

[54] **SHEATHED ELECTRICAL COUPLING**

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[63] Continuation of Ser. No. 248,210, April 27, 1972, abandoned.

[52] U.S. Cl. **339/60 R**, 339/101, 339/103 R, 339/209, 339/242, 174/91

[51] Int. Cl. **H01r 11/02**

[58] Field of Search 339/59, 60, 61, 198, 101, 339/103, 242, 206, 208, 209, 211, 213; 174/72 R, 91, 93

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UNITED STATES PATENTS

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[57] **ABSTRACT**

A cluster of horns project in generally parallel relationship from an insulating case. Each horn has a longitudinal bore stepped to provide progressively smaller sections toward the horn tip. Wires extending through the horns are secured to a connector block within the case. The end of the case remote from the horns is closed in waterproof fashion by a cap having a flange parallel to and spaced from a central boss to form a deep groove into which the margin of the case wall fits. The cap may have apertures through it for receiving electrical conductors sheathed by sleeves having end projections fitting sockets in the cap. Alternatively such sleeves can be coupled with other sleeves to provide smaller sheathed couplings.

4 Claims, 11 Drawing Figures

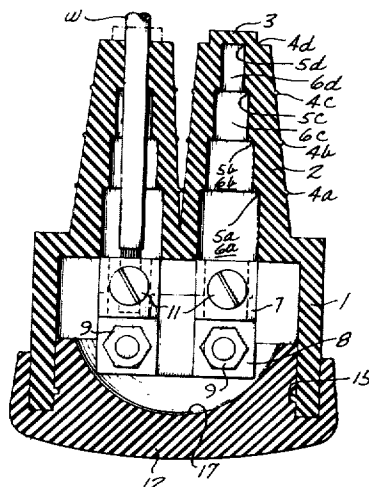


Fig. 1

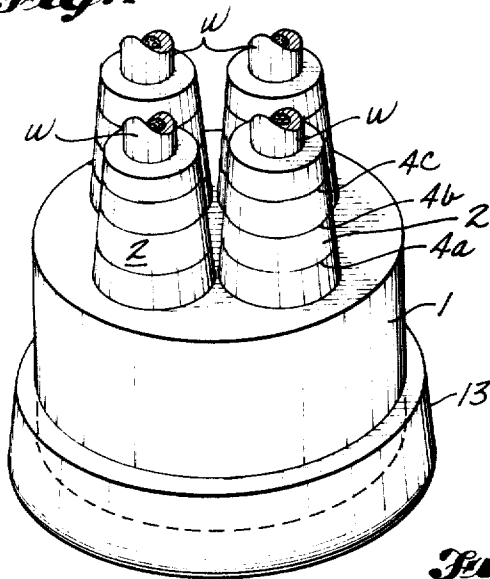


Fig. 4

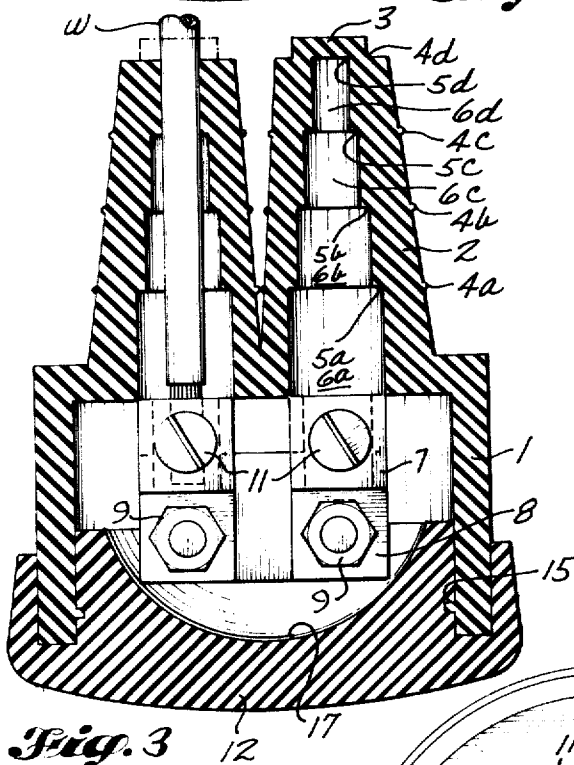
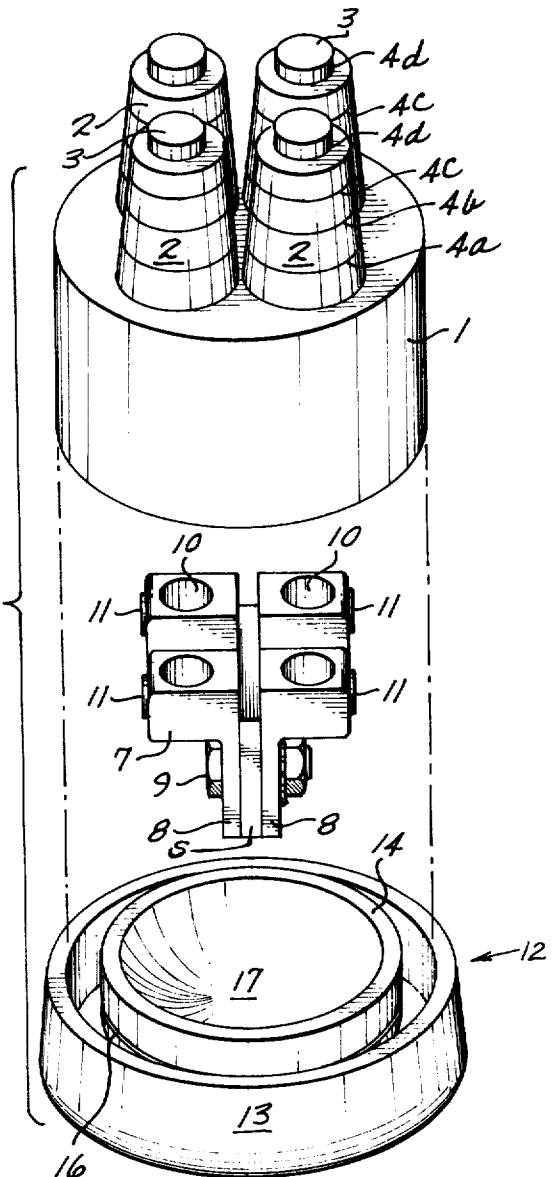


Fig. 3

Fig. 2

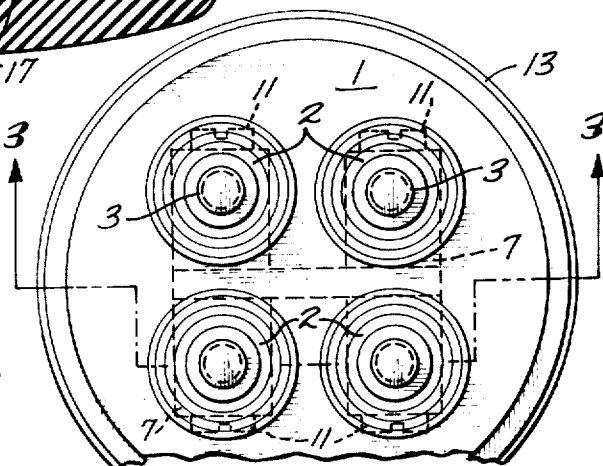


Fig. 5

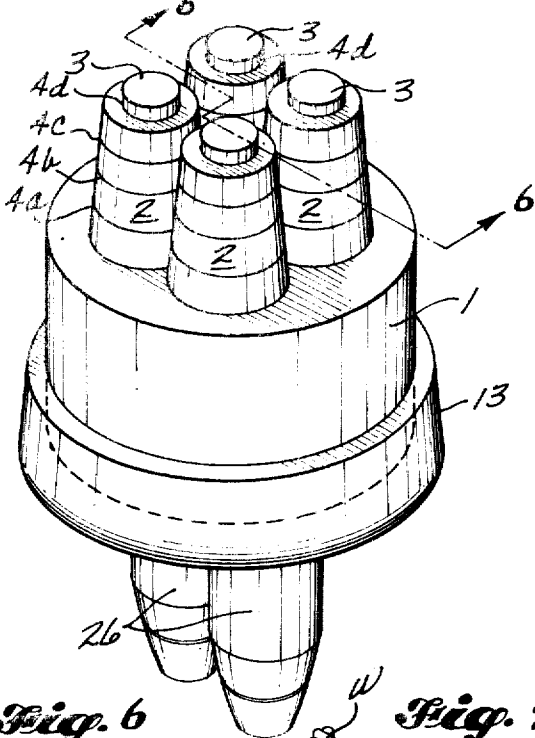


Fig. 6

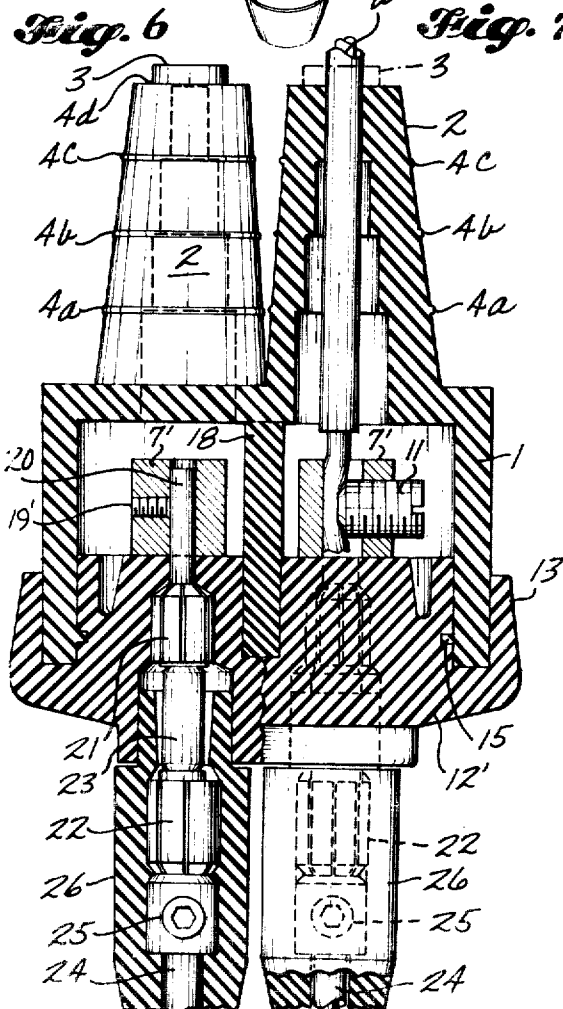
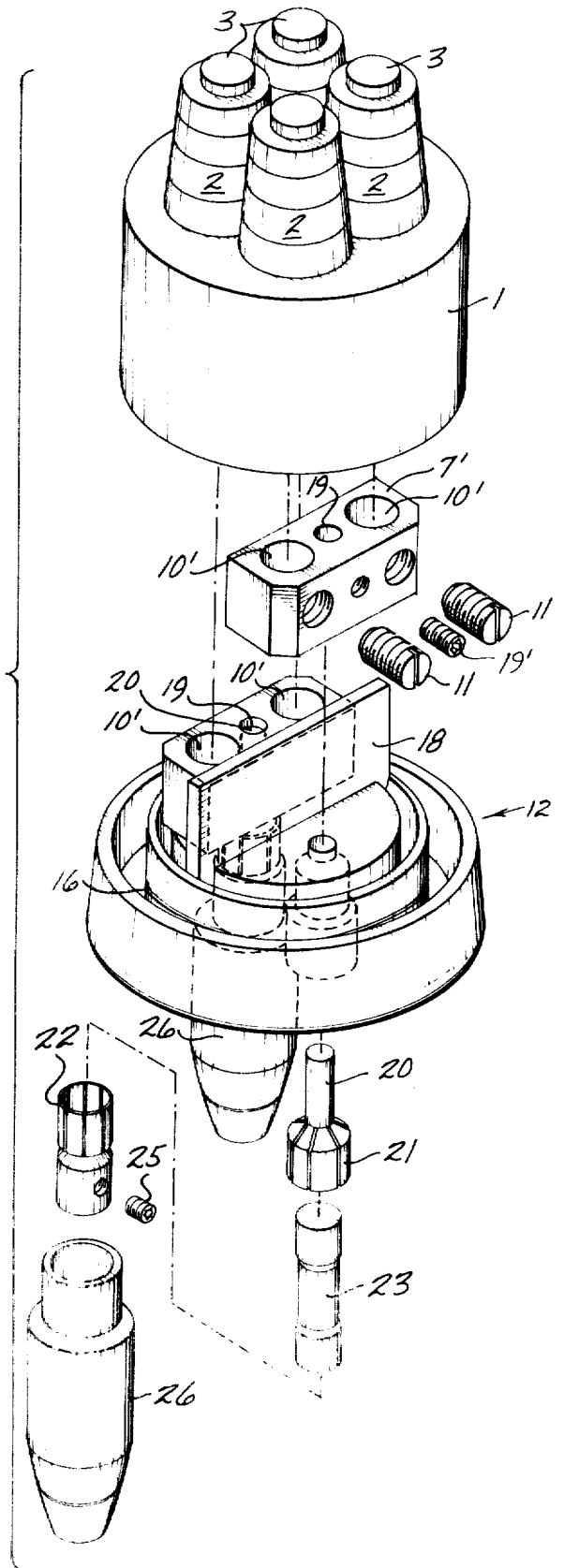
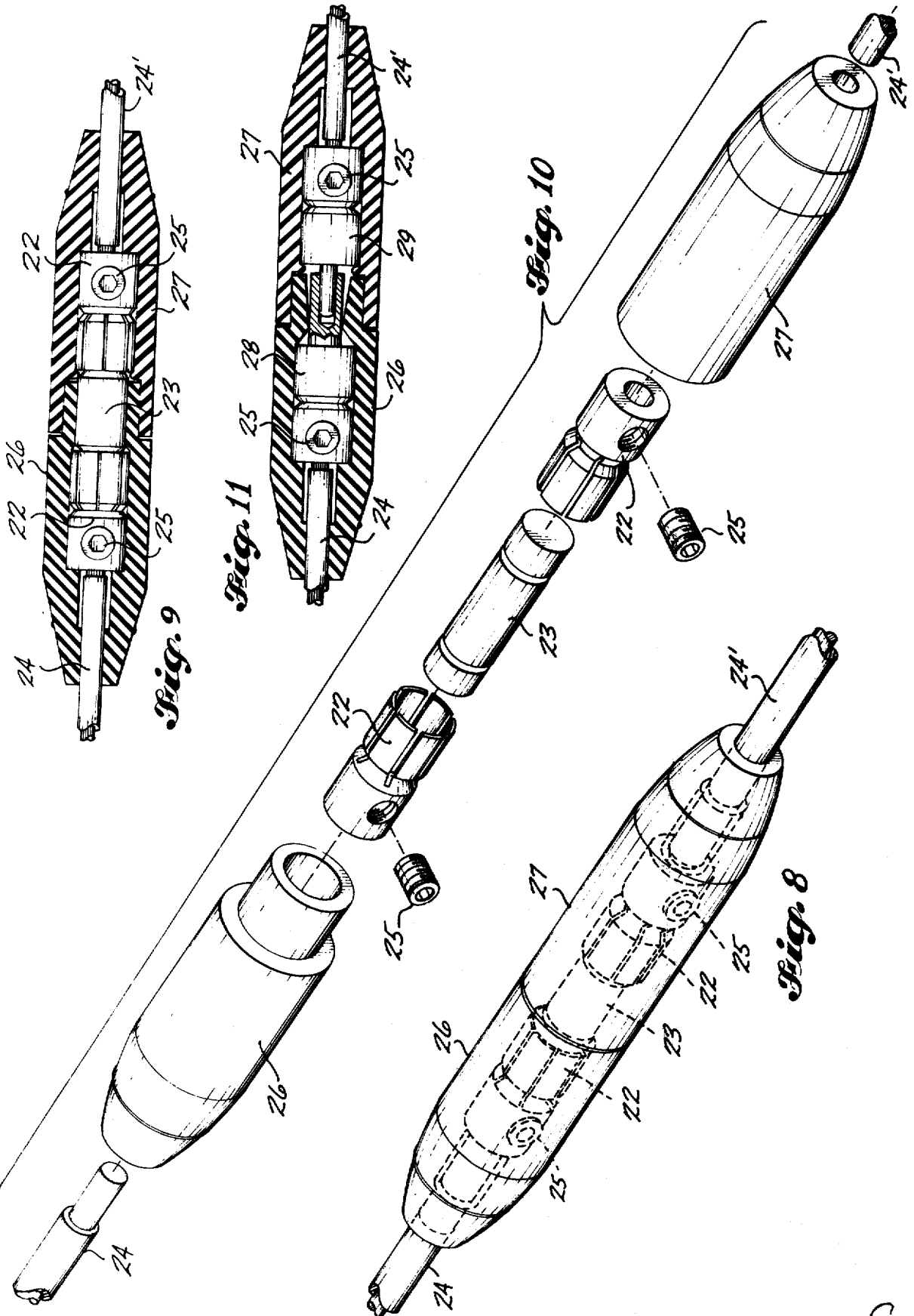


Fig. 7





SHEATHED ELECTRICAL COUPLING

This is a continuation of application Ser. No. 248,210, filed Apr. 27, 1972, now abandoned.

The present invention relates to an electrical coupling which is sheathed in waterproof fashion so that it can be used safely in underground or moist installations.

A principal object of the invention is to provide an electrical coupling construction enclosed in waterproof fashion in a sheath of insulating character which is tough and rugged and cannot be ruptured or injured readily.

A further object is to provide an electrical coupling sheathed so that the electrical coupling means will be readily accessible, quickly and without great difficulty, although the sheath is waterproof.

Another object is to provide an electrical coupling which, while being sheathed, is versatile so as to provide for connection of various numbers and sizes of wires in different arrangements.

It is also an object to enable a fuse to be incorporated in a sheathed electrical coupling.

An additional object is to provide a selection of sheathing components, various types of which can be selected and assembled in different relationships to sheath a variety of electrical couplings.

FIG. 1 is a top perspective of a sheathed electrical coupling. FIG. 2 is an end view of such coupling. FIG. 3 is a longitudinal section through the coupling taken on line 3—3 of FIG. 2. FIG. 4 is a top perspective of the coupling showing components in exploded relationship.

FIG. 5 is a top perspective of a different type of sheathed electrical coupling. FIG. 6 is a longitudinal section through such coupling taken on line 6—6 of FIG. 5. FIG. 7 is a top perspective of such coupling with the components shown in exploded relationship.

FIG. 8 is a top perspective of still a different sheathed electrical coupling. FIG. 9 is a longitudinal section through such coupling. FIG. 10 is a top perspective of the coupling with components in exploded relationship.

FIG. 11 is a longitudinal section through an electrical coupling having the same type of sheath as the coupling shown in FIGS. 8, 9 and 10, but having different electrical components.

The sheathed electrical coupling shown in FIGS. 1 to 4, inclusive, includes the sheathing case 1 in the form of a cup having an open end. A cluster of horns 2 project longitudinally from the bottom of the cup in generally parallel arrangement. Each of these horns is tapered externally away from the cup bottom. A stepped bore extends longitudinally through each horn, and normally such bore is blind, opening into the interior of the cup 1. The end of the bore at the tip of the horn is closed by a button 3.

The exterior of each horn is marked at intervals along its length by markers 4a, 4b, 4c and 4d which may be in the form of small annular ribs or grooves as are the markers 4a, 4b and 4c, or may be shoulders such as the marker 4d. Each of these markers is in substantially radial registry with the transition location 5a, 5b, 5c and 5d, respectively, of the longitudinal bore in the horn. In the horn shown in FIG. 3 each such bore is composed of sections 6a, 6b, 6c and 6d. The transition between such sections is formed by shoulders 5a, 5b and 5c. The cross sections of the sections is progressively smaller

toward the tip of the horn, and the outer end of the section 6d is terminated by the end wall 5d formed by the interior of button 3.

An electrical conductor connector block 7 is received within the cup 1 of the case formed by the cup 1 and horns 2. In the type of connector block illustrated in FIGS. 3 and 4, two components of angle shape are arranged with corresponding flanges 8 disposed in parallel relationship and secured together by bolts 9. The other flange of each component has in it one or more apertures 10 having axes extending perpendicular to such flange. Wires can be secured in such apertures by set screws 11. Such apertures should be sufficiently large so that wires of a considerable range of sizes can be received in the apertures.

By locating a spacer S of proper thickness between the flanges 8 the apertures 10 of the two components can be spaced apart appropriately so that wires W of a given size pressed against the sides of apertures 10 by set screws 11 will be axially aligned with horns 2, thereby avoiding deflection of such wires between their respective horns 2 and connector apertures 10. Also each horn is severed at a transition location 4a, 4b, 4c or 4d such that the end section 6a, 6b, 6c or 6d of the stepped horn bore will fit the insulation of the wire W snugly and the waterproof fashion, as shown at the left of FIG. 3.

By utilization of the connector block shown in FIGS. 3 and 4, a junction can be made within the sheath between two pairs of wires extending through horns 2. While such wires in FIG. 1 are shown as being all of the same size, such uniformity of size is not necessary. Also it is not necessary for the connector block to be connected to the sheath in any manner. The wires W can simply be slid through the horns 2 until their exposed ends project beyond the margin of the cup portion of the sheath, and the connector block can be secured to the bare wire ends by the set screws 11 in such position. The horns can then be slid along the wires toward the connector block until such block engages the bottom of the sheath cup.

With the connector block thus housed fully within the sheath cup 1, the open end of such cup can be closed in watertight fashion by a cap 12. Such cap has an axially extending marginal flange 13 spaced outward from a central plug portion 14. The circumference of such plug portion and the inner circumference of the flange 13 are spaced apart a distance to form a deep groove of a radial width substantially equal to the thickness of the margin of the open end of cup 1.

Because of the proportions of the thickness of the cup margin and the radial width of the cap groove, the engagement of the cup margin in the cap groove will be watertight. The cup margin and the cap groove can be secured in engagement by providing an annular interfitting rib and groove on such cup margin and cap deep groove. In FIG. 3 an annular rib 15 is shown projecting inwardly from the margin of the cup 1 and received in a complementary annular groove 16, shown best in FIG. 4, in the periphery of the plug 14.

The cup 1 and horns 2 of the sheath case are made of tough, somewhat flexible, elastomer material preferably having a durometer value of about 70. The sheath cap 12 is made of similar material but preferably somewhat softer, such as having a durometer value of approximately 50, so as to facilitate assembly of the cap onto the cup. In order to make the sheath as compact

as possible while allowing adequate body for the plug 14 a central cavity 17 can be provided in the inner side of the cap to afford sufficient space to house the connector block 7 within the cup. The cap recess is shown as being of spherical section shape so as to minimize radial deflection of the plug 14.

In the sheathed electrical coupling shown in FIGS. 5, 6 and 7, the case including the cup 1 and the horns 2 is the same as described in connection with FIGS. 1 to 4. Also, the marginal portion of the cap 12' and its structure which fits with the margin of the cup 1 is the same as that described in connection with FIGS. 1 to 4. This coupling differs, however, in the type of connector block used and in the central portion of the cap. Here the coupling is used for taking off taps from wires W extending through horns 2 instead of simply providing a junction between wires extending through such horns.

In the coupling of FIGS. 5 to 7 two connector blocks 7' are located in the cavity of cup 1 in side-by-side relationship and are separated by a partition 18 of insulating material, which may be soft rubber. Each of the connector blocks has in it apertures 10' for receiving the ends of wires extending through horns 2. Between these apertures is a further aperture 19 receiving the tip 20 of a fuse clip 21. As shown at the left of FIG. 6, the connector block 7' can be secured to the cap 12' by a set screw 19' clamping the tip 20 of the fuse clip in the aperture 19 of such connector block after the reduced tip portion of the fuse clip has been inserted through an aperture in the cap. The enlarged portion of the fuse clip is snugly received in a complementary bore in the cap 12'.

A fuse clip 22 can cooperate with the fuse clip 21 to hold opposite ends of a fuse 23 in such clips. A tap wire 24 can be held in the end of fuse clip 22 opposite the fuse by a set screw 25. The fuse clip 22, the end portion of wire 24 secured in the fuse clip, and the principal portion of the fuse 23 can all be enclosed in a sheath formed by a sleeve 26 of soft rubber. The end of such sleeve encircling the fuse 23 is reduced to fit a complementary aperture in the outer side of cap 12', axially aligned and communicating with the bore receiving clip 21.

The sheathed electrical coupling shown in FIGS. 5, 6 and 7 can be used by assembling the connector block 7' with the cap 12' by inserting the fuse clips 21 through the cap apertures with their tips clamped in the apertures 19 of the connector block. Wires W can then be inserted through horns 2 as described in connection with the coupling shown in FIGS. 1 to 4 and their ends inserted and clamped in apertures 10' of the connector blocks by set screws 11. The case 1,2 can then be slid along the wires W toward the cap until the margin of the cup 1 is inserted into the deep groove of the cap in locking engagement as shown in FIG. 6.

The tap connection of the coupling is then made by securing the tip of wire 24 in the fuse clip 22 by set screw 25 and sliding sleeve 26 along the wire over clip 22 as shown in FIG. 6. One end of fuse 23 can then be inserted in the clip 22 and the opposite end of such fuse and the reduced end of sleeve 26 can simultaneously be inserted into the cap 12' until the other end of fuse 23 has entered the other fuse clip 21 in the relationship

shown in FIG. 6. A fused connection will then be completed between a supply wire or wires W and a tap wire or wires 24.

A sheathed electrical coupling including a fuse can be provided between single wires without the complication of the casing 1,2. Such a coupling is shown in FIGS. 8, 9 and 10 as including a fuse clip 22 in which the tip of a wire 24 is secured by a set screw 25 and such clip and wire end are received within a sheath sleeve 26 as described in connection with the electrical coupling shown in FIGS. 5, 6 and 7. One end of a fuse 23 is fitted into the fuse clip 22 previously described. The opposite end of the fuse can be fitted into a similar fuse clip 22 secured on the end of a wire 24' by a set screw 25. This fuse clip and wire end portion are received within an insulating sleeve 27.

The end of the bore through sleeve 27 opposite that through which wire 24' extends is considerably larger than the wire-receiving bore end. In fact, such larger end is formed by a flange extending axially of the sleeve which is of a size to fit over the reduced end portion of sleeve 26 as shown best in FIG. 9, to provide a sheath completely enclosing the fuse and fuse clips.

In the sheathed electrical coupling shown in FIG. 11 the sleeves 26 and 27 are used to enclose plug and socket elements of a connector for connecting wire 24 and wire 24' without interposition of a fuse. The socket element 28 of the connector is secured to the tip of wire 24 by set screw 25. Correspondingly, the plug element 29 of the connector is secured to the tip of wire 24' by set screw 25. Preferably the reduced portion of sleeve 26 is long enough to cover the socket element 28 of the connector, and the axial flange of sleeve 27 is long enough to encircle the plug tip of the connector element 29. When the plug and socket elements are interengaged, the reduced portion of sleeve 26 will be inserted within the axial flange portion of sleeve 27 in the manner illustrated in FIG. 11.

We claim:

1. A sheathed electrical coupling comprising a sheathing case, a cluster of hollow horns projecting from said sheathing case in generally parallel arrangement, a wire extending through the bore of at least one of said horns into said case, wire-connecting means received in said case and connected to said wire, cap means for closing said case having an aperture there-through, electrical-conducting means extending through such aperture, a second wire connectible to said electrical-conducting means, and a sheath sleeve encircling the end portion of said second wire and engageable with said cap means, said cap means and said sheath sleeve having interfitting projection and socket means for retaining said sheath sleeve and said cap means in assembled relationship.

2. The sheathed electrical coupling defined in claim 1, the sheath sleeve including a projection and the cap means having a socket into which the sheath sleeve projection can be inserted.

3. The coupling defined in claim 1, in which the wire means and the electrical-conducting means are readily disengageable.

4. The coupling defined in claim 1, and fuse-holding means covered by the sheath sleeve.

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