Aug. 21, 1951 A. HEILES 2,564,691

PORTABLE KNOCK DOWN BUILDING

Filed Aug. 2, 1945 2 Sheets-Sheet 1

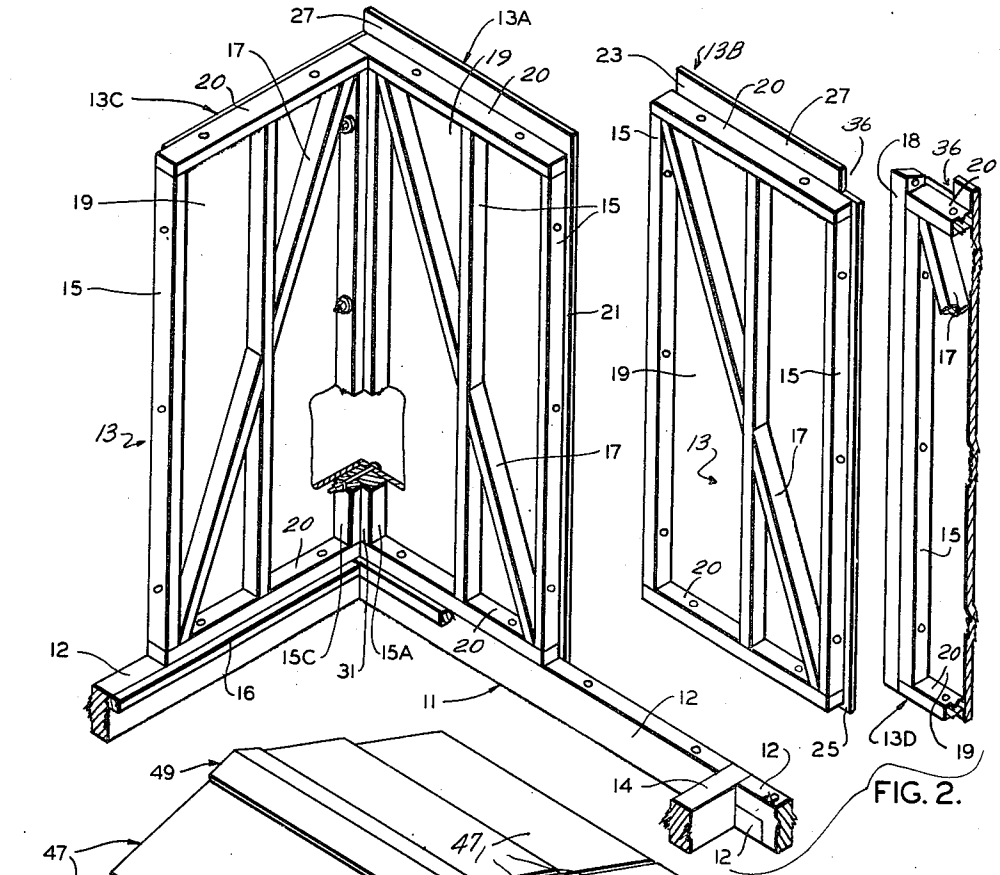


FIG. 2.

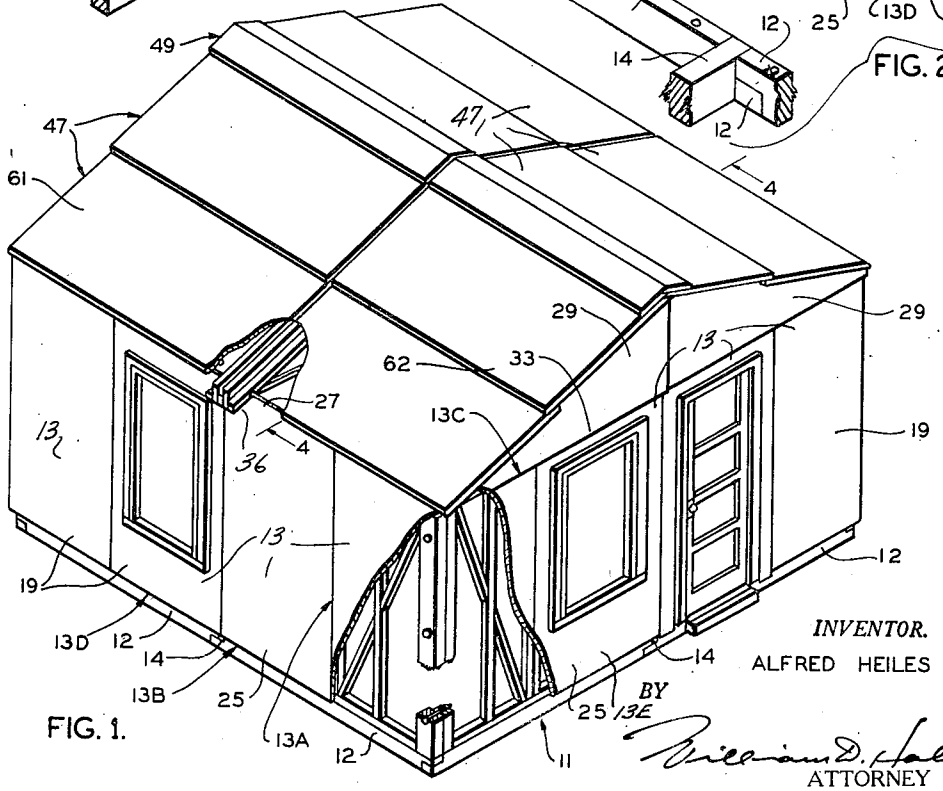


FIG. 1.

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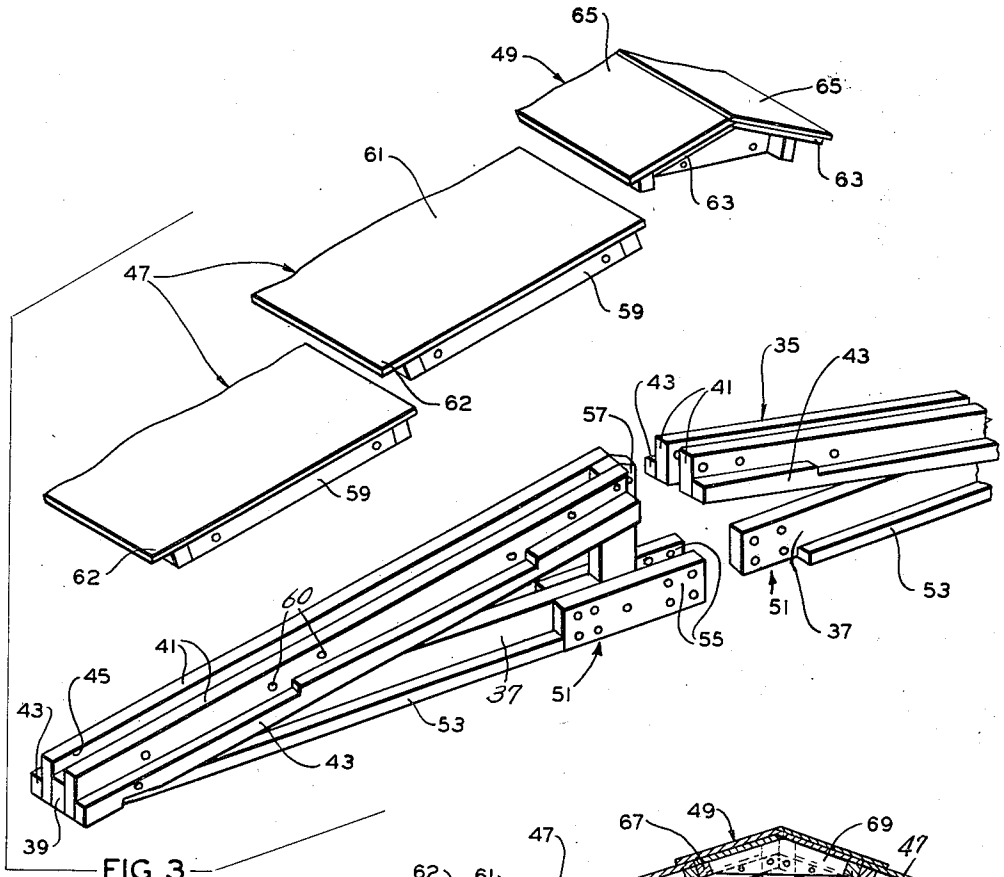


FIG. 3.

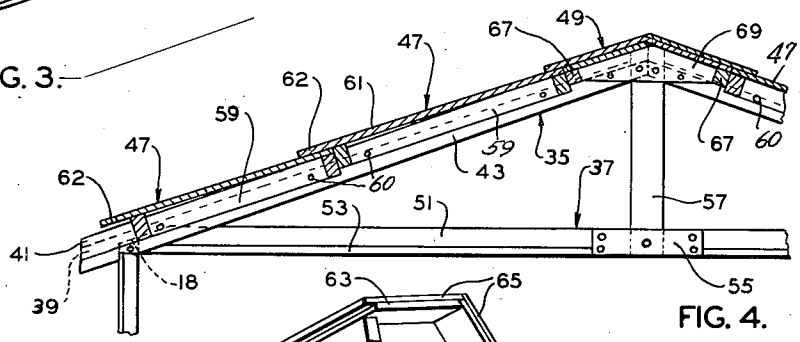


FIG. 4.

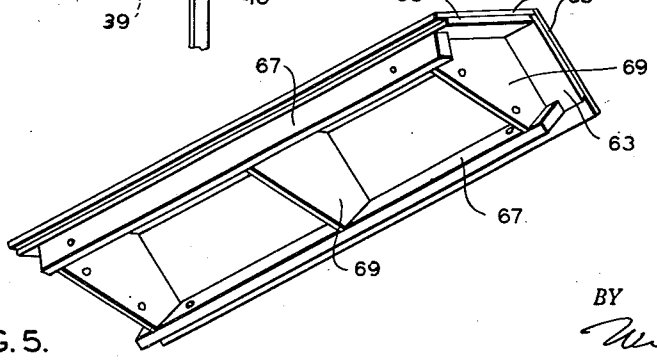


FIG. 5.

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PORTABLE KNOCKDOWN BUILDING

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Application August 2, 1945, Serial No. 608,569

4 Claims. (Cl. 108—1)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

The present invention relates to portable structures, and more particularly to buildings made up in sections so that they may be rapidly and easily assembled, disassembled and transported.

Portable buildings and structures of the prior art have been defective on a number of counts. In some, some of the parts have been so large as to be unwieldy. Others have required the application of waterproof paper or the like over the assembled building to keep out weather.

It is, therefore, an object of the present invention to provide a portable building construction in which all of the parts are light in weight, relatively strong, and of a substantially uniform size to facilitate transportation.

It is a further object to provide such a structure which will shed rain upon assembly, without the necessity of providing any additional waterproof covering or interlining.

The foregoing objects and others, as will hereinafter appear, are accomplished by a portable structure, the components of which are so arranged as to allow upper sections to overlap lower sections so as to shed rain and, where such overlapping is impractical, to provide gutter means within the structure to drain off any rain which may get inside. At the same time, all of the pieces are limited in size and are of a sturdy construction so as to facilitate portability. The parts are of such configuration and arrangement that they may be readily intermeshed and joined when erecting the building so as to allow the rapid and relatively easy assembling thereof.

In the accompanying drawings, Figure 1 is a perspective view of a small portable building embodying the present invention, portions being cut away to reveal structural details;

Figure 2 is an interior perspective view of that corner of the building which is in the foreground of Figure 1, the same being shown in process of construction with certain parts still detached and with portions cut away to show details;

Figure 3 is a fragmentary, exploded, perspective view showing the central truss of said building, and particularly the gutter incorporated into the upper chord of said truss, a ridge cap, and several roof sections;

Figure 4 is a fragmentary, vertical sectional view, taken along the line 4—4 of Figure 1, showing particularly the relative positions of the side walls, truss, roof ledger, roof sections and ridge cap; and,

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Figure 5 is a perspective view, showing the underside of one of the ridge caps.

Referring now more particularly to the particular embodiment of the present invention illustrated in the drawings, the portable building there shown is constructed upon a rectangular sill 11 made up of a plurality of peripheral sill members 12, and cross sill members 14, joined together by suitable joints. If a floor (not shown) is to be put into the building, floor ledgers 16 may be bolted to the inside of the sill members 12, flush with the top thereof (as indicated in Figure 2).

Bolted to the sill 11 are a plurality of vertically disposed wall sections 13. Each such wall section 13 is made up of a rectangular framework of studs 15, plates 20 and diagonal braces 17, sheathed on the outer side by a rectangular wall sheet 19, of plywood or the like. The outer peripheries of the framework of studs 15 and the wall sheet 19 of a wall section 13 are not coterminous, but are so staggered that the vertical edges of abutting wall sheets 19 of adjacent wall sections 13 are not aligned with the vertical edges of abutting studs 15.

This arrangement is illustrated, for instance, in the two wall sections 13A, 13B, as shown in Figure 2, where the right hand vertical edge portion 21 of the wall section 13A extends to the right beyond its right hand stud 15, and the left hand vertical edge portion 23 of wall section 13B is set in from the left hand edge of its left hand stud 15. The amount of overhang and setback is about half the thickness of one of the vertical studs 15 so that the abutting vertical edges of the two wall sheets 19 are backed up by the left hand vertical stud 15 of wall section 13B. At the corners, the sheet 19 of one wall section (as at 13C, Figure 2, for instance) laps the full width of the corner stud carried by the next wall section. The lower horizontal edge portions 25 of the wall sheets 19 also extend downward beyond the lower horizontal plates 20, so as to overlap the sill 11.

The upper horizontal edge portions 27 of the wall sheets 19 along the sides of the building (such as of wall sections 13A and 13B of Figures 1 and 2) also extend upward beyond the plates 20. This, however, is not true of the wall sections 13 at the ends of the building (such as section 13C in Figures 1 and 2) as the upper ends of said wall sections are overlapped by the outer sheet parts of gable sections 29 to be described.

It is advisable also that one upright stud (such as 15A of wall section 13A), positioned at each corner of the building, be of a greater thickness, so as to provide a surface 31 on the inside of the

building to which inner wall facings or panels (not shown) may be fastened, if desired. Thus, for example, the right hand vertical stud 15C (Figure 2) of wall section 13C may be a 2 inch by 4 inch timber and the left hand vertical stud 15A of wall section 13A may be a 4 inch by 6 inch timber (the relative positions thereof being shown in the cut away corner section of Figure 2).

Some of the wall sections 13, as the fragmentarily shown section 13D in Figure 2, are fitted with an auxiliary, vertically disposed stud 18, permanently secured to said wall section. Said auxiliary stud 18 extends upwardly a short distance beyond the studs 15 of said wall section 13D, so as to receive a truss, as will be explained below.

Some of the wall sections 13 may be provided with doors or windows as desired (as indicated at 13D and 13E in Figure 1).

At each end of the building, two vertically disposed, right triangular shaped, gable wall sections 29, constructed generally in a manner similar to the wall sections 13 already described, are bolted to the upper ends of the wall sections 13. The abutting vertical edges of the outer sheet portions of said gable sections 29 are staggered in a manner similar to the arrangement of the vertical edges of the wall sections 13 as hereinbefore explained. The lower sheet edges 33 of the gable sections 29 overlap the adjacent wall sections 13 on the outside of the building.

Intermediate the ends of the building, and parallel thereto, are positioned one or more trusses 35 to sustain the roof. The detailed construction of one of such trusses is illustrated in Figures 3 and 4, wherein it is shown to comprise a king truss in two separably connected parts, each having a composite diagonal and a lower horizontally disposed half-chord piece 37 separably joined to its opposite counterpart to form a complete chord or tie-beam 51, as in Figure 4. Each diagonal of the truss 35 is made up of five pitched, juxtaposed timbers, permanently bolted together side by side. These timbers comprise the center member or filler 39 (constituting a gutter bottom, as will appear), a pair of rafters 41, flanking said filler 39 and somewhat longer, and a pair of roof ledgers 43, flanking said rafters 41 and spaced below the top edges of the rafters.

The rafters 41 are taller than the filler 39 and thus a sloping channel or gutter 45 is formed by these three pieces. To make said gutter watertight, layers of suitable material (not shown), such as mastic, are placed between the filler 39 and the rafters 41. The upper surfaces of the roof ledgers 43 are stepped to accommodate the roof sections 47 and ridge cap 49 (as shown in Figure 4), the tops of the steps being inclined somewhat less than the rafters, as in Figure 3, for a purpose which will appear.

Each half of the chord 51 is made up of three juxtaposed, horizontal timbers, each of which comprises a beam or chord section 37, flanked by a pair of ceiling ledgers 53 secured thereto flush with the lower edge. The two halves of the tie beam 51 are joined together by a pair of splicing plates 55 attached to the sides of the inner ends of the sections 37. Extending from the peak of the truss 35 down to the midpoint of the chord is a king post 57, the upper end of which is positioned between the inner ends of the rafters 41 and the lower end of which is secured between the splicing plates 55. For portability, the truss is separable into its two halves (as shown in Figure 3), one of which halves permanently includes the two splicing plates 55 and the king post 57.

The outer end portions of the fillers 39 are notched out underneath to receive the bevelled outer ends of the tie beams 51 and the upper ends of the auxiliary studs 18 (as shown by the dotted lines in Figure 4). The rafters 41 and the roof ledgers 43 are notched out underneath to accommodate the upper horizontally disposed plates 20 of the wall sections 13 upon which they rest. As shown in Figures 1 and 2, upper corners of the wall sheets 19, immediately below the truss, are suitably notched at 36 to receive the outer eave ends of the rafters 41.

The roof of the building is made up of a plurality of roof sections 47 (eight such sections being required in the illustrated embodiment) and ridge caps 49 (two being used in the illustrated embodiment), which are so arranged that the upper roof sections 47 overlap the lower sections 47, and the ridge caps 49 overlap the upper sections 47. The roof sections 47 (Figures 1, 3 and 4) are constructed in a manner similar to the wall sections 13, previously described, and comprise the rectangular frames 59 and the roof sheets 61, which may be rectangular sheets of plywood or the like.

As may be seen in Figure 4, the upper edges of the roof sheets 61 are flush with the upper edges of the frames 59, but the lower edge portions 62 thereof project beyond said frames. The frames 59 rest in the steps of the roof ledgers 43, thus allowing the projecting lower edge portions 62 of the upper roof sections 47 to overlap the roof sheets 61 of the lower roof sections 47.

Each ridge cap 49 (see particularly Figure 5), which, in assembly of the building, is installed after the roof sections 47, includes two inner ridge sheets 63 disposed at an angle to each other, and two outer ridge sheets 65 superimposed upon said inner ridge sheets 63, respectively, so that the contiguous edges of said four sheets 63, 65 at one side are in intermeshing relationship, with the opposed edges of similar sheets at the opposite side of the cap, said edges being suitably bevelled for a tight fit. Secured below the lower edge portion of each of the inner ridge sheets 63, and normal thereto, is a longitudinal stringer 67 and positioned at several points along each ridge cap 49 are pentagonally shaped tie plates 69 which bind the said ridge cap 49 into a unitary structure. It may be seen in Figures 3 and 4 that the slope of the step tops on the ledgers 43 is such, and these step tops are so spaced below the tops of the rafters 41 that the upper edges of the sheets 47 rest on the rafters, while the lower edges of the sheets are spaced above the rafters a distance equal to the thickness of the sheet.

At the two ends of the building the roof sections 47 and the ridge caps 49 may be supported by roof ledgers (not shown) similar to the ones 43, secured to the inside of the gable sections 29, or by a simple truss (not shown), the peaked part of which will comprise merely a rafter such as at 41 and a roof ledger 43.

To assemble a portable building as just described, the recommended procedure is as follows: a piece of level ground is chosen or a number of puncheons (not shown) are erected. The sill members 12 and the cross sill members 14 are then bolted together to form a horizontally disposed grid-like sill frame 11, positioned upon the ground or puncheons. Wall sections 13 are then positioned upon the sill 11 and are bolted to the sill 11 and to each other. If a floor (not shown)

is to be installed, it may then be supported upon the floor ledgers 16. The gable sections 29 are now positioned upon and bolted to the wall sections at the ends of the building, so as to overlap the wall sections 13. The two halves of the truss are then bolted into a unitary triangular structure which is positioned athwart the building and parallel to the gable sections, so that it rests upon the horizontal studs 15—18 of oppositely disposed wall sections 13. The upper ends of the auxiliary studs 18 extend upwardly between the rafters 41, and the truss is bolted to said auxiliary studs 18 as in Figure 3. The roof sections 47 may then be placed upon the top of the structure so that their frames 59 rest into successive steps of the roof ledgers 43, the lower roof sections 47 being positioned first. Said roof sections 47 are bolted to each other if desired and to the truss as at 60. The ridge caps 49 are then dropped into position overlapping the adjacent upper roof sections 47 to both sides of it, the stringers 67 resting upon the uppermost steps of the roof ledgers 43. Said ridge caps 49 are bolted to the adjoining roof sections 47 and the truss. If it is desired a ceiling (not shown) may be supported upon the ceiling ledgers 53 provided therefor, and also, inner wall panels may be secured to the studs 15 and the inner exposed surfaces 31 of the corner studs 15A.

The embodiment aforesaid may be disassembled in the reverse order.

It will be noted that all of the components into which the structure is separable are approximately the same length, thus making it convenient to package said components for transporting the building.

The arrangement of the gutter 45 as a part of the truss, which gutter 45 is positioned directly below the abutting edges of the roof sections 47 and the ridge caps 49 eliminates the need for waterproofing paper or the like. Any rain falling upon the roof will run down over the overlapping ridge caps 49 and roof sections 47, but should any water leak in between the abutting edges of the roof sections 47 and ridge caps 49, it will be caught in said gutter 45 and precipitated outside the building.

While there has been described what is at present considered a preferred embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is, therefore, aimed in the appended claims, to cover all such changes and modifications as fall within the true spirit and scope of the invention defined by the appended claims.

I claim:

1. A portable knock-down building including roof sections made up of substantially rectangular frames and respective roof sheets secured thereto; a triangular truss; roof section supporting ledgers on the sides of diagonals of said truss stepped on their upper surfaces to receive the frames of the roof sections with the said frames beside the truss, with said sheets above and over the truss and so that the roof sheets of upper sections overlap the roof sheets of adjoining lower roof sections.

2. The structure of claim 1, wherein the lower edges of said sheets are extended, said ledgers are inclined so that the upper edges of said sheets lie at the top surfaces of the diagonals of the truss, and the lower edges of said sheets are spaced above the diagonals a distance equal to the thickness of the said sheets, the lower ends of the upper steps defining shoulders limiting the length of the next lower steps to receive thereagainst the frames of respective roof sections and spaced less than the corresponding dimension of the roof sections, whereby to determine the lap of one roof sheet over the next one therebelow.

3. The structure of claim 2, wherein said sheets are extended at the sides and said diagonals of the truss each comprises two parallel spaced apart rafter members positioned to support the upper edges of said sheets, said ledgers being on the outer sides of the said rafters, and a trough bottom member therebetween to form a gutter leading from the apex of the truss to its extremity, said roof sheets when laid projecting across and beyond the adjacent rafter members and over the gutter, so as to each lie in alignment and close relation to an opposed roof sheet of a roof section supported at the opposite side of the diagonal.

4. The structure of claim 3, wherein said trough bottom member stops short of the apex of the truss, the said rafter members having upper ends projecting a distance in spaced relation, said truss including a two-piece chord, each chord piece including an inner terminal projecting tie means midlength of the chord, means to connect the tie means separately to the end of an opposed chord piece, and a post member supported at the said tie means and fitted between said projecting ends of the rafter members, and fastenings between the inner extremities of each of the said diagonals and said post member, the fastening between the post and one diagonal at least being separable.

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