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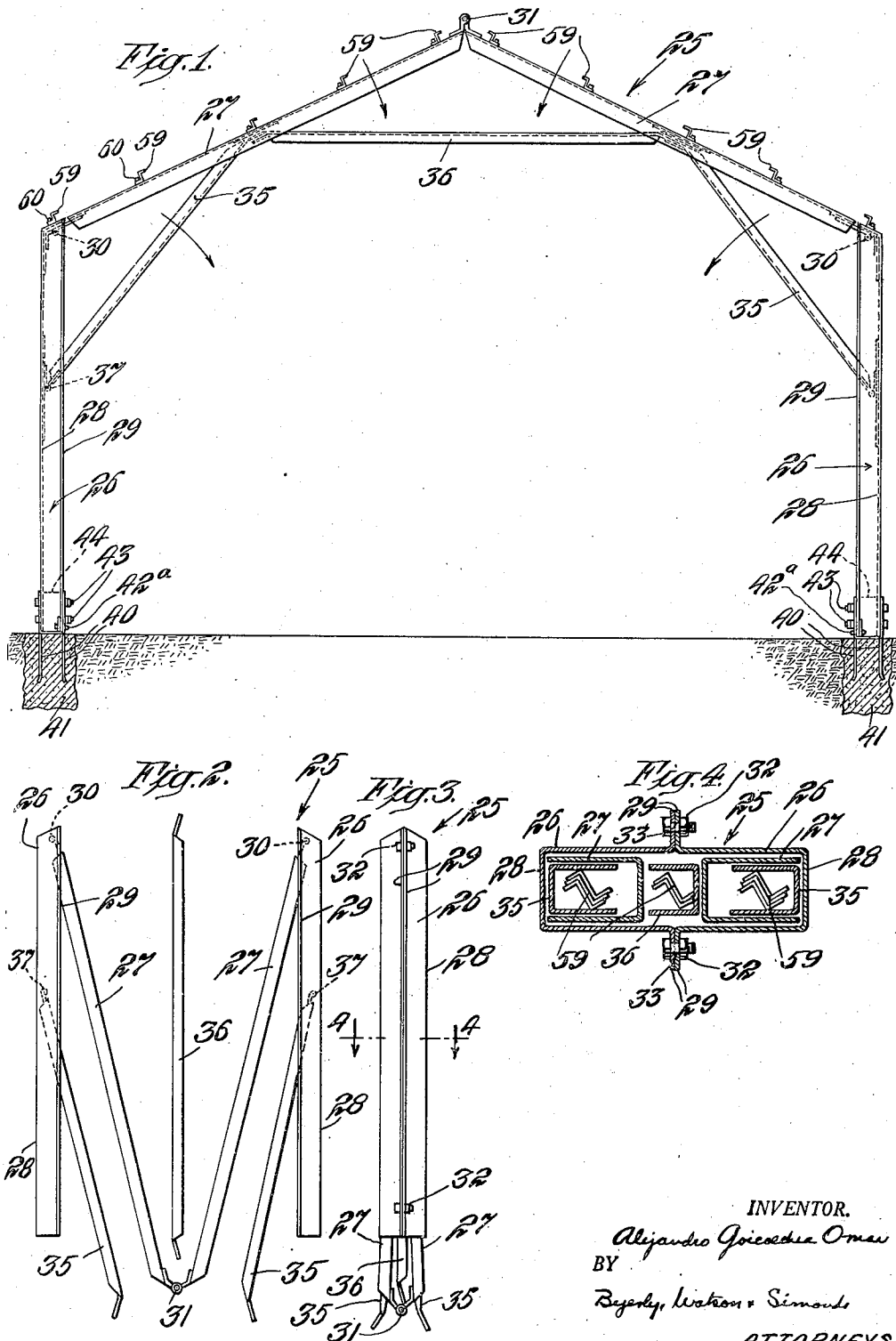
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DEMOUNTABLE BUILDING AND STRUCTURAL UNIT THEREFOR

Filed March 27, 1945

4 Sheets-Sheet 1



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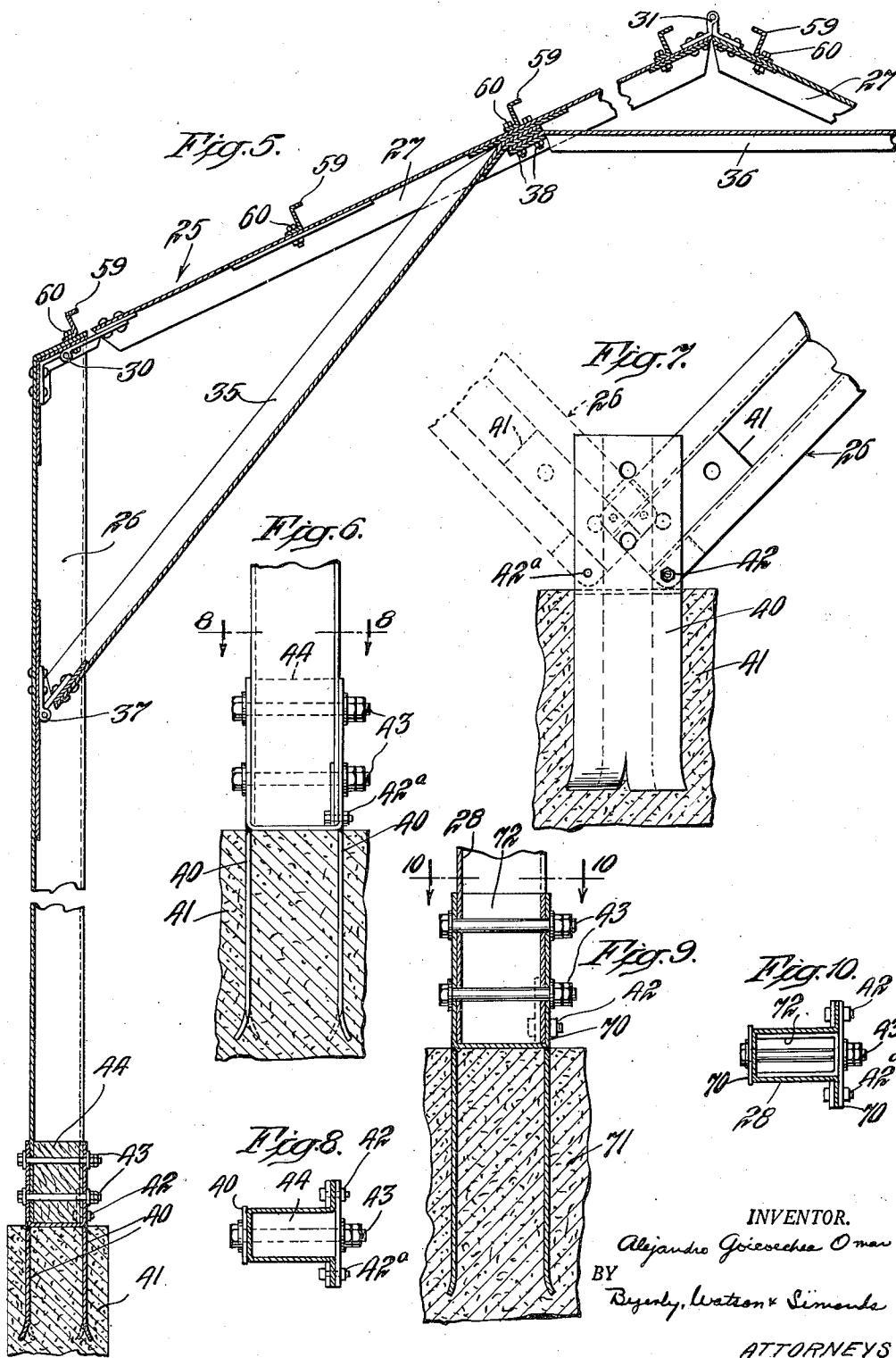
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DEMOUNTABLE BUILDING AND STRUCTURAL UNIT THEREFOR

Filed March 27, 1945

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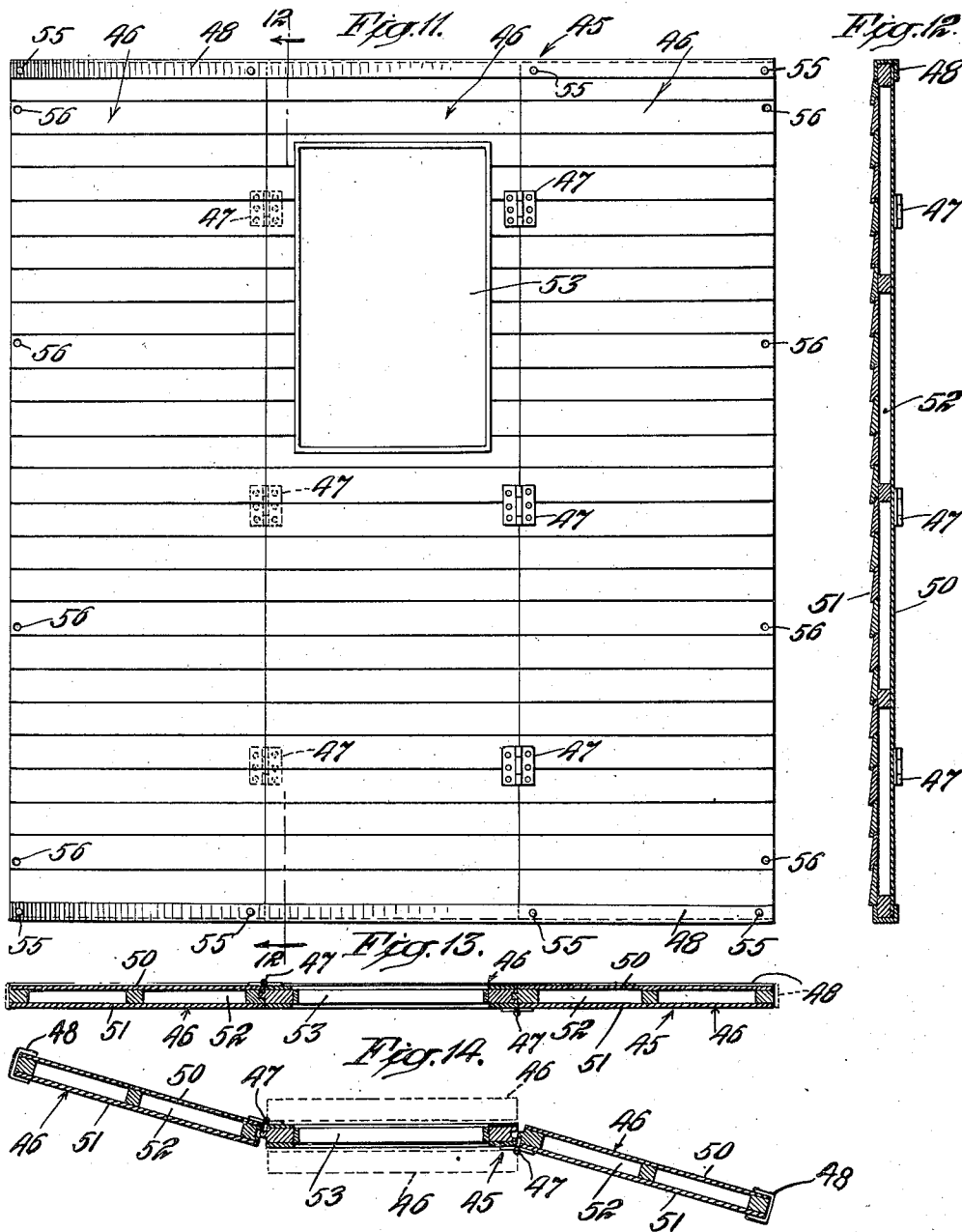
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2,461,916

DEMOUNTABLE BUILDING AND STRUCTURAL UNIT THEREFOR

Filed March 27, 1945

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Feb. 15, 1949.

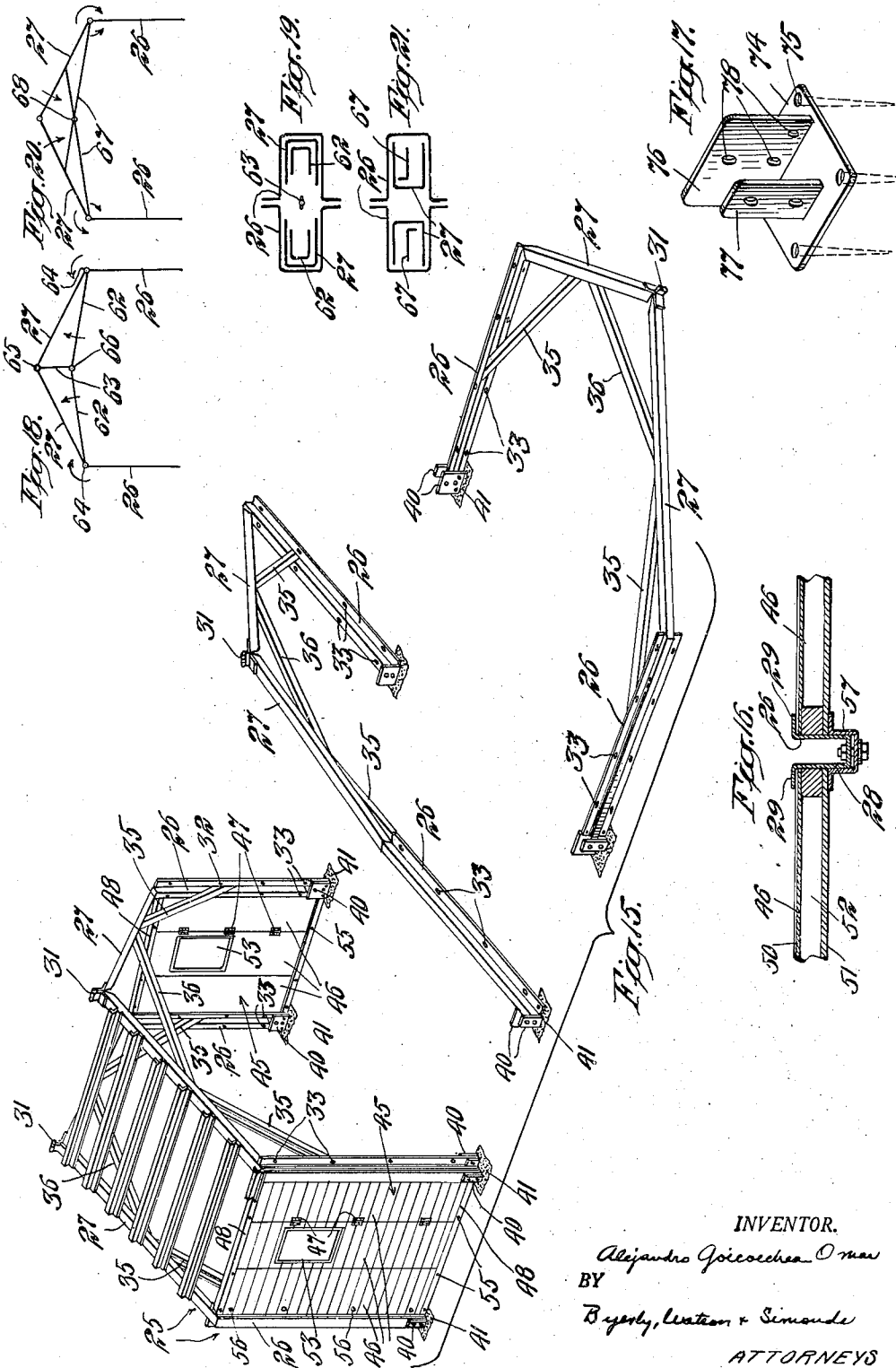
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DEMOUNTABLE BUILDING AND STRUCTURAL UNIT THEREFOR

Filed March 27, 1945

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UNITED STATES PATENT OFFICE

2,461,916

DEMOUNTABLE BUILDING AND STRUCTURAL UNIT THEREFOR

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Application March 27, 1945, Serial No. 585,035
In Spain August 14, 1944

3 Claims. (Cl. 20—2)

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This invention relates to prefabricated buildings and aims to provide a demountable building and structural units therefor.

In the past, prefabricated buildings have been constructed from parts designed for fabrication on a mass production basis and to fit one another so that they may be readily assembled and fixed together for the construction of a permanent building. It is very difficult to disassemble them and attempts to do so result in the destruction of much, if not most, of the material from which they are built.

I have discovered that a building may be constructed from basic collapsible units which possess great structural strength, but which are light and may be folded together compactly so that they may be transported with ease. The parts are capable of being assembled with comparatively little labor to form a strong rigid structure. They may be dismantled just as easily and may then be packed and shipped to a remote site where they can be re-assembled as before.

In accordance with my invention, a demountable building is constructed from foldable transverse frame units which can be anchored to the ground, and wall sections which are supported between the frame units. Each transverse frame unit includes a pair of uprights, and rafters hinged to the uprights and to each other so that they may be folded between the uprights in the form of an M. Each wall section consists of a number of vertical panels hinged to each other and channels engaging the upper and lower edges of the panels to hold them in alignment.

Other advantages of my invention will be pointed out or become apparent from the following detailed description of the specific embodiment which is illustrated in the accompanying drawings, and in which:

Fig. 1 is an elevation of a transverse frame unit;

Fig. 2 is an elevation of the unit illustrated in Fig. 1 in collapsed position;

Fig. 3 is an elevation of the parts of the frame unit in nested arrangement;

Fig. 4 is a section along the lines 4—4 of Fig. 3;

Fig. 5 is a fragmentary sectional elevation of the frame unit illustrated in Fig. 1;

Fig. 6 is a detailed view illustrating the fastening between an upright and its ground anchor;

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Fig. 7 is a side elevation of the ground anchor illustrated in Fig. 6 showing the method of pivoting an upright to it;

Fig. 8 is a section along the lines 8—8 of Fig. 6;

Fig. 9 is a detail illustrating a modified form of ground anchor;

Fig. 10 is a section along the lines 10—10 of Fig. 9;

Fig. 11 is an elevation of a wall section;

Fig. 12 is a section along the lines 12—12 of Fig. 11;

Fig. 13 is a section illustrating the extended panels of the wall section shown in Fig. 11;

Fig. 14 is a section illustrating the folding of the wall panels shown in Fig. 13;

Fig. 15 is a perspective showing the structural units in different stages of assembly;

Fig. 16 is a sectional detail illustrating a modified form of connection between the ends of adjacent wall sections and an upright;

Fig. 17 is a perspective view of a modified form of ground anchor;

Fig. 18 is a diagrammatic illustration of a modified frame unit;

Fig. 19 is a section of the members constituting the unit of Fig. 18 in nested relation;

Fig. 20 is a diagrammatic illustration of a further modification of the frame unit; and

Fig. 21 is a section of the parts constituting the frame unit of Fig. 20 in nested relation.

The transverse units 25 illustrated in the drawings include a pair of articulated uprights 26 and rafters 27 which are made of sheet metal, preferably sheet steel. Each upright 26 includes a channel 28 and flanges 29. The rafters 27 are preferably of channel form also, and one is connected to each upright 26 adjacent its top by a hinge 30 which is contained within channel 28. The rafters 27 of each pair are also connected to each other by hinge 31 so that they may be folded between the uprights in the form of an M, and the flanges 29 may be brought together to form a box which encloses the rafters 27. The box so formed may be fastened in closed position by bolts 32 which extend through holes 33 in flanges 29.

Each transverse frame member 25 is also provided with a series of detachable braces which are adapted so maintain the frame in its erected

position and which fit within the box provided by uprights 26 when the unit is folded up:

The transverse frame unit illustrated in Figs. 1-5 and 15 is provided with braces consisting of a pair of struts 35 and a tie member 36. Each strut 35 is permanently attached at one end in a channel 28 by hinge 37. The other end of that strut may be detachably secured to the corresponding rafter 27 and an end of the tie member 36 by bolts 38. When the bolts 38 are removed and the rafters 27 are folded within channels 28, the struts 35 are also folded within those channels 28 and are embraced by the channels forming rafters 27. The space between rafters 27 in the box provided by uprights 26 contains the tie member 36.

An anchor 40 which may be driven into the ground 41 is provided for each upright 26. The uprights 26 are secured to their respective anchors 40 by bolts 42, 42a and 43. A block of wood 44 is preferably placed in the lower end of channel 28 to permit the bolts 43 to be set tightly without crushing that channel.

The wall sections 45 include vertical panels 46 connected to each other by hinges 47 so that they may be folded over each other. Channels 48 are adapted to embrace the upper and lower ends of the panels 46 to keep them in proper alignment. The panels 46 may be constructed of any conventional building material. Preferably, they are made of two spaced walls 50, 51 which not only afford a strong light construction but also provide an insulation space 52. The panels 46 may also include openings such as the window 53.

When it is desired to ship or store the wall sections 45, the panels 46 are folded over each other. The outer edges of those panels are then protected from injury by the channels 48.

The frame units and wall sections and the building constructed from them are assembled as follows:

The bases of the anchors 40 are imbedded in the ground at the desired points. The nested transverse frame units are placed on the ground, bolts 32 are removed, and the frame unit is unfolded. The struts 35 and tie member 36 are then fixed to the rafters 27 by bolts 38 and the lower flange of each upright 26 is pivoted to its anchor 40 by bolt 42. The frame unit 25 is then swung on bolt 42 as a pivot to a vertical position. It is secured in that position by bolts 42a, 43. A second vertical frame unit 25 is placed in vertical position on its anchors 40 in like manner.

As soon as two adjacent vertical units 25 are secured in erected position, the wall sections 45 which fit between them may be installed. The panels 46 are unfolded, the channels 48 are removed from the edges of those panels and secured to the ends of those sections by bolts 55. The sections are then placed between adjacent uprights 26 so that their edges abut channels 28 and lie against flanges 29 and they are secured by bolts 55 which pass through holes 56 in the wall sections and holes 33 in the flanges. Alternatively, the wall sections 45 may be secured to uprights 26 by means of channels 57 which are bolted to the channels 28 of those uprights (Fig. 16). The balance of the frame units and wall sections are installed in like manner.

The rafters 27 and the upper ends of the uprights 26 of adjacent frame units 25 are tied together by horizontal beams which serve to support a roof of any conventional construction (not

shown). The horizontal beams illustrated in the drawings consist of Z-shaped sheet metal bars 59 which may be secured to rafters 27 and the upper ends of uprights 26 by bolts 60. As illustrated in Fig. 4, those bars 59 may also be contained in the box provided by the folded uprights 26.

The building so constructed may be readily disassembled by reversing the process described above.

The articulated uprights and rafters which provide transverse frame units capable of being folded to form a self-contained package may be braced in various ways other than that described above: One such system of braces is illustrated diagrammatically in Figs. 18 and 19. The uprights 26 and rafters 27 in this form are secured in erected position by converging braces 62, 63 which extend from hinges 64, 65 and which may be secured to each other by a pin 66. In this form the flanged portions of the channels of uprights 26 face away from each other rather than toward each other, and, when they are folded, the uprights 26 are swung outwardly to embrace the rafters 27.

Another bracing system for the frame units is illustrated diagrammatically in Figs. 20 and 21. In this form, the uprights 26 and rafters 27 are held in erected position by braces 67 which are hinged in the channels of the respective uprights 26, extend to opposing rafters, and are connected at their point of intersection by bolt 68.

The anchor 40 illustrated in Figs. 5, 6 and 8 is particularly designed for use in firm ground into which it may be driven securely. Modifications which support the uprights 26, in like manner, may be used with other foundations. The form illustrated in Figs. 9 and 10 is particularly designed for use in soft or sandy soil or in rock. It comprises a metal sheet 70 whose base is imbedded in a block of concrete 71. A metal brace 72 may be used to reinforce the channel 28 in order that the bolts 43 may be set without crushing that channel.

The form of anchor illustrated in Fig. 17 is designed for use on hard ground. It consists of a horizontal plate 74 provided with holes 75 for spikes. The plates 75, 77 are fixed to the horizontal plate 74 and are provided with holes 78 for the reception of bolts 42, 42a and 43.

It will be appreciated that the structure which I have described may be used for many different purposes and it may be erected, dismantled and re-erected with very little waste. Yet, it provides an exceptionally strong and rigid structure. Furthermore, it is very light and, by virtue of its collapsible features, and in particular the box provided by the flanged channels forming the uprights, it may be easily transported.

I prefer to use the foldable frame units and wall elements together in a building. However, either may be used without the other and various other modifications may be made in the building and structural units which I have described without departing from the spirit of my invention as defined in the appended claims.

What I claim is:

1. A demountable building including foldable transverse frame units having uprights and rafters, said rafters being pivoted together at adjacent ends and pivoted at their other ends to the uprights, wall sections fitting between adjacent uprights and each consisting of a number of vertical panels hinged to each other at adjacent vertical edges, and channels embracing the upper

and lower edges of the panels to hold them in alignment.

2. A foldable transverse frame unit for a demountable building comprising two channels having laterally-directed flanges forming up- 5 rights, and rafters, said rafters being pivoted together at their adjacent ends and at their outer ends to the channels and being foldable into housed relation with respect to the channels, the flanges of the channels being engaged in the 10 folded position of parts.

3. A folding transverse frame unit for a demountable building comprising uprights containing channels, rafters containing channels and 15 hinged to the uprights and to each other so as to be foldable within the channels of the uprights, and hinged braces detachably connecting the uprights and rafters and adapted to fold within the channels in said rafters.

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