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BUILDING PANEL AND METHOD OF ASSEMBLY

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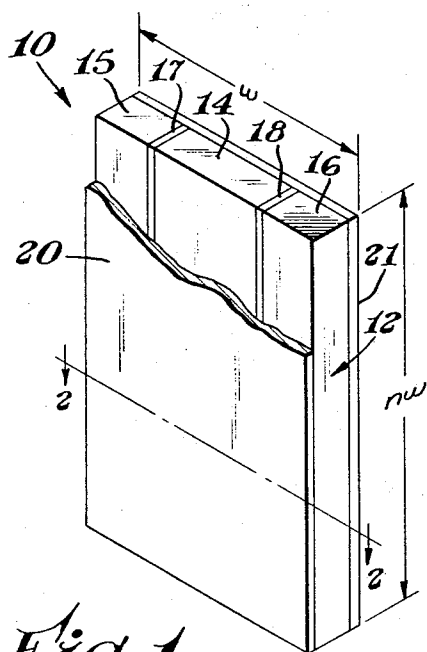


Fig. 1

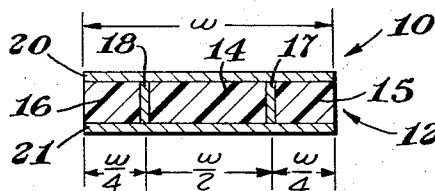


Fig. 2

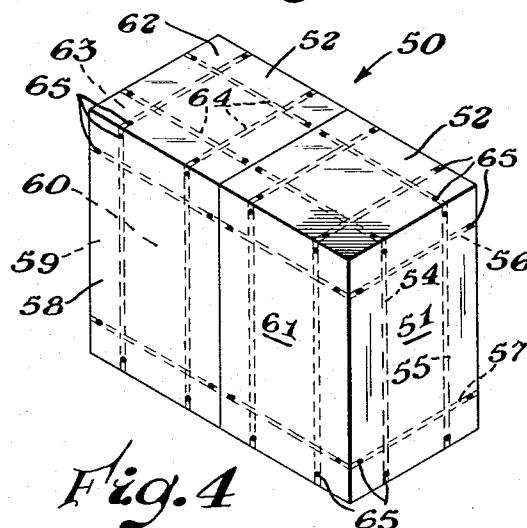


Fig. 4

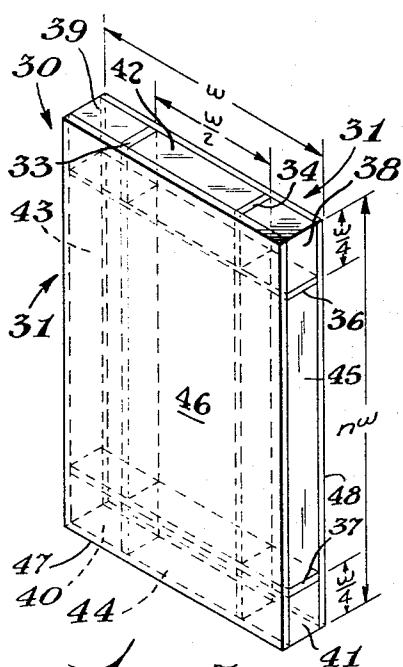


Fig. 3

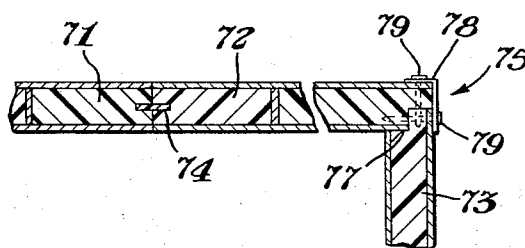


Fig. 5

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3,363,378

BUILDING PANEL AND METHOD OF ASSEMBLY
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Continuation-in-part of application Ser. No. 296,709, July 22, 1963. This application Jan. 12, 1966, Ser. No. 520,163

7 Claims. (Cl. 52—309)

This application is a continuation-in-part of my co-pending application Ser. No. 296,709 filed July 22, 1963, now abandoned.

This invention relates to sandwich panels. It more particularly relates to an improved sandwich panel which is adapted for modular construction.

Insulating sandwich type building panels are widely used for the construction of enclosures for various purposes such as refrigerators, cold rooms and the like as well as for the construction of conventional buildings. Generally the sandwich panels comprise skins or face sheets which are separated by and adhered to a core member. Many of the more effective panels utilize foam plastic material as the insulation and oftentimes employ a peripheral frame member to provide a means of joining the individual panels as well as adding to the structural strength thereof. Usually such panels are provided in a standard modular dimension such as 4 x 8 feet or 4 x 12. Assembly of such panels is generally accomplished by the use of suitable edge joining means, plates, strips, splines and the like. Oftentimes it is necessary to utilize a portion of the panel such as a half panel in order to obtain the desired dimensions or the structure must be made to the full dimensions or alternately a special panel prepared to fit the required dimension. Such sandwich panels when cut expose the core material and lose their structural integrity because the fractional panels lose one of the peripheral frame members such as, for example, when a 4 x 8 panel is cut into two 4 x 4 panels.

It is an object of this invention to provide an improved reinforced sandwich panel.

It is a further object of this invention to provide an improved method for the assembly of such sandwich panels.

It is another object of this invention to provide improved sandwich panels which may be readily joined to like sandwich panels to provide a well braced integral structure.

These features and other objects and advantages of the present invention are achieved by providing a modular panel having internal bracing embedded within the core, extending for substantially the thickness of the core from skin to skin, said bracing members being positioned at, at least two of the quarter points of the panel. By the term quarter point is meant a location within the panel that corresponds to a distance of one quarter the width of the panel from any edge. In utilizing the panels in accordance with the invention it is beneficial to assemble panels and half panels in such a manner that the spacers or frame members positioned at the quarter points of the panels are positioned in abutting or adjacent relationship to adjacent similar panels or fractional panels.

Further features and advantages of the present invention will become more apparent when the following specification is taken in connection with the drawing wherein:

FIGURE 1 is a partly-in-section view of a panel in accordance with the invention;

FIGURE 2 is an end view of the panel of FIGURE 1;

FIGURE 3 is a representation of an alternate panel in accordance with the invention;

FIGURE 4 is a schematic isometric view of a structure fabricated from panels of the invention;

FIGURE 5 is a sectional view of panels in accordance with the invention illustrating manners in which they may be joined together.

In FIGURE 1 there is illustrated a cut-away view of a panel in accordance with the invention generally designated by the reference numeral 10. The panel 10 comprises a core 12. The core 12 is divided into a central core portion 14 and two side portions 15 and 16. The side portion 15 is separated from the central portion 14 by a spacer or stiffener 17 and the side portion 16 is separated from the central core portion 14 by a similar stiffener or spacer 18. On each side of the core are positioned the face sheets 20 and 21. The face sheets 20 and 21 are secured to the core and spacers 17 and 18. The panel 10 has a width W and a length nW wherein n is a positive whole integer such as 1, 2, 3, 4, and the like.

In FIGURE 2 there is shown an end view of the panel 10 wherein the dimensional relationships between the spacers or stiffeners 17 and 18 is set forth. The center of the spacer 17 is located at a distance w/4 from one edge of the panel wherein W is the width of the panel.

Similarly the spacer 18 is located at a like distance from the opposite edge of the panel.

FIGURE 3 depicts a view of an alternate panel in accordance with the invention generally designated by the reference numeral 30. The panel 30 comprises a core 31. The core 31 comprises a pair of longitudinal stiffeners or spacers 33 and 34, each centered a distance of w/4 from the nearest edge of the panel, a pair of spacers 36 and 37 which are disposed substantially at right angles to the spacers 33 and 34 and are centered at a distance w/4 from the ends of the panel. In the spacers adjacent the stiffeners 33, 34, 36 and 37 are positioned insulating blocks 38 and 39, 40, 41, 42, 43, 44, 45 and 46. Firmly joined to either side of the core are rectangular facing sheets 47 and 48.

In FIGURE 4 there is illustrated a structure 50 prepared from panels 51 and 52. The panels 51 are provided with longitudinal spacers 54 and 55, transverse spacers 56 and 57 and to the major faces of this assembly are secured face sheets 58 and 59. Disposed between the face sheets 58 and 59 is insulating core material 60. The panel 52 comprises a pair of face sheets 62 and 63 having positioned therebetween the stiffening members 64 positioned at quarter points in the panel. The terminal portions of the stiffening members or spacers 64 and 54 are brought together at the edges and secured by suitable means. Similarly the transverse spacers 56 and 57 of the panels 51 are also in engagement with each other. The terminal portion of the stiffening members and spacers are secured together by means of nails 65. Where the ends of two co-linear stiffeners meet the nails 65 are driven at an angle in order that they pass through both members.

FIGURE 5 depicts methods of joining in edge to edge relationship the portions of the panels wherein the spacing members are absent. A pair of panels 71 and 72 are shown in edge abutting relationship and a spline 74 is recessed into the core portions of each. The edge portions of the panel 72 and a panel 73 are joined to form a corner 75. The panel 73 is recessed to form a rabbet 76 and the panel 72 is recessed to form the rabbet 77. The two edge portions of the panel are interfitted to form the corner 75. The corner 75 is maintained in position by means of an angle member such as the angle 78 which is secured by the fasteners 79 passing through the panels 72 and 73.

The panels in accordance with the present invention are prepared optionally from a wide variety of materials. Particularly advantageous as core materials are synthetic resinous foams such as foamed polystyrene, foamed polyurethanes, foamed phenolic resinous compositions and the like. Other insulation materials may be utilized such

as glass fiber mats, cellulose fibrous mats, fiberboard, expanded mica such as vermiculite, foamed polyethylene and the like. The selection of skins for the particular panel is also dependent upon the end use to which it will be put. Suitable skin materials include hardboard, fiberboard, plywood metal sheets, and the like. The stiffening members similarly may be selected to meet any particular desired and use conditions. Beneficial for many operations it is desirable to use wood, and for example when 4 foot by 12 foot or 4 x 8 panels are prepared for conventional housing and like construction 2 x 4 (1½ inches x 3½ inches) lumber is beneficially utilized. Alternately other stiffener or rib materials may be used such as metal channels, I's, Z's, circular tubes, rectangular tubes and the like.

Panels in accordance with the present invention may be fabricated in any desired manner which is consistent with the materials from which they are prepared. For example, a panel using wood stiffeners and polystyrene insulating material with a hardboard or plywood face is readily assembled by gluing. Alternately the skins may be nailed to the wooden stiffeners and the insulating materials maintained in position by an adhesive. When all metal construction is utilized for the stiffeners and skins a skin may readily be attached to the stiffeners by means of riveting, bolting, adhesives and the like.

By way of further illustration a plurality of panels similar in construction to those shown in FIGURE 3 were prepared utilizing foamed polystyrene having a density of about 2 pounds per cubic foot as a core material. The stiffening members were assembled utilizing 2 x 4 lumber with lap joints, ¼ inch thick tempered hardboard was glued to either side of the core assembly utilizing a phenolic adhesive. The resultant panels were assembled into a structure generally similar to that shown in FIGURE 4 by means of nailing the stiffeners members within the adjacent panels to each other. The corners and joints between the panels were made in accordance with FIGURE 5. This structure was quickly assembled with a minimum of time and effort in its construction and resulted in a sturdy, weatherproof insulating enclosure.

In a manner similar to the foregoing illustration other panels and panel structures are readily prepared utilizing conventional materials of construction. As is apparent from the foregoing specification, the article of the present invention is susceptible of being embodied with various alterations and modifications which may differ particularly from those that have been described in preceding specification and description.

For this reason, it is to be fully understood that all of the foregoing is intended to be merely illustrative and is not to be construed or interpreted as being restrictive or otherwise limiting of the present invention, excepting as

it is set forth and defined in the hereto appended claims. What is claimed is:

1. A plurality of generally rectangular adjacent building panels, each panel consisting essentially of a core of a cellular plastic foam having positioned therein four bracing members extending the entire thickness of the core and two of said members extending the length of the core material, the remaining two of said members extending the width of the core material, said bracing members being positioned at locations $w/4$ from the edges wherein w is the width of the panel, and at least one skin secured to at least one major face of the panel, the bracing members of adjacent panels are secured together by nailing means.
2. The panel of claim 1 wherein a skin is provided on each of the major faces of the panel.
3. The panel of claim 1 wherein the insulating material is expanded polystyrene.
4. The panel of claim 3, wherein the bracing members are rectangular wooden members.
5. The panel of claim 4, wherein the skins are sheet aluminum.
6. A method of assembling a plurality of generally rectangular sandwich panels having only four bracing members at locations $w/4$ from the edges of the panels wherein w is the width of the panel, the panels having a cellular foam plastic core, positioning the panels in edge to edge abutting relationship with the bracing members of adjacent panels adjacent each other and nailing adjacent bracing members of abutting panels together to form a structure which is an insulating enclosure.
7. The method of claim 6 wherein a spline member is utilized in the edges of adjacent parallel panels to maintain them in alignment with each other.

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