Jan. 23, 1968 E. J. ALLAIRE 3,364,634

BUILDING WITH ARCHED WALLS BRACED BY STRESSED PANEL

Filed April 25, 1966 2 Sheets-Sheet 1

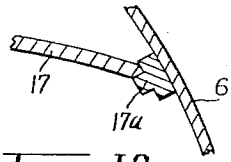


Fig. 10

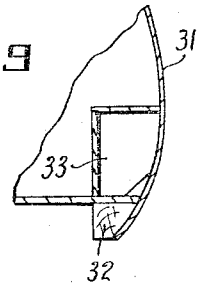


Fig. 9

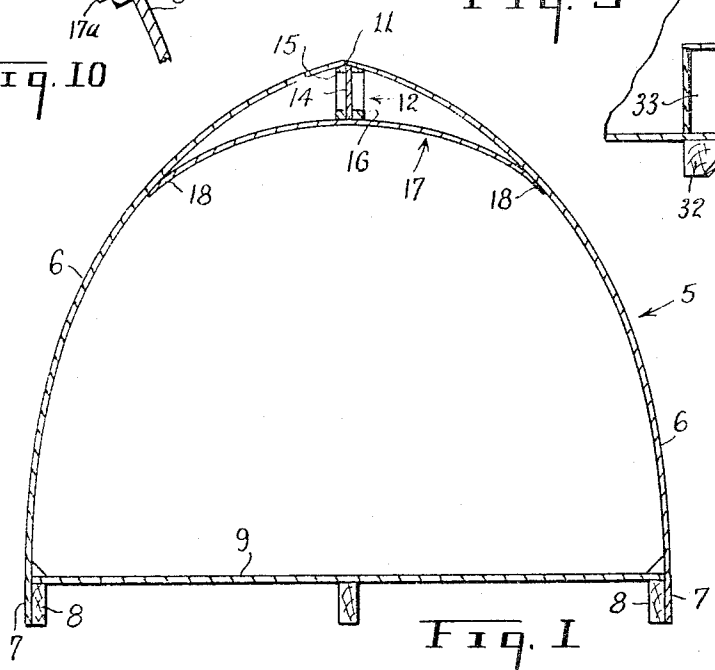


Fig. 1

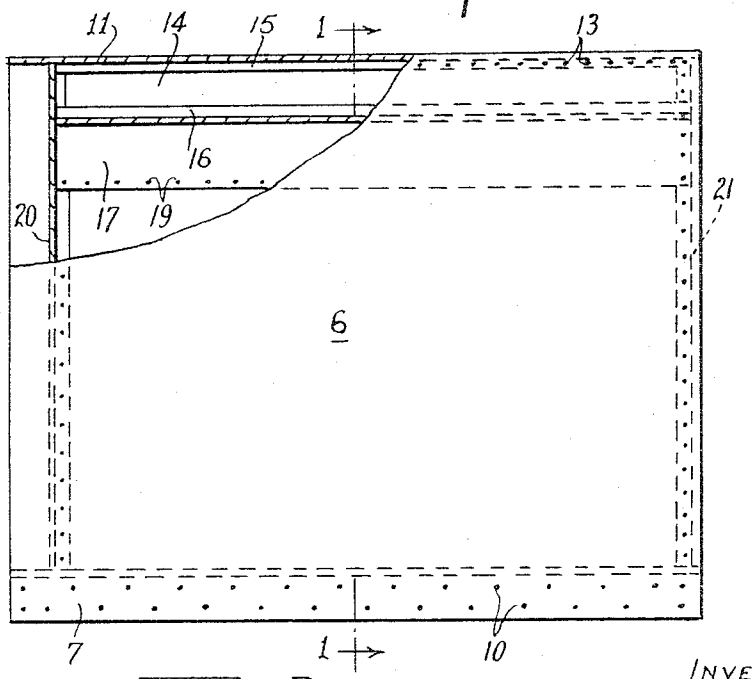


Fig 2

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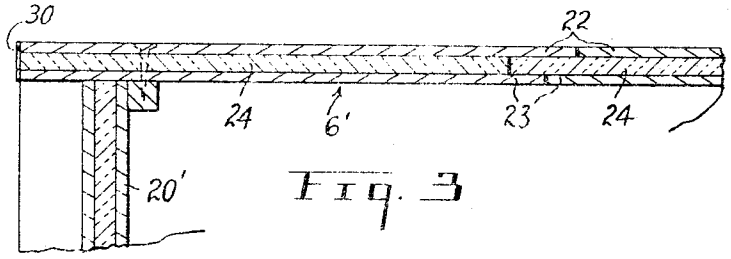


Fig. 3

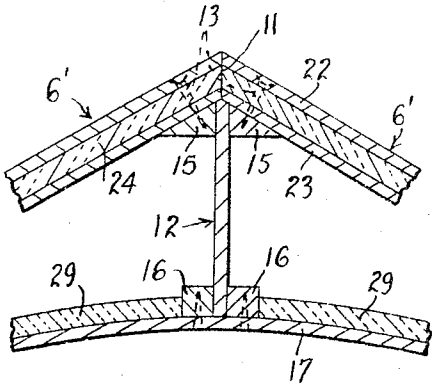


Fig. 5

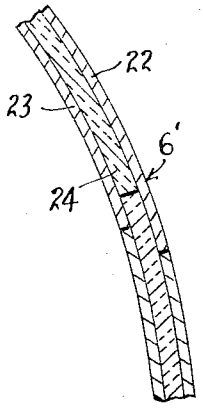


Fig. 4

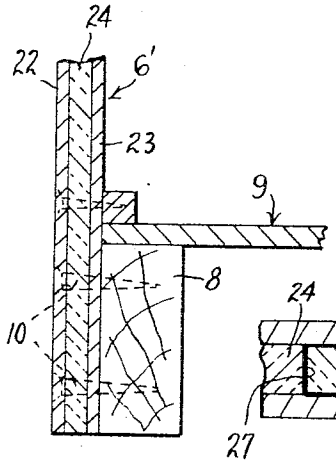


Fig. 7

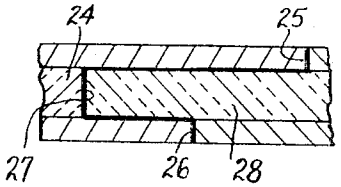


Fig. 8

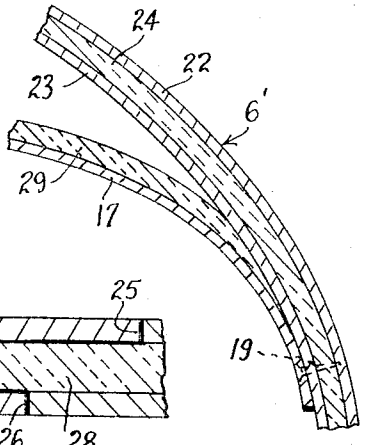


Fig. 6

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BUILDING WITH ARCHED WALLS BRACED BY STRESSED PANEL

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6 Claims. (Cl. 52—86)

This invention relates to building construction and particularly to light-weight buildings which are capable of assembly from readily available materials and which, on assembly, will have great strength.

Many attempts have been made to design light-weight buildings of low cost but these invariably have not been able to withstand the effects of weather and wind pressure or the weight of accumulated snow and ice in northern locations.

The present invention consists essentially in the use of standard size flat or corrugated panels of standard or oversize plywood with or without insulation, wood fibre panels or sheet iron, secured at their lower horizontal edges to the sides of a prepared floor structure consisting of joists and a floor supported on the joists. The panels are bent inwardly towards each other so that their top horizontal edges meet and are secured to a centrally located longitudinal strut. A brace member in the form of a panel or plywood or other material may be secured intermediately to the lower horizontal edge of the longitudinal strut and have its outer edges bent slightly downwardly and secured to the inner surfaces of the inwardly bent side panels. Where the walls are formed from single thickness plywood panels and more than one panel is employed on each side of the building structure, either in the vertical direction of the structure or in the longitudinal direction, the abutting edges of the panels may be secured in well known manner by overlapping straps both inside and outside, or a single strap on the inside or outside, as desired.

Where insulation is desired, the insulation may be of any desired type in sheet form and is preferably enclosed between outside and inside panels of plywood. A preferred form of insulation is sheets of polystyrene. The composite panels of plywood and insulation are secured together by means of a bonding agent which is suitable for bonding wood to the insulation, or the sheets may be secured by means of fasteners such as staples. At the joints between combined panels of plywood and insulation the adjacent edges of the plywood panels are offset relative to each other and the adjacent edge of the insulation sheet is offset further back than either of the offset edges of the plywood panels to provide a deep slot into which the projecting tongue of the insulation sheet of the adjacent composite panel is inserted. The joint between adjacent composite panels is secured by a suitable bonding agent and may be stapled for added security.

Composite panels, because of their greater stiffness, will tend to resist bending at their lower ends and thereby give a vertical rise to the panel at the floor level. This permits greater use of the floor space. Alternatively preformed panels could be given an outward curvature, providing still more floor space which could permit the installation of cupboards and work tables etc. to be placed in the outwardly curved area.

The object of the invention is to provide a building structure of simple and strong design which can be assembled from readily available materials at low cost.

A further object of the invention is to provide a building structure having no internal supports which will interfere with the maximum use of floor space.

A further object of the invention is to provide structure of arch design and consisting of plywood, wood fibre or

sheet iron side panels bent inwardly towards each other and secured together by a central strut.

These and other objects of the invention will be apparent from the following detailed specification and the accompanying drawings, in which:

FIG. 1 is a vertical transverse section of the building structure of the present invention taken on the line 1—1 of FIG. 2.

FIG. 2 is a side elevation of the structure shown in FIG. 1 with the side wall partly broken away to show the strut structure.

FIG. 3 is a horizontal section of a portion of a side wall including insulation, and showing a portion of an end wall and a vertical joint between adjacent side wall panels.

FIG. 4 is a vertical section of the side wall shown in FIG. 3 and showing a horizontal joint between adjacent side wall panels.

FIG. 5 is an enlarged partial transverse section of the central strut structure and brace panel.

FIG. 6 is a vertical section of a side wall showing the joint between it and the adjacent edge of the brace panel.

FIG. 7 is a vertical section showing the joint between the lower horizontal edge of the side panels and the joist and floor structure.

FIG. 8 is an enlarged detail of the joint between insulated wall panels bonded together with a bonding agent.

FIG. 9 is a partial detail showing a preformed, outwardly curved side panel secured to the floor.

FIG. 10 is a detail of an alternative method of securing the longitudinal edges of the brace panel to the side walls.

Referring to the drawings, the housing structure **5** shown in FIGS. 1 and 2 is formed from panels of plywood **6** but may be formed from composite panels of plywood and insulation or other flat building materials.

The lower horizontal edges **7** of the panels **6** are secured to the side joists **8** of the floor structure **9**, preferably by screws **10**.

The panels **6** are bent inwardly towards each other until their upper horizontal edges **11** abut each other and the edges **11** are secured to the top of the central strut structure **12** by the fasteners **13**.

The strut structure **12** consists preferably of a vertically disposed sheet of plywood **14** extending longitudinally of the housing structure has top horizontal strips **15** and lower horizontal strips of wood **16**. The fasteners **13** which may be screws, nails or staples are preferably driven into the top horizontal strips **15** for greater strength of grip.

A brace member **17** consists of a panel of plywood secured intermediate of its length to the underside of the ridge structure **12** by means of screws, staples or nails driven into the lower horizontal strips **16**. The length of the member **17** transversely of the building structure **5** is such that its outer ends **18** are bent slightly downwardly against the inner surface of the side wall panels **6** and exert a considerable outwards pressure against these side walls **6**. The outer ends **18** of the brace member **17** are secured to the side walls **6** by the screws, staples or nails **19**. An alternative method of anchoring the brace panel member **17** to the side walls **6** is shown in FIG. 10 with the edges of the panel member being secured to the horizontal stringers **17***a*.

The housing structure **5** is completed by fitting end walls **20** and **21** between the floor structure **9** and the side walls **6**. The end walls **20** and **21** are suitably secured to the floor structure **9**, side walls **6** and to the adjacent ends of the strut **14** and brace panel member **17**. Doors and windows may be set in either the side walls or end walls as required.

The above described building structure is basic to the invention and is suitable for many uses. The size of the structure can be increased by the use of oversize panels of plywood, or standard size panels 8'0" x 4'0" may be joined together by the use of straps at abutting edges in well known manner.

A building structure of this type is well suited for northern areas where climatic conditions are severe and heavy snow is encountered. However, additional insulation will be required and is shown in FIGS. 3 to 8.

The composite insulated panels **6'** are preformed from an outer facing sheet **22** and an inner facing sheet **23** of plywood and a sandwich sheet of insulating material **24**. A suitable insulating material is polystyrene which can be bonded to the outer and inner sheets **22** and **23** in well known manner to form a single panel which can be bent in the manner shown.

When a multiple of panels **6'** are used in the structure, the abutting joints are formed in the manner shown in FIGS. 3, 4 and 8. The outer and inner sheets **22** and **23** are positioned with their edges **25** and **26** offset with respect to each other and the insulation sheet **24** is positioned with its edge **27** offset with respect to the adjacent edges **25** and **26** of the sheets **22** and **23**. Such an assembly will provide an inner groove along one side and one edge of the composite panel and a tongue **28** of the insulating sheet will project along the opposite side and end of the composite panel. Such composite panels can then be assembled in the manner shown in FIG. 8 and the mating surfaces can be secured to each other by a suitable bonding agent, or mechanical fasteners.

Sheets of insulation material **29** may be laid on the upper surface of the brace member **17**.

The end walls **20'** are formed of a composite panel or panels similar to the panels **6'** above described.

The exposed edges of the composite panels **6'** are cut with the edges of the sheets **22, 23** and **24** flush with each other and can be sealed with a strip of weather resisting material **30** if desired. The exposed lower horizontal edge of the panel **6'** shown in FIG. 7 need not be sealed as, when an insulating material such as polystyrene is used, little or no deterioration due to weather will take place at this location.

FIG. 9 shows a preformed side panel **31** secured to a side joist **32** of the floor structure. By the use of such preformed side panels, greater use can be made of the floor space for the installation of other structures such as cupboards **33**, etc.

A building constructed as above described is self-supporting without the use of internal support columns and, in smaller buildings the additional support offered by the brace member **17** can be dispensed with. By using weatherproof plywood, the outer surfaces need only be surfaced with a weather repellent paint or like coating. If

desired, the outer surfaces may be covered with building siding material.

What I claim is:

1. A building structure comprising a floor and floor supporting joists, panel side walls, means to secure the lower horizontal edge portions of the said side walls to the sides of joists on opposite sides of said floor, a central longitudinally disposed strut member, the said side walls being bent to form an arch over the said floor and having their top horizontal edge portions secured to the upper portion of the said strut member, and a panel brace member secured along a medial centre line to the lower portion of the said strut member, the said panel brace member being bowed downwards on each side of said strut to exert outwards pressure on the upper portions of the said side walls, and means to secure the contacting surfaces of said panel brace member to the said side walls.

2. A building structure as set forth in claim **1** in which the said side wall panels comprise an outer sheet, an inner sheet and a sandwich sheet of insulation bonded to each of said outer and inner sheets.

3. A building structure as set forth in claim **1** in which the said side wall panels comprise an outer sheet of plywood, an inner sheet of plywood and a sandwich sheet of insulation bonded to each of said outer and inner sheets.

4. A building structure as set forth in claim **2** in which the said side wall panels are composed of two or more individual panels and the said outer and inner sheets are offset in relation to each other and the said sandwich sheet is offset with respect to the said outer and inner sheets to form tongue and groove joints between adjacent sheets.

5. A building structure as set forth in claim **1** in which opposing end walls are located between the said floor and the inner surfaces of the said opposing side wall panels, and the said strut and panel brace members are secured at their opposite ends to the said end walls.

6. A building structure as set forth in claim **1** in which the said side wall panels are preformed to curve outwardly relative to the said floor before being secured thereto.

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