April 3, 1945. R. L. DAVISON 2,372,768

BUILDING CONSTRUCTION

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Fig. 1.

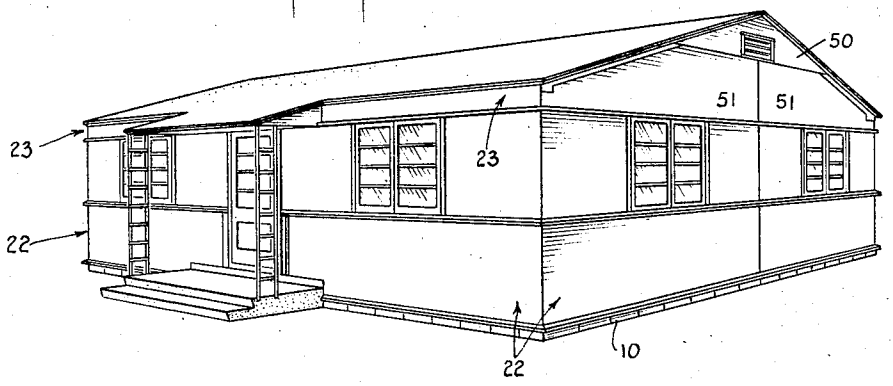
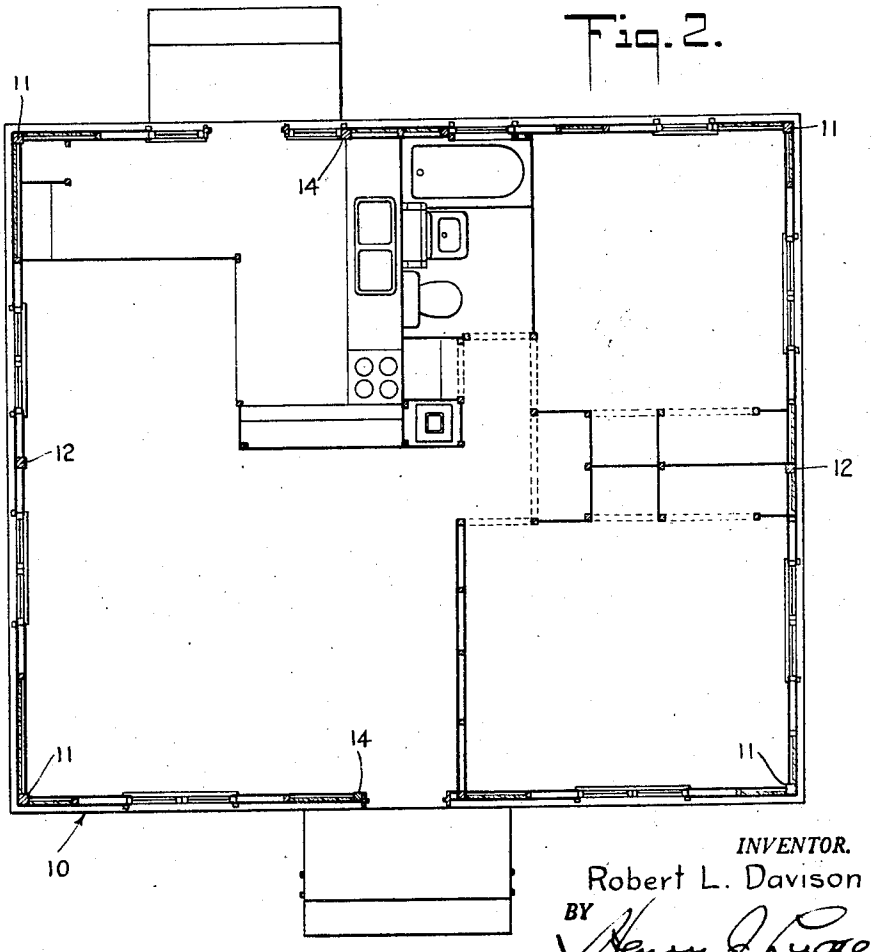


Fig. 2.



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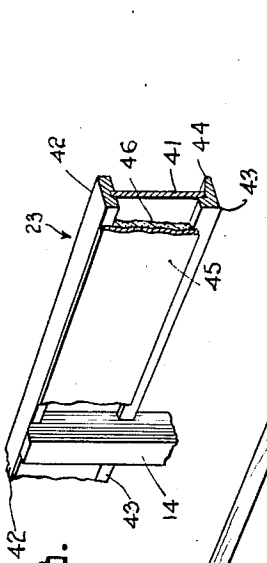

Fig. 3.

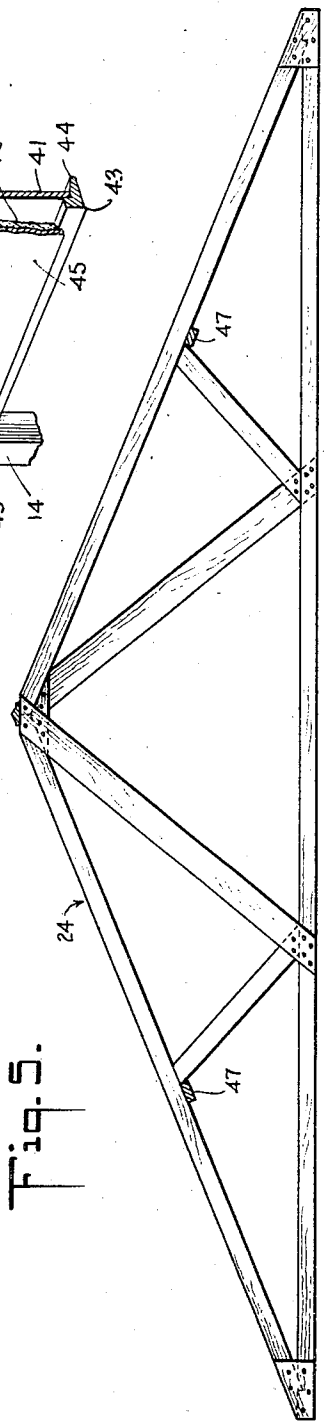

Fig. 5.

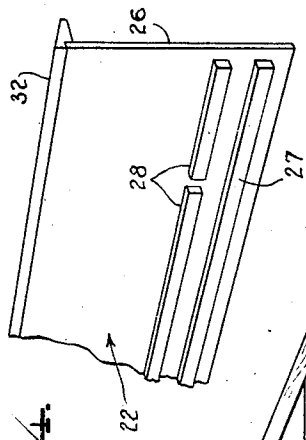

Fig. 4.

Fig. 6.

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Fig. 7.

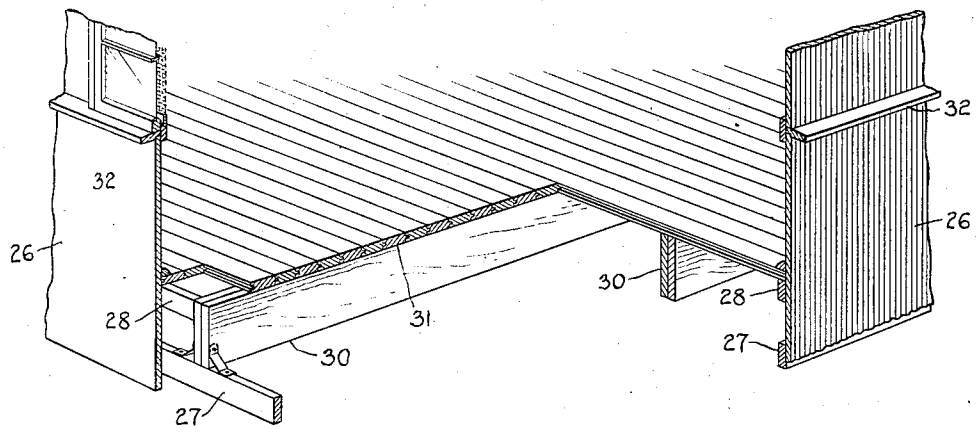

Fig. 8.

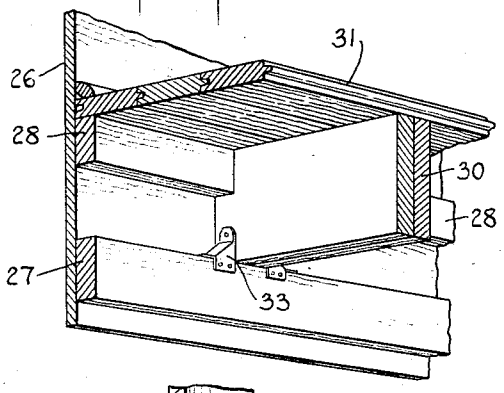

Fig. 9.

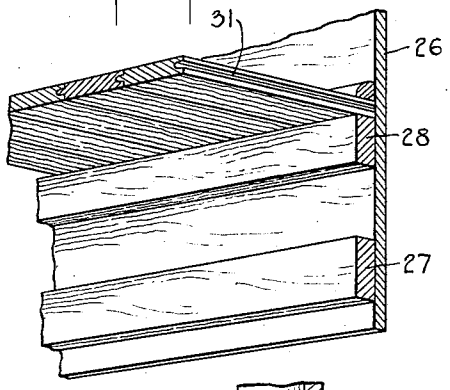

Fig. 10.

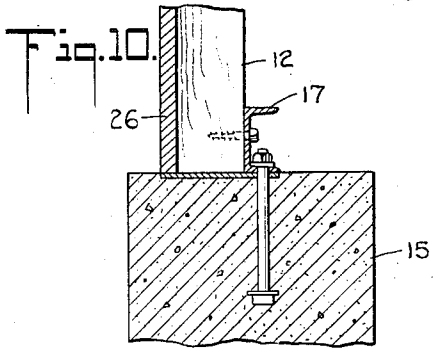

Fig. 11.

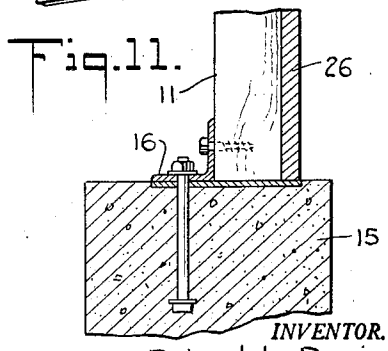

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Fig.12.

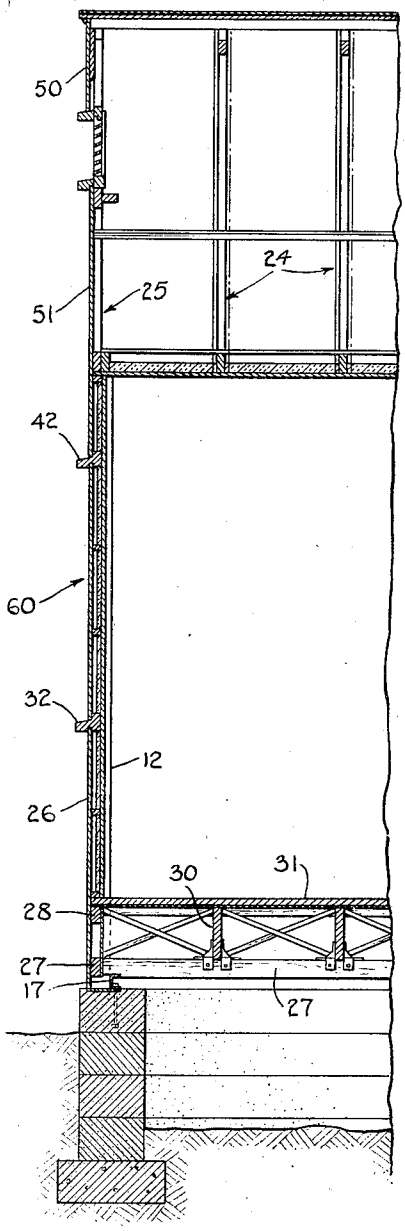

Fig.13.

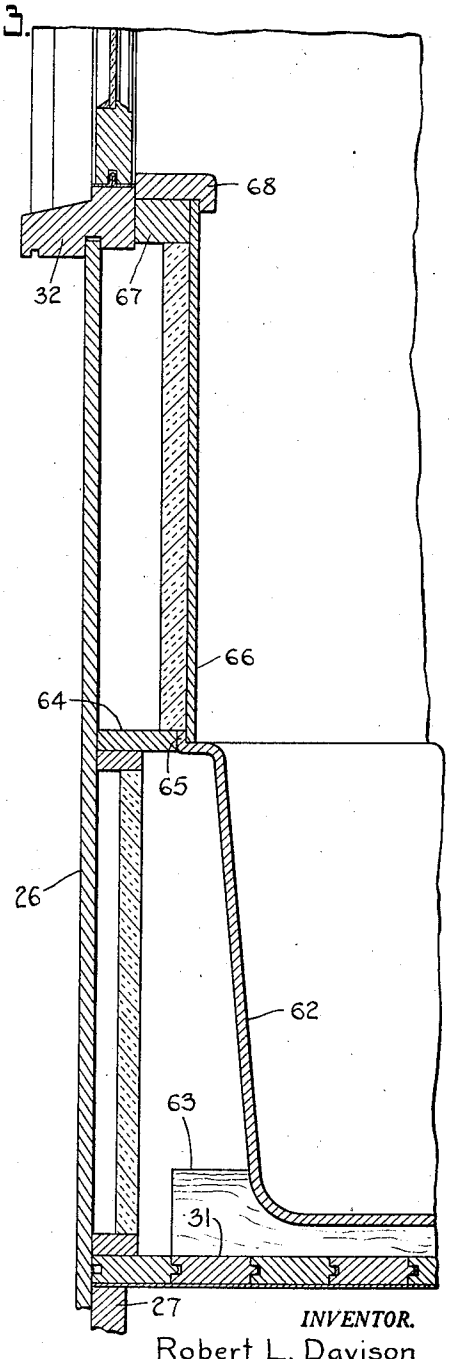

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Fig. 15.

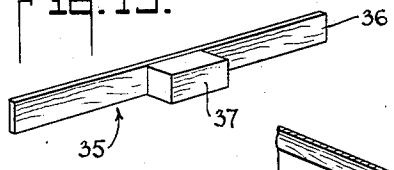

Fig. 16.

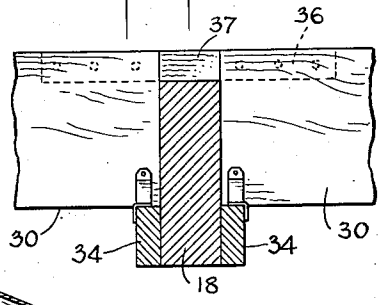

Fig. 14.

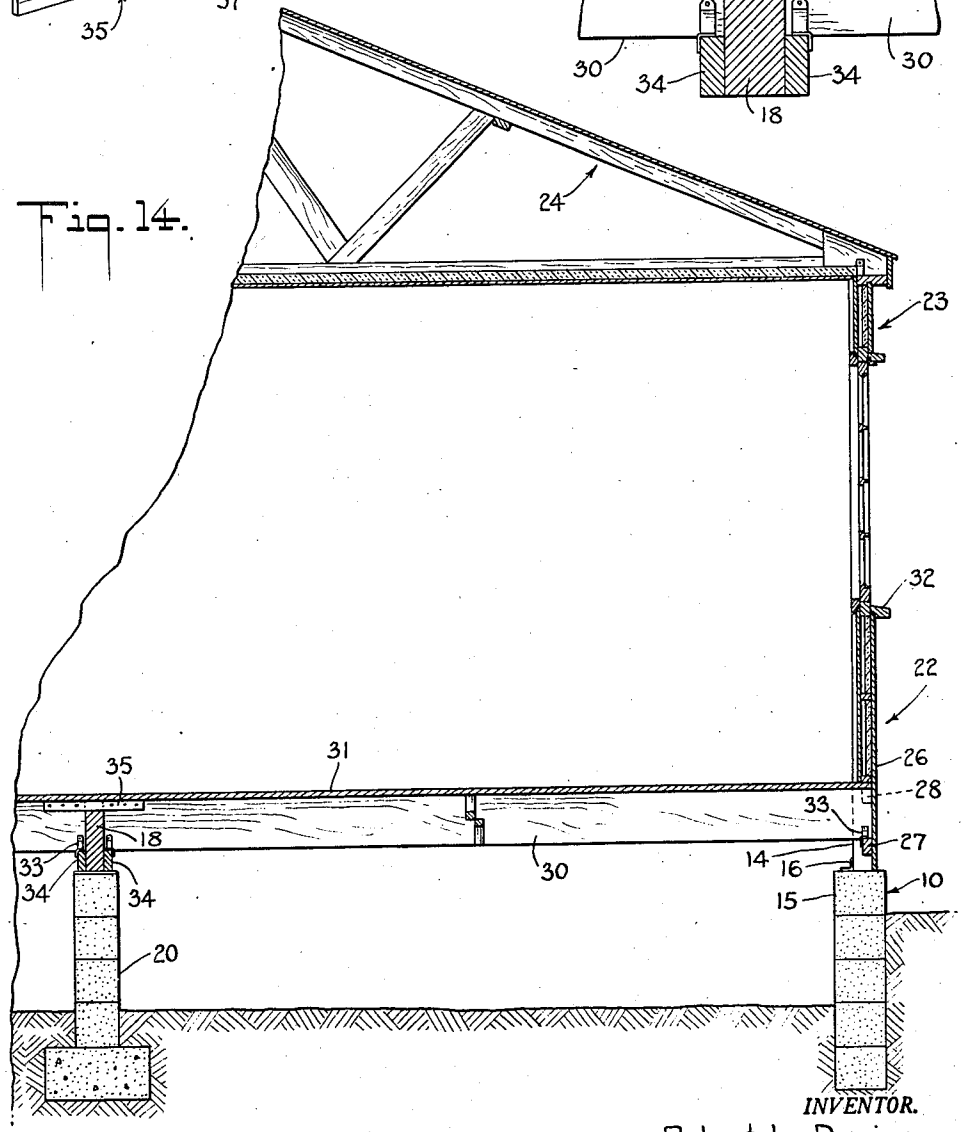

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Fig. 17.

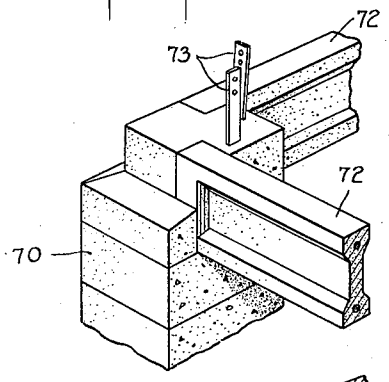


Fig. 18.

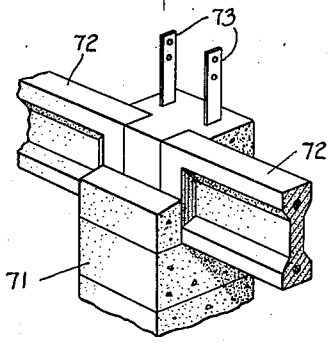


Fig. 19.

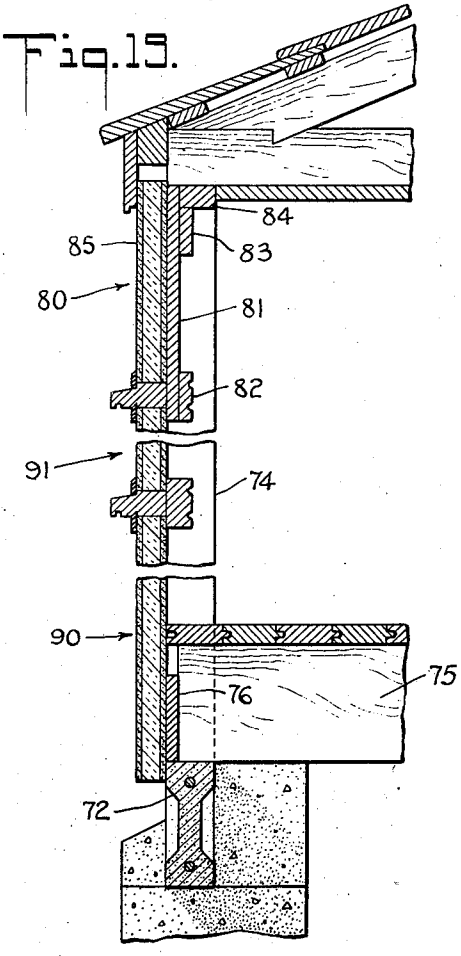
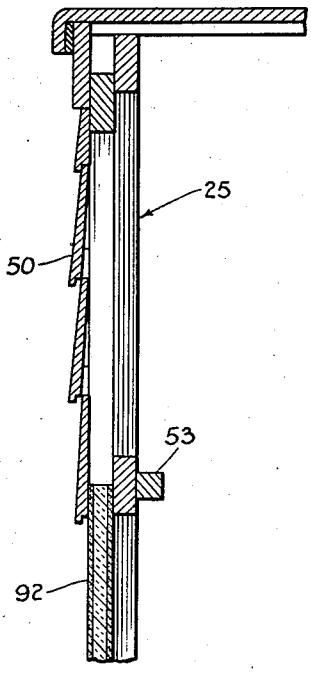


Fig. 20.



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Patented Apr. 3, 1945 2,372,768

UNITED STATES PATENT OFFICE

2,372,768

BUILDING CONSTRUCTION

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Application January 12, 1943, Serial No. 472,093

5 Claims. (Cl. 20—2)

This invention relates to improvements in building construction, and particularly to an improved building construction in which the framework of the building consists of relatively wide-spaced, vertical columns which are spanned by deep horizontally arranged beams serving as the principal means of supporting the roof and floors of the building and forming the external walls thereof without requiring additional external surfacing such as conventional clap-boards, shingles, bricks, or the like.

Pursuant to a preferred form of the invention, the horizontal deep beams are made up of sheets of water-proof bonded plywood of suitable thickness, to which are attached longitudinally extending stringers or like structural numbers capable of supporting floor beams or roof trusses and serving to transmit the load of such floor beams or roof trusses to the plywood panel.

It is a feature of the invention that the usual multiplicity of vertical columns or studding over which conventional practice requires a layer of sheathing material and then an external surfacing layer, are eliminated.

The employment of deep beam construction at the top and at the bottom of a story of the building makes it possible to completely eliminate, if desired, any structural framing or intermediate course between the top and bottom beams, thereby affording wide latitude in the positioning of windows or, in fact, the elimination of windows, and the substitution of long screen panels therefor, in locations where climatic conditions make it desirable to have the complete ventilation afforded by such continuous screening.

A building constructed pursuant to the present invention may be completely enclosed and, in fact, made ready for occupancy before the interior of the building is subdivided into rooms for the reason that the partitions defining the rooms are not necessary to carry the roof-load. Hence, and also suitable for warm climates, the room partitions need not extend to the ceiling, thereby providing for circulation of air through the structure.

Depending upon conditions dictated by geographical location of the building, the deep means comprising the external walls may be of plywood construction as aforesaid or may consist of composite material in which a center core of pulp insulation material is coated on either side with a cement-like material which serves both as a water-proof exterior and interior wall capable of receiving any desired decorative treatment.

Other features and advantages will hereinafter appear.

In the accompanying drawings

Figs. 1 and 2 are respectively a perspective of a building embodying the present invention and a plan view thereof in horizontal section, the latter showing the disposition of the main supporting columns and a typical subdivision of the interior room spaces.

Figs. 3 and 4 are fragmentary perspective views showing typical construction of the upper course and lower course deep beams and the arrangement of the component load-receiving stringers thereof.

Figs. 5 and 6 are elevations of an intermediate roof truss and an end wall roof truss respectively.

Fig. 7 is a fragmentary perspective view showing the manner in which floor joists and flooring are carried by lower course panels.

Fig. 8 is a detail of the interior arrangement of a lower course panel and the support of floor joists and flooring thereon.

Fig. 9 is similar to Fig. 8 but illustrating a lower course panel as adapted to front and rear walls of the building.

Figs. 10 and 11 are vertical elevations showing the manner of securing the vertical columns to the foundation piers; Fig. 10 illustrates the use of a channel iron for carrying a main girder.

Fig. 12 is an elevation in section taken through the gable end wall of a building.

Fig. 13 is a section of building wall showing improved means for supporting a bathtub or the like.

Fig. 14 is an elevation in section extending from front to rear of the building and showing the manner in which the floor joists may be supported upon and secured to the principal transverse floor beam.

Fig. 15 is a perspective of a floor joist tie.

Fig. 16 is an elevation showing the main girder in section, with floor joists supported thereon and interconnected by the tie shown in Fig. 15.

Figs. 17 and 18 are foundation details of another form of building construction.

Fig. 19 is a vertical section through a building construction pursuant to the form of the invention illustrated in Figs. 17 and 18 and showing the manner in which the respective panel units of the floors are arranged.

Fig. 20 is a section taken through the gable end of the roof of a building construction according to Fig. 19, said section showing the ventilating louvre construction at such gable end.

In the construction shown in Fig. 1, a residential type of building embodies a suitable foundation 10 upon which are supported vertical columns 11 defining the corners of the building, and suitable intermediate primary columns 12 at the end walls, and primary column 14'14 suitably positioned at the front and rear walls of the building. Other columns are spaced at such intervals as are required by openings such as doors and windows.

The respective corner columns 11 are secured to foundation piers 15 as by an angle iron 16 and suitable fastening means, see Fig. 11; end wall columns 12 have similar securement means for attachment to said piers with the exception that a girder-supporting channel 17 is substituted for the angle iron, see Fig. 10. Said channel supports the main transverse girder 18, see Fig. 14; an intermediate pier 20, disposed beneath girder 18 may be employed if the span of girder 18 is long.

The primary supporting structure for the walls and roof of the building consists of deep beam formations which additionally serve as external, or curtain walls.

Said deep beams, in one form of the invention, comprise panel structures 22, see Figs. 1, 4 and 14, placed end to end about the periphery of the building, completely enclosing the same except for door openings, and deep beams 23, forming an upper course at the end walls of the building, said deep beams 23 receiving and supporting the end and intermediate roof trusses, designated 24, 25 respectively.

The lower course panel structures 22, see Figs. 4 and 8, include an external panel 26, desirably of structurally strong homogeneous material such as waterproof-bonded plywood, adjacent the lower interior margin of which are mutually spaced load-supporting stringers 27, 28, which serve respectively to support the floor joists 30 and flooring 31, as later described. Said stringers 27, 28 may be secured to panels 26 by any suitable means; the waterproof glues developed for plywood structures have proven excellent for the purpose.

Along the top edge of such a panel 26, and likewise secured thereto, is a sill member 32, see Figs. 7, 12 and 14. The sill 32 and the stringers 27, 28 act to stiffen the deep panel 26, and the stringers 27, 28 distribute the floor load to the panel 26, which in each panel unit becomes a primary load carrying structure.

As shown in Fig. 8, the stringers 28 are periodically interrupted to accommodate the ends of the floor joists 30, which may be of single or double thickness according to the load to be carried. Beams 30 may be secured to lower stringers 27 by the clips 33; said beams are therefore held securely at their top and bottom portions.

Floor joists 30 abut against the main beam 18, see Figs. 14 and 16, and rest upon ledgers 34 disposed on each side thereof. For residential construction, beam 18 may be a standard 4 x 12 timber, and ledgers 34, standard 2 x 4's. Joists 30 are preferably 2 x 10's, and it will be seen that the upper edges of said joists 30 will extend above the surface of beam 18. Such arrangement is advantageous in affording means of tying the ends of adjacent joists 30 together, as by a joist tie 35, see Fig. 15, comprising an elongate member 36 and a block 37. As appears in Figs. 14 and 16, the member 36 serves to connect the adjacent joists 30, and block 37 fills the gap between said adjacent joists to receive the flooring 31 laid thereon.

A panel structure 22, when employed at an end wall, may have a continuous stringer 28, as such stringers need not be spaced for floor joists 30. As shown in Fig. 9, the ends of the flooring 31 rest upon said stringers 28 to be secured thereto.

As shown in Fig. 4, the ends of the stringers 27, 28 terminate short of the ends of panels 26 to such an extent that when the panel structures 22 are secured to the respective vertical columns, the panels 26 overlie the faces of the columns and the stringers abut against the sides thereof; sills 32 are coextensive with the panels 26.

Upper course panel structures 23, see Fig. 3, comprise an outer panel 41, a flange 42 applied thereto, a stringer 43 at and overlapping the bottom portion of panel 41, and a deep sill 44 secured respectively to the stringer 43 and the bottom of outer panel 41. An interior panel 45 of plywood is secured to flange 42 and stringer 43, and insulation 46 may be laid in the space between the panels 41 and 45. In securing panel structures 23 to columns, as columns 11, 14, see also Fig. 2, said columns are notched to receive the flange 42 and stringer 43, which are secured thereto; outer panel 41 overlies the outer surface of said columns for securement thereto.

End roof trusses 25 and intermediate trusses 24, see Figs. 5, 6 and 12, rest upon flanges 42 for securement thereto, preferably with "hurricane" clips such as the clips 33. Suitable longitudinal ties 47 and like conventional means provide interior bracing.

At the gable ends, louvre panels 50 close the upper portions of end trusses 25, and plywood facing panels 51, see Fig. 1, are secured to the truss elements 52, 53, 54, to complete the gable ends; facing panels 51 extend below the end trusses to the lower margin of front and rear panel structures 40, see Figs. 1 and 12.

Intermediate the lower and top course of structural panel units, any suitable wall surfacing may be employed and above course 22 at the gable end walls, is a course 60 of panel construction. Such courses 60 are not essentially load-carrying and may incorporate any desired number of window installations. Such window installations may be grouped or located as desired, without weakening the structure. Fig. 14 shows a typical window installation in section; Fig. 12 discloses intermediate course construction other than at a window location.

Drip sills 32 and 42 are carried completely around the building, serving as junctures between the respective courses, and improving the architectural effect.

Any internal finish may be applied to the respective courses. As shown in Figs. 12 and 14 such interior finish may comprise panels of plywood, wallboard, or the like suitably secured as by the illustrated nailing strips fastened to the inner wall surface of the exterior panels. Desirably, the interior panels are vertically arranged and abutting joints concealed with battens or equivalent. If desired, any suitable insulating board or loose insulation material may be incorporated in the external walls between the exterior and interior components thereof.

The structure may be subdivided into suitable room spaces in accordance with any pre-established architectural plan. Pursuant to the improved construction disclosed herein, wherein the load bearing elements of the building are essentially the lower and topmost panel courses, the sub-division of the interior may be accomplished after the building has been completely enclosed, for the reason that the interior partitions are not essentially load-carrying structures.

At locations where the weight of installed equipment makes it necessary additionally to strengthen the building construction, such as in the bathroom where a bathtub and water content thereof may attain considerable weight, I prefer to support the bathtub 62 at suitable in-

tervals upon spaced cradles 63 secured to the floor boards. Said cradles 63 have flat central portions forming the principal support for the tub, and enlarged ends engaging the sidewalls of the tub, as shown. Such arrangement prevents side-play of the tub while affording rigid support.

The sidewall panel 26 is characterized by an additional offset 64 at the upper rim of the tub, against which the lip 65 of the tub rests. A suitable interior panel 66 overlies the lip 65, and is secured by the upper stringer 67 and window sill cap 68.

The embodiment of the invention disclosed in Figs. 17 through 20, there is illustrated a fire and termite-proof construction suitable for erection in tropical climates.

Insofar as such construction differs from that previously described, there are provided a number of concrete foundation piers 70, 71, spanned by pre-cast concrete beams 72. At the respective piers 70, 71 structural elements such as the illustrated strap iron braces 73 are imbedded in the concrete during the formation of the piers to serve as means for attachment of the vertical columns 74.

The beams 72 support the floor joists 75, the ends of which are tied together by a continuous stringer 76 nailed to the ends thereof, and notched into the respective vertical posts 74.

The uppermost course of panels, 80, Fig. 19, comprises an interior plywood panel 81 having secured thereto a lower longitudinal batten 82 and a transverse batten 83 and cap 84. Said battens 82 and 83 are notched into the vertical column 74, and cap 84 rests upon said column for securement thereto.

The panel 80 is completed by an external facing 85 of composite wallboard such as "Cemesto" board, in which a central core of pulp insulation material is formed on each side with an asbestos cement layer which is weather-proof for external surfaces, and capable of receiving any suitable interior decorative treatment.

Said upper panels 80 are the principal load-carrying panels for the roof structure; they operate as deep beams and successive roof trusses rest upon and are secured to the longitudinally extending cap 84 as inndicated in Fig. 19.

The lowermost course 90, and the intermediate course 91 are not essentially load-bearing structures and comprise merely the composite "Cemesto" panels, battens, and sills delineating the respective courses. The said courses 90 and 91 are nailed or otherwise secured to the posts 74, and the lowermost course 90 is additionally nailed through the stringers 76 into the ends of the floor joists 75.

As shown in Fig. 19 the lower edge of the composite panel forming the lower course 90 overlaps the upper portion of beam 72 to deter infection of the wooden portions of the floor structures by termites or fungus growths. If desired, a metal termite shield not shown may be inserted between the lower panel 90 and the beam 72.

Fig. 20 shows the louvre portion of the end gable construction, indicating at its lower end that its composite panel 92 extends downwardly to the level of the facing of upper panel 80 in the manner previously described with respect to the facing panels 51 of Fig. 1.

I claim:

1. In building construction the combination of vertical columns secured to a foundation, a lower course of horizontally disposed, substantially rectangular panel structures having a length greatly in excess of height extending between adjacent columns and secured thereto, stringers secured to said panel structures to support the ends of floor joists, and an upper course of horizontally disposed, substantially rectangular panel structures having a length greatly in excess of height extending between adjacent columns and secured thereto, flanges secured to said last-named panel structures, and means secured to said flanges for supporting roof-truss means, said upper and lower courses of panel structures being spaced apart to an extent equal to suitable window height.

2. In building construction, a peripheral foundation wall, vertical columns secured thereto, a main girder extending from one foundation wall to an opposite foundation wall, said girder having stringers disposed on each side thereof at its lower edge; a lower course of horizontally disposed, substantially rectangular panel structures having a length greatly in excess of height extending between adjacent columns and secured thereto, said panel structures having stringers at their lower portions for receiving and supporting floor joists; floor joists resting upon said panel stringers and extending to and resting upon the stringers of said main girder, the upper edges of said floor joists being above the upper surface of said main girder, and tie means secured to a floor joist and extending across said girder to attach to a floor joist on the other side of said girder, said tie means including a block resting upon said girder and having its upper surface in the plane of the upper surfaces of said floor joists.

3. In building construction, a main girder, a stringer disposed on each side of said girder at the lower edge thereof, floor joists of height equal to the height of the girder supported upon said stringers at opposite sides of said girder, a tie extending across said girder from joist to joist and secured to said joists, and a filler block secured to said tie and resting upon said girder to fill the space between said girder and said floor joists.

4. In building construction, a plurality of widely spaced vertical columns terminating at a level equivalent to the ceiling height of a room, and deep beam structures including a composite panel having secured thereto near its upper edge a longitudinally extending stringer, horizontally extending flange means secured to the upper edge of said composite panel, each of said deep beam structures having a length greatly in excess of its height and having the panel, stringer, and cap thereof secured to adjacent columns, and roof-supporting means resting upon and secured to said horizontally extending flange means of said girder.

5. In building construction, the combination with a foundation including beams, floor joists supported thereon, vertical supporting columns secured to said foundation, a continuous stringer extending along the ends of said floor joists and secured thereto, said stringer being notched into adjacent vertical columns and secured thereto, and elongate composite panels extending between and secured to said posts and to said stringer and the floor joists associated therewith.

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