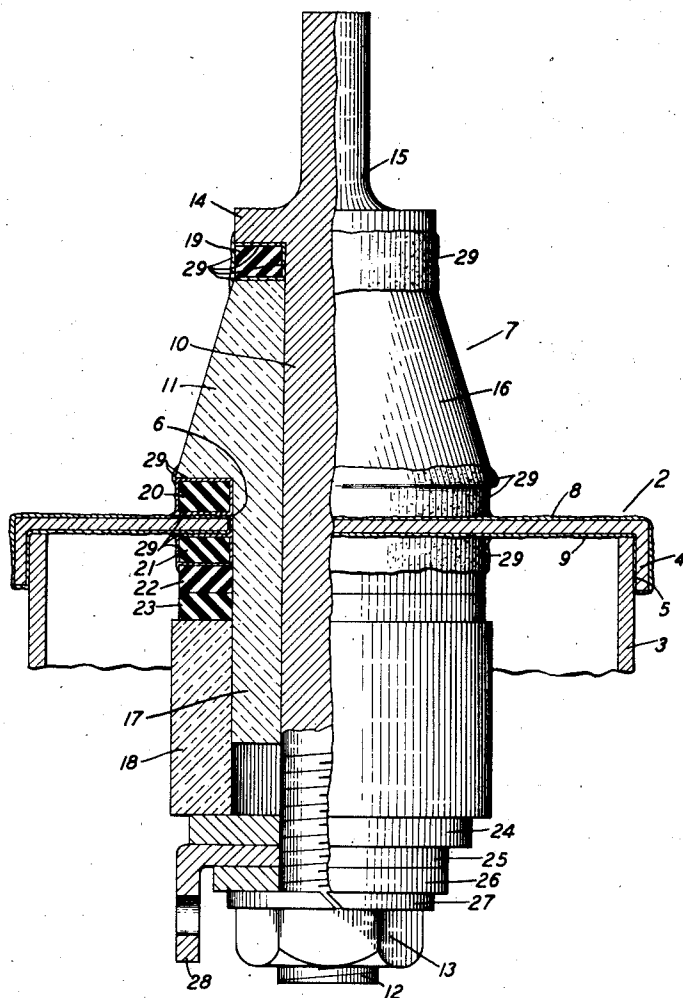


Aug. 29, 1944.

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LEAK-PROOF TERMINAL STRUCTURE

2,356,831

Filed Oct. 20, 1942



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2,356,831

LEAKPROOF TERMINAL STRUCTURE

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Application October 20, 1942, Serial No. 462,698

1 Claim. (Cl. 174-153)

This invention relates to an electrical terminal and a method of constructing and mounting the terminal on an apertured wall.

The object of the invention is to provide a terminal structure and arrangement suitable for use on a casing which must be sealed against the entrance of moisture or the escape of oil or other filling material in the casing.

The terminal when constructed and assembled according to the invention will be suitable for use, for instance, on transformer casings even when the casing is subjected to various moisture conditions containing salt and when the casing is subjected to wide ranges of temperature changes. The construction and arrangement may also be used on oil-filled casings and terminals mounted thereon.

In the drawing the single figure shown therein is a view partly in section of a portion of a casing and the terminal mounted on and extending through an apertured wall in the casing. It will be understood that the casing may contain a transformer or some other electrical apparatus (not shown).

The casing 2 may be of any desired shape or form but is shown merely for the purpose of illustrating the invention as comprising a cup-like body 3 and a cover 4 which serves as a top closure for the upper end of the body 3. The cover 4 is secured to the body 3 in any suitable manner to provide a leak-proof joint between the casing parts. The body 3 and the cover 4 may be made, for instance, of sheet metal and the body and cover may be welded or soldered together as shown at 5 to provide a leak-proof joint between the parts. The cover 4 is apertured at 6 to receive the terminal 7 and the upper and lower surfaces of the cover 4 are protected by moisture-proof coatings 8 and 9, respectively. The coatings 8 and 9 should be of such material that it may be abraded or machined in the vicinity of the aperture 6 to provide suitable seats for parts of the terminal 7 brought into engagement therewith, as will be subsequently described. Tin may be well used for the coatings 8 and 9.

The terminal 7 comprises a rod 10 of conducting material supported in and extending longitudinally through an insulating bushing 11 which extends through the aperture 6 in the cover 4. The conducting rod 10 is male-threaded on its lower end 12 to receive a nut 13 and is provided with an integral flange 14 near its upper end 15. The bushing 11 is made of ceramic material and has a frusto-conical upper portion 16 located above the cover 4 and the base of the

portion 16 is of larger diameter than the aperture 6. A cylindrical tubular portion 17 of the insulating bushing 11 extends through the aperture 6 and for a considerable distance below the cover 4, the portion 17 being of slightly smaller outside diameter than the aperture 6. A tubular collar 18 of ceramic material is telescoped over the lower end of the portion 17.

Insulating washers 19, 20, 21, 22 and 23 are provided in the terminal 7 to partly seal parts of the structure pressed into engagement with other parts when the terminal 7 is assembled and mounted on the cover 4. The washers 19, 20, 21, 22 and 23 are made of fibrous insulating material and are somewhat compressed when the terminal 7 is assembled and mounted in place. Hempwood pulp has been found to be a suitable material for the washers above mentioned. We do not desire to be limited to the use of this particular material, however, since other fibrous insulating materials are in some cases found suitable for the purpose. The washer 19 is placed on the conducting rod 10 and so that it is disposed between the flange 14 and the top of the insulating bushing 11. The washer 20 is placed on the portion 17 of the insulating bushing 11 and so that it is disposed between the lower end of the frusto-conical portion 16 and the upper surface of the cover 4. The washers 21, 22 and 23 are placed on the portion 17 of the insulating bushing 11 in the order named and so that they are located between the upper end of the collar 18 and the under surface of the cover 4. The washer 21 is nearest to the cover 4. A pile-up of washers 24, 25, 26 and a lock washer 27 all made of conducting material are placed in the order named on the conducting rod 10 and are held thereon by means of the nut 13. The washer 24 is of larger diameter than the inside diameter of the collar 18 and is disposed against the lower end of the collar 18. When the nut 13 is tightened on the rod 10, the parts of the terminal 7 are drawn into closely assembled condition and the washers 19, 20, 21, 22 and 23 are somewhat compressed. The washer 25 is provided with an angularly disposed apertured ear portion 28 so that a conductor wire (not shown) may be electrically connected to the terminal 7. The conductor wire mentioned may form an electrical connection between the terminal 7 and an electrical device located in the casing 2.

In assembling the terminal 7 above described and in mounting the terminal on the casing 2 a particular technique is followed and a moisture-proof sealing compound 29 is applied to certain

of the parts make the structures leak-proof at certain points where parts of the terminal are pressed together and where the terminal extends through the cover 4. The technique above mentioned is as follows:

(1) The coatings 8 and 9 on the cover 4 are abraded or rubbed down to form seating surfaces for the washers 20 and 21, the seating surfaces being formed only in the coatings 8 and 9. The seating surfaces should not contain grooves extending radially of the aperture and may be formed by circularly rubbing or machining the coatings 8 and 9 around the aperture in the casing. The seating surfaces formed are cleaned with carbon tetrachloride or other suitable cleaning fluid and then thoroughly dried.

(2) The under surface of the flange 14 and immediately adjacent portion of the conducting rod 10, the top and the lower surface of the frusto-conical portion 16 of the insulating bushing 11 are cleaned with carbon tetrachloride or other suitable cleaning fluid and then thoroughly dried.

(3) The washers 19, 20 and 21 are cleaned with a suitable cleaning fluid. These parts are oven-dried at a temperature of 140° F. to 160° F. for about four hours. The washers 19, 20 and 21 should then be stored in a desiccator or equivalent containing calcium chloride until required for assembling in the terminal when they should be removed and handled with tweezers or other pick-up tool to insure cleanliness of the washers until applied in the terminal assembly.

(4) A coat of moisture-proof sealing compound 29 is applied to the seats formed in the coatings 8 and 9 on the cover 4, the sealing compound being of such character that it will bake to substantially permanent hardness when subjected to a temperature of between 220° F. and 240° F. for twelve to sixteen hours.

(5) A coat of the above-mentioned sealing compound is applied to the under surface of the flange 14 and the immediately adjacent portion of the conducting rod 10.

(6) A coat of the sealing compound is applied to the top and lower part of the frusto-conical portion 16 of the insulating bushing 11.

(7) The washers 19, 20 and 21 are dipped in the sealing compound and assembled in the terminal 7 in condition for clamping the parts together by operation of the nut 13, the parts coated with the sealing compound being assembled while the sealing compound is in a tacky condition.

(8) While the sealing compound is in a tacky condition the nut 13 on the rod 10 is tightened to hold the parts in tightly assembled condition.

(9) The terminal 7 and the cover 4 are baked at a temperature of between 220° F. and 240° F. for from fourteen to sixteen hours.

(10) The nut 13 is still further tightened on the rod 10 while the parts are still at about the temperature above mentioned.

(11) A coat of the sealing compound is applied to the outer edge of the flange 14, the outer surface of the washer 19 and the outer surface of the upper part of the portion 16 of the insulating bushing 11.

(12) A coat of the sealing compound is applied to the outer edge of the washer 20 and so that the coat of sealing compound extends over the outside of the lower part of the portion 16 and also over the nearby portions of the top surface of the cover 4.

(13) A coat of the sealing compound is applied to the outer edge of the washer 21 and so that the coat of sealing compound extends also over the nearby portions of the lower surface of the cover 4.

(14) The cover 4 and the terminal 7 mounted thereon are then baked at a temperature between 220° F. and 240° F. for about twelve hours.

We have found that when a terminal is constructed as above described and is mounted on a casing as shown in the drawing, and the above-outlined technique is followed in preparing and assembling the parts, the construction is leak-proof and will remain leak-proof even when the casing and terminal are subjected to relatively high and low temperatures or when the casing and terminal are immersed in salt water and the temperature of the water is changed over a relatively wide range. The sealing compound employed in making the structure and arrangement leak-proof must obviously be of such character that it will not crack or fail to perform its sealing function under the conditions met in service. A relatively high-temperature baking enamel may be used as the sealing compound. A sealing compound we have found to be satisfactory for the purpose is a mixture of a high-temperature baking enamel and toluol in the proportions of 3.5 to 4 parts by volume of enamel to one part of toluol.

What is claimed is:

A leak-proof terminal structure and arrangement comprising in combination, an apertured wall coated on opposite faces with relatively soft metal, seats formed in the coatings on said wall around the aperture in said wall, washers disposed on opposite sides of said wall and resting in said seats, an insulating bushing, an enlarged upper portion on said bushing extending above said washers, a reduced lower portion on said bushing extending through said wall and said washers, a conducting rod extending longitudinally through said bushing, a flange on said rod extending over the upper portion of said bushing, a washer located between said flange and the top of said enlarged upper portion of said bushing, a collar supported on the lower portion of said bushing, means on said rod to hold the terminal parts in tightly assembled condition and press the washers in said seats against said seats, coats of moisture-proof sealing compound covering the washers in said seats and extending into leak-proof sealing engagement with said wall and a coat of leak-proof sealing compound covering the washer on the upper end of said bushing and extending into leak-proof sealing engagement with said bushing and said flange.

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