ABSTRACT

A building panel comprising spaced-apart inner and outer facing members having a foamed plastic material therebetween. The building panel including load-bearing surfaces along the top, bottom and side edges thereof, the load-bearing surfaces at the side edges of the panel adapted to engage with load-bearing surfaces on the next adjacent panel and to be secured thereto for retaining the panels in their proper erected position. Some of the aforesaid panels being provided with openings to receive a door and/or window structure to thus provide a panel structure and arrangement of panels whereby a dwelling may be readily constructed with the aforesaid panels.

4 Claims, 12 Drawing Figures
BUILDING PANEL AND STRUCTURE CONSTRUCTED THEREWITH

BACKGROUND OF THE INVENTION

In the past, numerous attempts have been made to provide panel structures which can be fabricated at a plant facility, and when so formed, the panel units can then be adequately packaged for shipping to the building site and then easily assembled to form the desired structure. Panels such as utilized in the present invention are such that they may be easily molded to the desired configuration as will enable one to readily assemble the panel units to form a structure of the desired height without the use of the conventional vertical studding, thus reducing materially the costs in erecting a building.

With the above in mind, it is the primary object of the invention to provide a panel structure, comprising an interior and an exterior panel, with an insulating foam material extending therebetween which will serve as an effective means to properly insulate the dwelling without the use of an extraneous material to effect the desired insulation for the dwelling.

Another object of the invention is to mold as an integral building panel, an interior and an exterior surface constructed of any suitable material and providing each of said panel units with load-bearing surfaces which are adapted to engage with like load-bearing surfaces on the next adjacent building panel and secured thereto to form a completed wall unit without the employment of the usual vertical studding.

Another object of the invention is to form a composite building panel unit with the exterior surface constructed so as to overlie the exterior of the foundation and customary floor joists so as to prevent the ingress of rodents, rain water, etc., into the undersurface of the customary sub-flooring commonly employed in the formation of a dwelling or like structure.

Another object of the invention is to provide suitable cut-out areas at the upper portion of the panels so as to receive therein the customary rafters employed in the support of a flat or slanted roof structure.

Another object of the invention is to provide each of a number of composite building panels with equally spaced conduits extending into the insulting material disposed between the interior and exterior facings employed in the formation of the instant building panel, thus facilitating the placement therein of suitable electrical wiring, etc.

Another object of the invention is to mold a composite building panel having an interior and an exterior facing constructed of any suitable material with suitable insulating material between the spaced inner and outer facings and to enclose said insulating material within load-bearing surfaces which extend along all sides of the panel.

Another object of the invention is to mold a composite building block comprising an inner and an outer facing member formed of any suitable material and to form openings in the desired panel to receive a door and/or window casing and to secure said casing within the aforesaid opening by reason of adhesion of the foam insulting material which extends between the said inner and outer facing members, thus providing a building panel which will combine therewith the desired door and/or window unit mounted therein when the building panel is constructed at the plant facility and obviating the need for installing doors and/or windows at the building site, thereby effecting a considerable savings in the construction of a dwelling or like structure.

Another object of the invention is in the utilization of a building panel constructed as aforesaid in the formation of partitions within an enclosure, the building panel providing the necessary insulation desired between different rooms within a dwelling, thus greatly enhancing the insulating properties of partitions of a room-divider wall and the like.

Another object of the invention is to provide suitably spaced recesses along the upper edge of the panels wherein roof-supporting rafters may be placed and secured therein to properly support either a flat or a slanted roof construction.

A still further object of the invention is to mold a composite building panel in the manner aforesaid and to include as a part of the panel a series of strap members mounted along the lower edge of the panel, the strap members adapted to engage with a suitable load-supporting surface extending on the conventional sub-flooring to thus effectively secure the lower edge of the panel to the said sub-flooring assembly.

Unusual strength is imparted to the building by novel formation of the building panels employed in erecting the same. Such building panels enable the same to support considerable stresses without any special supporting framework, thereby contributing to the economy of the building. Additional strengthening is imparted by the novel way in which the panels fit together and by the novel fastening connections extending between each adjacent panel.

Thus, the general objects of the invention are to provide a rapidly assembled prefabricated building which can be quickly erected on a building site from panel sections which have been formed as in a mold at factory site, and which, after having been thus formed, can be easily transported to the building site and erected without resorting to special tools, extra fasteners or special skill to assemble the panels in the formation of an enclosure such as a dwelling or the like.

Other objects and advantages of the invention will appear from the following description of the preferred embodiments thereof.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective end view of a dwelling constructed with the panel structure of the invention.

FIG. 2 is a perspective view of a side of a dwelling constructed with the panel structure.

FIG. 3 is an enlarged sectional view taken at a corner of a dwelling.

FIG. 4 is an enlarged sectional view disclosing the manner in which interior partitions are constructed.

FIG. 5 is an enlarged sectional view disclosing the manner in which the panels about one another.

FIG. 6 is a section taken on lines 6--6 of FIG. 7 looking in the direction of the arrows.

FIG. 7 is a perspective view of a panel constructed in accordance with the present invention.

FIG. 8 is an enlarged sectional view showing the manner in which the panels overlap in the formation of a roof structure.

FIG. 9 is an enlarged sectional view taken on line 9--9 of FIG. 2 looking in the direction of the arrows.

FIG. 10 is an enlarged sectional view disclosing the recess formed for accommodation of a roof rafter.

FIG. 11 is an enlarged sectional view disclosing the manner in which a window opening is formed in the panel structure, and

FIG. 12 is an enlarged section disclosing the manner in which a door assembly is mounted within the panel.

PREFERRED EMBODIMENTS OF THE INVENTION

Referring now to the drawings, there is disclosed at FIGS. 1 and 2, respectively, a side and an end view of a dwelling constructed with the building panels of the present invention. FIG. 1 of the drawings discloses a dwelling structure having a slanted roof, however, as will be described more fully hereinafter, the dwelling may be equally fabricated with a flat roof.

The panels of the present invention are shown generally by reference numeral 10. The panels 10 comprise an interior and an exterior facing 11 and 12. The exterior surface 12 of the panel 10 may be formed of any weather-resistant material such as maconite or weather-proofed plywood formed with or without a decorative exterior surface. Or, the exterior facing may be constructed of a plastic sheathing or any other number of materials capable of being employed to present an exterior
surface which will effectively withstand the weather elements. The interior surface 11 may likewise be formed of any known suitable material such as set forth above and may, where desired, have a decorative surface formed on the panel so as to obviate the need for applying paint, wallpaper and the like in order to present an interior surface which will be pleasing to the eye.

The panel 10 is formed by selecting the materials utilized for the interior and exterior facings, and when so selected, a load-bearing surface in the nature of a relatively thin strip of wood or the like 13 is secured as nails or the like to a position adjacent to, but spaced from, the side edges of the aforementioned facings 11 and 12. On the opposite edge of the facings, a relatively thick load-bearing surface 14 of wood or the like is likewise secured between the facings 11 and 12 with a portion thereof extending beyond the edges of facings 11 and 12 as clearly shown in FIG. 5 of the drawings. Also, a load-bearing surface 15, in the nature of a strip of wood, metal and the like, is secured as by nails or the like to a position adjacent to, but spaced from, the upper ends of the top of the facings 11 and 12. A load-bearing surface 16, also of wood, metal or the like, is secured to the edge of the inner facing 11 and intermediate the edge of the outer facing 12 as more clearly shown in FIG. 6 of the drawings.

The interior and exterior facings arranged in the manner aforesaid, with the load-bearing surfaces 13, 14, 16 and straps 17 secured therebetween, the assembly is then placed in an appropriate mold which will contain the assembly therebetween, and following the placement of the assembly in a mold, as aforesaid, a suitable foamy material such as polyurethane 18 is admitted in any known manner into the area defined between the interior and exterior facings and the load-bearing surfaces aforesaid. Thus, there is provided a composite panel comprising an inner and an outer facings and a foamy material therebetween which will add to the insulating properties of the panel and likewise by virtue of the inner layer of foamy material, the strength of the composite panel has been greatly increased.

Referring again to FIG. 5 of the drawings, it will be seen that one end of the panel 10 is provided with a relatively thin bearing surface 13 whereas the opposite edge of the panel is provided with a relatively thick bearing surface 14. The arrangement of the load-bearing surfaces 13 and 14, as aforesaid, produces a groove 19 which is adapted to receive the tongue 20 which extends from the bearing surface 14, and when the parts are assembled with the tongue 20 inserted within the groove 19, the parts may be permanently joined to one another as by means of a mastic or like adhesive 21 extending between the abutting edges of the load-bearing surfaces. A batten strip 22 of suitable material is adapted to be mounted in any known manner over the jointed ends of the load-bearing surfaces to enhance the exterior appearance of the assembled assembly and to likewise prevent the seepage of rain water and the like between the joined parts.

As can be seen in FIG. 5 and 7 of the drawings, a tubing 23 of any known material is positioned a known distance from the edge of the panel and will provide a means whereby electrical wiring can be placed therein and will enable one to easily determine the location of the wiring, thus facilitating the tapping therein for placing the necessary electrical outlets at the desired locations either interiorly and/or exteriorly of the panel structure.

The load-bearing surfaces 13 to 16, inclusive, have been described as being made of wood, however, if desired, metal may be employed in lieu of the wood and as can be appreciated, when the foamy material sets within the confines of the framework provided as aforesaid at the top, bottom and side edges of the panel, the foamed metallic engages with the wood or metal or other material employed to form the load-bearing surfaces and thus forms a composite structure which will be characterized by its great strength and stability once erected in a manner to be more fully described hereinafter.

There has thus been described a building panel constructed in accordance with the terms of this invention, and likewise there has been described the manner of securing the panels in edge-to-edge relationship such as when building a wall for a building, warehouse, etc.

Referring now to FIG. 6 of the drawing, there is shown therein the formation of the exterior facing 12 of the panel 10. As shown in this figure of the drawings, the lower edge or bottom 24 of the facing extends to a position below the lower edge of the interior facing 11. As can be seen, the lower edge or bottom 24 is adapted to overlie the sill 25 and foundation 26, thus preventing the entry of rain water, rodents and the like at the foundation level of the dwelling. To secure the panel to the foundation level of the dwelling, a strip 27 in the nature of a conventional two-by-four is secured in any known manner to the sub-flooring 28. Thereafter, the panel is placed over the said two-by-four and the panel secured thereto as by means of nails, etc., extending through straps 17 and into the said two-by-four structure. Thus, with the panels secured to the two-by-four extending over the sub-flooring in the manner aforesaid, and with the edges of the panels mounted in abutting relationship with one another as shown more clearly in FIG. 5 of the drawings, a wall constructed with the panel of the present invention can be easily and economically erected with a minimum of labor and parts, thus reducing considerably the overall costs in the construction of a structure of this type.

Referring now to FIG. 4 of the drawings, there is shown therein the manner of providing for partitions within the confines of the dwelling. The panel 10 which forms the partition aforesaid comprises facings 11 and 12 with the foamed material therebetween. The edge of the panel is provided with a relatively thin load-bearing surface 13' secured inwardly of and between the ends of the facings as by nails and the like. When it is desired to form a partition within the building or enclosure, a strip 29 of wood or other suitable material is nailed or otherwise secured to the interior facing 11, and the parts assembled as shown in FIG. 4 of the drawings. If desired, an adhesive mastic may be applied between the strip 29 and the load-bearing surface 13' to retain the parts in their proper assembled position. Also, if desired, the facings 11 and 12' may be nailed or otherwise secured to the strip 29 to assist in retaining the elements in their assembled relationship.

Referring now to FIG. 3 of the drawings, there is shown therein a corner construction which is employed in association with the panel of the present invention. The corner structure comprises a pair of exterior facing members 30, 31 which are disposed at right angles to one another with a corner channel member 32 extending between the facing members and secured thereto an any known manner. In constructing the corner section such as shown in FIG. 3 of the drawings, the exterior facings 30, 31 and the corner channel disposed therebetween are mounted in a suitable mold, and wooden barriers 33 and 34 are likewise placed in the said mold apparatus, and with the parts in their respective positions within the mold, the foamy material is introduced into the mold, thus filling in the space between the exterior facings 30, 31 and wooden barriers 33, 34, and when the foamy material sets, it will adhere to all of the vertical areas within the aforementioned space, thus resulting in a corner structure which will interfit with the next adjacent panels and to be connected thereto as by an adhesive mastic between the parts so joined, and if desired, nails or other type fasteners may be employed along with the adhesive to assist in retaining the assembly in proper assembled relationship. Of course, the lower edge of the exterior facings forming the corners in the aforesaid will extend over the sub-flooring, sill and foundation such as described with respect to FIG. 6 of the drawings and will perform the function previously described.

Referring now to FIG. 8 of the drawings, there is shown a type of insulating panel which is employed in the formation of a roof structure. FIG. 8 of the drawings shows an overlapping type panel constructed of an exterior surface 35 and an interior or surface 36 and the manner of joining the top and bottom
edges of the panel with a tongue and groove arrangement. The exterior surface 35 of the panel is formed of any suitable weather-resistant material and the inner surface 36 of the roof may be placed in a suitable molded panel provided with a suitable decorative surface. The panels of FIGS. 8 and 9 of the drawings are formed in a suitable mold in the manner aforesaid with a foamed material 18 extending between the interior and exterior roof sections. A suitable tongue and groove arrangement is formed along the side edges of the panels for interlocking the panels in their assembled relationship to one another. A suitable mastic 21 extends between the tongue and groove arrangement to assist in retaining the panels in their proper relationship to one another, and in the case of an overlapping arrangement of the panels such as such as in FIG. 8 of the drawings, a nail or the like can be employed for nailing the panel to a rafter extending thereunder. The roof structure shown in FIGS. 8 and 9 of the drawings is one to be employed in the formation of a slanted roof, with the rafters underlying the roof likewise disposed on a slant and retained in that position in a well known manner.

In installations employing a roof such as shown in FIGS. 8 and 9 of the drawings, a suitable weather-resistant strip 37 overlies the abutting edges of the panels so as to prevent the entry of rain water, etc., at the joint between the adjoining panels. The panel employed in forming the ends of the roof may be suitably capped as by a weather-resistant end piece 38 which is nailed or otherwise secured to the ends of the panels. A mastic 21 is placed between the tongue and groove arrangement shown in FIGS. 8 and 9 of the drawings to assist in retaining the panels in their assembled relationship to one another. If deemed necessary, rafters can extend below the joined panels to support the same in their proper assembled position.

Referring now to FIG. 10 of the drawings, there is shown therein the manner in which the customary rafters employed in the support of a roof are mounted on the upper position of the panels and secured thereto to retain the rafters in their proper supporting position. In FIG. 10, there is shown a pair of panels 10 which have been joined at the edges thereof in the manner set forth previously with respect to FIGS. 5 and 6 of the drawings. The panels 10 are each provided at their top surfaces with the load-bearing surfaces 15 shown particularly in FIG. 6 of the drawings. To provide for a rafter-supporting surface, the upper edges of each panel form a substantially U-shaped area 39. The U-shaped area comprises a pair of vertically extending side pieces 40, 41 joined at the bottom thereof by a horizontally extending connector member 42. The aforesaid U-shaped member may be constructed of wood or any other suitable material and the same is lined with a metal reinforcement strap 43 which is secured to the said U-shaped member as by nailing or any other suitable means to effect the retaining of the strap within the U-shaped area. In instances where a flat roof is to be installed, the rafters are placed within the confines of the aforementioned U-shaped area and are caused to extend horizontally across the area of the dwelling and to be similarly placed in corresponding U-shaped areas provided for on the opposite side of the dwelling. With the rafters so assembled, one for each of the aforesaid U-shaped areas, the same can be nailed therein in order to retain the same in their proper supporting position. A rafter is illustrated generally at 44 in FIG. 10 of the drawings. In instances where the installation calls for a slanted roof structure, the rafters 44 are placed in the aforesaid U-shaped area and disposed at the desired angle to form the slanted roof-supporting surfaces and then nailed or otherwise secured therein in any knower manner.

FIG. 11 of the drawings discloses the manner in which a panel constructed in the manner aforesaid is provided with a window casing and trim which is formed within the panel at factory site. The casing and trim are shown at 45 and 46, respectively, and the same may comprise an integral structure having formed therein the customary guide rails for the window, screen, and the like. To assemble the casing and trim within the panel, an opening corresponding to the area to be occupied by the casing is cut away from the interior and exterior facing of the panel. Then, the panels with their cut-outs and trim within the aforesaid cut-outs, and the foamy material is poured into the mold area to completely fill in the space between the aforesaid interior and exterior facings 11, 12 and the area defined between the load-bearing surfaces 13, 14 and the casing 45. The foamy material 18, when caused to set, will adhere tightly to the casing 45 and thus retain the same within the panel without requiring any extraneous means for holding the same in proper position.

Referring now to FIG. 12 of the drawings, there is disclosed therein a door assembly which can likewise be positioned within a panel assembly in substantially the same manner as previously described with respect to the window unit shown in FIG. 11 of the drawings. The door frame comprises a unitary structure formed of metal, plastic or any other suitable material and includes the trim areas 48 and 49 which are adapted to be disposed on either side of the panel opening formed for the reception of the frame. The door frame may be formed with the necessary stops for the conventional swinging door and also for the customary storm or screen door. To assemble the door frame and its adorning panels, the panel employed in forming the ends of the roof 10, the opening of the required size is formed in both the interior and exterior facings, and the door frame, minus the aforementioned doors, is placed within the formed openings. This assembly is placed within a suitable mold apparatus, and with the load-bearing surfaces 13 and 14 secured to the facings as shown in FIG. 12 of the drawings, the foamy material 18 is poured into the mold, thus forming the area defined between the aforesaid facings and load-bearing surfaces and the area bridged by the door frame. Upon setting of the foamy material, the same is caused to adhere to the area of the door frame coming in contact with said foamy material, thus retaining the frame within the confines of the opening formed therefor in the facings in the manner aforesaid. Thus, it will be seen that the door frame can be installed within a panel of the present invention, and that the same can be assembled at factory site and later conveniently shipped to the building site for assembly with next adjacent panels in the manner previously described.

To erect a building with the panels of the present invention, the usual foundation, including the customary sub-flooring, is first formed in the well known manner with two-by-fours or the like extending over the edges of the sub-flooring and secured thereto in any known manner. Thereafter, the panels of the present invention, which have been formed at factory site and which are of the desired height and width, will be secured to the two-by-fours as by nails, etc., with the exterior facings of the panels extending below the sub-flooring, sill and foundation so as to present a barrier for the entry of rodents and the like to the area under the sub-flooring. Following the placement of the panels in the manner aforesaid, and following the placement of a plurality of panels in this manner, a header plate of considerable length (not shown) is nailed or otherwise secured to the load-bearing surfaces 15 of each of the panels, thus rigidifying the panel assembly. Thereupon, the roof may be applied to the dwelling in the manner aforesaid to complete the structure.

In the description of the invention, I have designated certain types of material which can be employed to form the interior and outer facings. Obviously, many other type materials can be employed in the formation of the panels, and likewise, while I have referred to polyurethane as the foamy material employed between the panel facings, it is obvious that other type foamy material can be employed for accomplishing the same purpose. Also, if desired, a suitable fire-resistant material may be added to the foamy material so as to add to the fireproofing qualities of the panel. Also, it is conceivable that an insect or rodent repellent could be added to the foamy material so as to render the installation rodent and/or insect free.
Prefabricated panel units constructed in accordance with the invention are rigid modular units which replace the heavy mullions and floating panels of conventional curtain-type building walls. The normal loading is distributed throughout the entire building wall formed by these panels joined together. Also, the panel units constructed in accordance with the invention may be shipped and handled with a minimum of expense and trouble and can be quickly erected on the building site in attractive and effective building wall structures.

To those skilled in the art to which this invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from spirit and scope of the invention. The disclosures and the description herein are purely illustrative and are not intended to be in any sense limiting.

I claim:

1. A building panel comprising spaced-apart inner and outer facing members with a core of a foamed material therebetween, load-bearing and confining surfaces secured to the top, bottom and side edges, said surfaces being separate and independent from the facing members and adapted to support contiguous panels and to confine the foamed material, there being an opening formed between the side edges of said panel, a unitary hollow casing member within said opening with the walls thereof extending beyond the plane of said inner and outer facing members, the portion of the casing extending beyond the outer face member being bent outwardly towards said facing member forming a trim area for said member, said foambale material constituting the only means of adhesion for said casing in the panel.

2. The structure set forth in claim 1 in that the portion of the casing extending beyond the plane of the inner face member is bent towards said facing member forming a trim area for said member.

3. The structure recited in claim 1 wherein said casing houses a window therein.

4. The structure recited in claim 2 wherein said casing houses a door therein.

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