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(54) PROCESS FOR MANUFACTURING MOULDED PLASTICS ARTEFACTS

(71) We, STAMICARBON B.V., a Netherlands Limited Liability Company, of P.O. Box 10, Geleen, the Netherlands, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a process for manufacturing moulded objects comprising a thermosetting resin containing dispersed mineral components having a grain size of from 0.2 to 2 mm., fillers and glass fibre reinforcing material.

For formation of moulded plastics use is often made of a moulding powder or moulding compound, which is compressed in a mould under temperature elevation to form the required object and which is allowed to cure in the mould. Examples of these are objects made of melamine resin and phenol-formaldehyde resins. For large objects e.g. bath-tubs, the plastics used are expensive, or not sufficiently attractive in appearance, or not sufficiently water-resistant or impact-resistant. For large objects use is also made of moulding compounds on tbe basis of polyester resin, powdery minerals or glass fibres. Also in this case the surface of the objects formed is not attractive and the water resistance insufficient. For forming moulded objects in a compression mould high demands are made on such a compound and associated mineral filler, as described in Dutch Patent specification 138,012. Moreover the compression mould is subject to wear due to friction of the mineral component so that the surface of the moulded object becomes non-uniform in appearance.

It is also known to make moulded objects by depositing glass fleece layers on a mould and impregnating these each time with liquid, curable resin, to form inter alia ships' hulls. It is also known for boards, for instance chip-board, to be coated with glass fibre and plastic. The board is covered with a glass fleece which is coated on either side with a layer of dry, polymerizable plastic, catalyst, filler, and if required pigment. The assembly is then compressed at an elevated temperature to effect curing. However this process is only suitable for objects that are flat or only slightly curved.

Also known are moulded plastics boards which can be built up in layers in various ways, as described for instance in French Patent specification 1,136,386. These boards also can only be made flat or slightly curved. Strongly curved boards cannot be manufactured well with this known process because either the mineral filler flows away or the wholly impregnated mat is too sticky and hence cannot be handled well. Moreover, the appearance is not attractive and the glass fleece, in strongly curved places provides insufficient strength without certain measures.

By the practice of the invention moulded plastics objects may be obtained built up of layers, which may if desired by strongly curved, of deep section, which are strong and which have a finished surface.

The invention provides a process for manufacturing moulded objects which comprise a thermosetting resin containing a dispersed mineral component having a grain size of from 0.2 to 2 mm, fillers and glass fibres as reinforcing material, comprising the steps of

A. forming on a support a pliable assembly by

(1) disposing on said support a bonded glass fibre fleece at least one side of which contains a dry thermosetting resin, a catalyst and a pigment, at least one side thereof being in contact with the said support and said thermosetting plastics material being inert to the bonded glass fibre fleece;

(2) uniformly applying to the supported fleece a deposit of mineral components; and

(3) impregnating the deposited mineral component with a liquid thermosetting resin which cures slowly at

room temeprature, whereby after the step of impregnating the resin has a viscosity of at least 500,000 poises; and consequently

B. introducing the still pliable assembly thus obtained into a compression mould and subjecting it to elevated temperature and pressure to thermally set the assembly, and removing the assembly from said mould.

Preferably the process of the invention further includes the step of disposing a second bonded glass fibre fleece on the said layer after step A(3) but before step B.

Thermosetting plastics which may be used in the process of the invention include unsaturated polyester resins, and may for instance be a liquid resin based on isophthalic acid and neopentyl glycol dissolved in styrene monomer or based on pisphenol-A. The liquid non-polymerized thermosetting resin material used should have a consistency so that after having been combined with the mineral components no movement occurs, e.g. due to gravity effects on a vertically-disposed layer. A viscosity of at least 500,000 poises is thus preferred. It is also thus desirable that the thermosetting resin is one which cures slowly at room temperature, and rapidly at elevated temperature. To this end the liquid resin may contain magnesium oxide or calcium oxide.

The glass fibre fleeces coated with a layer of dry, non-polymerized thermosetting resin, catalyst and possibly pigments are commercially available. Usually they are coated on both sides, although this is not necessary in the process of the present invention. The fleece is obtained by covering or impregnating it, for instance with a resin on the basis of bisphenol-A dissolved in toluene, with, for instance, diallylphthalate and triallyl cyanurate as linking monomer. The fleece thus treated is dried by removal of the toluene by evaporation. For extra strength another fleece may, if desired, be placed in the first layer.

The intermediate layer of mineral components may consist of sand with a grain size of from 0.2 to 2 mm. The sand is impregnated with the liquid thermosetting resin. To this end first the resin may be deposited on the fleece and upon this dry sand, or reversely. The sand and the liquid, curable plastic may also be mixed and be subsequently uniformly spread on the fleece.

For strongly curved moulded objects, for instance bath-tubs, it may be necessary to provide the prepared sheet with incisions. In those places the incised edges will overlap each other or lie against each other in the compression mould.

Preferably when two or more fleeces are used, the layers contain pigments of the same colour. Any damage caused to the exterior layer will then be less obvious.

The fleeces used may be in the form of fabric.

WHAT WE CLAIM IS:—

1. A process for manufacturing moulded objects which comprise a thermosetting resin containing a dispersed mineral component having a grain size of from 0.2 to 2 mm, fillers and glass fibres as reinforcing material, comprising the steps of

A. forming on a support a pliable assembly by

(1) disposing on a said support a bonded glass fibre fleece at least one side of which contains a dry thermosetting resin, a catalyst and a pigment, at least one side thereof being in contact with the said support and said thermosetting plastics material being inert to the bonded glass fibre fleece;

(2) uniformly applying to the supported fleece a deposit of mineral components; and

(3) impregnating the deposited mineral component with a liquid thermosetting resin which cures slowly at room temeprature, whereby after the step of impregnating the resin has a viscosity of at least 500,000 poises; and consequently

B. introducing the still pliable assembly thus obtained into a compression mould and subjecting it to elevated temperature and pressure to thermally set the assembly, and removing the assembly from said mould.

2. A process according to Claim 1, which further includes the step of disposing a second bonded glass fibre fleece on the said layer after step A(3) but before step B.

3. A process according to Claim 1 or Claim 2, wherein the said dry thermosetting resin is derived from bisphenol A.

4. A process according to any of Claims 1 to 3, wherein the said liquid thermosetting resin is an unsaturated polyester resin.

5. A process according to any of Claims 1 to 4, wherein the said fleece is a fabric.

6. A process according to any of Claims 1 to 5, wherein the said mineral component is sand.

7. A process according to any of Claims 2 to 6, wherein the said fleeces contain pigments of the same colour.

8. Moulded objects obtained by a process according to any of Claims 1 to 7.

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