

Dec. 14, 1965

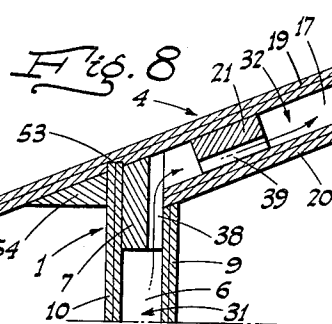
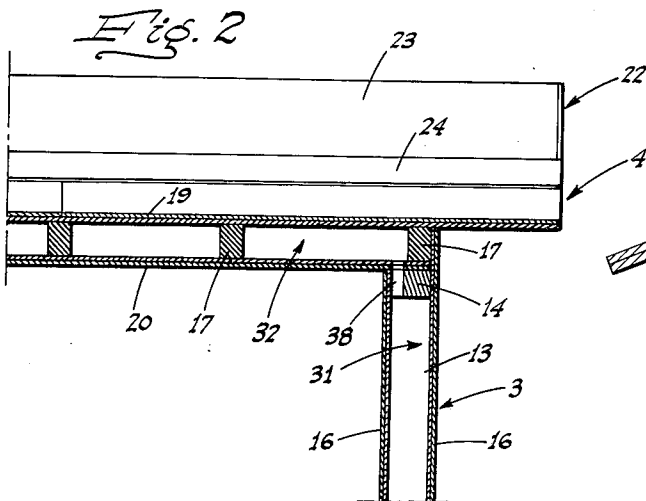
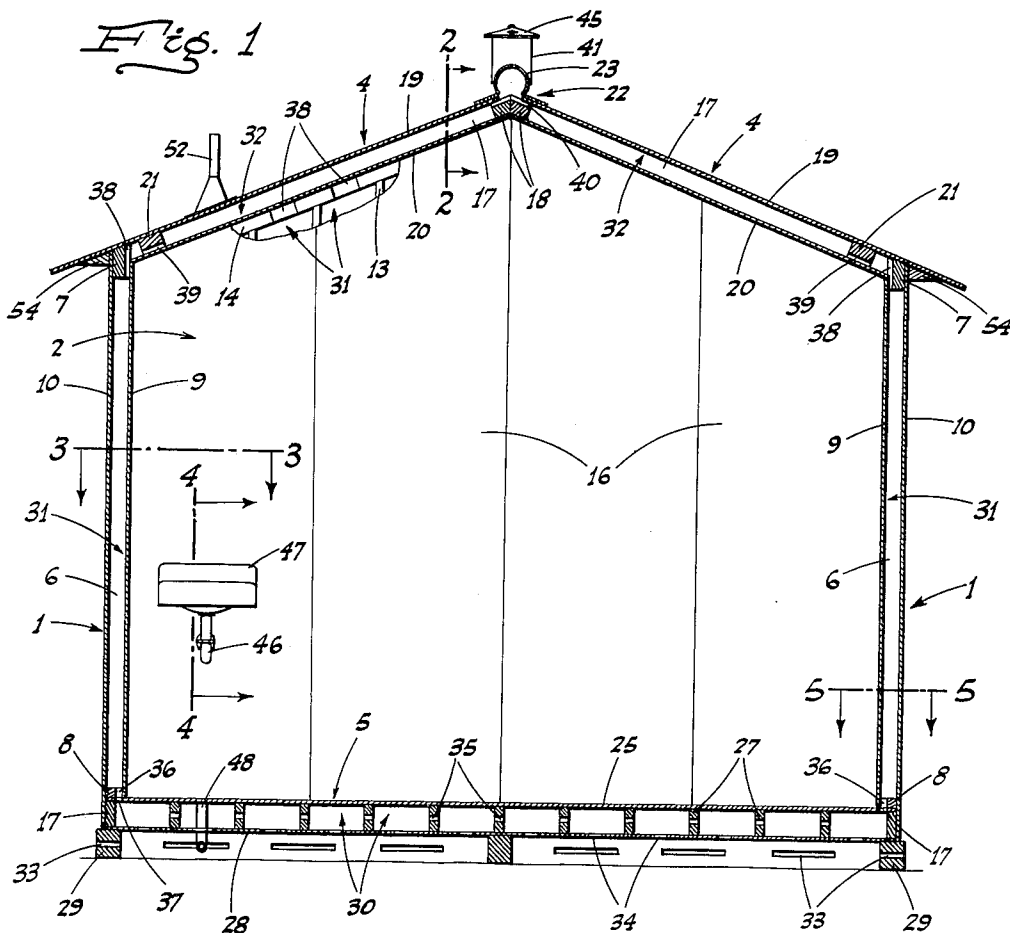
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3,223,018

BUILDING STRUCTURE WITH AIR CIRCULATION MEANS

Filed Nov. 5, 1963

2 Sheets-Sheet 1



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Fig. 3

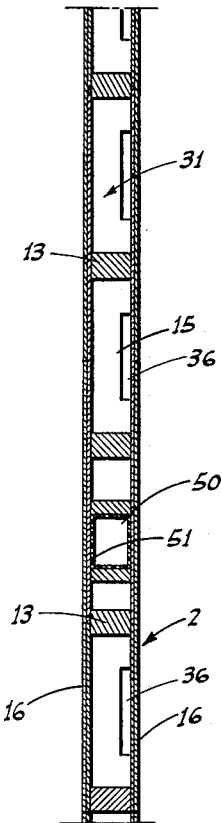


Fig. 4

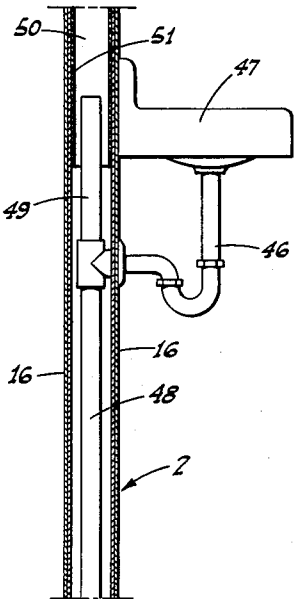


Fig. 5

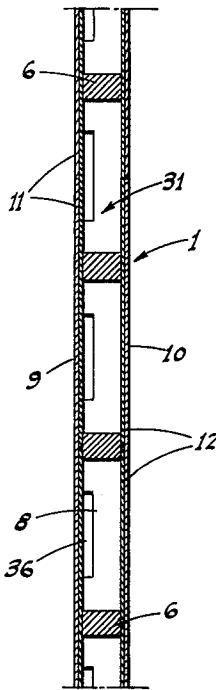


Fig. 6

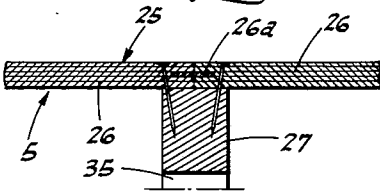
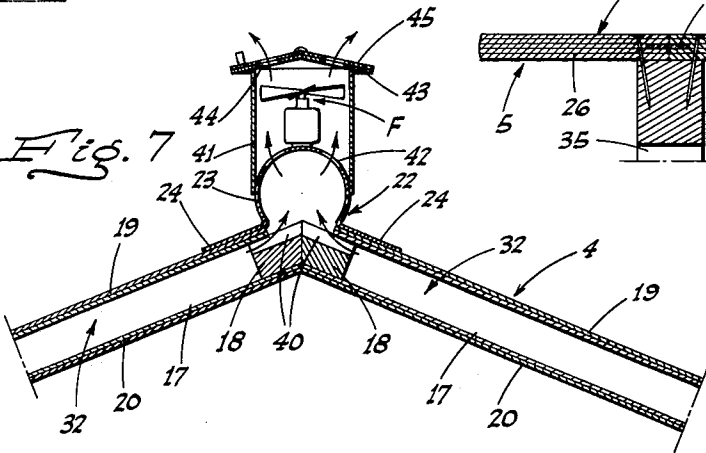


Fig. 7



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BUILDING STRUCTURE WITH AIR CIRCULATION MEANS

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3 Claims. (Cl. 98—31)

This invention relates in general to an improved building structure especially designed, but not limited, for erection in one-room form and adapted to provide shelter houses, tourist cabins, construction headquarters or offices, or for any other similar purpose.

A major object of the invention is to provide a building structure, as above, which is so constructed that air circulation (either forced or natural) may be induced throughout the floor, walls and roof of the building when desired and so as to keep the interior reasonably cool in warm weather. Also, when the air circulation is shut off, said floor, walls, and roof provide dead air spaces so that the interior of the building is maintained in an insulated condition without the use and attendant expense of insulating materials; such insulated condition being of obvious advantage in cold weather.

A further object of the invention is to provide a building structure which is formed of a number of prefabricated sections which are of simple and lightweight construction and yet very strong and rigid, and thus may be readily transported to and easily and quickly erected and assembled at the desired site.

A further object of the invention is to provide a building structure which is designed for ease and economy of manufacture.

A still further object of the invention is to provide a practical, reliable, and durable building structure and one which is exceedingly effective for the purpose for which it is designed.

These objects are accomplished by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specifications and claims.

In the drawings:

FIG. 1 is a cross sectional elevation in somewhat diagrammatic form, of a one-room rectangular building incorporating the improved air conditioning and insulating features which, in the main, constitute my invention.

FIG. 2 is a fragmentary enlarged section taken on line 2—2 of FIG. 1.

FIG. 3 is a fragmentary enlarged sectional plan of one wall of the building, taken on line 3—3 of FIG. 1.

FIG. 4 is a fragmentary enlarged vertical section through said one wall, taken generally on line 4—4 of FIG. 1.

FIG. 5 is a view similar to FIG. 3, but of another wall of the building, and taken on line 5—5 of FIG. 1.

FIG. 6 is a fragmentary enlarged section of the floor of the building.

FIG. 7 is a fragmentary enlarged cross sectional elevation of the roof of the building, taken through the exhaust fan unit.

FIG. 8 is an enlarged, fragmentary sectional elevation taken at the junction of one side wall section and the related roof section.

Referring now more particularly to the drawings and to the characters of reference marked thereon, the building depicted in FIG. 1 for purposes of illustration of the invention is a one-room structure of prefabricated construction. Such structure comprises opposed side wall sections 1, opposed end wall sections 2 and 3, opposed sloping roof sections 4, and a floor section 5.

Each wall section 1 comprises studs 6, a top plate 7, a bottom plate 8, and plywood panel units 9 and 10 forming the inner and outer surfaces, respectively, of

the wall section. The studs, plates, and panel units are securely glued and nailed together to provide a rigid wall section. Such rigidity, as well as air and water tightness of the wall section, is assured by reason of the fact that each panel unit 9 and 10 is formed of a double thickness of panels 11 and 12 firmly glued together and arranged in staggered relation to each other so that the joints between adjacent panels of either thickness are overlapped by the panels of the other thickness as shown in FIGS. 3 and 5.

Similarly, the end wall sections 2 and 3 each comprises studs 13, upper and lower plates 14 and 15, respectively, and double thickness plywood panel units 16 forming the outer and inner wall surfacing of said wall sections. This feature makes a very strong and stiff wall section, eliminating the need of cross-bracing between the studs.

Each roof section 4 comprises rafters 17 connected at their upper ends to a ridge beam 18, and double thickness panel units 19 and 20 rigidly secured to the upper and lower faces, respectively, of the rafters. In addition, the rafters are connected at their lower ends by a plate 21; the upper panel unit 19 extending beyond said plate a distance sufficient to enable said panel unit to rest on and be secured to the upper face of the upper plate 7 of the adjacent side wall section 1. The lower panel unit 20, on the other hand, terminates short relative to the panel unit 19 and so as to engage the upper edge of the inner panel unit 9 of said wall section 1. The panel unit 9 terminates below the upper edge of the related upper plate 7 a distance substantially equal to the height of the rafters 17 which in turn is less than that of said plate 7, as clearly shown in FIG. 1. It will be noted that the upper faces of the upper plates 14 of the wall sections 2 and 3 have the same slope as that of the corresponding roof sections so that the endmost rafters 17 of said sections are directly above and supported by such plates, as shown in FIG. 2.

The adjacent edges or faces of the ridge beams 18 of the two roof sections 4 are cut on a slope such that said faces will abut against each other when the roof sections are erected into position; the adjacent ends of the upper panel units 19 terminating short of each other and thus leaving a gap therebetween as most clearly shown in FIG. 7. This gap is closed by a metal cap 22 which extends from end to end of the roof and includes a longitudinal manifold 23, closed at its ends but open along the bottom to said gap, and flanges 24 projecting from the manifold at its base and overlapping and secured on the adjacent portions of said panel units 19 in watertight relation. The purpose of this manifold will be hereinafter described.

The floor section 5 comprises flooring 25 consisting of a number of plywood panels 26 of substantial thickness and disposed in abutting relation; joists 27 supporting the flooring, and a bottom plywood panel unit 28 connecting and enclosing the joists. The various wall sections are supported on and are suitably secured to the floor section, while the latter rests on mud sills or similar foundation members 29.

Adjacent flooring panels 26 along their meeting edges are connected by a longitudinal metal strip 26a inset into both panels intermediate their upper and lower faces. These strips not only form an airtight joint between such flooring panels, but also prevent relative warping or misalignment of the adjacent edges of the panels in a vertical direction and such as would cause possible cracking of any linoleum or the like which might be laid on the floor.

By reason of the above described features of construction, it will be seen that the floor section provides dead-air spaces 30 between adjacent joists; the wall sections

are hollow from top to bottom and likewise provide dead-air spaces 31; and the roof sections are also hollow and similarly provide dead-air spaces 32.

All these spaces are connected in air-flow relation so as to receive air from ground level and discharge such air from the manifold 23, if desired, by means of the following features of construction:

The foundation members 29 are either spaced apart somewhat or are slotted at intervals, as at 33, to admit air to the area below the floor section. The lower or bottom plywood unit 28 of the floor section is provided with openings 34 therethrough between the various joists 27, while the latter are provided with openings 35 therethrough. The bottom plates 8 and 15 of the various wall sections are vertically slotted in facing relation to the inner wall panels of such sections, as at 36, while the flooring 25 is provided with openings 37 communicating with the slots 36. Similarly, the upper plates 7 and 14 of the wall sections are vertically slotted, as at 38, to communicate with the various rafter-separated air spaces 32 of the roof sections. The plates 21 and the ridge beams 18 of the roof sections are similarly slotted as at 39 and 40, respectively, so as to provide an uninterrupted air flow from the wall sections and thence through the roof sections to the manifold 23.

Midway of its length, the manifold 23 is provided with a short upstanding stack 41; said manifold having openings 42 communicating with the interior of the stack. The stack is provided with a cover 43 having air escape orifices 44 therein; a similarly orificed shutter 45 being turnably mounted on the cover so that the orifices 44 may be opened or closed as desired. An electric fan unit F is mounted in the stack 41 to draw air from the manifold, and thus from the roof and wall passages, and thus force such air through the orificed cover 43.

It may be here noted that additional stack and fan units may be mounted at spaced intervals along the roof manifold if the length of the building would render such additional units advisable for efficient air circulation purposes.

By reason of the above described features of construction, a constant movement of cool air from adjacent the ground may be maintained through the floor, walls and roof, and thereby keeping the interior of the building in a cool condition in warm weather or the circulation of air may be shut off and the air allowed to lie inert within the floor, walls and roof to thus provide an insulating medium which aids in keeping the interior of the building relatively warm in cold weather.

The drain pipe 46 (see FIG. 4), from a plumbing fixture such as a wash bowl 47 mounted on the wall section 2 in centralized relation to adjacent studs 13 thereof, projects through the inner surfacing 16 of such wall section and is connected to a pipe 48 which depends between the wall surfacings 16 and through the floor section to discharge onto the ground or to a connection with a sewer pipe. The pipe 48 is vented by an open ended extension 49 which projects upwardly from the upper end of said pipe and into a flue 50 formed within said wall section 2. Such flue is lined with a plastic or other waterproofing material, as at 51, and extends to the usual vent fitting 52 on the related roof section 4. This eliminates the need for the wide studding employed in walls through which a conventional vent pipe passes since the built-in flue 50 takes the place of any such vent pipe.

To improve the strength of the structure, and to make it more weather tight, the upper edge of each outer panel unit 10 is mortised, as at 53, into the underside of the related upper panel unit 19 of the roof; there being a continuous exterior filler block 54 secured between said panel units 10 and 19 at the eave. These two features, while shown in a double wall arrangement, can be employed in single wall structures, such as a garage.

While no windows or doors for the building are shown in the drawings, such features may, of course, by incor-

porated in any wall sections desired without affecting the air circulation, or trapping, within the wall sections.

Further, while the inventive features have been here shown and described as being incorporated in a rectangular building, they may also be provided in the floor, wall, and roof sections of a building of any other shape and in which event the prefabricated sections would be correspondingly formed.

It will, of course, be understood that adjacent wall sections are connected together—when erected—by suitable means such as nailing, glueing, or both.

With the present invention, I have provided a building formed of portable and lightweight sections which when erected and assembled define an enclosure which is efficiently insulated without the use of any insulation materials, and a building which—in the main—requires nothing but conventional materials of standard sizes in the construction of the sections without sacrifice of strength and rigidity.

From the foregoing description, it will be readily seen that there has been produced such a structure as substantially fulfills the objects of the invention, as set forth herein.

While this specification sets forth in detail the present and preferred construction of the structure, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described the invention, the following is claimed as new and useful and upon which Letters Patent is desired:

1. A building structure comprising a prefabricated floor section, prefabricated wall sections extending upwardly from and resting on the floor section, a pair of prefabricated roof sections supported by the wall sections and sloping upwardly toward each other to form a ridge, said roof sections abutting and secured to each other along the ridge, means supporting the floor-section clear of the ground so that air from ground level may freely pass under said floor section, each wall section comprising studs, upper and lower plates and wall surfacings secured to the studs on both sides and forming air enclosures between the studs and plates, the lower plate and the floor section being slotted to provide communication with the air below the floor; each roof section including rafters, a ridge beam and upper and lower roof surfacings secured on the respective faces of the rafters, the upper roof surfacing overlying the upper wall plates and supported thereby and the outer surfacings of the wall sections extending to engagement with the underside of said upper roof surfacing; the upper wall plates being slotted to provide air communication between the wall air enclosures and the roof sections between the surfacings thereof, the adjacent faces of the ridge beams of the two roof sections engaging each other and the upper roof surfacings terminating short of said beam faces to provide a gap between said surfacings extending along the ridge beams, the upper faces of said ridge beams being slotted transversely to establish air communication between said gap and the interior of the roof sections, a cover on the roof over the gap, said cover including an upstanding manifold in communication with the gap, a stack on the manifold communicating therewith, a cover on said stack having openings therethrough, a shutter on said cover providing for selective exposing and closing of the openings therein, and a selectively operable fan in the stack arranged to direct air upwardly.

2. In a building structure having hollow wall sections provided with air intake and outlet openings at the top and bottom, respectively, a pair of roof sections supported by the wall sections and sloping upwardly toward each other to form a ridge, each roof section including upper and lower roof surfacings spaced apart in parallel relation, and a ridge beam along the upper end of each roof section, the ridge beams of the two roof sections co-

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operating with each other in abutting relation when said sections are erected, the lower roof surfacings terminating at the inner edges of the wall sections and extending to abutting relation with each other at the ridge beams, and the upper surfacing overlying the wall sections and terminating short of the outer vertical edges of the ridge beams, the air outlet openings from the wall sections communicating with the spaces between the roof surfacings, and a cover secured on the upper roof surfacings over the gap formed between the adjacent ends of said upper roof surfacings and spaced from the ridge beams to provide a passage extending lengthwise of the roof; said passage being open to atmosphere, and the upper faces of the ridge beams being transversely slotted to establish air communication between said passage and the spaces between the upper and lower roof surfacings.

3. In a building structure having hollow wall sections provided with air intake and outlet openings at the top and bottom, respectively, a pair of roof sections supported by the wall sections and sloping upwardly toward each other to form a ridge, each roof section including upper and lower roof surfacings spaced apart in parallel relation, and a ridge beam along the upper end of each roof section, the ridge beams of the two roof sections cooperating with each other in abutting relation when said sections are erected, the lower roof surfacings terminating at the inner edges of the wall sections and extending

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to abutting relation with each other at the ridge beams, and the upper surfacings overlying the wall sections and terminating short of the outer vertical edges of the ridge beams, the air outlet openings from the wall sections communicating with the spaces between the roof surfacings, and a cover secured on the upper roof surfacings over the gap formed between the adjacent ends of said upper roof surfacings and spaced from the ridge beams to provide a passage extending lengthwise of the roof; said passage being closed at its ends, transverse slots being provided between the upper roof surfacings and the ridge beams to establish air communication between said passage and the spaces between the upper and lower roof surfacings, a stack upstanding from the cover intermediate the ends thereof and communicating therewith, and a fan in the stack arranged to direct air upwardly.

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