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CLAMPING MEANS FOR ELECTRICAL BUSHINGS

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2 Sheets-Sheet 1

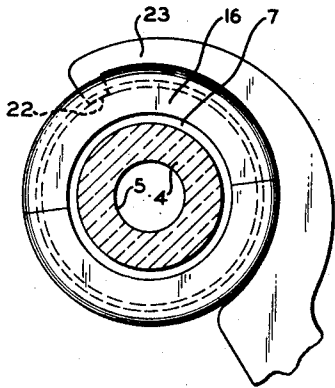


Fig. 2

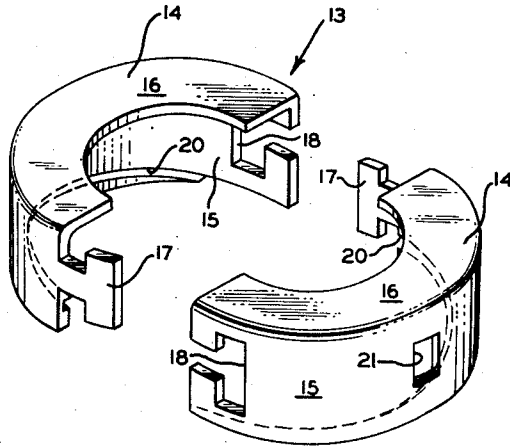


Fig. 3

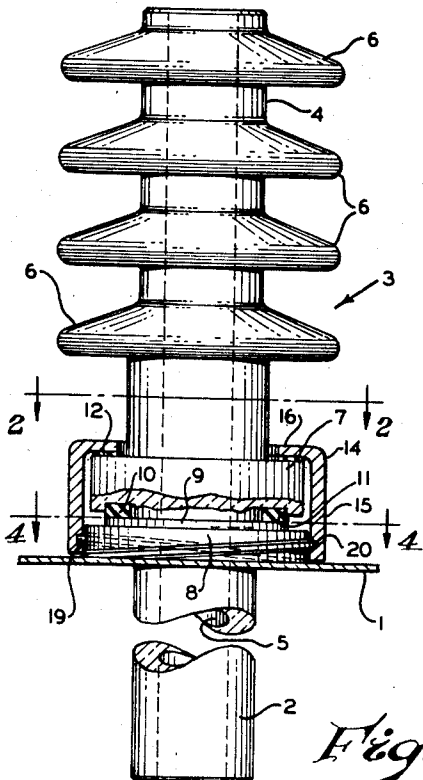


Fig. 1

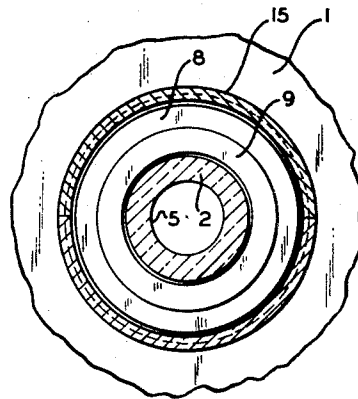


Fig. 4

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2 Sheets-Sheet 2

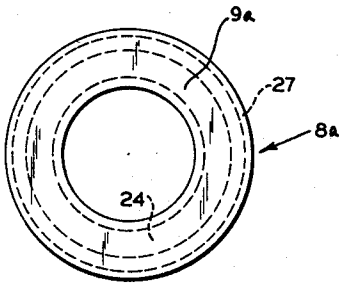


Fig. 6

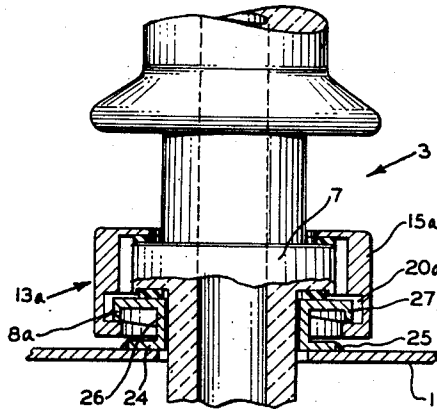


Fig. 7

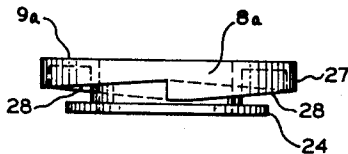


Fig. 5

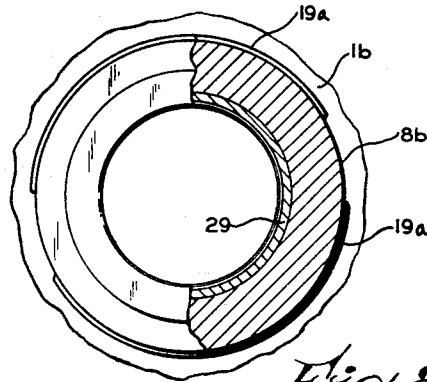


Fig. 8

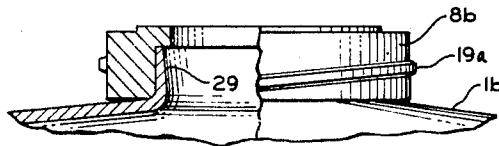


Fig. 9

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CLAMPING MEANS FOR ELECTRICAL BUSHINGS

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4 Claims. (Cl. 287—20.3)

This invention relates to insulating bushings of the kind used in conjunction with distribution transformers and other electrical apparatus for enabling conductors to be connected to transformer winding terminals or the like, and more particularly this invention is concerned with the provision of means for clamping the bushings in place on the transformer tank or other support.

Various kinds of bushing clamping means, both internal and external, have been used heretofore, but none of them has been entirely free from objection in that the servicing, repair or replacement of the bushings has necessitated numerous operations and the handling of small parts such as screws, nuts and bolts, and the like. In those instances where internal clamping devices of the kind utilizing a plurality of such small parts are used in conjunction with transformers, the difficulty in handling the small parts is increased by the necessity of removing the transformer tank's main or hand-hole cover and attempting to remove or install a clamping device where space is limited. In working either with internal or external clamps, cold weather further increases the difficulty in handling small parts.

Not the least of the disadvantages of known clamp constructions utilizing such small parts as have been referred to is the tendency of sharp or pointed parts to corrode and to present electrical discharge points causing radio and television interference. The corrosion of such parts also makes it more difficult for the service man to remove a broken or defective bushing.

An object of the invention is to provide a bushing clamp construction having a complete absence of all such small parts as nuts, bolts, screws and the like, thereby facilitating the installation and removal of bushings.

Another object of the invention is the provision of an external bushing clamp having no sharp points or edges of the kind known to cause radio and television interference.

A further object of the invention is to provide a bushing clamp which is self-cleaning and self-draining and which may be formed of weather resistant material thereby reducing to a minimum the erosive and corrosive actions of weather.

A still further object of the invention is the provision of a bushing clamp so constructed as to be quickly and easily applied to or removed from a bushing.

Other objects and advantages of the invention will be referred to specifically or will become apparent from the following description and the appended claims when considered in conjunction with the accompanying drawings, in which:

Figure 1 is a view partly in side elevation and partly in section of apparatus constructed in accordance with one form of the invention;

Figure 2 is a sectional view taken on the line 2—2 of Figure 1;

Figure 3 is a perspective view showing parts of the clamping device in disassembled relation;

Figure 4 is a sectional view taken on the line 4—4 of Figure 1;

Figure 5 is a side elevation of a modified part of the apparatus shown in Figure 1;

Figure 6 is a top plan view of the part shown in Figure 5;

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Figure 7 is a fragmentary elevation similar to Figure 1, but showing the Figure 5 part in assembled relation with a modified clamping device;

Figure 8 is a view partly in top plan and partly in section of a further modified part of the apparatus; and

Figure 9 is a view partly in side elevation and partly in section of the part shown in Figure 8 in assembled relation on a transformer tank or other support.

In Figures 1—4 of the drawings there is disclosed a transformer tank cover or other support 1 which is provided with an opening through which one end 2 of a terminal bushing 3 may extend. The bushing preferably comprises a tubular or cylindrical member 4 formed of porcelain or other suitable insulating material and having a bore 5 through which conductors connected to the transformer windings may pass. Integral with the member 4 is a plurality of downwardly sloping radial enlargements or rain sheds 6 to divert water away from the tubular body 4.

Intermediate the lowermost rain shed 6 and the end 2 of the bushing is an integral flange 7 which extends radially outwardly of the body 4 to form a shoulder or an enlargement of greater diameter than the diameter of the body 4. The shoulder 7 is adapted to be supported on a metal base part 8 which may be welded or otherwise suitably secured to the support 1, and which preferably includes an upstanding part 9 on which a sealing gasket or washer 10 formed of yieldable material may be placed. The under surface of the shoulder 7 preferably is provided with an annular groove 11 in which the gasket 10 seats, and preferably the upper surface of the shoulder 7 also supports a gasket 12 similar to the gasket 10.

In the embodiment of the invention disclosed in Figures 1—4, means is provided for anchoring or clamping the bushing 3 to the support 1 and comprises a hollow, generally cup-shaped clamping device generally designated by the numeral 13 and composed of two similar, substantially semi-circular segments or parts 14. Each of the parts 14 includes a vertical wall or skirt 15, the upper edge of which terminates in a radially inwardly directed, semi-circular wall or flange 16. At one end of each of the parts 14 the skirt 15 is formed with a T-shape projection 17 which extends beyond the end of the flange 16, but follows the same curvature as the skirt. The opposite end of each of the parts 14 is provided with a T-shaped slot 18 adapted to receive and mate with the associated projection on the other part 14.

When installing the clamp 13 on the bushing 3 the two parts 14 are separated and placed in encircling relation about the tubular portion of the bushing in the region between the shoulder 7 and the first water shed 6 with the wall portions 16 extending radially from the body 4. The two clamp sections are not placed in end abutting relation, but are radially displaced or offset with respect to the bushing so that one of the projections 17 lies inwardly of the adjacent skirt wall 15 and the other projection lies outwardly of the other skirt wall. The diameters of the shoulder 7 and the clamp sections 14 are such that, in the radially offset positions of the latter, the slots 18 in the skirt walls 15 will be in positions to receive the associated T-shaped projections. To insert the projections in the slots, the two clamp sections may be moved from their radially offset positions to such positions that the assembled clamp device is concentric with the shoulder 7 at which point the T-shaped projections 17 will be trapped in their respective slots. At this time the clamping device may be moved downwardly over the base part.

Means is provided for locking the clamping device sections in assembled relation and for securing the device on the base part. As is shown in Figure 1, these means

comprise an external thread 19 on the base part 8 and a cooperating internal thread 20 in each of the clamping sections 14, the threads being formed with a sufficiently steep pitch as to preclude inadvertent loosening of the clamping device. As the assembled clamping device is moved downwardly in the manner previously described; the threads may be engaged and the clamping device turned relatively to the base 8. To facilitate turning of the clamping device, the skirt wall 15 of one of the sections 14 may be apertured as at 21 to enable a lug 22 of a wrench 23 to be inserted. The wrench is of known construction and its manner of use will be readily understood without further description.

When the clamp device has been firmly screwed onto the base part 8, the flanges 16 will exert force against the upper surface of the bushing's shoulder 7; and the lower surface of the shoulder 7 will exert force against the surface 9 of the base part 8, thereby axially squeezing the shoulder 7 and firmly anchoring or clamping the bushing on its support 1. The force exerted by the segments on the shoulder and on the threads will prevent inadvertent separation of the segments.

In Figures 5, 6, and 7, there is shown a modification of the invention. In this construction the bushing is the same as that previously described, but the base part and the clamping device are changed. As shown, the base part 8a comprises a lower flange 24, which may be welded or otherwise fixed to the support 1 as at 25, and from which extends a tubular portion 26 through which the shank of the bushing 3 may extend. The tubular portion of the base part 8a terminates at its upper end in a radially disposed flange 9a which forms the upper or supporting surface of the base part. At the radially outermost edge of the flange 9a, there is a downwardly extending portion 27, the lowermost edge of which is cut at an incline to the horizontal so as to form a pair of helical surfaces 28 which act similarly to screw threads.

The clamping device 13a disclosed in Figure 7 is similar to the device 13, but differs from the latter in that the inner wall 15a of the skirt is annularly recessed as at 20a for reception of the portion 27 of the base part 8a.

The assembly of the clamping sections shown in Figure 7 with the base part 8a is similar to the operations described in connection with the construction disclosed in Figures 1-4, the main difference being that the clamp sections are joined to one another after the portions 27 are received in the recesses 20a. This necessitates the provision of sufficient space between the shoulder 7 and the skirt walls 15a and between the portion 27 of the base part and the inner wall of the recess 20a to enable the two parts of the clamp device to be moved oppositely to one another and radially relative to the bushing a combined distance substantially equal to the thickness of the walls 15a. In the disclosed embodiment the required spacing is provided by making the parts of such size that the clearances referred to are a trifle more than half the thickness of the wall 15a.

The result achieved by the construction shown in Figures 5-7 is similar to that previously described in connection with the apparatus shown in Figures 1-4 in that the shoulder 7 is gripped between the flange 16a of the clamping device and the upper surface 9a of the base part 8a when the clamping device is turned so as to wedge the flange 27 in the recess 20a. Sealing gaskets similar to the gaskets 7 and 10 preferably are included in the modified construction and lie between the shoulder and the bearing portions of the base part and the flange 16a.

Figures 8 and 9 disclose a modified form of base part which is similar to the base part 8 in that external screw threads 19a are provided for engagement with the threads in the skirt of the clamping device 13. In the Figures 8 and 9 construction, however, the base part 8b, instead

of being welded to the support 1b, is force fitted onto an upstanding integral flange 29, and the support 1b may be sloped radially of the flange 29 to promote drainage of water away from the bushing. In all other respects, the construction shown in Figures 8 and 9 is similar to the construction shown in Figures 1-4.

When the bushing is clamped to its support by any of the disclosed embodiments of the invention, there will be clearance between the bushing and the clamping means so as to permit the clamping means to be self cleaning and self draining. Water will be prevented from entering the opening in the support, however, by the sealing gaskets which are used in conjunction with the clamping means. In each of the disclosed embodiments of the invention, the clamping device may be used to anchor the bushing to its support without using any of the commonly required screws, nuts, bolts, or the like. Moreover, in the disclosed apparatus there are no sharp points or projections to create points of high field stress concentration and consequent radio and television interference.

The disclosed embodiments are representation of preferred forms of the invention, but the disclosure is intended to be illustrative rather than definitive of the invention. The invention is defined in the claims.

I claim:

1. A clamping device for removably clamping on a support an electrical bushing of the kind having a generally cylindrical body from which a shoulder extends radially, said clamping device comprising a base member adapted to be fixed to said support; a hollow, substantially cup-shaped member having a wall adapted to be positioned in a plane extending radially of said body and a skirt extending substantially normal to said wall, said wall having an opening therein of a diameter larger than the diameter of said body by an amount at least as great as the thickness of said skirt but less than the diameter of said shoulder, and said skirt being of such size as to receive said shoulder, said cup-shaped member being composed of a plurality of separable, arcuate sections to enable said wall of said cup-shaped member to surround said body between said shoulder and said enlargement; means on the skirt of each of said separable sections of said cup-shaped member adapted to be interlocked and unlocked upon relative lateral movement of said sections for removably maintaining the cup-shaped member in body-surrounding position; and means on said skirt and on said base member for removably securing said members together with said shoulder clamped between said wall and said base member.

2. The combination set forth in claim 1 in which the means for securing said members together comprises screw threads on said base member and cooperating threads on said skirt.

3. The combination set forth in claim 1 in which said means for securing said members together comprises a helical flange on said base member and a recess in said skirt receiving said helical flange, the dimensions of said recess and flange being such that flange may be wedged in said recess.

4. The combination set forth in claim 1 in which said support includes an upstanding flange and in which said base member is force fitted on said flange.

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