No. 611,309. Patented Sept. 27, 1898.

# E. S. YOUNG.

## PORTABLE HOUSE.

(Application filed Dec. 15, 1897.)

(No Model.) 2 Sheets—Sheet 1.

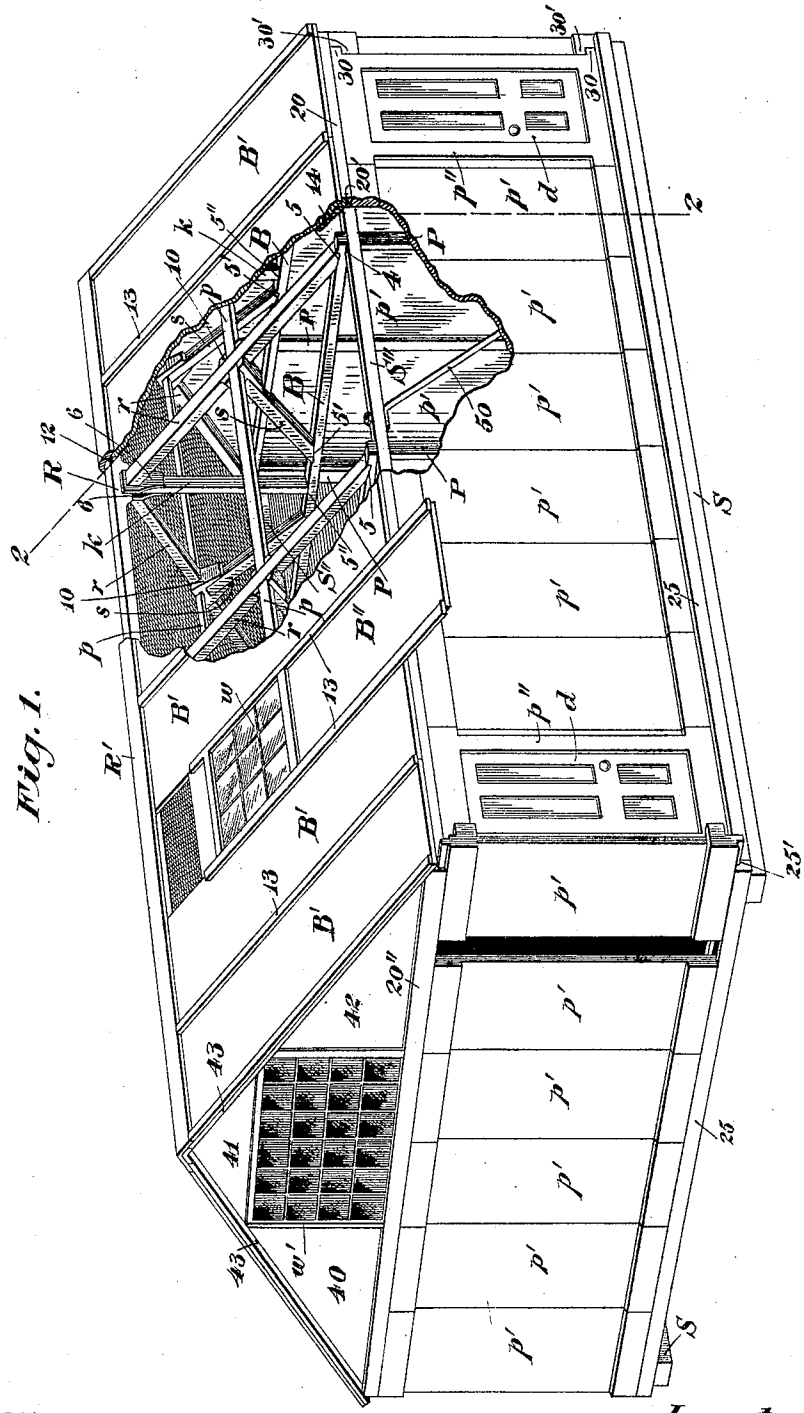


Fig. 1.

Witnesses;
Chas. E. Schmidt
Fred. J. Dole.

Inventor:
Edward S. Young
By his Attorney,
F. A. Richards.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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Fig. 3.

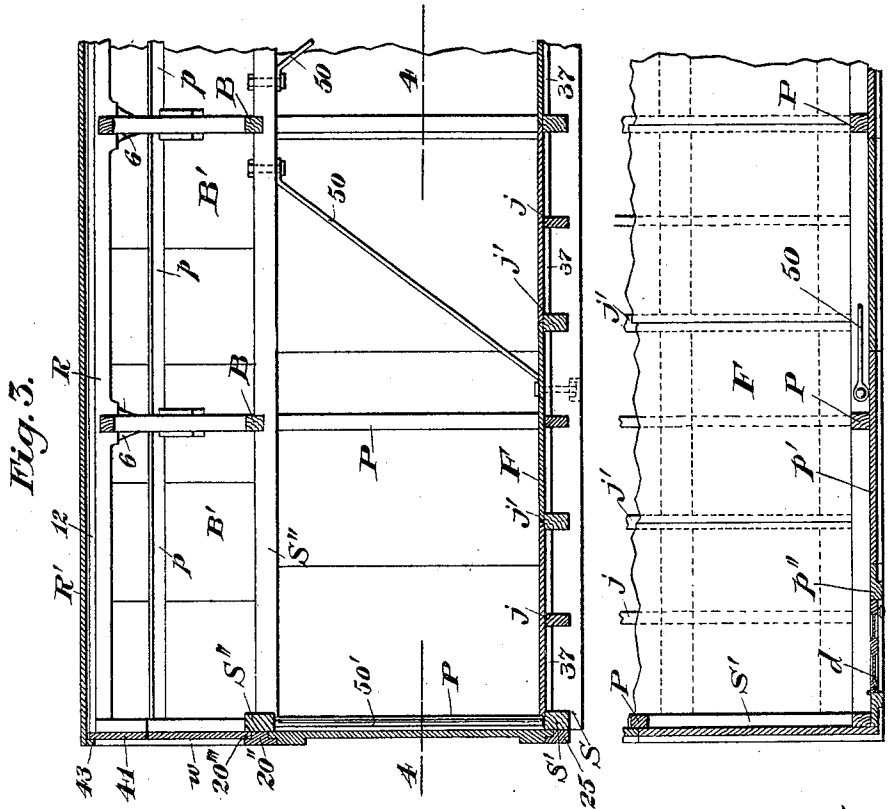


Fig. 2.

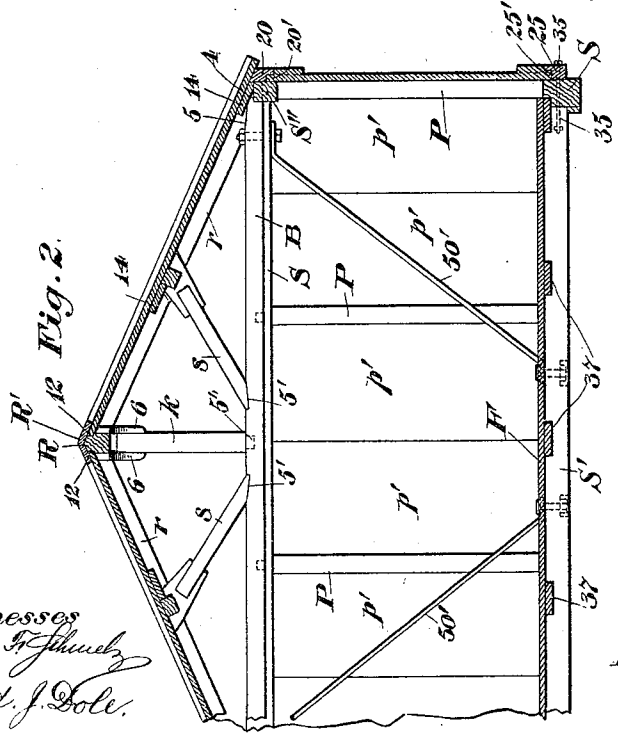


Fig. 4.

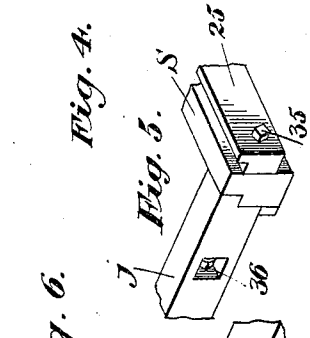
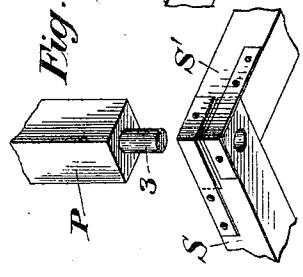


Fig. 5.



Fig. 6.



Witnesses
Chas. F. Schmelz
Fred. J. Dole.

Inventor:
Edward S. Young
By his Attorney,
F. A. Richards.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

EDWARD S. YOUNG, OF HARTFORD, CONNECTICUT.

## PORTABLE HOUSE.

SPECIFICATION forming part of Letters Patent No. 611,309, dated September 27, 1898.

Application filed December 15, 1897. Serial No. 662,051. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD S. YOUNG, a citizen of the United States, residing in Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Portable Houses, of which the following is a specification.

This invention relates to improvements in portable houses; and it has for its main object the provision of an improved structure of this class of the "knockdown" type in which all of the several parts will be interlocked in such a manner that the structure may be assembled and all of the parts held and maintained in their proper positions without employing additional securing devices for holding the members together, the construction being such that by means of interlocking grooves and tenons or similar steps for the projecting ends or dowel-pins of members to be connected all of the parts may be assembled readily and as quickly disassembled without employing screws, nails, bolts, or other similar connecting devices which would mar the appearance of the parts and in time cause so much injury to the different members of the structure as to impair the usefulness of the same.

The portable house forming the subject-matter of this invention may be employed for a variety of different purposes, as will be manifest; but it is especially designed and intended for use as a voting-house, in which of course all of the parts must be exceptionally strong and the several members firmly and rigidly braced to withstand and resist the strains due to the presence of a large number of persons in the house at the same time.

One of the main features of this portable structure is a roof-truss in which all of the parts are separately interlocked in such a manner that no extraneous fastening devices whatever are required to maintain the parts in place and in which also each of the parts will be firmly braced and bear its own proper portion of the strain exerted upon the truss by the superincumbent roof. In this roof-truss this separable interlocking of the parts will be effected either by suitable mortises and tenons or by steps receiving the feet of the king-posts, the struts, and the rafters, or by both. In all cases, however, the struts will be interlocked first with the rafters and with the usual tie-beam and the rafters themselves with the tie-beam and the king-post in such a manner that the greater the strain exerted upon the truss by the roof the more tightly will the parts be wedged together.

Another feature of this invention which I deem of special importance is the employment, in connection with the usual sills and stringers and with posts for supporting the stringers upon the sills, of guides on which may slide a series of panels, preferably interchangeable with one another and constructed to form when assembled the side walls of the house. One or more of these panels may carry a door or doors for permitting ingress to and egress from the interior of the building, and when the panels are made interchangeable it will be apparent that the points at which these doors may be located may be changed as desired within limits.

Preferably at the corners of the frame structure the adjacent panels will have interlocking members by means of which these panels will be held together, and both of the side walls of the house in which said panels are located will be stiffened and braced by such connection.

The main frame structure of the building will have the usual sills and stringers connected by posts; but at the corners of the structure the sills and the stringers will be preferably interlocked by passing the posts therethrough in such a manner that the lower end of each corner-post will pass through the ends of two meeting sills, while the upper end of each of such posts will pass in a similar manner through the meeting ends of two adjacent stringers. Between the corners of the structure the stringers and the sills may be connected and braced by additional posts, which may be set into suitable steps in the sills and stringers.

The posts just described constitute a means for bracing the main frame structure in vertical planes, and for the purpose of resisting strain in horizontal direction, which will tend to cause the falling of the side walls, I make use of the tie-beam and joists, which coöperate with the stringers and with the sills to maintain the stringers at proper distances apart and also, of course, the sills. Like the

other parts of the frame structure hereinbefore described, these tie-beams and joists will also be separably interlocked with the stringers and sills, respectively, in such a manner that they may be quickly put into place and taken out again when it is desired to disassemble the building.

As the roof structure is dependent for its strength and solidity upon the construction and connection of the roof-trusses and as the construction of these trusses and the manner in which the tie-beams are interlocked with and brace the stringers has been described, it only remains to indicate the manner in which the roof-trusses themselves are braced relatively to one another. This is done by connecting them by means of a ridge-pole, with which the king-post may be interlocked, and by joining the rafters, if desired, by means of removable purlins interlocking the rafters.

For the purpose of covering the frame structure just described I prefer to employ interchangeable interlocking roof-boards, which will be supported on the rafters and the purlins and will preferably interlock with a ridge-board covering the ridge-pole from end to end of the latter. These roof-boards may have suitable stops or stop-boards on their under sides for keeping them in place when the roof is assembled, and in order to keep out the rain and thus protect the interior of the structure the roof-boards will preferably have overlapping portions at their side edges to close the joints between the boards.

The floor of the building may be formed in a manner substantially similar to that just described with respect to the roof in so far as the interchangeability of the parts and the spacing of the same are concerned. In this case I deem it preferable to employ floor-boards interlocking with the joists and having on their under sides spacing members or boards so disposed as to engage the sides of the joists on which the ends or sides of the floor-boards (as the case may be) are supported.

In the drawings accompanying and forming part of this specification, Figure 1 is a perspective of a portable house constructed in accordance with my invention, parts being broken away to illustrate more clearly the construction of the interior framework. Fig. 2 is a partial transverse section of the same, the section being taken in the line 2 2, Fig. 1. Fig. 3 is a partial central vertical longitudinal section of the same. Fig. 4 is a partial horizontal section of the same, taken substantially in the line 4 4, Fig. 3. Fig. 5 is a detail illustrating the manner in which the joists are connected to the sills, and Fig. 6 is a detail illustrating the manner of connecting the sills at a corner by means of a post.

Similar characters designate like parts in all the figures of the drawings.

The superstructure of my improved portable house will usually be reared upon sills, two of which, such as S S, may constitute the side sills and the other two, S′ S′, the end sills. The sills will usually be jointed at the corners of the building substantially in the manner shown in Fig. 6 and will have therein registering openings, (indicated by 2,) in which the correspondingly-shaped lower end or foot 3 of the corner-post P will be received. It should be understood, of course, that this construction will be repeated at the other corners of the building and that as many intermediate posts may be used between the corner-posts as may be desired, all of these posts being suitably supported in openings or steps in the sill and preferably supporting the stringers in the same manner at their upper ends, as will be evident by referring especially to Fig. 2.

The stringers may be joined at the corners of the building in substantially the same manner as the sills, and the upper ends of the posts may be passed through the openings therein to interlock the parts substantially in the manner indicated in Fig. 6 with respect to said sills.

As before stated, one of the principal features of my improved portable house is a knockdown roof-truss of such construction that all the parts thereof may be interlocked with one another without employing extraneous holding devices, and when so interlocked will support the roof structure and will be wedged more firmly in place by the pressure applied thereto by the weight of the roof supported thereon, all the strains upon each roof-truss being properly distributed among and borne by the several members thereof in substantially the usual manner. Each of the roof-trusses will usually be of the "king-post" type, having a tie-beam, a king-post, a pair of struts, and the usual rafters. In this case the tie-beams, which are indicated by B, will be notched at their outer ends at 4, as shown in Fig. 2, for the purpose of interlocking with the stringers, which are indicated herein by S″. These stringers will, of course, be braced firmly in horizontal direction by the tie-beams and will be maintained by them at a fixed distance apart. As many of these trusses and tie-beams may be employed as desired, although, of course, only so many as may be necessary for properly supporting and strengthening the roof need be used. Each tie-beam has in the upper side thereof in this instance a plurality of steps, some of which support the feet of the rafters, while others receive the feet of the struts and the king-post. The steps which receive the feet of the rafters are indicated at 5, while those which support the feet of the struts are shown at 5′, the step for the foot of the king-post being disposed centrally of the tie-beam and being illustrated at 5″. The king-post is shown at *k* and has at its lower end a reduced portion forming a pin or foot adapted to enter the opening or step 5″ in the tie-beam, while at its upper end said king-post may have a mortise or channel for

the reception of the usual ridge-pole by means of which the several trusses of the roof are connected. This mortise or channel may be formed between a pair of plates, such as 6 6, which may be of metal and bolted or otherwise secured to the upper end of the king-post. This construction of course assures additional strength at this important point of the truss.

The two plates 6 6 of each king-post may be recessed in their outer sides for the reception of the upper ends of the rafters, as will be clear by referring to Fig. 1, and hence the rafters and the king-post will be interlocked at this point.

The rafters are indicated in a general way by *r*, and the foot of each is so shaped as to be received in the corresponding step 5 of its tie-beam. When the rafter is sprung into place, it will be obvious that the parts will be firmly connected.

For the purpose of bracing the rafters and distributing the strains applied to the truss I make use of struts positioned substantially in the usual manner. These struts are indicated by *s*, and the foot of each is so shaped as to be received by the proper step 5′ in the tie-beam, each strut preferably having at its upper end an interlocking connection with the corresponding rafter. This connection may be formed in many different ways, but I prefer to make use of that illustrated herein. In this case each rafter has near its center an enlargement or junction, such as 10, channeled at the under face of the rafter and also at the sides of the latter. The channel or mortise in the under face of this junction-piece is adapted to receive the upper end of the corresponding strut, and the channels or mortises at the sides of the junction-piece are intended to receive in substantially the same manner the ends of suitable purlins, (indicated by *p*,) by means of which the rafters, and hence the trusses, will be spaced at proper intervals. The manner in which the interlocking junctions of the rafters, the struts, and the purlin is effected will be apparent by referring to Figs. 1 and 2.

All the different trusses of the roof structure will be connected, substantially in the usual manner, by means of a ridge-pole, such as R, which will be received at different points in its length in the channels between the plates 6 6 of the king-post, and all of the parts of the roof structure will be properly sustained and spaced by means of this ridge-pole. In connection therewith the purlins just described, on which the roof-boards will be supported, will of course be effective for maintaining the proper spacing of the trusses.

The ridge-pole R may have the usual arched ridge-board, (indicated herein by R′,) which will be fastened securely to the ridge-pole and will in this instance serve as a means for interlocking the roof-trusses with suitable roof-boards for covering the whole structure.

It will be noticed by referring to Fig. 3 that the ridge-pole itself is slightly channeled at 12 at its opposite sides, so as to form grooves or channels substantially of the same height as the thickness of the roof-boards, and these parts will not only be interlocked by means of the ridge-board, but will also rest upon walls of the lower edges of the channels or grooves 12.

The roof-boards which I employ are indicated in a general way by B′ and B″, these parts being preferably interchangeable and adapted to interlock not only with the frame of the roof structure but also with one another. Each has at one side thereof a member or batten, such as 13, adapted to overlap the adjacent side of the next board and close the joint between the two. Thus it will be evident by referring to Fig. 1 that at the upper ends thereof these roof-boards are slipped under the projecting edges of the ridge-board R′ and into the grooves or channels 12, whereby these boards are properly positioned and locked at their upper ends. In order to locate the roof-boards and prevent them from slipping off from the roof, each board preferably has on the under side thereof suitable stops or stop-boards, such as 14, one of these stop-boards of each roof-board engaging one of the purlins, while the other is intended to abut against a suitable stop or guide on a stringer. Each of the roof-boards not only has a locking-guide or batten at one side thereof, but one of the boards—as, for instance, that indicated at B″—may have suitable guides or battens at both sides thereof and may also have therein a window, such as *w*, for the purpose of lighting the interior of the structure. All of the battens may be covered with felt or similar material for the purpose of keeping out the rain in stormy weather, and at all joints felt or similar material may be used for this purpose. The manner in which this may be applied is well understood and need not be described in detail.

For the purpose of forming the main side walls of the house I prefer to make use of interchangeable panels, which may be slid into place and as easily removed when it is desired to take the structure apart.

For the purpose of locking the panels properly I make use of suitable guides on the sills and the stringers so constructed and positioned as to engage the panels between them and hold said panels in place. These guides may be of any suitable type, but are preferably in the form of channeled or grooved rails, such as 20, 20″, and 25, and may be substantially similar in construction. The side rails 20 and the end rails 20″ will be fastened usually to the stringers S″ in some suitable manner and the rails 25 correspondingly secured to the sills S and S′. The grooves or channels in these rails are indicated at 20′, 20‴, and 25′, respectively, and it will be apparent that they form ways in which panels of suitable construction may be slipped, the faces of the sills and stringers forming the back

walls of these guideways. The rails 20 project slightly above the upper edges of the stringers in order to form stops or abutments for engaging the lower stop-boards 14 of the roof-boards, and it will be clear that these parts constitute additional interlocking means for maintaining said roof-boards in place. It will also be seen that at their outer ends these roof-boards project beyond the sides of the building a distance sufficient to shed the rain properly.

The panels which form the sides of the building are indicated by $p'$ and $p''$ and all are preferably of the same width, and those indicated by $p'$ are all interchangeable with one another. The panels $p''$ are slightly different from the panels $p'$, and each is constructed with a pair of interlocking members of any suitable type—such, for example, as illustrated at 30—these coacting with corresponding interlocking members, such as 30'.

It will be noticed that the interlocking parts 30 and 30' are on panels which meet at the corners of the house and that these interlocking parts serve as a means for bracing said members and the sides and ends of the building in vertical direction. One or more of the panels $p''$ may have therein a door, such as $d$, for permitting ingress to and egress from the house.

By referring to Figs. 2 and 3 it will be seen that tight joints are formed between the panels and the rails 20, 20'', and 25, owing to the fact that said panels are of extra thickness at points adjacent to such rails.

The floor-joists are interlocked with the sills in substantially the same manner as are the tie-beams and the stringers. These floor-joists are indicated in a general way by $j$ and $j'$, respectively, $j$ indicating a series of ordinary narrow joists on which the floor-boards may rest, while $j'$ shows a series of wide joists on which the sides of two adjacent floor-boards will be supported. In other words, the joists $j$ come substantially under the central portions of the floor-boards and the joists $j'$ under the side edges of said boards.

The manner in which the joists and the sills are interlocked is clearly illustrated in detail in Fig. 5, in which I have also shown a bolt, such as 35, forming an auxiliary means for maintaining the rails 25, the sills, and the joists in proper connection. Each of these bolts may be passed through one of the rails 25 on a sill and into the end of the joist, but will not extend far into the latter, which is mortised out, as indicated at 36, this opening being of sufficient size to receive not only the nut or the bolt but also a wrench or spanner for turning the nut. Hence it will be seen that these bolts are very short and do not, as is usually the case, extend entirely through the joists from end to end of the latter. The same construction may be used for all the main members of the frame structure.

The floor-boards are indicated in a general way by F, and each will be usually of a length equal to the distance between the side sills S and of a width equal to the distance between the centers of two wide joists $j'$. Each floor-board may have on the under side thereof stops, preferably in the form of stop-boards, such as 37, these stop-boards being of a length equal to the interval between the inner sides of two adjacent joists, as will be evident by referring to Fig. 3. These stop-boards serve as a means for positively locating the floor-boards and locking the latter in place between the joists, as will be obvious.

The triangular upper ends of the building above the panels may be closed substantially in the manner shown in Fig. 1, in which I have illustrated at one end of the building three triangular end pieces, such as 40, 41, and 42, and a window $w'$, interposed between these triangular pieces, these four parts serving to fill the space above the panels and between the end roof-boards. By referring to Figs. 1 and 3 it will be seen that these boards will be held in place between the end guide-rails 20'' and corresponding guide-strips 43. Obviously the lower side of the window, as is usual, will be positioned by the guide-rail 20'', while the upper corners thereof will be held by the guide-strip 43.

All of the parts hereinbefore described are so constructed as to interlock with one another and be maintained in their proper positions without the employment of any other fastening means than the coacting grooves and tenons or steps and pins hereinbefore described; but for the purpose of stiffening the side walls of the building and rendering them less liable to be disturbed and distorted I prefer to use in connection therewith stay-rods or tie-rods, such as those illustrated herein at 50, for tying the side stringers and the side walls together, and corresponding stay-rods or tie-rods 50 for tying in a similar manner the end stringers and the end sills, all of these tie-rods being held in place by suitable bolts and nuts passed through the sills and the stringers.

In assembling my improved portable house the sills are first laid and the posts P reared thereon, after which the stringers are put in place. The joists may be positioned on the sills and the floor-boards then laid on the joists. Each roof-truss is then separately assembled, the tie-beam being of course put in place first, the king-post next, and after that the struts and the rafters on each side of the king-post. When all of the roof-trusses are in position, the purlins may be laid on the rafters and the ridge-pole inserted in the channels of the king-post. After the roof structure is thus assembled the end pieces 40, 41, and 42 and the window $w'$ will be slid into position, the roof-boards slipped into place under the ridge-board, the panels inserted between the guide-rails at the sides of the main framework, and the tie-rods and the tie-bolts connected to the framework in the manner hereinbefore described. In disas-

sembling the structure the operation described will of course be reversed.

Having described my invention, I claim—

1. In a portable house, a knockdown roof-truss embodying a tie-beam, a king-post, struts, and rafters all separably interlocked.

2. In a portable house, a knockdown roof-truss embodying a tie-beam, a king-post, struts, and rafters all separably interlocked, said tie-beam having steps for the feet of the king-post, the struts, and the rafters.

3. In a portable house, a knockdown roof-truss embodying a tie-beam, a king-post, struts, and rafters all separably interlocked, said rafters having mortises for the upper ends of the struts.

4. In a portable house, a knockdown roof-truss embodying a tie-beam, a king-post, struts, and rafters all separably interlocked, said tie-beam having steps for the feet of the king-post, the struts, and the rafters, and said rafters having mortises for the upper end of the struts.

5. In a portable house, a knockdown roof structure embodying a pair of roof-trusses each having a tie-beam, a king-post, struts, and rafters all separably interlocked; and a ridge-pole mortised to the king-posts.

6. In a portable house, a knockdown roof structure embodying a pair of roof-trusses each having a tie-beam, a king-post, struts, and rafters all separably interlocked; a ridge-pole connecting the king-posts; and purlins mortised to the rafters and connecting said trusses.

7. In a portable house, a knockdown roof structure embodying a pair of roof-trusses each having a king-post, struts, and rafters all separately interlocked; a ridge-pole connecting the king-posts of said trusses; and purlins connecting said trusses and also mortised to the rafters.

8. In a portable house, a knockdown roof structure embodying a plurality of roof-trusses each having a tie-beam, a king-post, and rafters separately interlocked; a ridge-pole, purlins, and stringers connecting said trusses, said stringers interlocking with said tie-beams; and interlocking roof-boards supported on the rafters and purlins.

9. In a portable house, a knockdown roof structure embodying a plurality of roof-trusses each having a tie-beam, a king-post, and rafters separately interlocked; a ridge-pole, a ridge-board, purlins, and stringers connecting said trusses, said stringers interlocking with said tie-beams; and interlocking roof-boards supported on the rafters and purlins and locked at their upper ends by the ridge-board.

10. In a portable house, a knockdown roof structure embodying a plurality of roof-trusses each having a tie-beam, a king-post, and rafters separately interlocked; a ridge-pole, a ridge-board, purlins, and stringers connecting said trusses, said stringers interlocking with said tie-beams; and interlocking roof-boards supported on the rafters and purlins and locked at their upper ends by the ridge-board and having stops in position to be engaged by the purlins.

11. In a portable house, the combination, with sills and stringers, of posts interlocking the sills and the stringers and also supporting the latter; knockdown roof-trusses embodying king-posts and struts interlocked with the tie-beams and rafters and tie-beams interlocked at their ends with the stringers; and a ridge-pole connecting said trusses.

EDWARD S. YOUNG.

Witnesses:
FRED. J. DOLE,
HEATH SUTHERLAND.