Oct. 13, 1970 S. P. BECKER ET AL 3,534,323

TRANSFORMER TAP FOR UNDERGROUND APPLICATIONS WITH PRESSURE PLATE CONNECTION

Filed March 6, 1969 2 Sheets-Sheet 1

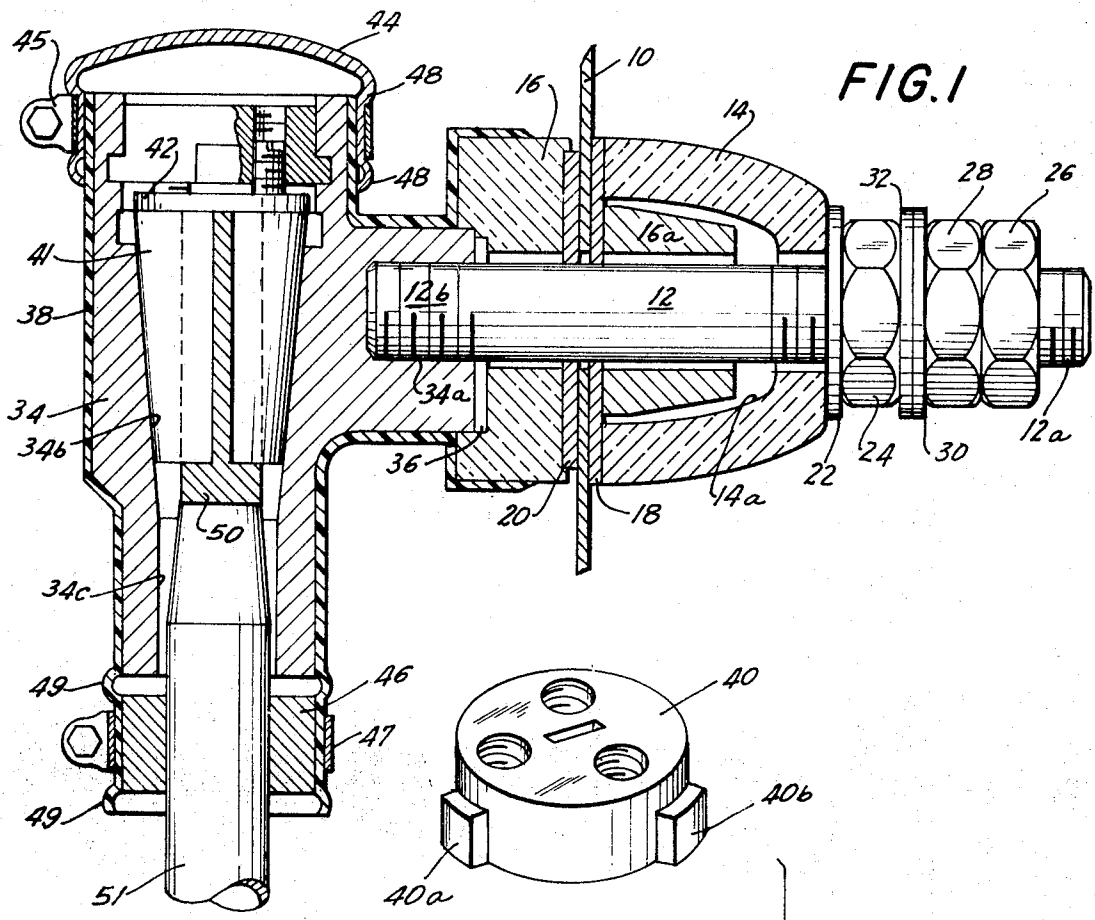


FIG. 1

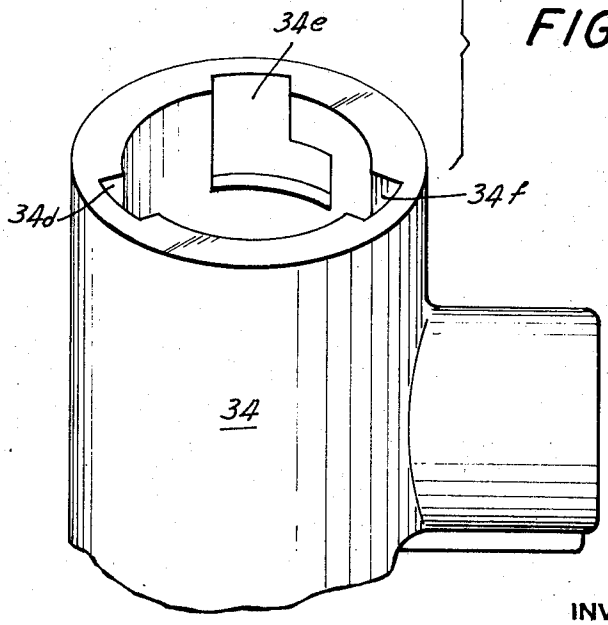


FIG. 2

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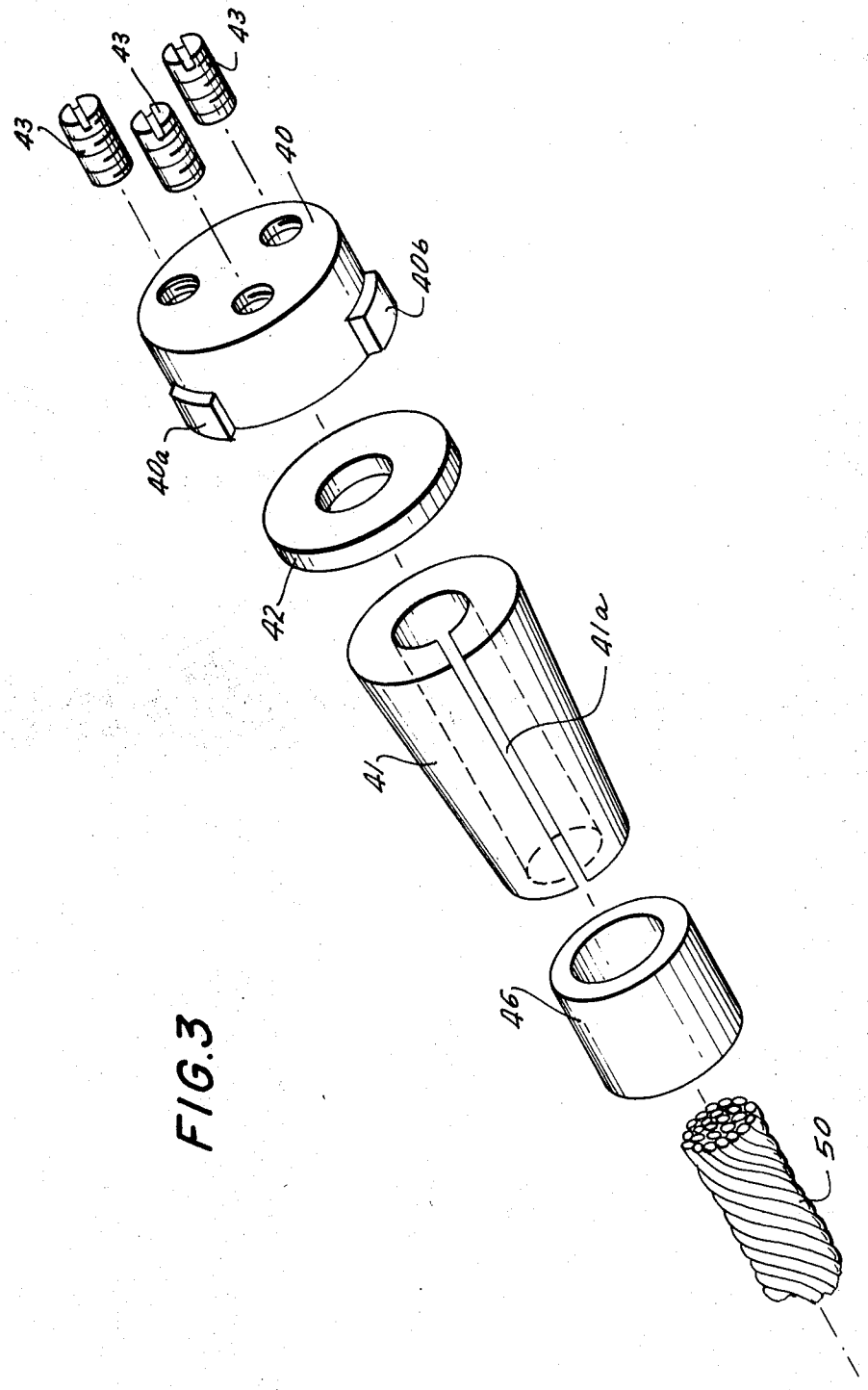


FIG. 3

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TRANSFORMER TAP FOR UNDERGROUND APPLICATIONS WITH PRESSURE PLATE CONNECTION

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Int. Cl. H01r 3/02
U.S. Cl. 339—116 6 Claims

ABSTRACT OF THE DISCLOSURE

A rugged and compact connector or tap to a transformer or other encased electrical components for direct burial applications providing permanent, water-tight, insulated junction including internal and external attachment means and external insulation means and also including pressure plate means for positively fastening a conductor thereto from the direction opposite to that of conductor insertion.

BACKGROUND OF THE INVENTION

It has become highly desirable for a number of reasons to bury electrical components, such as transformers, underground. Connector assemblies, or taps, for such underground applications must be specifically designed with this end use in view. In "direct burial" applications where the connection to the transformer is made and left without benefit of enclosure in a vault, the tap or connection means used must be moisture-proof and provide its own sealing. Additionally, it must be relatively simple to use. In certain applications the fastening of the conductor through the tap is made from the same direction as that in which the conductor is inserted. In certain applications it has been found desirable to provide means for fastening the conductor to the tap from the direction opposite to that of conductor insertion. Suitable means for making a positive connection from the direction opposite to that of conductor insertion have not been provided by the prior art transformer tap or connection means.

SUMMARY OF THE INVENTION

A transformer tap including a stud member projecting through the transformer cover with first and second portions disposed internally and externally of the transformer cover, internal and external cover fastening means supported by the stud member, internal and external insulation means between the cover and the respective internal and external fastening means, external conductor attaching means and first and second sealing means for respectively providing sealing between the conductor attaching means and the conductor and the conductor attaching means and the external cover fastening means, and a pressure plate accessible from the direction opposite to that of conductor insertion whereby a positive connection of conductor can be made from the direction opposite to that of conductor insertion.

DESCRIPTION OF THE DRAWINGS

In the accompanying drawings,

FIG. 1 is a longitudinal sectional view of a transformer tap assembly constructed in accordance with the teachings of this invention;

FIG. 2 is an exploded segmentary perspective view of the pressure plate and body member which is utilized for cable attachment; and

FIG. 3 is an exploded perspective view of that portion of the assembly shown in FIG. 1 which is utilized for cable attachment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the figures, the transformer cover or side wall is indicated by the numeral **10**. A stud member **12** projects through an opening in the cover **10** and supports internal and external cover fastening members **14** and **16**, respectively. The stud is formed of conducting material, such as copper, and the fastening members are formed of non-conducting material, such as porcelain. The external cover fastening member **16** has a portion **16***a* projecting through the opening in cover **10** and disposed within bore **14***a* of internal cover fastening member **14**. Insulating baskets **18** and **20** are respectively supported between internal member **14** and cover **10** and external member **16** and cover **10**.

Internally the internal cover fastening member **14** is held against the gasket **18** by flat washer **22** and jam nut **24**. These are mounted on threaded end **12***a* of stud **12**. Jam nuts **26** and **28** are also supported on threaded end **12***a* to maintain flat washers **30** and **32** between jam nut **28** and **24**. The internal connection of the transformer winding is made to the tap by disposing the winding end between flat washers **30** and **32**.

The remaining ends of stud **12** which is also threaded at portion **12***b* is threaded within cavity **34***a* of conducting body member **34** to clamp external cover fastening member **16** and gasket **20** against cover **10**. Gasket **36** also constructed of insulating material is disposed between the cover fastening member **16** and body member **34**.

The external cover fastening member **36** and the member **34** are provided with an insulating coating **38** such as durable hard vinyl by means of a dip coating process. Of course, other insulating materials can be used for coating or enclosing the fastening member **16** and body member **34** and other means of attachment of the insulating material to these members can be utilized in the practice of the invention.

The body member **34** is provided with a cylindrical bore section **34***c* and a conical bore section **34***b*. Section **34***b* is conical in configuration with the cross-sectional diameter of the bore adjacent section **34***a* least or smallest in diameter. Additionally, the member **34** is provided at one end with three bayonet type slots **34***d*, **34***e* and **34***f*, seen best in FIG. 2, to receive the radial projections of pressure plate **40**. In the figures only two of these projections are visible and these are indicated by the numerals **40***a* and **40***b*.

The remaining parts of the tap connector are connector cone **41**, bearing washer **42**, pressure screws **43**, cap **44** held in position by hose clamp **45**, and grommet **46** held in position by hose clamp **47**. It is noted that the coating **38** extends beyond body member **34** to provide a receptacle for grommet **46** and that the cap **44** and coating **38** are formed with ridges **48** and **49**, respectively, to define respective positions for clamps **45** and **47**.

Connector cone **41** is formed of an electrically conducting material and provided with a full length longitudinal slot **41***a*. The connector cone **41** is provided, as will be explained in greater detail below, to encircle and grip the strands **50** of a cable **51** attached to the connector and the cone **41** is sized to the conductor to provide optimum encirclement and strand-to-strand contact. The slot **41***a* is provided to allow the connecting cone to become reduced in diameter in the fully assembled connector and firmly grip the cable strands. The internal surface of the cone is preferably provided with a corrugated configuration to aid in the provision of a firm contact with the conductor

strands. The pressure plate **40**, bearing washer **42** and screws **43** can be formed of any suitable conducting or non-conducting material having the strength to perform the function for which it is designed. The pressure plate **40** is provided to be received and held by its radial projections within the bayonet slots of body member **34** and to support the screws **43** therein. A tightening of the screws **43** will result in the screw ends embracing and abutting bearing washer **42** since tightening the screws will cause them to move downwardly as seen in FIG. 1 forcing the bearing washer **42** against cone **41** and driving the cone further within the conical bore **34***b* formed in body member **34**. The conical cone **41** being driven deeper into the conical bore **34***b* results in the outer surface of cone **41** being forced inwardly radially due to bearing action and embracing strands **50** of the cable **51**.

The cap **44** and grommet **46** can be formed of any suitable non-conducting material and the clamps **45** and **47** are formed of material such as will enable them to be tightened resulting in a tightening of the cap about body member **34** and the insulation **38** about grommet **46**. As is known in the art it is necessary that the hose clamps be formed of material having suitable strength and resiliency for this purpose.

In assembling or in attaching a cable to the tap, the cable is prepared by skinning the insulation in the usual manner to expose stranded portion **50**. The cable end is threaded through the grommet **46** and body member **34** until the exposed end **50** of the cable is inserted within connector cone **41**.

The bearing washer **42**, pressure plate **40** and screws **43** are then inserted with the screws **43** tightened to form a tight connection between the cone **41** and cable end portion **50**. Cap **44** is then applied with clamp **45** which is tightened and clamp **47** tightened as well.

It is noted therefore that the cable can be connected to the assembly by mechanical tightening with a standard screwdriver to provide a permanent yet easily disconnected connection. Sealing is provided on either side for the cable by the grommet and cover and their respective clamps. Further, sealing is provided on either side of the transformer cover and throughout the connection since the insulation **38** covers most of the exposed members.

It is anticipated that the body member will be placed in position with insulation **38** surrounding it and that the line man will be provided with a kit which would include grommet **46**, hose clamp **47**, cone **41**, bearing washer **42**, pressure plate **40**, cover **44** and hose clamp **45**. The line man then, in fastening a cable to the assembly, would utilize the parts from the kit in the manner described above.

We claim:

1. A conductor connecting member including in combination a body member formed of an electrically conductive material, a bore of said body member, an insulating coating of said body member, a conical section of said bore, a collapsible connecting member having an outer conical surface at least partially within said conical section in adjacency with the inner surface of said bore, a conductor receiving section of said bore adjacent the lesser diameter end of said conical section, a pressure plate receiving section of said bore adjacent the greater diameter end of said conical section, pressure plate means within said pressure plate receiving section and abutting said connecting member for urging said connecting member toward said conductor receiving section with said connecting member being collapsed about said conductor by the wedging action of its outer surface and the surface of the bore of said conical section, and first and second sealing means respectively providing a seal at the entrance to said pressure plate receiving section and at the entrance of said conductor receiving section.

2. A conductor connecting member in accordance with claim **1** in which said pressure plate means consists of a pressure plate supported within said pressure plate receiving section in a substantially fixed position, a bearing washer within said pressure plate receiving section between said pressure plate and said connecting member with an abutting portion thereof abutting said connecting member, and pressure applying means supported by said pressure plate and adjustable for applying determined force urging said bearing washer against said connecting member.

3. A conductor connecting member in accordance with claim **2** in which the pressure applying means are a plurality of screw members threadedly supported by said pressure plate and abutting said bearing washer whereby degree of rotation of said screws determines the force applied to said connecting member.

4. A conductor connecting member in accordance with claim **2** in which said pressure plate is provided with radial projections and the surface of said pressure receiving section is provided with bayonet slots to receive said projections by longitudinal insertion of said pressure plate and rotational locking thereof.

5. A conductor connecting member in accordance with claim **1** in which said first sealing means consists of a cap covering the entrance to said pressure plate receiving section and provided with a depending circular skirt and a clamp means for embracingly urging said skirt against insulating coating surrounding the entrance to said pressure plate receiving section.

6. A conductor connecting member in accordance with claim **1** in which said second sealing means including a cylindrical extension of said insulating coating beyond the entrance to said conductor receiving section, a resilient grommet within said extension through which said conductor passes and a clamp means for embracingly urging said extension against said grommet and said grommet against said conductor.

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24—126; 339—270