Sept. 20, 1971 G. L. MARCOTT 3,605,353

BUILDING PANEL AND BUILDING CONSTRUCTION

Filed May 1, 1969 2 Sheets-Sheet 1

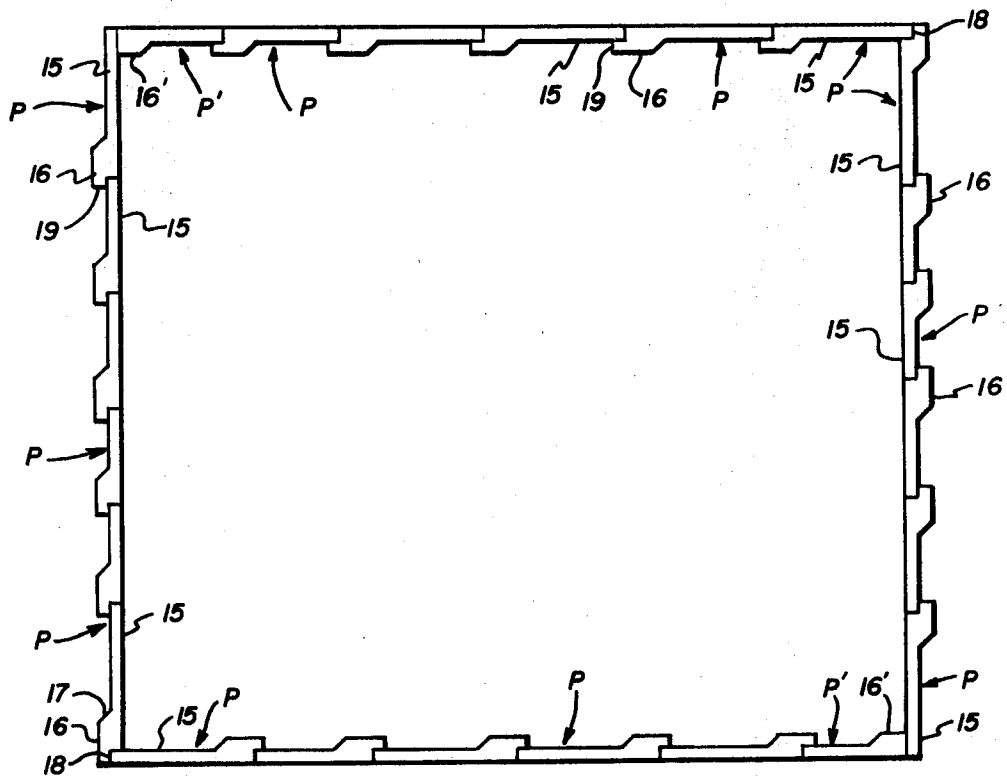


FIG. 1

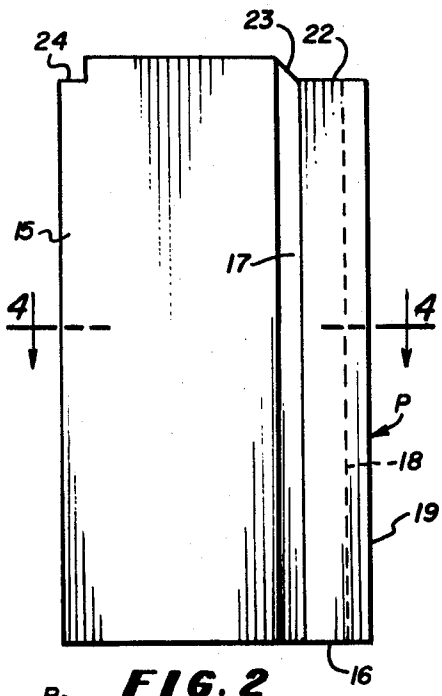


FIG. 2

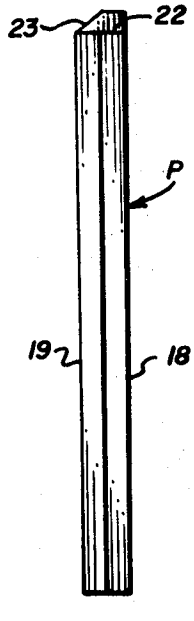


FIG. 3

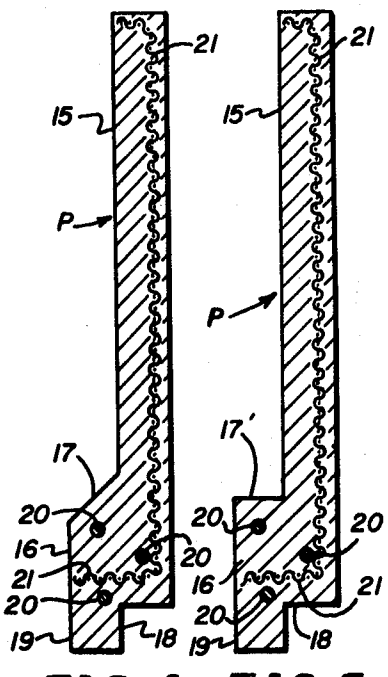


FIG. 4 FIG. 5

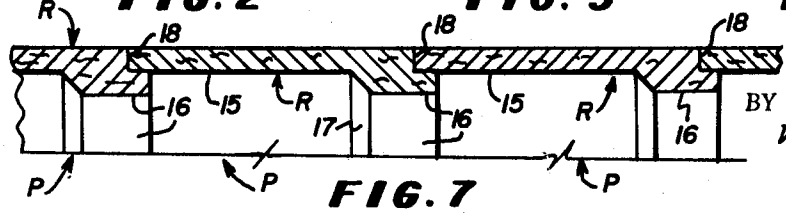


FIG. 7

INVENTOR.
Gordon L. Marcott
BY
Van Valkenburgh & Lowe
ATTORNEYS

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BUILDING PANEL AND BUILDING CONSTRUCTION

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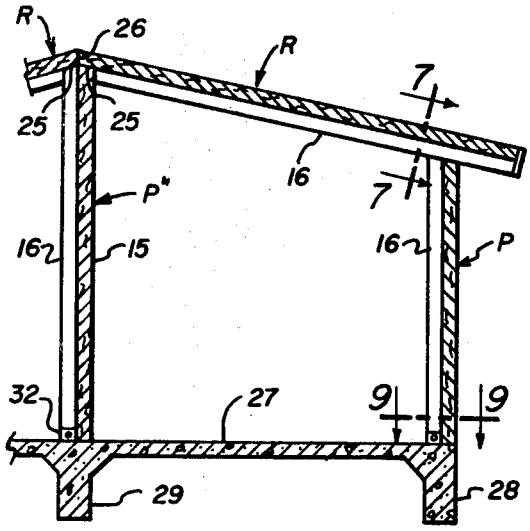


FIG. 6

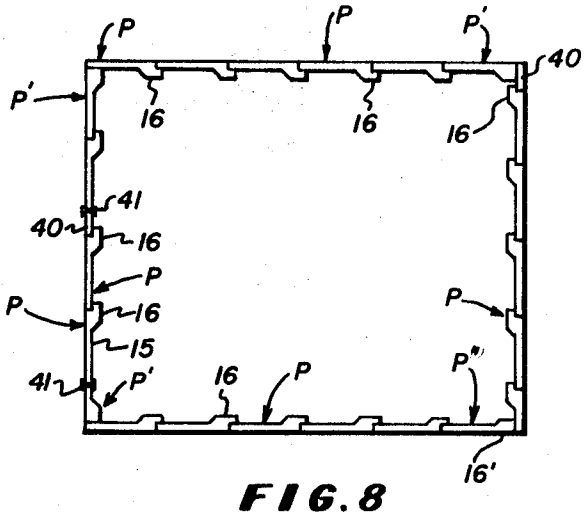


FIG. 8

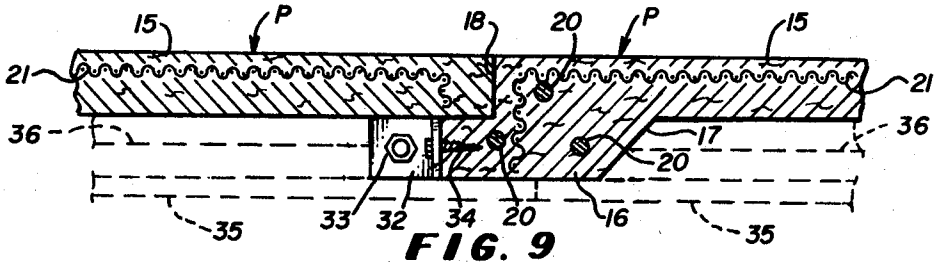


FIG. 9

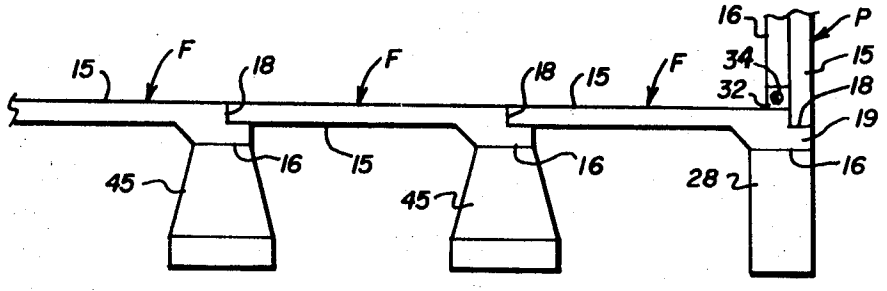


FIG. 10

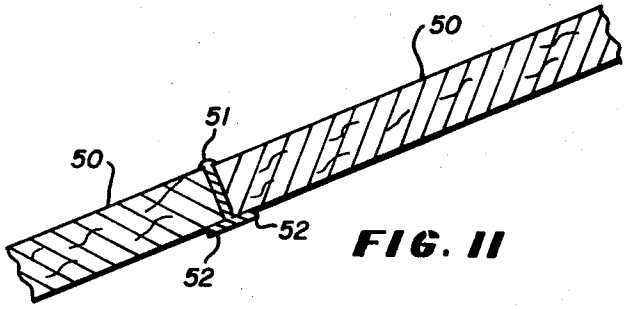


FIG. 11

INVENTOR.
Gordon L. Marcott
BY
Van Valkenburgh & Lowe
ATTORNEYS

United States Patent Office 3,605,353 Patented Sept. 20, 1971

3,605,353

BUILDING PANEL AND BUILDING CONSTRUCTION

Gordon L. Marcott, 1365 Columbine St., Denver, Colo. 80206

Filed May 1, 1969, Ser. No. 828,073
Int. Cl. E04b 7/02, 5/02
U.S. Cl. 52—91 1 Claim

ABSTRACT OF THE DISCLOSURE

A building construction panel is molded and formed primarily of relatively light weight material, having a planar first portion of uniform thickness and a second or beam portion along the lateral edge of the first portion, the beam being thicker than and offset at one side from the first portion and also having a notch in lateral alignment with the first portion to receive an edge of an abutting panel. The beam is provided with primary reinforcing rods extending longitudinally therewithin, while secondary reinforcing, such as wire mesh, is embedded within the first portion and extends laterally into the beam. The walls and/or roof and/or floor of a building may be constructed from such panels, with the longitudinal end or first portion of one panel being received in the notch of the beam of an adjacent panel. The wall panels may be notched at the upper ends to receive the beams of the roof panels, while narrower, rectangular panels may be utilized in walls or in the roof, with an I-channel connecting the edge of such a narrow panel with the edge of a first portion of one of the above panels. At a corner of the building wall, the first portion of one panel may fit into the notch in a beam of a panel of the adjacent wall, while special panels whose beams have a planar end surface, i.e. without the notch, may abut a first portion of an adjacent wall panel at the corner.

This invention relates to building panels and buildings constructed with the use thereof, and more particularly to cast or molded building panels and buildings constructed with the use thereof.

For the rapid and expeditious erection of buildings, a building panel which is relatively light but has sufficient strength to withstand the loads and pulls thereon, as well as being connectable to other panels, foundations or the like, by the more usual connecting means, such as nails, screws and the like, is highly desirable. Concrete panels, formed of either prestressed or reinforced concrete, have sufficient strength but are extremely heavy and require relatively heavy and expensive connecting devices, since two panels of concrete cannot be readily connected together by nails or screws. Panels formed of lighter weight material have not had the necessary structural strength, so that the use of a light weight material has been confined to blocks which are set in place with mortar, a time consuming and expensive operation.

Among the objects of this invention are to provide a novel building construction panel; to provide such a panel which is light in weight, yet has the necessary structural strength; to provide such a panel which may be connected to another panel by ordinary connecting devices, such as nails, screws or the like; to provide such a panel which will permit the attachment of wall board or the like, as on the inside, without difficulty; to provide such panels which may be utilized as outside or interior bearing walls; to provide such panels which may be also used for roofs or floors; to provide such panels which may be molded to shape without undue difficulty; to provide a building construction which utilizes the panels of this invention; to provide such buildings which are readily and quickly erected with the use of normal hand tools; and to provide

such panels which are particularly adapted for use in constructing a series of smaller buildings, such as one story structures.

Additional objects and the novel features of this invention will become apparent from the description which follows, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a diagrammatic, top plan view of the walls of a building of this invention constructed of panels of this invention, with door and window openings omitted;

FIG. 2 is a side elevation of a panel of this invention, adapted for use as a wall panel and notched to receive a similar panel as a roof panel;

FIG. 3 is an end elevation of the panel of FIG. 2;

FIG. 4 is a transverse section, taken along line 4—4 of FIG. 2 but on an enlarged scale;

FIG. 5 is a transverse section similar to FIG. 4, but showing an alternative form of panel;

FIG. 6 is a fragmentary vertical section of a building of this invention, showing a foundation and floor, as well as a wall, a central partition and a portion of the roof, each formed of panels of this invention;

FIG. 7 is a fragmentary vertical section, on an enlarged scale and taken along line 7—7 of FIG. 6 at the roof adjacent a wall;

FIG. 8 is a diagrammatic, top plan view of the walls of a building of this invention, utilizing panels of this invention in an alternative arrangement to that of FIG. 1 and on a lesser scale;

FIG. 9 is a fragmentary horizontal section, on an enlarged scale and taken along line 9—9 of FIG. 6;

FIG. 10 is a diagrammatic, fragmentary elevation, showing particularly a portion of a floor formed of panels of this invention and the support therefor; and

FIG. 11 is a fragmentary vertical section, on an enlarged scale and corresponding to a portion of FIG. 7, showing a support for roof panels which extend transversely of the roof slope, rather than longitudinally.

The walls of a one story building, as in FIG. 1, may be quickly and readily erected through the use of a series of panels P of this invention. Each panel P, as in FIGS. 2–4, may include a longitudinally and laterally elongated planar portion **15**, i.e. having parallel sides and a minimum thickness. Along one edge of the planar portion **15** is formed a thicker portion **16** having a thickness such as twice the thickness of the planar portion **15** and having an offset edge **17**, as in FIG. 4, which may extend angularly to the sides of the portions **15** and **17**, or an offset edge **17'**, as in FIG. 5, which may be perpendicular to the sides of the portions **15** and **16**. Of course, the offset edge **17** may have any desired angularity or curvature. Along the edge opposite planar portion **15**, the thicker portion **16** is provided with a notch **18** having a thickness the same as the thickness of the planar portion **15** and providing a lip **19**, so that, as in FIG. 1, the opposite edge of the planar portion **15** of an abutting panel is received in the notch **18**. The offset **17** or the thicker portion **16** may be placed on the inside of a wall, as on the upper and lower walls, shown diagrammatically in FIG. 1, or on the outside, as in the case of the wall at each side of FIG. 1. In FIG. 1, it will be noted that at two of the corners, the edge of a planar portion **15** of a panel P fits perpendicularly into the notch **18** of the adjacent panel of the wall perpendicular thereto, but on the opposite corners, the corner panels P' are provided with beam portions **16'** in which the notch **18** is omitted, thus providing a planar edge. It will be noted that each panel may be connected to an adjacent panel by nailing through the lip **19** into the next abutting panel, while the panels are connected together in the same way at two of the corners. However, at the opposite two corners, the end of the planar portion **15** of each panel P is

nailed or otherwise secured to the abutting beam portion **16'** of a panel P'.

In further accordance with this invention, the thicker portion **16** is reinforced by primary reinforcement bars or rods **20** which extend longitudinally of the thicker portion and may be similar to the steel reinforcing rods or bars normally used for reinforced concrete. Any desired number of rods **20** may be utilized, although the arrangement of the three rods shown is highly desirable in providing sufficient structural strength for the thicker portion **16** to act as a beam and thereby to become the principal bearing or support part of the panel. As in FIG. 1, a series of panels P are placed in a wall and an upright beam is formed at each of the thicker portions **16**. Also, due to the interfitting of the adjacent panel into the notch **18** of each thicker portion, the beam of each panel also reinforces the abutting panel. Each panel may also include secondary reinforcing, such as a wire mesh **21** which extends from the opposite edge of the planar portion **15** and into and thence across the thicker portion **16**, between two of the reinforcing rods **20**, as shown, although other suitable arrangements of the wire mesh will be evident to those skilled in the art.

The material of which the panels are molded around the primary reinforcing rods **20** and secondary reinforcing wire mesh or the like **21** may be the calcium silicate hydrate product of U.S. Pat. No. 3,144,346, the disclosure of which is incorporated herein by reference. Suitable molds for the panels are utilized, constructed in accordance with conventional methods, and the slurry prepared in accordance with said Patent No. 3,144,346 placed in the molds, with the panels, after setting, treated by heat for several hours and permitted to dry, after removal from the molds. Appropriate fibers may also be mixed with the slurry. Or, the panels may be molded or cast from the light weight aerated concrete of U.S. Pat. No. 3,062,669, the disclosure of which is incorporated by reference. The panels may also be formed of a reinforced styrofoam composition of conventional character.

For wall panels, as shown in FIGS. 2, 6 and 7, the upper end of each beam or thicker portion **16** may be provided with a corner notch **22** having a sloping edge **23**, to accommodate the beam or thicker portion **16** of a roof panel R of similar lateral cross section, as in FIG. 7. At the opposite corner, a notch **24** may be provided, to accommodate the lip **19** of the next adjacent roof panel R. Notch **22** of panel P of FIG. 2 is shown in FIG. 3 as a notch for a flat roof, it being understood that when the roof is sloping, as in FIG. 6, notches **22** and **24** will be transversely inclined, to correspond to the slope of the roof panels. An intermediate partition, as in FIG. 6, may be formed of a series of panels P'' having a greater length than the wall panels P, but having the same lateral configuration, including the planar portion **15**, thicker or beam portion **16** and notch **18**. The upper ends of the partition panels P'' may be provided with transverse bevels **25**, to accommodate the slope of the roof panels R, as well as notches corresponding to notches **22** and **24** of FIG. 2, to accommodate the beams of the roof panels. Also, the abutting ends of the roof panels may be provided with bevels **26**, to facilitate fitting them together. The roof panels may be attached to the wall panels and the partition panels by fluted roof deck spikes, of an appropriate length, and preferably driven downwardly into the beam sections **16** of the wall and partition panels.

The floor of the building shown in FIG. 6 may be a concrete slab **27**, supported by an outside foundation wall **28** and a central foundation wall **29**, which also supports the partition panels P''. The lower ends of the wall panels and partition panels may be connected to the floor by angle clips **32**, the horizontal leg of each angle being connected to the floor by a bolt **33** embedded in the concrete in a conventional manner, while the end of each thicker or beam portion **16** of each wall panel and partition panel, at the edge of lip **19**, may be connected to the angle clip by a lag screw **34**, as in FIG. 9. The interior of the wall may be completed by a series of wall boards **35**, which are shown in dotted lines in FIG. 9, and may be merely nailed to the beam portions **16**, when on the inside, with insulation **36**, also shown in dotted lines, placed against the panels P prior to installation of the wall boards **35**.

For the building walls shown in FIG. 8, all of the wall panels may be placed with the offset of the beam portion **16** on the inside, utilizing a panel P' at each corner and one or more narrow panels **40** adapted to complete a corner or extend between a panel P and a light I-beam **41**. Panel **40** fits between the flanges of beam **41**, the opposite side of which receives the edge of a planar portion **15** of the adjacent panel P. Another light I-beam may be placed between a panel P and a panel P' adjacent one corner, as shown at the lower left in FIG. 8, to permit reversal of direction of the beams **16** of the respective panels. The panels for the walls of FIG. 8 may be connected together and to the foundation or floor and roof in any suitable manner, such as that previously described. The wall panels **40** are formed as slabs, from material similar to that used for wall panels P and P', having secondary reinforcement, such as wire mesh **21**, but normally do not require primary reinforcing rods **20**.

In the alternative floor construction illustarted in FIG. 10, the floor is formed by floor panels F which are constructed similarly to the wall panels P and interfit together in a manner similar to that described above. The beam **16** of each outermost floor panel F rests on the outer foundation wall **28**, but the beams **16** of the floor panels between the walls rest on spaced concrete piers **45**. The sides of floor panels F may be molded with a tongue and groove arrangement (not shown) to interfit along the longitudinal edges thereof. This tongue and groove connection may be grouted to provide a seal. As before, the lateral ends of the planar portions **15** of the panels may be attached, as by nails or screws, to the lip **19** of the next floor panel. Also, the angle clips **30** by which the walls are attached to the floor may be attached by lag screws to the beam **16** of the corresponding floor panels above the outer foundation wall **28**, or bolt **33** of FIG. 9 may be embedded in foundation **28** and extend through a floor panel F.

In the alternative roof construction shown in FIG. 11, the roof panels **50** are formed as slabs, without the reinforcing beams **16**, and may extend across the roof, rather than in an upward direction, as in FIG. 6. Roof panels **50** are supported at the outer edges by the walls, at the center by a bearing partition and also supported at one or more intermediate positions by an inverted T-bar **51**, on the lower flanges **52** of which the edges of the panels **50** rest. The inverted T-bar is supported at each end by the end walls of the building, thus being located at the position of a beam **16** of a wall panel P, while the ends of panels **50** at flanges **52** may be set in grout.

In a building constructed as described, the floor may be finished in any appropriate manner, such as a conventional underlay and carpet, tile or any other conventional flooring. The exterior of the walls may be sprayed with a cement hard coat, a resin base exterior material or conventional stucco. Also, the exterior of the panels can be precoated in the mold, as by using a hard cement or other surfacing material. When the exterior of the wall panels are precoated, the joints between the wall panels, after the building is constructed, may be finished by grout or an epoxy sealant. In addition to the roof panels, the roof may be a conventional built up roof, such as gravel and a "wet mop" asphalt sealant. If desired, the roof may be provided with shingles in a conventional manner, since the roof panels R, when constructed in accordance with this invention, are nailable.

What is claimed is:

1. A building comprising a series of wall panels and a series of roof panels, each of said panels being molded and formed primarily of relatively light weight material, and each including:

a generally planar first portion of substantially uniform thickness;

a second portion extending along a lateral edge of said first portion and having a substantially greater thickness than said first portion and offset at one side from said first portion but generally coplanar at the opposite side with said first portion, said second portion having a notch in lateral alignment with said first portion adapted to receive an edge of an abutting panel having a thickness, at said edge, corresponding to that of said first portion;

primary reinforcing means embedded within said second portion, whereby said second portion acts as a beam to support a load above said panel, with said panel in upright position, and to support said panel, with said panel in other than an upright position;

said wall panels forming an upright wall, with the edge of said first portion of one panel being received in said notch of an abutting panel;

said roof panels being similarly interfitted to form a roof extending downwardly to and across the top of said wall, with said second portions of the roof panels facing downwardly and above said second portions of the wall panels; and

said wall panels having notches at the upper ends comprising:

a corner notch at the position of said second portion

and corresponding in shape to the second portion of the corresponding roof panel; and

an opposite corner notch corresponding in shape to that part of the second portion of the adjacent roof panel directly thereabove.

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ALFRED C. PERHAM, Primary Examiner

U.S. Cl. X.R.

52—270, 274, 600, 610