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INSULATING BUSHING

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Fig. 1.

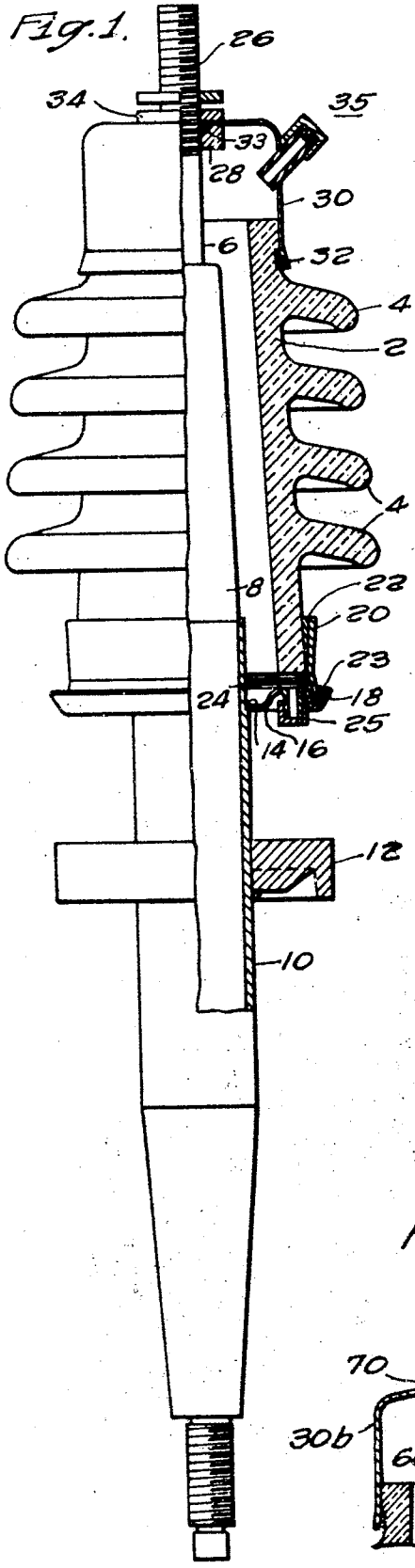


Fig. 2.

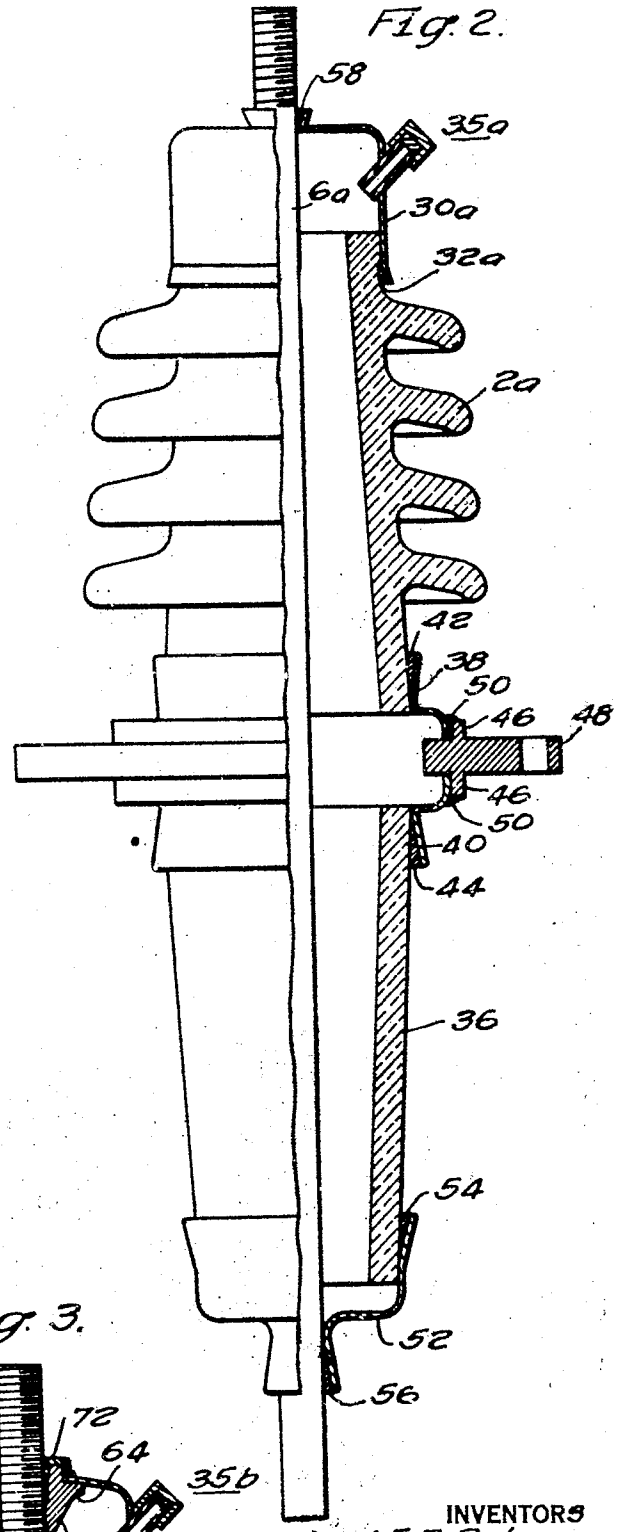
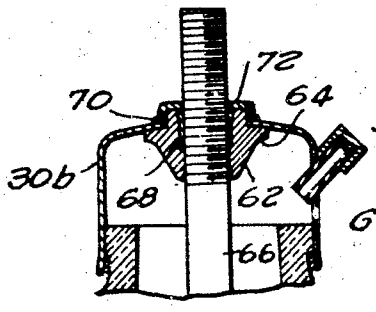


Fig. 3.



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INSULATING BUSHING

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2 Claims. (Cl. 174—167)

The present invention relates to insulating bushings and it has particular relation to electrical insulating bushings for high-voltage equipment.

It is desirable to have such electrical bushings, and particularly those of the high-voltage type, as nearly perfectly sealed as possible against the admission of moisture and the egress of oil or other insulating fluid.

None of the previously suggested sealing means which includes screw caps, gaskets, and other devices have been found completely satisfactory for this purpose. Even a soldered seal arrangement wherein the closing members are soldered directly to the ceramic insulating portion is not completely satisfactory since the rigid connections are susceptible to damage due to ordinary jars and strains which occur during use.

According to the present invention, a hermetically sealed bushing which is particularly resistant to such breakage is provided. This improved construction is obtained by providing flexible metallic caps and supporting members at the sealed joints in a manner hereinafter described in detail.

It is accordingly an object of the present invention to provide a novel and improved insulating bushing.

Another object of the invention is to provide an improved hermetically sealed electrical insulating bushing.

A further object of the invention is to provide a hermetically sealed, high voltage bushing in which the insulating casing is flexibly supported with respect to other portions of the assembly.

Other objects and advantages will appear from the following detailed description taken in conjunction with the accompanying drawing, in which:

Figure 1 is an elevational view, partly in section, of an insulating bushing embodying the invention;

Fig. 2 is a view similar to Fig. 1 of a modification of the invention; and

Fig. 3 is a sectional view of a cap structure which may be substituted in the arrangements shown in Figs. 1 and 2.

The device shown in Figure 1 comprises a tubular insulating casing 2 with surface creepage flanges 4 of a usual type and having a conducting member or stud 6 extending axially therethrough. The member 6 may be either solid or tubular, as preferred and may have a condenser structure 8 of alternate layers of conducting and non-conducting material wound about it in a usual manner. The metallic sleeve 10 is rolled or pressed about the condenser portion in a manner known to the prior art. A main supporting flange 12 for securing the device on the tank of the apparatus with which it is used, is brazed or soldered to the sleeve 10, as shown.

Soldered to the sleeve 10 at 14 is a lower closure member 16 of relatively flexible metallic construction. An annular groove 18 is formed near the outer edge of the member 16 in any suitable manner, as by spinning. A ring 20, which may be of the same material as the member 16 spun to the shape shown, is soldered to the lower portion of the casing 2 at 22. This soldered connection may be made by first metallizing the contacting surface of the casing or in any other manner which will produce a strong bond. The lower end of the ring 20 fits into the groove 18 and is bonded thereto by filling the groove with solder, as shown at 23. An annular supporting pad 24 is disposed between the member 16 and the lower end of the casing 2 to furnish mechanical reinforcement for the connecting assembly. A plug device 25 is preferably secured to the member 16 to permit filling the bushing with insulating liquid or plastic material.

The upper end of the conductor 6 is screw-threaded as shown at 26 and a nut 28 threaded thereon. A flexible metal cap 30, which is preferably spun from sheet material, is soldered as at 32 to the upper portion of the insulated casing 2 while its inner periphery is bent into a grooved portion 33 in the nut 28. The groove 33 is then filled with solder to hermetically seal the joint between the cap and the stud. An additional nut 34 may be threaded over the outside of the cap 30 to mechanically reinforce the soldered joint.

A plug and cap assembly 35 is secured to the side of the cap 30 to permit testing the level of fluid insulating material in the bushing. This assembly should be such that the test opening may be completely sealed.

In Fig. 2, the invention is shown applied to a somewhat different type of bushing. This bushing includes a lower insulating casing portion 36 in addition to the upper portion 2a and may be filled with oil, porcelain, and other suitable materials. As in the device previously described, a conductor 6a extends through the insulating casing. Flexible metal supporting members 38 and 40 are soldered to the upper and lower casing sections, respectively, at 42 and 44. The other ends of these supporting members are

shaped, as by spinning, to engage projections 46 upon the metallic supporting flange 48 and are soldered thereto as indicated at 50. In this manner, the two casing portions are flexibly connected to each other and to the supporting flange.

A flexible metallic member 52 is soldered to the lower end of the lower insulating portion 36 at 54. The other end of this member is soldered to the conductor 6a at 56 to hermetically seal the bottom of the bushing. The member itself may be spun to shape from sheet material.

A flexible cap 30a is soldered to the upper end of the upper portion of the casing at 32a and to the conductor 6a at 58. A testing plug unit 35a similar to that described in conjunction with Fig. 1 is provided.

The cap assembly employed on the device of Fig. 1 may be substituted for the simpler arrangement shown in Fig. 2, if desired.

A cap construction having some points of superiority over those previously described is shown in the sectional view in Fig. 3. In this case, a nut 62 having an annular shoulder 64 is threaded on the upper end of a conductor 66. The upper, inner portion 68 of this nut is recessed to form a pocket surrounding some of the screw threads. The inner edge of a flexible metallic cap 30b is arranged to seat on the shoulder portion 64 and be soldered or brazed thereto as indicated at 76, to hermetically seal the cap to the nut. The connection of the nut to the conductor is made completely fluid-tight by filling the recess 68 with solder 72. A plug assembly 35b is secured to the side of the cap 30b.

It will be evident that the construction illustrated provides a bushing which, in addition to being completely sealed against moisture is also simple and relatively inexpensive to manufacture. The flexible casing connections at the top, flange and bottom of the bushing permit relative expansion between the portions of the bushing without causing harmful stresses to be set up. In addition, jars will be absorbed or cushioned thereby preventing undue strain on the porcelain soldered seal joints.

Since various modifications of the embodiments shown will appear to those skilled in the art, it is intended that the invention shall not be limited except as by the appended claims interpreted in view of the prior art.

We claim as our invention:

1. An insulating bushing comprising a tubular insulating casing, a conducting stud extending axially therethrough in spaced relationship therewith, insulating material disposed about the central portion of said conducting stud, a metallic sleeve closely surrounding the central portion of said insulating material, a flexible metallic cap secured in solder sealed relationship to the top of said casing and to said conducting stud to hermetically close the top of said casing and resiliently space it from said conducting stud, a flexible metallic closure member soldered to the outer surface of said casing at the lower end thereof and to said metallic sleeve to resiliently support said casing in spaced relationship to said sleeve and hermetically seal the space therebetween, means disposed between said flexible closure member and the lower edge of said casing to additionally support the casing thereon, and a supporting flange secured to said sleeve, said casing being so spaced from said stud and sleeve that transverse forces exerted on said casing are transmitted to said stud only through said flexible cap and said flexible closure member.

2. A high voltage insulating bushing comprising a tubular insulating casing, a conducting stud extending axially therethrough in spaced relationship therewith, an insulating member disposed about substantially the central portion of said conducting stud, a metallic sleeve surrounding said insulating member, a flexible metallic cap secured in solder sealed relationship to the top of said casing and to said conducting stud to hermetically close the top of said casing and resiliently space it from said conducting stud, a flexible ring member secured about said sleeve in sealed relationship and defining an annular groove at its outer edge, a metallic band secured about the lower part of said casing in solder sealed relationship with an edge thereof disposed in said groove to resiliently support the casing, and means for securing said band to said ring member in solder sealed relationship to hermetically seal the bottom of said casing.

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