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(54) Plate casing having sealingly-mounted through insulators and manufacturing method.

(57) A method of sealingly mounting electric insulators passing through a plate wall, in particular for the manufacture of a housing case (10) for electric disconnecting switches, comprises the steps of making a collar (14) projecting from the plate at a passage hole (13) for the insulator; fitting the insulator (12) into the hole in the direction of the collar (14) projection so as to bring, upon interposition of a seal (18), an abutment edge (15) radially projecting from the insulator against an edge of the hole on the side opposite to the collar projecting side; bending the free end of the collar inwardly, forming a locking angle and forcing said end into a circumferential seating (16) present in the insulator surface so as to prevent the insulator from being withdrawn from the hole. In this manner a plate casing (10) for an electric apparatus is achieved which has an excellent tightness between the casing wall and the insulators passing therethrough.

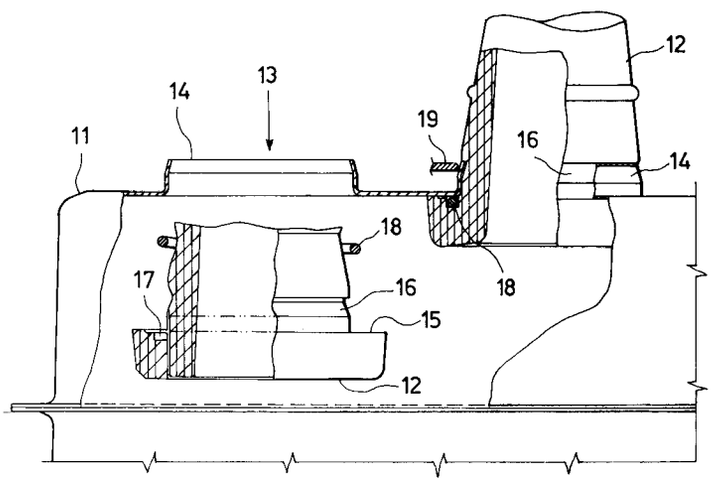

Fig. 2

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The present invention relates to a plate casing having insulators sealingly projecting therefrom for making electric disconnecting switches immersed in a gas for example, or other electrical equipments. In particular, the invention relates to the sealed junction between the insulator and the casing wall.

Electrical equipments of some power are often enclosed in sealed containers or cases filled with an insulating fluid such as inert gas, from which cases insulators for passage of electric cables project. Tightness of the casing-insulator assembly must be ensured over a relatively long period of time, in the order of some ten years. Therefore junction between the insulator and casing must be as accurate and long-lasting as possible.

In the known art, said junction is generally made by means of flanges, counter-flanges and related connecting screws pressing seals along the edge of the insulator passage hole through the casing. Such an embodiment ensures good tightness features, at least at the beginning, but it is comparatively expensive and disadvantageous, in terms of time-consuming at the mounting. In addition, since tightness is achieved by releasable elements, it does not ensure constancy over time.

The object of the invention is therefore to eliminate the above mentioned drawbacks by providing a sealed casing having through insulators which is of easy manufacture and sure tightness and reliable over time.

In view of the above object, in accordance with the invention a method of sealingly mounting electric insulators passing through a plate wall, in particular for the manufacture of a housing case for electric disconnecting switches has been devised, which method comprises the steps of making a collar projecting from the plate at a through hole for passage of the insulator; fitting the insulator through the hole in the direction of the collar projection, so as to bring, upon interposition of a seal, an abutment edge radially projecting from the insulator against an edge of the hole on its side opposite to the collar projecting side; bending the free end of the collar inwardly, forming a locking angle and forcing said end into a circumferential seating present in the insulator surface, so as to prevent the insulator from being withdrawn from the hole.

According to the above method, a plate casing for an electric apparatus has been also provided, which has at least one electric insulator sealingly passing through one wall of the casing at a hole provided therein, characterized in that the hole comprises a collar projecting from the wall to encircle a portion of the insulator close to said wall, the insulator comprising a radially-projecting abutment edge to be disposed against the wall on the wall side opposite to the collar, a seal being interposed between the abutment edge and the wall, and the collar having its free edge bent inwardly and received into a circumferential seating in the insulator surface to jam against a wall of said seating so as to prevent the insulator from being withdrawn from the hole and keep the seal pressed between the facing abutment edge and wall.

For better explaining the innovatory principles of the present invention and the advantages it offers over the known art, a possible embodiment applying said principles will be described hereinafter, by way of example, with the aid of the accompanying drawings, in which:

- Fig. 1 is a diagrammatic elevational side view of a casing according to the invention;
- Fig. 2 is an exploded and partly sectioned view to an enlarged scale of a junction area of the casing in Fig. 1. Referring to the drawings, a casing, generally denoted by 10, is shown in Fig. 1. It consists of a sealed box 11, made of plate, from which electric insulators 12 for passage of electric cables (not shown) project. The box is filled with an insulating fluid, inert gas for example.

Any electrical equipment (not shown) needing such a casing may be contained in the box; it may be an electric disconnecting switch for example, as can be easily imagined by a person skilled in the art.

As clearly discernible from Fig. 2 for the exploded insulator on the left, the passage hole 13 for each insulator comprises a collar 14 projecting from the box wall. Said collar may be formed by drawing of the plate for example.

The insulator to be fitted into the hole has a radial abutment edge 15 close to a circumferential seating 16 formed in its surface. The radial edge also comprises a circumferential groove 17 for receiving an annular seal 18.

The insulator is fitted into the hole 13 on the side opposite to the collar 14 projection, so that the abutment edge abuts against the inner wall of the box on the hole perimeter and the seal is sandwiched between the radial abutment edge and the wall.

As shown for the insulator on the right in Fig. 2, once the insulator is fitted in place, so that the collar 14 encircles the insulator close to the seating 16, the free end of the collar is bent inwardly forming a locking angle to be received into the circumferential seating 16. Bending of the collar may take place by rolling, by means of a known machine tool, as diagrammatically shown at 19. By bending the collar inwardly, it jams by its free end against an upper wall of the seating, so that withdrawal of the insulator from the hole is prevented and the seal is further compressed between the

facing abutment edge and wall.

Advantageously, the circumferential seating 16 is of increasing depth in the projecting direction of the collar from the casing wall, so as to help with bending of the end portion of the collar and afford a rest surface for said end portion.

As can be seen for the left-hand hole in Fig. 2, before fitting of the insulator into the hole, the free end of the collar can be advantageously bent inwardly by a first angle lower than the locking angle, so as to provide an interference fit of the insulator in the hole.

This first angle may be included between 10° and 20° for example, and preferably is 15°.

In this manner mounting is facilitated, the insulator being pressure-fitted into the hole so that the collar end slightly and elastically snaps in the seating 16 to keep the insulator in place during the subsequent rolling action to bend the collar towards its definitive locking position.

It is clear that the intended purposes have been achieved. The sealed mounting of an insulator through the plate wall is quick, inexpensive, safe in terms of tightness and reliable in time.

It is sufficient to make a collar projecting from the plate at the insulator passage hole, fit the insulator into the hole in the projecting direction of the collar, so as to bring, upon interposition of a seal, the abutment edge radially projecting from the insulator against the hole edge on the side opposite to the collar projecting side and finally bend the free end of the collar inwardly to prevent the insulator from being withdrawn from the hole.

During bending by rolling of the collar so as to form the locking angle, a simultaneous axial movement of the insulator in the direction for compressing the seal between the abutment edge of the insulator and the hole edge is produced, so that tightness is ensured.

It has been found that while such an assembling method is of simple execution, it ensures a perfect tightness over long periods of time.

Obviously, the above description of an embodiment applying the innovatory principles of the present invention is given for purposes of illustration only and therefore must not be considered as a limitation of the scope of the invention as herein claimed.

For example, the insulator number and the casing shape may vary depending on the particular practical application envisaged for the container and the type of electrical equipment it must hold.

Claims

1. A method of sealingly mounting electric insulators passing through a plate wall, in particular for the manufacture of a housing case for electric disconnecting switches, comprising the steps of:

- making a collar projecting from the plate at a passage hole for the insulator;
- fitting the insulator through the hole in the direction of the collar projection so as to bring, upon interposition of a seal, an abutment edge radially projecting from the insulator against an edge of the hole on the side opposite to the collar projecting side;
- bending the free end of the collar inwardly forming a locking angle and forcing said end into a circumferential seating present in the insulator surface so as to prevent the insulator from being withdrawn from the hole.

2. A method according to claim 1, in which, before fitting the insulator into the hole, the free end of the collar is bent inwardly by an angle of smaller amplitude than the locking angle, said first angle providing an interference fit of the insulator in the hole.

3. A method according to claim 2, in which the first angle is included between 10° and 20°, and preferably is 15°.

4. A method according to claim 1, in which during bending of the free end of the collar, a simultaneous action involving an axial movement of the insulator in the direction for compressing the seal between the abutment edge of the insulator and the hole edge is produced.

5. A plate casing (10) for an electric apparatus having at least one electric insulator (12) sealingly passing through one wall of the casing at a hole (13) formed therein, characterized in that the hole comprises a collar (14) projecting from the wall to encircle a portion of the insulator close to said wall, the insulator comprising a radially-projecting abutment edge (15) to be disposed against the wall on the wall side opposite to the collar, a seal (18) being interposed between the abutment edge and the wall and the collar having its free edge bent inwardly and received into a circumferential seating (16) in the insulator surface to jam against a wall of said seating so as to prevent the insulator from being withdrawn from the hole and keep the seal (18) sandwiched between the facing abutment edge and wall.

6. A casing according to claim 5, characterized in that the circumferential seating (16) is of an increasing depth in the projecting direction of

the collar (14) from the casing wall.

7. A casing according to claim 5, characterized in that the abutment edge (15) has a circumferential groove (17) facing the casing wall, in which groove (17) the seal (17) is partly received.

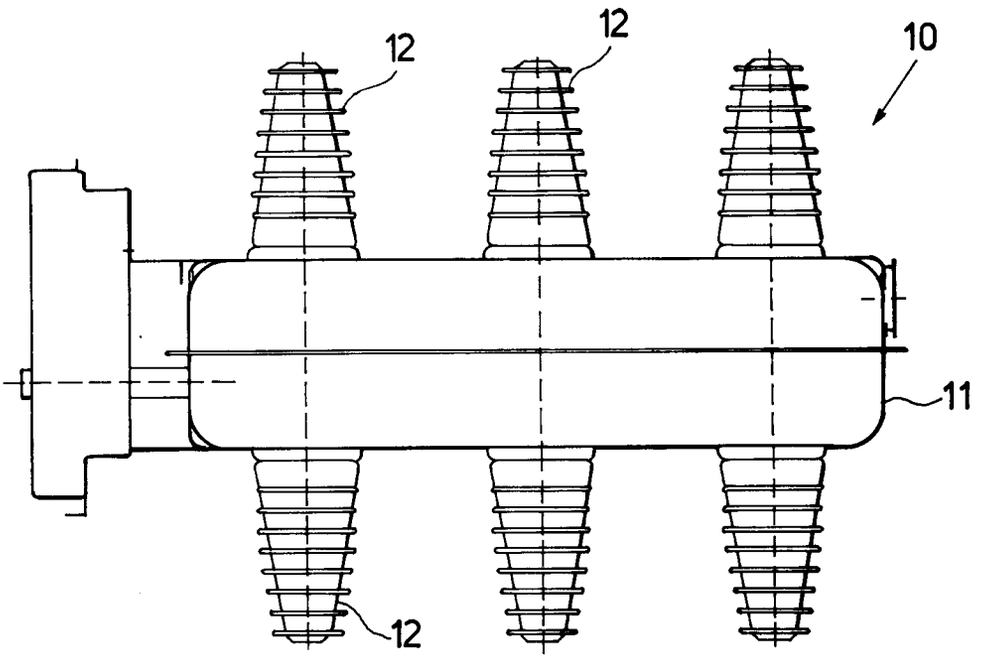

Fig. 1

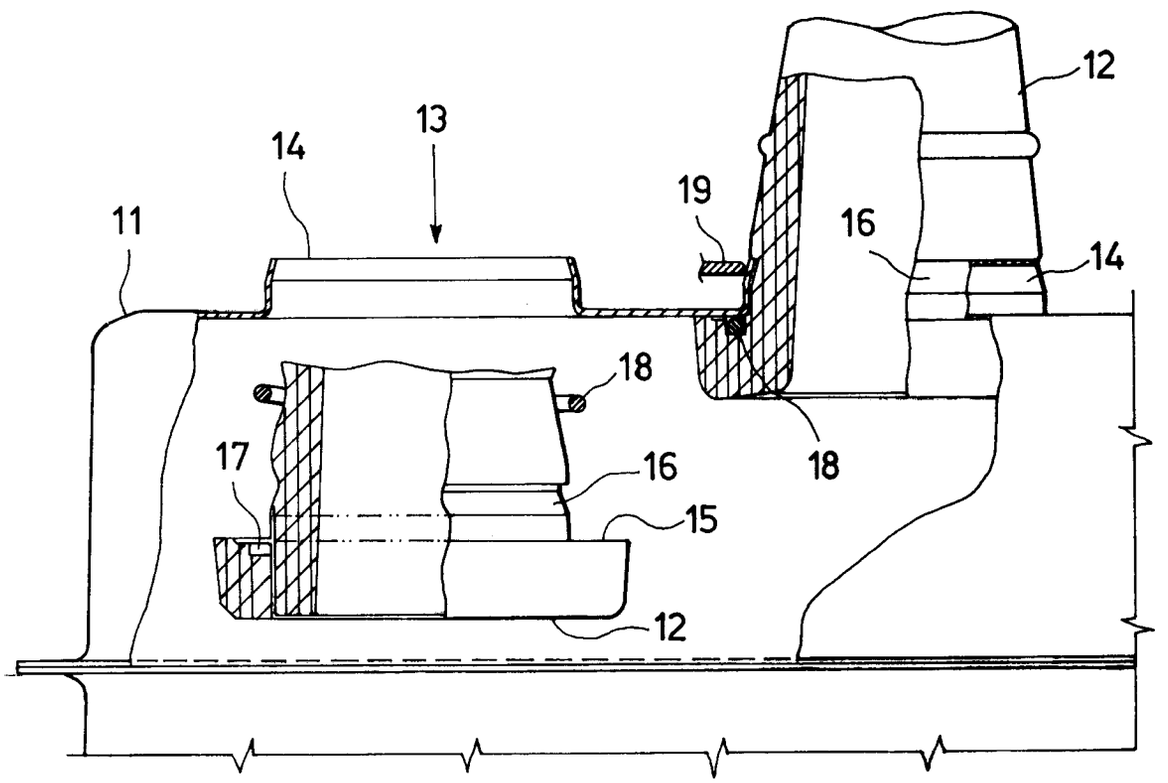

Fig. 2