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LEAD-IN BUSHINGS

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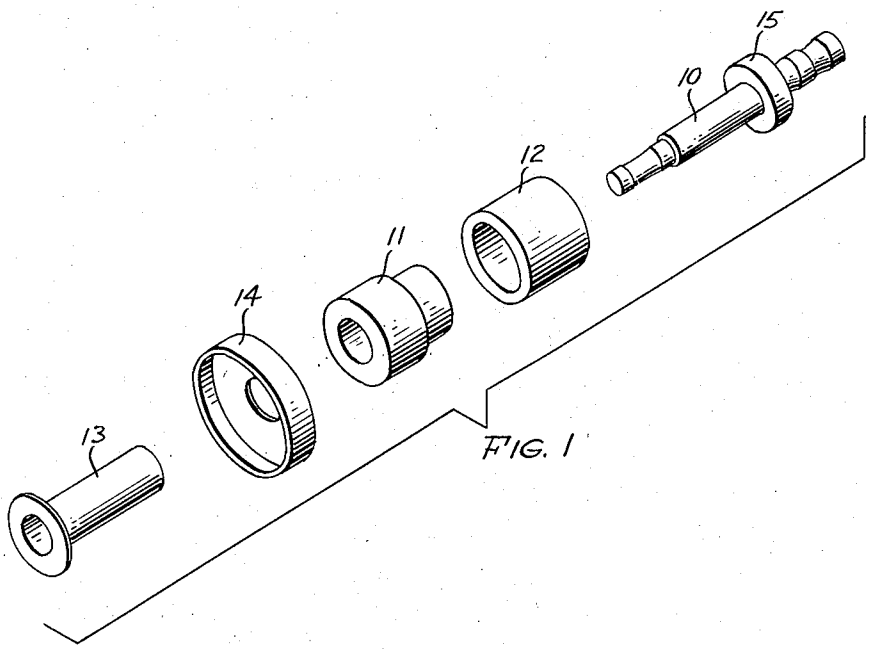


FIG. 1

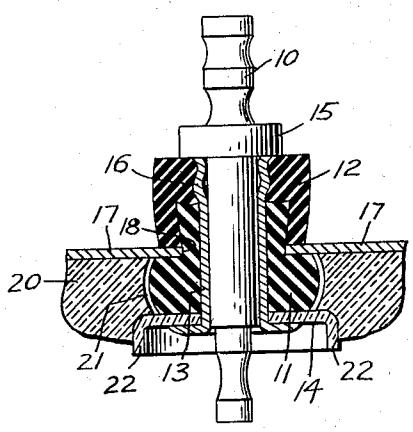


FIG. 2

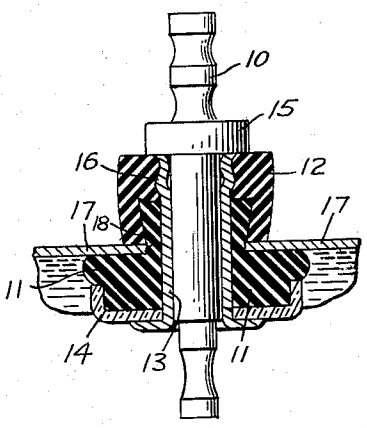


FIG. 3

INVENTOR
FRANK J. COREY
BY Elmer J. Gorn
ATTORNEY

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LEAD-IN BUSHINGS

Frank J. Corey, Belmont, Mass., assignor to Raytheon Manufacturing Company, Waltham, Mass., a corporation of Delaware

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3 Claims. (Cl. 174—153)

This invention relates to a lead-in bushing, and, more particularly, to a bushing for providing a high electrical insulation and a hermetic seal to a terminal or other conducting member at its point of entry into a case container or similar housing.

In many types of electrical apparatus, for example, transformers, it is desirable and even necessary to enclose some element, such as a coil, in a housing. Frequently, the housing must be hermetically sealed to prevent the loss of fluid filling, such as oil, from the container or to prevent the entrance into the interior of air or moisture from the atmosphere. The lead-in connections for such apparatus must be well insulated from the metallic walls through which they pass, while at the same time the opening must be sealed against leakage even at considerable difference in pressure between the interior and the exterior of the container.

This has been done by means of a resilient insulating bushing constructed in two parts, one fitting inside of the other with a central opening through both pieces in which the conductor is mounted. The pieces can be held together by means of an eyelet that is somewhat longer than the bushing and is forced into the assembled bushing against a shoulder formed on the central conductor which results in crimping the outer end of the eyelet against the walls of the opening in the bushing to hold the parts together. With such a bushing, when used with a potting compound, the potting compound may shrink away from the materials from which the bushing is formed, leaving a void space between the metallic eyelet and the metallic case. With sufficient potential difference, there may be a breakdown between the eyelet or central conductor and the metallic case. When this type of terminal is used with oil-filled units, the oil of the filling tends to be absorbed by the resilient plastic of the bushing, causing it to swell and destroy the seal.

By the construction of the invention, a cup-shaped washer of insulating material is mounted between the inner end of the bushing and the eyelet head. Where it is desired to prevent electrical breakdown through any void left between the shrinking potting material and the bushing, the washer is mounted with the lip pointed inward to present a longer leakage path to the electrical potential. In this embodiment the washer is made of a material to which the potting compound will adhere, preventing the formation of a void in this region. Where it is desired to limit the absorption of an oil filling by the resilient plastic or rubber bushing, the cup-shaped washer is mounted with its lip pointed outward toward the metallic casing to enclose the plastic parts of the washer and prevent the swelling of these parts by the absorption of the filler fluid. In this embodiment of the invention, the washer is made of oil-resistant material.

The foregoing and other advantages, objects and features of the invention will be better understood from the following description taken in conjunction with the accompanying drawing wherein:

Fig. 1 is an exploded view of the bushing of the invention;

Fig. 2 is a longitudinal sectional view of an assembled embodiment of the invention; and

Fig. 3 is a longitudinal sectional view of another assembled embodiment of the invention.

In the drawing, reference numeral **10** designates an electrical conductor which extends through an axial opening in a two-part bushing made of resilient insulating material such as rubber or tetrafluoroethylene (Teflon) consisting of a male part **11** dimensioned for mating fit in an opening into a female part **12**. An eyelet **13** passes through an opening in a cup-shaped washer **14** made of insulating material such as fiber sheet and the opening in the bushing dimensioned for interference fit with it. The conductor **10** is inserted into the eyelet, the inside diameter of which is dimensioned for press fit with it, and the eyelet is forced against a shoulder **15** formed on the conductor **10**, causing the eyelet to be crimped in the region **16** near its outer end, as best seen in Figs. 2 and 3. The two parts **11** and **12** of the bushing are positioned on either side of the mounting case or partition **17**. The resilient material of the bushing is compressed within an opening **18** in the case **17**, and swells out beyond it to form a tight fit. When the bushing is used with a component having a case filled with potting compound **20** of a type that does not adhere to the material of the bushing, a slight void **21** will be left about the male part **11** of the bushing through which there can be an arc-over between the case **17** and the conductor **10**, or eyelet **13**. By mounting the cup **14** made of insulating material with its lips **22** extending inward, as shown in Fig. 2, the leakage path for this breakdown is made longer all around the lip **22** of the washer **14**, so that an arc-over is less likely to occur. When the bushing is used with a case **17** filled with insulating oil, or other material that is likely to be absorbed by the bushing, causing it to swell and possibly pull away from the eyelet or the case, breaking the seal, the cup **14** can be mounted with its lip **22** extending outward, as shown in Fig. 3. This construction compresses the bushing and prevents it from swelling away from the opening in the case to leave a break in the seal. Thus this construction protects the seal.

The construction of this invention provides a compact, cheap lead-in bushing for encased components that is protected from electrical breakdown and leakage of the hermetic seal.

This invention is not limited to the particular details of construction, materials and processes described, as many equivalents will suggest themselves to those skilled in the art. It is accordingly desired that the appended claims be given a broad interpretation commensurate with the scope of the invention within the art.

What is claimed is:

1. A lead-in bushing mounted in an opening in a conductive case comprising a member of two resilient insulating parts one on either side of the case one fitting in an opening in the other, each having a passage extending longitudinally therethrough, an eyelet dimensioned for interference fit with said passage, an electrical conductor dimensioned for force fit in said eyelet and formed with a shoulder near one end, and a cup-shaped washer of insulating material mounted at the inner end of said bushing, said eyelet being crimped against the shoulder formed on the conductor and outward against the outer resilient insulating member, to fasten said bushing, said conductor and said washer together in the opening in the conductive case.

2. A lead-in bushing mounted in an opening in a conductive case comprising a member of two resilient insulating parts one on either side of the case one fitting in

an opening in the other, each having a passage extending longitudinally therethrough, an eyelet dimensioned for interference fit with said passage, an electrical conductor dimensioned for force fit in said eyelet and formed with a shoulder near one end, and a cup-shaped washer of insulating material mounted at the inner end of said bushing opening inward, said eyelet being crimped against the shoulder formed on the conductor and outward against the outer resilient insulating member to fasten said bushing, said conductor and said washer together in the opening in the conductive case.

3. A lead-in bushing mounted in an opening in a conductive case comprising a member of two resilient insulating parts one on either side of the case one fitting in an opening in the other, each having a passage extending longitudinally therethrough, an eyelet dimensioned for interference fit with said passage, and an electrical conductor dimensioned for force fit in said eyelet and

formed with a shoulder near one end, and a cup-shaped washer of insulating material mounted at the inner end of said bushing opening outward, said eyelet being crimped against the shoulder formed on the conductor and outward against the outer resilient insulating member to fasten said bushing, said conductor and said washer together in the opening in the conductive case.

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