Aug. 29, 1967 L. H. BURNS ETAL 3,338,608

TAP OFF CONNECTOR

Filed Jan. 21, 1965 2 Sheets-Sheet 1

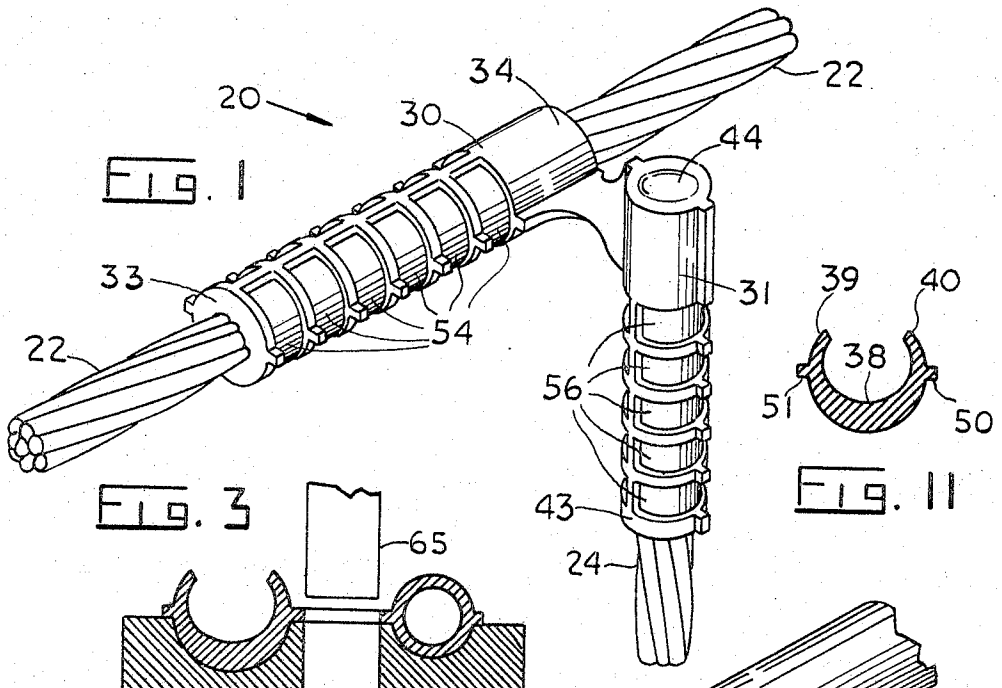

FIG. 1

FIG. 11

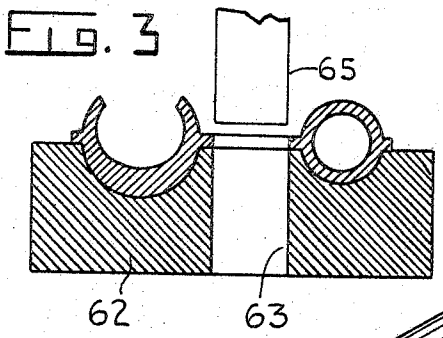

FIG. 3

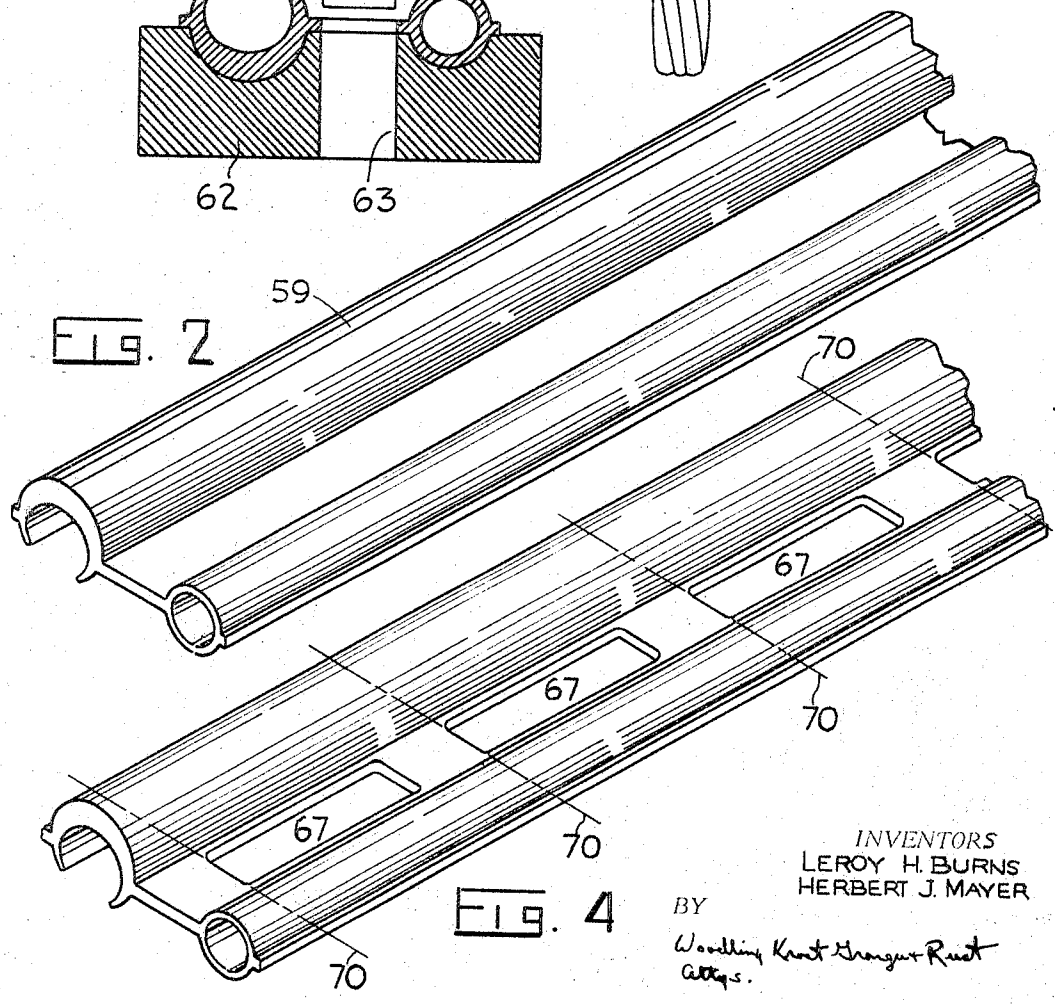

FIG. 2

FIG. 4

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TAP OFF CONNECTOR

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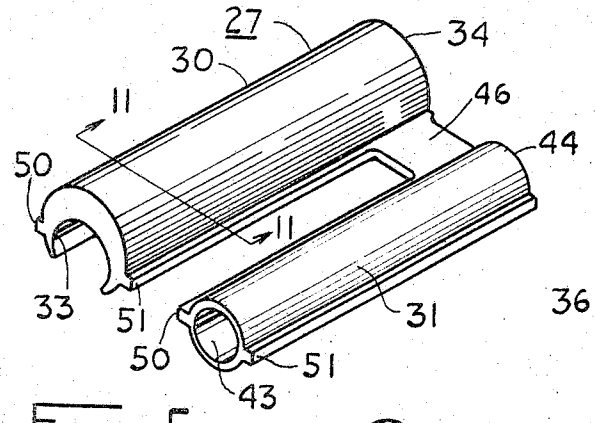

Fig. 5

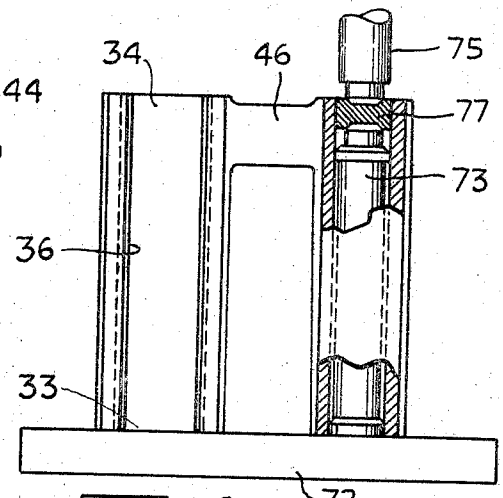

Fig. 6

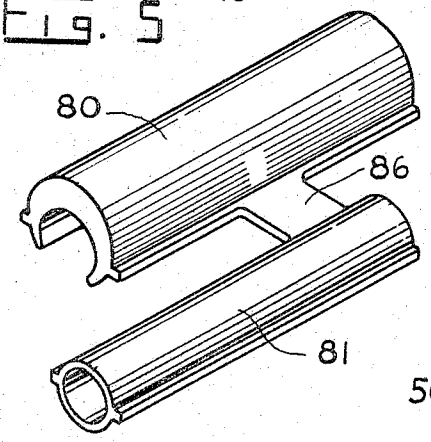

Fig. 7

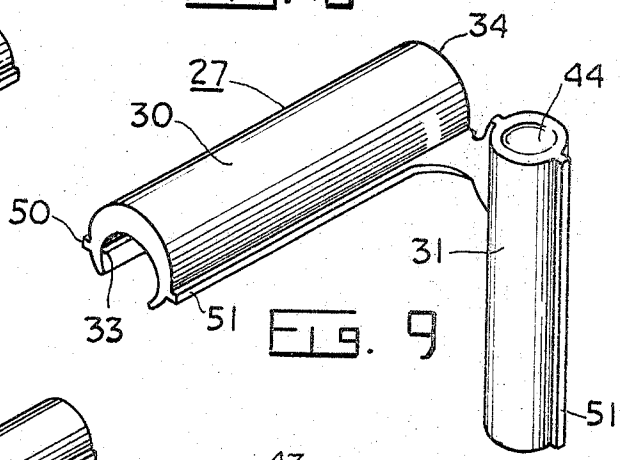

Fig. 9

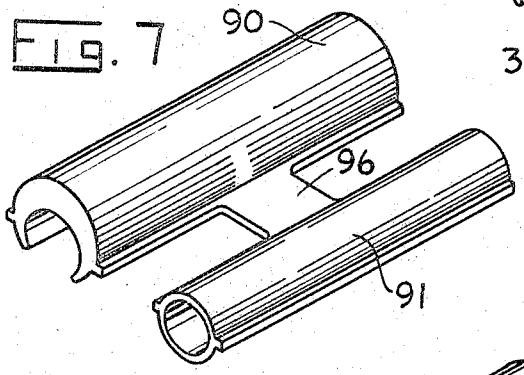

Fig. 8

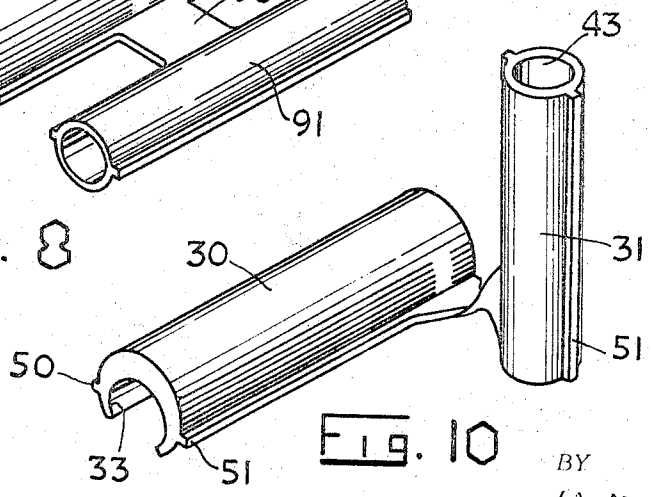

Fig. 10

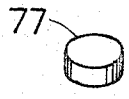

Fig. 12

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TAP OFF CONNECTOR

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Filed Jan. 21, 1965, Ser. No. 427,005
3 Claims. (Cl. 287—78)

The present invention relates in general to tap off connectors and more particularly to a new and improved construction of such a device as well as a novel method of making the same.

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.

It is, therefore, an object of the present invention to provide a superior and novel device for making a connection between two conductors.

Another object of the present invention is to provide 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 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.

Another object of the present invention is to provide a new and novel connection between a straight run conductor and another conductor which may for convenience be referred to as a dead end or take off conductor.

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 firs tand 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 connec- is generally cylindrical in shape. The first and second side 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 substantialy 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 sight 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. A tap off connector for electrically and physically connecting a straight run electrical conductor to a take off electrical conductor including in combination an integral metal member, said metal member comprising first and second side members, said first and second side members having generally parallel axes lying in generally parallel planes, said first side member comprising an elongated annular member having first and second open ends and wall means defining a slot extending between said first and second open ends for receiving a straight run electrical conductor thereinto in a direction generally transverse to the extent of the conductor, said first side member having a generally crescent shaped cross section, said second side member comprising an elongated annular member having a first open end and a closed second end whereby a conductor may be received through said first open end and dead ended against said closed second end, said first and second side members being substantially parallel and of substantially the same length, connection means extending between said first and second side members and being integrally connected thereto, said connection means comprising at least one flat web member operative to connect said first and second side members together at a single general connection area, the axial length of said connection means being less than the axial length of said side members, said flat web member lying in a plane which extends generally radially with respect to said first and second side members, each said first and second side member having first and second supporting ribs on opposed sides thereof and lying substantially in the plane of said flat web member, said flat web member having a shape and cross section to permit twisting thereof and shifting of said side members to various angular position relative to each other by deformation of said web member upon the exertion of an manual force on said side members without deformation of said side members, said axes of said side members, after said side members have been twisted, being located at an angle to each other and still substantially located in said generally parallel planes.

2. A tap off connector for electrically and physically connecting a straight run electrical conductor to a take off conductor including in combination an integral metal member, said metal member comprising first and second side members, said first and second side members having generally parallel axes lying in generally parallel planes, said first side member comprising an elongated annular member having first and second open ends and wall means defining a slot extending between said first and second open ends for receiving a straight run electrical conductor thereinto in a direction generally transverse to the extent of the conductor, said first side member having a cross section which has the heaviest wall section opposite said slot which wall section is generally progressively thinner as it approaches each side of said slot, said second side member comprising an elongated annular member having a first open end and a closed second end whereby a conductor may be received through said first open end and dead ended against said closed second end, said first and second side members being substantially parallel and of substantially the same length, connection means extending between said first and second side members and being integrally connected thereto, said connection means comprising at least one flat web member operative to connect said first and second side members together at a singe general connection area, the axial length of said connection means being less than the axial length of said side members, said flat web member lying in a plane which extends generally radially with respect to said first and said second side members, said flat web member having a shape and cross section to permit twisting thereof and shifting of said side members to various angular positions relative to each other by deformation of said web member upon the

exertion of a manual force on said side members without deformation of said side members, said axes of said side members, after said side members have been twisted, being located at an angle to each other and still substantially located in said generally parallel planes.

3. A tap off connector for electrically and physically connecting a straight run electrical conductor to a take off conductor including in combination an integral metal member, said metal member comprising first and second side members, said first and second side members having generally parallel axes lying in generally parallel planes, said first side member comprising an elongated annular member having first and second open ends and wall means defining a slot extending between said first and second open ends for receiving a straight run electrical conductor thereinto, said first side member having a cross section and shape such that the material thereof will be compressed about the straight run conductor when the same is crimped, said second side member comprising an elongated annular member having a first open end whereby a conductor may be received through said first open end, said first and second side members being substantially parallel, a web member extending between said first and second side members and being integrally connected thereto said web member being operative to connect said first and second side members together at a single general connection area, the axial length of said web member being substantially less than the axial length of said side members, said web member having a shape and cross section to permit twisting thereof and shifting of said side members to various angular positions relative to each other by deformation of said web member upon the exertion of a manual force on said side members without deformation of said side members, said axes of said side members, after said side members have been twisted, being located at an angle to each other and still substantially located in said generally parallel planes.

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