

Sept. 17, 1963

H. C. BOLT

3,103,709

BUILDING STRUCTURES

Original Filed Oct. 18, 1956

5 Sheets-Sheet 1

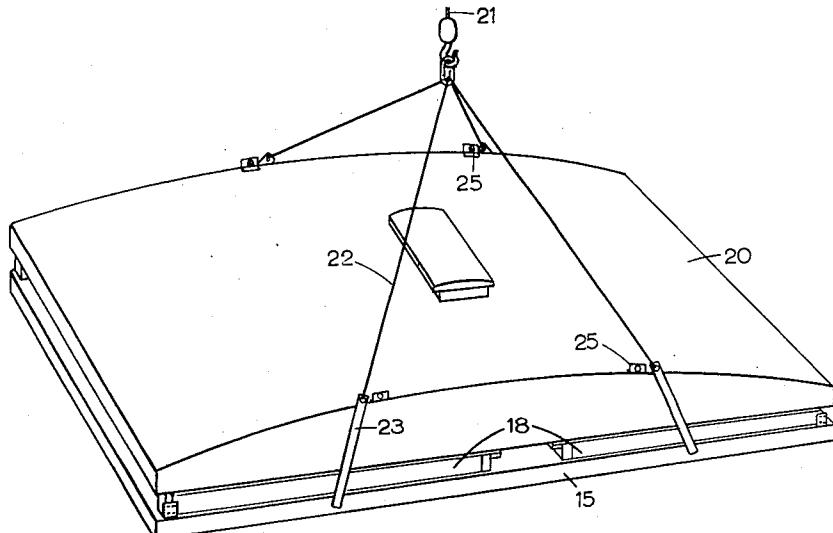


FIG. 1.

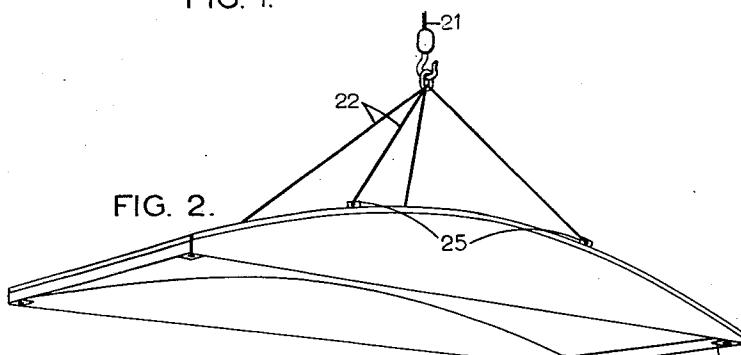
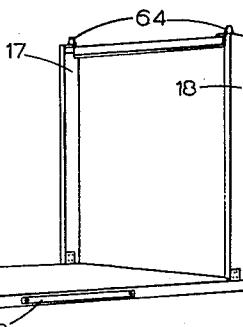
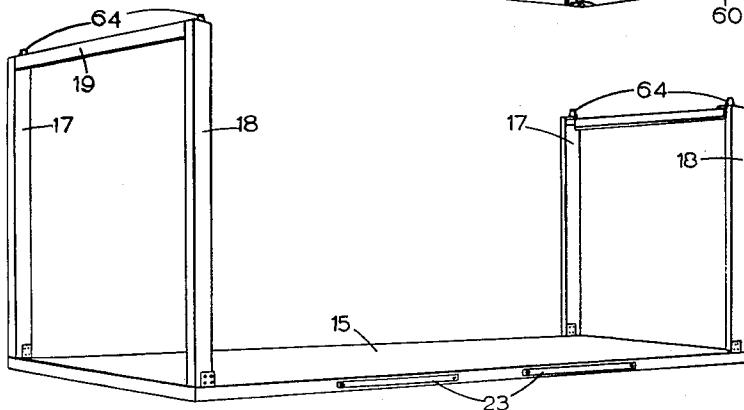


FIG. 2.



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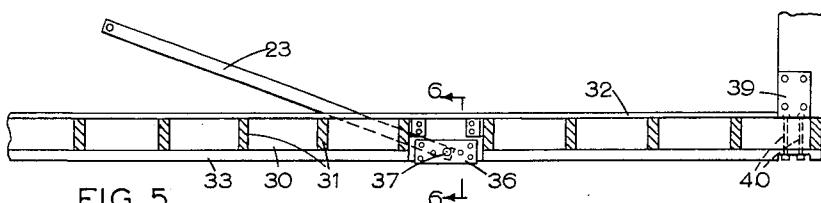
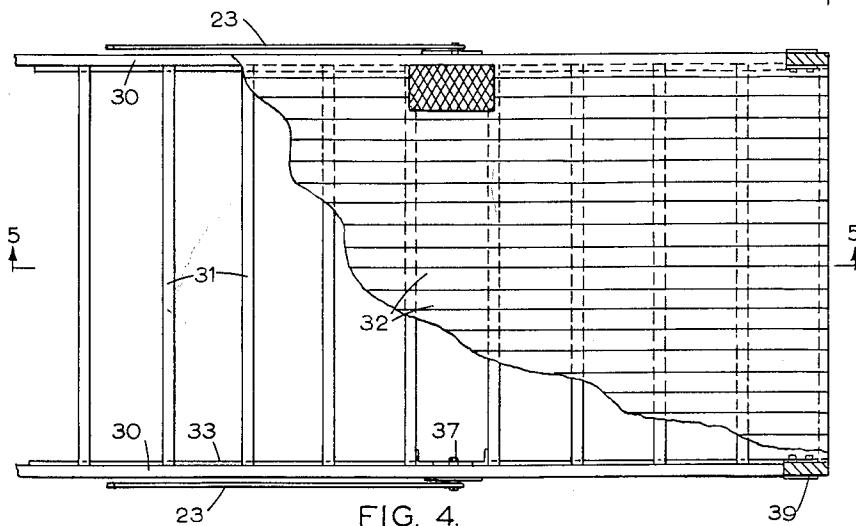
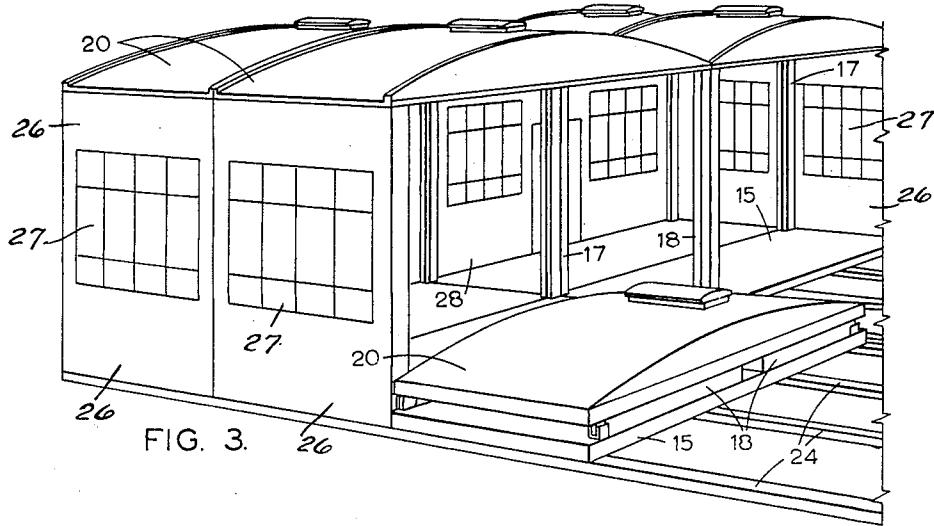
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Original Filed Oct. 18, 1956

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BUILDING STRUCTURES

Original Filed Oct. 18, 1956

5 Sheets-Sheet 3

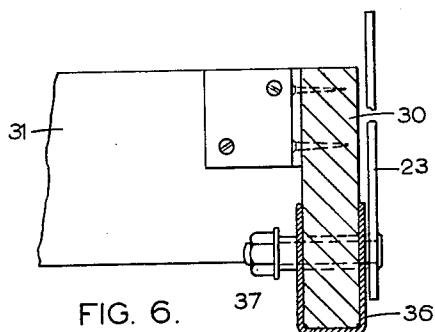


FIG. 6.

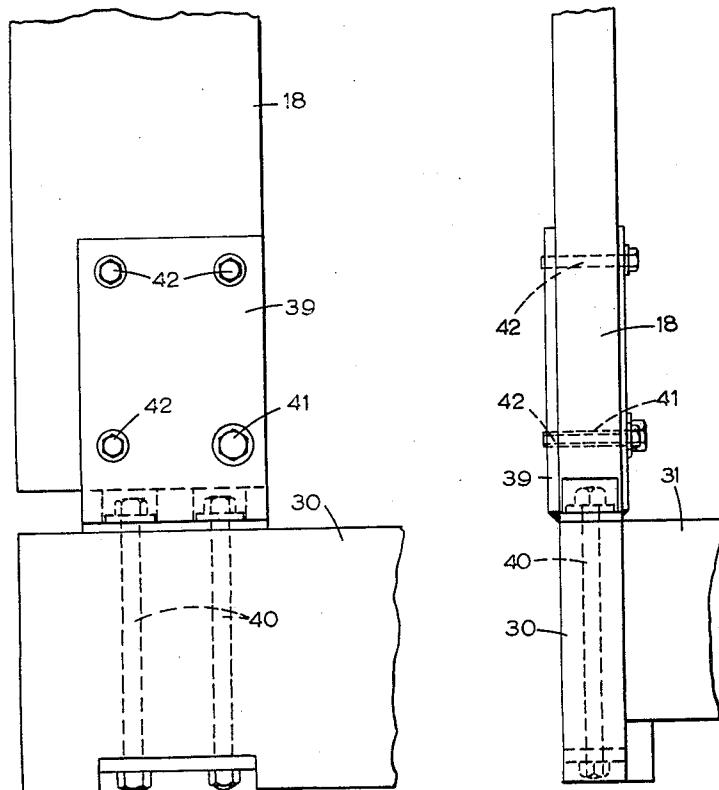


FIG. 7.

FIG. 8.

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Original Filed Oct. 18, 1956

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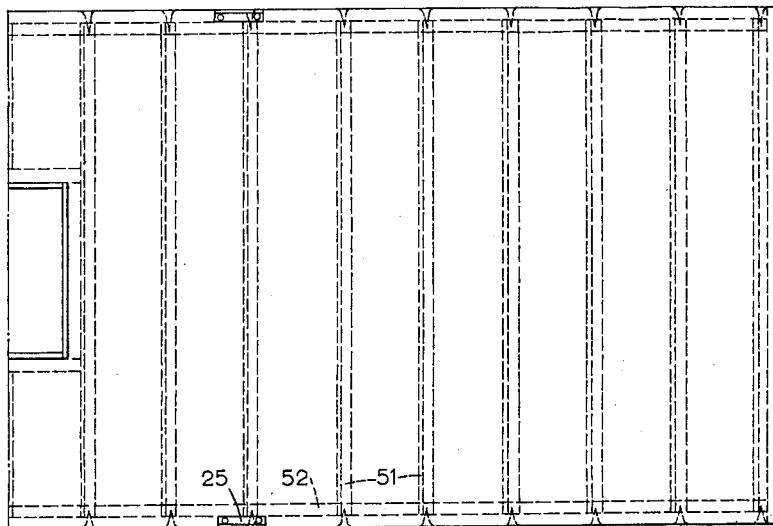


FIG. 9.

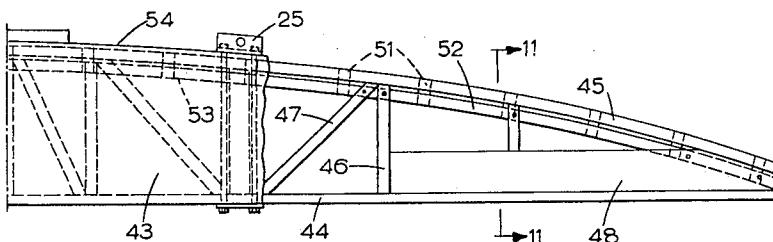


FIG. 10.

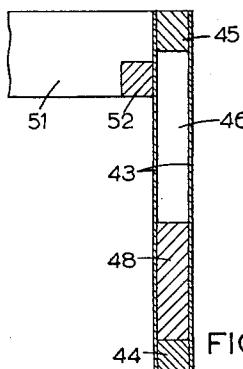


FIG. 11.

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Original Filed Oct. 18, 1956

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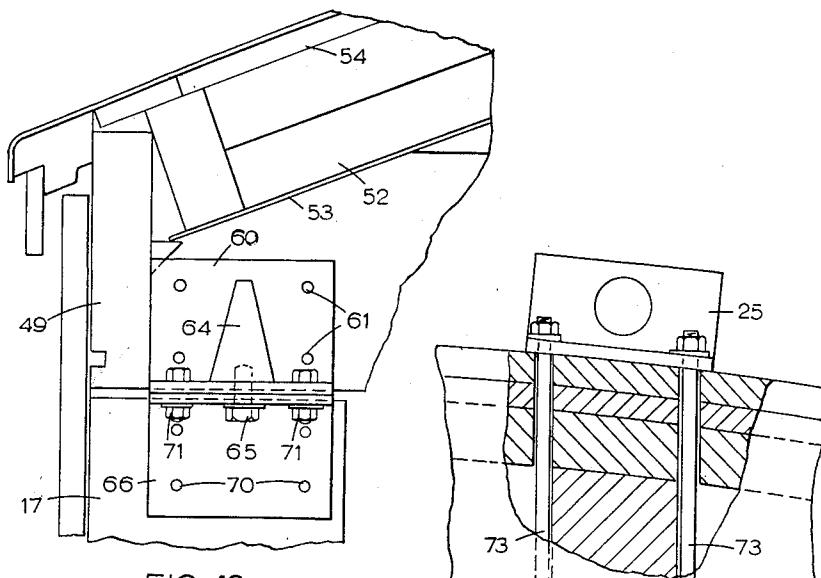


FIG. 12.

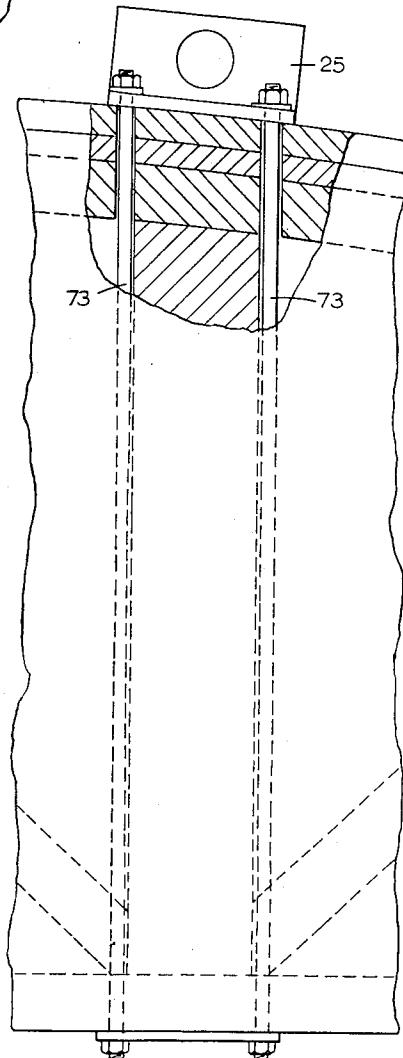


FIG. 13.

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3,103,709

Patented Sept. 17, 1963

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BUILDING STRUCTURES

Harry Collett Bolt, London, England, assignor to Terrapin (Overseas) Limited, London, England, a British company
Continuation of application Ser. No. 616,809, Oct. 18, 1956. This application Jan. 5, 1961, Ser. No. 80,873
Claims priority, application Great Britain Oct. 18, 1955
12 Claims. (Cl. 20—2)

This invention relates to building structures of the kind which can be wholly or mainly fabricated in a workshop, delivered to an erection site in a collapsed condition, i.e. in a compact pack of minimum size, and there quickly erected. This application is a continuation of my application Serial No. 616,809, now abandoned.

The main object of the invention is to provide building units which can be collapsed to a low height and formed into a compact bundle or pack for facilitating transport of several units one upon another over highways by truck, and to enable these units to be readily erected and joined together, with a minimum of time and labor, to form larger buildings. A further object is to enable these units when in collapsed condition to be substantially weatherproof and thus to be storable in the open without spoiling interior decoration.

According to the invention, the building unit may comprise a one-piece floor member of greater length than width, end frames pivoted to the floor so that they can fold towards each other and lie flat on the floor without overlapping, and a one-piece roof member of approximately the same length and width as the floor member, which roof member can be fixed detachably to the end frames when these are upright.

The invention will now be further described by way of example with reference to the accompanying diagrammatic drawings, wherein

FIGURE 1 is a perspective view of a building unit in collapsed condition made in accordance with the invention;

FIGURE 2 is a perspective view showing the unit in course of erection;

FIGURE 3 is a perspective view showing a building in course of erection made up from a number of said units;

FIGURE 4 is a plan of part of the floor member of a unit, part of the covering being broken away to show the inner structure;

FIGURE 5 is a sectional view taken on the line 5—5 of FIGURE 4;

FIGURE 6 is a sectional view taken on the line 6—6 of FIGURE 5;

FIGURE 7 is a fragmentary view of a detail on a larger scale than the aforementioned figures;

FIGURE 8 is an end view of the parts shown in FIGURE 7;

FIGURE 9 is a half plan view of the roof member of a unit;

FIGURE 10 is a half side view of the roof member, part of the covering being omitted to show the inner structure;

FIGURE 11 is a sectional view taken on the line 11—11 of FIGURE 10;

FIGURE 12 is a fragmentary view of a locating device to be described; and

FIGURE 13 is a fragmentary enlarged view of part of FIGURE 10.

A building unit in accordance with this invention comprises a rectangular floor member 15 at each end of which an end frame is pivotally attached, each end frame comprising a pair of uprights 17, 18 connected at their

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upper ends by a crossbar 19. The length of the floor member 15 is more than twice the height of the end frames so that the latter can both lie flat on the floor member without overlapping, as shown in FIG. 1. The 5 floor member desirably will usually be about twenty to twenty-five feet in length. The width of the floor member preferably will be less than half its length, which facilitates using a width, e.g. eight feet, such that the unit can be mounted on a lorry or truck for transport 10 on roads to the site of erection.

The weatherproof roof member 20 of each unit is rectangular and about the same size as the floor member so that it will seat on the end frames, when the unit is collapsed, to form a convenient pack which can be 15 lifted as a whole by a crane (not shown) the cable 21 of which is shown connected by cables 22 to connecting means 23 attached to the floor. The collapsed unit or pack is thus lifted off a truck onto any suitable foundation 24 at an erection site, as shown in FIG. 3, 20 and the roof member is then lifted and supported in an elevated condition by connecting the cables 22 to connecting means 25 on the roof member, as shown in FIG. 2. The end frames are then erected into an upright position, and the roof member lowered onto them. Any 25 required number of these units may be placed end to end and/or side by side to form a complete large building, as shown for example in FIG. 3.

After erection, adjacent uprights 17, 18 preferably are bolted together and may be covered by a facing board 30 (not shown). Internal uprights will form columns, as shown in FIG. 3. Exterior end frames are covered over with weather boards 26, windows 27, or doors (not shown) or the like to form outer walls, and may also carry all kinds of fittings (not shown), such as electric 35 wires and plumbing. Most of these fittings and parts, i.e. weather boards, etc., desirably are applied to end frames in the factory before the unit is transported as a pack to the site of erection. After erection, joints between roof members and outer walls of adjacent units 40 may be covered by appropriate strippings (not shown), and other parts may be secured in place, including wall panels 28 at the ends of the building, as shown in FIG. 3, and any required internal partitions (not shown). Such site-installed panels and partitions, as well as any other 45 site-installed parts or fittings, may be transported to an erection site separately from the basic unit.

It will be noted that the upper surface of the floor member of each unit, when the end frames are in their upright positions, extends substantially without interruption from end to end and side to side of the unit, that is, such upper surface is interrupted only by the corner uprights 17, 18 and such uprights are contained within the peripheral outline of the floor member. As a result, when two or more units are assembled to form a larger building, 55 as shown for example in FIG. 3, the floor members of adjacent units not only can be juxtaposed in substantially abutting relation, but also the upper surfaces of the floor members of adjacent units will be substantially flush with each other. Of course, two or more units can also be assembled with a small clearance space between adjacent floor members, which space can be filled by an appropriate filler strip (not shown).

As shown in FIG. 4, the floor member 15 is made in one piece or unitary construction from a framework consisting of longitudinal members 30 and cross members 31 covered with floor boards 32. Strips of wood 33 are fixed to the lower part of the inner sides of the members 30 and assist in supporting the cross members 31. Each of the members 30 carries a pair of U-shaped plates 36 which embrace the lower edge of said member and are secured thereto by screws, as shown in FIGS. 5 and 6. A

bolt 37 passes through each U-shaped member and carries a connecting member 23 in the form of a bar, which can lie close against the outer side of the member 30 when not in use but is raised to the position shown in FIG. 1 for attachment to the crane cables 22. For this latter purpose, the bars 23 are longer than the combined depth of the end frames and roof member, when the unit is in pack form, and the part of the floor above the pivotal axes 37 at the position where the bars 23 are located.

Each of the members 30 also carries, on top and at each end thereof, an upstanding U-shaped bracket 39 (FIGS. 7 and 8) attached thereto by bolts 40. This bracket carries a pivot bolt 41 which passes through the respective upright 17 or 18 that seats in the bracket 39. The uprights pivot on the bolts 41 to the upright or horizontal positions as required. After erection, other bolts 42 may be fitted to hold the uprights rigid in the brackets.

The roof member preferably is made up from two side beams each consisting (see FIGS. 9, 10 and 11) of a bottom bar 44, connected to a top curved bar 45 by verticals 46 and diagonals 47 with a stiffening block 48 at each end. These two beams are covered on both sides with appropriate sheet material 43 and are connected together by an upper frame structure consisting of crossbars 51 and longitudinal bars 52 supporting the ends of the crossbars 51. This upper frame structure carries bottom and top covering 53, 54 of appropriate sheet material.

In order that the roof member will readily and exactly locate during assembly, it is provided at each corner, as shown in FIG. 12, with an angle plate 60 having a vertical limb fixed by screws 61 to the roof member and having a horizontal limb formed with an aperture which fits the larger diameter part of a conical member 64. The latter is fixed by a stud 65 to the horizontal limb of an angle plate 66, the vertical limb of which is fixed by screws 70 to the end frames. Additional bolts 71 are fixed to the horizontal limbs of adjacent angle plates after erection to hold the plates 60, 66 firmly attached together.

One of the connecting means 25 is shown in FIG. 13 and consists of an apertured angle plate fixed to the roof member by bolts 73.

In an alternative construction, the floor member is made as a slab of reinforced concrete, the brackets 39 being fixed to the slab by lag bolts embedded therein.

Having described my invention, I claim:

1. A portable building structural unit for assemblage with similar units to form a human habitable readily-demountable building having a large floor area comprising: a substantially-rigid, generally-rectangular, unitary framework floor member of greater length than width and having a substantially plane upper surface extending substantially without interruption from end to end and from side to side of said member; generally rectangular unitary framework end frame members of substantially the same width as said floor member and including roof-supporting side uprights; means movably mounting the lower end of each of said uprights to the corresponding corner of said floor member for movement between a horizontal position wherein the corresponding end frame member lies flat against said floor member upper surface and an upright position wherein said upright is substantially within the rectangular peripheral outline of said floor member, said upright mounting means interrupting said floor member upper surface only at said corners thereof; a substantially rigid unitary framework weatherproof roof member of approximately the same length and width as said floor member and of sufficient strength to require no support intermediate its ends; and means for detachably fixing the corners of said roof member to the upper ends of said uprights, when the latter are in their said upright positions, to provide a habitable building.

2. The structure defined in claim 1 wherein the length of the floor member is at least twice the width thereof.

3. The structure defined in claim 1 including weather boards covering at least a portion of one of the end frame members.

4. A compact pack of a size to be lifted as a unit by a crane and transported as a unit over highways by truck, said pack comprising a collapsed portable building structural unit for erection and assemblage with similar units to form a human habitable readily-demountable building having a large floor area, said unit comprising: a substantially-rigid, generally-rectangular, unitary framework floor member of greater length than width and having a substantially plane upper surface extending substantially without interruption from end to end and from side to side of said member; generally rectangular unitary framework end frame members of substantially the same width as said floor member and including roof-supporting side uprights, the height of each of said end frame members being less than half the length of said floor member and each of said end frame members lying flat on said floor without overlapping and being contained substantially within the peripheral outline of said floor member; means movably mounting the lower end of each of said uprights to the corresponding corner of said floor member for movement from said flat position to an upright position wherein said upright is substantially within said outline, said upright mounting means interrupting said floor member upper surface only at said corners thereof; a substantially rigid unitary framework weatherproof roof member of approximately the same length and width as said floor member and of sufficient strength to require no support intermediate its ends, said roof member being disposed in substantially coextensive overlying relation with said floor member with said end frame members lying flat therebetween whereby said floor member and end frame members are covered and protected by said roof member and said pack is of minimum height; and means for detachably fixing the corners of said roof member to the upper ends of said uprights, when the latter are in their said upright positions, to provide a habitable building.

5. The structure defined in claim 4 wherein the length of the floor member is at least twice the width thereof.

6. The structure defined in claim 4 including weather boards covering at least a portion of one of the end frame members.

7. A set comprising at least two portable building structural units of substantially identical over-all dimensions for assemblage end-to-end or side-by-side with each other to form at least a portion of a human habitable readily-demountable building having a large floor area, each of said units comprising: a substantially-rigid, generally-rectangular, unitary framework floor member of greater length than width and having a substantially plane upper surface extending substantially without interruption from end to end and from side to side of said member; generally rectangular unitary framework end frame members of substantially the same width as said floor member and including roof-supporting side uprights; means movably mounting the lower end of each of said uprights to the corresponding corner of said floor member for movement between a horizontal position wherein the corresponding end frame member lies flat against said floor member upper surface and an upright position wherein said upright is substantially within the rectangular peripheral outline of said floor member, said upright mounting

means interrupting said floor member upper surface only at said corners thereof; a substantially rigid unitary framework weatherproof roof member of approximately the same length and width as said floor member and of sufficient strength to require no support intermediate its ends; and means for detachably fixing the corners of said roof member to the upper ends of said uprights, when the latter are in their said upright positions, to provide a habitable building, the length of said floor member being greater than twice the height of each of said end frame members to enable the latter to fold inwardly about said pivotal mounting means towards each other and to lie flat on said floor member without overlapping in order to provide, with said roof member superimposed thereon, a compact collapsed pack of minimum height to facilitate transportation to an erection site and in which said floor member and end frame members are covered and protected by said roof member, all of said members being of such a size that said pack can be lifted as a unit by a crane and transported as a unit over highways by truck.

8. The structure defined in claim 7 wherein the length of the floor member is at least twice the width thereof.

9. The structure defined in claim 7 including weather boards covering at least a portion of one of the end frame members.

10. A sectional readily-demountable human habitable building comprising a plurality of portable building structural units of substantially identical over-all dimensions, each of said units comprising: a substantially-rigid, generally-rectangular, unitary framework floor member of greater length than width and having a substantially plane upper surface extending substantially without interruption from end to end and from side to side of said member; generally rectangular unitary framework upstanding end frame members of substantially the same width as said floor member and including upstanding roof-supporting side uprights, said uprights being disposed substantially within the rectangular peripheral outline of said floor member; means movably mounting the lower end of each of said uprights to the corresponding corner of said floor member for movement from its upstanding position to a horizontal position wherein the corresponding end frame member lies flat against said floor member upper surface, said upright mounting means interrupting said floor member upper surface only at said corners thereof; a substantially rigid unitary framework weatherproof roof member of approximately the same length and width as

said floor member and of sufficient length to require no support intermediate its ends; and means detachably fixing the corners of said roof member to the upper ends of said uprights, the length of said floor member being greater than twice the height of each of said end frame members to enable the latter to fold inwardly about said movable mounting means towards each other and to lie flat on said floor member without overlapping in order to provide, with said roof member in a lowered superimposed position thereon, a compact collapsed pack of minimum height to facilitate transportation to an erection site and in which said floor member and end frame members are covered and protected by said roof member, all of said members being of such a size that said pack can be lifted as a unit by a crane and transported as a unit over highways by truck, said units being positioned in edge-to-edge relation with adjacent edges of a pair of juxtaposed units being of equal dimensions and with the upper surfaces of their floor members in substantially the same plane; and means detachably connecting adjacent portions of like members of adjacent units together.

11. The structure defined in claim 10 in which the length of the floor member of each unit is at least twice the width thereof.

12. The structure defined in claim 10 including weather boards covering at least a portion of the exterior end frames of each of the units and additional weather boards extending between the edges of the end frames and between the floor and roof members of each unit along at least a portion of the exterior side thereof.

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