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(54) **COMPOSITE PANEL**

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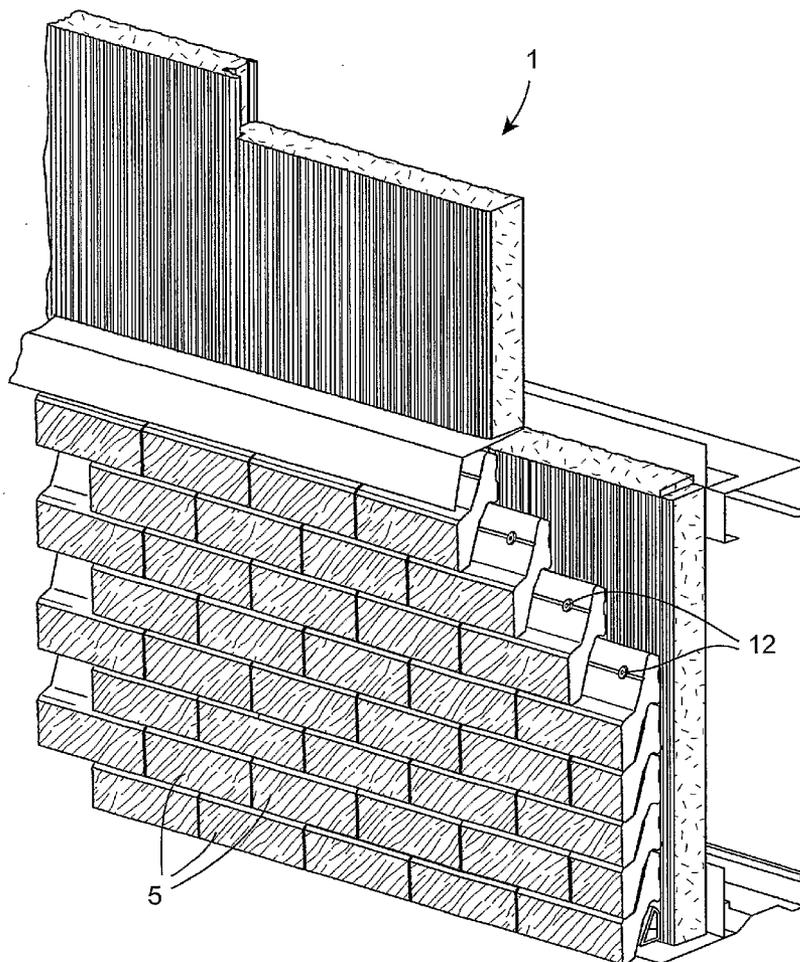
(57) **ABSTRACT**

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A composite cladding panel 1 comprises a backing tray 2 and an external skin 3 with a layer of foam insulation material 4 such as a phenolic or polyurethane based foam material therebetween. One of the skins, in this case the external skin 3 has a plurality of tongue and mortise blocks 5 fastened to the panel 1 by fasteners 12. Each fastener 12 comprises a peel rivet having a mandrel, a stress plate, and a main body. Pilot holes 13 are first drilled through the blocks 5 and the rivet 12 is inserted. On operation of a rivet gun the main body curls up 22 and is clamped against the inside surface of the external skin 3. The blocks 5 are thereby efficiently and effectively clamped to the external skin 3. A composite insulating panel with an integrated high performance brick cladding is provided.

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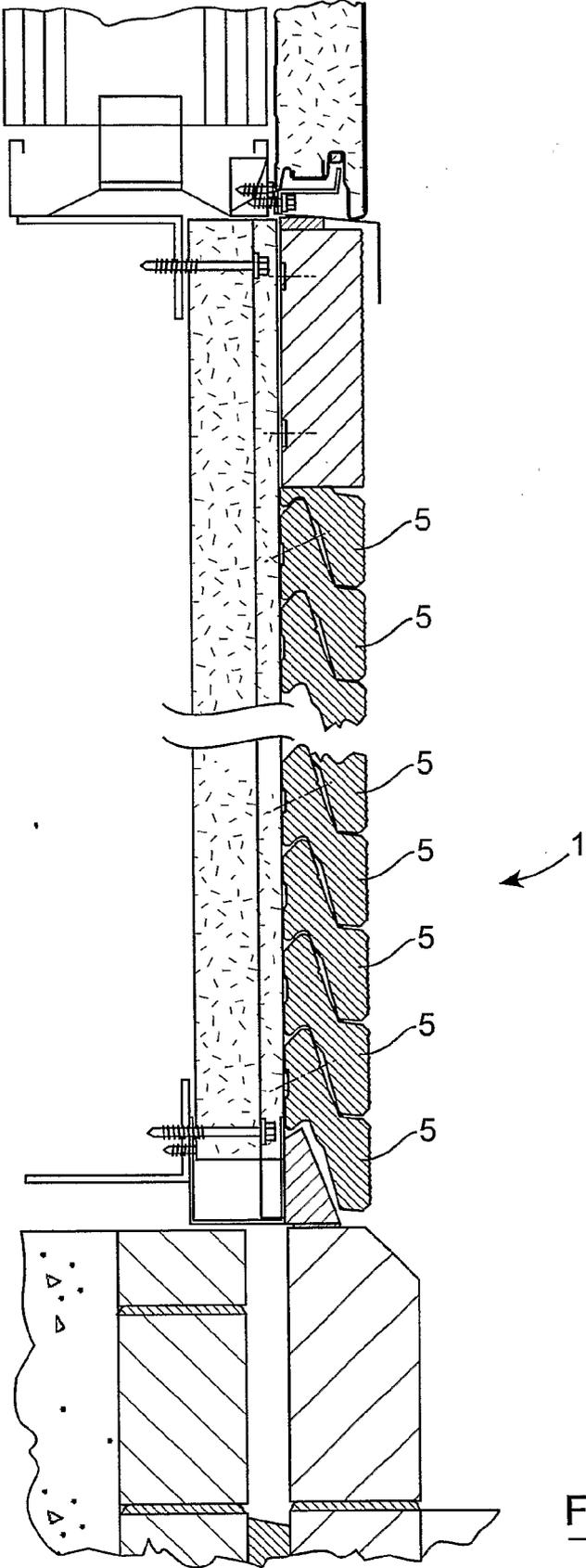
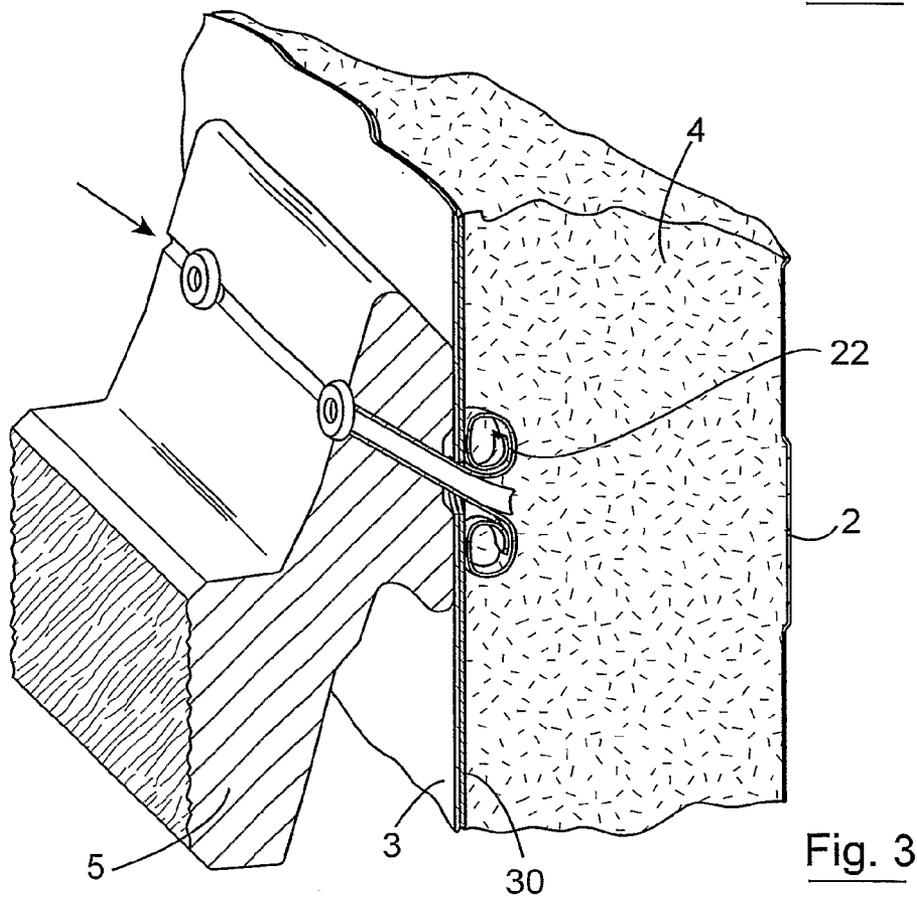
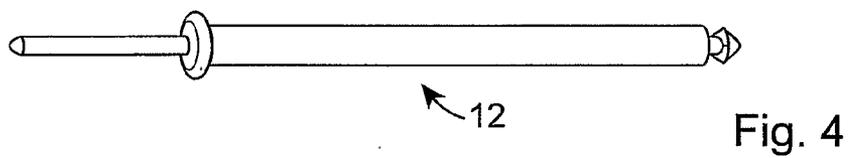
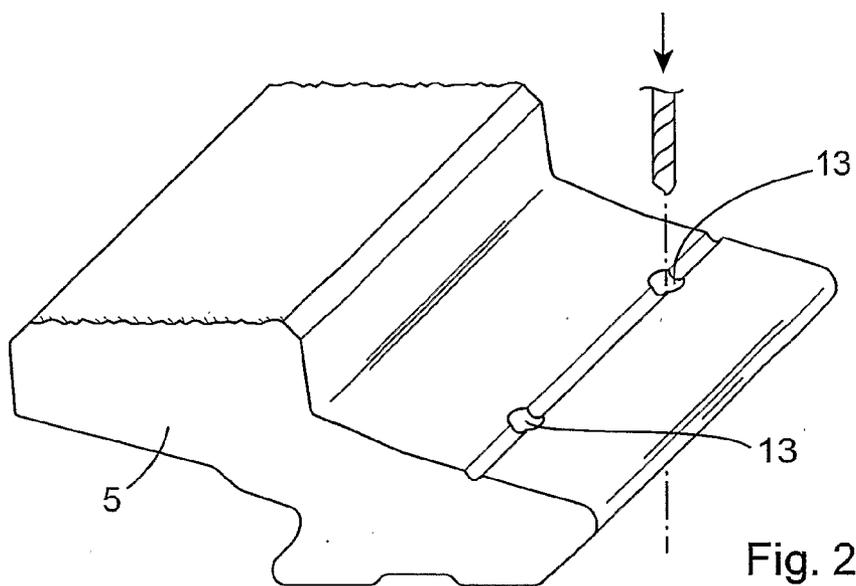


Fig. 1



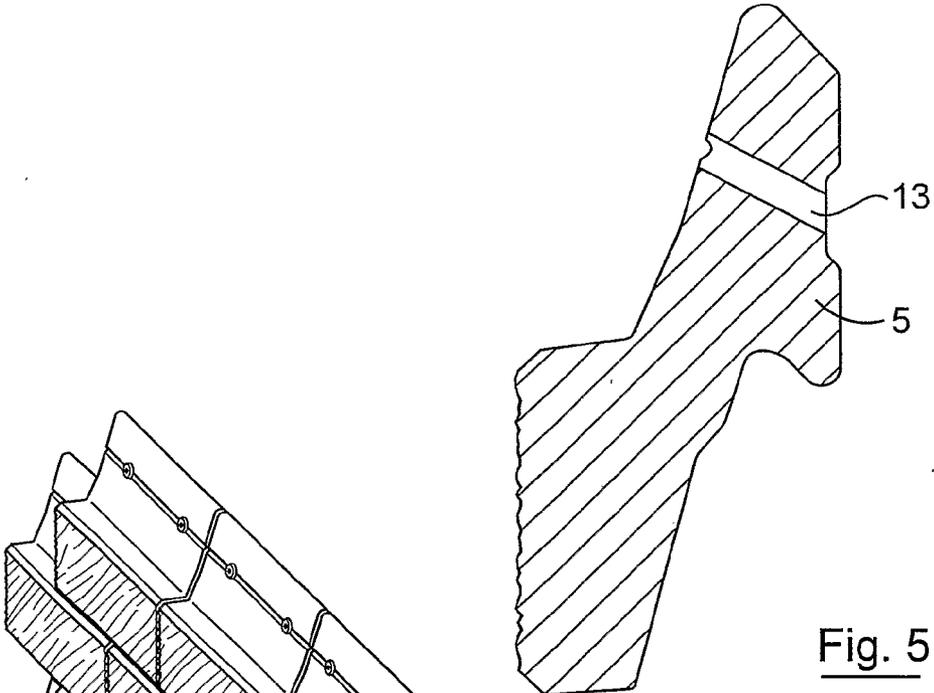


Fig. 5

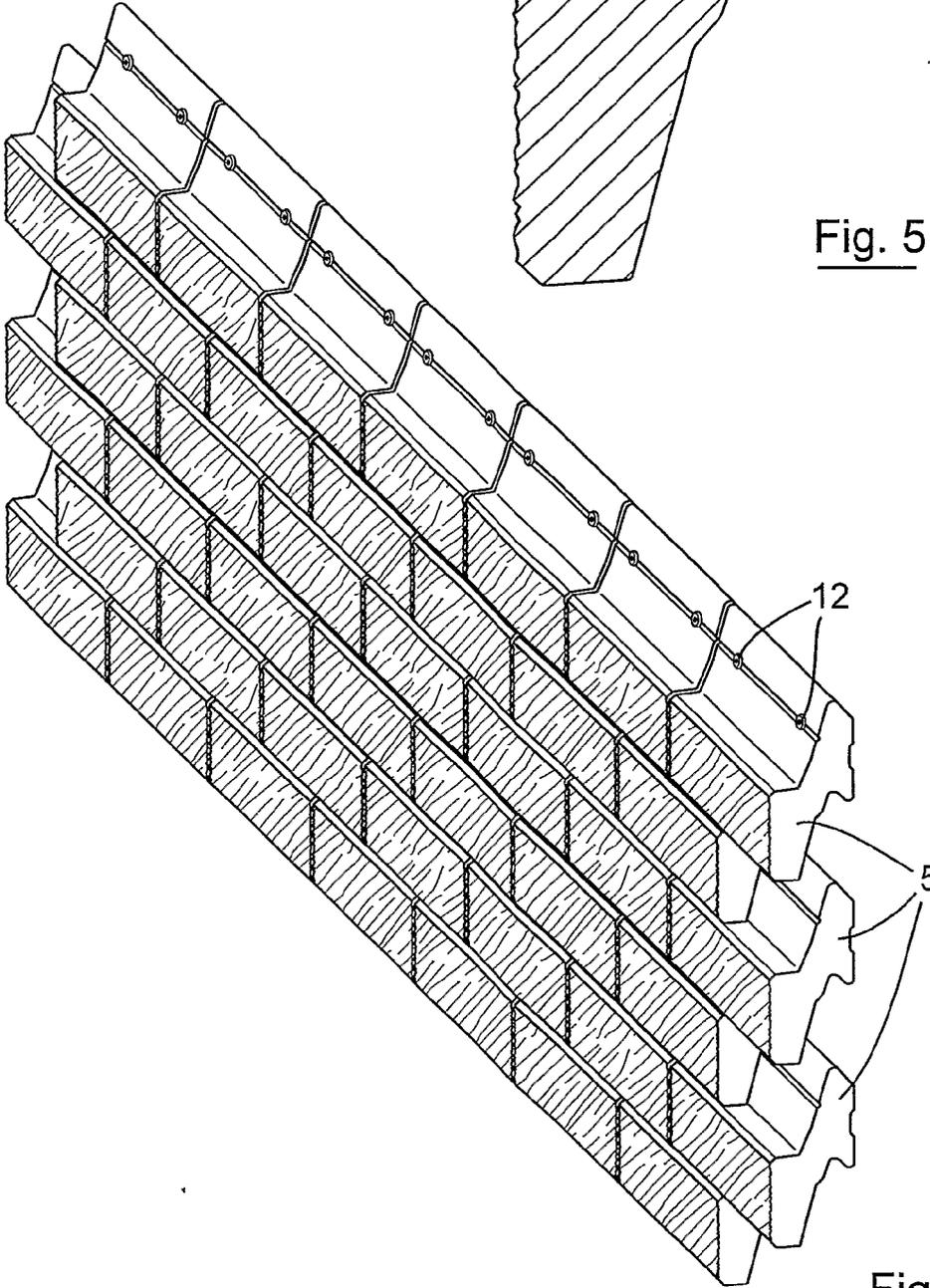
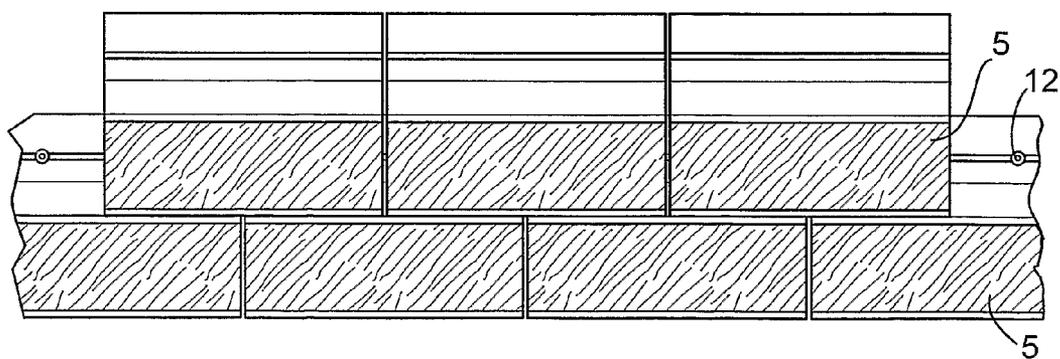
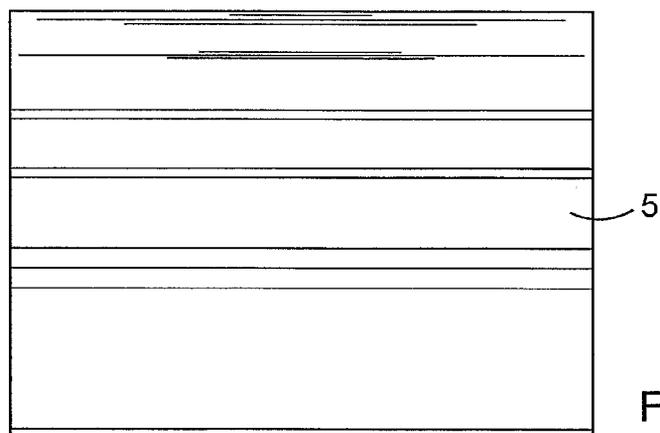
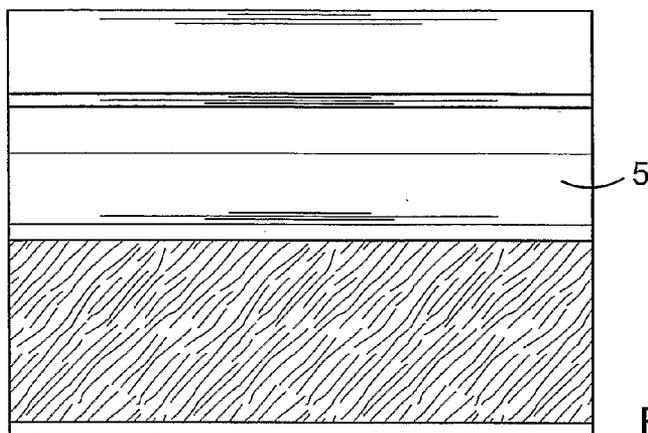


Fig. 6



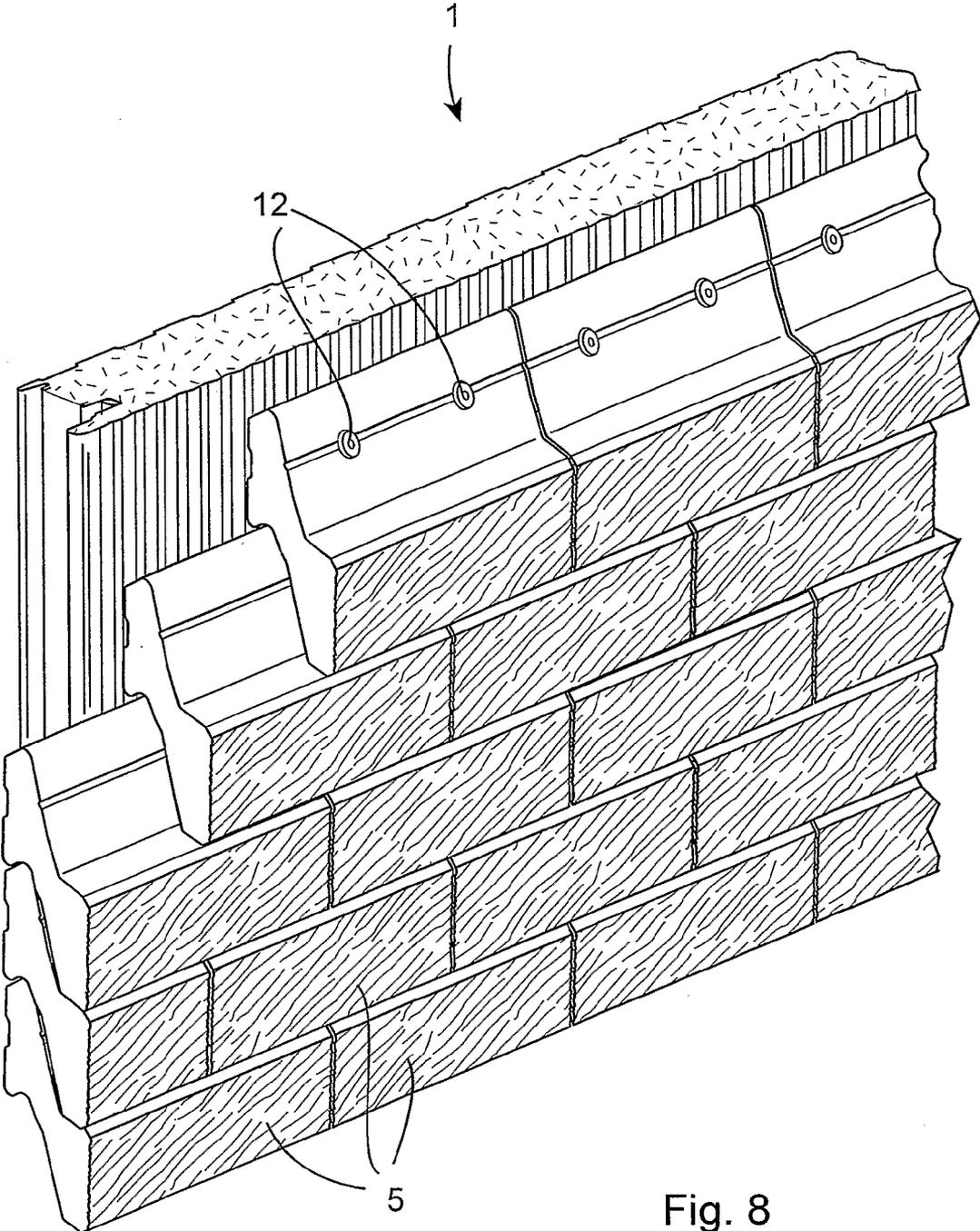


Fig. 8

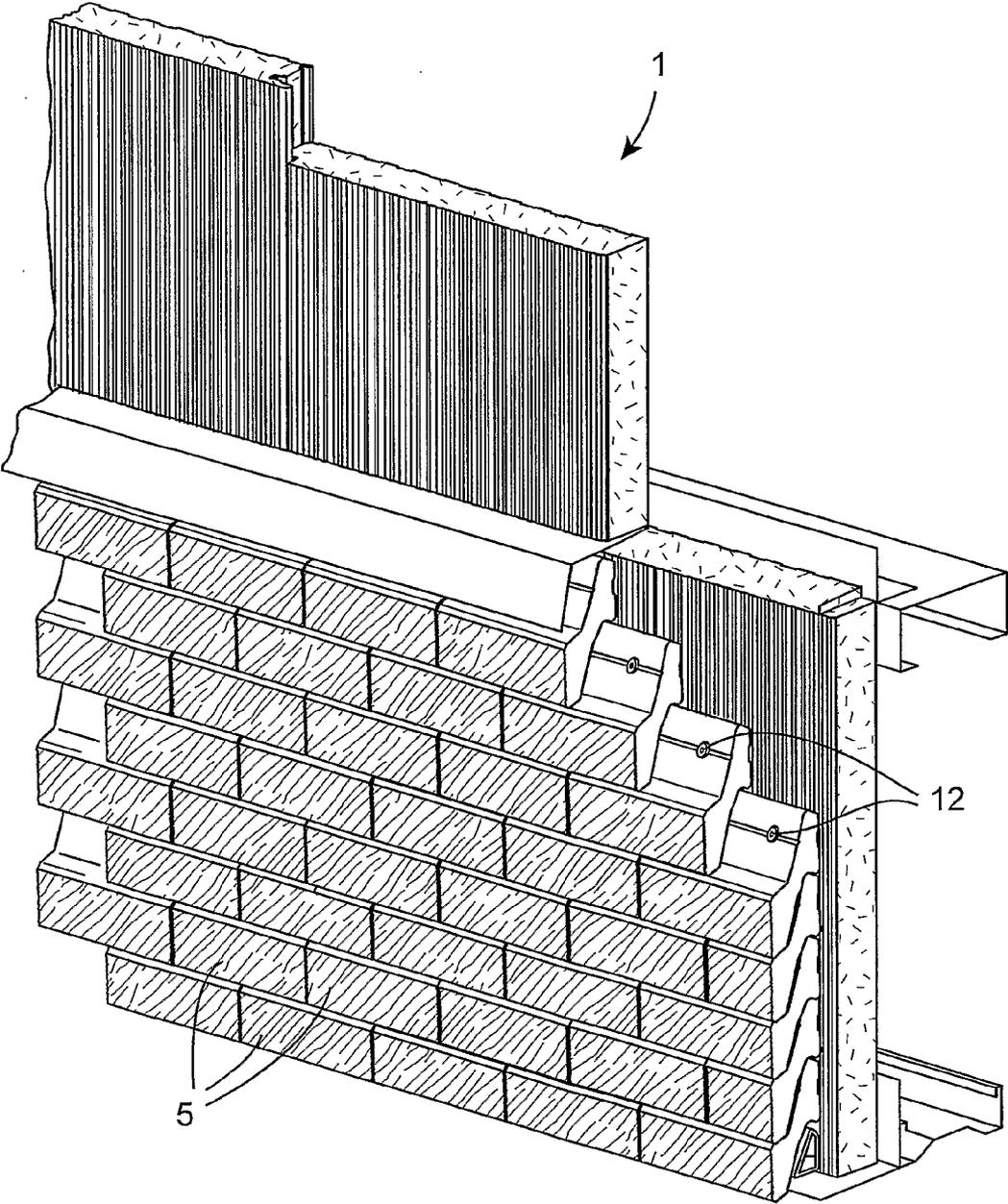


Fig. 9

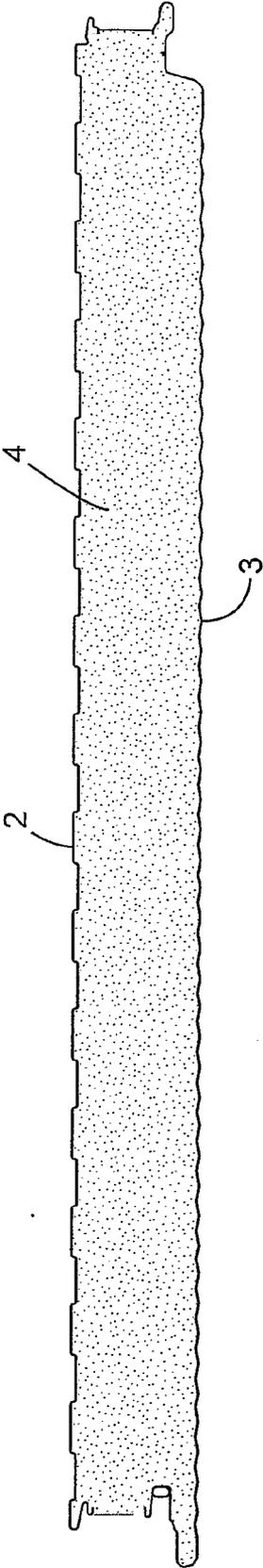


Fig. 10

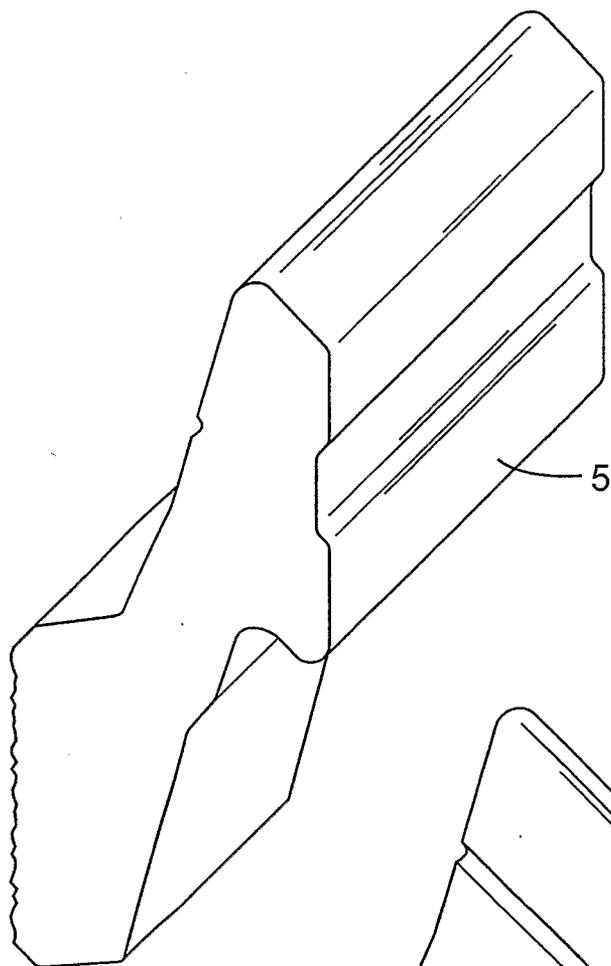


Fig. 12

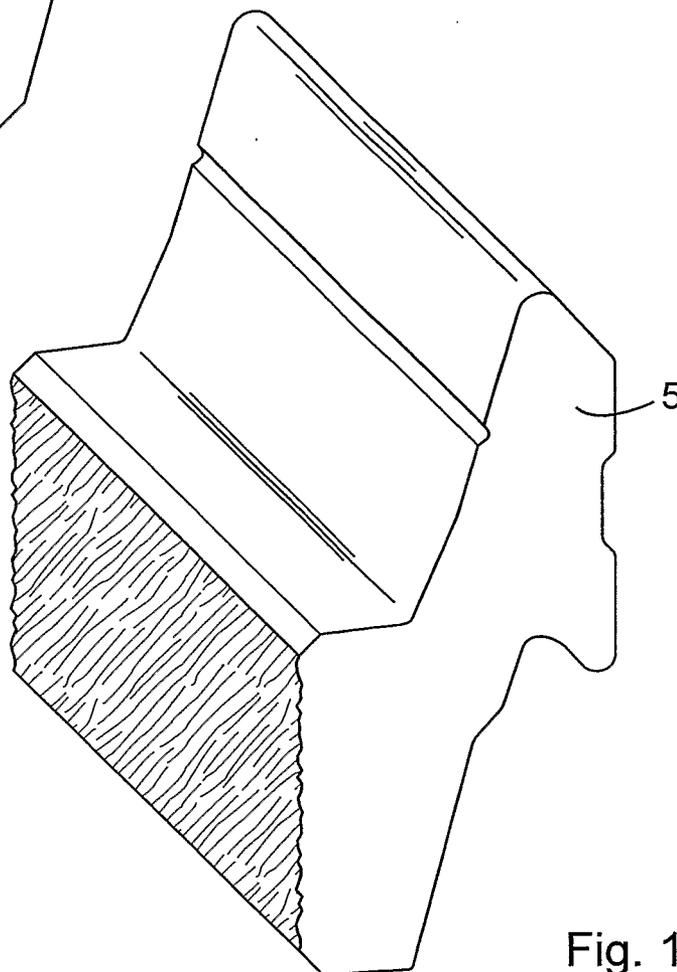


Fig. 11

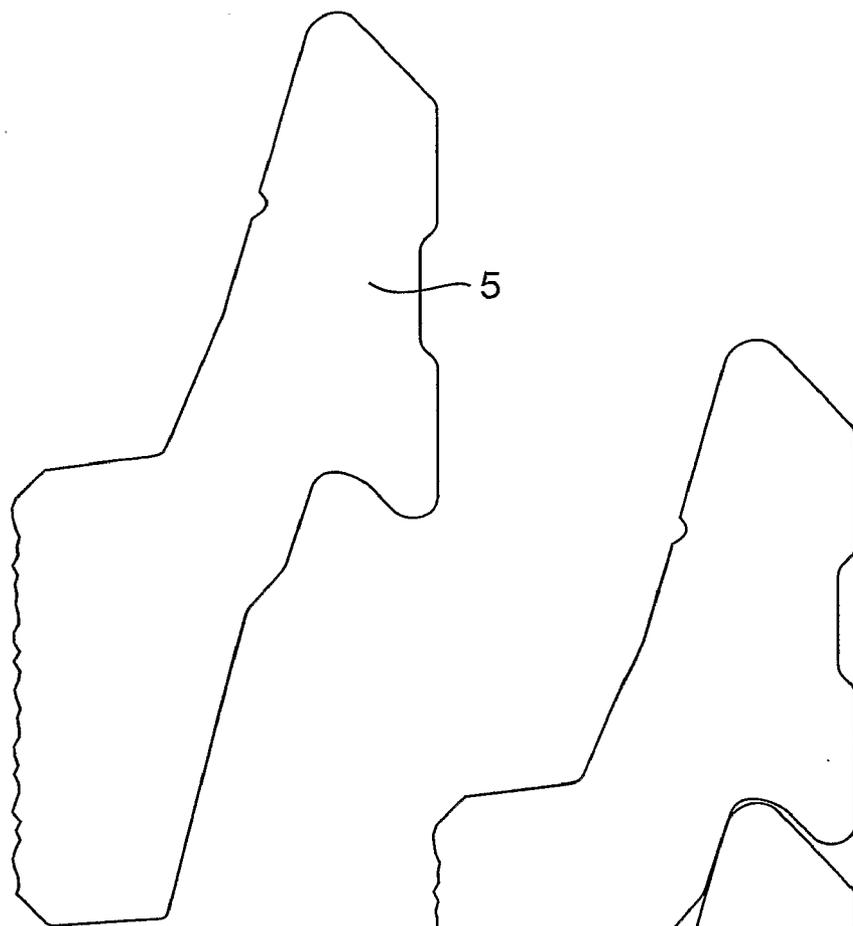


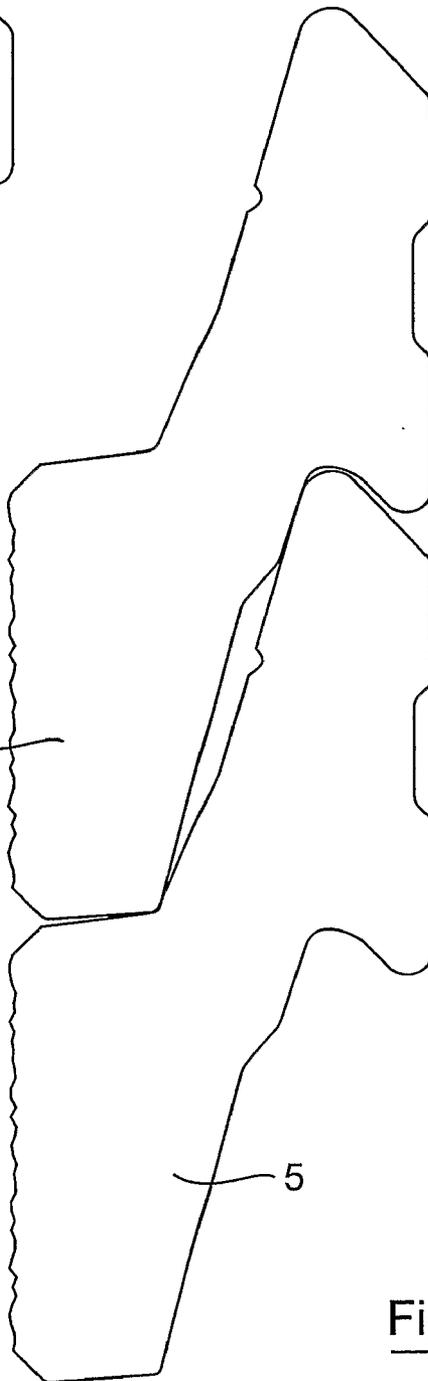
Fig. 13

5

5

5

Fig. 14



## COMPOSITE PANEL

### INTRODUCTION

[0001] The invention relates to a composite cladding panel of the type comprising an inner skin and an external skin with insulation foam material therebetween.

[0002] Buildings comprising a steel frame on which pre-formed panels are mounted may be erected quickly and more cheaply than buildings with brick or block facades.

[0003] One of the problems with buildings constructed from pre-formed panels is that such panels can often be uninteresting aesthetically. It is known to form such panels with various profiles and in various colours, however, there is still a need to provide an aesthetically different façade in some cases.

[0004] This invention is directed towards providing a panel system which will address this need.

### STATEMENTS OF INVENTION

[0005] According to the invention there is provided a composite cladding panel comprising an internal skin and an external skin with insulation material therebetween, one of the skins having a plurality of tongue and mortise blocks mounted directly to the panel by a mounting means to form a cladding.

[0006] In one embodiment the blocks have mounting holes and the mounting means comprises a fastener for insertion through the hole to fasten the block to the panel.

[0007] In one case the fastener comprises a clamping fastener.

[0008] The clamping fastener may comprise a peel rivet.

[0009] In one embodiment the external skin of the panel has an adhesive on the inner face thereof. The adhesive may be applied to the inner face of the external skin prior to lay-down of liquid insulating foam reactants.

[0010] The invention also provides a method for manufacturing a composite cladding panel comprising the steps of:

[0011] manufacturing a composite insulating panel comprising an internal skin, an external skin with insulation material therebetween;

[0012] providing a plurality of tongue and mortise blocks with mounting holes through the blocks;

[0013] providing a plurality of fasteners;

[0014] placing the blocks along at least portion of the external face of a skin; and

[0015] fastening the blocks to the skin by inserting the fasteners through the holes in the blocks.

[0016] The method may comprise the step of fixing the blocks to the panel using the fasteners. The fasteners are preferably clamping fasteners, especially peel rivets.

[0017] In one embodiment the method comprises boring holes through the blocks to provide the mounting holes.

[0018] In one embodiment the method comprises the steps of laying the external skin down with the outer side lowermost, applying an adhesive to the inner face of the external skin, applying liquid foam reactants over the adhesive, applying an internal skin over the liquid form reactants and heating the sandwich thus formed in an oven to form the composite insulating panel.

[0019] The invention further provides composite cladding panels when manufactured by a method of the invention.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The invention will be more clearly understood from the following description thereof given by way of example only, in which:

[0021] FIG. 1 is a cross-sectional view of a composite insulating cladding panel according to the invention with a plurality of tongue and mortise blocks attached;

[0022] FIG. 2 is perspective view of one of the blocks of FIG. 1;

[0023] FIG. 3 is a perspective partially cut-away of the block of FIG. 2 fastened to the panel;

[0024] FIG. 4 is a view of a rivet used to fasten the blocks to the panels;

[0025] FIG. 5 is a cross sectional view of the drilled block of FIG. 2;

[0026] FIG. 6 is a perspective view showing a plurality of the drilled blocks with the panel omitted;

[0027] FIGS. 7(a) to 7(c) illustrate the mounting of the blocks to the panel;

[0028] FIGS. 8 and 9 are perspective views illustrating the mounting of the blocks to panels;

[0029] FIG. 10 is a cross-sectional view of a composite panel with no blocks in place; and

[0030] FIGS. 11 to 14 are various views of a prior art tongue and mortise block used in the composite panel of the invention.

### DETAILED DESCRIPTION

[0031] Referring to the drawings there is illustrated a composite cladding panel 1 according to the invention. The panel 1 comprises a steel skin or backing tray 2 and an external steel skin 3 with a layer of foam insulation material 4 such as a phenolic or polyurethane based foam material therebetween. The panel may be of any suitable type such as that described in our UK2325678A, the entire contents of which are hereby incorporated by reference.

[0032] One of the skins, in this case the external skin 3 has a plurality of tongue and mortise blocks 5 such as those available from Novabrick fastened to the panel 1 by fasteners 12. Each fastener 12 in this case is a clamping fastener and comprises a peel rivet having a mandrel, a stress plate, and a main body. We have found that such a clamping fastener is particularly efficient in fastening such blocks to the panel.

[0033] Pilot holes 13 are first drilled through the blocks 5 and the rivet 12 is inserted. On operation of a rivet gun the main body curls up as illustrated by reference 22 and is clamped against the inside surface of the external skin 3 as will be particularly apparent from FIG. 3. In this way the blocks 5 are fixed to the panels. The blocks 5 are thereby efficiently and effectively clamped to the external skin 3.

[0034] To enhance the peel strength of the composite panel a layer 30 of an adhesive is applied to the internal face of the external skin 3. The adhesive layer 30 is a pre-lay-down adhesive which is compatible with the material of the insulating core 4. We have found that the use of such an adhesive greatly enhances the peel strength of the panel and enables the panel to carry the additional load of the cladding tiles.

[0035] In manufacture, an external skin 3 is drawn from a reel and laid down in a lay-down bed with the internal face uppermost. The adhesive 30 is then uniformly applied over

the internal face of the skin **3** prior to lay-down of liquid foam reactants. The inner skin **2** is then led from a reel and located above the liquid foam reactants.

**[0036]** The assembly is then passed through an oven in which the liquid foam reactants expand to form the insulating core **4**. A desired length of panel is then cut. The blocks **5** are laid out across the external face of the skin **3** and the locations for fastening the receiving holes to be drilled in the panel are marked. The blocks **5** are then fitted as illustrated. The system is a mortarless cladding system.

**[0037]** The invention provides a composite panel of relatively simple but highly robust construction which facilitates easy on site cladding with tongue and mortise blocks. The system creates a strong, water resistant brick finish with insulation built-in. The system combines proven composite insulated panel technology with an aesthetic and high performance mortarless brick cladding.

**[0038]** The system of the invention allows a weather proofed building to be fitted out much quicker than traditional blockwork. This is because the panels can be put up quickly and the building is then ready to fit out. The bricks can be applied to the outside of the panel at any stage. The panels of the invention do not need to cover the whole of the building. For example, they can be used at suitable locations such as for a height of one or two metres from the ground up much like a dado-wall. Such an arrangement is particularly suitable for retail parks, supermarkets and the like as the brick clad panel is more resistant to impact damage (for example from shopping trolleys) than an unclad panel.

**[0039]** The invention is not limited to the embodiments hereinbefore described which may be varied in detail.

**1-15.** (canceled)

**16.** A composite cladding panel comprising an internal skin and an external skin with insulation material therebetween, one of the skins having a plurality of tongue and mortise blocks mounted directly to the panel by a mounting means to form a cladding.

**17.** The panel as claimed in claim **16** wherein the blocks have mounting holes and the mounting means comprises a fastener for insertion through the hole to fasten the block to the panel.

**18.** The panel as claimed in claim **17** wherein the fastener comprises a clamping fastener.

**19.** The panel as claimed in claim **18** wherein the clamping fastener comprises a peel rivet that clamps to the inside of the external skin.

**20.** The panel as claimed in claim **16** wherein the external skin of the panel has an adhesive on the inner face thereof.

**21.** The panel as claimed in claim **20** wherein the adhesive is applied to the inner face of the external skin prior to lay-down of liquid insulating foam reactants.

**22.** method for manufacturing a composite cladding panel comprising the steps of:

manufacturing a composite insulating panel comprising an internal skin, an external skin with insulation material therebetween;

providing a plurality of tongue and mortise blocks with mounting holes through the blocks;

providing a plurality of fasteners;

placing the blocks along at least portion of the external face of a skin; and

fastening the blocks to the skin by inserting the fasteners through the holes in the blocks.

**23.** The method as claimed in claim **22** wherein the fastener comprises a clamping fastener for clamping to the inside of the external skin.

**24.** The method as claimed in claim **23** wherein the clamping fastener comprises a peel rivet.

**25.** The method as claimed in claim **24** comprising the step of fixing the blocks to the panel using the rivets.

**26.** The method as claimed in claim **22** comprising the steps of laying the external skin down with the outer side lowermost, applying an adhesive to the inner face of the external skin, applying liquid foam reactants over the adhesive, applying an internal skin over the liquid form reactants and heating the sandwich thus formed in an oven to form the composite insulating panel.

**27.** The method as claimed in claim **22** comprising boring holes through the blocks to provide the mounting holes.

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