United States Patent [19]

Villeger

[11] **3,835,611**

[45] **Sept. 17, 1974**

[54] **SOLID HEAT INSULATION PANEL FOR BUILDING**

[76] Inventor: **Jean G. Villeger,** 95 Ave. du Grand Marin, Lesigny, France

[22] Filed: **Nov. 12, 1971**

[21] Appl. No.: **198,270**

[30] **Foreign Application Priority Data**

Nov. 30, 1970 France 70.42960

[52] **U.S. Cl.** **52/621,** 52/396, 52/624

[51] **Int. Cl.** **E04b 2/28,** E04c 3/34

[58] **Field of Search** ..... 52/127, 235, 403, 404, 52/580, 615, 620, 623, 656, 309, 405, 406, 619, 624, 627, 628, 396, 400, 621; 49/501, 504, 478, 479; 287/189.36 H

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Primary Examiner—Henry C. Sutherland

Attorney, Agent, or Firm—McDougall, Hersh & Scott

[57] **ABSTRACT**

A structural heat insulation panel formed of a frame and two facings in which the frame comprises four profiles in the form of U-shaped members having a core perpendicular to the facings and two wings parallel to the facings and which includes a heat insulation and sealing joint having a central portion applied to the core for tightness and a forward portion applied to the front wing for heat insulation.

4 Claims, 2 Drawing Figures

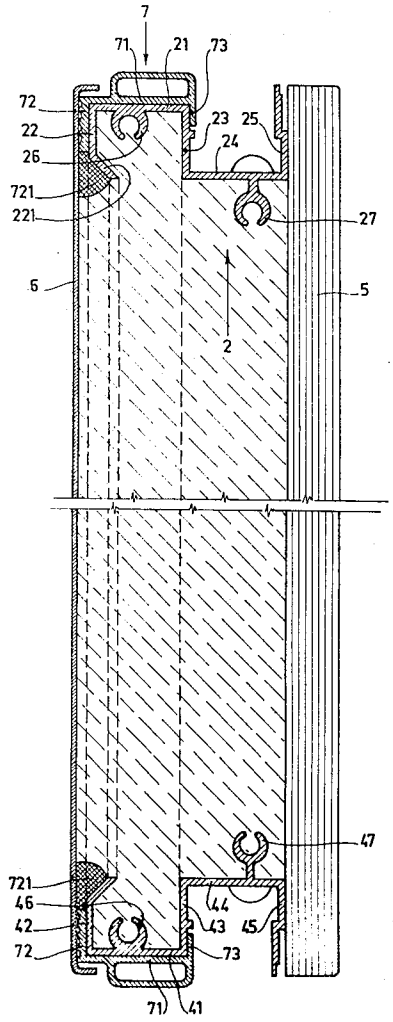


Fig. 1

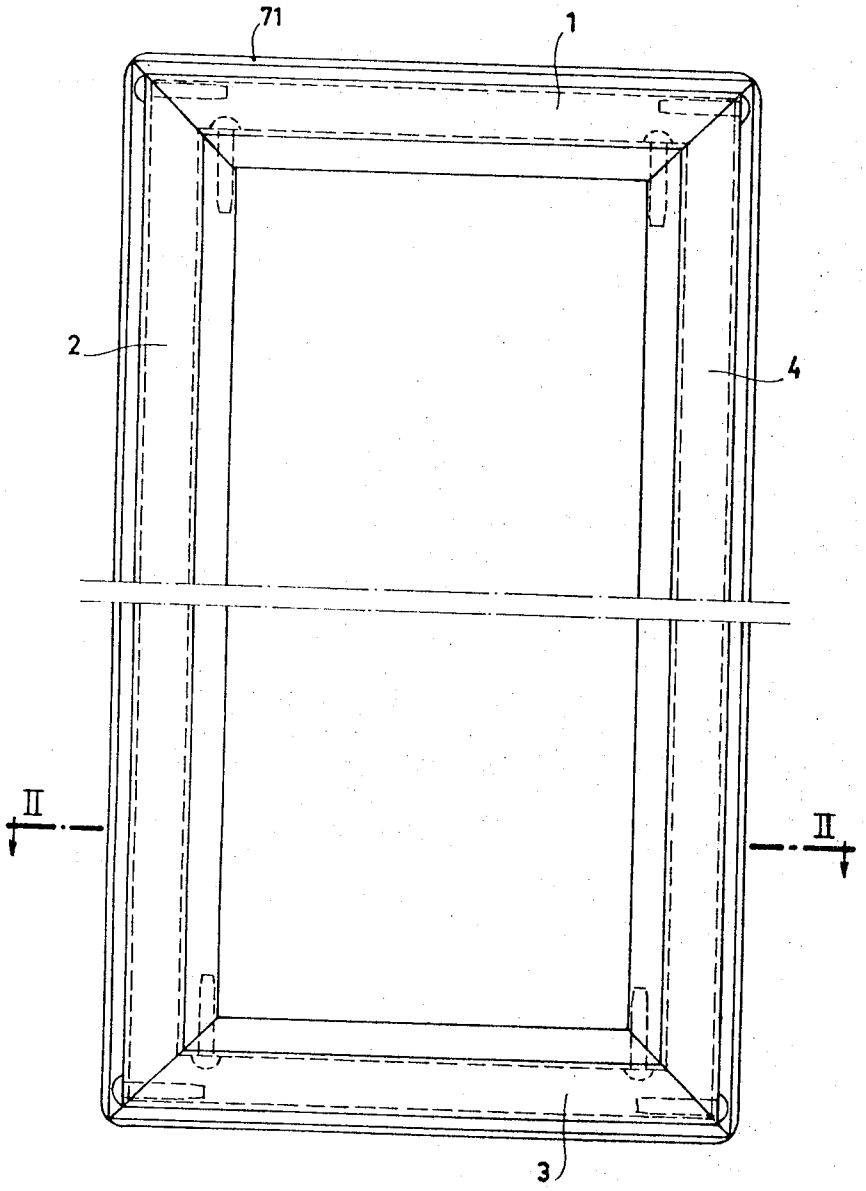
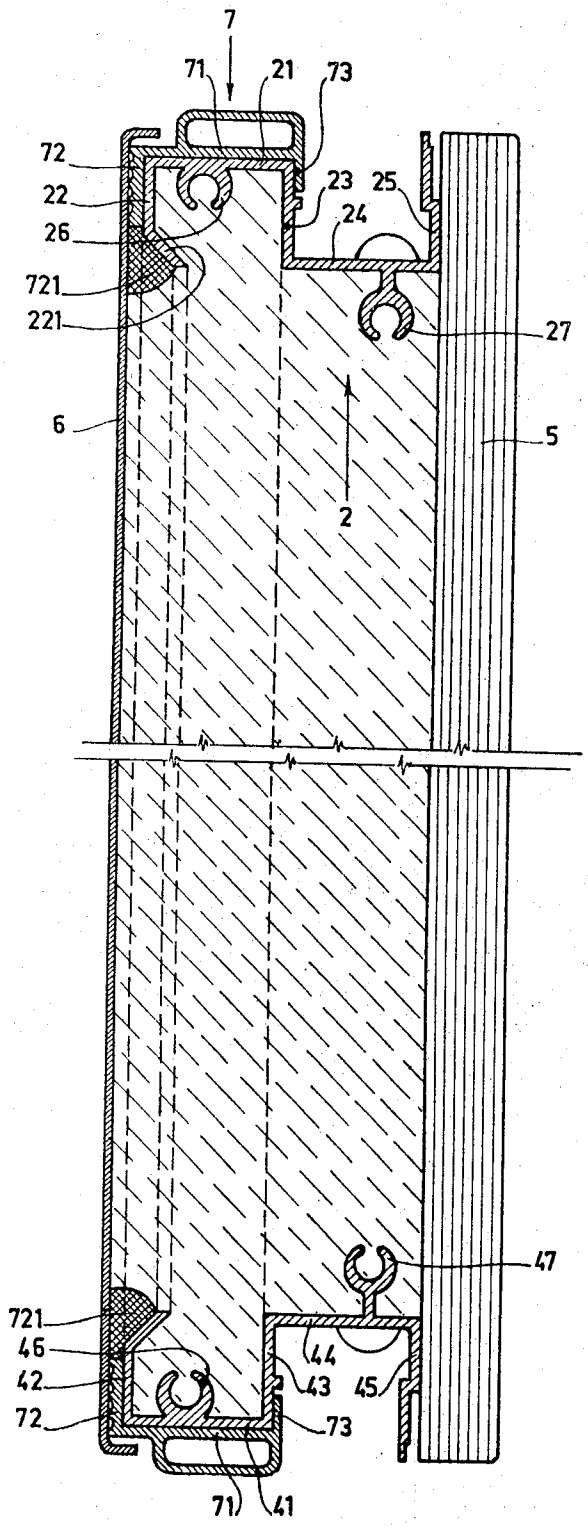


Fig. 2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SOLID HEAT INSULATION PANEL FOR BUILDING

This invention relates to a solid heat insulation panel for buildings.

A panel known from the prior art comprises a facing on the outside, an inner facing and a joinder member for the two facings. Generally, this joinder member is constructed of synthetic resinous material, which may or may not be foamed, and cast between both facings, the ends of which are sometimes bent by 180° towards the inside, in order to form hooks which increase the solidity of the assembly. In certain instances, the junction member is constructed with] frame comprising four assembled profiles and provided with legs intended for the assembly of the panels between each other. The tightness of the assembly, the need for providing expansion and tolerance takeup joints, pose problems which require complicated solutions.

It is an object of this invention to produce a solid heat insulation panel for buildings which provides simultaneously heat insulation, tightness between the panels and the takeup of the tolerances.

These and other objects and advantages of this invention will hereinafter appear and, for purposes of illustration, but not of limitation, an embodiment of the invention is shown in the accompanying drawings in which:

FIG. 1 is a front elevational view of the panel, and

FIG. 2 is a sectional view taken along line II—II of FIG. 1 in which the outer panel is made transparent for greater clarity of the drawing. The section through a vertical plane is identical with the symbols of the near profiles in the horizontal section of FIG. 2.

According to the practice of this invention, a panel is formed with a frame constructed of two horizontal beams and two uprights, an inner facing and an outer facing which are assembled in the frame by a plastic resinous material injected at the assembly site. Each of the four frame profiles are in the form of U-shaped members having a core extending perpendicular to the surface of the facings and two wings or flange members, identified as a front wing and a rear wing, parallel to the planes of the facings and turned to extend substantially perpendicularly from the core toward the inside of the panel. These four profile members constitute a joint support. An annular joint is fastened all the way around this support comprising a central portion which is applied to the U-shaped core to form a joint for tightness and takeup of play at the juncture between two adjacent panels and a front portion applied to the front wings and forming a heat insulation joint therewith, with the outer facing being applied against said front portion.

The joint preferably includes a rear portion applied against the rear wings of the U-shaped members of the frame profile and intended to perfect the solidity and the fixation of the joint.

Referring now to the drawings, the panel comprises, on the one hand, a frame formed of two cross beams including an upper cross beam **1** and a lower cross beam **3**, and two uprights **2** and **4** and, on the other hand, an inner facing **5** of wood or plastic material, an outer facing **6** formed in the illustrated embodiment of a metal panel, such as aluminum or an alloy of aluminum. The cross beams and uprights **1, 2, 3** and **4** are mitered at their ends at an angle of 45° for assembly in an interfitting relationship, as by welding or by screw fastening means in throats, such as **26** and **27**, which are provided for this purpose.

Each of the four profiles of the frame comprises, at its outer facing side, a U-shaped member which includes, for the upright **2**, a core **21** which extends perpendicular to the surfaces of the facings **5** and **6** and two wings or flanges including a front wing **22** and a rear wing **23**, which extend substantially perpendicularly inwardly from the ends of the core in parallel relation with the facing surfaces. These four members constitute a joint support. The rear portion of the profile has a shape in function of that of the rear facing **5**. In the embodiment shown, it is formed with a crosswise extending wing section **24** and an outwardly extending wing section **25** which extends substantially perpendicularly from the rearward end of the section **24** in parallel relationship with the facing **5** and which together with the wing **24** forms an angle iron. Two throats **26** and **27** are connected, one to the core **21** of the U-shaped member and the other to the wing **24** which extends parallel to the core and which with the core defines the thickness of the panel section between the facings **5** and **6**. The description of the U-shaped members of the other profiles of the frame is the same as that described by the first and is derived from the description by replacing the first numeral **2** of the symbols by the symbols **1, 3** or **4** of the corresponding profiles.

The joint support, formed of the U-shaped members of the four profiles, bears a single annular joint **7** which comprises, on the one hand, a central portion **71** dimensioned to correspond with and to abut the core **21** of the U-shaped members and which constitutes a joint for tightness and for compensating for the expansion and play between adjacent panels and, on the other hand, a front portion **72** which extends alongside the front wings, such as the wing **22** of the U-shaped profile and forms therewith a heat insulation joint. In the embodiment shown, the joint **7** includes a rearward portion **73** which extends alongside the rear wing **23** of the U-shaped member of the frame profiles. This portion improves the solidity of the fixed joint. For the same purpose, the end **221** of the wing **22** is folded to extend angularly inwardly in order to provide a space adapted to receive padding **721** which finishes the forward portion of the joint **72** or the space may be used for cementing purposes.

The central portion **71** may be formed to include a hollow cylindrical shape of elongated section to improve the tightness and permit a takeup of expansion and play. Moreover, the section of the panels is thus protected during handling between the factory and the site for utilization.

The panel can be manufactured in the following manner:

The frame is first assembled by welding or, after drilling holes, by screw fastening. The joint **7** is then put in place, as described above; then the front and rear facings are placed in position of use and the assembly is placed under a press. Finally, a plastic, such as polyurethane, is injected between the surfaces and polymerized. The padding or cementing **721** prevents the plastic material from escaping between the member **72** of the joint and the facing **6**.

These panels offer multiple advantages. They are inter-assembled without requiring any additional member, such as joint covers or stampings. They are not individualized and their standardization is simple in that

one single type of panel suffices since their fastening requires no additional members. Finally, each panel can be installed and dismantled separately directly onto the framework without intervention upon the environment. The inner facings are joined without excessive thickness, the narrow joint is similar to a line joint, which aspect is highly desirable by architects and decorators. The sealing surface is located as far as possible on the outside, immediately behind the outer facing, constituted by the contact of the parts **21** by joinder with adjacent panels with the result that the frame is not in contact with the outside air whereby weakening of the heat insulation at the juncture between the two panels is minimized.

For the panels forming an inner partition, both facings **5** and **6** may be fabricated of wood or plastic material. For use as an outside panel, the inner facing may be the same as described while the outside facing may be formed of a ceramic, frosted glass or metal. The profiles are of metal such as of an aluminum alloy containing approximately 1 percent magnesium and 1 percent silicon. The outer facing may be anodized or lacquered aluminum.

In order to facilitate shipment and mounting of the panel, the hollow cylindrical portion of the joint may be provided with a vacuum as by means of a valve, not shown. This vacuum is formed at the time of the manufacture of the panel and it is removed after the panel has been mounted at the construction site.

The invention is addressed to solid panels for buildings and particularly to the construction of panels for curtain walls and for partitions.

It will be understood that changes may be made in the details of construction, arrangement and operation, without departing from the spirit of the invention, especially as defined in the following claims.

I claim:

1. A solid heat insulation structural panel characterized by good heat insulation, tightness between the panels and compensation for variation from tolerances comprising a frame formed of four profiles, an inner facing member and an outer facing member joined to the profiles by a resinous adhesive injected between the facing members at the construction site, each of the four profiles of the frame comprising a U-shaped member including a core section perpendicular to the plane of the facings and flanged wing members extending substantially perpendicularly inwardly from the ends of the core section including a front wing and a rear wing parallel with the facings, a crosswise wing section integral with the rear wing extending perpendicularly toward the inner facing member and an outward wing section extending from the crosswise wing section parallel to the facing members and adapted to abut the inner facing member, an annular joint support comprising a central portion overlaying and attached to the core and an outer portion extending substantially perpendicularly from said central portion between the front face of the front wing and the outer facing member, thereby forming a heat insulation joint therewith, said joint support also including a rearward portion overlying and engaging the rearward wing, said central portion of the annular joint being formed with a hollow section of cylindrical shape to provide a joint having maximum tightness and takeup of play at the juncture of the adjacent panels.

2. A panel as claimed in claim **1** in which the hollow cylindrical section of the joint is evacuated to subatmospheric pressure, which vacuum is destroyed after the panel has been set in place.

3. A structural panel as claimed in claim **1** in which the facing sections are of wood.

4. A structural panel as claimed in claim **1** in which the facing on the outside is of metal and the facing on the inside is of wood.

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