(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 870 878 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
14.10.1998 Bulletin 1998/42

(51) Int. Cl.[6]: **E04B 1/80**

(21) Application number: **97830430.1**

(22) Date of filing: **29.08.1997**

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

(30) Priority: **10.04.1997 IT MI970255 U**

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(54) Insulating metal panel having a perimetrical frame provided with clamping elements

(57) A self-supporting metal panel (1) comprises a fretted sheet-metal element (2) and a flat sheet-metal element (4), with an intervening insulating material layer (5), and including a perimetrical frame (6, 6a, 6b), provided with clamping elements (7, 7b, 8), forming a clamping set provided for assembling purposes. According to a preferred embodiment, the clamping set between two panels (1a and 1b) comprises: a threaded bush (8) rigid with the frame (6a) of a first panel (1a), a contoured slot (7b) formed through the frame (6b) of a second panel (1b) and a screw (11), the head portion (13) of which is provided for engaging the slot (7b), whereas the stem (12) thereof engages the threaded bush (8).

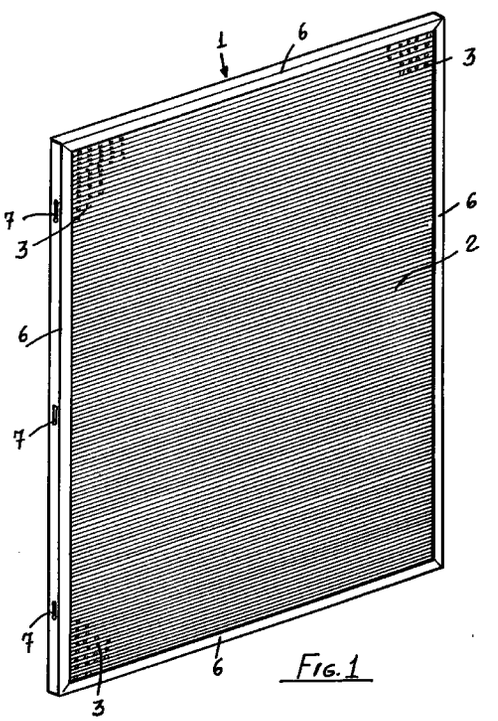

Fig. 1

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Description

BACKGROUND OF THE INVENTION

The present invention relates to an insulating metal panel, of a self-supporting type.

As is known, self-supporting metal panels are conventionally used for forming walls and coverings for buildings, of comparatively small size, such as garages, sheds and the like.

A main advantage of the above mentioned metal panels is that they can be easily assembled without using expensive raising or lifting means.

Moreover, the reduced thickness of the above mentioned panels make them very suitable to partition comparatively large rooms and the like.

The above mentioned metal panels are conventionally assembled, in order to form walls, by self-threading screws.

On the other hand, these metal panels are usually employed in spaces or applications, such as for partition walls, frequently subjected to a distributing type of modification.

Thus, the assembling operation of said metal panels should be as easy as possible while preventing the metal panels being assembled from being damaged, since said metal panels will be frequently reused.

Thermal and acoustic requirements are usually met by using composite panels, i.e. metal panels formed by coupling to one another two sheet metal elements, having an insulating material arranged therebetween.

Such panels are conventionally used for partitioning public or working spaces.

These panels are rarely used in private environments since the latter require a comparatively high acoustic insulation.

SUMMARY OF THE INVENTION

The main object of the present invention is to improve prior metal panels so as to solve the assembling and acoustic insulating problems affecting said prior metal panels.

According to one aspect of the present invention, the above aim is achieved by a metal panel comprising a fretted sheet metal element and a flat sheet metal element with an insulating material arranged therebetween, as well as a perimetrical frame provided with at least one of several clamping elements constituting a clamping set for assembling said panels.

In a preferred embodiment of the metal panel according to the present invention, the clamping elements constituting the mentioned clamping set for clamping two panels comprise: a threaded bush or nut, rigid with the frame of the first panel, a contoured slot, including at least a wider region and a narrower region, formed in the frame of a second panel, and a screw, a head portion of which engages in said slot, whereas the stem of said screw engages said bush or nut.

Preferably, the slot is provided with two opposite wide regions, coupled by a narrower region, and being provided, at said narrower region, with holding fins, provided for preventing any clearance of said screw in a direction perpendicular to said slot.

The panel according to the present invention comprises a fretted sheet metal element, including a plurality of holes, which can be provided on 40% of the surface of said sheet metal element, the insulating material comprising rock wool of an oriented fiber type, preferably having a density of 145 kg/m^3, and anyhow from 80 to 250 kg/m^3.

Preferably, the fretted sheet metal element is made of galvanized steel and has a thickness of 0.3 mm, whereas the flat sheet metal element is made of aluminium and has a thickness of about 1 mm.

The metal panel according to the present invention is moreover provided with a stiffening perimetrical frame, has a high mechanical strength and, while being constituted by small thickness sheet metal elements, of which at least one is provided with a plurality of holes, is of a self-supporting type, even for heights of about 12 m.

The clamping elements rigid with the mentioned perimetrical frame of said metal panels will allow said panels to be quickly and safely assembled, without any risks of damaging said panels or arranging them with an overlapping relationship.

The panel comprising a sheet metal element including a plurality of holes constitutes moreover a very good insulating element, from an acoustic standpoint, since it is provided with a very high acoustic absorbing coefficient, together with a very high acoustic insulating power.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the present invention will be disclosed in a more detailed manner hereinafter, with reference to the accompanying drawings, where:

Figure 1 is an axonometric view illustrating a metal panel according to the present invention;

Figure 2 is a further axonometric view, partially broken away, of the metal panel shown in Figure 1;

Figure 3 is a cross-sectional view illustrating two metal panels provided to be assembled by means of a butt coupling assembling relationship;

Figure 4 is a cross-sectional view illustrating a full clamping set or assembly;

Figure 5 is a further cross-sectional view illustrating two coupled panel series; and

Figure 6 is a further cross-sectional view illustrating

several assembled metal panels.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 illustrates a metal panel 1 comprising, as clearly shown in figure 2, a fretted sheet metal element 2, provided with throughgoing holes 3, a flat sheet metal element 4, and an insulating material layer 5.

The fretted sheet metal element 2, which has a very close rib pitch, has preferably a thickness of 0.3 mm, and is made of a galvanized steel material.

The thickness of said fretted sheet metal element 2, however, can vary from 0.2 mm to 0.8 mm.

The flat sheet metal element 4 has preferably a thickness of 1 mm and is made of an aluminium material.

The insulating material layer 5 is made of rock wool, of a synthetic fiber type, and with a density of about 145 kg/m^3.

In this connection it should be pointed out that the density of the insulating material layer can vary from 80 to 250 kg/m^3.

The end portions of said panel 1 are coated by a metal section-member, constituting a perimetrical frame 6, which will stiffness said metal panel 1.

Along a side of the frame 6, a plurality of slots 7 are provided, for assembling the panels in order to form, for example, a wall.

Figure 3 illustrates the sides of two panels, 1a and 1b, provided for coupling with a butt or "head-against-head" relationship.

The two panels 1a and 1b comprise complementary elements of clamping set or assembly, which is clearly shown in figure 4.

A threaded bush 8 is made rigid, by welding, with the frame 6a of the panel 1a, whereas through the frame 6b of the panel 1b, a slot 7b is formed, said slot 7b being so contoured as to present two wide regions 9, opposite to one another, coupled by a narrower region 10.

The head portion 13 of a screw 11, the stem 12 of which can be threaded in the threaded bush 8, can be engaged in the wide region 9 of the slot 7b.

In assembling the two panels 1a and 1b, the head portion 13 of the screw 11, the stem of which will be already engaged in the threaded bush 8, will be engaged in one of the wide regions 9 of the slot 7b; then, it will be caused to slide in said slot 7b, thereby engaging the narrower region 10, so as to reach that position where the two panels 1a and 1b will be perfectly coplanar.

The specifically designed contour of the slot 7b will allow the panels to be easily adjusted during the assembling operation.

Holding fins 14 are provided along the edges of the narrower region 10 of the slot 7b in order to prevent, with the panels being in an assembled condition, any clearance of the screw 11 in a direction perpendicular to the sliding direction thereof in said slot 7b.

The above disclosed clamping set or assembly will allow the panels 1a and 1b to be quickly and easily assembled, without causing said panels to overlap onto one another and without the provision of holes for coupling the panels.

If any modifications would be necessary, then the panels could be easily disengaged and used again.

Figure 5 illustrates the connection of two series of panels 1c and 1d, which are connected to one another so as to provide a partition assembly including an air chamber 15 therebetween.

In this exemplary embodiment, the connection of the panels would be completed by a gasket 16 made of a ceramic board material.

This connection will be very efficient as it is necessary to provide a very high acoustic insulation power for the wall.

In particular, the shown connection would be very useful on ships.

The arrangement of the panels and the provision of the gasket 16 will provide the partition wall with good fume resistance properties, in the case of possible fires.

Actually, the panel according to the present invention is particularly suitable to partition ship rooms and the like.

Finally, figure 6 illustrates the assembling of several panels 1e, 1f, 1g, 1h.

As clearly shown in the drawings, the panels can be assembled by a butt type of connection, or by a cross type of connection, and a same panel may be also coupled to several panels at the same end portion thereof, by suitably arranging the clamping elements along the mentioned perimetrical frame.

Claims

1. An insulating metal panel (1), characterized in that said panel comprises a fretted sheet metal element (2) and a flat sheet metal element (4), with an insulating material layer (5) arranged therebetween, and characterized in that said panel comprises moreover a perimetrical frame (6), suitable to stiffen and reinforce said panel at a connection region of said panel with other adjoining like panels.

2. An insulating metal panel, according to Claim 1, characterized in that said panel is provided with a perimetrical reinforcement frame including of the elements (7, 7b, 8) forming a clamping set, for assembling said panel with other panels.

3. A panel, according to one or more of the preceding claims, characterized in that said clamping set for clamping two panels (1a and 1b) comprises: a threaded bush (8) rigid with said frame (6a) of the first panel (1a); a contoured slot (7b) formed through said frame (6b) of the second panel (1b)

and a screw (11), the head portion (13) of which is suitable to engage the slot (7b) whereas the stem (12) is suitable to engage said threaded bush (8).

4. A panel according to one or more of the preceding claims, characterized in that said slot (7, 7b) is provided with two opposite wide regions (9), coupled by a narrowing region (10) and being provided, at said narrowing region (10), with holding fins (4) adapted to prevent any clearance of said screw (11) in a direction perpendicular to said slot (7, 7b).

5. A panel according to one or more of the preceding claims, characterized in that said fretted sheet metal element (2) is provided with holes (3) affecting 40% of the surface of said fretted sheet metal element.

6. A panel according to one or more of the preceding claims, characterized in that said fretted sheet metal element (2) is a galvanized steel sheet element having a thickness of 0.3 mm, and being provided with a plurality of closely arranged ribs or undulations suitable to increase the mechanical strength of said sheet element.

7. A panel according to one or more of the preceding claims, characterized in that said galvanized sheet metal element has a thickness from 0.2 to 0.8 mm.

8. A panel according to one or more of the preceding claims, characterized in that said flat sheet metal element (4) is made of aluminium and has a thickness of about 1 mm.

9. A panel according to one or more of the preceding claims, characterized in that said insulating layer (5) is made of rock wool material including oriented fibers having a density of 145 kg/m^3.

10. A panel according to one or more of the preceding claims, characterized in that said insulating layer, arranged between a smooth sheet metal element and a corrugated sheet metal element comprises a rock wool material having oriented fibers and a density from 80 to 250 kg/m^3.

11. A panel according to one or more of the preceding claims, characterized in that said fretted sheet metal element (2) has a thickness of 0.3 mm and is made of galvanized steel, and being provided with holes (3) affecting 40% of the surface thereof, the flat sheet metal element (4) being made of aluminium and having a thickness of 1 mm, said insulating layer (5) being made of a rock wool material including oriented fibers having a density of 145 kg/m^3.

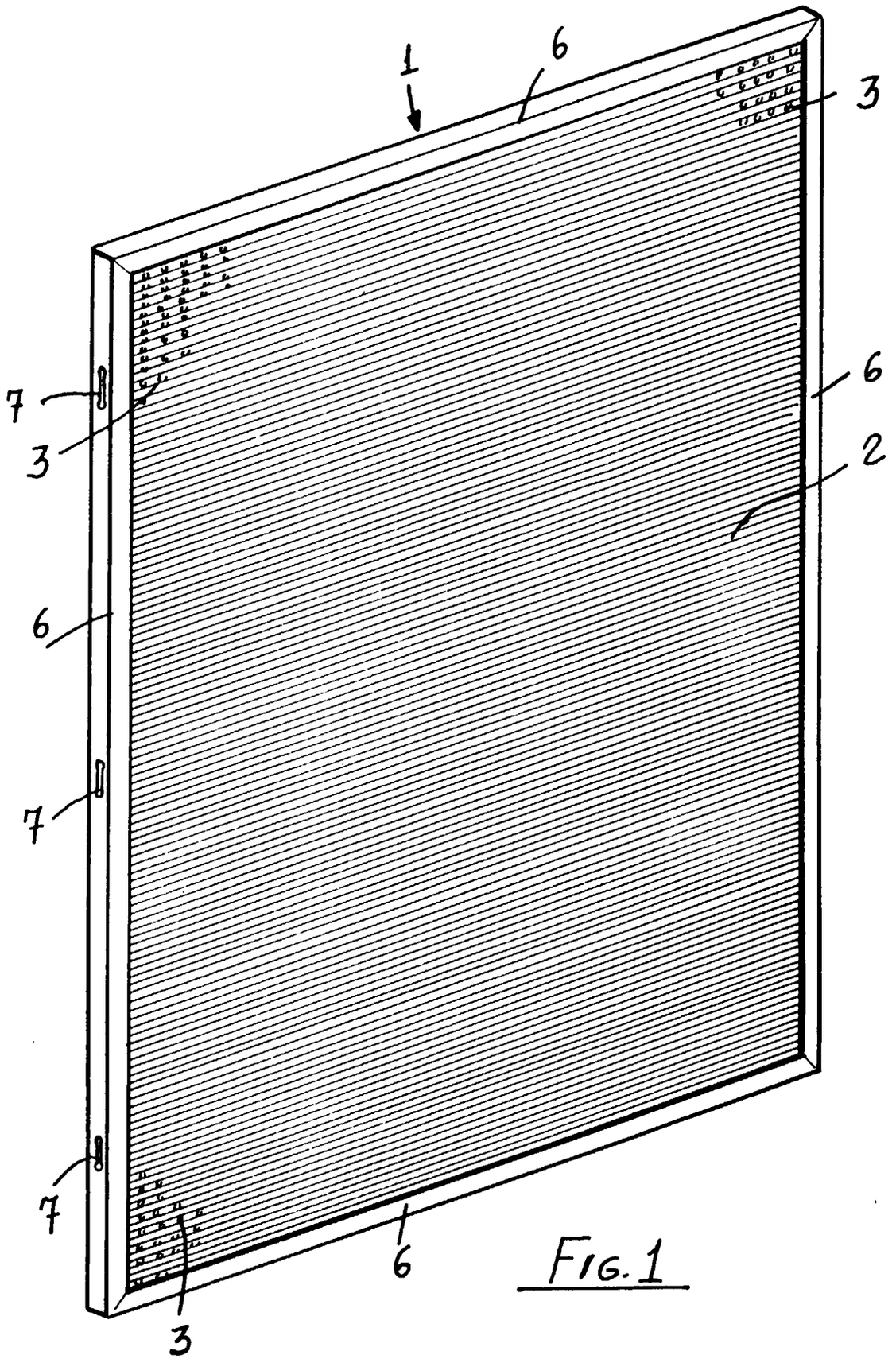

FIG. 1

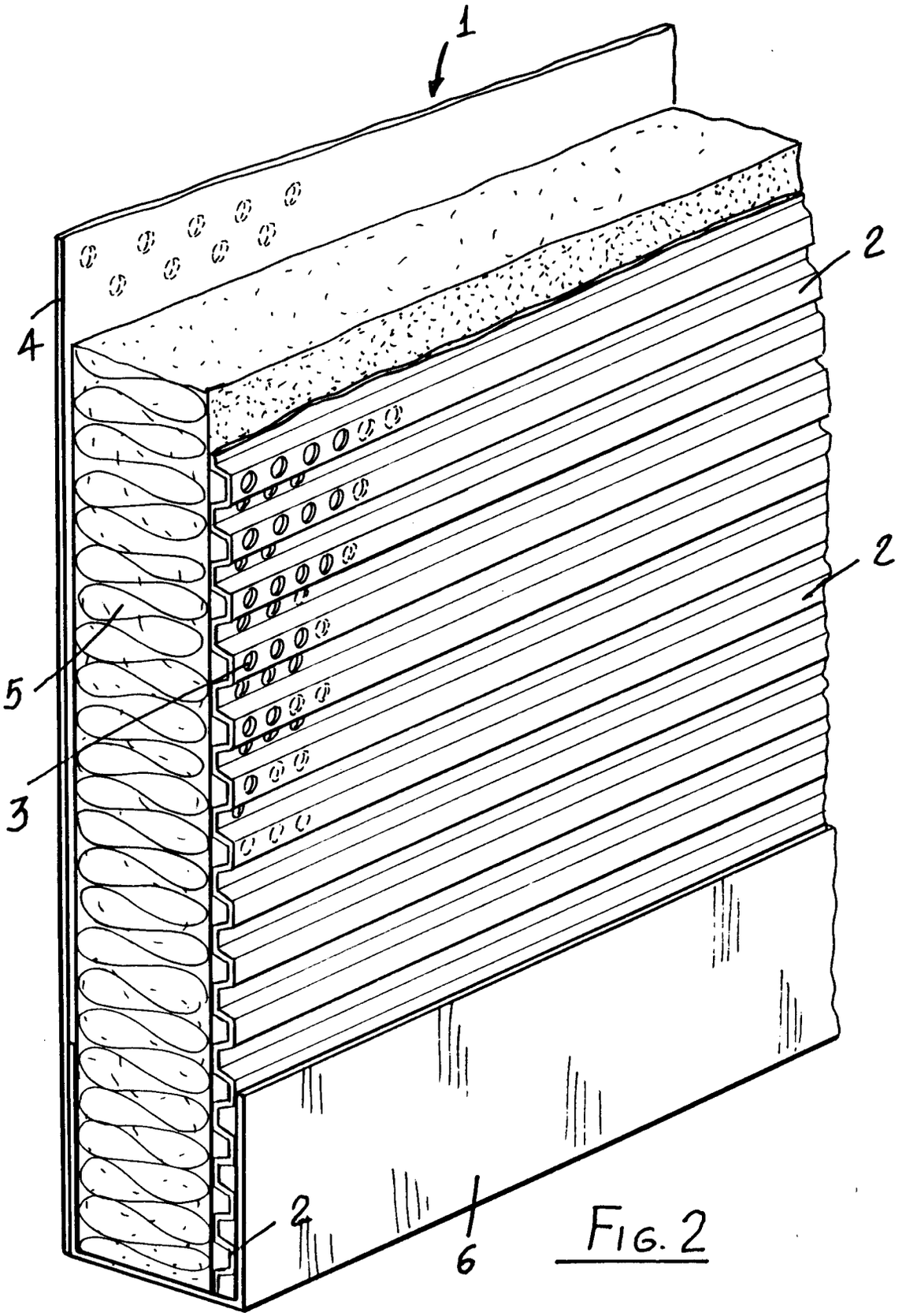

FIG. 2

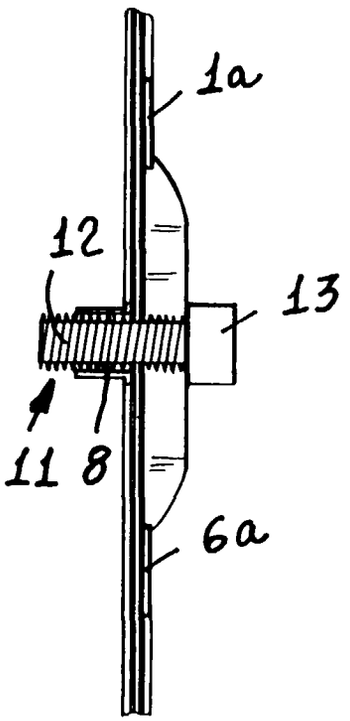

FIG. 4

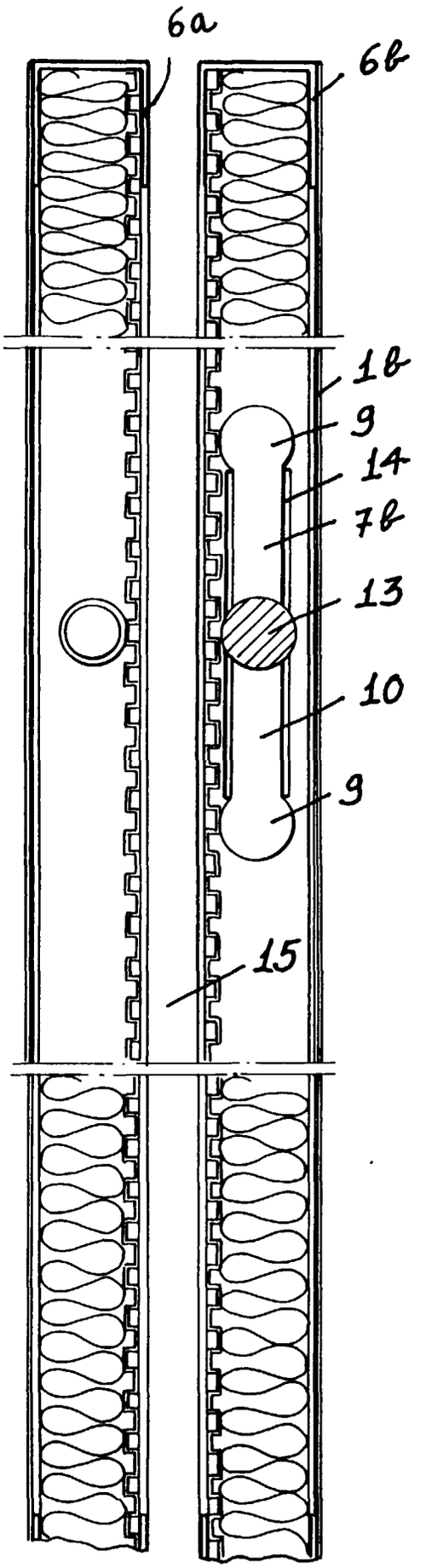

FIG. 3

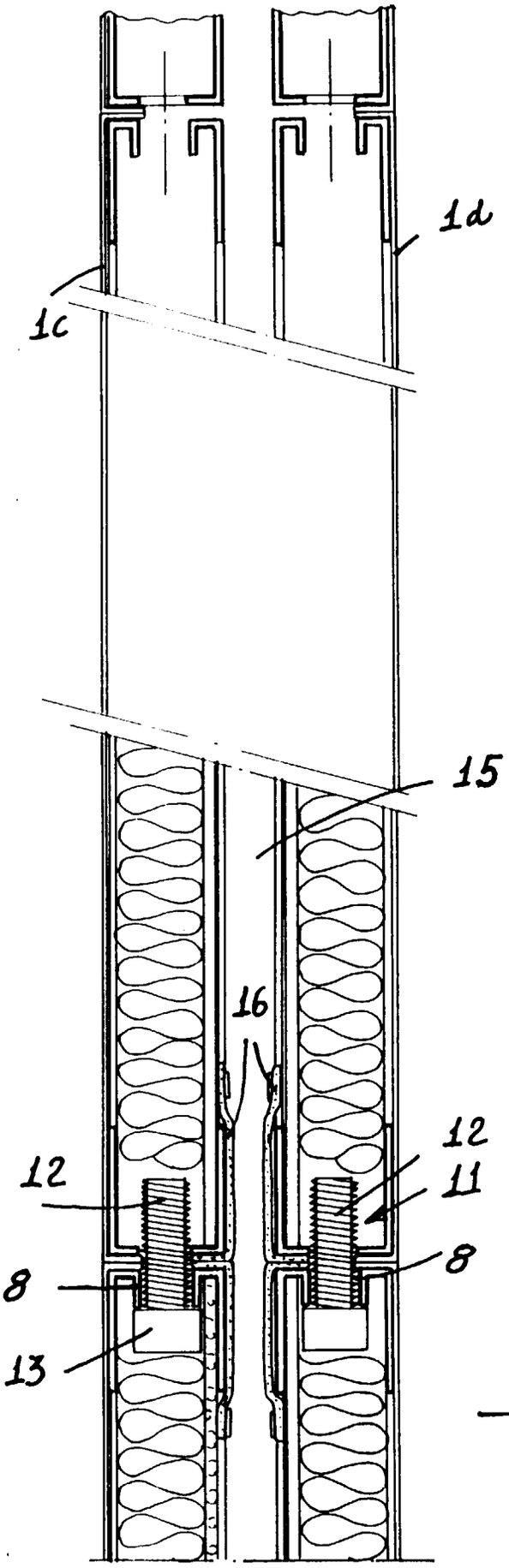

FIG. 5

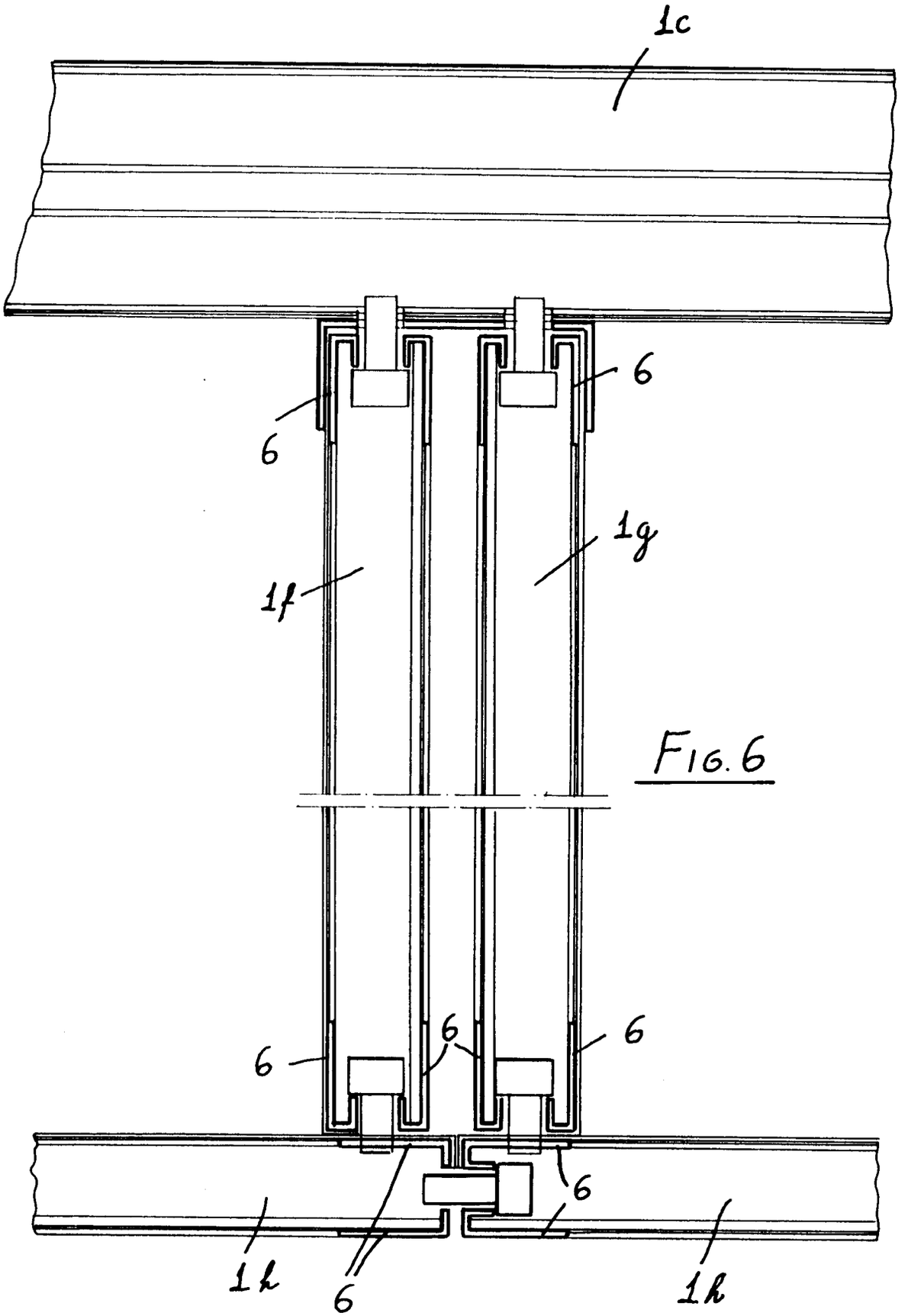

FIG. 6