Aug. 9, 1932. G. A. BURR 1,870,833

TERMINAL DEVICE

Filed April 11, 1929

Fig. 1.

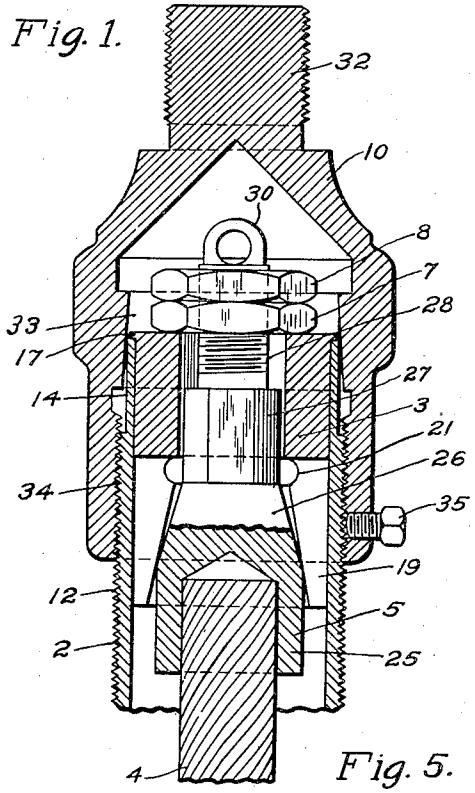


Fig. 2.

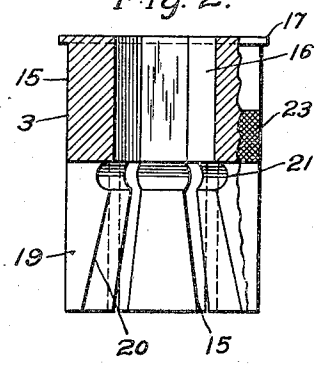


Fig. 3.

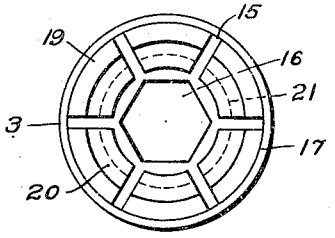


Fig. 5.

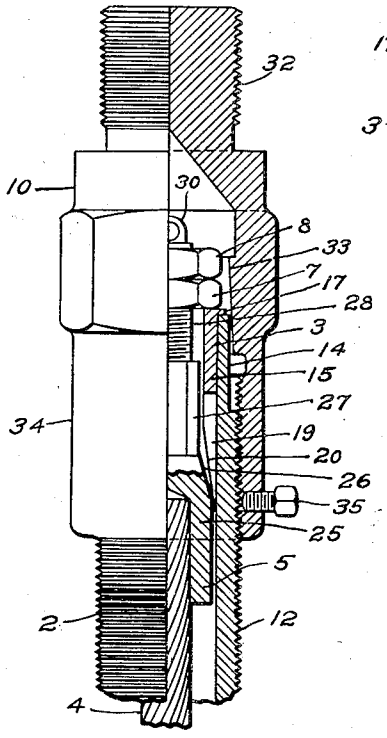
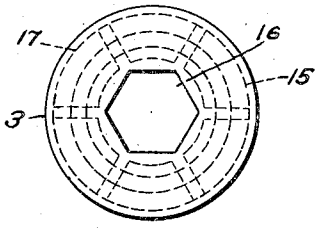


Fig. 4.



INVENTOR

Gordon A. Burr.

BY

Overbaugh & Earl

ATTORNEY

Patented Aug. 9, 1932 1,870,833

UNITED STATES PATENT OFFICE

GORDON A. BURR, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA

TERMINAL DEVICE

Application filed April 11, 1929. Serial No. 354,308.

My invention relates to terminal devices and particularly to outer-end terminal structures for high-voltage bushings for electrical apparatus.

One object of my invention is to provide a device of the above-indicated character that shall embody a tube and means for sealing the same through the medium of metal-to-metal contact surfaces.

Another object of my invention is to provide a bushing terminal that shall provide an air, oil and moisture seal and, at the same time, effect good electrical contact between the sealed parts.

Another object of my invention is to provide a high-voltage terminal that shall avoid the use of gaskets, cements and other elements and substances that are subject to deterioration.

Another object of my invention is to provide a bushing terminal that shall permit tightening of the air seal without disturbing the bushing, and that shall also permit detaching the upper end of a conductor extending through the bushing for removing the latter without requiring access to its lower end.

A further object of my invention is to provide a terminal of the above-indicated character that shall be simple and durable in construction, economical to manufacture and effective in its operation.

Heretofore, in high-voltage-bushing practice, the outer-end terminals thereof have been sources of considerable trouble and expense, it having been difficult to provide terminals that were sufficiently fluid tight and that would provide good electrical contact between the outer conductor and the conductor extending through the bushing.

In practicing my invention, I provide a bushing terminal embodying a tube, re-inforcing means for the outer end thereof, an internal conductor terminal to effect wiping contact with said means and to exert forces outwardly against the tube. The conductor terminal is also provided with means for facilitating the lifting thereof, means for preventing rotation relative to the re-inforcing means and means for clamping and locking the terminal in position.

An external sealing means is provided with an outer terminal, an inner surface for wiping contact against the tube and means for holding the sealing means in position.

Figure 1, of the accompanying drawing, is a side view, partially in longitudinal section and partially in side elevation, of a bushing-terminal structure embodying my invention,

Fig. 2 is a detail view of an element embodied in Fig. 1, partially in side elevation and partially in section,

Fig. 3 is a bottom plan view of the member shown in Fig. 2,

Fig. 4 is a top plan view of the member shown in Fig. 2, and

Fig. 5 is a view, similar to Fig. 1, of a modified form of my invention.

Referring to Fig. 1, the device comprises, in general, a tube 2, an insert 3 therefor, a flexible conductor 4 in the tube 2, a terminal member 5 for the conductor 4, nuts 7 and 8 on the terminal member 5 and an outer cap terminal structure 10.

The tube 2, preferably constructed of good conducting material, such as copper or brass, is provided with external screw threads 12 for a portion of its length adjacent to its upper end, but removed from said upper end, and a section 14 of reduced exterior diameter extending from the screw-threaded portion 12 to the outer end of the tube.

The insert member 3, as shown also in Figs. 2, 3 and 4, is provided with a tubular body portion 15 having a longitudinal interior recess 16 of hexagonal or other polygonal lateral contour, a flange 17 and inwardly-extending peripheral fingers 19. The fingers 19 have preferably cylindric outer surfaces flush with the outer cylindrical surface of the body portion 15 and inner sloping surfaces 20 diverging away from the interior of the body portion 15. A grooved or weakened portion 21 is provided in each of the fingers 19 to assist in a slight outward movement of the fingers, as will hereinafter be set forth.

The insert 3 may also be provided with a knurled outer surface 23, as indicated in Fig.

2, for assisting in holding the insert in place when it is driven into tightly-fitting relation to the tube 2, the flange 17 serving as means to position the insert in the tube.

The conductor 4 is preferably of the flexible stranded type and is soldered or otherwise secured in position in the lower end cup portion 25 of the terminal member 5.

The terminal member 5 further comprises a substantially frusto-conical portion 26, a polygonal portion 27 having a number of sides corresponding to the number of sides in the recess 16 of the insert 3, a stud portion 28, on which the nuts 7 and 8 are supported, and a loop or lifting portion 30 at the upper end thereof. By attaching a wire, or other element, to the lifting portion 30, the conductor 4 and its attached terminal member 5 may be drawn up through the tube 2 and through the bushing in which the tube is to be disposed.

The cap 10 is provided with an outer stud terminal portion 32, a substantially frusto-conical inner portion 33 and an internally screw-threaded portion 34 for cooperation with the threads 12 of the tube 2. A set screw 35, or other suitable means, may be provided for holding the cap member 10 in position.

In assembling the parts, the insert 3 is first driven into the tube 2, after which the conductor 4 and its terminal member 5 are drawn up through the tube by means of a wire attached to the lifting or loop portion 30, as above set forth, until the frusto-conical surface 26 of the terminal member 5 engages the tapered fingers 19 of the insert member 3. By turning the nut 7, the terminal member 5 and the insert member 3 are drawn longitudinally toward each other to spread the fingers 3 outwardly against the inner walls of the tube and to effect wiping contact between the fingers and the tapered portion 26 of the terminal members. The hexagonal portion 27 of the terminal member 5 prevents appreciable turning movement thereof relative to the insert member 3. The nut 8 locks the parts in position.

After the above described operation, the cap 10 is screwed inwardly on the screw threads 12 of the tube 2 until the sloping surface 33 is drawn tightly against the outer end of the tube opposite the insert member 3.

In the above-described structure, the terminal member 5 has longitudinal wiping contact against the fingers 19 of the insert 3, and the cap member 10 has longitudinal and peripheral wiping contact along the outer end of the tube, thereby providing a very effective fluid-tight seal, without the use of gaskets, cement or other deteriorating substance or members, and effects good contact between the conductor 4 and the cap 10.

In Fig. 5, in which corresponding parts are designated by corresponding reference characters, the construction, assembly and operation, are substantially identical with those above-described, except that the terminal is adapted for bushings of smaller sizes.

While I have shown and described particular forms of my invention, changes may be effected therein without departing from the spirit and scope thereof, as set forth in the appended claims.

I claim as my invention:

1. In combination, a tube having exterior screw-threads adjacent to, but removed from, an end thereof and a portion of reduced exterior diameter from said threads to said end, an insert having a flange abutting said end, a tubular body portion having an inner longitudinal surface of polygonal transverse contour, a knurled cylindrical outer surface tightly fitting the tube, and circumferentially-spaced fingers having cylindric outer surfaces, longitudinally diverging tapered inner surfaces and portions of reduced cross section adjacent to said body, an internally screw-threaded cap cooperating with said tube threads over the end of the tube having an end stud portion, a grooved section adjacent to said reduced tube portion and a tapered inner surface for engagement with said tube end, a set screw extending through said cap against said tube, a flexible conductor in the tube, a terminal member having a socket for said conductor, a tapered outer-surface portion for cooperation with said fingers, a polygonal portion in said polygonal body portion and a lifting portion, and means on said terminal member cooperating with said insert for drawing and locking said insert and terminal member together.

2. In combination, a tube having exterior screw-threads displaced from an end thereof and a portion of reduced exterior diameter between said threads and said end, an insert having a portion abutting said end, a body portion having an outer surface tightly fitting the tube, perimetrally-spaced fingers having outer surfaces for cooperation with the inner surface of the tube, longitudinally diverging tapered inner surfaces and portions of reduced cross section adjacent to said body, an internally screw-threaded cap over the end of the tube having a grooved section adjacent to said reduced tube portion and a tapered inner surface for engagement with said tube end, a conductor in the tube, a terminal having a socket for said conductor, a portion for spreading said fingers and a portion cooperating with the insert to prevent turning relative thereto, and means on said terminal cooperating with said insert for drawing said insert and terminal together.

3. In combination, a tube having external screw threads displaced from an end thereof and a yielding portion between said threads and said end, an insert having a body portion tightly fitting the tube and perimetrally-spaced fingers cooperating with a longitudi-

nal surface of the tube, a cooperating internally screw-threaded cap having a longitudinally tapered inner surface for engagement with said tube end, and a terminal for moving said fingers radially and cooperating with said member to prevent turning relative thereto.

4. In combination, a tube having exterior screw threads adjacent to an end thereof, an interiorly-screw-threaded cap therefor having a sloping annular inner surface tending, upon advancement of the cap inwardly on the tube, to bend the end of the tube radially inwardly at a given position, an insert having a rigid portion closely fitting, and resisting said bending tendency of, the tube and including bendable portions about the inner surface of the tube, and means in the tube for bending said bendable insert portions radially outwardly at a position longitudinally offset along the tube from said first position.

5. In combination, a tube having exterior screw threads adjacent to an end thereof, an interiorly-screw-threaded cap therefor having a sloping annular inner surface tending, upon advancement of the cap inwardly on the tube, to bend the end of the tube radially inwardly at a given position, an insert having a rigid portion closely fitting, and resisting said bending tendency of, the tube and including bendable portions about the inner surface of the tube, and means in the tube for bending said bendable insert portions radially outwardly at a position longitudinally offset along the tube from said first position, said means and said insert cooperating to prevent relative turning thereof.

6. In combination, a tube, a cap for an end thereof having a sloping annular inner surface tending, upon advancement of the cap inwardly on the tube, to bend the end of the tube radially inwardly at a given position, an insert having a rigid portion closely fitting, and resisting said bending tendency of, the tube and including bendable portions about the inner surface of the tube, and means in the tube for bending said bendable insert portions radially outwardly at a position longitudinally offset along the tube from said first position.

In testimony whereof, I have hereunto subscribed my name this 28th day of March, 1929.

GORDON A. BURR.