C. M. STAFFORD.

PORTABLE HOUSE.

APPLICATION FILED OCT. 12, 1918.

1,350,478. Patented Aug. 24, 1920.

4 SHEETS—SHEET 1.

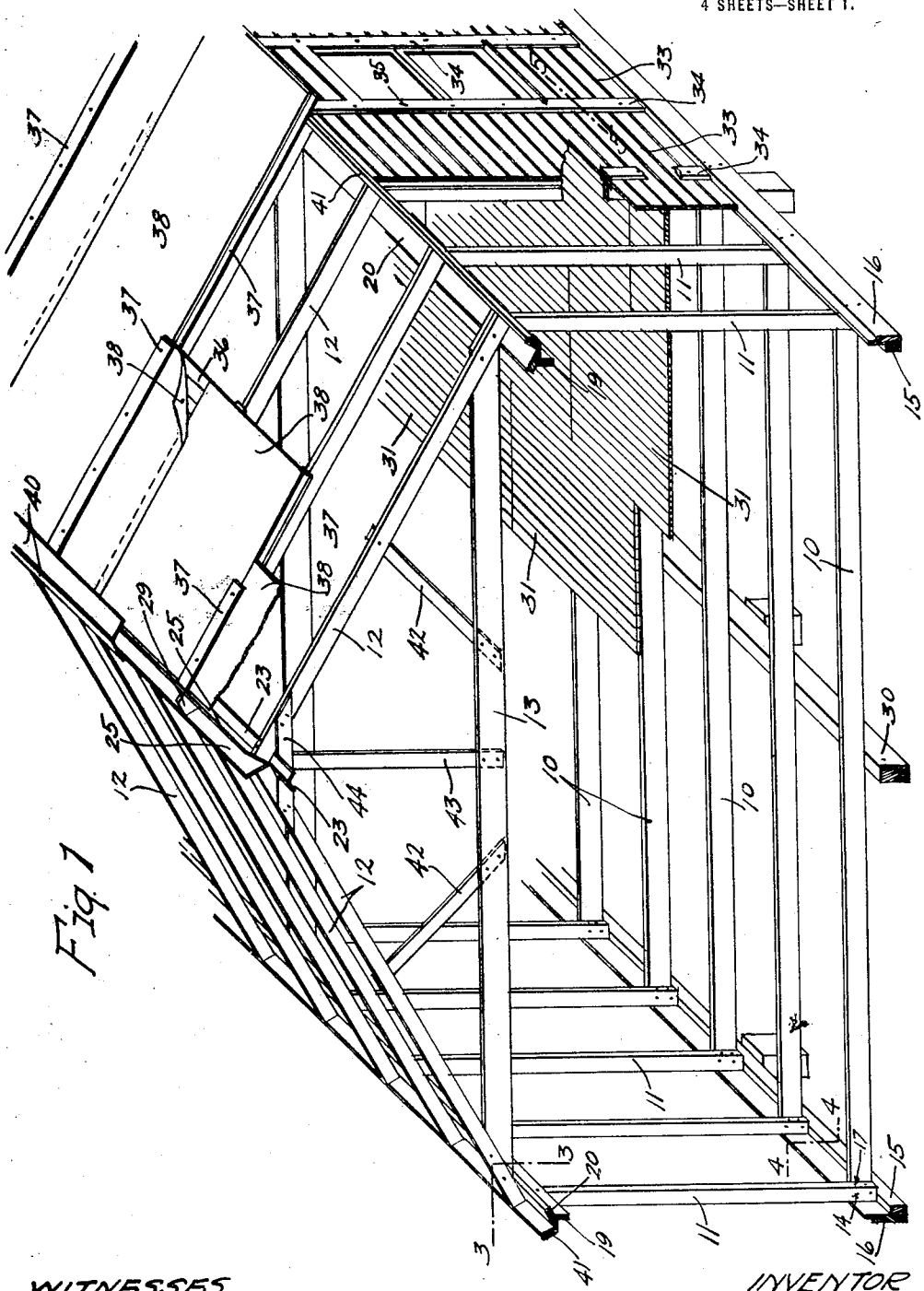


Fig. 1

WITNESSES
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4 SHEETS—SHEET 2.

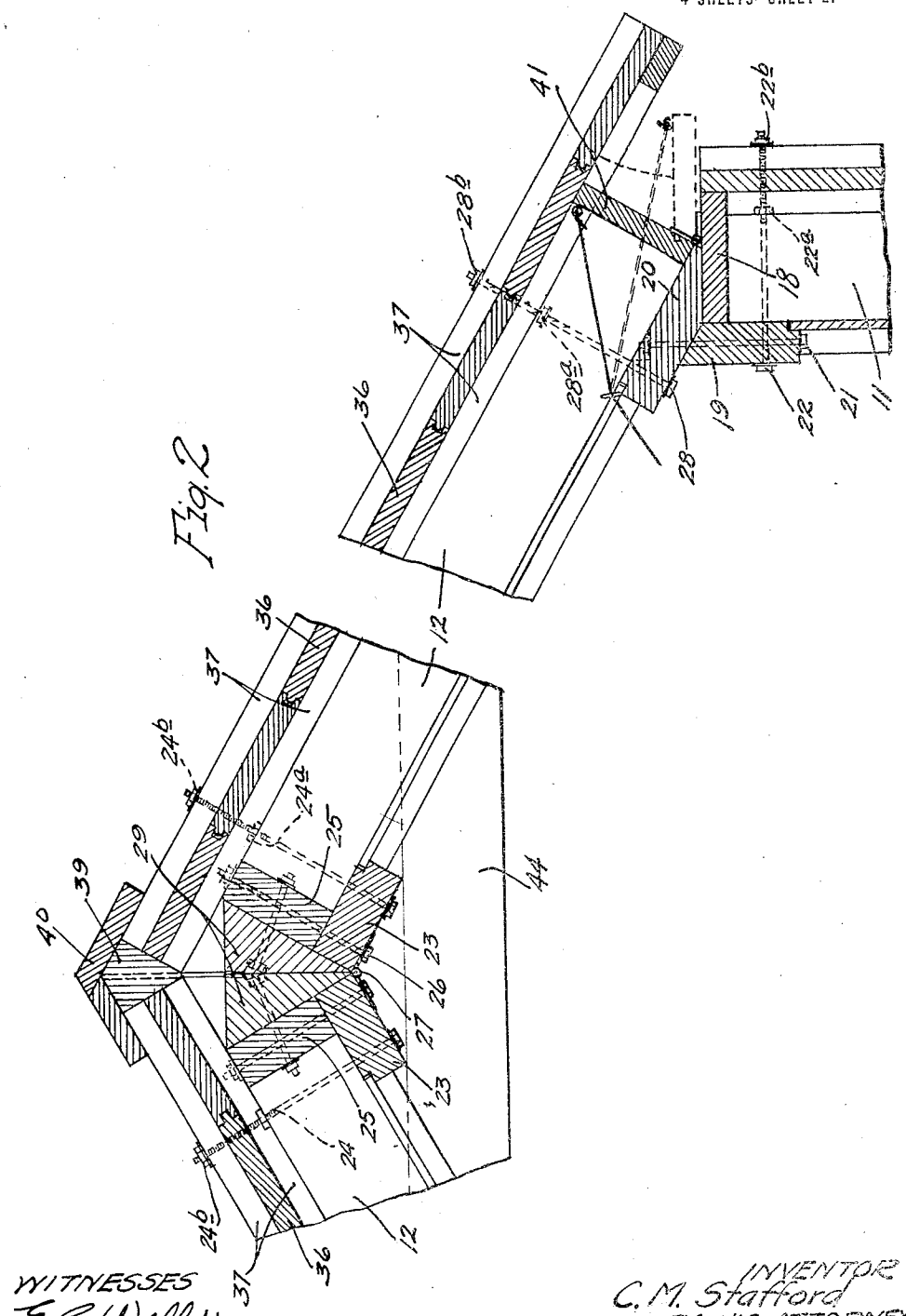


Fig. 2

WITNESSES

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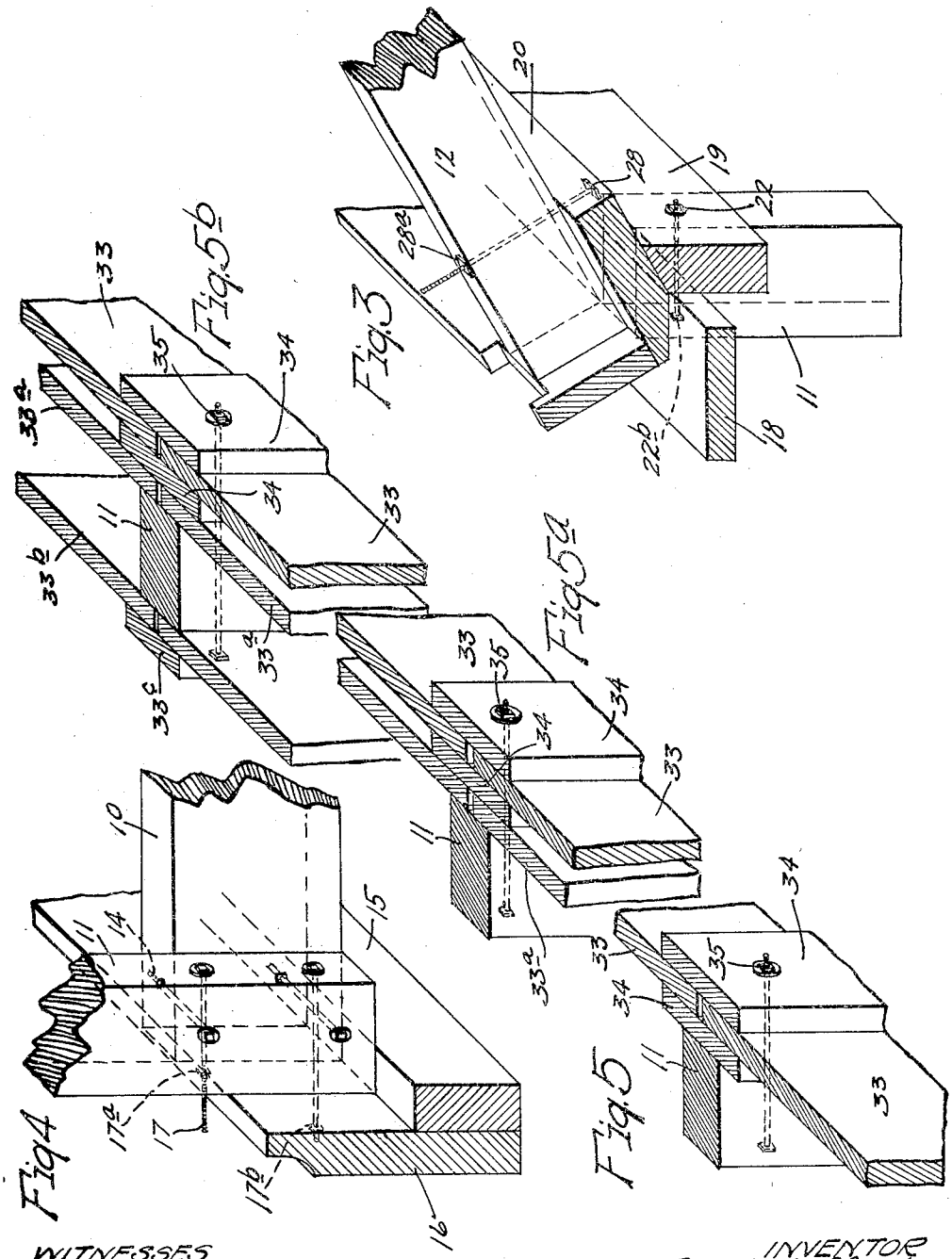
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

Fig. 6

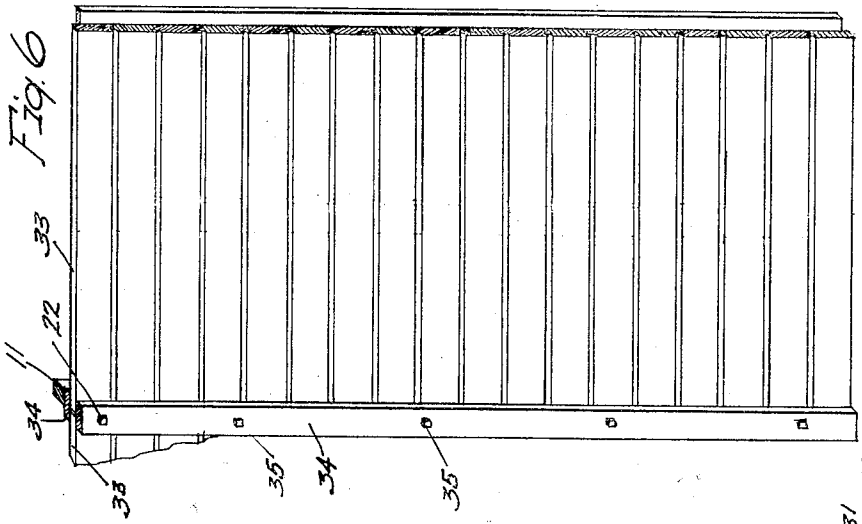


Fig. 9a

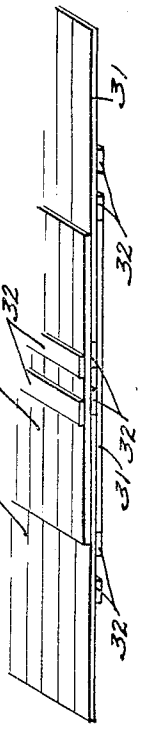


Fig. 8

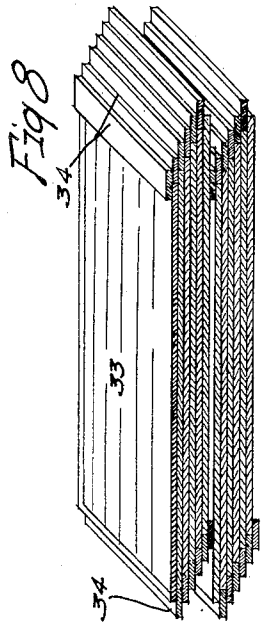


Fig. 7

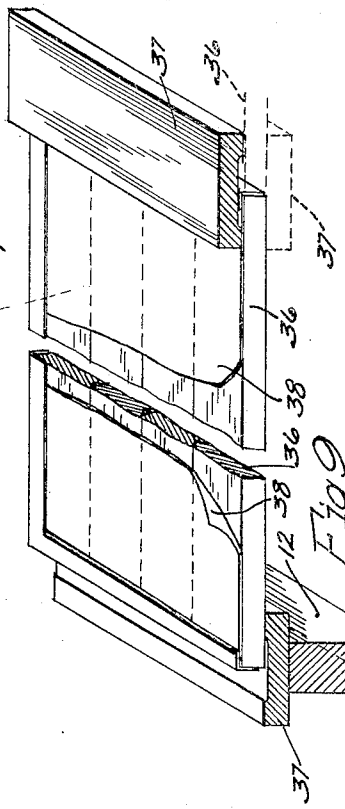
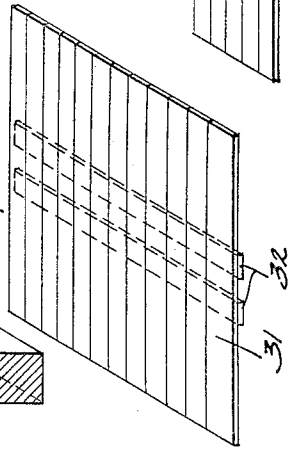


Fig. 9



WITNESSES

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UNITED STATES PATENT OFFICE.

CHARLES M. STAFFORD, OF MINNEAPOLIS, MINNESOTA.

PORTABLE HOUSE.

1,350,478. Specification of Letters Patent. Patented Aug. 24, 1920.

Application filed October 12, 1918. Serial No. 257,872.

To all whom it may concern:

Be it known that I, CHARLES M. STAFFORD, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Portable Houses; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to wooden buildings, and has for its especial object to provide a knock-down portable structure of low first cost and capable of large salvage, in good lumber, when the building is no longer needed.

The invention is directed to features which make the erection of such buildings possible, without the use of carpenters or other expert workmen; which permit the use of lumber to be cut to form any length at the mill, where such work may be done at a minimum cost; which enable the buildings to be very rapidly erected, without waste of lumber and, preferably, without the use of nails, at least to any considerable extent; which permit a building once erected, to be quickly taken down, packed into a minimum of space and shipped at a minimum of cost, without destroying or wasting any of the material. It, of course, follows that buildings thus constructed may be reërected quickly and at a minimum expense and without skilled labor. It also follows, from the peculiarities of the structure, that, if the building is no longer needed, practically all of the lumber employed may be salvaged in its original condition adapted for resale and reusage, wherever desired.

The novel features of construction hereinafter described will be found of advantage in the erection of numerous different types of buildings, a few of which may be enumerated as follows: buildings for war uses, such as barracks, warehouses, and the like, at cantonments, or army headquarters; barns or implement houses for farm use; garages; summer cottages; or even residences.

In the accompanying drawings, I have illustrated my invention as incorporated in a building suitable for use as a barracks.

Referring to the drawings, like characters indicate like parts throughout the several views.

Figure 1 is a skeleton in perspective showing the building partly erected, some parts being sectioned and some parts being broken away;

Fig. 2 is a transverse vertical section through the top and upper wall structure of the building;

Fig. 3 is a fragmentary perspective in section approximately on the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary perspective taken approximately on the line 4—4 of Fig. 1;

Fig. 5 is a fragmentary perspective on the line 5—5 of Fig. 1;

Figs. 5^a and 5^b are views corresponding to Fig. 5, but illustrating slightly modified arrangements;

Fig. 6 is a perspective showing one of the preferred wall panels;

Fig. 7 is a perspective view with some parts broken away showing one of the roof panels;

Fig. 8 is a perspective view showing a number of the wall or roof panels knocked down and packed for shipment;

Fig. 9 is a perspective view showing one of the floor panels;

Fig. 9^a is a fragmentary perspective showing the manner in which the floor panels may be packed together without waste space.

The side sills are of such structure as to be stepped and, as shown, are composed of furring strips 15 and a main sill plate 16 of greater height, which is of such shape at its upper end as to serve as a water table. The joists 10 rest with their ends on the step of the sill afforded by the face of the furring strip 15, in the structure shown, and the studding 11 also rest with their lower ends on the said step of the sill, with one of their side faces abutting the adjacent side face of the sill, and with their outer faces abutting the inner face of the water table, or that part of the main sill 16, which extends above the furring strip 15, in the sill structure shown. Two sets of nut-equipped bolts marked respectively 14 and 17 extend through the lower end portion of each of the studdings 11, at right angles to each other, and one set of these bolts extends through the abutting joist 10 and the other set thereof extends through the water table portion or that part of the main sill 16 above the furring strip 15. The holes for

these bolts 17 are formed in the said joist 10, said studding 11 and said main sill 16, at the mill, with the respective pairs of holes all properly alined and the holes in the main sill member 16 properly spaced apart, in respect to each other, lengthwise thereof. It follows therefrom that the said bolts 17 cannot be applied to connect the said members 10, 11 and 16, without having the said members properly located, in respect to each other, and to the furring strip 15 of the stepped sill; for otherwise the coöperating holes in the respective members will not be properly alined. Hence, it further follows that, when said members 10, 11 and 16 are so connected by said two sets of bolts 17, they will be rigidly united in proper working position.

It is, of course, obvious that, for convenience of erection, the joists 10 and studding 11 may be properly disposed, in respect to each other, and bolted together, when in a horizontal, or substantially horizontal position, and be then turned up on the faces of the furring strips 15, or step of the sill, in proper position for being bolted to the water table or main section 16 of the stepped sill. However erected, it is also obvious that when the said parts 10, 11 and 16 are rigidly bolted together by the said two sets of bolts 17 applied as described, the studding 11 are self-sustaining and ready for the application of the roof structure; and when the roof structure is in working position, some of the pairs of rafters 12 are cross-connected by tie beams 13 bolted thereto, as shown in Fig. 1 of the drawings.

In order to permit the usage of square ended rafters 12 and square ended studding 11, I provide a special form of pitch-joint plate, consisting essentially of two sections marked in the drawings, respectively, with the numerals 19 and 20, and there shown as coöperating with an ordinary flat cap plate 18 resting on the square upper ends of the studding 11, as best shown in Figs. 2 and 3. The cap plate 18, however, might be dispensed with and the pitch-joint plate, made up of the elements 19 and 20, be made to coöperate directly with the studding 11 and the rafters 12. The said section 19 of the pitch-joint plate is vertically disposed with its outer face abutting the studding 11 and is beveled on its upper surface to the pitch line of the rafter with this beveled surface abutting the under surface of the upper section 20 of the pitch-plate, at approximately the middle portion thereof, and is rigidly connected thereto by a nutted bolt 21 passing through the two plates. The upper section 20 of this pitch-joint plate abuts the under surface of the rafter 12 and is of sufficient length to extend upward and outward beyond the lower or vertical section 19; and the outwardly extended portion is beveled to a right angle, with the outer face of the lower section 19 and, in the structure shown in the drawings, is adapted to rest on the cap plate 18. The upward extension of this section 20 of the pitch-joint plate affords a surface, which stands at an obtuse angle to the inner face of the lower or vertical section 19, and through which a long threaded bolt 28 is applied, which extends through the said section 20 and the rafter 12 and is provided with an inner nut 28^a, which re-acts against the rafter and serves to rigidly connect the joint plate made up of said two sections 19 and 20 to the rafter 12. To the vertical section 19 of this pitch-joint plate, is applied a similar long threaded bolt 22, which extends through said section 19 and the studding 11 and is provided with an inner nut 22^a, which re-acts against the studding 11, and thereby rigidly connects the said joint plate to the studding, as best shown in Fig. 2. It is obvious that, when the said bolted together sections 19 and 20 of said pitch-plate are bolted, respectively, to the studding 11 and the rafter 12, as above described, the studding 11 and the rafter 12 will be separably interconnected rigidly together, with the rafter on the right pitch line of the roof. It is also obvious that, by the relative disposition of the said two sections 19 and 20, their inner surfaces, standing on obtuse angles to each other as they do, they afford a good cornice, of pleasing design, at the juncture of the side walls and the roof. It is also obvious that, when the cap plate 18 is employed, as shown in the drawings, the spaces between the respective studding 11 are closed, at their tops; and, as the sections 19 and 20 of the pitch-joint plates extend the full length of the sides of the building and the roof, it further follows that the joint between the roof and the sides is a tight one. Preferably, the cap plate 18 is a little wider than the tops of the studding 11, so as to project outward beyond the same, as shown in Fig. 2 of the drawings, for a purpose which will be presently noted.

In order to permit the usage of rafters 12, which are square at their upper ends, and, in order to afford an extremely strong and tight joint between the upper ends of the coöperating pairs of rafters 12, I provide and use the following special devices, to wit:—In the first place, I provide for each rafter a ridge joint plate made up of two sections 23 and 25 disposed at right angles to each other, with the lower section 23 abutting the under surface of the rafter 12 and extending beyond the same, and the upper section 25 setting on the extended edge of the lower section 23 and abutting the upper end of the rafter, with these two sections rigidly connected together by nutted bolts 26, as best shown in Fig. 2 of

the drawing. The lower section 23 is rigidly connected to the rafter 12 by long threaded bolts 24, provided with inner nuts 24ª, which re-act against the rafter 12. When thus interconnected together by the nutted bolts 26 and interconnected to the rafter by the bolts 24, this ridge-joint plate, made up of the said sections 23 and 25, constitute an upper end section of the rafter, wherein one side of the upper section 25 alines with the upper end of the lower section 23; and when the coöperating pairs of rafters, with their respective pitch-joint plates, are brought into proper working position, they will meet and abut at the lower corner edges of the lower sections 23 of said pitch-joint plates and leave an upwardly and outwardly flaring wedge-shaped space between the coöperating sets of said joint plates.

To fill this space and afford a key to the rafter arch, I provide a wedge-shaped filler block which is shown as composed of two similar triangular sections 29 abutting each other on their vertical faces with their points downward, and which, in Fig. 2 of the drawings, are shown as bolted, respectively, one to each of the upper sections 25 of the set of ridge-joint plates.

I also preferably connect the lower sections 23 of said coöperating ridge-joint plates by strap hinges 27, as best shown in Fig. 2 of the drawings.

It must be obvious that, with the presence of the special features above noted, a very strong and tight joint is made between the coöperating pairs of rafters 12, at their meeting points. The ridge-joint plates, made up of the said sections 23 and 25, extend for the full length of the building, and, as these are bolted together and to the respective rafters, they securely connect together all of the rafters and hold the same spaced apart from each other at their upper ends.

The sections 19 and 20 of the pitch-joint plates also run for the full length of the building and, as they are bolted together and to the studding and the rafters, they serve to interlock the studding properly spaced apart for the full length of the building, and to interlock the rafters, properly spaced apart at their lower ends, for the full length of the building.

Assuming that the pitch-joint plates, made up of the sections 19 and 20, have been bolted together and to the studding 11, it is obvious that the ridge-joint plates may be bolted to each other and to the rafter, and the filler sections 29 to the upper sections 25 of the respective ridge-joint plates, and the hinges 27 be applied to connect the lower sections 23 of said ridge-joint plates, when the rafters 12 are on or near the floor level of the building and then the whole skeleton framework, afforded by said rafters, ridge-joint plates and filler blocks, be raised into working position, so as to bring the lower ends of the rafters in proper position on the sections 20 of the pitch-joint plates to permit the nutted bolts 28 to be applied to interlock the rafters to the sections 20 of the pitch-joint plates, and thereby to the studding of the building.

After the rafters 12 have been properly applied in working position, as above described, certain thereof may be cross-connected near the lower ends by cross ties 13 bolted thereto above the pitch-joint plates, as shown in Fig. 1 of the drawings; and, if additional strength is needed, diagonal braces 42 may be applied to connect the coöperating pair of rafters with the cross tie 13 by being bolted thereto, at their opposite ends; and the cooperating pair of rafters 12 may be further cross-connected by a short cross tie 44 bolted thereto directly below the ridge-joint plates, and this, in turn, may be connected to the lower or main cross tie 13 by a vertical brace 43 bolted to said crossties, all as best shown in Fig. 1 of the drawings.

If the width of the building is considerable, it will be desirable to supplement the stepped side sills, made up of the rigidly connected parts 15 and 16, by one or more intermediate sills 30, for upholding the joists 10. One such sill is shown centrally located between the side sills for supporting the joists 10 in Fig. 1 of the drawings.

So far, attention has been given to the skeleton framework of the building.

The coverings, to wit: the floor, the side walls and the roof, will next be noted, in the order named.

The floor is made up of panels or sections, each composed of a suitable number of jointed floor boards 31 cross-connected by a pair of parallel cleats 32 rigidly secured to the under surfaces of said boards 31 adjacent to the median line of the panel, measured lengthwise of the boards, and spaced apart from each other far enough to straddle and embrace the upper edges of the joists 10, when the panels are in working position. The floor panels are further so applied to the joists that, when in working position, they will break joints with each other, as clearly shown in Fig. 1 of the drawings. In view of the structure of these panels and their said disposition, the cleats 32 of the different panels embracing the different joists 10, as described, enable the panels, themselves, to cross-lock the joists 10, and thereby do away with the necessity of any other bridging between the joists. This structure also enables the said panels to be used on the joists and make up a sufficiently tight floor, without nailing the same to the joists, although they may, of course, be nailed or screwed fast thereto, if desired.

Another great advantage of this peculiar panel structure of the flooring is that the

panels may be packed together practically the same as solid lumber, as illustrated in Fig. 9ª. By reference to said view of the drawing, it will be seen that between any two of the panels, placed with the cleats upward, may be embraced the end sections of two additional panels, with their cleats downward and be made to abut the cleats of the underlying member of the first two named panels. This relative arrangement may be extended to any length and any height desired, and the panels so disposed will make up a solid body of lumber with no material waste space. The only space that is lost is that between the two cleats 32 of each panel, and this is so small as to be almost negligible. It follows that the floor panels, when so stacked together, can be shipped in practically the same space as ordinary unconnected flooring boards, or other plain lumber, and get the benefit of the plain lumber rates in the freight classification.

The side walls are also composed of panels, two forms of which are illustrated. From the standpoint of economy of manufacture, compactness of packing and economy of shipment, I prefer the form of panel shown applied in Fig. 1 of the drawings, and one of which is shown partly detached in Fig. 6, and a series of which detached panels are shown packed together for shipment in Fig. 8 of said drawings. In this preferred form of panel, the siding boards 33, of the proper length to span the spaces between pairs of studding 11 and overlap the edges thereof, are secured together by marginal strips 34, rigidly united thereto by nails or other suitable means at the place of manufacture. These marginal strips 34 are applied to said jointed boards 33, one on the outer and the other on the opposite inner margin of the connected boards, so as to project therefrom about half the width of the strips, and thereby become operative to lap the vertical joints between successive panels of the side wall, when the panels are in working position, and when thus applied, nutted bolts 35 interlock the abutting panels to each other and to the studding 11, as best shown in Fig. 5, but also indicated in Fig. 6 of the drawings. As before stated, the siding boards 33 are of such length that the said boards 33, of adjacent panels, do not quite meet, when the said parts are in working position, thereby leaving a space through which the bolts 35, extending from the studding 11, may pass, without requiring any holes for the same in the boards 33. The holes in the marginal strips 34 for the bolts 35 and the holes in the studding 11 for these said bolts 35 are bored at the mill, all properly spaced apart, so that when the elements are assembled, it is only necessary to apply the nutted bolts 35, and the siding panels are interlocked to the studding 11 in proper working position. The outer ends of the bolts 22 and nuts 22ᵇ are used on the upper ends of the upper panels.

The said peculiar structure of the siding panels, made up of the jointed boards 33 and the marginal strips 34, applied, one to the outer and the other to the opposite inner surface of the panel boards, permits the said panels, when knocked down, to be packed together practically solid, as shown in Fig. 8 of the drawings. By reference to said Fig. 8, it will be seen that several of these siding panels, made up of the boards 33 and marginal strips 34, may be placed, one over the other, with the respective marginal strips 34 of the successive panels abutting each other at one end of the stack and abutting the ends of the boards 33 at the other end of the stack. This brings the ends of the panels into stepped relationship with each other, with the steps reversed at the opposite ends of the stack; and hence, the stacks may be abutted endwise with the marginal cleats under and overlapping and abutting each other, without loss of space, or practically solid. Then another series of stacks can be abutted longitudinally on the first series, without any loss of space, except that between the two series of longitudinally abutted stacks, which is so small as to be negligible.

The main roof covering is also made up of panels composed of jointed boards 36, provided with marginal strips 37 nailed or screwed fast to the boards 36, one on the upper and the other on the under surface of the said boards, and so applied that they project beyond the ends of the board, in position for the upper and lower marginal strips 37 of adjacent panels to lap with each other, with the under strips resting on the rafters, when the parts are in working position, as shown in Fig. 1 of the drawings. When thus in working position, the said panels are bolted to the rafters 12, the bolts extending through the rafters and the overlapped marginal strips 37 of the adjacent panels, thereby enabling an extremely tight joint to be made between the roof panels and the rafters. As shown, in Fig. 2 of the drawings, certain of the bolts, used in the roof framing, are used to connect the upper and lower ends of the roof panels to the rafters. For example, the bolts 24, which connect the under section 23 of the ridge-joint plate to the rafters, have their screw-threaded portions of sufficient length to extend through the overlapping strips 37 of adjacent panels of the roof and are provided with outer end nuts 24ᵇ, which re-act against the outer faces of the overlapped panel strips 37; and the bolts 28, which connect the upper members 20 of the pitch-

joint plate to the rafters, have their screw-threaded portions of sufficient length to extend through the overlapping strips 37 of adjacent panels and are provided with outer end nuts 28^b, which re-act against the outer face of the overlapping member of said strips 37.

Preferably, the roof panels are provided at the mill with an outer covering 38, of flexible waterproof material, one margin of which underlies the outer marginal strip 37 of the panel, as best shown in Fig. 7. The roof panels, therefore, come from the mill complete and ready to be applied to the rafters, in the manner above described, to complete the covering. As the boards 36 and the marginal strips 37 of the roof panels are related to each other in precisely the same way as the boards 33 and the marginal strips 34 of the wall panels, shown in Fig. 6, it must, of course, be obvious that the roof panels may be packed together in precisely the same way as the wall panels, which, as before stated, is illustrated in Fig. 8 of the drawings.

The roof panels being square at their upper ends, it follows that when they are applied to the rafters, in proper working position, the upper ends of the panels of the opposite sides of the roof can only meet on their under edges, thereby leaving a triangular opening between the two flaring outward and upward, and this is filled by a wedge-shaped top ridge pole 39, set point downward, and which top ridge pole 39 has its upper surface bevel-shaped to line with the face surfaces of the roof panels, as clearly shown in Fig. 2 of the drawings. This top ridge pole 39 having been placed in position, the joints between the panels and the ridge pole 39 are closed by lapped ridge boards 40 rigidly secured to the panels and to each other in any suitable way, such as by nails, screws or bolts, thus completing a water tight roof.

The roof panels are of such dimensions in length, relative to the length of the rafters 12, that when applied to the rafters in working position, the lower ends of the lower sets of panels will project downward and outward, as eaves, beyond the side walls of the building, as shown in Fig. 2 of the drawings. The spaces between the rafters, the roof panels and the upper member 20 of the respective pitch-joint plates are adapted to be closed by pieces 41 hinged to the studding cap 18 and adapted to abut the ends of the rafters with their upper surfaces joining the under surface of the panels and the lower surfaces joining said upper section 20 of the joint plate, when in closed positions, but which pieces 41 can be thrown outwardly and downward into an open position, as shown by the dotted lines in Fig. 2, thereby affording openings under the eaves, between the rafters for the access or egress of air to or from the interior of the building. The said hinge pieces 41 may be made of any desired length, so as to abut more or less rafters; and hence, it follows that, by opening or closing more or less of these passages controlled by the hinge pieces 41, the room can be ventilated, as desired.

Considering the question of the degree of cold protection desired from the side walls, attention is called to the fact that the wall panels, made up of the jointed boards connected by the marginal strips 34, arranged as hitherto described, readily lend themselves not only to the formation of single walls, as hitherto noted, but to the formation of any desired number of walls with air spaces between each pair of walls. For example, in Fig. 5^a, a double exterior wall is shown composed of these panels, properly set relative to each other and bolted to the studding 11 by the nutted bolts 35, substantially in the same way as the single wall shown in Fig. 5, and wherein the marginal strips serve to space apart the boards of the double set of panels, thereby affording between the same a still air space, well known to be one of the best forms of heat insulation. In Fig. 5^b, there is added to the double exterior wall, shown in Fig. 5^a, an interior wall, made up of these same forms of panels, and which, by the same bolts 35, are connected to the studding 11 and the double outer wall, thereby affording large air spaces between the pairs of studding 11.

In Figs. 5^a and 5^b of the drawings, the panel boards of the second outer wall are marked by the reference 33^a and in Fig. 5^b, the panel boards of the inner wall are marked by the reference 33^b.

If still further protection against cold is desired, the jointed wooden boards of the wall panels may be replaced by slabs of flax felt, insulite, or other board-like forms of high grade insulating material, either in all of the walls or in all thereof, except the outermost external wall.

Having regard to the advantages resulting from the peculiarities of structure illustrated in the main views, Figs. 1 to 9^a, inclusive, and which peculiarities of structure have hereinbefore been pointed out in detail, the following are obvious, towit:—

1. Because of the fact that most of the timbers of the framework are square ended, the cost of their manufacture is relatively small as compared with corresponding elements having beveled ends; because it takes so much longer time, in the mills, to manufacture these parts with the beveled cross cuts. For example, in the best equipped modern mills, about 48 square ended studding or square

ended rafters can be turned out in the time that it takes to produce a single rafter or a single studding with beveled ends.

2. No skilled labor is needed to erect and complete a building of such structure.

3. Such a building can be readily knocked down and all the elements thereof be handled or packed for shipment, as in their original forms, practically solid like ordinary lumber, thereby getting the same economy of space and freight rates.

4. When a building is no longer needed, the salvage of good lumber is relatively great. This is due in part to the shapes of the timbers of the framework and to the formation of the panels of the flooring; the side walls and the roof; but, in a very large measure, it is due to the fact that bolts are generally employed to connect the coöperating timbers of the framework and the panels of the side walls and roofing to the said framework. Hence, the side walls and the roof come off with their panels intact and ready for re-use on any other building, and the timbers come apart intact, and, likewise ready for re-use on any other building, or capable of being employed as original lumber in buildings of widely different structure.

The importance of said advantages, above noted, can hardly be over estimated.

What I claim is:—

1. In a knock-down building, the combination with a sill and a joist, of a studding having one of its sides abutting the joist and its outer face abutting said sill, and two sets of nutted bolts extending through said studding, at right angles to each other, with one set thereof also extending through said sill and the other set thereof also extending through said joist, whereby said joist, sill and studding may be properly alined and separably interconnected rigidly together in their required working positions.

2. In a knock-down building, the combination with a stepped sill, of a joist, a studding having one of its sides abutting said joist and its outer face abutting the vertical face of the step of the sill, and two sets of nutted bolts extending through said studding, at right angles to each other, with one set thereof also extending through said vertical section of the step of the sill and the other set also extending through said joist, substantially as described.

3. In a knock-down building, the combination with a stepped sill, composed of a furring strip and a water table section rigidly secured together with said table extension extended upward above said furring strip, of a joist seated on said furring strip, a studding also seated on said furring strip with one of its sides abutting said joist and its outer face abutting said table, and two sets of nutted bolts extending through said studding, at right angles to each other, with one set thereof also extending through said table section of the sill and the other set also extending through said joist, substantially as and for the purposes set forth.

4. In a knock-down building, the combination with a square ended rafter and a square ended studding, of a pitch-joint plate made up of an upper and a lower section, the lower of which is vertical, has its outer face abutting the studding and has its upper surface beveled to join the upper section on the pitch line of the roof and the upper section of which joint plate occupies an inclined position, with its upper surface abutting the rafter and which upper section extends both upward and outward beyond said vertical section and has its outwardly projecting portion beveled to afford a surface at right angles to the outer face of the lower section adapted to overlap the studding, and means for rigidly connecting together said two sections of said pitch-joint plate and for connecting said plate to the studding and to the rafter, whereby all of said parts will be interconnected rigidly together with tight joints and the interior faces of the two sections of the joint-plate will stand at obtuse angles to each other and afford a suitable cornice to the interior of the building, substantially as described.

5. In a knock-down building, the combination with a square ended rafter and a square ended studding, of a pitch-joint plate made up of an upper and a lower section, the lower of which is vertical, has its outer face abutting the studding and has its upper surface beveled to join the upper section on the pitch line of the roof and the upper section of which joint plate occupies an inclined position, with its upper surface abutting the rafter and which upper section extends both upward and outward beyond said vertical section and has its outwardly projecting portion beveled to afford a surface at right angles to the outer face of the lower section adapted to overlap the studding, nutted bolts separably connecting said two sections rigidly together, nutted bolts connecting the lower section to the studding, and nutted bolts connecting the upper section to the rafter, whereby said elements are all separably interconnected together with tight joints and the interior faces of the two sections of the joint plate will stand at obtuse angles to each other and afford a suitable cornice to the interior of the building, substantially as described.

6. In a knock-down building, the combination with a coöperating pair of square ended rafters, of two pairs of coöperating ridge joint plates, each composed of a lower plate abutting the under surface of the rafter and projecting upward beyond the same, and an upper plate abutting the end of the

rafter and joining the projecting part of the lower plate, and means for rigidly connecting the said plates together and to the rafter.

7. In a knock-down building, the combination with a coöperating pair of square ended rafters, of two pairs of coöperating ridge joint plates, each composed of a lower plate abutting the under surface of the rafter and projecting upward beyond the same, and an upper plate abutting the end of the rafter and joining the projecting part of the lower plate, nutted bolts connecting said two plates together, and nutted bolts connecting the same to the rafter, substantially as described.

8. In a knock-down building, the combination with a coöperating pair of square ended rafters, of two pairs of coöperating ridge joint plates, each composed of a lower plate abutting the under surface of the rafter and projecting upward beyond the same, and an upper plate abutting the end of the rafter and joining the projecting part of the lower plate, means for rigidly connecting the said pairs of plates together and to the rafters, and a wedge-shaped filling block affording a key piece to the Gothic arch formed by said coöperating rafters and pairs of ridge joint plates.

9. In a knock-down building, the combination with a coöperating pair of square ended rafters, of two pairs of coöperating ridge joint plates, each composed of a lower plate abutting the under surface of the rafter and projecting upward beyond the same, and an upper plate abutting the end of the rafter and joining the projecting part of the lower plate, means for rigidly connecting the said pairs of plates together and to the rafters, and a wedge-shaped filling block composed of two right angled triangular pieces set with their vertical faces abutting point downward, and affording a key piece to the Gothic arch formed by said coöperating rafters and pairs of ridge joint plates, substantially as described.

10. In a knock-down building, the combination with a coöperating pair of square ended rafters, of two coöperating ridge joint plates respectively underlying the upper end portions of each of said two rafters, and means for rigidly connecting said joint plates and rafters together, substantially as described.

11. In a knock-down building, the combination with a coöperating pair of square ended rafters, of two coöperating ridge joint plates respectively underlying the upper end portions of each of said two rafters, means for rigidly connecting said joint plates and rafters together, and a wedge-shaped filling block affording a key piece to the Gothic arch formed by said coöperating rafters and coöperating ridge joint plates, substantially as described.

12. A flooring for knock-down buildings made up of panels, each composed of a series of jointed boards rigidly connected together by a single pair of cleats applied to the under surface of the jointed boards, centrally of the panel, with said pair of cleats spaced apart from each other and adapted to straddle and closely embrace the joist, when in a working position, and which said panels so made are adapted, when removed from the joists, to be packed together for shipment practically like solid lumber, substantially as described.

13. In a knock-down building, the combination with the roof and pitch-joint plate connecting the rafters and the studding, of pivoted pieces between adjacent pairs of rafters adapted to close the space between the roof and the joint plate, when said pivoted pieces are in their closed position, and to afford an open passage between the roof and said joint plate, for ventilating purposes, when said pivoted piece is in its open position, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES M. STAFFORD.

Witnesses:
HARRY D. KILGORE,
F. D. MERCHANT.