Jan. 8, 1963 R. L. NORRIS 3,072,881

COLLAR BUSHING TERMINAL

Filed Aug. 20, 1959 2 Sheets-Sheet 1

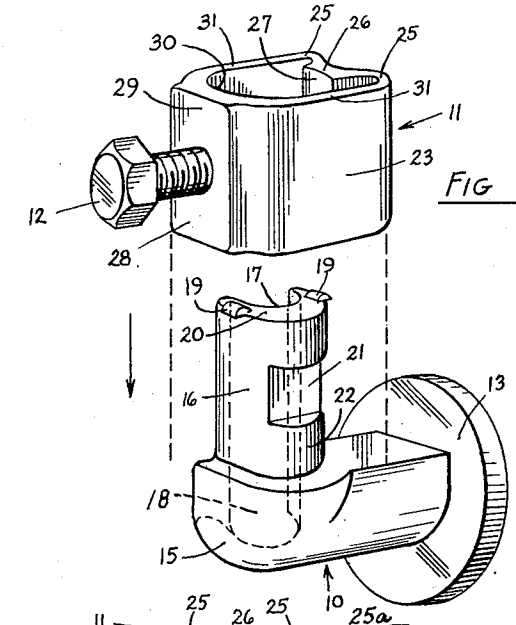


FIG 1

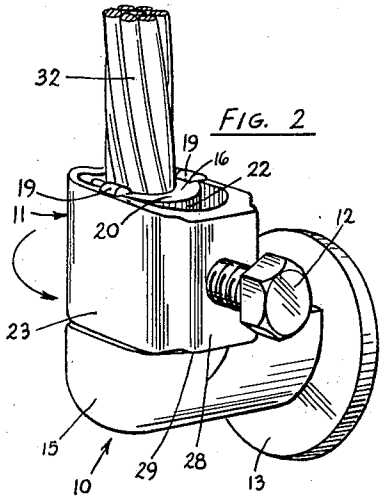


FIG. 2

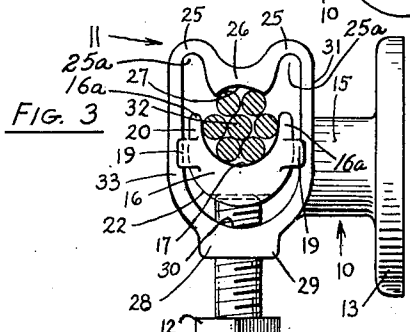


FIG. 3

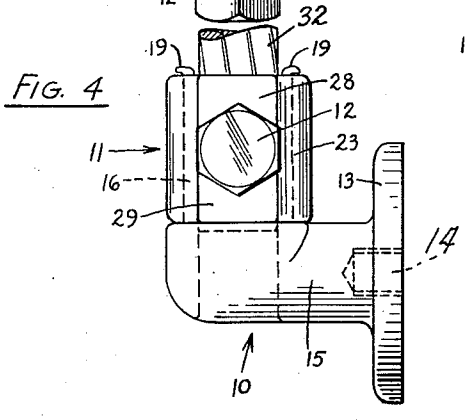


FIG. 4

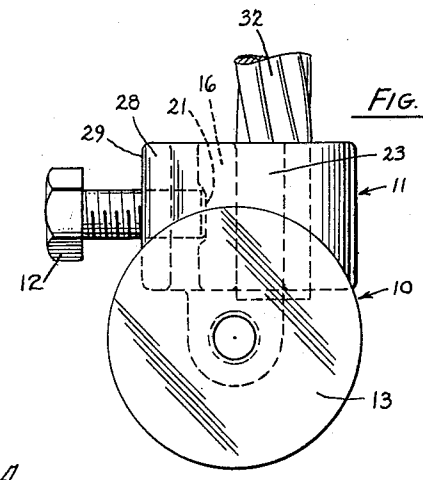


FIG. 5

INVENTOR.
Robert L. Norris

BY

Kenyon & Kenyon

ATTORNEYS

Jan. 8, 1963 R. L. NORRIS 3,072,881

COLLAR BUSHING TERMINAL

Filed Aug. 20, 1959 2 Sheets-Sheet 2

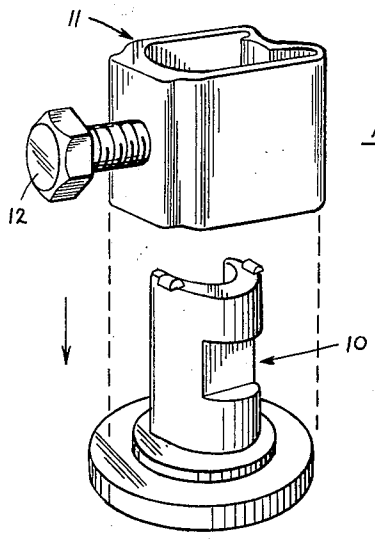


FIG. 6

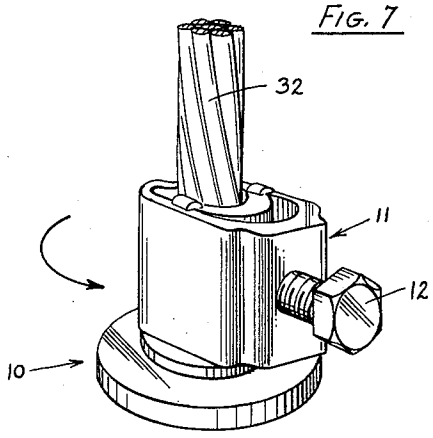


FIG. 7

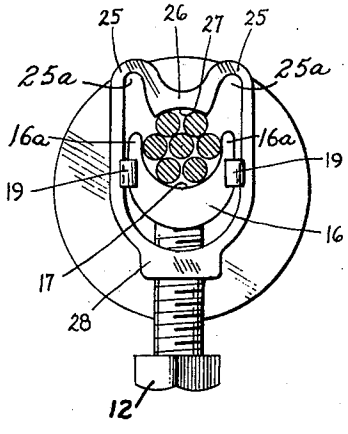


FIG. 8

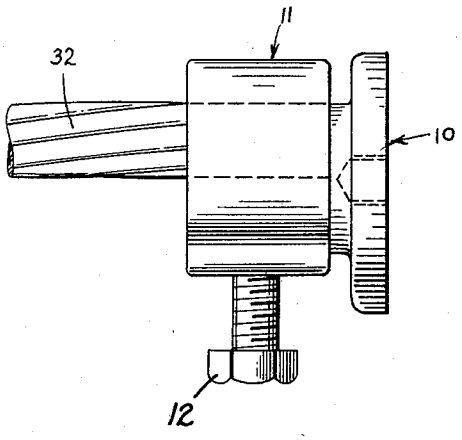


FIG. 9

INVENTOR.
Robert L. Norris

BY

Kenyon & Kenyon

ATTORNEYS

United States Patent Office 3,072,881 Patented Jan. 8, 1963

3,072,881

COLLAR BUSHING TERMINAL

Robert L. Norris, Birmingham, Ala., assignor to Anderson Electric Corporation, Birmingham, Ala., a corporation of Alabama

Filed Aug. 20, 1959, Ser. No. 834,971
3 Claims. (Cl. 339—272)

This invention relates in general to cable terminal connectors and more particularly to solderless cable terminal connectors particularly adapted for use as terminal connectors on power transformers and the like.

Desirable features for a cable terminal connector include a single adjusting device to clamp the cable securely in the cable terminal connector, a deep continuous cable contact groove that can retain an oxide inhibitor, means for self compensation for creep or cold flow of the retained cable especially when said cable is aluminum, a captive yet removable clamping device, a workable configuration that will attain the other ends herein yet is constructable in aluminum so as to avoid surface problems when aluminum cable is connected, and a large cable accommodation range.

Previous devices have fallen into three major categories comprising the eyebolt type terminal, the U-bolt or 2-bolt type terminal, and the standard collar type terminal. Each of these approaches to the problem attains some, but not all, of the aforesaid desirable features. All three of the aforesaid approaches require an extrinsic cold flow or creep compensating device.

In addition the eyebolt type has a divided groove that cannot easily retain an inhibitor and does not lend itself to fabrication in aluminum, this latter defect requiring for example a tin-plated bronze eyebolt for use with aluminum cables, which is undesirable. In addition the divided groove of the eyebolt produces two high pressure contact areas which enhance creep of conductors of aluminum, etc.

The U-bolt and 2-bolt types also have additional disadvantages, chief among these being that their cable accommodation range is small and they entail the adjustment of two nuts when being employed.

The additional disadvantages of the standard collar type terminal are its shallow groove that cannot retain inhibitor, its small cable accommodation range, and its non-captive non-positive pressure clamping device.

It is, therefore, an object of the present invention to provide a secure mechanical and electrical connection between a cable terminal and a cable that will remain secure even though the cable material may cold flow or otherwise change its radial dimensions.

Another object is to provide a single tightening means so as to permit rapid and easy connection and disconnection of the cable in the terminal.

An additional object is to provide a clamping configuration of extruded aluminum so as to accommodate aluminum cables without the necessity of using a plated bronze fitting as required when non-aluminum clamping members are used.

A further object is to provide a deep continuous cable contact groove that improves the mechanical and electrical connection and also provides greatly increased retention of an oxide inhibitor.

A still further object is to provide a captive clamping means that can be used with a wide range of cables.

Other objects and a fuller understanding of the 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 exploded perspective of a first embodiment of the invention;

FIGURE 2 is a normal perspective of said first embodiment;

FIGURE 3 is an elevation of said first embodiment;

FIG. 4 is a bottom view of said first embodiment;

FIG. 5 is another elevation of said first embodiment;

FIG. 6 is an exploded perspective of a second embodiment of the invention;

FIG. 7 is a normal perspective of said second embodiment;

FIG. 8 is an end elevation of said second embodiment; and

FIG. 9 is a side elevation of said second embodiment.

With reference to the drawings, and particularly FIGS. 1–5 inclusive, the present invention comprises, in general, a fixed base and bushing member **10**, a detachable collar member **11** adapted to mate with base and bushing member **10**, and an operating bolt **12** disposed to thread through said detachable collar member **11**.

As illustrated, fixed base and bushing member **10** comprises base plate member **13** having tapped mounting hole means **14** therein, extension member or body portion **15** extending normally from said base plate member **13**, semi-cylindrical bushing member or stud **16** of channel or U-shaped cross-section extending at a right angle, or generally to the right as viewed in FIG. 1, from said extension member **15** with its open semi-cylindrical inner face or groove **17** opening upwardly as viewed in FIG. 3, a semi-cylindrical indentation or groove **18** in said extension member **15** being essentially a continuation of the groove **17** of said bushing member **16**, a pair of projections or ears **19** being disposed radially outward at the upper part of the outermost end **20** of bushing member **16**, and a flat bearing surface **21** on the underside **22** of bushing member **16** generally centrally thereof to accommodate bolt **12** as hereinafter described.

It is to be noted that all the above described structure appurtenant to base and bushing member **10** may be constructed integrally therewith as by casting, and preferably such casting should be of aluminum in order to obtain the benfits set forth in the objects herebefore recited in regard to the desirability of using aluminum jaws to grasp aluminum cables.

Also as illustrated, detachable collar member **11** comprises an open-centered or hollow aluminum body member **23** whose upper portion **24** as viewed in FIGS. 1–3 is shaped to form a pair of springing portions or shoulders **25**, a movable clamp jaw **26** having an inner grooved face **27**, and an oppositely disposed tapped adjusting boss **28** on the lower portion **29** of said body member **23**. Jaw **26** defines a pair of recesses **25***a* on its opposite sides which are adapted to receive respectively sides **16***a* of the channel-shaped stud **16**. These recesses are substantially complementarily shaped with respect to the stud sides so that they can accommodate and substantially completely receive these stud sides when a very small size conductor is clamped between the inwardly projecting jaw **26** and the groove of the stud **16**.

The inner (vertical as viewed in FIGS. 1, 2, 4 and 5) dimension of collar member **11** is slightly less than the outer vertical dimension of stud **16** (measured between the undersurfaces of the projections **19** and the upper surface of body portion **15**) with which it mates. Also (see FIG. 3) the major transverse dimension of collar member **11**, that is, from the inner surface **30** of base **28** to the face or groove **27** of clamp jaw **26**, is larger than the extreme transverse distance between the outer-most reach of ears **10** while the minor transverse inside dimension of collar member **11** is a shade larger than the total lateral dimension of semi-cylindrical bushing member **16** with which it mates.

In order to obtain the benefits set forth in the aforesaid objects, it is desirable that the collar member **11** be of aluminum, and furthermore of extruded aluminum. Aluminum matching jaws of the bushing terminal assembly can deal most effectively and simply with aluminum

cable, obviating the necessity of using plated bronze for said jaws, while extrusion of the collar member 11 presents hardened shoulders 25 thereof which are capable of sufficient resilience to accomplish the creep compensating function hereinafter described.

The base and bushing member 10 may be affixed to, say a transformer frame, by bolting into the tapped hole 14. The inner face or groove 17 of bushing member 16 may then be lined with an oxide inhibitor (not shown). The collar member 11 is then slipped over bushing member 16 by presenting the major transverse inside dimension of collar member 11 to the ears 19 on bushing member 16. A ninety degree turn of collar member 11 will then engage ears 19 over the sides 31 of collar member 11 situated the minimum transverse distance apart. A conventional conductor or cable 32 may then be inserted into the opening between the movable jaw face 27 and the inner fixed face 17 of bushing member 16.

Operating bolt 12 is then inserted by threading through boss 23 on collar 11 until it contacts or bears against flat bearing surface 21 on bushing 16. Further turning of bolt 12 will draw movable jaw 26 on collar 11 toward fixed bushing 16. When cable 32 is contacted by both movable jaw face 27 and groove 18, further tightening of bolt 12 will result in flexing of springing shoulders 25. When thus further tightened, aluminum cable 32 receives spring loaded pressure that will compensate for any relaxation or creep in radial dimension of the cable and thereby maintain the desired secure mechanical and electrical contact between bushing assembly and cable.

It will be noted that when in this assembled and tightened position, the aluminum cable 32 is grasped in a non-hostile aluminum grip, rendered self-compensating by the aforesaid extruded aluminum spring action, and is capable of retaining any oxide inhibitor applied to said jaw faces 18, 27. Furthermore, once the operating bolt 12 is tightened down to the desired torque, the clamping collar 11 is captive with respect to the bushing 16, although the whole connection is rapidly removable by loosening the single operating bolt.

In addition the matching male and female contours of bushing member 16 and shoulders 25 and jaw 26 of collar 11 respectively, permit a wide degree of approach and withdrawal of such members relative to one another thereby providing accommodation of a correspondingly wide range of cable sizes.

It will be observed that all the foregoing recitation of structure and function was directed to the first embodiment illustrated in FIGS. 1–5 inclusive. The second embodiment shown in FIGS. 6–9 inclusive differs from the above not at all in general function, and differs in actual structure only in the orientation of its base plate member 13, said member 13 being oriented to allow a connected cable 32 to extend normal to the mounting surface rather than parallel to it. Said second embodiment is merely

a slight variation in application from said first embodiment, and may be practiced with the same structure and operation as hereinbefore disclosed.

Although this invention has been described with a certain degree of particularly, it is understood that the present disclosure 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 terminal connector for electrical power cables comprising a body portion, a stud thereof of channel-shaped cross section, a collar having an opening accepting said stud and having a jaw which projects inwardly toward the groove defined by said channel section and is adapted for reception therein, said jaw defining recesses on opposite sides thereof adapted to receive the sides of the channel-shaped stud, means associated with said collar for forcing said jaw into clamping engagement with an electrical conductor inserted into said groove, said recesses being substantially complementarily shaped with respect to said stud sides and adapted to receive said sides whereby a wide range of conductor sizes may be clamped, said collar having portions adjacent the recesses on opposite sides of said jaw which are adapted resiliently to flex under clamping pressure thereby to provide a spring bias for maintaining clamping pressure upon relaxation of said conductor, and means adapted to hold the collar captive axially on said stud.

2. A terminal connector as set forth in claim 1 in which said means includes projections at the end of said stud, said collar being held captive axially on said stud by said projections with said jaw opposite the groove defined by said channel section.

3. A terminal connector as set forth in claim 1 in which said means includes ears at the end of the stud, and the minimum lateral dimensions of the interior opening of said collar are greater than the maximum lateral dimensions of said stud whereby said collar is adapted to be held captive axially on said stud by said ears with said jaw opposite the groove defined by said channel section and adapted to be removable therefrom when rotated approximately 90° relative to said stud about the longitudinal axis thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

1,991,075	Bloomquist	Feb. 12, 1935
2,068,152	Rowe	Jan. 19, 1937
2,809,363	Schertel et al.	Oct. 8, 1957

FOREIGN PATENTS

497,089	Canada	Oct. 20, 1953
226,097	Switzerland	June 16, 1943
233,001	Switzerland	Sept. 16, 1944