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(72) Inventors:

- **Melvin, Glenn**
Middlesbrough, Cleveland TS7 8NL (GB)
- **Melvin, Rosalind**
Middlesbrough, Cleveland TS7 8NL (GB)

(71) Applicants:

- **Melvin, Glenn**
Middlesbrough, Cleveland TS7 8NL (GB)
- **Melvin, Rosalind**
Middlesbrough, Cleveland TS7 8NL (GB)

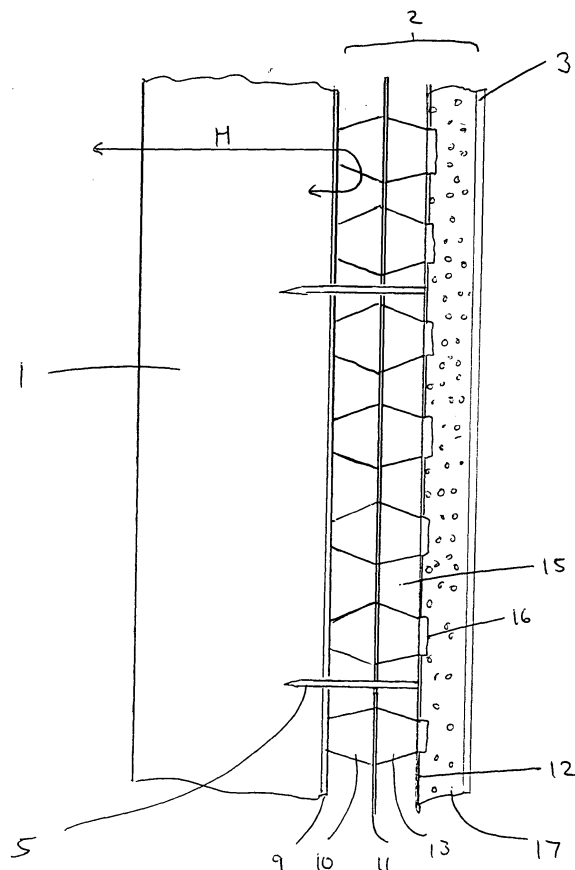
(74) Representative: **Wilson, Peter et al**

Novagraaf Patents Limited,
The Crescent,
54 Blossom Street
York YO24 1AP (GB)

(54) Insulating cladding system

(57) An insulating cladding system for a surface of a building or the like comprising a base membrane, for example a studded plastic sheet, adapted to be fixable to the said surface, an outer membrane, for example a studded plastic sheet, remotely spaced therefrom by means of spacer elements such as the studs, with an outer surface serving as a keying surface for immediate application of a surface finish such as a plaster, render or the like, and at least one thermally reflective metal sheet layer retained in position within the gap, for example by the studs. Further intermediate membranes may be provided. The outer surface may include an insulating plaster underlayer. A method of applying such cladding to a surface is also described.

Figure 1



EP 1 688 552 A1

Description

[0001] The invention relates to a system and method for provision of insulating cladding for use in conjunction with the wall, ceiling or the like of a building or the like to reduce the three modes of heat transfer across building envelopes. The invention further provides a system and method with a capability of reducing sound transmission, whilst also incorporating the prevention of damp and the elevation of condensation. The invention in particular relates to the provision of prefabricated cladding units to be fixed directly to a wall, ceiling or the like to comprise such a system or in accordance with such a method.

[0002] It is essential new insulation methods and techniques are brought to the market to comply with the ever more stringent building regulations. Energy agencies worldwide recognise the problems and see the development of radiation and convection barriers for building structures is needed to complement conduction barriers.

[0003] Ideally, a cladding system should reduce the effects of the three principal modes of heat transfer in relation to buildings. These are convection, conduction and radiation. However, there is also a general desire that any cladding system or method provides for easy application of the cladding to a wall, ceiling or the like, in particular in such manner as to allow for the easy application of a subsequent finishing coat such as plaster or render.

[0004] A number of cladding systems are in existence which are effective for reducing in particular convection and conduction. The simplest form of barrier comprises parallel panels defining a gap between. These act to limit airflow, and limit conduction losses. Both the panels and the gap may also serve as an insulator to reduce conduction losses, with the panels being fabricated from thermally insulating material, and the air gap also serving as an insulating barrier. Multiple layers of panels may be provided. Such systems may be prefabricated. Examples include that described in US patent number 3501878. Although an air gap provides reasonable conduction insulation, such a system may further include insulating material, such as is exemplified by UK published patent application 2345071.

[0005] Such conventional systems can be effective in reducing heat transfer through conduction and convection, but are of limited effectiveness in reducing heat transfer through radiation. Accordingly, as heat transfer through radiation has become more of an issue, such systems have come to be used in conjunction with radiation barriers. The simplest form of radiation barrier is a reflective surface such as for example a metal foil sheet. This might be applied under a plaster/render baseboard or other wall/ceiling covering, such as one fabricated in accordance with the above principles, as is illustrated in UK published application 2367839. Alternatively, reflective layers may be placed over a surface finish such as a render/plaster material. Such an approach is often preferred for example behind internal radiators and other

heaters.

[0006] However, presently there is no cladding system which incorporates the reduction of all three modes of heat transfer which can also be directly coated in a suitable render/plaster material. In particular, there is no such system which can simply be fixed to a wall or ceiling to provide a surface already prepared for the application of render/plaster material. Nor is there a system which achieves these three objectives whilst also upgrading sound insulation, preventing damp and alleviating condensation.

[0007] It is an object of the present invention to provide a system and method for insulating cladding which is effective in reducing all three modes of heat transfer, and in particular one which also upgrades sound insulation significantly, and acts to prevent damp and alleviate condensation.

[0008] It is a particular object of the present invention to provide a system which achieves this objective by means of units which are easy to apply in situ, for example as a modular construction, and which provide a ready surface for the immediate application of a surface finish such as a plaster or render, and to provide a method for such application.

[0009] Thus, in accordance with the invention in the first aspect there is provided an insulating cladding system for a surface such as a wall, ceiling or the like comprising a base membrane adapted to be fixable to the said surface, an outer membrane remotely spaced therefrom by means of spacer elements in the gap thereby defined, an outer surface of which outer membrane comprises a keying surface for immediate application of a surface finish such as a plaster, render or the like, and at least one thermally reflective layer retained in position within the said gap and generally coextensive with the said membranes. In particular, the at least one reflective layer is supported within the gap laterally spaced from both the base and the outer membrane by means of the spacer elements.

[0010] The whole system is conveniently provided assembled as a unit, or as a plurality of modular units for modular application, so as to be readily applied in situ onto a wall, ceiling or the like and provide an insulating cladding with a capacity to reduce all three modes of heat transfer which also presents an immediately plasterable, renderable or otherwise finishable surface. The single unit reduces all three modes of thermal transmission in a simple, quick and effective manner which is not provided by prior art systems. It is quicker, easier and cheaper to provide a finished wall or ceiling or the like incorporating the insulating cladding of the invention and a suitable surface finish than has been possible hitherto.

[0011] The base membrane preferably comprises a generally planar rigid or semi-rigid sheet (that is, a sheet which exhibits sufficient rigidity for the purpose in use when assembled into the system). The sheet may have thermally insulating properties. The sheet is also preferable substantially impermeable to moisture. The base

membrane is adapted to be fixable to the wall, ceiling etc, and for example has provision for mechanical fixings, keying surfaces for the provision of adhesive, or other suitable fixings or combinations.

[0012] The base membrane is conveniently fabricated from suitable plastics material, for example comprising an optionally reinforced thermoplastic or thermoset polymer.

[0013] The outer membrane similarly preferably comprises a generally planar rigid or semi-rigid sheet, and is conveniently coextensive with the base membrane. The outer membrane serves as a cover layer for the system, and further serves to present an outermost surface acting as a keying surface for the required surface finish such as plaster, render or the like. The outer membrane may conveniently be fabricated of similar material to the base membrane, and in particular may be of similar plastics material and/or may have similar thermally insulating and/or moisture impermeable properties. The outer membrane may be of monolithic construction, with an outer surface integrally therewith inherently serving as a keying surface for the surface covering, or may alternatively be of a multi-layered construction with at least an innermost structural membrane layer and an outermost keying layer.

[0014] One or more intermediate membranes comprising similar or dissimilar materials, and in particular comprising further rigid or semi-rigid sheets generally parallel to and coextensive with the base and outer membranes, maybe provided in the gap therebetween.

[0015] The spacer elements preferably comprise rigid lateral projections extending from an inner surface of one or both of a pair of adjacent membranes to space the membranes and define the gap therebetween. In particular, the spacer elements comprise an array of projecting studs fixedly attached to or integrally moulded with the membrane. Most preferably, the spacer elements comprise co-engaging extending projections between adjacent membranes.

[0016] In a particular preferred embodiment, each membrane comprises a studded plastics sheet of a design which will be generally familiar in relation to known insulating cladding systems, wherein internally facing studs co-operably engage to act as spacer elements. Such materials are especially useful, since the surface relief inherently provided on the external surface in consequence of the integrally moulded studs on the internal surface can give an inherently good keying surface for plaster, render or the like and/or for fixing of a unit to the wall or ceiling.

[0017] The key to the invention however is the provision of one or more reflective layers within the gaps defined by the base and outer membrane, including where applicable any gaps defined by an intermediate membrane with a base or outer membrane or with each other, which serve as the main means of reduction of heat transfer through radiation. By provision of a radiation reduction layer within the structure of a cladding system in accord-

ance with the invention, the system is rendered able to prevent all three modes of heat loss, and there is no need for the use of additional radiation preventive materials.

[0018] The or each reflective layer is disposed within the gap between the base and outer membrane to lie generally coextensive therewith and be supported by the structure formed by the membranes, for example on the surface of a membrane but, more preferably, spaced therefrom and supported by the spacer elements. In a preferred embodiment, a reflective layer is disposed between a pair of adjacent membranes, whether the base and outer membrane, or some combination of those and intermediate membranes where present, wherein the spacer elements comprise mutually engaged projecting studs retaining a reflective film layer in position in the gap thereby defined at the point of engagement of the studs.

[0019] The reflective layer preferably comprises a reflective sheet, and is for example a sheet of metallic material.

[0020] The outer membrane presents an outermost surface in use which serves as a key surface for plaster, render or like finish. Optionally, the outer membrane comprises in combination a rigid or semi-rigid plastic sheet structural layer, and one or more outer layers serving as a plaster or render base. In one particularly preferred embodiment, such an outer layer comprises an insulating plaster underlayer, for example comprising a dispersion of insulating particles such as expanded polystyrene spheres in a plaster matrix. Such a surface provides a particularly convenient surface for the application of a top coat plaster finish.

[0021] In accordance with the invention in a further aspect, a method for the application of thermal insulation, and in particular thermal insulation also serving as acoustic insulation and/or damp or condensation prevention, to building envelopes or the like comprises applying a system as above, for example in the form of modular units, and in particular comprises the steps of

- a) preparing a surface ready for application of cladding as above described;
- b) applying the cladding system as above described, in particular in the form of a plurality of modular units overlapped as necessary, to the said surface, and optionally air sealing with a suitable sealant;
- c) fixing the cladding in position, for example utilising mechanical fixings such as wall-plugs, and thereby creating a cladded surface suitable for the application of an appropriate finish; and optionally thereafter
- d) applying a suitable finish such as a plaster or render, for example in the case of an external surface applying an external weather proof finish, which can only be acquired aesthetically, and in the case of an internal surface applying a coating such as finishing plaster when used internally.

[0022] In accordance with the invention there is thus provided a system and method of preventing heat trans-

fer covering the three modes: radiation, conduction and convection, and also reducing sound transmission, which in a preferred embodiment makes effective use of already known studded semi-rigid sheet material by incorporating a reflective foil or coating to produce a system which can be directly plastered/rendered, and may for example include insulating plaster/render ready for finishing with a top coat.

[0023] The number of membranes can be multiplied giving a more effective barrier depending on insulation requirements. The material can be applied internally or externally onto any structure or could be utilised in pre-fabricated panel processes, and finished as required.

[0024] The invention will now be described by way of example only with reference to figure 1 of the accompanying drawings, which illustrates in cross section an insulation cladding system in accordance with the invention in situ on the surface of a structure.

[0025] Referring to figure 1, a structure 1 is illustrated onto which a cladding 2 in accordance with the invention has been fixed by means of mechanical fixing 5, and to which a finish coat 3, such as a plaster or render top coat, has been applied.

[0026] The main structural element of the cladding consists of a studded plastic base sheet 9 provided with projecting studs 10, and a studded plastic top sheet 12 provided with projecting studs 13. The projecting studs 10, 13 engage with each other and act to separate the sheets 9, 12 to define an air gap with a series of air-sealed cells 15. These reduce convection losses in familiar manner, with the air gap also serving as an insulator to limit conduction losses. Optionally, the air gaps may be filled with material offering greater conduction insulation than air.

[0027] The particular refinement of the cladding in accordance with the invention is the provision of a reflective/radiant barrier in the form of the metal sheet 11. The metal sheet is held in position between, spaced from, and generally parallel to the parallel sheets 9/12 by means of the co-operating studs 10/13. It forms an effective barrier to radiant heat loss, creating a heat flow direction generally in the direction of the arrow H. The cladding thus, in a single integral construction, provides for limitation of all three principal modes of heat transfer.

[0028] In the embodiment, the cladding is further refined, and its effects further enhanced, by incorporation of a low-density layer 17. This low density layer is conveniently in the form of an insulating plaster, for example comprising polystyrene spheres in a plaster matrix, with the back portions 16 of the studs 13 on the outer sheet 12 providing a key to ensure that this plaster under layer is soundly retained as part of the cladding 2. The plaster under layer itself serves as a key for the top coat 3.

[0029] The insulating cladding of the invention thus provides a means for reducing all three modes of heat transfer in a single application, and at the same time providing a cladding which is immediately ready for application of a finish in situ.

Claims

1. An insulating cladding system for a surface comprising a base membrane adapted to be fixable to the said surface, an outer membrane remotely spaced therefrom by means of spacer elements in the gap thereby defined, an outer surface of which outer membrane comprises a keying surface for immediate application of a surface finish such as a plaster, render or the like, and at least one thermally reflective layer retained in position within the said gap and generally coextensive with the said membranes.
2. An insulating cladding system in accordance with claim 1 wherein the at least one reflective layer is supported within the gap laterally spaced from both the base and the outer membrane by means of the spacer elements.
3. An insulating cladding system in accordance with claim 1 or claim 2 wherein the base membrane comprises a generally planar rigid or semi-rigid with thermally insulating and moisture impermeable properties.
4. An insulating cladding system in accordance with one of claims 1 to 3 wherein the outer membrane comprises a generally planar rigid or semi-rigid generally coextensive with the base membrane with thermally insulating and moisture impermeable properties and an outermost surface adapted to act as a keying surface for the required surface finish such as plaster, render or the like.
5. An insulating cladding system in accordance with any preceding claim further comprising one or more intermediate membranes comprising further rigid or semi-rigid sheets generally parallel to and coextensive with the base and outer membranes in the gap therebetween.
6. An insulating cladding system in accordance with any preceding claim wherein the spacer elements comprise co-engaging extending rigid lateral projections extending from an inner surface of each of a pair of adjacent membranes to space the membranes and define the gap therebetween.
7. An insulating cladding system in accordance with claim 6 wherein the spacer elements comprise an array of projecting studs integrally moulded with the membrane, whereby internally facing studs co-operably engage to act as spacer elements.
8. An insulating cladding system in accordance with claim 7 wherein the reflective layer is disposed between a pair of adjacent membranes, the mutually engaged projecting studs retaining the reflective film

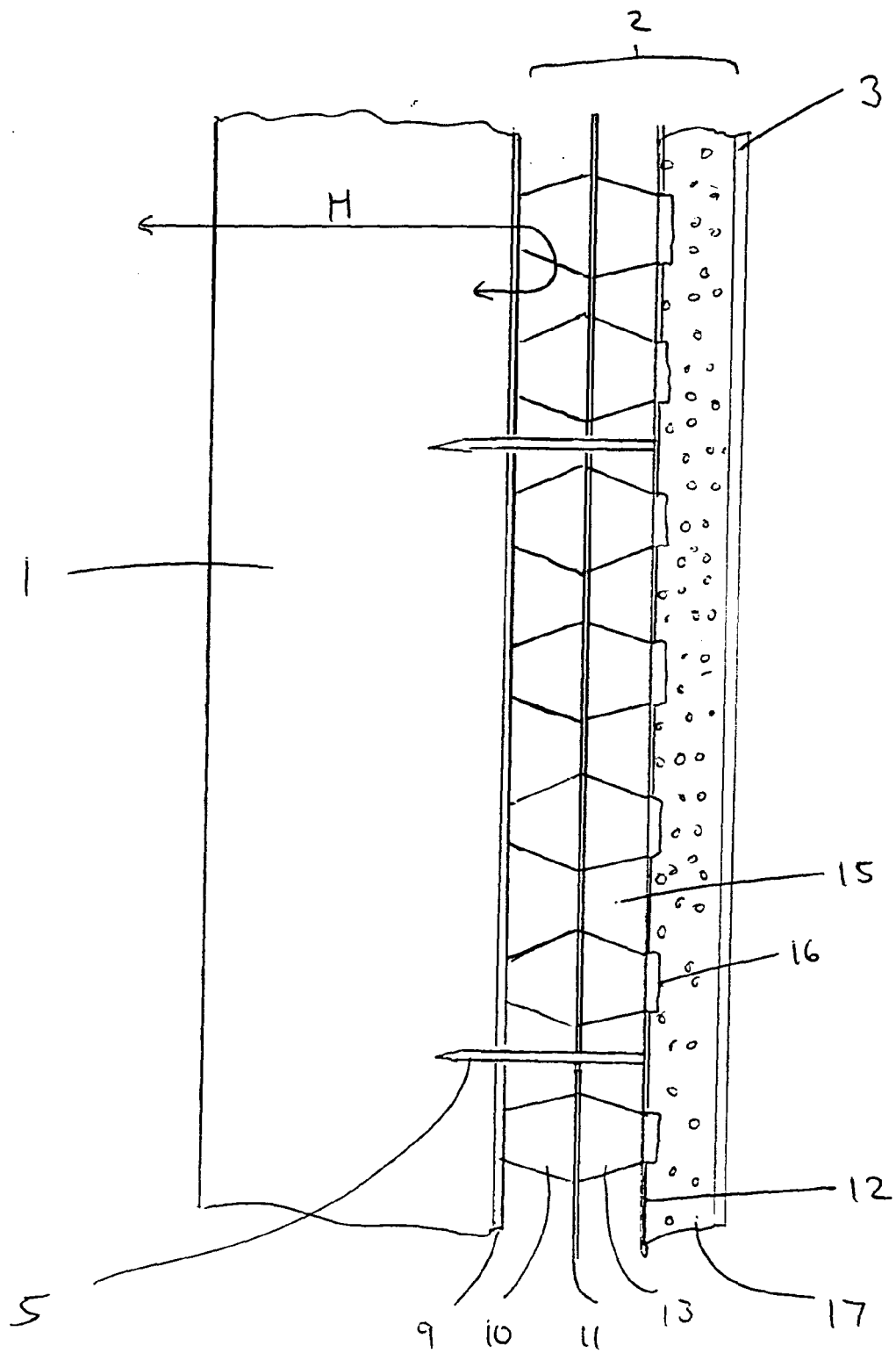
layer in position in the gap thereby defined at the point of engagement of the studs.

9. An insulating cladding system in accordance with any preceding claim wherein the reflective layer comprises a reflective sheet of metallic material. 5
10. An insulating cladding system in accordance with any preceding claim wherein the outer membrane comprises in combination a rigid or semi-rigid sheet structural layer, and one or more outer layers serving as a plaster or render base. 10
11. An insulating cladding system in accordance with claim 10 wherein the outer layer comprises an insulating plaster underlayer, comprising a dispersion of insulating particles such as expanded polystyrene spheres in a plaster matrix. 15
12. A method for the application of thermal insulation to building envelopes or the like comprises applying a system in accordance with any preceding claim to a surface thereof. 20
13. The Method of claim 12 comprising the steps of 25
 - a) preparing a surface ready for application of cladding;
 - b) applying the cladding system in accordance with any one of claims 1 to 11, in particular in the form of a plurality of modular units overlapped as necessary to the said surface, and optionally air sealing with a suitable sealant; 30
 - c) fixing the cladding in position, for example utilising mechanical fixing such as wall-plugs, and thereby creating a cladded surface suitable for the application of an appropriate finish; and optionally thereafter 35
 - d) applying a suitable finish such as a plaster or render, for example in the case of an external surface applying an external weather proof finish, which can only be acquired aesthetically, and in the case of an internal surface applying a coating such as finishing plaster when used internally. 40 45

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Figure 1





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 05 07 5309

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