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METHOD OF COVERING AN IRREGULAR SURFACE

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This invention relates to improvements in composite materials and is, more particularly, concerned with composite constructional materials of a waterproof nature.

The composite material of the invention comprises a preformed cellulose acetate sheet carrying a layer of asphalt solidified upon its surface.

The term "asphalt" is used to indicate any bituminous composition of the type usually applied while hot, e. g. in a molten condition, to concrete and other surfaces to produce a solid wear-resistant and waterproof layer.

The cellulose acetate sheet used in accordance with the present invention must, in view of its thermoplastic nature, be supported when the hot asphalt is applied to its surface and in practice it has been found that by forming the composite material of the invention *in situ* not only is the support provided, but in addition the cellulose acetate sheet is moulded to the shape of the surface being treated, and in this way becomes anchored to it. Despite the fact that asphalt is heated to a fairly high temperature before being applied, usually about 200° C., the cellulose acetate sheet is not destroyed during the application of the asphalt to it and in the cold composite material retains its structure as a coherent sheet which, however, as above indicated, has the configuration of the surface to which it has been applied.

The composite material of the invention possesses many properties which render it very valuable as a constructional material. Thus, if it is desired to inspect the surface carrying the composite at any time, the whole composite or portions of it can be stripped therefrom very readily without damage to the surface carrying it. Moreover, the waterproof properties of the cellulose acetate sheet prevent or minimize damage to the asphalt layer due to the development of pockets of water vapour underneath it. Such pockets are liable to form, particularly where the asphalt is laid on concrete, even when concrete is first covered with bituminous felt; under the influence of heat such as occurs when the asphalt surface is exposed to hot sunshine, the pockets develop and cause areas of the asphalt to be lifted and eventually broken. The cellulose acetate sheet prevents moisture reaching the inside of the asphalt, while the strength of the cellulose acetate sheet, even at the temperatures it assumes after the asphalt surface has been exposed to hot sunshine over extended periods, is sufficient for it to withstand substantial deformation under the influence of water vapour trapped beneath it, and thus prevents or

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considerably reduces the tendency to breaking up of the asphalt layer in the manner described above.

The cellulose acetate sheet used for the purposes of the invention need only be quite thin, say not more than five thousandths of an inch, a thickness of the order of one or two thousandths of an inch having been found quite satisfactory. The sheet may contain a plasticiser and it is preferred to employ a plasticiser of relatively low volatility, for instance dibutyl phthalate is preferred to the more volatile dimethyl phthalate. Any of the other plasticisers commonly used with cellulose acetate may, however, be employed, e. g. dimethoxy ethyl phthalate and organic phosphates such as tricresyl phosphate, triphenyl phosphate and trichlorethyl phosphate. Preferably the quantity of plasticiser used is kept to below about 15% based on the weight of the cellulose acetate, e. g. quantities between 5 and 10% may be used and have been found to result in the production of a cellulose acetate sheet of adequate strength and flexibility for the purposes of the invention.

The cellulose acetate sheet may be provided with reinforcing materials, for instance an open mesh textile fabric or a warp of yarns, cotton being quite satisfactory for the purpose and being relatively cheap. Such a product may be made by applying a film of cellulose acetate with or without plasticisers to one or both sides of the fabric or warp of yarns and securing it thereto by means of solvents and/or heat and pressure or by applying a suitable film-forming solution to the fabric or warp of yarns. The cellulose acetate sheet may be embossed with a regular or irregular pattern, especially where the sheet does not contain a reinforcing material, the embossing stiffening the material and rendering it easier to handle in the form of large sheets.

As previously indicated, the novel composite material of the invention is intended for use as a constructional material and is most suitably formed *in situ*. Thus, one important application of the invention is in the production of floors and roofs, in particular flat roofs and roofs sloping at a small angle, e. g. up to 10° to the horizontal. For this purpose the surface to be treated, usually of concrete, reinforced concrete or wood, is simply covered with the cellulose acetate sheeting, conveniently by laying separate sheets with overlapping edges and applying hot asphalt directly to the cellulose acetate sheeting and finishing to a level surface. The thermoplastic property of the cellulose acetate sheeting, besides resulting in the cellulose acetate sheeting

assuming the configuration of the surface covered, has the effect of causing the overlapping edges of the sheets to be joined together by this operation.

The invention may be applied to other purposes than the treatment of floors and roofs, for instance in the construction of roadways. In the latter case the cellulose acetate sheeting may also be laid on the site before forming the concrete layer to which the composite of the invention is to be applied. Thus, the concrete layer will eventually be sandwiched between cellulose acetate sheeting and in this way the drying out of the concrete is retarded with considerable benefit to the quality of the concrete eventually formed.

The invention has been described only in connection with the use of cellulose acetate sheeting, since this material, besides being eminently suitable for the purposes of the invention, is cheap and available in large quantities. Other thermoplastic sheet materials of suitable strength, flexibility and melting point may, however, be used, for example sheet material having a basis of cellulose derivatives other than cellulose acetate, e. g. cellulose propionate and ethyl cellulose.

The following example illustrates the invention:

Example

Separate zones of a concrete-surfaced area were covered with cellulose acetate sheeting of two thousandths of an inch thickness and a composite consisting of a light weight cotton net sealed between two layers of cellulose acetate sheeting, each of one thousandth of an inch thickness. The sheeting in both cases consisted of cellulose acetate plasticized with between 5 and 10% of diethyl phthalate.

Molten asphalt heated to 200 to 250° C. was then poured on to the covered zones to form layers about half an inch thick. No bubbles appeared in the asphalt layer in either case during subsequent cooling and, when inspected more than six months later, the asphalt layers were still in an excellent condition and showed no signs of any lifted or broken areas such as are liable to occur when an asphalt layer is applied directly to concrete, or even when an underlayer of bituminous felt is used.

Having described our invention, what we desire to secure by Letters Patent is:

1. Method of protecting concrete, wooden and other irregular structural surfaces, comprising applying directly to the irregular surface to be protected a preformed sheet of a thermoplastic cellulose derivative, pouring hot molten asphalt on to said sheet so that the sheet is softened by the heat of said asphalt and assumes the configuration of said surface, and allowing the assembly to cool to solidify the asphalt as a surface on the coherent cellulose derivative sheet.

2. Method of protecting concrete, wooden and other irregular structural surfaces, comprising applying to the surface a preformed cellulose acetate sheet, pouring hot molten asphalt on to said sheet so that the sheet is softened by the heat of said asphalt and assumes the configuration of said surface, and allowing the assembly to

cool to solidify the asphalt as a surface on the coherent cellulose derivative sheet.

3. Method of protecting concrete, wooden and other irregular structural surfaces, comprising applying to the surface a preformed cellulose acetate sheet containing less than 15% by weight on the weight of the cellulose acetate of a plasticizer for cellulose acetate, pouring hot molten asphalt on to said sheet so that the sheet is softened by the heat of said asphalt and assumes the configuration of said surface, and allowing the assembly to cool to solidify the asphalt as a surface on the coherent cellulose derivative sheet.

4. Method of protecting concrete, wooden and other irregular structural surfaces, comprising applying to the surface a preformed cellulose acetate sheet containing from 5 to 10% by weight on the weight of the cellulose acetate of a plasticizer for cellulose acetate, pouring hot molten asphalt on to said sheet so that the sheet is softened by the heat of said asphalt and assumes the configuration of said surface, and allowing the assembly to cool to solidify the asphalt as a surface on the coherent cellulose derivative sheet.

5. Method of protecting concrete, wooden and other irregular structural surfaces, comprising applying to the surface a preformed cellulose acetate sheet containing reinforcing textile yarns and less than 15% by weight on the weight of the cellulose acetate of a plasticizer for cellulose acetate, pouring hot molten asphalt on to said sheet so that the sheet is softened by the heat of said asphalt and assumes the configuration of said surface, and allowing the assembly to cool to solidify the asphalt as a surface on the coherent cellulose derivative sheet.

6. Method of protecting concrete, wooden and other irregular structural surfaces, comprising applying to the surface a preformed cellulose acetate sheet containing reinforcing textile yarns and from 5 to 10% by weight on the weight of the cellulose acetate of a plasticizer for cellulose acetate, pouring hot molten asphalt on to said sheet so that the sheet is softened by the heat of said asphalt and assumes the configuration of said surface, and allowing the assembly to cool to solidify the asphalt as a surface on the coherent cellulose derivative sheet.

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