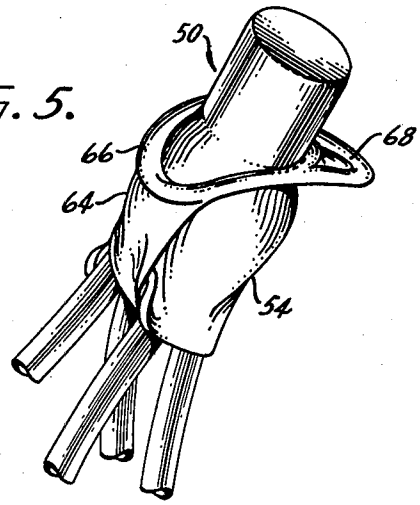
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Filed July 8, 1960 2 Sheets-Sheet 2

Fig. 5.



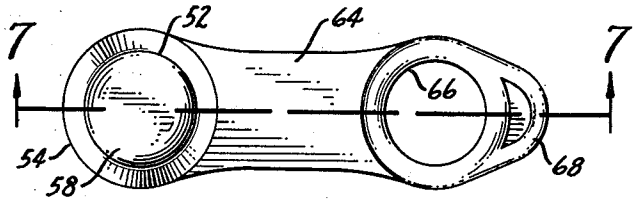


Fig. 6.

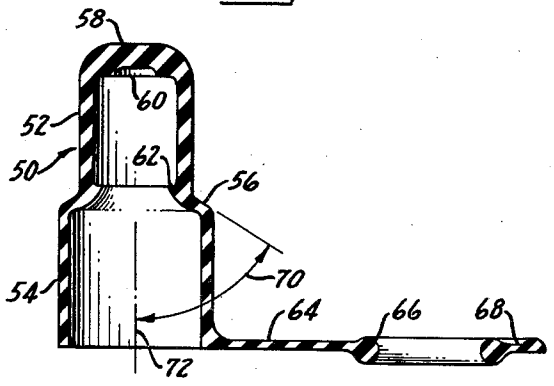


Fig. 7.

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INSULATING CAP FOR ELECTRICAL CONNECTORS

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This invention is in the field of connectors and is concerned with an insulator including a cap made of insulating material, such as neoprene or plastic or the like, which is easy to apply and may be used to cover a joint or connection made between a number of wires.

A primary object of the invention is a cap insulator having a flexible strap and retaining member which is easy to apply.

Another object is a cap type insulaor having a strap retaining arrangement which will not slide down over the cap.

Another object is a cap type insulator of the above type in which the retaining member does not tend to roll up in use.

Another object is a cap type insulator with a strap and retaining member having increased flexibility so that it can be applied more easily.

Another object is a cap type insulator for electric connections which will not open up at the bottom.

Other objects will appear from time to time in the ensuing specification and drawings in which:

FIGURE 1 is a perspective of the preferred form of the connector;

FIGURE 2 is a top view of the connector shown in FIGURE 1;

FIGURE 3 is a side view of FIGURE 2;

FIGURE 4 is a section along line 4—4 of FIGURE 3;

FIGURE 5 is a perspective of a modified form;

FIGURE 6 is a top view of the FIGURE 5 form; and

FIGURE 7 is a section along line 7—7 of FIGURE 6.

In FIGURES 1–4 we have illustrated the preferred form in which the joint insulator includes a main cap or cover member **10** which is made up primarily of a somewhat cylindrical body portion **12** and a skirt **14** which is also cylindrical and somewhat flared out at a junction **16**. The main body portion may be closed by an end wall **18** which has an inner recess or depression **20**. We may provide an inwardly directed shoulder **22** or the like disposed on the inside of the main cover member roughly at the junction or joint between the main body portion in the skirt, although it might vary somewhat.

A strap **24** is connected to the skirt and extends from it, as shown in FIGURE 2, generally at right angles to the axis **26** of the cap. The strap may be joined to the free edge **28** of the skirt, if desired, or it may be offset somewhat.

At the outer end of the strap, or adjacent the outer end, a retaining member in the form of a ring **30** is provided with a tab **32** beyond it. As shown in FIGURE 4, the ring may have an enlargement or bead **34** in the form somewhat of a thickened rim around the ring and we prefer that both the upper and lower edges, as at **36** and **38**, are square cornered or somewhat at right angles, instead of rounded or otherwise, so that in use the ring will not tend to roll up or invert itself when applied.

It will be noted in FIGURE 2 that the strap varies in width between the cap and ring and we prefer that the strap join the cap generally tangent to the circle of the free edge **28** of the skirt and tapered inwardly somewhat to a throat **40** and then widen out again to join the ring tangentially to its outer free edge. This is to say that the outer diameter of the ring is greater than the width of the strap throat as is the outside diameter of the

skirt. It should also be noted that the strap throat is a good bit closer to the ring than to the cap and this is important in adding flexibility to the strap when it is stretched so that the ring can be pulled over the top of the cap. The tab **32** projecting beyond the ring may have a raised lip or rim **42** if desired.

We provide one or more abutments on the side surface of the cap which, in this case, take the form of three somewhat equally spaced ribs, **44** in the center and **46** on the outside. It will be noted that the ribs are all on the side of the cap next to the strap **24**. Also, all of the ribs terminate or stop short of the top or end wall of the cap to provide abutments **48**, all of which are undercut. It will also be noted in FIGURES 1 and 3 that the abutments are staggered, meaning that the rib lengths vary, the center rib **44** rising the highest or being the longest, while the side ribs **46** are somewhat shorter. The end surfaces or abutments **46** on the side ribs are somewhat slanted so that they slope away from the center rib, as shown in FIGURE 3. It should be noted that the ribs extend all the way down and, in fact, merge somewhat into the skirt, but nevertheless are visible along the surface of the skirt until they flow smoothly into the strap. This additionally reinforces the connection between the strap and skirt as well as providing easy molding.

A connector of this type is intended for the larger combination of wire sizes. Accordingly, the main cap or cover member must be correspondingly large. The strap must have sufficient flexibility so that when it was pulled between the wires and the ring is stretched up over the top, the strap will stretch sufficiently to let the ring pass over the end wall **18**. At the same time the main body portion must be long enough to house and fully cover the stripped ends of the wires and if the ring is free to slide down, the strap between the wires will be too loose for a tight compact insulating joint.

In the present arrangement, when the ring is stretched up over the top of the cap, it will rest and be locked against the undercut abutments **48**. Also, the ring will fit across the cap on a diagonal or dihedral against all three abutments. Where we have shown the abutments as separate in the form of ribs, they could be integral or we could use only one. To get the ring over the top of the cap, the strap must be stretched somewhat and we position the narrow throat **40**, which has the most stretchability, closer to the ring because it is this portion of the strap that will be stretched. The portion of the strap next to the cap will drag against the wires and skirt and will resist stretching.

In FIGURES 5–7 we show a modified form in which the cap **50** has a main body portion **52** joined to a skirt **54** by a junction or offset **56**. The end wall **58** of the cap may have an inner depression **60** and a shoulder **62** may be provided to interlock with the connection. As before, the strap **64** is joined to the free edge of the skirt and is enlarged at its outer end around a ring **66** which has a tab **68** on the far side. The strap may or may not have a throat or narrow portion, but we prefer that it be somewhat thinned out, relative to the diameter of the skirt and ring, so that it will stretch. The ring or retaining member and strap may be pulled between the wires after the cap has been slipped over the joint. Then the ring may be stretched up over the top of the main body portion **52** and allowed to slip down. The offset **56** should have sufficient angle, indicated at **70**, to the axis of the cap **72**, so that when the ring slides down against it, it won't slide past. In a sense, the offset is a shoulder or abutment, but it should not be a right angle or undercut surface since this would complicate molding. The FIGURES 5–7 form does not have external ribs. However, the offset is sufficiently obtuse to prevent the ring from slipping by down the skirt. The FIGURES 5–7 form is intended for the

smaller combinations of wires and accordingly the socket in the main body portion **52** of the cap does not have to be as long as the FIGURES 1–4 form. In both cases, the skirts may be about the same length.

The use, operation and function of the invention are as follows:

We provide a cap type insulator which may be made of a suitable insulating material, for example neoprene, nylon or the like. A strap is formed integrally to the free edge of the skirt on the body portion and a retaining member on the other end, in the form of a ring or the like, is provided so that after the cap has been slipped over a connection made between the stripped ends of a plurality of wires, the strap and ring may be pulled between the wires and then the ring slipped up over the top of the cap.

In the FIGURES 5–7 form, the offset joining the main body of the cap and the skirt is sufficiently obtuse such that the ring will rest against it and will not slip farther. The main purpose of the ring is as a retaining member, and it does very little if any insulating. In prior U.S. Patent No. Re. 23,649, issued April 21, 1953, the retaining member was in the form of a second cap, somewhat smaller than the main cap. But this has the disadvantage that it was more difficult to mold and required a double pin gate arrangement, one in the top center of each cap with the plastic meeting in the strap. In the present arrangement, we merely provide one gate which may be in the top of the main cap and the material will flow into the mold and out through the strap and ring.

Also, the ring has much greater flexibility and, everything else being equal, we can stretch a shorter strap and ring combination. We may provide square corners on the inside of the ring in FIGURE 7 to prevent it from rolling up as it slides down the body portion of the cap.

In the FIGURES 1–4 form, the skirt may be the same length but the body portion is substantially extended to hold a larger combination of wires. To get the ring over the top of the cap would require a somewhat longer strap and possibly larger ring. We provide the reduced width throat section in the strap closer to the ring than to the cap so that the strap will stretch. The flexibility of the ring itself helps. When the cap has been slipped down over the connection and the strap pulled between the wires and the ring slipped over the top of the cap, the greater length of the cap would make the joint too loose around the otherwise open mouth of the skirt if the ring slipped all the way down to the junction between the body portion and skirt. But the ring will lie on a diagonal across the undercut abutting surfaces on the ribs and the strap will stay tight between the wires across the skirt opening.

The particular connection and how it is made is not important to this invention. It might be made by merely

twisting the wires together, as in U.S. Patent No. Re. 23,649, or it might be made by a spring or coil, as in U.S. Patent No. 2,885,771, issued May 12, 1959. Or it might be a sleeve slipped over the wires and crimped against them, as in U.S. Patent No. 2,810,897, issued October 22, 1957. But it is important that the cap be of an insulating material, and we prefer that the strap and retaining member, the ring, be integrally molded.

Whereas we have shown and described the preferred form and suggested one modification of the invention, it should be understood that suitable additional modifications, substitutions, alterations and changes may be made without departing from the invention's fundamental theme. For example, we have shown the ring as circular or annular, but it might be somewhat oval or elliptical or otherwise. Accordingly, as used herein, the term ring should be broadly interpreted to include any annular or ring shape or closed strap or binding member. With these and other modifications in mind, it is wished that the invention be unrestricted, except as by the appended claims.

We claim:

1. An insulator for covering a joint made between the stripped ends of two or more electrical wires, including a cap made of an insulating material, a strap connected to the cap and extending from it, an opening formation in the strap adjacent the end thereof spaced from the cap such that when the strap is pulled between the wires, the opening formation may be mounted over the top of the cap, and an abutment on the side of the cap generally adjacent the top thereof to engage the opening formation and proportioned to hold it generally adjacent the top of the cap with the strap generally in a taut condition.

2. The structure of claim 1 further characterized in that the abutment includes a plurality of circumferentially spaced longitudinally disposed ribs along the side of the cap.

3. The structure of claim 2 further characterized in that the upper ends of the ribs terminate in abutments which are staggered in height so that the retaining member will rest on a diagonal across the cap.

4. The structure of claim 3 further characterized in that the abutments on the upper ends of the ribs are undercut.

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