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(54) Sealing member for insulated cavity walls.

(57) A flexible, thermally insulating, compressible sealing profile (1) for use in cavity wall construction (9, 10) comprises essentially an L-shaped cross-section, which is adapted to be a compression fit in the cavity wall (9,10). The outer longitudinal face (5) of the vertical limb (2) of the profile (1) abuts the inner surface of the exterior wall (10) and the longitudinal edge of the horizontal limb (13) abuts the cavity surface of the interior wall (9). An insulting board (14) is received in the space defined between the profile (1) and the interior wall (9). Preferably, the top surface (3) of the vertical limb (2) is inclined towards the exterior wall (10) and a water-impermeable film (6) extends from the insulating board (14) over said top surface (3) to a joint (15) in the exterior wall (10) to direct condensation or water from the cavity (7).

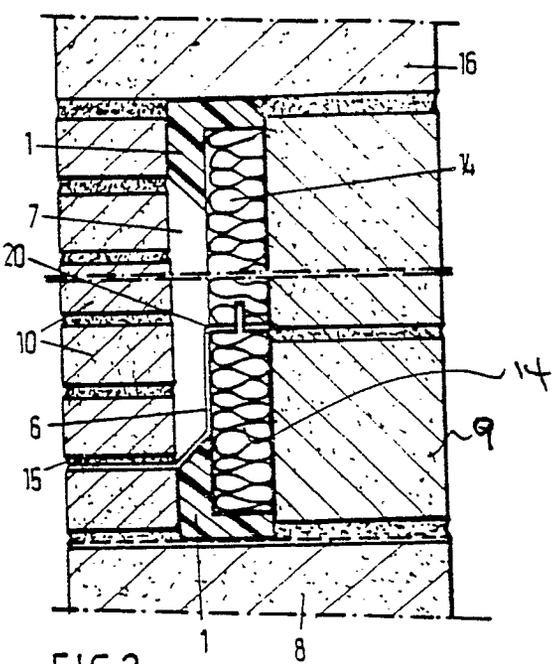

FIG.2

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SEALING MEMBER FOR INSULATED CAVITY WALLS

This invention relates to an elongate air sealing member made from a flexible, compressible, water repellant material having, inter alia, thermal insulating properties. More particularly, this invention relates to an auxiliary insulating profile for installation in a cavity wall.

In certain types of building construction, known as insulated, cavity wall construction, it is customary to have a construction comprising an outer wall, an air gap or cavity that is eventually vented, and an inner wall. Such a construction usually includes insulation boards or insulation materials applied to the inside cavity wall in such a manner that a venting space remains between the insulating boards and the outer wall. It has been shown that natural convection, meaning thermal air circulation, causes substantial heat losses around insulation layers and/or insulation boards, as compared to calculated theoretical values.

Thus, in order to obtain a proper thermal insulated cavity wall, adequate steps must be taken to prevent natural convection from occurring. This requires that the insulation boards fit tightly together so as to form an airtight shield. Openings of only a few millimeters in width can create natural convection currents with corresponding substantial heat losses.

Even more important, however, is to be able to seal all openings around the top and bottom edges of insulation layers, around wall openings and vertical corner connections of cavity walls, so as to prevent normal air infiltration and thermal convection from occurring.

In practice, the inner wall is normally not smooth at its cavity side, i.e. there are projecting cement residues and brick dimensional tolerances which prevent insulating boards from coming to rest perfectly against the inner-wall. Furthermore, the top and bottom edges of insulation layers are normally not sealed in an airtight manner with other building parts. Therefore, it is clear that in order to obtain proper thermal insulation, it is necessary to take extra precautions and work very accurately, which is time-consuming and hence an expensive way of building an insulated, cavity wall construction.

It is an object of this invention to provide an auxiliary member or cavity sealing profile for use in insulated cavity wall construction that is simple to use, and that prevents the circulation of air via natural convection around the insulating layer. It is a further object of this invention to provide a method of insulating cavity walls, which utilizes the cavity sealing profile of this invention.

The auxiliary member comprises essentially an L-shaped cross section of a flexible, compressible, water repellant material having thermal insulation properties. Such a profile is adapted to fit against the butt edge of an insulating board. Other types of L-shaped profiles can be employed to accommodate insulating boards having tongue-and-groove edges, or ship-lapped edges. L-shaped profiles containing various other minor modifications can also be employed to accommodate the edges of specially formed insulating boards, and these are contemplated as falling within the scope of the present invention.

It is clear that any flexible, compressible, water repellant material having thermal insulating properties can be employed in the practice of this invention. Such materials include, for example, synthetic foams made from polyethylene, polypropylene, polyurethane, ethylene vinyl acetate, polyvinyl chloride, polystyrene and the like, both extruded and expanded. Preferably, elastic, closed-cell, crosslinked and non-crosslinked polyolefin foams are employed.

Still more particularly, cavity sealing profiles comprising closed-cell, non-crosslinked polyethylene foam or mixtures containing such foams are utilized in the present invention. These materials have very good thermal insulating properties, are not susceptible to hydrolysis and absorb practically no water. Moreover, such polyethylene foam materials are resilient and can absorb the tensile and compressive stresses arising from temperature fluctuations or load pressures. Due to their resilience they are able to deform under stress and pressure and thereby fit tightly into a cavity wall without cracking. Thus, cavity sealing profiles made from such materials form a tight compression fit within the cavity that effectively prevents any heat losses from occurring via thermal convection.

The desired profiles can be milled to shape from block foam, molded to shape, or extruded to shape through special dies. However prepared, the cavity sealing profile is adapted to be placed in the cavity of the wall in such a manner that the outer longitudinal face of the vertical member of the L-shaped profile is adjacent to the inner surface of the exterior wall, while the longitudinal edge of the horizontal limb of the L-shaped cavity sealing profile is adjacent to the inner cavity surface of the interior wall.

One advantage of the cavity sealing profile or auxiliary profile described herein is in the construction of the cavity wall itself. In some countries, both inner and outer cavity walls are progressively constructed at the same time. By seating the auxiliary profile at the base of the cavity of the cavity wall, it

forms a spacer between the inner and outer walls, thereby providing and maintaining a proper cavity width. At the same time, the auxiliary profile helps to prevent cold bridges from occurring at connections between insulation surfaces and other construction parts. Furthermore, as a construction aid, once the longitudinal surface of the horizontal limb of the cavity sealing profile is plumb and level, insulation boards subsequently added thereto will also automatically be level. Once the top of the cavity wall is reached, a second cavity sealing profile is attached which is in opposition to the base cavity sealing profile, thereby effectively sealing all air leaks both at the bottom and at the top of the cavity. Obviously, additional cavity sealing profiles can be installed at vertical corners and around wall openings, such as doors and windows.

In addition to the other functions previously mentioned, the cavity sealing profiles of the present invention can serve to discharge any condensate or rain water that may occur in the cavity between the insulating layer and the inner surface of the exterior wall. In a preferred embodiment of the present invention, the top surface of the cavity sealing profile, is sloped downwardly to the exterior wall. Thus, the inclined top surface conducts any water or condensate towards the direction of the external wall. The water and condensate can be easily discharged via openings provided near the lowest point of the inclined top surface leading to the exterior of the outer wall.

For an even more effective discharge of cavity wall condensate or rain water that might collect within the cavity, a moisture-proof, tear resistant, flexible film can be employed which serves as a condensate or water barrier. As a preferred embodiment such a film is made to adhere to the sloping surface of the cavity sealing profile. The top edge of this film is secured to the exterior surface of the insulation board, whereas the bottom edge of this film leads to the outside of the exterior wall via a horizontal joint in the outer wall. Such a film effectively serves as a water impermeable barrier and conduit to the exterior surface of the outer wall for any rainwater or condensate that finds its way inside the cavity wall. The top of this film can be conveniently secured to the exterior surface of the insulation boards by passing the film through a horizontal joint of the insulation layer in such a manner as not to disturb the air tightness of the joint.

Any type of moisture proof film can be utilized in connection with this invention. Due to the hard usage to which such a film is subjected during construction, it is desirable to employ a film of sufficient thickness so as to be tear and puncture resistant, but which still retains its flexibility. Cast or blown films made from linear low density polyethylene resins are particularly useful in the practice of this invention. They exhibit exceptional tear, toughness and puncture resistant properties and are completely water resistant. The film can be so attached to the auxiliary profile that it allows a horizontal overlap which can be either a loose-laid overlap or which can be sealed together at the job site.

Some embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of an elongate cavity sealing profile in combination with a moisture-resistant sheet material;

Figure 2 is a cross-sectional view of a cavity wall construction, showing the placement of an insulation member between two cavity sealing profiles of Figure 1;

Figures 3 and 4 represent vertical and horizontal cross-sections, respectively, of a cavity wall located around a window or door, provided with an insulating member contained by a cavity sealing profile of Figure 1;

Figure 5 is a horizontal cross-sectional view of a corner of a cavity wall, provided with insulating members that are contained by a cavity sealing profile; and

Figures 6 and 7 show vertical cross-sections of two variations of the cavity sealing profile of Figure 1.

One embodiment of an elongate cavity sealing profile (1) is shown in Figure 1, which has a substantially L-shaped cross section, and which is made from a flexible, compressible material having thermal insulating properties. The free end of the vertical limb (2) of the L-shaped cavity sealing profile (1) has a top surface (3) extending obliquely downwards from its inner longitudinal face (4) to the direction of its outer longitudinal face (5). A moisture-resistant, film material (6) may be fixed to the top sloping surface (3), said film being of sufficient length so as to substantially extend beyond the top and bottom edges of the sloping surface (3).

As shown in Figure 2, the cavity sealing profile (1) is adapted to be a compression fit in the base of the cavity (7) of a cavity wall (9,10). The bottom longitudinal face (11) of said profile rests on the foundation (8) or the base of the cavity (7), while the outer longitudinal face (5) is adjacent to the inner surface of the exterior wall (10). The longitudinal edge (13) of the horizontal limb (12) rests adjacent to the inner surface of the interior wall (9). Between the inner longitudinal face (4) of the sealing profile (1) and the cavity side of the inner wall (9), a part of an insulating board (14) is adapted to be confined therein. It is clear that the sealing

member (1) should be of such a length as to seal the entire length of the cavity wall.

The inclined top surface (3) of the cavity sealing profile (1) is designed so as to collect any rain water or moisture condensate present in the cavity (7), and discharge it to the outside of the exterior wall (10). Preferably, the sealing profile (1) is positioned in such a manner that the lowest point of the top surface (3) is flush with a horizontal joint (15) formed by two rows of bricks in the exterior wall (10).

For the effective discharge of water, the moisture-proof, tear resistant, flexible film (6) is affixed to the top surface (3) of the cavity sealing profile (1). The top edge of this film can be readily held in place by passing it through a joint (20) formed between two insulation boards (14), care being taken not to disturb the air tightness of the joint. The lower edge of the film can be sloped downward and led to the exterior via the horizontal joint (15). The top of the cavity wall can be enclosed by reversing the cavity sealing profile so that the longitudinal face (11) of said profile (1) is adjacent to the ceiling (16).

Figures 3 and 4 show a vertical and horizontal cross-section of a cavity wall adjacent to a window or door opening, and shows how the cavity sealing profile (1) can be mounted in such a case. Figure 3 shows the use of a course of brick or stone laid on edge (17), and the placement of the sealing profile (1) at the appropriate height against the inner face of said course of brick or stone. Such techniques, can be utilized, for example, when said edge (17) is a lintel or ornamental supporting structure of natural stone, having a larger vertical dimension than the outer longitudinal face (5) of the cavity sealing profile. Again the joints (15) between the lintel and superposed brick function as an outlet channel for any moisture or water the cavity may receive. The cavity formed between the frame (18) and the bottom longitudinal face (11) of the sealing member (1) can be filled with an insulation member (14) and then with an expandable foam or soft insulation material (19). In the vertical portion of the wall (see Fig 4), the cavity sealing profile can be placed against the frame (18) without objection, since its positioning near a joint is not necessary in the vertical plane.

Figure 5 shows an embodiment of how a cavity sealing profile (1) can function as a cavity sealer in the situation where the external walls are set at right angles to each other. Such a positioning of the sealing profile results in effectively sealing any gaps created by improperly fitting insulating boards. Since even small gaps of one or two millimeters can create thermal convection with resulting heat loss, the use of a cavity sealing profile to seal a corner joint is a further advantage of the present invention.

Figures 6 and 7 show two cross sectional variations of the sealing profile (1). The ridged horizontal limb ensures that the edges of the insulation board (14) having a complementary profile, fit snugly and remain air tight. The fact that the cavity sealing profile can be slightly deformed when the edge of the insulation board is pressed against the L-shaped surface of the cavity sealing profile ensures a tight fit. The result is that excellent sealing is obtained and no undesirable air circulation or thermal convection occurs between the inner surface of the interior wall and the insulation boards.

It is clear that, without departing from the scope of the present invention, modifications can be made for instance as regards the profile of the sealing member. Likewise, the sealing member can be used between any two spaced-apart walls to prevent undesirable air circulation or convection from occurring.

Claims

1. An elongate cavity sealing profile made of flexible, thermally insulating, compressible material, wherein said sealing profile (1) has a substantially L-shaped cross-section and is adapted to be a compression fit in a cavity space (7), formed by opposing interior and exterior walls (9,10), with said profile located in such a manner that the outer longitudinal face (5) of its vertical limb (2) is adjacent to the inner surface of the exterior wall (10), and the longitudinal edge (13) of its horizontal limb (12) is adjacent to the cavity surface of the interior wall (9), said profile being of such a configuration as to accommodate the edge of an insulating board (14).

2. A profile as claimed in Claim 1, wherein the top face (3) of said profile extends obliquely downwards from its inner longitudinal face (4) to its outer longitudinal face (5).

3. A profile as claimed in Claim 1 or Claim 2, wherein said profile (1) is provided with a moisture-proof, tear resistant, flexible film (6), which is fastened to the top face (3) of the vertical limb (2) of said profile, said film extending in both directions beyond the top face (3) of said profile.

4. A profile as claimed in any one of Claims 1, 2 and 3, wherein the top surface of the horizontal limb (12) of said profile is in the form of a tongue-and-groove joint.

5. A profile as claimed in any one of Claims 1, 2 and 3, wherein the top surface of the horizontal limb (12) of said profile is in the form of a ship-lap joint.

6. A profile as claimed in any one of the preceding claims wherein the compressible material is a closed-cell, non-cross-linked polyethylene foam.

7. A profile as claimed in any one of the preceding claims, wherein the profile is as defined in Claim 3, characterized in that the said film is a linear low density polyethylene resin film.

8. A method of constructing thermally insulated cavity walls characterized by inserting at the base of the cavity (7) formed by said cavity walls (9, 10) an elongate cavity sealing profile (1) made of a flexible, thermally insulating, compressible material and having a substantially L-shaped cross-section, the profile being located with the outer longitudinal face of its vertical limb adjacent to the inner surface of the exterior wall and the longitudinal edge of its horizontal limb adjacent to the cavity surface of the interior wall; inserting an edge of a thermal insulating board (14) in the L-shaped portion of said profile (1); progressively constructing the inner and outer cavity walls (9, 10) while adding additional insulating boards (14) until the desired height is obtained; and capping the upper edge of the uppermost insulating board (14) with a second said elongate sealing profile (1) which is placed in opposition to the base profile (1).

9. A method as claimed in Claim 8, wherein said elongate sealing profile is a profile as defined in any one of Claims 2 to 7.

10. A method as claimed in Claim 9, wherein a moisture-proof, tear resistant flexible film (6) extends from the lowermost insulating board over the top surface (3) of the profile (1) to a joint (15) in the exterior wall (10) to direct condensation or water from the cavity (7).

11. A cavity wall comprising opposed interior and exterior walls and an insulating board adjacent the cavity surface of the interior wall, characterized in that an elongate cavity sealing profile (1) made of flexible, thermally insulating, compressible material and having a substantially L-shaped cross-section extends across the cavity (7) with the outer longitudinal face (5) of one limb (2) adjacent to the inner surface of the exterior wall (10) and the longitudinal edge (13) of the other limb (12) adjacent to the cavity surface of the interior wall (9) and an edge of the insulating board (14) is located in the space defined between the profile (1) and the interior wall (9).

12. A cavity wall as claimed in Claim 11, wherein the profile (1) is located at the base of the cavity (7).

13. A cavity wall as claimed in Claim 12 wherein a second said profile (1) is similarly located at the top of the cavity.

14. A cavity wall as claimed in any one of Claims 11 to 13, wherein the profile (1) is as defined in any one of Claims 2 to 7.

15. A cavity wall as claimed in any one of Claims 11 to 14 wherein a moisture-proof, tear resistant, flexible film (6) extends from the insulating board (14) over the top surface (3) of the profile (1) to a joint (15) in the exterior wall (10) to direct condensation or water from the cavity (7).

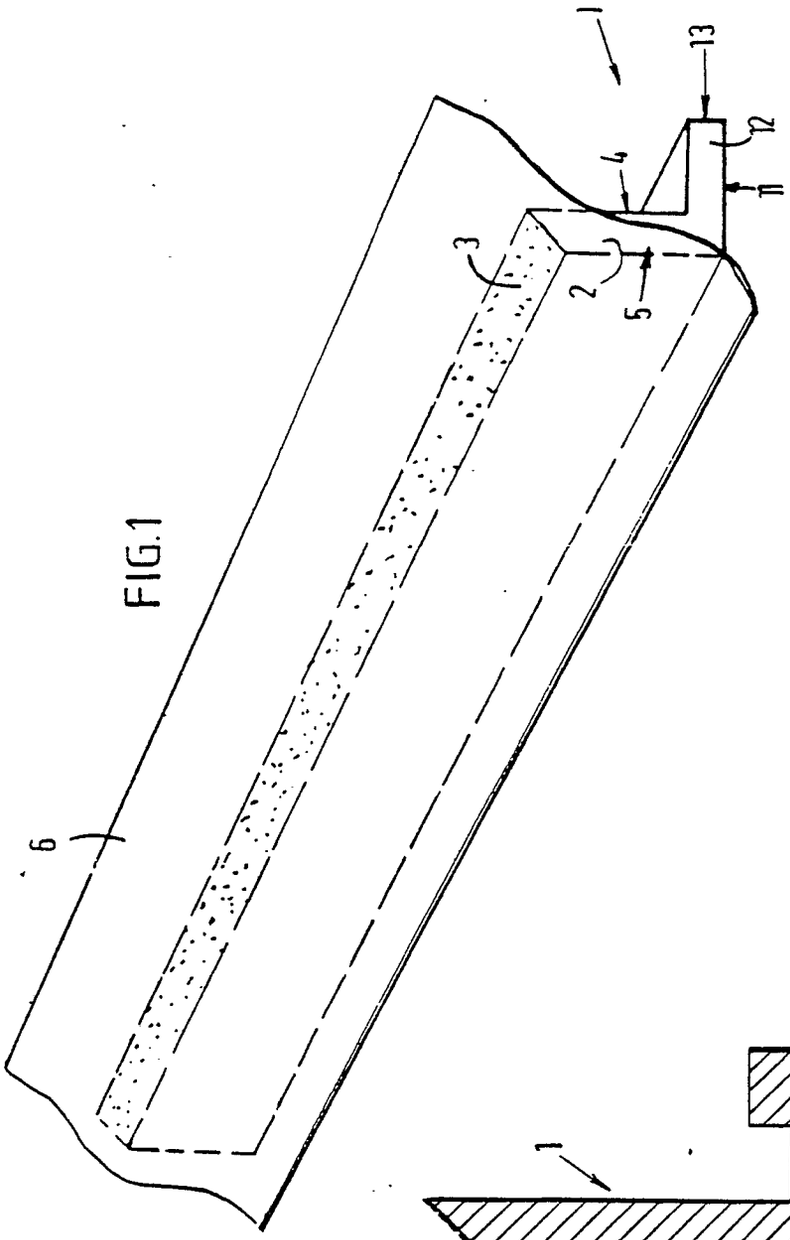

FIG.1

FIG.7

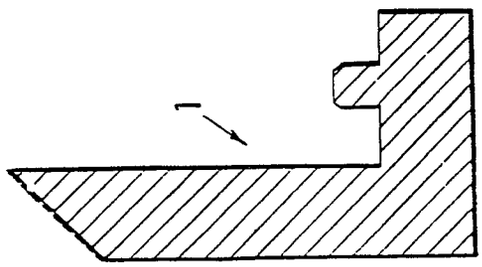

FIG.6

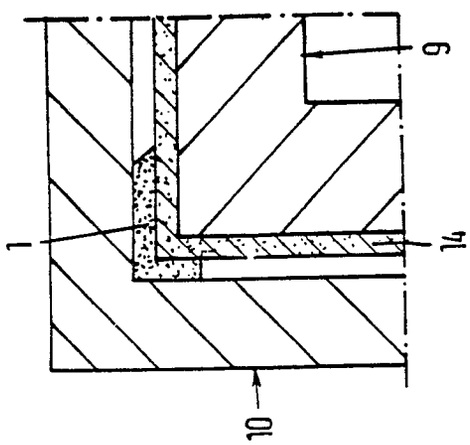

FIG.5

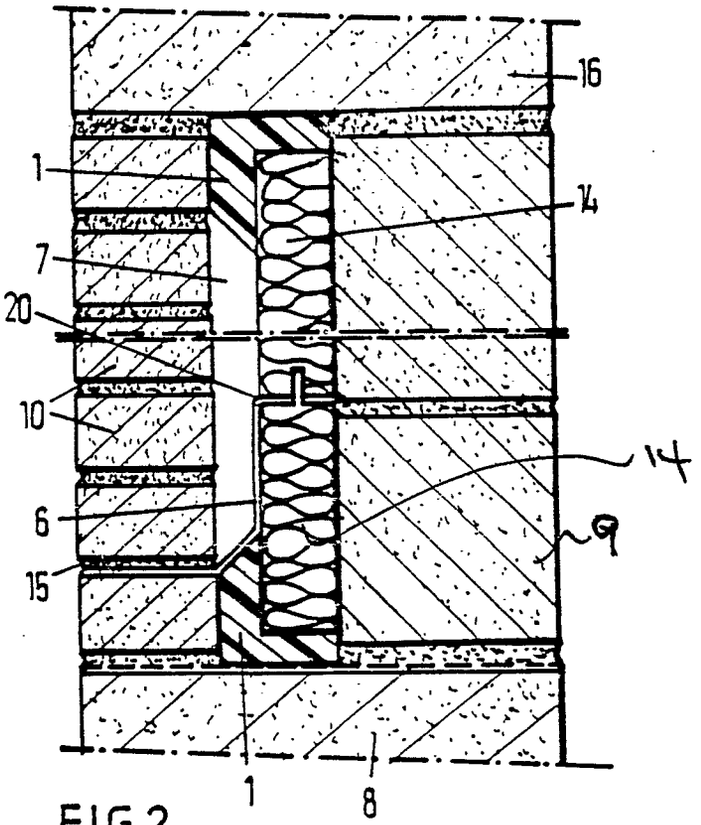

FIG.2

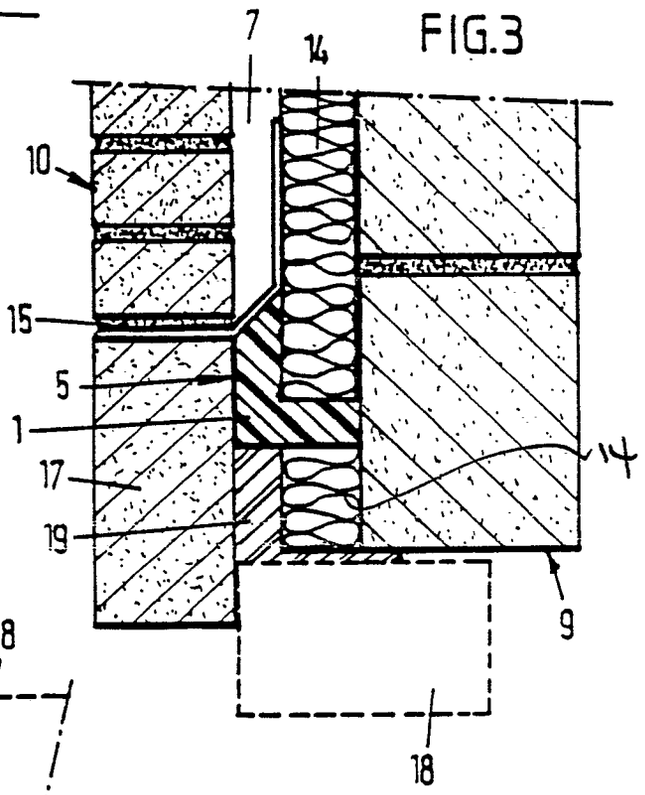

FIG.3

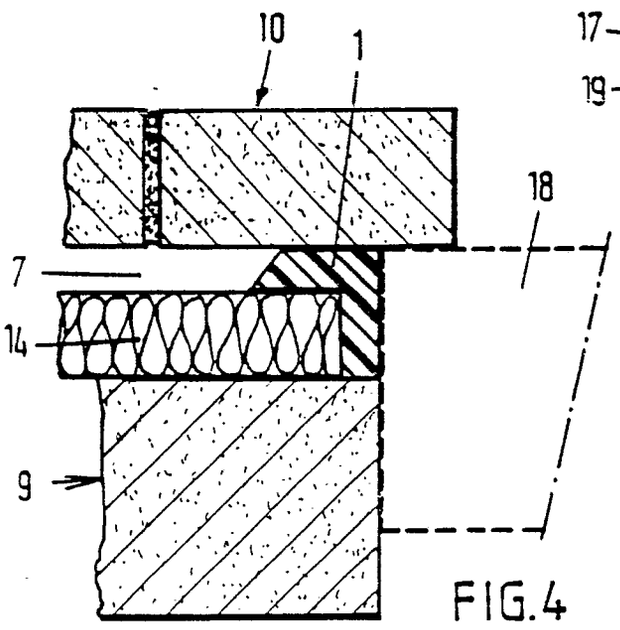

FIG.4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 30 2977

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	AT-A- 344 380 (WINKLER) * Page 5, lines 8-15; figure 9 *	1,2,11, 12,14	E 04 B 1/76
Y	GB-A-1 517 966 (STRESSLINE LTD) * Page 1, lines 38-51; figures 1,2 *	1,2,11, 12,14	
A	GB-A-2 171 430 (DOYLE) * Page 3, lines 6-30; figures 5-7 *	1,2,11, 12	
A	US-A-3 881 292 (PORTER) * Column 3, lines 5-17; figures 1,3,4 *	1,3,15	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

E 04 B
E 06 B
E 04 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	22-06-1989	PORWOLL H.P.

CATEGORY OF CITED DOCUMENTS

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