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## (54) Polymeric insulator for supporting electrical lines and electrical components in general.

(57) The present invention relates to a polymeric insulator for supporting electrical lines and electrical components in general that comprises an electrically insulating body made of fibreglass with a thermosetting base resin forming connection points. The distinctive feature of the invention consists in the fact that it comprises a flange of thermoplastic polymeric material that forms an integral part of the aforesaid body at leats at one of the said connection points.

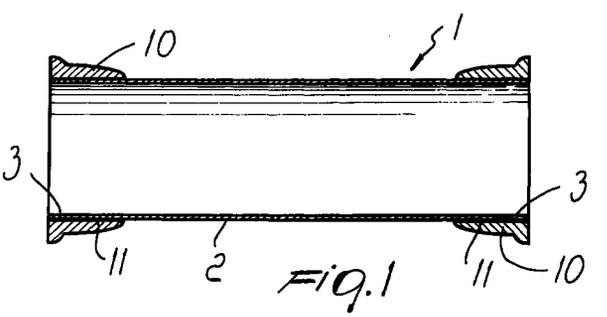


Fig.1

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## Description

The present invention relates to a polymeric insulator for supporting electrical lines and electrical components in general.

As is known, the polymeric insulators that are used as insulating supports for electricity transmission lines and as supports for insulating compartments for switchgear, circuit breakers and the like, or in any case for supporting electrical components, are generally formed of an electrically insulating body that is made of fibreglass with a thermosetting base resin.

Aluminium flanges or, generically, metal connectors, are fitted on the connection points of the electrically insulating body by gluing them to the connection points of the body itself.

In practice, the fibreglass body ensures the insulating distance and, in addition, the mechanical characteristics of the part that may be subjected to flexural, tensile, compression and internal pressure loads. The flanges that are connected to the connection points, on the other hand, confer the possibility of mechanically connecting the insulating components to the rest of the installation using threaded connections or by tightening pins or bolts.

In certain embodiments, when the mechanical loads involved and the dimensions are not particularly large, insulators are made completely from thermosetting fibreglass that is poured in a mould, that is to say with the insulating body and the connection flanges being made as a single piece.

Both the above solutions require relatively long times for the polymerisation process and for going through the production cycle, for the oven postcuring and other treatments, due to the time required for the crosslinking of the thermosetting resins; in addition the flanges of thermosetting material, which provide excellent electrical insulation characteristics, offer poor impact resistance.

The solutions that adopt glued metal flanges are mechanically more solid but have very long processing times, due to the use of thermosetting adhesives and the fact that the fibreglass parts must be machined to close tolerances using a machine tool before the metal parts are glued; also, costs are not insignificant due to the slowness of machining fibreglass by abrasion using diamond-tipped tools.

The aim of the invention sets is to solve the problem set forth above, providing a polymeric insulator for supporting electrical lines and electrical components in general, in which the connection flanges have excellent electrical insulation characteristics without, however, being made of thermosetting material, thus contributing to an improvement in the mechanical characteristics as well.

Within the scope of the aforementioned aim, a particular object of the invention is to provide a polymeric insulator in which it is possible to have the connection flanges fitted directly on the body of the insulator without having to resort to machining to prepare the body itself. Another object of the present invention is to provide a polymeric insulator that is able to offer greater guarantees of reliability and safety in use as a result of its distinctive constructional characteristics.

A further object of the present invention is to provide a polymeric insulator that is easy to obtain with processes that require short treatment times and that are, furthermore, competitive from a purely economic standpoint.

The aforementioned aim, as well as the objects mentioned and others that shall emerge more clearly hereinafter, are achieved by a polymeric insulator for supporting electrical lines and electrical components in general, comprising an electrically insulating body made of fibreglass with a thermosetting base resin having connection points, characterised by the fact that it comprises, in at least one of the connection points, a flange of thermoplastic polymeric material that is joined to said body so that it forms an integral part of it.

Further characteristics and advantages will become more clearl from the description of a preferred but not exclusive embodiment of a polymeric insulator for supporting electrical lines and electrical components in general, illustrated by way of a non-limitative example in the accompanying drawings, wherein:

Figure 1 is a diagrammatic representation of a cross-section of the polymeric insulator according to the invention;
Figure 2 shows, on an enlarged scale, the connection of the connection flange in detail.

With reference to the aforesaid figures, the polymeric insulator for supporting electrical lines and electrical components in general according to the invention, which is indicated by reference number 1, comprises an electrically insulating body 2 that preferably, but not necessarily, has an elongated hollow shape and is made of fibreglass with a thermosetting base resin.

At the ends of the body, there are connection points 3 to which the flange for fitting the elements to be supported must be connected.

The important distinctive feature of the invention is constituted by the fact that this flange, indicated by reference number 10, is made of thermoplastic material and made to form an integral part of the body of the insulator at the connection points in order to obtain a monolithic assembly.

The technical problem to be overcome, is that of being able to make the connection between the body 2 of thermosetting material and the flange 10 of thermoplastic material.

A preferred method is to form a thin intermediate layer 11 of thermoplastic material that is applied to the surface of the thermosetting resin connection points directly in the polymerisation phase of the resin itself in

such a way as to obtain a molecular migration of the liquid resin during the polymerisation, favouring the adhesion between the intermediate layer and the body of the insulator.

The thermoplastic flange is then applied to the intermediate layer obtained in this way through an injection moulding operation. The flange can in this way be joined so as to form a single body with the insulator, in that there is compatibility between the thermoplastic material of which the flange is made and the thermoplastic material forming the intermediate layer. In practice, a moulding on a layer of the same material is carried out, thus obtaining a complete moulding with a suitable injection pressure.

This technology completely eliminates the processing costs arising in connection with any subsequent machining of the insulating body on a machine tool.

Alternatively, it is however still possible to carry out suitable machining of the insulator body on a machine tool and treat it with an agent that will make it compatible for, and therefore enable, the moulding of the thermoplastic material directly on the electrically insulating body. Alternatively, the flanges of thermoplastic material can be moulded separately and subsequently fitted and made to form an integral part of the insulator body.

As far as the materials to be used are concerned, experimental tests have shown that it is advisable to use polysulphone or polyethersulphone as the thermoplastic material for the flanges to obtain the best results; an epoxy resin having a high glass transition temperature is, on the other hand, advisable for the insulator body in that such a resin offers the advantage of having excellent resistance to the temperatures that occur in the phase of moulding the flanges of thermoplastic material on the body of the insulator.

The polymeric insulator obtained in this way offers the advantage of guaranteeing greater insulation distances, since it has electrically insulating ends; alternatively, if desired, it is possible to use smaller insulating bodies for the same insulating distances.

In addition, the production times of the injection moulded flanges are considerably shorter than the times required to manufacture traditional flanges, with moreover the advantage of significantly reducing the production costs associated with the machining of the ends to tight tolerances and the subsequent gluing of the thermosetting materials that require long process times, while the direct injection moulding of the thermoplastic flanges on the fibreglass body is not only more effective but also quicker to perform.

A further though not last advantage derives from the fact that the flanges of polymeric material are more corrosion resistant and, furthermore, the thermoplastic flanges can easily be detached when hot by melting, thus allowing recycling at the end of the product life,as well as recovering any metal inserts that can be separated and recovered.

The invention thus conceived is susceptible of numerous modifications and variants, all of which are within the scope of the same inventive concept.

All the details may furthermore be replaced with other technically equivalent elements. In practice the materials used, as well as the contingent dimensions and shapes may be any according to requirements.

## Claims

1. Polymeric insulator for supporting electrical lines and electrical components in general, comprising an electrically insulating body made of fibreglass with a thermosetting base resin and having connection points characterised by the fact that it comprises, at least at one of the said connection points, a flange of thermoplastic polymeric material forming an integral part with said body.

2. Polymeric insulator, as in the previous claim, characterised by the fact that said flange of thermoplastic polymeric material is applied by injection moulding.

3. Polymeric insulator, as in the previous claims, characterised by the fact that it comprises an intermediate layer of thermoplastic material joined to said fibreglass body during the production phase of the fibreglass body.

4. Polymeric insulator, as in one or more of the previous claims, characterised by the fact that said thermoplastic polymeric material is polysulphone.

5. Polymeric insulator, as in one or more of the previous claims, characterised by the fact that said thermoplastic polymeric material is polyethersulphone.

6. Method for manufacturing a polymeric insulator for supporting electrical lines and electrical components in general, characterised by the fact that it consists in manufacturing an electrically insulating body of fibreglass with a thermosetting base resin and in applying a liquid thermoplastic material at the connection points during polymerisation of the thermosetting resin, and injection moulding of a flange of thermoplastic material on said intermediate layer of thermoplastic material with related joining.

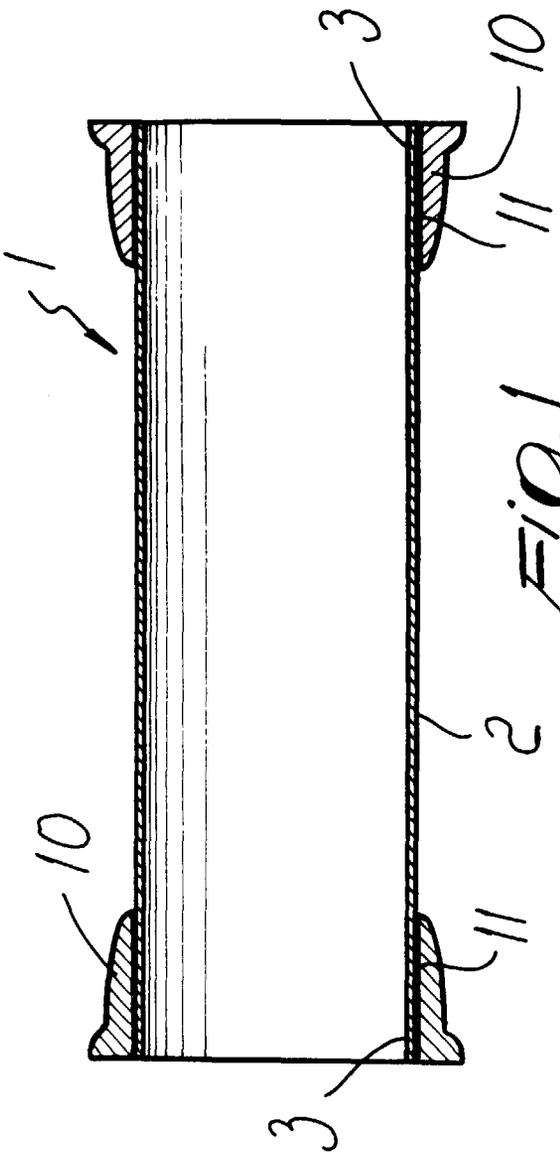


Fig. 1

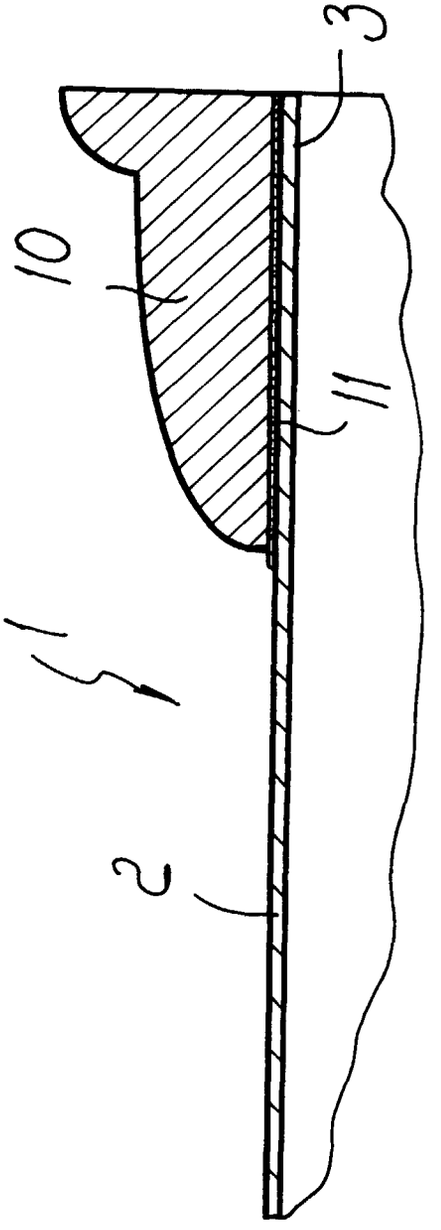


Fig. 2