Oct. 31, 1933. J. R. GASTON 1,932,456

ELECTRICAL CONNECTING MEANS FOR INCLOSED TRANSFORMERS

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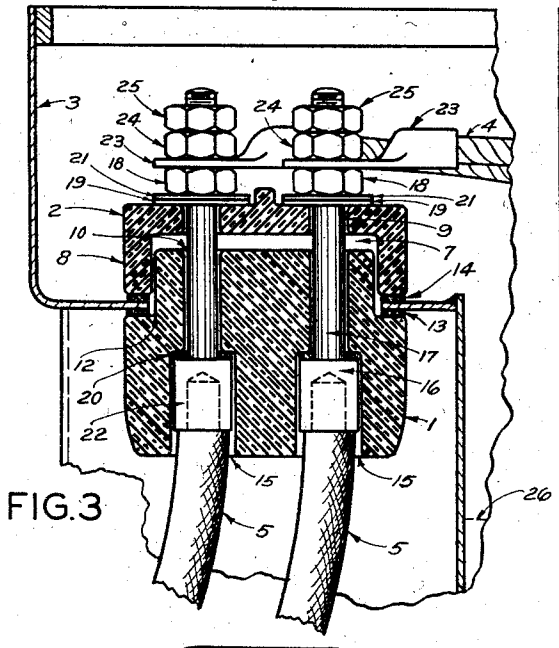


FIG. 3

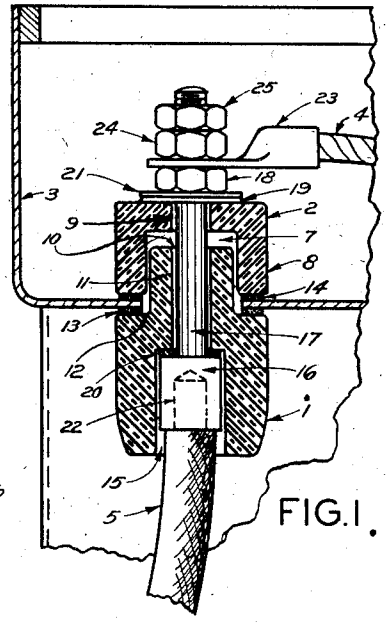


FIG. 1.

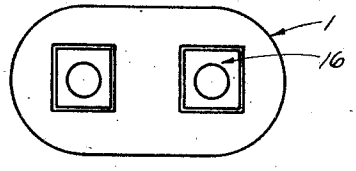


FIG. 4

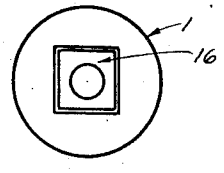


FIG. 2

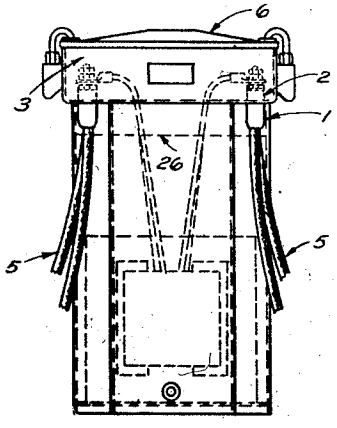


FIG. 5

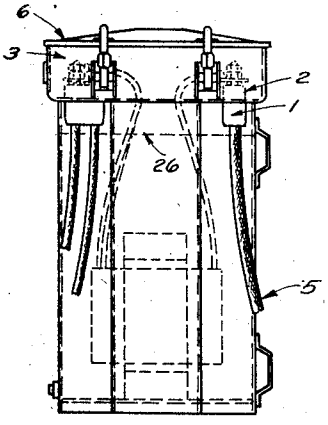


FIG. 6

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ELECTRICAL CONNECTING MEANS FOR INCLOSED TRANSFORMERS

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10 Claims. (Cl. 175—361)

This invention relates to means for making connections with a distribution transformer; that is, one which is enclosed within a casing, especially a casing of the type that is weather-proof, where the transformer may be mounted out of doors; for example, on a pole for power or light distribution.

Heretofore, it has been the usual practice to extend the cables coming from the transformer windings out through a porcelain bushing in the casing, the bushing being clamped or leaded to the casing, the space between the bushing and the cable being filled with a high-temperature melting compound. I have found in practice, that in shipment and when handling the transformer, this compound sometimes becomes cracked and allows the oil used in the casing around the transformer to seep out. Furthermore, in cases of heavy overload, the compound sometimes melts and oozes out around the cable and after a while lowers the insulation resistance around the cable or danger point.

It is therefore the principal object of my invention to provide means for connecting the transformer to the outside conductors or cables in such a manner as to overcome the objectionable features above referred to.

Another object of my invention is to provide connecting means through the casing of the transformer which may be readily installed without the inconveniences of handling a hot sealing compound.

While attaining the mechanical advantages above set forth, it is another object of my invention to attain certain electrical advantages which will be hereinafter set forth.

My improvement in transformer-connecting means will be readily understood by reference to the annexed drawing, wherein:

Figure 1 shows a part-sectional and part-elevational view of a single conductor-connecting means.

Figure 2 is an end view of the outside insulator shown in Figure 1.

Figure 3 is a view similar to Figure 1, but showing a double or twin connecting arrangement.

Figure 4 is an end view of the outside insulator shown in Figure 3.

Figure 5 shows one view of the complete transformer casing with the connections made thereto.

Figure 6 is a view of the transformer of Figure 5 turned at an angle of ninety degrees.

My improved connecting means includes a pair of insulators 1 and 2. The insulator 2 is mounted wholly within the interior of the top part 3 of the casing of the transformer, it being understood that when the transformer lead 4 is to be connected to the outside cable or conductor 5, the cover 6 is not on the casing. The insulator 2 is somewhat dish-shaped, having a cavity 7 and a rim 8.

In the bottom of the insulator and preferably centrally located therein, is an opening 9 which is adapted to register with an opening 10 in an extension 11 of the insulator 1 when the insulators are in assembled position as shown in Figures 1 and 3. The extension 11 has a smaller diameter, or as in the construction shown in Figure 3, smaller diameters than the main or body portion of the insulator 1, and this extension passes through the casing 3 into telescopic relationship with the rim 8 of the insulator 2. Preferably, this extension passes within the cavity 7 of the insulator 2. The reduced extension 11 provides a seat 12 for a gasket 13 positioned between the insulator 1 and the outer part of the casing 3. A similar gasket 14 is used between the rim 8 of the insulator 2 and the casing 3. These gaskets are preferably of cork.

The insulating bushing 1 is provided with a recess 15 which is preferably polygonal in shape as more clearly shown in Figure 2, to receive the similarly shaped head 16 of a fastening and connecting bolt 17 which passes through the openings 10 and 9 of the two insulators 1 and 2, and is used to clamp the insulating bushings securely in position, through the gaskets 13 and 14, against the walls of the casing 3, a nut 18 being used for this purpose.

At the points where strains are applied to the insulators 1 and 2 by the bolts, gaskets 19 and 20, preferably of cork, are used, a washer 21 being introduced between the nut 18 and the gasket 19.

It may be remarked that in assembly, before the bolt 17 is put in place, the cable 5 is attached to the head 16 of the bolt in any satisfactory manner as by sweating or soldering the cable end 22 within a recess provided in the head of the bolt. After this is done, the bolt can then be inserted into position as above described, and the cable 4 from the transformer, having a terminal 23, is fastened in position on the bolt by a nut 24 and a lock-nut 25. After the insulator assembly has been made as provided, the oil is then poured into the transformer to a suitable level as indicated by the dotted line 26 (see Fig. 3), and then the cover 6 is put into place and fastened down by suitable fastening means.

The construction described, is relatively simple

and can be easily and quickly installed and absolutely prevents any leakage of the oil, due to its slopping around in the casing in transportation or handling, or due to siphoning by the transformer cable, and is not affected by changes in temperature in the manner of melting compounds heretofore used around such cable connections.

While attaining the mechanical advantages heretofore described, I attain certain electrical advantages by making the insulators 1 and 2 of porous and readily fusible porcelain, as I have found that the dry-processed porcelains and also to a lesser degree the wet-processed porcelains show a decreasing resistance with increased voltage, and I have discovered that by proportioning the thicknesses of the walls of extension 11 of the insulators or bushings in co-ordination with the character of the insulation used in the transformer, the bushings will allow electrical surges to pass through extension 11 to casing 3 without destroying them, and the readily fusible porcelain will automatically seal an actual puncture.

I believe I am the first to discover and utilize this relation between such a bushing and the insulation of the transformer, and to utilize it for the protection of the transformer.

Having thus described my invention, what I claim is:

1. Electrical connecting means for a transformer inclosed within a casing including, a two-part insulator, one part being dish-shaped and mounted within the transformer casing, its rim being presented toward the casing, the other part being positioned outside the casing and having a projection extending through the casing into telescopic relation with said dish-shaped part, said second-mentioned part having a recess in its exterior extending portion, both said parts having openings therethrough in alignment with said recess when the parts are in operative position, and a bolt positioned in said openings with its head in said recess, said bolt having means to clamp the two parts in position with respect to the casing, and to clamp a lead from the transformer to the bolt, said bolt-head having means for attaching an outside conductor thereto.

2. Electrical connecting means for a transformer inclosed within a casing including, a two-part insulator as set forth in claim 1, further characterized in that the insulator parts have substantially the same diameters and are provided with gaskets on both sides of the casing and where the mechanical strains are applied by the bolt.

3. Electrical connecting means for a transformer inclosed within a casing including, a two-part insulator as set forth in claim 1, further characterized in that the said projection of one part extends within the cup portion of the other part, gaskets being provided between the two parts and the casing and at the points where the bolt applies strains to said two parts.

4. Electrical connecting means for a transformer inclosed within a casing including, two insulators, one wholly within the casing and having an opening therethrough, and the other having its major part without the casing but having an extension going through the casing into telescopic relation with the interior insulator, gaskets between the casing and said insulators, the outer insulator having a recess and an opening from the recess through said extension, in alignment with the opening in the interior insulator, and a bolt having its head non-rotatably positioned in the recess of the outer insulator and extending through said openings in both insulators, means on the bolt for clamping the insulators and gaskets to the casing, means for connecting a transformer lead to the interior bolt-end, and means for attaching an outside conductor to said bolt-head.

5. Electrical connecting means for a transformer inclosed within a casing, as set forth in claim 4, further characterized in that the said insulators have substantially the same contactual area with the casing through the gaskets, while the said extension of the outer insulator projects within a hollow part of the interior insulator.

6. Electrical connecting means for a transformer inclosed within a casing, as set forth in claim 4, further characterized in that the said extension has reduced diametrical dimensions thereby forming a shoulder for one of said gaskets, and said extension projects within a hollow part of the interior insulator and gaskets around the bolt where mechanical strains are applied to said insulator.

7. Electrical connecting means for a transformer inclosed within a casing including, an insulator wholly within the casing, and another insulator outside the casing but having an extension passing through the casing into telescopic relation with the interior insulator, gaskets between the casing and said insulators, a bolt passing through said insulators to clamp them to the casing, gaskets around the bolt where mechanical strains are applied to the insulators, means for connecting a transformer lead to the interior end of the bolt, and means for connecting an exterior conductor to the outer end of the bolt.

8. Electrical connecting means for a transformer inclosed within a casing including, a pair of insulators, one within the casing and one without except for an extension which projects through the casing into telescopic relation with the interior insulator, a bolt for clamping said insulators in operative relation to the casing, and means for making electrical connections to opposite ends of the bolt.

9. Electrical connecting means for a transformer inclosed within a casing as set forth in claim 8, further characterized in that the insulators are of readily fusible porcelain for the purpose described.

10. Electrical connecting means for a transformer inclosed within a casing as set forth in claim 8, further characterized in that the insulators are of readily fusible porcelain, and the thickness of the walls thereof is such as to pass an electrical surge through the insulators to the casing for the purposes described.

JOHN R. GASTON.