Aug. 30, 1960 R. F. COBAUGH 2,951,228

ELECTRICAL CONNECTOR

Filed April 11, 1956

Fig. 1

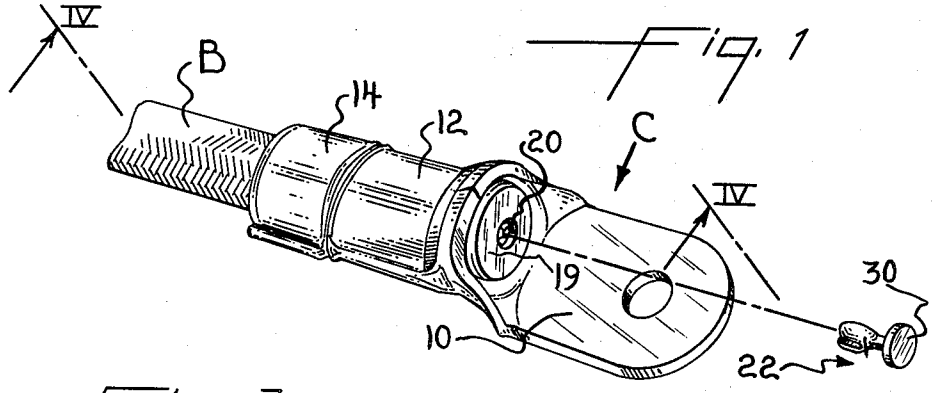


Fig. 2

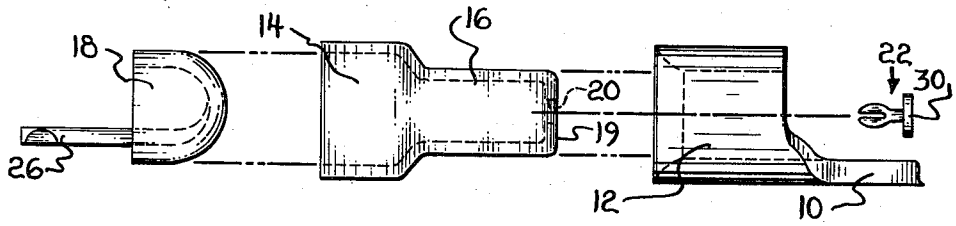


Fig. 3

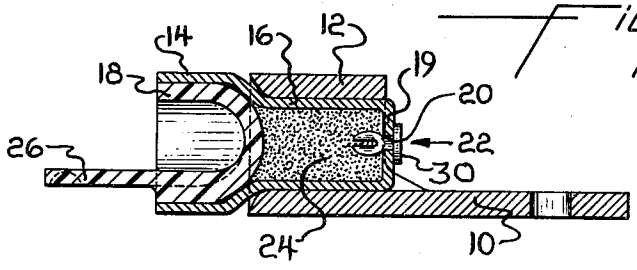
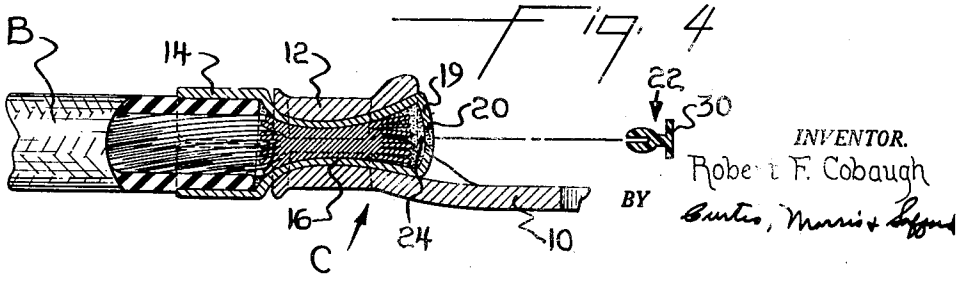


Fig. 4



INVENTOR.
Robert F. Cobaugh
BY
Curtis, Morris & Safford

United States Patent Office 2,951,228 Patented Aug. 30, 1960

2,951,228

ELECTRICAL CONNECTOR

Robert F. Cobaugh, Harrisburg, Pa., assignor to AMP Incorporated

Filed Apr. 11, 1956, Ser. No. 577,594

1 Claim. (Cl. 339—115)

This invention is directed to electrical connectors to be cold forged onto a conductor. Particularly, it is directed to such connectors as are crimped on aluminum wires, which connectors contain a material in a fluid phase for increasing the conductivity of the connection, providing a waterproof seal, or for inhibiting corrosion or the formation of aluminum oxide within the crimped connection, henceforth called "the inhibitor."

Some connectors of this nature are described in Patent No. 2,815,497, issued December 3, 1957, in the name of Jean J. Redslob, and Patent No. 2,869,103, issued January 13, 1959, in the name of Franklin H. Wells.

The above-identified patent applications describe a connector containing an unctuous material, used as an inhibitor, in the barrel thereof, which functions to effect a more efficient crimped connection. Prior to crimping these connectors and in order to provide a satisfactory shelf life during storage, the barrel containing the inhibitor must be closed at each end to confine the inhibitor within the barrel prior to the crimping operation.

The present invention provides a novel type of sealing arrangement which closes each end of the barrel, thus maintaining the inhibitor wholly within the conductor crimping barrel prior to the crimping operation. The inhibitor is so confined that it does not encounter the portion of the barrel used for crimping the connector to the insulation. Furthermore, the sealing means is easily removed and does not disturb the position of the material within the barrel during the removal operation. Also the present invention decreases the amount of inhibitor used in the connector. Furthermore, a novel means is provided for retaining the inhibitor within the barrel prior to crimping and yet permitting inspection of the crimped connection after the crimp is made.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there is shown and described an illustrative embodiment of the invention; it is to be understood, however, that this embodiment is not intended to be exhaustive nor limiting of the invention but is given for purposes of illustration in order that others skilled in the art may fully understand the invention and the principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

In the drawings:

Figure 1 shows a perspective view of a crimped connection embodying principles of this invention;

Figure 2 shows an exploded view of a connector of Figure 1;

Figure 3 shows a sectional view through the assembled parts shown in Figure 2; and

Figure 4 shows a fragmentary sectional view taken along the line IV—IV of Figure 1.

The connector is generally indicated by the letter C.

The particular connector shown has a ring tongue portion **10**, a conductor crimping barrel **12**, and an insulation crimping barrel **14**. As shown in Figures 2 and 3 the particular embodiment is made in three sections. One section contains the ring tongue **10** and the conductor crimping barrel **12**. The second section contains the insulation crimping barrel **14** and has a cylinder **16** at one end containing the inhibitor (see Figure 2). The sealing means **18** fits into one end of the insulation receiving barrel **14** when the connector is assembled. The closed end of the cylinder **16** has an annulus **20** containing a sealing means **22** which will be described later. By making the connector in two sections, as shown, it is easy to make the section **14** which extends over the insulation thinner than the section **12** which is crimped to the conductor. This effects a substantial saving of material and in addition permits the section **14** to be folded inwardly when crimped to the insulation, see Figure 1, thus effecting a tighter seal to retain the material within the container **16** and render the seal substantially waterproof.

As shown in the drawings, a cylinder **16** is fitted within the conductor crimping barrel **12** and held in position by a friction or interference fit. In this position the closure **19** of the cylinder **16** protrudes forwardly of the conductor crimping barrel. The insulation crimping barrel **14** extends rearwardly of the conductor crimping barrel **12**. The preferred means for sealing the insulation crimping barrel constitutes a semi-spherical cap **18** which is preferably made of polyethylene. As shown in Figures 2 and 3, the shape of this sealing means **18** is so dimensioned as to seal off the main portion of the insulation sealing barrel **14**. Thus, the sealing means **18** restricts the inhibitor **24** in such a manner that the inhibitor remains completely within the conductor crimping barrel **16** and does not enter the insulation crimping barrel **14**. This performs a two-fold effect. First, it permits the use of a smaller amount of inhibitor, since it is only necessary to provide enough material to fill the container **16** and not the container **14**. Also it prevents the material from entering the insulation crimping barrel, thus keeping the insulation relatively free of the inhibitor prior to crimping. A tab **26** extends outwardly from the sealing means **18** to provide a means for grasping the sealing means in order to remove it prior to making the crimped connection.

In the annulus **20** of the cylinder **16** a sealing means in the form of a closure **22** is provided. This closure is shaped like a collar button and is preferably made out of nylon or some other plastic material. The closure is made in two sections, one an expandable member **29** which is slotted as at **31** to permit compression and the other a head member **30**. The member **29** is compressed and inserted into the annulus **20**, then allowed to re-expand, so that the closure **22** is held in place. The head **30** prevents the closure from being inserted all the way into the container **16**. This button **22** also performs a dual function. First it holds the material **24** within the container prior to the crimping operation. As shown in Figure 1, after the crimp is made, the button **22** may be withdrawn and the conductor C viewed from the outside of the connection. An inspector can visually or by probing determine the proper positioning of the conductor in crimping relationship to the connector so that an efficient crimp is performed.

Operation

When it is desired to crimp a connector to a conductor the sealing means **18** is removed by grasping tab **26** with a pair of pliers (or other suitable tool) and exerting an outward pressure. The shape of means **18** is such that when tilted a little air can get into cylinder **16**; thus means

18 may easily be removed without pulling the inhibitor out of the cylinder. When the sealing means is removed, the bare end of the conductor is inserted into the connector so that it is positioned within the barrel 12. The insulation on the conductor is within the barrel 14. Crimping dies are brought to bear on the barrels 12 and 14, deforming these barrels onto the conductor and insulation, respectively. To inspect the crimped connection, button 22 is removed from closure 19. A visual or probing inspection of the bare end of the conductor will indicate whether or not the connector has been properly crimped onto the conductor.

Changes in construction will occur to those skilled in the art and various apparently different modifications and embodiments may be made without departing from the scope of the invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only. The actual scope of the invention is intended to be defined in the following claim when viewed in its proper perspective against the prior art.

I claim:

An electrical connector for terminating a wire conductor comprising a tubular structure of crimpable metal defining ferrule means for receiving through one end thereof an end portion of said conductor, a section of the length of said ferrule means adapted to be compressed onto said conductor end portion to provide a solderless cold-forged connection therebetween, radially extending metal portions adjacent said section for closing the end of said ferrule means remote from the conductor insertion end but for an inspection aperture of small diameter relative to said ferrule means, said aperture providing for external access to within said section to inspect the limit of conductor insertion within said section, a removable closure plug in said aperture, an unctuous material in said ferrule means section for fluid-proof sealing the conductor and ferrule means interfaces upon crimping the connector, a retaining plug removably fitted in and sealing the conductor insertion end of said ferrule means for protecting said unctuous material prior to connector crimping, and connecting means extending at said closed end away from said tubular structure for coupling said ferrule means and the conductor upon connection to external circuitry.

References Cited in the file of this patent

UNITED STATES PATENTS

513,949	Munson	Jan. 30, 1894
914,038	Gugler	Mar. 2, 1909
2,020,819	Bell	Nov. 12, 1935
2,405,111	Carlson et al.	Aug. 6, 1946
2,423,290	Bonwitt	July 1, 1947
2,533,200	Rogoff	Dec. 5, 1950
2,674,647	Dibner	Apr. 6, 1954
2,815,497	Redslob	Dec. 3, 1957