March 12, 1968 L. H. BURNS ET AL 3,372,460

METHOD OF MAKING TAP OFF CONNECTORS

Original Filed Jan. 21, 1965 2 Sheets-Sheet 1

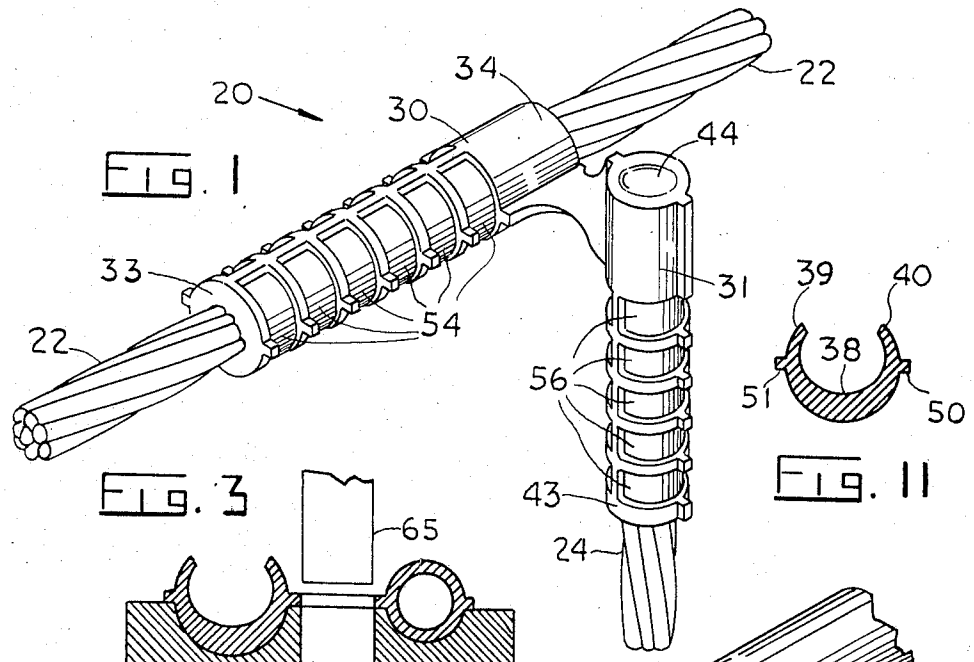


Fig. 1

Fig. 11

Fig. 3

Fig. 2

Fig. 4

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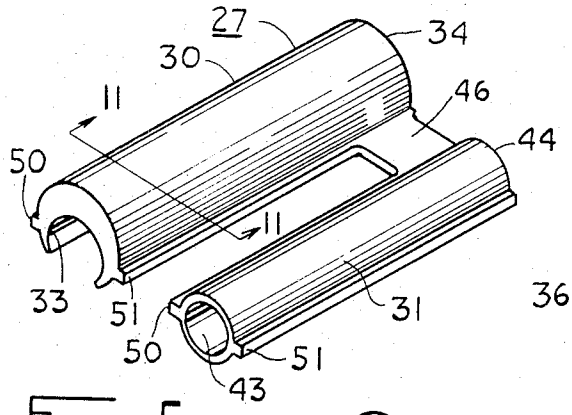


Fig. 5

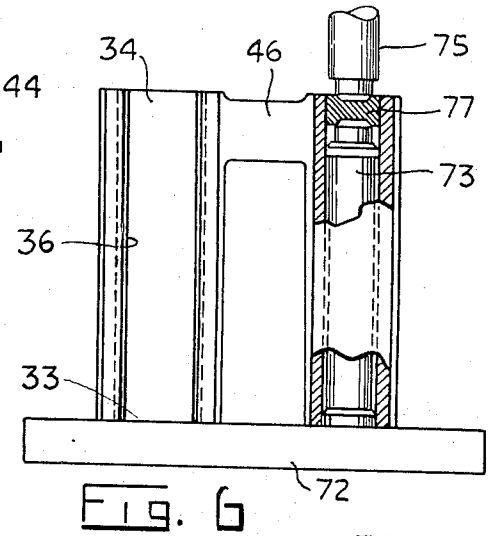


Fig. 6

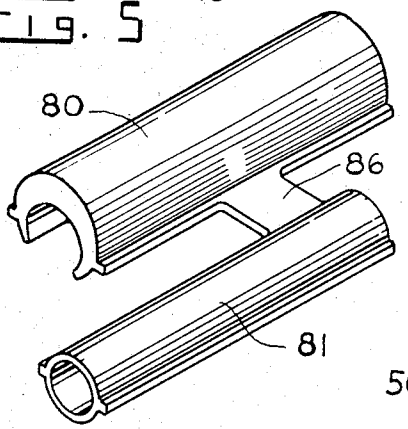


Fig. 7

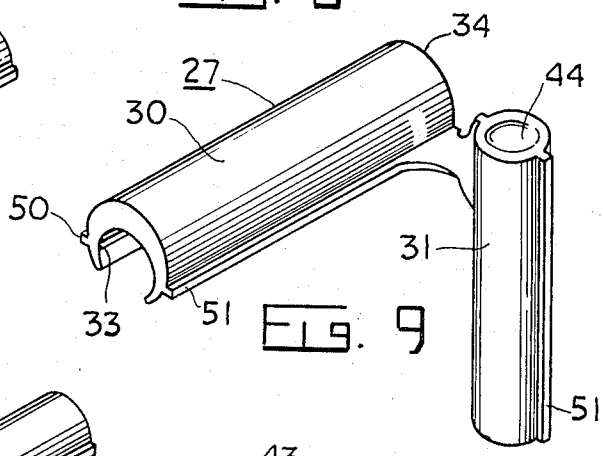


Fig. 9

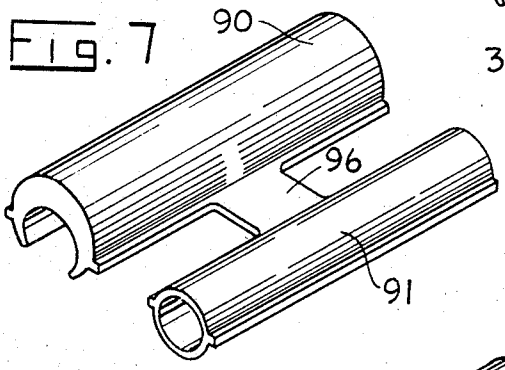


Fig. 8

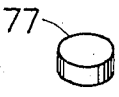


Fig. 12

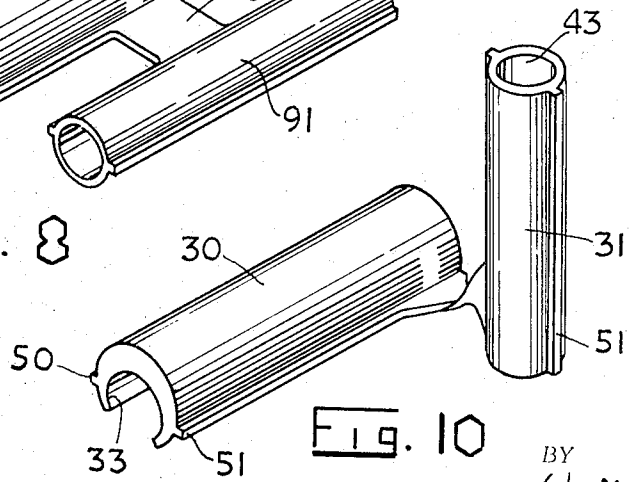


Fig. 10

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METHOD OF MAKING TAP OFF CONNECTORS

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Original application Jan. 21, 1965, Ser. No. 427,005, now Patent No. 3,338,608, dated Aug. 29, 1967. Divided and this application Sept. 20, 1965, Ser. No. 488,576
4 Claims. (Cl. 29—417)

This application is a divisional application of United States application Ser. No. 427,005, filed Jan. 21, 1965, now Patent No. 3,338,608.

The present invention relates to a method of making a tap off connector.

In prior art devices, which are designed for providing an electrical connection between a straight run electrical conductor and another conductor, which begins or ends (as the case may be) at the connection, a great deal of difficulty has been encountered in constructing a device which provides a good connection and which is capable of conveniently providing for various angular relationships between the conductors which are to be connected. Even in those devices constructed for this purpose, the methods employed for constructing the devices are not susceptible of large scale production methods resulting in a superior device.

An object of the present invention is to provide a method of making a tap off connector for providing electrical connection between a straight run conductor and a dead end or take off conductor which conductors may extend at various angular directions with respect to each other.

Another object of the present invention is to provide a method of making a tap off connector which includes two annular portions each capable of connection to a conductor, connected by a web which may be distorted by hand to locate the two annular portions at a desired angular position with respect to each other.

Another object of the present invention is to provide a new and novel method of producing a tap off connector.

Other objects and a fuller understanding of this invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is an isometric view of the tap off connector of the present invention in its ultimate use connecting a straight run electrical conductor to a take off electrical conductor;

FIGURES 2 through 6 show several of the steps in the method of producing the tap off connector of the present invention;

FIGURES 7 and 8 show modified forms of the tap off connector of the present invention;

FIGURES 9 and 10 illustrate the tap off connector of the present invention as twisted in two different directions;

FIGURE 11 is an elevational view taken generally along the line 11—11 of FIGURE 5; and

FIGURE 12 is an isometric view of a part of the tap off connector before assembly.

The tap off connector of the present invention is shown in its ultimate environment in the drawing of FIGURE 1 and is indicated generally by the reference numeral **20**, and as seen, demonstrates its utility in electrically and physically connecting a straight run connector **22** to a take off or tap off electrical conductor **24**.

The construction of the tap off connector **20** just prior to its use by a lineman is best seen in FIGURES 6, 9 and 10 and the tap off connector as seen includes in combination an integral metal member **27** preferably of aluminum which comprises first and second side members **30** and **31**, respectively. The first side member **30** comprises

an elongated annular member having first and second open ends **33** and **34**, respectively, and wall means **36** defines a slot which extends between these open ends **33** and **34**. As best seen in FIGURES 3 and 11, the cross sectional shape of the first side member **30** is what may be generally referred to as crescent shaped with the greatest thickness dimension occurring at **38** substantially intermediate the ends **39** and **40** of the crescent shape which ends **39** and **40** generally define the slot **36**. The slot **36** serves to provide an opening to receive the straight run electrical conductor **22** as seen in FIGURE 1.

The second side member **31** also comprises an elongated annular member which has a first open end **43** and a second closed end **44**. The second side member is generally cylindrical in shape. The first and second side members are substantially parallel with each other and are of substantially the same length. A flat (flat before distortion by a lineman) web member **46** extends between the second end of the first and second side members and is integrally connected thereto to insure a firm connection between the two parts. The flat web member lies in a plane which extends generally radially with respect to the first and second side members in the condition of the device as seen in FIGURES 5, 7 and 8, and each of the first and second side members has first and second supporting ribs **50** and **51** and these supporting ribs lie substantially in the plane of the flat web member **46**.

The flat web member **46** is of a thickness and has a connection at either end thereof to the side members **30** and **31** which permits the first and second side members to be twisted relative to each other to various angular positions and in most instances these various angular positions provide for such twisting up to a point whereby the first and second side members extend at approximately 90° with respect to each other. It is of course possible to provide a construction which enables the two side members to be twisted at angles greater than this, but preferably not to an angle greater than 180°. The design of the flat web member is such that this twisting can be accomplished by a lineman utilizing the device and the twisting does not have to be effected until the workman is ready to place the tap off connector in its ultimate use as seen in FIGURE 1.

In order to utilize the device shown in FIGURE 6, a lineman would preferably insert the tap off conductor **24** into the open end **43** of the second side member **31** to a position where it engages the closed end **44**. The tap off conductor is then firmly secured in the second side member **31** by means of a plurality of crimps **56**. These crimps may be accomplished by many tools familiar to those skilled in the art, examples of which may be found in U.S. Patent Nos. 2,254,416 and 3,084,575. After the tap off connector is firmly secured to the tap off conductor as aforementioned, the two side members are twisted relative to each other to position the same at the correct angular position. In many instances it may be desirable to twist the two side members prior to the connection with the tap off conductor. The first side member **30** is then placed over, or hung on, the straight run conductor **22** with the slot **36** facing in a downward direction. This leaves both of the lineman's hands free for connecting the first side member to the straight run conductor by means of a plurality of crimps **54** which are produced by the same type of tool as produced the crimps **56**. The securing of the first side member with the slot facing in a downward direction, or in other words on the underside of the conductor **22**, is highly advantageous in that this aids greatly in keeping this connection away from the direct contact of rain and similar elements. It will be apparent to those skilled in the art that it is possible to secure the first side member to the conductor **22** before securing the tap off conductor **24** to the second side

member 34. The supporting ribs 50 and 51 serve to balance the metal flow in the crimping operations.

FIGURES 3 through 6 demonstrate the steps utilized in producing the tap off connector of the present invention. The tap off connection is produced by extruding a continuous length of metal indicated by the reference numeral 59 in FIGURE 2 through dies in a manner which will be appreciated by those skilled in the art. This continuous length of metal forms the initial shape of the side members 30 and 31, and the web member 46. The continuous length of metal 59 is next transported to a station, the essential details of which are shown in FIGURE 3, which comprises a female die 62 having an opening 63 which is adapted to receive a punch 65. The female die 62 is adapted to cradle the first and second side members as shown and the punch 65 serves to punch out a plurality of spaced rectangular openings 67 which results in a construction shown in FIGURE 4. The continuous length of metal with the rectangular openings punched therein is then cut by suitable means in a direction transverse to the length thereof and through the rectangular openings. The cutting is schematically indicated by the dot-dash lines 70. This cutting of the continuous length of metal produces a plurality of structures such as that shown in FIGURES 5 and 6 with the second side member 31 being completely opened at both ends. In order to plug or close the second end 44 of the second side member 31, an operation is performed thereon which is demonstrated in FIGURE 6. A base 72 having a vertically extending support 73 thereon which support extends through the second side member, is provided, and a punch 75 cooperates with the support 73 in order to expand a slug 77 (also seen in FIGURE 12) against the inside wall of the side member 31 to close the second end thereof.

After this operation, the tap off connector is ready for its ultimate use as demonstrated in FIGURE 1. FIGURE 9 of the drawings demonstrates the twisting of the first and second side members relative to each other in one angular direction and FIGURE 10 demonstrates the twisting of the two side members in the opposite direction relative to each other.

FIGURE 7 is a modification of the tap off connector just previously described, however, the side members are indicated by numerals 80 and 81 and are connected by a web member 86. The difference in the tap off connector of FIGURE 7 as distinguished from that of FIGURE 5 or 6 demonstrates that the first and second side members may not be axially co-extensive and shows the web member 86 connecting the first side portion of the web member to the second end of the second side member 81. The modification shown in FIGURE 8 shows the flat web member 96 connecting the central part of each of the side members 90 and 91.

It will be appreciated from the above that the present invention provides a tap off connector which is susceptible of convenient and economical production and in its ultimate use is reliable in operation. The construction of the device which includes the web member 46 enables a lineman or other workman to conveniently bend or twist the two side portions to the desired degree on the job site and when so twisted, will perform its function in a reliable manner.

Although this invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. The process of making a tap off connector for connecting a straight run conductor to a take off conductor, comprising the steps of extruding a continuous length of metal which includes a flat web connected at either side to first and second generally parallel annular side members with the first annular side member being hollow and open along one side and the second annular side member being hollow and closed on all sides, punching a series of spaced rectangular openings in the flat web, cutting said continuous length of metal into pieces in a direction transverse to the length thereof and through the rectangular openings, plugging one end of said second annular side member of the pieces, and twisting the first and second side members of the pieces relative to each other about the web to distort the web and locate the first and second side members at various angular positions relative to each other.

2. The process of making a tap off connector for connecting a straight run conductor to a take off conductor, comprising the steps of extruding a continuous length of metal which includes a flat web connected at either side to first and second generally parallel annular side members with the first annular side member being hollow and open along one side and the second annular side member being hollow and closed on all sides, punching a series of spaced rectangular openings in the flat web, cutting said continuous length of metal into pieces in a direction transverse to the length thereof and through the rectangular openings, and plugging one end of said second annular side member of the pieces.

3. The process of making a tap off connector for connecting a straight run conductor to a take off conductor, comprising the steps of extruding a continuous length of metal which includes a web connected at either side to first and second generally parallel annular side members with the first annular side member being hollow and open along one side and the second annular side member being hollow and closed on all sides, producing a series of spaced openings in the web, and cutting said continuous length of metal into pieces in a direction transverse to the length thereof and through the openings.

4. The process of making a tap off connector for connecting a straight run conductor to a take off conductor, comprising the steps of extruding a continuous length of metal which includes a flat web connected at either side to first and second generally parallel annular side members both open on each end with the first annular side member being hollow and open along one side and the second annular side member being hollow and closed on all sides, producing a series of spaced openings in the flat web, cutting said continuous length of metal into pieces in a direction transverse to the length thereof and through the openings, closing one end of said second annular side member of the pieces, and twisting the first and second side members of the pieces relative to each other about the web to distort the web and locate the first and second side members at various angular positions relative to each other.

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