This invention relates to building construction and more particularly to wooden houses and the like adapted to be erected from preformed or fabricated units. While the invention is susceptible to various modifications, so far as the type of building is concerned, that is, small houses, bungalows, garages, barns and the like, it will be hereinafter described with particular reference to a one-story bungalow as illustrated.

As is well known to those familiar with the art, it has heretofore been common to build houses from panel units manufactured at a mill, for example, and transported to the site of erection, but many of those constructions now on the market have been open to serious objections by building authorities as failing to comply with regulations, and what may be termed permanent wooden buildings. Usually such constructions are made from relatively thin, flimsy material improperly constructed and secured, resulting in warping of the panel sections or units, sagging of the roof, doors and windows, resulting in damage of the opening and the closing of doors and windows, as well as leaks not only in the roof but in the outside wall sections.

Accordingly, it is one of the principal objects of the present invention to provide a building construction of the above general character, while of simple and practical construction, is novel, strong and durable, the parts being so related and proportioned to each other throughout the entire building and provided with interlocking connections whereby the flat structure is substantially the equivalent of the usual permanent structure erected by skilled labor.

A further object is to provide a building of the above character in which the parts are so assembled into units and panels at the factory so as to permit the ready fabrication of these panels at the place of erection without the necessity of employing skilled carpenters at the place of erection.

A further object is to provide a house of the above character constructed from properly proportioned and related units so as to permit a ready variation in size and design yet at all times present a finished structure having the appearance and structural strength of a permanent building built in the conventional way.

A further object is to provide improved building units such as roof, ceiling, floors, side walls, etc., including the windows and door frames as desired, whereby the parts may be easily and quickly assembled and interlocked in a permanent, substantial and water-tight manner.

Other objects will be in part obvious from the annexed drawings and in part hereinafter indicated in connection therewith by the following analysis of the invention.

This invention accordingly consists in the features of construction, combination of parts and in the unique relation of the members and in the relative proportioning and disposition thereof, all as more completely outlined herein.

To enable others skilled in the art to fully comprehend the underlying features of this invention, that they may embody the same by the numerous modifications in structure and relation contemplated by the invention, drawings depicting one of several forms of the invention have been annexed as part of this disclosure, and in such drawings like characters of reference denote corresponding parts throughout all of the views, in which—

Fig. 1 is an elevational perspective view of one of the many forms of bungalows or cottages constructed in accordance with my invention.

Fig. 2 is an elevational view with parts broken away showing one of the outside panels.

Fig. 3 is a similar view showing one of the inside panels forming a partition.

Fig. 4 is a perspective view of the cottage shown in Fig. 1 with the roof, partitions and one of the side walls removed.

Fig. 5 is a floor plan view of the cottage shown in Fig. 1.

Fig. 6 is an elevational view with parts removed of the gable end of the cottage immediately beneath the roof.

Fig. 7 is a sectional view taken substantially on the line 7–7 of Fig. 6.

Fig. 8 is a detail view of one of the connecting members shown at the bottom of Fig. 7.

Fig. 9 is a partial sectional view taken substantially along the line 9–9 of Fig. 6.

Fig. 10 is a vertical sectional elevational view taken substantially along the line 10–10 of Fig. 1.

Fig. 11 is a detail view with parts broken away showing one of the roof panels.

Fig. 12 is a side view of the panel shown in Fig. 11.

Fig. 13 is a sectional view of the roof panel, the lower part of which is shown in Fig. 17.

Fig. 14 is a sectional detail view taken substantially on the line 14–14 of Fig. 1.

Fig. 15 is a plan view of the ceiling panel, one end of which is shown in Fig. 17.

Fig. 16 is a side elevational view of the panel shown in Fig. 15.
Fig. 17 is a detail view showing the connection between the ceiling panel and the roof, as well as the side wall.

Fig. 18 is a detail view of the right hand end of the ceiling panel shown in Fig. 17.

Fig. 19 is a detail view of the connection of the adjacent panel with the right hand end of the panel shown in Fig. 16.

Fig. 20 is a plan sectional view of the outside wall and an interior partition.

Fig. 21 is a detail plan view of the corner formed by two adjacent outside walls.

Fig. 22 is a detail sectional view of the angle formed by two interior partitions.

Fig. 23 is a similar view showing two interior partitions.

Fig. 24 is a similar view showing the angle formed by two exterior and two interior walls.

Fig. 25 is a sectional plan view of the joint between two exterior panels.

Fig. 26 is a vertical sectional view substantially on the line 26 of Fig. 1.

Fig. 27 is a plan view of two adjacent floor panels, certain parts being broken away.

Fig. 28 is a similar view of the undersides of the floor panels.

Fig. 29 is a transverse sectional view of two adjacent floor units taken substantially on the line 29 of Fig. 28.

Fig. 30 is a vertical sectional view through a double-hung window frame.

Fig. 31 is a plan sectional view of the same.

Fig. 32 is a similar view taken between two adjacent windows.

Fig. 33 is a similar view of an inside door frame.

Fig. 34 is a similar view of an outside door frame.

Fig. 35 is a vertical sectional view of an outside door frame.

Fig. 36 is a vertical view through a casement window frame.

Fig. 37 is a plan sectional view of the casement window frame, and

Fig. 38 is a sectional plan view between two casement window frames.

As far as possible reference numerals used in Fig. 5 correspond to the figures above-mentioned.

Referring now to the drawings in detail, and more particularly to Fig. 1, there is illustrated a conventional form of bungalow, generally recog-
nized in shape, being provided with a small ell projecting from one side not only for the purpose of providing additional space but also to break up the conventional straight lines and present a more pleasing and artistic appearance.

The entire building rests, of course, on a suitable foundation which may have a cellar, if desired, and according to the floor plan in Fig. 5, could be provided with an exterior entrance (not shown) although, if desired, the floor plan may be modified to include a small stairway leading thereto.

The entire body portion of this building, including the side walls, roof, ceiling and floor, are made from unit panels of stock size and preformed at a mill prior to transportation to the place where the house is to be erected. The parts are all cut either to interfit with one another or reprovided with suitable holes, for example, to receive securing bolts and other fastening means, as may be necessary. Each outside panel is provided with one or more suitable windows, which may be either large or small, of the single sash type, or of the casement type, according to plans and appearance desired. The roof panels are made in sections which may be easily and quickly joined one with another to cover the entire area and interlock with the frame, and the triangular portions or gables beneath the roof and above the body of the house are likewise preformed to constitute the desired panel units and interfit with adjacent parts.

The present invention is not concerned with the plumbing fixtures, electric lighting equipment, or kitchen units. It is of course to be understood that these are installed as desired in the usual manner. Many of the interior panels, however, are provided with outlet boxes and electric conduits to provide the necessary plug-in connections at convenient points.

These, however, are not shown, but are easy to put in at the time when the plan is made.

Referring to Fig. 1, showing a conventional bungalow, a roof 50 is formed from a plurality of units depending upon the size of the roof, each unit extending from the eaves 51 to the peak 52 and being approximately four feet wide, as shown more clearly in Fig. 1. The roof is supported on the sides walls 53 and 54, Fig. 4, and at the ends are triangular gable inserts 55. As here shown, a small ell is provided, the roof 56 of which is constructed of similar units but smaller, that is shorter, in size. The side walls 57 and 58 are formed from a plurality of panels, depending upon the size of the finished building, as is also the end wall 56 and the walls of the ell 57.

Each one of these panels may be provided with one or more windows, a single sash window being shown at 59 and a double sash window at 60.

Obviously, casement windows may be used, if desired, the details of such windows being shown in Figs. 36, 37 and 38, for example.

One or more outside doors, such as indicated at 61, are provided in suitable panels and used where desired as shown in the floor plan. The top of the house may be provided with a ventilator resembling a chimney, if desired, and indicated at 62.

In a house of this character it is probable that electricity would be used and in which case a single ventilating flue would be suitable to carry off the air from the attic. A separate or joint flue may be used connected with the bathroom fixtures, as may be necessary or required.

As shown in Fig. 4, in which the roof and some of the side walls of the house are removed, it will be noted that the walls are of double wall construction and comprise a framework of vertically disposed joists 63 (Figs. 2 and 3) extending between a rabbeted sill 64 and an end or top plate 65. Secured to these joists are slabs of suitable building composition material which is sanitary, strong, durable and waterproof.

The product "homasote" is especially suitable.

While these two separated slabs, indicated at 66 and 67, will provide an insulating airspace therebetween, it is of course to be understood that between the joists 63, the space may be filled with suitable insulating material of any desired type and indicated by insulating wool at 68.

In these panels, as shown in Fig. 2, is positioned a window opening comprising a header 70 and a lintel 71 interlocking at the ends 73 with the adjacent joists 63 and reinforced or supported on upper and lower cripples 74 and 75, respectively.

The details of the window and door frames will be hereinafter more fully described in connection with Figs. 30 to 38, inclusive.

Referring to Fig. 6 of the drawings, there is
shown more in detail the construction of the gable 55 which supports the end of the roof. This gable includes a series of gable studs 75 supporting a stud strip 77 from a gable sill 78. This end gable panel, like the side wall panels, is of single wall construction and of similar material as the covering for the panels shown in Figs. 2 and 3, except that the covering is omitted and panel strips 99 are used on the outside to give rigidity and structural strength.

About one-half of the distance from the eaves to the peak there is provided a reinforcing knee wall construction shown in detail in Fig. 7, which includes knee wall studs 83 and knee wall braces 81 connected at their upper and lower ends to knee plate 82 and knee wall sill 83. This latter construction rests upon joists 84 which support the ceiling plate 85 and is secured to the rafters 66 by means of double ended angular nails 87 shown in detail in Fig. 8. The opposite ends of this wall extend at right angles to the body portion, thereby to engage the joists and rafters, as clearly indicated in Fig. 7. This angle drive nail and knee wall is a very important item in the construction as it enables one to use 2 x 4 rafters and ceiling joists, giving the required strength, and still keep the weight down, which is so important in handling prefabricated sections.

In Fig. 9, there is shown a sectional view of Fig. 6, taken at one end of the knee wall constructed in the manner in which the parts are assembled. On the outside of the panel there is provided a ribbon board 88 and vertically extending battens 90 for strengthening and reinforcing purposes, as well as appearance. These battens terminate adjacent to the rakerfrieze 91 connected to the ribbon board at the bottom. Suitable caulk 92 is provided where desired to render the structure more water-tight and prevent leakage between the ribbon board and the "homasote" panel 93. A ventilator or window 94 is suitably positioned beneath the rafter, as desired.

In Fig. 10, there are shown certain details of construction of the outside walls, a corner of the roof panel and an intermediate partition. The rafters 66 support the roof panel, which comprises a series of matchboards 100 covered with shingles 101 and between which insulating paper may be placed, if desired. The rafter is supported by means of a diagonal brace 102, the lower end of which is secured to the ceiling joists 64. The side wall 56 supports the ceiling joists 64 and has an interlocking engagement with the joists 64 by means of a plate board 103, beneath one end of which is a frieze 104, adjacent to a fascia 105, which in turn is protected by a longitudinally extending fascia board 106, which also covers the ends of the joists 64 and terminates beneath the roof sheathing 100. Moulding and trim are added as may be necessary to improve the appearance and protect the parts.

There is indicated at 107 floor boards which are protected on their undersides by a composition material 108, such as "homasote," which has the necessary insulating and strengthening qualities, and this flooring is supported upon the side joists 110 and the floor joists 111. Special rabbeted sills 64 are incorporated in the side panel, as above explained, and secured to the adjacent parts of the rabbeted main sill 49 by means of relatively heavy nails.

The partition shown at the right of Fig. 10 is midway of the house and indicated by the numeral 10 in Fig. 5. It will be noted that this partition is between and under the ends of headers 113 of two abutting ceiling panels to interlock therewith. The partition is of double wall construction similar to the outside panels and is provided with the upper plate 65 and lower shoe 69, which are secured to the headers 111 and joists 114, respectively, by means of any desired fastening means. Bolt screws, such as shown at 114, are to be preferred by reason of the rather severe strain to which they are put by reason of their location in the middle of the house.

Certain details of roof construction are shown in Figs. 11 to 14, all bracing and paneling shown in Fig. 11 is shown one of a series of roof panels, the left hand end of which is the lower part adjacent the eaves, while the opposite end, or the right, is the peak or ridge-pole section. The rafters are indicated at 66 and end in a longitudinal rafter tie board 115, while the ridge board is indicated at 116. It will be noted particularly that by reference to Fig. 10 this unit panel has a peculiar interfitting relation with the ceiling panels. Of course, the ridge board 116 meets with the complementary roof section at any suitable angle (there shown as 90°), and these tie boards are secured together in any desired manner to withstand the strains to which the roof is subjected. Fig. 14, which is a section through the rafter, that is, substantially on the line 14—14 of Fig. 1, shows the general arrangement and position of parts heretofore described.

In Fig. 15 there is illustrated the ceiling panel which coasts and interfits with the roof panel shown in Fig. 11. By reference to Fig. 16, the ceiling joists 64 support the composition board 65, the joists being connected by cross members or headers 113 at one end and the plate board 103 at the other, the parts having a dove-tailed or interfitting relation, as shown in Fig. 16. In Fig. 17 the relationship of these various parts and the manner in which two units are connected is more clearly shown. Where two ceiling panels come together longitudinally they are bolted in place by means of ties 117, as shown in Fig. 17, while the ends of said headers are secured, as shown in Fig. 19, by means of bolts 118. Where such units are connected without the partition shown in Fig. 10, then a suitable molding strip, such as the wood panel 120, is provided to seal the joint.

In Figs. 20 and 25, inclusive, there are shown various detail sectional views of inner and outer wall constructions, as well as interior partitions and joints. In Fig. 20, there is illustrated a portion of the outer wall panel, such as 56 in Fig. 1, which is formed of two sheets 66 and 67 spaced by a relatively wide stud 121. The walls 66 and 67 lap over this stud 121 and the joint is protected by a vertical outside strip 122 which also protects the heads of the fastening screw bolts 123 or the like which secure the stud 121 to the end stud 124 of an interior partition unit. Moulding strips 125 extend from floor to ceiling and fill the corners in the manner shown.

In Fig. 21 there is shown an exterior corner protecting the joint of two outside panels by means of corner boards 126 and 127. These boards also conceal and protect the screw bolt fastening devices 128 extending between the corner stud 129 of one partition and the corner stud 131 of the other unit.

Fig. 22 illustrates an interior corner which is substantially the same as the outside corner, ex-
cept for the corner guard 135 concealing the meeting edges of the two wall boards 66, as shown. Fastening member 133 secures the end studs of two adjacent panels, and the bolt heads are concealed by plastic.

In Fig. 23 is shown an interior partition joint of the T-type. The exterior partition 134 may be positioned at any place along another partition 110. It is merely being necessary to bring the holes into register for receiving bolts 135. The bolt head is countersunk and protected and concealed in any desired manner.

In Fig. 24 there is shown an exterior joint between two outside panels and the arrangement is substantially the same as above described, the main difference being in the quarter round moulding 135 provided at the outside joint, which quarter round has a suitable caulking compound 137 to prevent leakage. The joint between two panels in an exterior position is shown in Fig. 25 where the seams between the wall boards 66 and 67 is concealed by means of a wood panel 138, although any form of concealing means, such as adhesive tape 140, may be adopted. The relative location of these various joints between wall and partition units are indicated in Fig. 5 by reference numerals corresponding to those designating the figures.

In Fig. 26 there are shown the details of the side wall construction, and the floor and ceiling units being taken substantially along the line 26—28 of Fig. 1. The side panels of the main floor have already been fully described, and the general arrangement is substantially the same as that shown in Fig. 10. It is to be noted, however, that the floor units 107 are positioned between the joints 110 and the lower part of the inner wall 67, and are further secured by means of base board 141. The floor units themselves are shown in Fig. 27, for example, and include a plurality of parallel floor joists 142 extending between headers 143, which are bolted together, as shown more clearly in Fig. 28, by means of bolts 145 and metal tie plates 146. Beneath the headers, 147, shown in Fig. 27, is a sheet of "thomasite" 148 or the like to provide additional strength, insulation and sound-deadening qualities. A sectional view of the connection is shown more clearly in Fig. 29.

Floor sections are not to exceed eight feet wide, and in even multiples of four, according to the length of the house. The length of each section is to be governed by the width of the house. Tongue and groove floor boards match together, whereby the joints are invisible from above.

In Figs. 30 to 38, inclusive, are shown various details of interior and exterior trim. Thus, in Fig. 30, there is shown a vertical section of a window of the double hung sash type, that is, the usual outside sash 150 and the interior sash 151. The window frame is positioned between the upper lintel 171 and the lower lintel or header 170, Fig. 2, and includes the window sill 152 and a top frame member 153, which are positioned between inner and outer window frame members 154 and 155, the latter being provided with a caulking strip 156 positioned beneath a drip cap 157. Metal flashing 159 is fastened at the top of the drip cap and is set back from the face of the siding to seal the joint against possible leakage. Fig. 31 shows a plan or side view, and the relative positioning of the parts is clear.

Fig. 32 is a mullion between two windows as appear at the right of Fig. 1. The sash are indicated at 150 and 151, respectively, of the two windows, and outer panel 163 is provided with caulking material 164 to prevent leakage and the parting strip 165 is positioned on the interior.

Fig. 33 is a detail of an inside door frame in which the door is indicated at 166 abutting against moulding 171 which is a part of the door swingings in the usual frame, the top of which is shown at 166, protected by trim 170 on both sides of the main panel indicated at 171. Fig. 34 is a detail of the outside door shown in Fig. 1, the door being indicated at 172 abutting trim 173 and swinging beneath jam 174. A vertical section of this same door is shown in Fig. 35, in which the parts are substantially the same as above described, except that a sill 175 is provided at the bottom and a drip cap 176 at the top with metal flashing at 175. Fig. 36 is a detail view of a casement window in which the window is shown at 177 and swings inwardly with respect to weatherstrip 178. A sill 180 and drip cap 181 are provided in a manner similar to that shown in Fig. 30. Fig. 37 is a plan sectional view of the same window, the other parts being substantially the same as shown in Fig. 34, for example. Fig. 38 is a mullion between two casement windows and is substantially the same as shown in Fig. 32.

From the above it will be seen that the present invention comprehends a prefabricated building in which the parts are entirely prearranged and are so constructed individually as to prevent warping and bending of the parts. Likewise, the various units and panels are interconnected with each other by strong and secure fastening means, and building boards if necessary, to prevent any relative movement. Likewise, many of the units have an interlocking relation to prevent dislocation of the parts and further increase the strength of the entire building. The units are preferably constructed in stock sizes but possibly of different appearance and shape. Thus, for example, the two panels shown at the left end of Fig. 1 may be reversed, that is, if one should prefer the double window in one room and the single window in the other. Likewise, the roof panels are so constructed in stock sizes so as to permit the ready adaptation or addition of an L, as shown in Fig. 1, to one side or the other, merely by reversing the parts.

The interior partitions, shown in Fig. 5, are subject to wide variation, thus permitting the door from one room to another to be located either at the right, as shown in Fig. 3, or anywhere along the panel, for that matter.

The choice of windows is open to a wide selection and requires very slight change in the units as formed.

The floor panels and ceiling panels are of stock size and have a relative dimension with respect to the roof panels and ceiling panels, thus permitting the entire house to be elongated to the extent of one or more units without in any way changing the other units other than to add a corresponding number. For example, the entire house, shown in Fig. 1, for example, could be extended to a length of three side walls, which would involve merely the addition of a corresponding number of extra floor units, ceiling units and roof units. The units may be manufactured in large quantities and in a variety of designs, and assembled to suit the requirements or desires of a large number of purchasers.
As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A building having substantially rectangular ceiling units including joists, and headers connecting said joists, a series of said units including aligned longitudinally and the units being disposed in pairs in transverse alignment with headers disposed contiguously and secured together; a plurality of substantially rectangular roof units each substantially superposed with respect to a corresponding ceiling unit and having rafters secured at one end to the joists of a ceiling unit and connected together at the peak, and a knee wall interposed between the rafters and ceiling joists and located immediately between the peak and eaves of the building and having upper and lower knee plates connected by rigidly secured diagonal braces, the knee plates being secured to the rafters and to ceiling joists.

2. A building having substantially rectangular ceiling units including joists and headers connecting the joists, a series of said units being aligned with headers disposed contiguously and secured together; a plurality of substantially rectangular roof units each substantially superposed with respect to a corresponding ceiling unit and having rafters secured at one end to the joists of a ceiling unit and connected together at the peak, and a knee wall interposed between the rafters and ceiling joists and located immediately between the peak and eaves of the building and having upper and lower knee plates connected by diagonal braces, the knee plates being secured to the rafters and to said ceiling joists by double ended nails having ends driven into the side of the knee plate and into the sides of the rafters and ceiling joists.

3. A building having substantially rectangular ceiling units including joists and headers connecting the joists, a series of said units being aligned longitudinally and transversely disposed in pairs with adjacent headers secured together; a plurality of substantially rectangular roof units each substantially superposed with respect to a corresponding ceiling unit and having rafters secured at one end to the joists of a ceiling unit and connected together at the peak, and a knee wall interposed between the rafters and ceiling joists and between the peak and eaves of the building and having upper and lower knee plates connected by diagonal braces, the knee plates being secured to the rafters by double ended fastenings, the upper knee plate receiving the ends of certain of the fastenings which extend upwardly with their ends directed into the rafters.

4. A building having substantially rectangular ceiling units including joists, a series of said joists being aligned longitudinally and the units being disposed in pairs, a plurality of substantially rectangular roof units each substantially superposed with respect to a corresponding ceiling unit and having rafters secured at one end to the joists of a ceiling unit and connected together at the peak and the eaves of the building and having upper and lower knee plates rigidly connected by diagonal braces, the knee plates being secured to the rafters and to the ceiling joists by double ended nails having ends driven into the sides of the knee plates and into the sides of the rafters and ceiling joists respectively.

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