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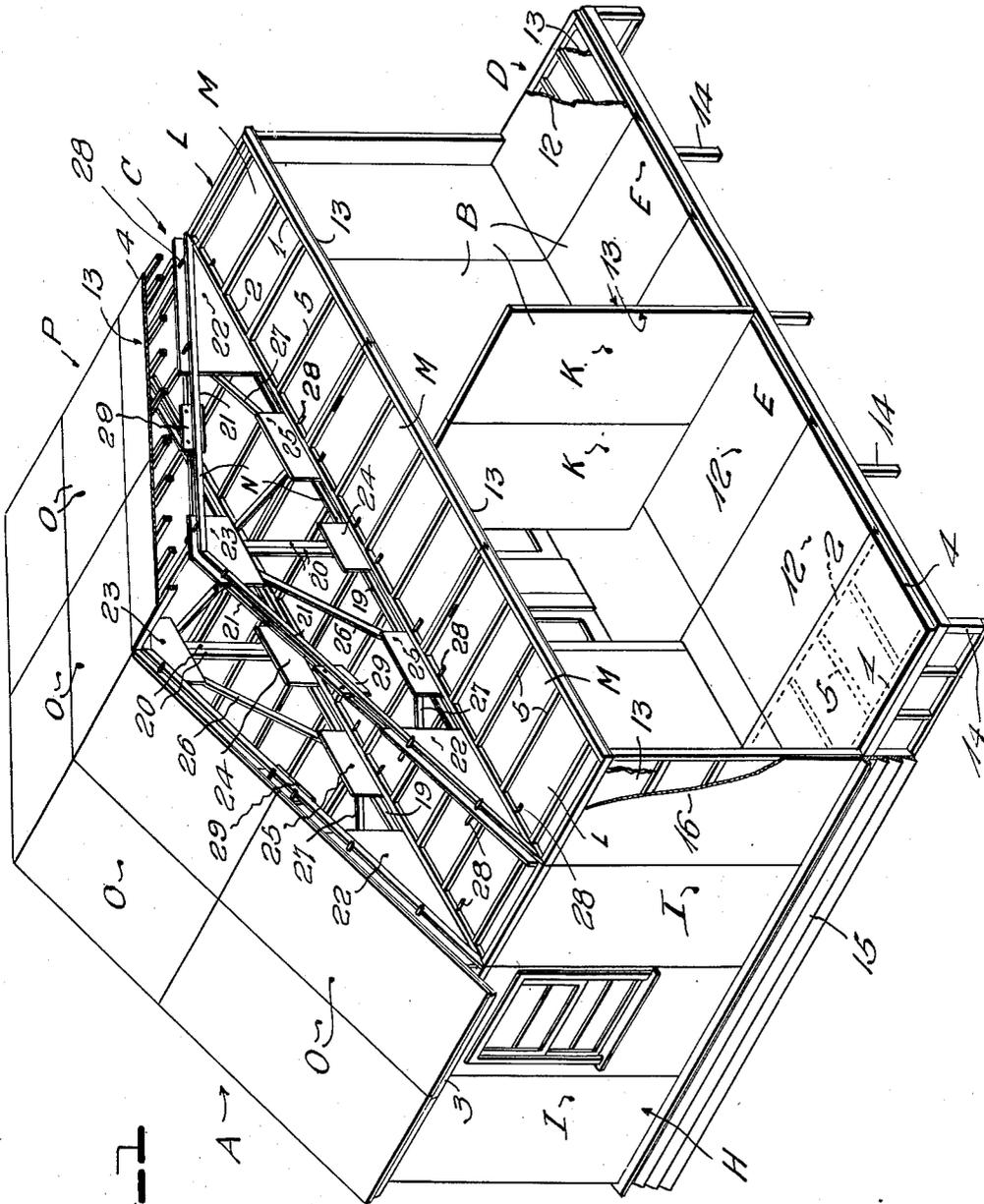
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PREFABRICATED BUILDING STRUCTURE

Filed March 8, 1943

4 Sheets-Sheet 1



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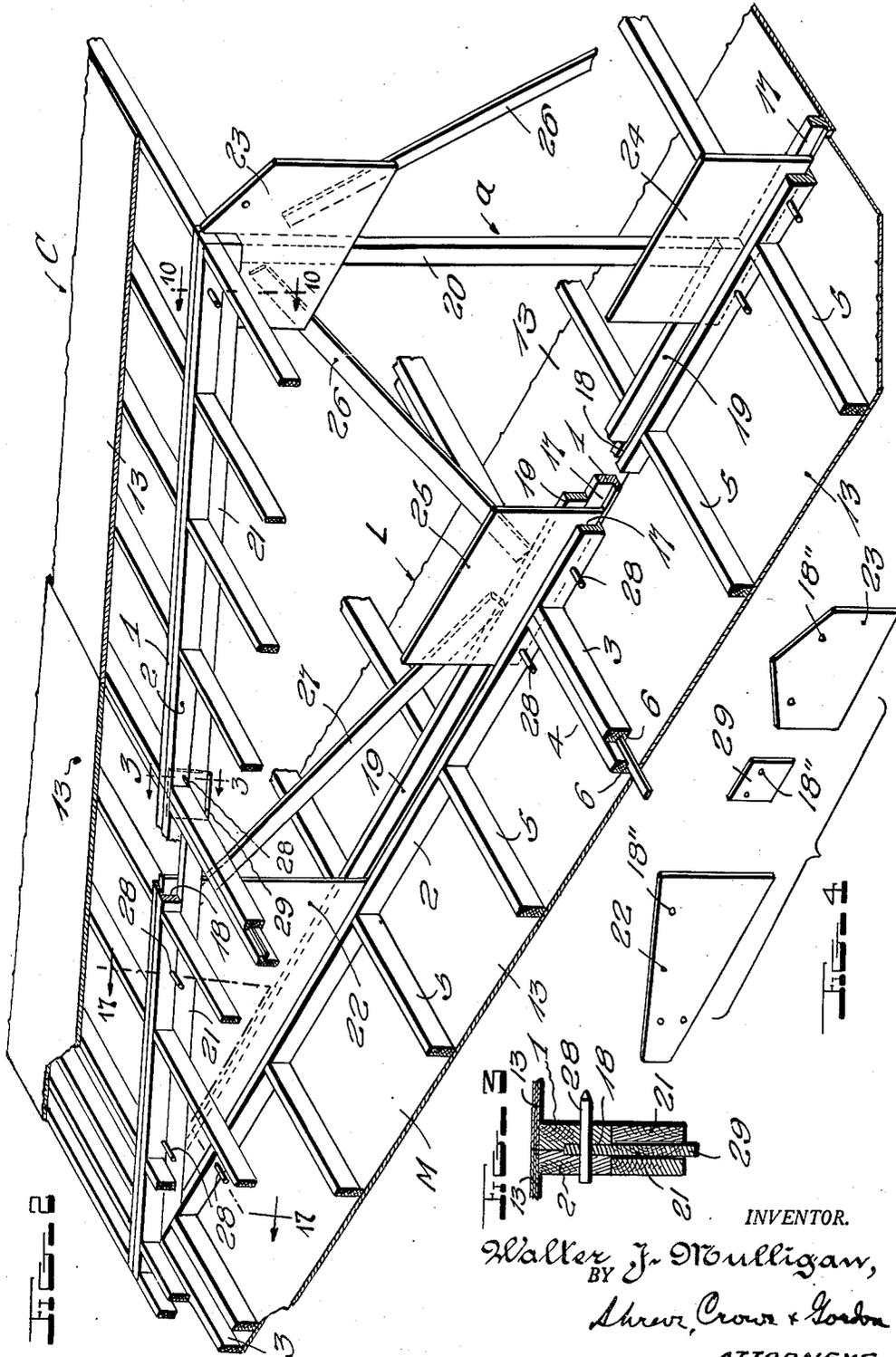
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4 Sheets-Sheet 2



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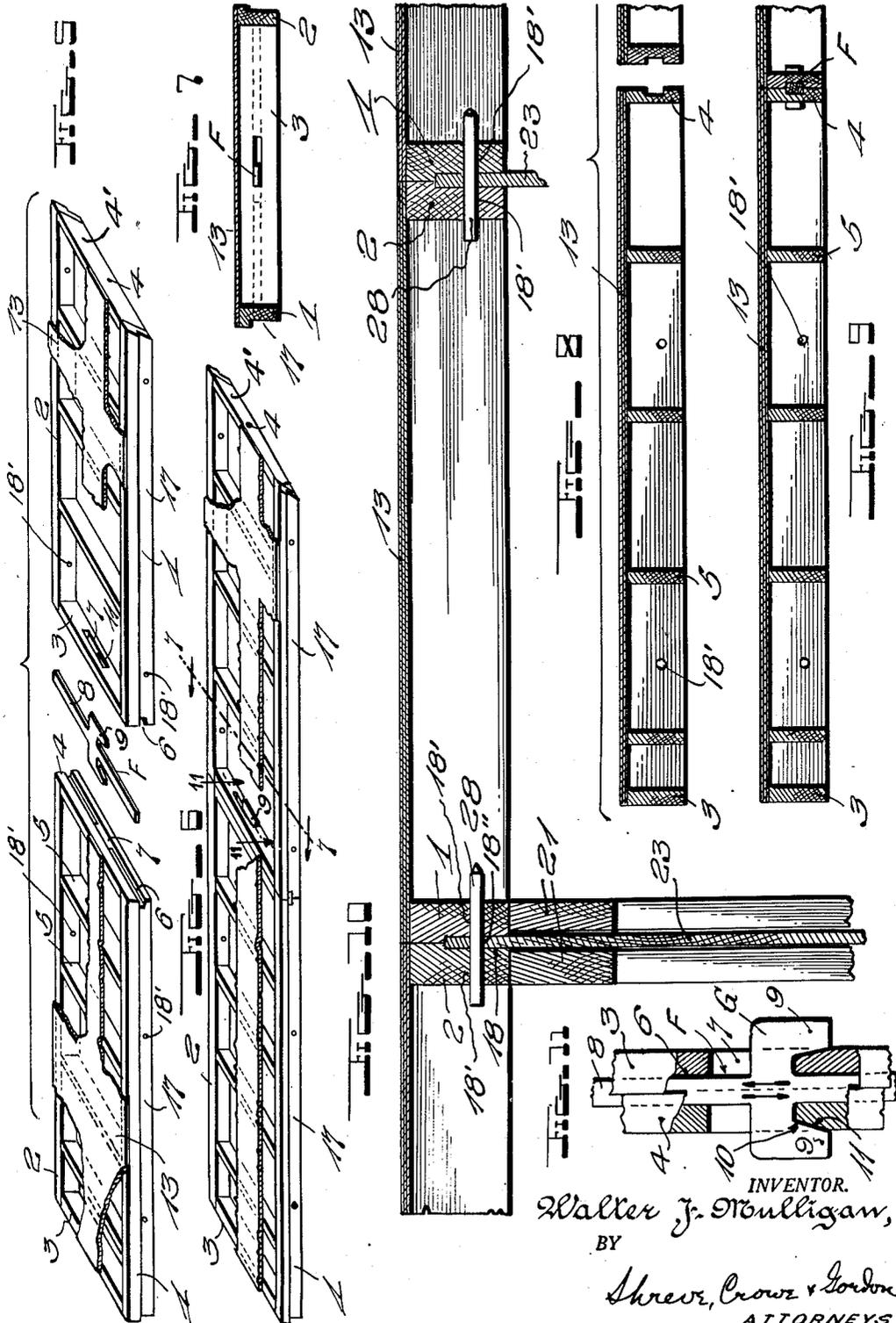
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PREFABRICATED BUILDING STRUCTURE

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4 Sheets—Sheet 3



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# UNITED STATES PATENT OFFICE

2,365,579

## PREFABRICATED BUILDING STRUCTURE

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Application March 8, 1943, Serial No. 478,394

10 Claims. (Cl. 20—2)

Generically this invention relates to a prefabricated house embodying demountable structural units, but it more particularly is directed to the superstructure of said house and means for tying together and interconnecting the roof, roof truss structure, and ceiling into a unitary rigid structure and including the interlocking spline device for structural units forming the subject matter of my co-pending application Ser. No. 472,772 filed January 18, 1943, of which the instant application is a continuation in part in so far as it pertains to construction using said spline device.

One of the principal objects of this invention is the provision of a prefabricated house including means for interconnecting and locking the component sections into a rigid unitary structure, without the use of nails, bolts, or other metallic fastening means, and adapted to be erected and demounted within a few hours.

Another principal object of this invention is the provision of a prefabricated house including a sectional ceiling structure, a sectional roof structure, a roof truss structure, and gusset plate means for interconnecting said truss, roof, and ceiling structures into a rigid unitary demountable structure, without the use of metallic fastening elements.

A further important object of this invention is the provision of a prefabricated building construction including sectional demountable ceiling and roof structures and an intermediate truss structure having a plurality of rigidly secured gusset plate members detachably attached to the roof and ceiling structures for uniting said structures into a rigid unitary assembly, without the use of nails or other metallic fastening elements.

A still further object of this invention is the provision, in a building construction, of a sectional ceiling and roof structures adapted to be unitarily and detachably interlocked, the ceiling sections or panels including supporting joist members and the roof sections including rafter members, a roof truss structure, and means for interconnecting the respective meeting joint and rafter members of adjacent vertically aligned ceiling and roof sections and said truss into a unitary assembly, without the use of metallic fastening elements.

Another object of this invention is the provision of a prefabricated house including a sectional ceiling having joist members and a sectional roof having rafter members, the meeting ends of the ceiling and roof sections adapted to be rigidly interconnected by a plywood locking spline means, and a supporting truss structure

having depending and upstanding plywood gusset plate elements adapted to extend intermediate the respective meeting joist and rafter members, said components being united into a rigid unitary structure by means of wooden dowels and glued joints, without the use of nails or other metallic fastening means.

With these and other objects in view, which will become apparent as the description proceeds, the invention resides in the construction, combination and arrangement of parts, hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which like characters of reference indicate like parts throughout the several figures, of which:

Fig. 1 is a fragmentary perspective view of a prefabricated building, constructed in accordance with the instant invention, with parts broken away, showing the ceiling, roof, truss, and interconnecting gusset plates and panel construction.

Fig. 2 is an enlarged fragmentary isometric view of the roof, ceiling, and supporting truss and interconnecting gusset plates.

Fig. 3 is a detailed vertical transverse section on the line 3—3 of Fig. 2.

Fig. 4 is a perspective of a number of gusset plates.

Fig. 5 is a fragmentary perspective view of a pair of the roof panel sections and the connecting spline member in disassembled relation.

Fig. 6 is a similar view to Fig. 5 showing the parts assembled.

Fig. 7 is a transverse section on the line 7—7 of Fig. 6.

Fig. 8 is a central, vertical, longitudinal section of the sections shown in Fig. 5 prior to assembly.

Fig. 9 is a similar view to Fig. 8 with the sections in assembled position.

Fig. 10 is a detailed vertical section on the line 10—10 of Fig. 2.

Fig. 11 is a detail horizontal section on the line 11—11 of Fig. 6.

Fig. 12 is a perspective view of ceiling sections and spline disassembled with parts broken away and in section and showing the rabbeted edges.

Fig. 13 is a similar view to Fig. 12 with the sections in interlocked relation.

Fig. 14 is a transverse vertical section on the line 14—14 of Fig. 13.

Fig. 15 is a central, vertical, longitudinal section of the ceiling section shown in Fig. 12 previous to assembly.

Fig. 16 is a similar view to Fig. 15 with the ceiling sections in assembled and interlocked position.

Fig. 17 is a vertical transverse section taken on the line 17—17 of Fig. 2, showing the roof sections, ceiling sections, truss structure, interconnecting gusset plate and dowel pins in rigid interlocking association.

Fig. 18 is a side elevation of a modified form of one of the truss sections.

As stated in my co-pending application Ser. No. 472,772 hereinbefore referred to, an unprecedented demand as to material and speed of production in the building industry has created an acute housing situation necessitating an enormous increase in housing units and at the same time requiring the conservation of critical materials such as nails, sheet metal, bolts, tie rods, metallic braces, clips, and the like. To accomplish this, a radical departure from accepted practices and structural designs had to be made. This was achieved by designing a prefabricated house, adapted to a variety of sizes and designs, and constructed wholly of wood without requiring metallic tying or fastening elements, yet economical, attractive, and capable of being erected and dismantled within a few hours. Such construction including floor, wall, and partition panel sections is adapted to be manufactured in sizes to conform to fixed modular width and length, and adapted to be assembled in edge to edge relation, the meeting or contacting edges grooved to receive a co-operating removable single or double lock plywood spline device, the moving into seating position of which, effects the drawing together of said contacting edges into binding engagement and locking them in such position, the spline device constituting a weather seal at the jointure of the locked units.

Surmounting the above described structure is the roof assembly including a ceiling structure, adapted to in part rest on said partitions and exterior wall structures, and comprising panel sections having their meeting ends mortised and grooved and spline-locked similar to said wall sections, their meeting side edges rabbeted to receive gusset plates carried by the truss elements and a substantially similar sectional roof surmounting said truss elements with its panel sections similarly locked at their meeting ends and with their side edges rabbeted to receive gusset plates carried by said truss elements and means for securing said gusset plates to said roof and ceiling panel sections to unite said ceiling, truss structure, and roof into a unitary structure and which forms the subject matter of this invention.

In the illustrated embodiment characterizing this invention there is shown a prefabricated house A, comprising a floor, wall, and partition structure B and a roof assembly C.

The structure B comprises a floor D constructed of a plurality of panel units or sections E, an exterior wall structure H constructed of a plurality of panels I and partition walls of panels K, all of which are of substantially similar structural framework construction with their meeting edges grooved, mortised, and plywood spline locked as described in my copending application Serial No. 472,772, hereinbefore referred to, except that the frame construction of these panels E, I, and K are covered or sheathed on both sides, all of them on one side and panels K on both sides with a plywood covering 13, said coverings differing slightly in thickness depending upon their different requirements, and panels E on their opposite or exposed sides with suitable flooring 12 and the wall panels I on their exposed sides with suitable weather siding 16. The plywood cover-

ing 13 with respect to all of the panels is firmly glued to the frames, and flooring 12 and weather siding 16 are similarly secured.

Said assembled floor D is suitably supported on underpinning and piers 14, thereby assuring complete demountability, and surrounding which is a suitable skirt and weather insulation structure 15.

The roof assembly C comprises a ceiling structure L constructed of a plurality of panel sections or units M, a series of roof truss structures N and a roof construction P constructed of a plurality of panel sections O. The framework construction of these panel sections M and O is substantially similar to that of the panel sections E, I, and K, and it would seem that following detailed description of said sections M and O would render a more detailed description of the panels E, I, and K unnecessary, since the same reference characters are substantially applicable to all of the panels.

The ceiling L is constructed of a plurality of panel sections or units M formed with side frame members 1 and 2, with end members 3 and 4 fitted between the side members 1 and 2 as are also a plurality of cross pieces 5, said members 3, 4 and 5 having their ends shaped and doweled, glued, or otherwise suitably secured to form a strong and rigid structure. The ends 3 and 4 are formed in their outer edges with grooves 6 and mortise openings 7 intersecting said grooves at right angles thereto. A plywood spline member F comprising a key or body portion 8 of a length substantially corresponding to that of the grooves in which it is adapted to seat is formed at one or more predetermined points throughout its length with a double lock tongue G adapted to extend through the registered openings 7 and comprising the inverted L-shaped tongue members 9 extending outwardly and downwardly from opposite sides of the body portion 8 and formed with the beveled or cam contact surfaces 10 adapted, when the members 9 are projected through said registered openings 7, as shown in Fig. 11 with respect to the panels O, to engage the complementary beveled surfaces 11 formed on the outer surfaces of the members 3 and 4 to lock the panels in end to end relation (Fig. 1). The side members 1 and 2, instead of being grooved and mortised as in panels E, I, and K, are rabbeted as at 17, so that when the panels are arranged in side to side relation with adjacent side members in edge to edge engagement, as shown in Fig. 17, a recess 18 is provided for a purpose directly more fully appearing. Also the ends of the panels M terminating at the opposite eaves of the house are not grooved as shown at 3 in Fig. 15. Further, sections M have the plywood covering 13 glued to the underside only, facing the floor, and in part rest on the center partitions and exterior wall construction.

A sufficient number of sections M to extend from eave to eave are spline locked in end to end relation and constitute a ceiling strip (Fig. 1) and the number of strips necessary to form the ceiling are arranged in edge to edge contacting engagement and form, intermediate such adjacent strips, the recesses 18.

Associated with each of the recesses 18 is a truss section a comprising a lower cord member 19 extending from a point in vertical alignment with the roof ridge to the outer end of side member 1 of an end ceiling section M on which it is adapted to seat. A center post 20 is supported on the inner end of lower cord 19, and supported on

the upper end of post 20 and seating on the outer end of said lower cord at the angle of the roof so that the roof supporting surface will extend from the roof ridge to the lower surface of lower cord 19 at the eave end of member 1 is an upper cord 21, and laterally spaced from said cord 21 is a companion cord 21' extending parallel therewith and with its eave end adapted to seat on the side member of the adjacent ceiling section M. Positioned between said upper cords at their eave ends and projecting thereabove and cut to the slope of the roof and extending below said lower cord and seating in said recess 18 is a triangular gusset plate 22 glued to said upper and lower cords. Similarly mounted intermediate said upper cords extending above said cords and overlying said center post is a gusset plate 23 glued to said cords and post. In vertical alignment with said gusset plate 23 is a gusset plate 24 extending in opposite directions from said post and below said lower cord 19 for engagement in said recess 18 and is glued to said post and lower cord. Intermediate the gusset plates 22 and 24 is a gusset plate 25 extending above and below lower cord 19 similar to gusset plate 24. Extending from the upper end of post 20 and diagonally downward to lower cord 19 and glued to said gusset plates 23 and 25 is a strut 26, and extending from said lower cord diagonally to the under surface of the vertically spaced upper cord is a strut 27 which is glued to said gusset plates 22 and 25. It will be seen that this truss structure constitutes a truss section *a* for one side of the roof from the ridge to the eave. An identical truss section *a* with its center post 20 in edge engagement with post 20 of the section just described extends in alignment with said section to the opposite eave for supporting the opposite slope roof section. The post 20 and the upper abutting ends of the upper cords 21 of this section are glued to the ridge gusset plate 23 and said post and lower cord 19 are glued to the gusset plate 24 and which unites said truss sections into a unitary truss construction N.

At points where the gusset plates 22, 25 and 24 of the sections *a*—*a* extend within the recess 18, the juxtapositioned side members 1 and 2 of the adjacent ceiling panels are formed with registering openings 18' communicating with said recess, and similar openings 18'' adapted to register with said registering openings 18' are formed in said gusset plates to receive respective wooden dowel pins 28 to firmly lock said ceiling sections and truss construction into a unitary structure. Glued between the upper cords 21 intermediate gusset plates 22 and 23 is the gusset plate 29 adapted to further interconnect and anchor, by the dowel pins 28, the four adjacent roof panel sections O (Figs. 1 and 2).

Locked in each of the recesses 18 extending from eave to eave formed in the contacting parallel extending side members 1 and 2 of adjacent ceiling panel sections M is a truss construction N and which truss assembly is adapted to support and lockingly interconnect the panel sections O of the roof construction P. The respective roof panel sections O are constructed similar to the ceiling panels M except being reversed, that is, covered on the upper side only with a suitable plywood covering 13 glued to the frame, the side members 1 and 2 of which are rabbeted as at 17 so that when the sections are in edge to edge engagement a recess 18 will be formed (Fig. 10) as heretofore described in connection with the ceiling. Since in the present instance there are

only two sections O extending from the ridge to the eaves on each side of the roof, the end 3 of one eave panel and the free end of the other is not grooved. The meeting ends of the eave and ridge sections are provided with grooves 6 and registering mortise openings 7, similar to the ceiling sections, to receive the locking spline F for locking the sections in end to end relation, as shown in Fig. 6. The meeting ends of the ridge sections are shaped as at 4' (Fig. 5) for abutting engagement in accordance with the slope of the roof as will be well understood. When the two panels on each side are interlocked and positioned on a pair of trusses N (Fig. 1) with their ends glued in abutting relation at the roof ridge, such strip from eave to eave will be in vertical alignment with the underlying ceiling strip and when an adjacent strip is similarly mounted a recess 18 in vertical alignment with the ceiling recess 18 will be formed co-extensive and vertically spaced with respect thereto and gusset plates 22, 23 and 29 will seat therein. The sides 1 and 2 of adjacent panels O and said gusset plates are formed with suitable openings 18' and 18'', respectively, to receive dowel pins 28 for interlocking said side rafter members and truss into a unitary structure, as heretofore described in connection with ceiling panels M and, whereby the unitary interlocking of the ceiling, truss, and roof sections is completed. When the entire roof has thus been assembled the ceiling L, truss structures N, and roof P will be interconnected and locked, by the wooden dowel pins extending through the respective sets of said side members and gusset plates extending therebetween, into a unitary structure.

Fig. 18 shows a slightly modified form of truss which may be used in the place of the section *a* heretofore described where a particularly strong structure is desired. This form comprises lower cord 19*a*, a center post 20*a*, a pair of upper laterally spaced cords 21*a*, differing from section *a* only in that strut 26*a* at the upper end is fitted to engage and be glued to centerpost 20*a* and one of the upper cords 21*a*, and the lower end fitted and glued to the upper edge of lower cord 19*a* and to gusset plate 25*a*. Another strut 27*a* has its lower end seated against strut 26*a* at its lower end and is glued thereto and to gusset plate 25*a*, and the upper end of strut 27*a* is fitted and glued to the under surface of upper cord 21*a* and to the gusset plate 29*a*. An identical section is adapted to extend in the opposite direction as the section above described and which is glued to center plates 23*a* and 24*a* to unite the sections into a unitary truss construction, as described in connection with the truss construction N.

From the above it will be apparent that I have designed a prefabricated building wherein the floor, side walls, partition walls, ceiling and roof are constructed from interlocked panel sections and said floor, walls, partitions, ceiling and roof are interlocked into a unitary structure without the use of metallic fastening elements, and further that I have designed a roof assembly including ceiling and roof frameworks, a roof truss interposed therebetween including gusset plate means forming said frameworks and truss into a unitary structure without the use of metallic fastening means, the entire structural arrangement being such as to permit the expeditious erection of the building within a few hours and an equally rapid dismantling thereof, at the same time providing an economical yet sturdy construction.

Although in practice it has been found that the form of the invention illustrated in the accompanying drawings and referred to in the above description as the preferred embodiment is the most efficient and practical; yet realizing the conditions concurrent with the adoption of this invention will necessarily vary, I desire to emphasize that various minor changes in details of construction, proportion and arrangement of parts, may be resorted to within the scope of the appended claims without departing from or sacrificing any of the principles of this invention.

Having thus described my invention, what I desire protected by Letters Patent is as set forth in the following claims:

1. A prefabricated wooden building construction including sectional ceiling and roof frameworks, a truss construction therebetween including oppositely extending horizontally disposed lower cords and oppositely and downwardly inclined laterally spaced upper cords, a strut structure on opposite sides of a center post and intermediate the upper and lower cords and a plurality of gusset plates connected to and connecting said upper cords and engageable intermediate and with adjacent sections of said roof framework, and a plurality of gusset plates connected to said lower cords and engageable intermediate and with adjacent sections of said ceiling framework, and means coacting with said gusset plates and adjacent sections of said frameworks for uniting said sections and said truss into a unitary structure.

2. A prefabricated building construction including ceiling and roof frameworks, a truss construction therebetween, said truss construction including a lower cord structure and pairs of laterally spaced oppositely inclined upper cords, supporting posts and strut structures intermediate said lower and upper cords, a plurality of gusset plates connected to and extending beyond the lower cord and between and beyond the upper cords and engageable respectively, with the ceiling and roof frameworks, and means for uniting said gusset plates and frameworks into a unitary structure.

3. A prefabricated demountable building construction including sectional interlocked panel ceiling and roof constructions arranged in parallel strips formed with coextensive vertically aligned recesses intermediate the strips, a roof truss construction formed with means engageable in said recesses and means coacting with said strips and said engageable means for securing the latter in said recesses for uniting the ceiling, roof, and truss construction into a unitary structure.

4. A prefabricated building construction including a ceiling framework member, a roof construction member, said members being formed with openings, and a roof truss member disposed between the ceiling and roof members and means in connection with said members for effecting a unitary structure thereof, said means including a plurality of gusset plates carried by and extending above and below said truss and provided with dowel pins adapted to cooperate with the openings in the ceiling and roof members.

5. A prefabricated building of wooden construction including ceiling and roof frameworks, each comprising a plurality of panel sections arranged in parallel strips, the panels of each strip interlocked in end to end relation, the side members of said interlocked panels being formed to provide recesses intermediate and coextensive with the respective roof and ceiling strips and in vertical alignment, a roof truss structure, means in

connection with said structure engageable in said recesses, and means for securing said engageable means therein for uniting said ceiling, truss, and roof structures into a unitary structure.

6. A prefabricated demountable building construction including sectional ceiling and roof structures formed of panels having side and end members, spline means engageable with said end members for detachably locking said panels in end to end relation forming strips extending from eave to eave, said ceiling and roof strips arranged in parallel and vertically spaced relation, a series of truss structures intermediate said ceiling and roof structures and means for interconnecting the meeting side members of adjacent ceiling and roof paneled strips and truss structures into a unitary structure.

7. A prefabricated demountable building construction including a sectional ceiling, the side pieces of respective sections constituting joist members, and a sectional roof structure, the side pieces of the respective sections constituting rafter members, the meeting ends of the ceiling and roof sections adapted to be detachably interlocked, the interlocked sections of said ceiling and roof extending from eave to eave and in vertically spaced relation, the respective meeting edges of adjacent interlocked sections of said ceiling and roof structures being formed to provide aligned recesses coextensive therewith, a series of roof truss structures each having extensions adapted to seat in the respective aligned recesses and means in connection with said meeting edges for securing said extensions in said recesses to unite said ceiling, roof, and truss structures into a rigid unitary structure.

8. A prefabricated demountable building construction including ceiling and roof frameworks, each comprising a plurality of panel sections formed with side and end members, said panels being arranged in parallel strips, a spline locking element disposed between the end members of adjacent panels of the respective strips adapted to effect interlocking of said panels in binding end to end relation, the side members of said interlocked panels being formed to provide aligned recesses intermediate and coextensive with the respective ceiling and roof strips, a roof truss structure, extensions carried by and extending beyond said structure engageable in said recesses, and means for securing said engageable means therein for uniting said ceiling, truss and roof structures into a rigid unitary structure.

9. A prefabricated demountable building including spline interlocked floor, wall, and partition structures, said structures being formed of detachable spline interlocked panel sections and a detachably secured roof assembly surmounting said wall structure, said assembly including ceiling and roof frameworks, each comprising a plurality of panel sections formed with side and end members arranged in parallel strips, a spline locking element disposed between the end members of adjacent panels to effect interlocking of said panels, the side members of said panels being formed to provide recesses intermediate and coextensive with the respective ceiling and roof strips, a roof truss structure including a lower cord structure and oppositely inclined upper cords, a plurality of members connected to and extending above said upper cords and other members carried by and extending below said lower cords, and engageable, respectively, in said ceiling and roof recesses, and means coacting with adjacent ceiling and roof panel side members and ex-

tensions to unite said structures into a unitary structure.

10. A prefabricated demountable building construction including sectional ceiling and roof frameworks, a sectional truss construction therebetween, said truss construction comprising oppositely extending lower horizontal cord structures and oppositely extending inclined upper cord structures, supporting posts and strut structures intermediate said lower and upper cords, a plurality of extension members including a central member connected to and extending beyond the lower and upper cords, respectively, and en-

gageable, respectively, with adjacent sections of said ceiling and roof frameworks, and means for uniting said extension members and adjacent sections of said frameworks into a unitary structure, said centrally disposed upper extension member being adapted to connect the oppositely inclining upper cord and supporting post structures of the truss sections and adjacent pairs of the overlying roof sections, and the centrally disposed lower extension member being adapted to connect the lower cord and post structures and adjacent pairs of the underlying ceiling sections.

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