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(54) Fire resistant sandwich panel.

(57) A sandwich wall system panel (10,12) comprising an insulating core (18), a first metal skin (14) adhered to one face of the core, a second metal skin (16) adhered to the opposite face of the core, two separate elongate steel joining members (34,36), connected to the first or second skin and extending in parallel spaced relation to define a central joining tongue (33), first and second connectors (48,50) connecting the joining members of a pair, one at one end of the pair and the other at the other end of the pair, to prevent movement of the joining members towards and away from one another, the connectors being formed of expanded sheet steel, a steel grid or perforated steel sheet, said central joining tongue (33) being flanked by a pair of channels (35,37) and extending from the longitudinal edge of the panel, a pair of spaced parallel legs (24,26) formed by marginal portions of the first and second skins and projecting beyond the main insulating core at the opposite longitudinal edge of the panel, said legs being spaced to form a groove (32) to receive the tongue of an adjacent, similar panel, the legs being accommodated within the channels of the adjacent panel.

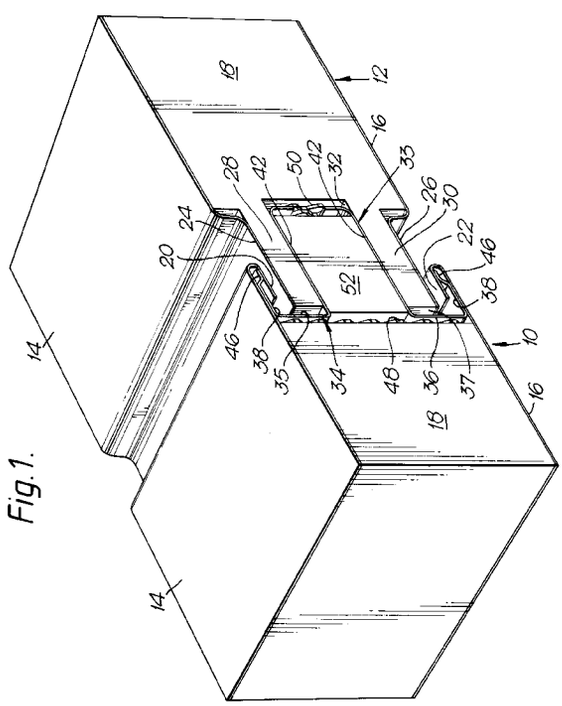

Fig. 1.

EP 0 568 227 A1

The present invention relates to a sandwich wall system panel.

Conventionally such panels are formed with an insulating core sandwiched between first and second metal skins. The insulating core often takes the form of a foamed compound but other insulating cores comprise fibrous material such as sold under the trade mark ROCKWOOL.

Sometimes it is necessary to provide such sandwich panels so that they are of a fire resistant nature and in these circumstances the ROCKWOOL cores are to be preferred because of their inherent fire resistance.

The opposite edge portions of the panels are usually provided with a tongue and groove arrangement to enable adjacent panels to be interconnected. To provide adequate rigidity, at least one of the opposite edge portions is usually provided with a continuous connecting profile or member extending between the first and second skins. However, a problem associated with such panels is that the connecting profile can form a heat bridge diminishing the insulating effect of the core. In order that a satisfactory level of thermal insulation be attained, the choice of material for the connecting profile is limited. In a structure, for example as illustrated in EP-A-324282, a rim portion, usually formed as an aluminium extrusion, is associated with and extends along one longitudinal edge of each of the first and second metal skins, the rim portions facing one another, with the free ends of the rim portions extending in parallel spaced relation to one another to define a central joining tongue flanked by a pair of channels and extending from the longitudinal edge of the panel, a pair of spaced parallel legs formed by marginal portions of the first and second skins and projecting beyond the core at the opposite longitudinal edge of the panel. The legs are spaced apart to form a groove to receive the tongue of an adjacent similar panel, the legs then being accommodated within the channels of the adjacent panel and at least one rigid connector is inserted between the rim portions to connect the tongue forming free ends to prevent movement of the rim portions towards and away from one another.

One of the problems of providing a satisfactory fire resistant panel is that when the fire reaches a particular intensity, the temperature may be such as to melt the metal skin on the fire side of the panel. If aluminium rim portions are used, then these too will melt and the whole panel will disintegrate. Consideration has been given to forming the connector portions of steel, but such connector portions are of somewhat complicated profile and are substantially impossible to manufacture on an economic basis.

It is now proposed, according to the present invention, to provide a sandwich wall system panel comprising an insulating core, a first metal skin adhered to one face of the core, a second metal skin adhered to the opposite face of the core, two separate elongate steel joining members, connected to the first or second skin and extending in parallel spaced relation to define a central joining tongue, first and second connectors connecting the joining members of a pair, one at one end of the pair and the other at the other end of the pair, to prevent movement of the joining members towards and away from one another, the connectors being formed of expanded sheet steel, a steel grid or perforated steel sheet, said central joining tongue being flanked by a pair of channels and extending from the longitudinal edge of the panel, a pair of spaced parallel legs formed by marginal portions of the first and second skins and projecting beyond the main insulating core at the opposite longitudinal edge of the panel, said legs being spaced to form a groove to receive the tongue of an adjacent, similar panel, the legs being accommodated within the channels of the adjacent panel.

Because the connectors are formed of a material in particular expanded sheet steel, which has adequate strength but a relatively small cross-section heat bridge path, the integrity of the insulating core can be retained and this can act as a true barrier to the fire on one side of the panel even should the metal skin facing the fire be melted away. The melting point of steel is significantly higher than that of aluminium, hence there is little risk of the joining members or the connectors melting. The ROCKWOOL core will act as an adequate fire screen for a considerable period thereby giving adequate time for personnel on the side of the panel remote from the fire readily to escape.

Preferably an inturned bead is associated with and extends along one longitudinal edge of each of said first and second metal skins, said inturned beads facing one another and extending in parallel spaced relation to one another. Advantageously the two separate elongate steel joining members are generally U-shaped, each including a short arm engaged in the associated inturned bead of the first or second skin, and a longer arm, the longer arms extending in parallel spaced relation to form said tongue.

The associated inturned bead of the first and second skins may simply be of U-shaped configuration, but in a preferred construction preferably includes one or more inwardly directed projections engageable with the short arm of the U-shaped steel joining members more firmly to retain these joining members in place.

The insulating core is preferably also provided within the tongue and is engaged between the first and second connectors, thereby to provide a greater insulating effect. With regard to the groove formed on the opposite side of the panel, the insulation preferably has two portions extending inwardly of the spaced parallel legs, the inner sides of these portions then defining the groove to receive the tongue of the

adjacent similar panel.

The term "steel" is to be read herein as covering any high melting point metal.

In order that the present invention may more readily be understood, the following description is given, merely by way of example, reference being made to the accompanying drawings in which:-

Figure 1 is a schematic perspective view of the junction between two panels according to the present invention;

Figure 2 is a similar view showing the two joining members secured together by first and second connectors;

Figure 3 shows alternative shapes of the inturned rims of the panel of Figure 1; and

Figure 4 is a schematic fragmentary section showing the support of two adjacent panels.

Referring first to Figure 1, the drawing illustrates a portion of two adjacent panels 10,12, according to the present invention. The panels will be substantially identical and comprise a first metal skin 14 on one face and a second metal skin 16 on the other face, the skins being adhesively bonded to an insulating core 18 formed of ROCKWOOL. The right hand edge of panel 10 is indicated as having an inturned bead 20 and the skin 16 having inturned bead 22.

The opposite edges of the panels, that is to say the edge illustrated on the left of the panel 12 in Figure 1, is such that the skins 14,16 are provided with a pair of spaced parallel legs 24,26. On this edge of the panel the insulating core 18 preferably includes two portions 28,30 extending inwardly of the spaced parallel legs 24,26 and defining therebetween a groove 32.

The right hand edge of the panel 14 is shown as being provided with two joining members 34,36 which are illustrated more clearly in Figure 2. These two joining members are each of a U-shaped configuration having a shorter arm 38, a web portion 40 and a longer arm 42 having an inturned flange 44 at its free edge. It will be noted that the shorter arms 38 are each provided with a cranked flange portion 46.

The two joining members 34,36 are connected to one another by a first expanded metal connector 48 spot welded to the web portions 40 and a second connector 50 spot welded to the flanges 44. As illustrated in Figure 1, a further ROCKWOOL insulating core portion 52 is positioned between the longer arms 42 and the connectors 48,50. It will be seen in Figure 1 that the cranked flange portions 46 are engaged in the inturned beads 20,22 to retain the joining members 34,36 in place. Figure 3 shows two forms of the inturned bead. In the upper part the inturned bead is a simple U-shaped member, as illustrated in Figure 1. In the lower part of Figure 3 the inturned bead has an inturned projection or projections 54 which can engage to the left, as seen in Figure 1, on the cranked flange 46 more firmly to hold the shorter arm 38 in place. The longer arms 42, flanges 44, connector 50 and core portion 52 form a tongue 33 engageable in groove 32, the tongue being flanked by channels 35,37 into which the legs 24,26 and the core portions 28,30 extend.

The joining members 34,36 can be roll formed readily from sheet steel which has a far higher melting point than the aluminium of the skins 14,16. The connectors 48,50 are also formed of steel and as shown are formed of expanded sheet steel which is made by the conventional expanded metal technique. As alternatives the connectors 48,50 could be formed of perforated sheet steel or a steel grid. Which ever method is used, the connectors provide an adequate connection between the members 34,36 but provide a relatively small cross-sectional area for the passage of heat. The connectors 48,50, therefore, will not provide a significant heat bridge so there will be little tendency for the skins on the remote side from any fire to be raised to a sufficiently elevated temperature for them to melt.

It will be appreciated that the steel construction of the joining members 34,36 and the connectors 48,50 will withstand excess temperatures quite adequately and will maintain the integrity of the structure even though one of the skins should be melted away. The ROCKWOOL core will be fire resistant and it will be retained in place by the assembly comprising the joining members and the connectors.

Figure 4 illustrates very schematically how panels of the invention are mounted. A support member 60 extends vertically and has associated with it, for each panel, a bracket 62 held to the support member 60 by a screw 64. An arm 66 of the bracket extends into the space formed between the inturned bead 22 of the panel 10 and the leg 26 of the panel 12. The arm 66 thus retains the panels 10,12 against the support 60.

A sealing member 68 is engaged between the bead 20 and the leg 24 on the far side of the panels.

Claims

1. A sandwich wall system panel (10,12) comprising an insulating core (18), a first metal skin (14) adhered to one face of the core, a second metal skin (16) adhered to the opposite face of the core, two separate elongate steel joining members (34,36), connected to the first or second skin and extending in parallel spaced relation to define a central joining tongue (33), first and second connectors (48,50) connecting the joining members of a pair, one at one end of the pair and the other at the other end of the pair, to prevent movement of the joining members towards and away from one another, the connectors being formed of expanded sheet steel, a steel grid or perforated steel sheet,

said central joining tongue (33) being flanked by a pair of channels (35,37) and extending from the longitudinal edge of the panel, a pair of spaced parallel legs (24,26) formed by marginal portions of the first and second skins and projecting beyond the main insulating core at the opposite longitudinal edge of the panel, said legs being spaced to form a groove (32) to receive the tongue of an adjacent, similar panel, the legs being accommodated within the channels of the adjacent panel.

2. A system according to claim 1, wherein an inturned bead (20,22) is associated with and extends along one longitudinal edge of each of said first and second metal skins (14,16), said inturned beads facing one another and extending in parallel spaced relation to one another.

3. A system according to claim 2, wherein the two separate elongate steel joining members (34,36) are generally U-shaped, each including a short arm (38) engaged in the associated inturned bead (20,22) of the first or second skin, and a longer arm (42), the longer arms extending in parallel spaced relation to form said tongue (33).

4. A system according to claim 3, wherein the associated inturned bead of the first and second skins is of U-shaped configuration.

5. A system according to claim 3, wherein the inturned bead includes one or more inwardly directed projections engageable with the short arm of the U-shaped steel joining members more firmly to retain these joining members in place.

6. A system according to any preceding claim, wherein the insulating core is also provided within the tongue and is engaged between the first and second connectors, thereby to provide a greater insulating effect.

7. A system according to any preceding claim, wherein the insulation has two portions (28,30) extending inwardly of the spaced parallel legs, the inner sides of these portions then defining the groove (32) to receive the tongue (33) of the adjacent similar panel.

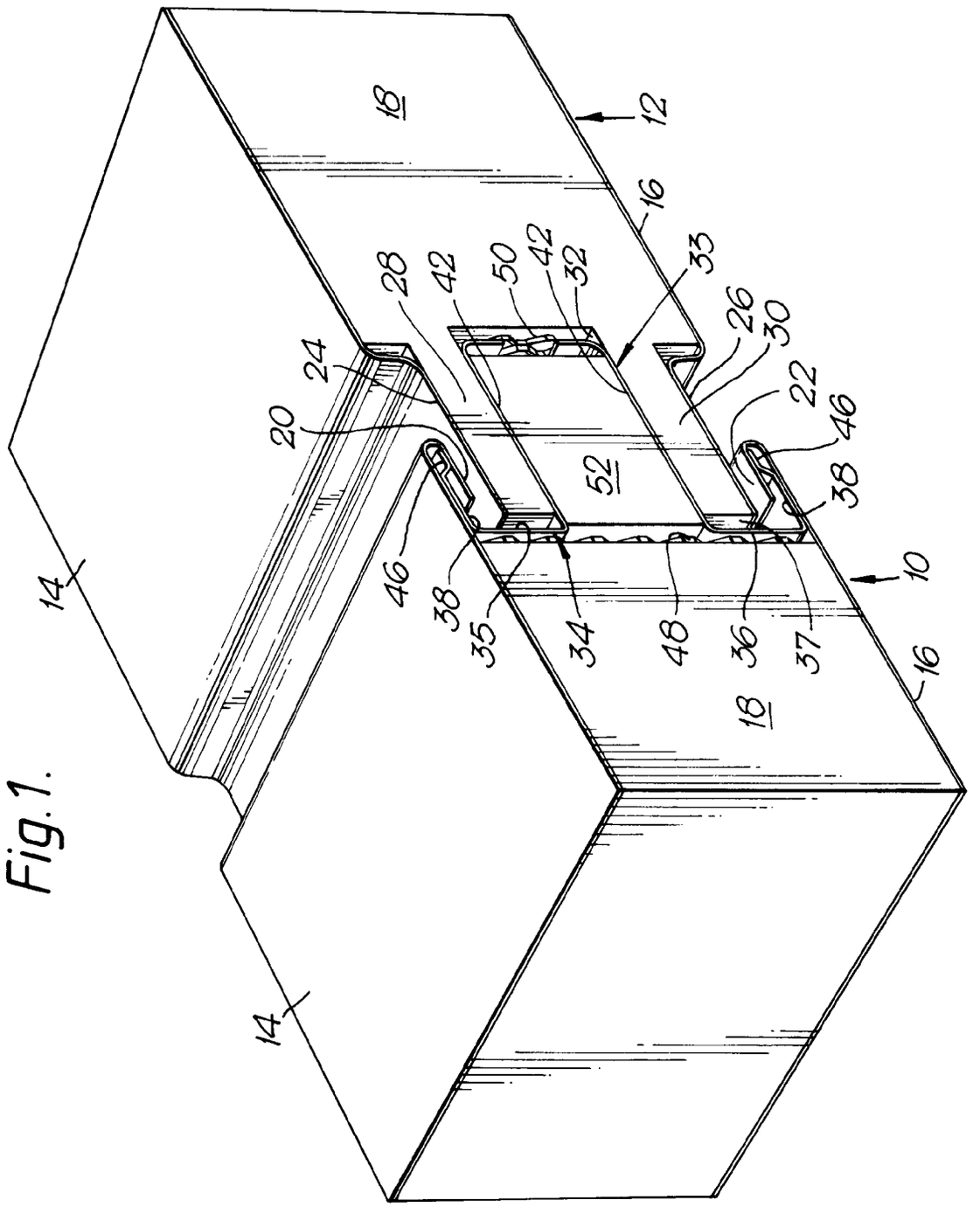
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Fig.1.

Fig. 2.

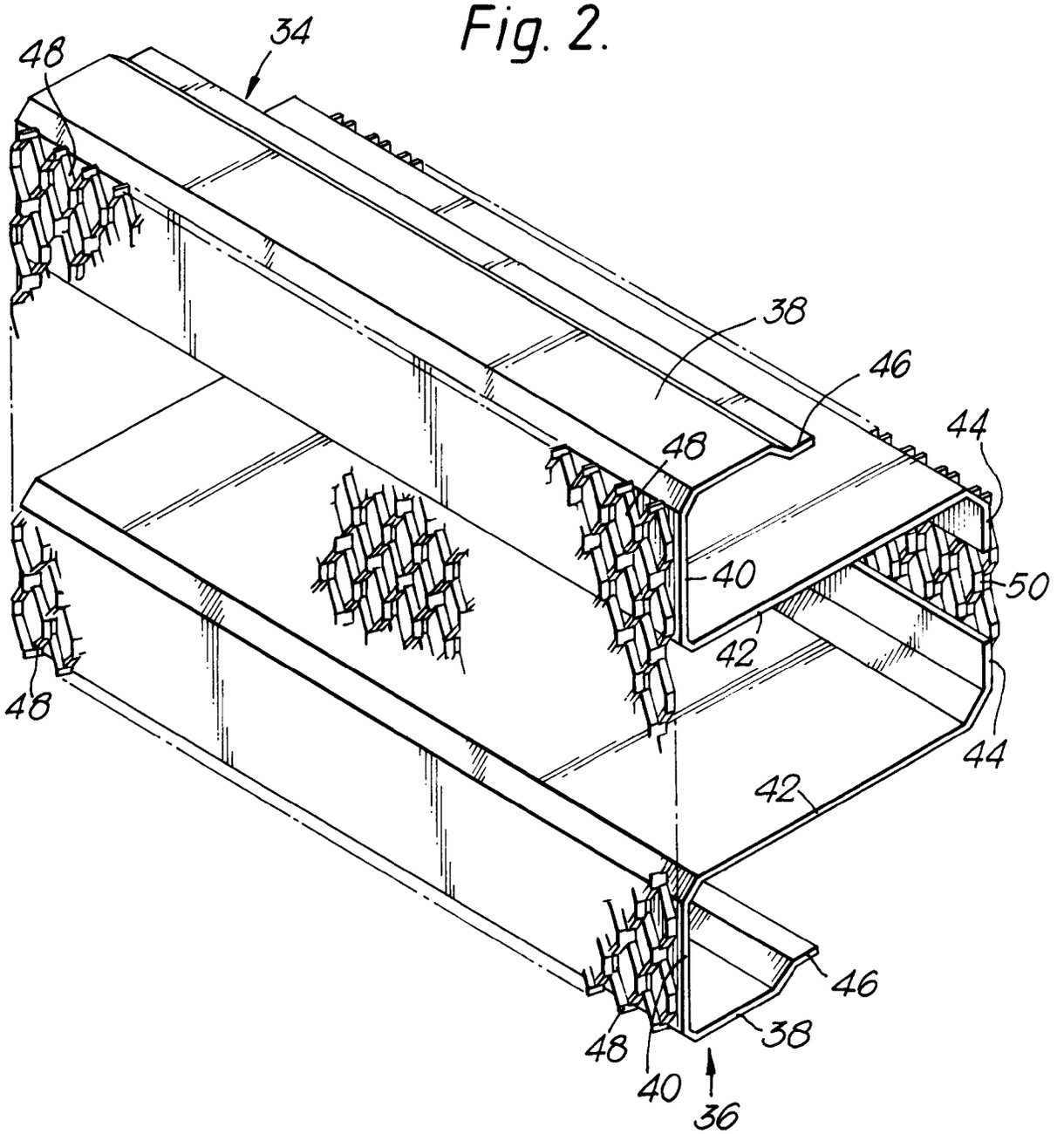


Fig. 3.

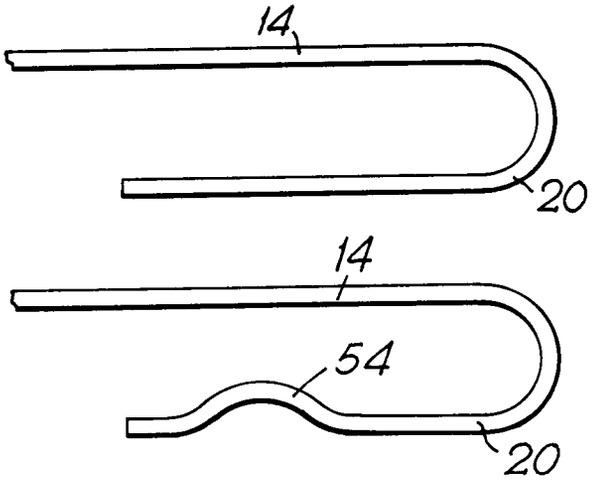
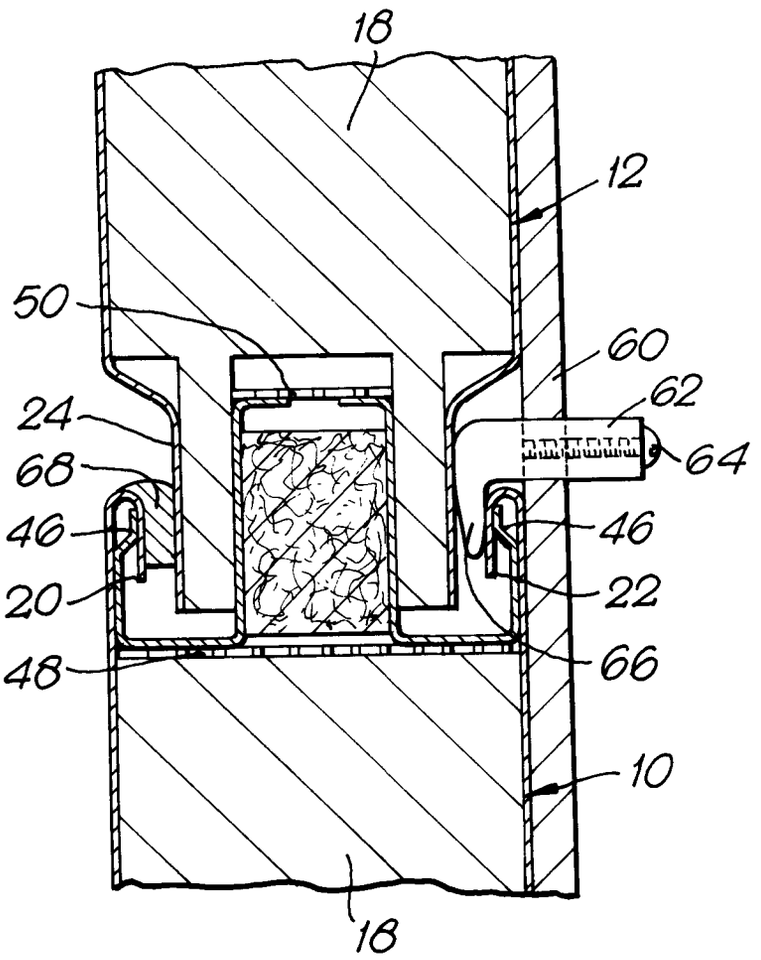


Fig. 4.



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EUROPEAN SEARCH REPORT

Application Number
EP 93 30 2998

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.5)
A	FR-A-2 332 391 (HUNTER DOUGLAS INDUSTRIES B.V.) * page 7, line 8 - line 13; figures 1-3 * * page 9, line 23 - page 10, line 30 *	1,2,6,7	E04C2/26
A	EP-A-0 240 161 (HUNTER DOUGLAS INDUSTRIES B.V.) * figure 1 *	4,5	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

E04C
E04B
E04F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21 JULY 1993	MYSLIWETZ W.P.

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