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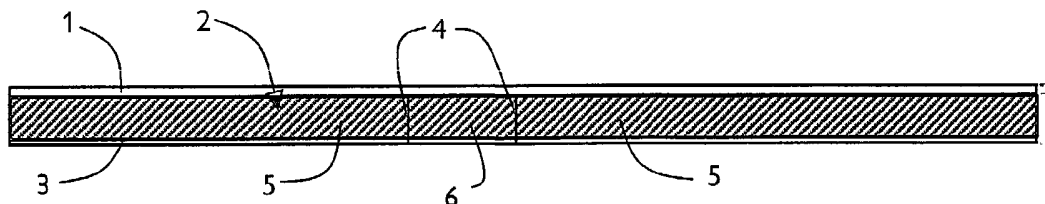
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(54) Title: BUILDING CONSTRUCTION METHOD AND APPARATUS THEREFOR



(57) Abstract: A method of providing a decorative surface on a substrate comprises spraying on to the substrate a layer of a first hardenable liquid material and allowing the material to harden, applying to the surface of the layer a mask (6) of corresponding to the pattern of mortar between bricks of blocks in conventional brick- or block-work, spraying on to the masked layer of hardened first material a layer (7) of a second hardenable liquid material of different appearance from the first cementitious material and allowing the material to harden, and stripping the masking layer from the substrate.

BUILDING CONSTRUCTION METHOD AND APPARATUS THEREFOR

Field of the Invention

This invention relates to a building construction method, and to apparatus for use in the method.

5 Background to the Invention

Conventional building construction methods still largely rely on the bonding of bricks or blocks one upon another using mortar. Brick-laying is a skilled job, and can therefore be a costly operation, especially since the number of courses of bricks or blocks which can be laid in one day is additionally limited by the need for the mortar layers to
10 gain sufficient strength to support more than a limited number of upper courses of bricks or blocks.

More rapid construction can be achieved by the use of lightweight blocks, but the appearance of such blocks is not acceptable for many applications; the traditional appearance of conventionally-laid bricks is often preferred.

15 It has been proposed to simulate the appearance of conventional brickwork by applying thin "biscuits" of brick as a facing for block work or other constructions whose appearance is unsatisfactory. However, skill is still required to apply these if an acceptable simulation of conventional brickwork is to be achieved.

Summary of the Invention

20 The present invention provides a method of providing a decorative surface on a substrate, comprising spraying on to the substrate a layer of a first hardenable liquid material and allowing the material to harden, applying to the surface of the layer a mask corresponding to the pattern of mortar between bricks or blocks in conventional brick- or block-work, spraying on to the masked layer of hardened first material a layer of a second
25 hardenable liquid material of different appearance from the first material and allowing the material to harden, and stripping the masking layer from the substrate.

Preferably, the mask is applied by forming a composite material comprising a supporting foil having a masking material temporarily bonded thereto, the exposed surface of the masking material having a film of adhesive thereon, a non-adhesive backing sheet
30 overlying the adhesive film, the adhesive and the backing sheet being selected such that

the sheet is temporarily held in position on the masking layer by the adhesive but is readily separable therefrom, the masking layer and backing sheet being pre-cut in a pattern representing bricks or blocks shapes with mortar bed regions therebetween, the backing sheet portions corresponding only to the mortar bed regions being first stripped from the adhesive film before application, and peeling off the supporting foil to lift off from the layer the portions of the masking layer and backing sheet corresponding to the brick or block shapes, thereby leaving a masking pattern corresponding to the mortar bed regions.

The hardenable materials may be surface coating materials such as paints, but are preferably cementitious materials which harden to give an appearance closely resembling brick, stone, cement mortar or other building materials whose appearance is to be simulated.

Where the appearance of brickwork is to be simulated, the first cementitious material is formulated to have the appearance of mortar, while the second cementitious material is formulated to have the appearance of bricks of the desired colour. Pigments may be added to the cementitious material to simulate more closely the appearance of different types of brick or masonry block. For example, a red pigment may be used to produce the appearance of conventional red bricks. Combinations of differently-coloured materials may be sprayed successively on to the substrate to build up a more complex appearance. For example, the appearance of more highly burnt bricks may require a combination of red-coloured, yellow-coloured and black-coloured spray material. The sprayed materials may be subjected to further treatment to change the appearance, for example by the use of acid etching or abrasion. Different parts of the same coated substrate may be treated differently, for example to simulate mixed brick and stone construction.

The cementitious material is preferably an aqueous mixture of cement, a filler such as powdered limestone, and mica. Such a material is the subject of our European Patent No 749404.

The texture of the layer of cementitious material may be varied to simulate different types of brick or block, for example. This is suitably achieved by selecting different spray nozzles discharging larger or smaller drops or particles of the liquid material. Other

factors, such as spray pressure and the proportion of water in the cementitious mixture, may also be varied to vary the surface finish of the material.

The spraying of the cementitious material may be achieved by means of conventional paint spraying apparatus, for example of the type adapted to spray thicker paints
5 such as masonry paints.

Other materials than brick can be simulated, and random sizing of blocks, for example stone block work, can be readily achieved by suitable cutting of the masking material. It may also be possible to produce a more random appearance to the bricks or blocks by arranging for the mask to retain temporarily some of the masking layer regions
10 corresponding to individual bricks or blocks, and after application of the second cementitious material to remove these regions and to apply a new mask covering the first and second materials and to leave exposed brick or block shapes for the application of a different, third, coating material.

The masking layer is conveniently formed from an expanded plastics material, for
15 example expanded polyurethane or expanded polyethylene, so that the brick or block shapes have recessed mortar layers between them to give a more attractive and more realistic appearance. The amount of recessing of the mortar layers can be controlled by the thickness of the masking layer used, according to the desired effect.

In an alternative embodiment, the masking layer is formed from sheet steel, preferably
20 erably with an expanded plastics layer on the face which contacts the substrate, in use, to ensure that the sprayed material does not stray under the mask. The mask may be temporarily attached to the substrate by means of magnets, although it will be appreciated that other means of attachment are also possible. The edges of the mask of preferably slightly chamfered to assist release from the sprayed material.

25 The supporting foil is conveniently a self-adhesive plastics film, for example a polyethylene film, while the backing sheet may be, for example, paper coated with a waxy material to permit temporary hold of the adhesive film but to prevent permanent bonding. Such backing sheets are commonly used for protecting self-adhesive tapes and films before application.

The decorative surface of the invention may be applied to a wide range of substrates, from insulating block work to cement board panels, or even to existing building surfaces such as common bricks normally covered by cement-based rendering. The method may thus provide a more decorative alternative to rendering. The method of the invention may be applied to the manufacture of building panels based on, for example, thermally-insulating sheet materials such as expanded polystyrene or expanded polyurethane. It will be appreciated that the panel may be formed in a size permitting relatively large areas of the building to be clad fairly quickly. For example, the conventionally-sized panel of 1.2 metres by 2.4 metres by 50 millimetres thick may be conveniently used. Such panels may be used as cladding for walls, either by adhering or otherwise fixing the panels to an existing block or other wall, or by attaching the panels to a wood or steel frame. So, for example, the panels may be used in the construction of new buildings or in the refurbishment of existing buildings. The panels may also be formed to simulate the appearance of roof tiles or slates, to constitute a lightweight, thermally-insulating, roofing panel, or they may be used as flooring panels, either load-bearing, for example in the construction of a balcony or mezzanine floor, or supported by an underlying surface, for example providing an insulated finishing layer to a ground floor. The completed panels may be fixed in position by means of clips or by adhesive, for example.

The invention also provides a composite material for use in providing a decorative surface on a substrate, comprising a supporting foil having a masking material temporarily bonded thereto, the exposed surface of the masking material having a film of adhesive thereon, a non-adhesive backing sheet overlying the adhesive film, the adhesive and the backing sheet being selected such that the sheet is temporarily held in position on the masking layer by the adhesive but is readily separable therefrom, the masking layer and backing sheet being pre-cut in a pattern representing bricks or blocks shapes with mortar bed regions therebetween.

The pre-cutting is conveniently achieved by passing the composite material under a roller provided with a pattern of cutting blades thereon corresponding to the brick or masonry block pattern desired, the height of the blades relative to the space between the

roller and a conveyor for the material or a supporting plane roller being such that the masking layer and backing sheet are cut, but the supporting foil remains unaffected.

Brief Description of the Drawings

In the drawings, which illustrate an exemplary embodiment of the invention:

5 Figure 1 is an enlarged sectional view of the composite material;

Figure 2 shows the underside of the composite material before application to the layer of first cementitious material;

Figure 3 illustrates a portion of the mask before application of the second cementitious material;

10 Figure 4 is a view corresponding to Figure 3, but after the application of the second cementitious material; and

Figure 5 shows the finished surface after removal of the mask.

Detailed Description of the Illustrated Embodiment

The composite material shown in enlarged cross-section in Figure 1 (not to scale) comprises a supporting foil 1 of a plastics material such as polyethylene bonded to a layer 2 of an expanded plastics masking material such as a plasticised polyurethane foam by an adhesive which has sufficient tack strength to hold the foam layer temporarily in place, but which permits separation of the layers when required. The opposite face of the foam layer is provided with a film of an adhesive having a greater tack strength than that between the supporting foil 1 and the masking material 2, so that, when the exposed adhesive adheres to a surface to be masked, lifting the supporting foil causes separation of the foil from the masking layer, rather than lifting the masking layer from the surface. A backing sheet 3, for example of wax-coated paper which temporarily adheres to the adhesive film, protects the adhesive. The masking layer 2, the adhesive film and the backing sheet are pre-cut as indicated at 4 to define brick shapes 5 and continuous mortar regions 6 between them.

In use, the substrate, for example a building surface constructed from insulating blocks, is first sprayed with a thin layer of an aqueous slurry or paste of cement, a filler such as powdered limestone, and mica, with pigment added, if necessary, to achieve the appearance of brick- or block-laying mortar. This is allowed to harden sufficiently to allow

the adhesive film of the composite material to adhere to it. The backing sheet 3 is then peeled off the masking layer only in those regions corresponding to the mortar between the bricks or blocks, leaving it in place overlying the brick or block shapes as shown in Figure 2, and the composite material is applied to the surface so that the adhesive film adheres to the surface.

The supporting foil is then carefully pulled off the surface, carrying with it the brick or block shapes which have not adhered to the substrate, leaving a masking pattern up-standing from the surface to a depth corresponding to the desired height of the brick surface relative to the mortar surface in the finished brickwork. A small portion of the resulting mask is shown in Figure 3.

The second cementitious material is, like the first cementitious material, prepared by mixing with water a composition containing powdered stone, mica and cement in accordance with our European Patent No 749404 to obtain a free-flowing liquid paste which can be sprayed using conventional paint spraying or mortar spraying apparatus. Pigments are added to achieve the desired colour, for example a red brick colour, and waterproofing additives, for example based on silicones, may be added to increase the weather resistance of the resulting decorative finish. Alternatively, the finished surface may be treated, after curing, with a liquid silicone-based water repellent material. The second material is sprayed over the surface, adhering to the first material on the substrate and filling the frames formed by the mask, as illustrated in Figure 4. The material adheres less well to the mask material, which can be formed with a smooth surface to ensure that adhesion of the cementitious material is minimised. Stripping away of the mask leaves a relief pattern of brick or masonry block shapes 7, as shown in Figure 5, with the appearance of recessed mortar between them, thus simulating the appearance of conventional brickwork.

CLAIMS

1. A method of providing a decorative surface on a substrate, comprising spraying on to the substrate a layer of a first hardenable liquid material and allowing or causing the material to harden, applying to the surface of the layer a mask corresponding
5 to the pattern of mortar between bricks or blocks in conventional brick- or block-work, spraying on to the masked layer of hardened first material a layer of a second hardenable liquid material of different appearance from the first material and allowing the material to harden, and stripping the masking layer from the substrate.
2. A method according to Claim 1, wherein the step of applying the mask
10 comprises forming a composite material comprising a supporting foil having a masking material temporarily bonded thereto, the exposed surface of the masking material having a film of adhesive thereon, a non-adhesive backing sheet overlying the adhesive film, the adhesive and the backing sheet being selected such that the sheet is temporarily held in position on the masking layer by the adhesive but is readily separable therefrom, the
15 masking layer and backing sheet being pre-cut in a pattern representing bricks or blocks shapes with mortar bed regions therebetween, stripping off the backing sheet portions corresponding only to the mortar bed regions from the adhesive film, adhering the exposed adhesive film to the substrate, and peeling off the supporting foil to lift off from the layer the portions of the masking layer and backing sheet corresponding to the brick or
20 block shapes, thereby leaving a masking pattern corresponding to the mortar bed regions.
3. A method according to Claim 1 or 2, wherein at least one of the hardenable materials is a cementitious material.
4. A method according to Claim 1, 2 or 3, wherein at least one of the first and second hardenable materials comprises an additive to give a different finished appear-
25 ance from that of the other material.
5. A method according to Claim 4, wherein the additive is such as to yield a different surface texture in the hardened material.
6. A method according to Claim 4, wherein the additive is a pigment.

7. A method according to any preceding claim, comprising spraying two or more different materials to form the layer of first material and/or the layer of second materials.

8. A method according to any preceding claim, comprising temporarily retaining some of the masking layer regions corresponding to individual bricks or blocks, and after application of the second material removing these regions and applying a new mask covering the first and second materials and leaving some exposed brick or block shapes for the application of a different, third, hardenable material.

9. A method according to any preceding claim, wherein the masking layer is formed from an expanded plastics material.

10. A method according to any of Claims 1 to 8, wherein the masking layer is formed from steel sheet.

11. A method according to Claim 10, wherein the masking layer is provided with an expanded plastics layer on the face thereof contacting the substrate, in use.

12. A composite material for use in providing a decorative surface on a substrate, comprising a supporting foil having a masking material temporarily bonded thereto, the exposed surface of the masking material having a film of adhesive thereon, a non-adhesive backing sheet overlying the adhesive film, the adhesive and the backing sheet being selected such that the sheet is temporarily held in position on the masking layer by the adhesive but is readily separable therefrom, the masking layer and backing sheet being pre-cut in a pattern representing bricks or blocks shapes with mortar bed regions therebetween.

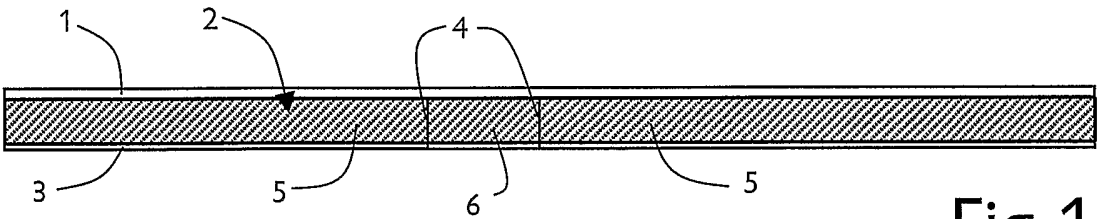


Fig 1

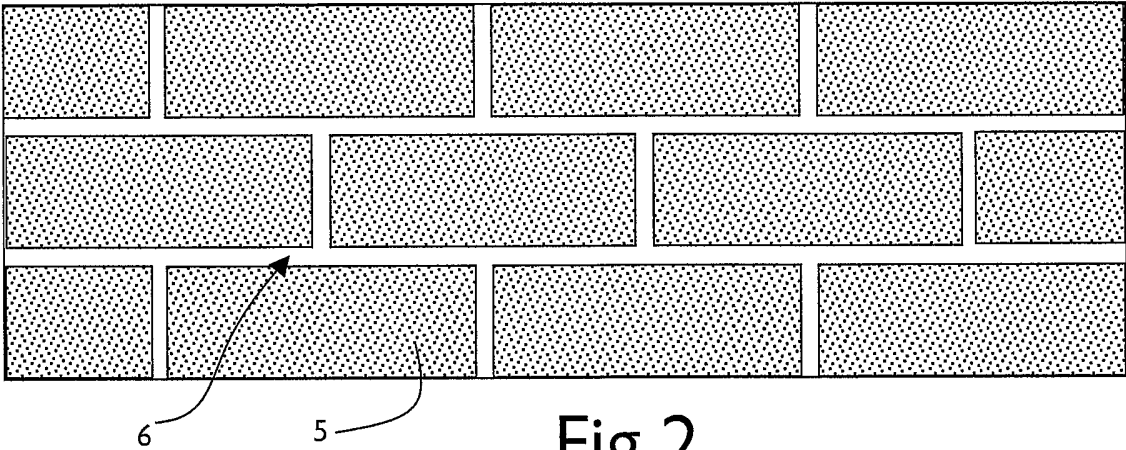


Fig 2

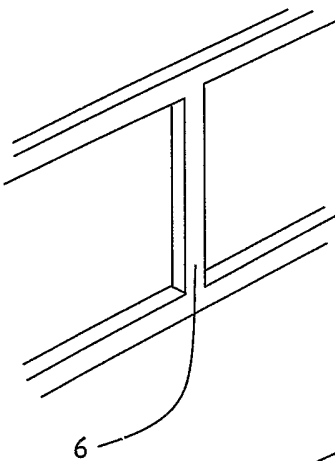


Fig 3

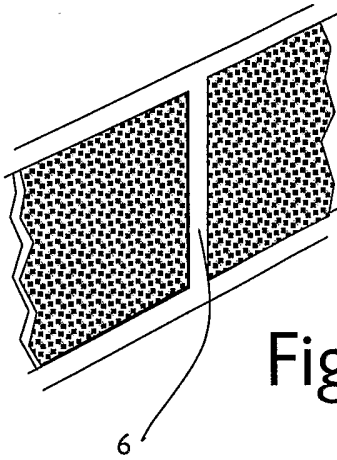


Fig 4

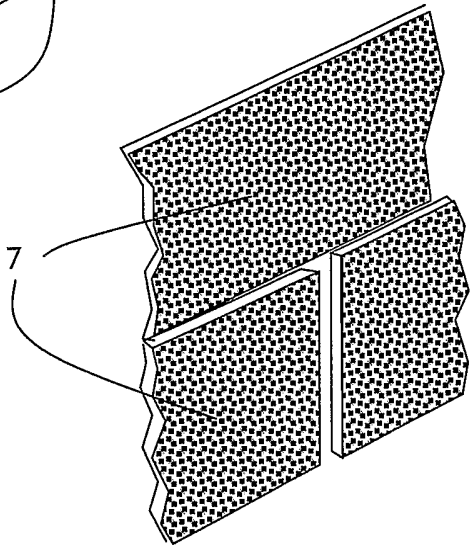


Fig 5