April 28, 1942. A. C. KETCHAM 2,280,832

BUILDING

Filed Jan. 2, 1940 3 Sheets-Sheet 1

FIG. 1

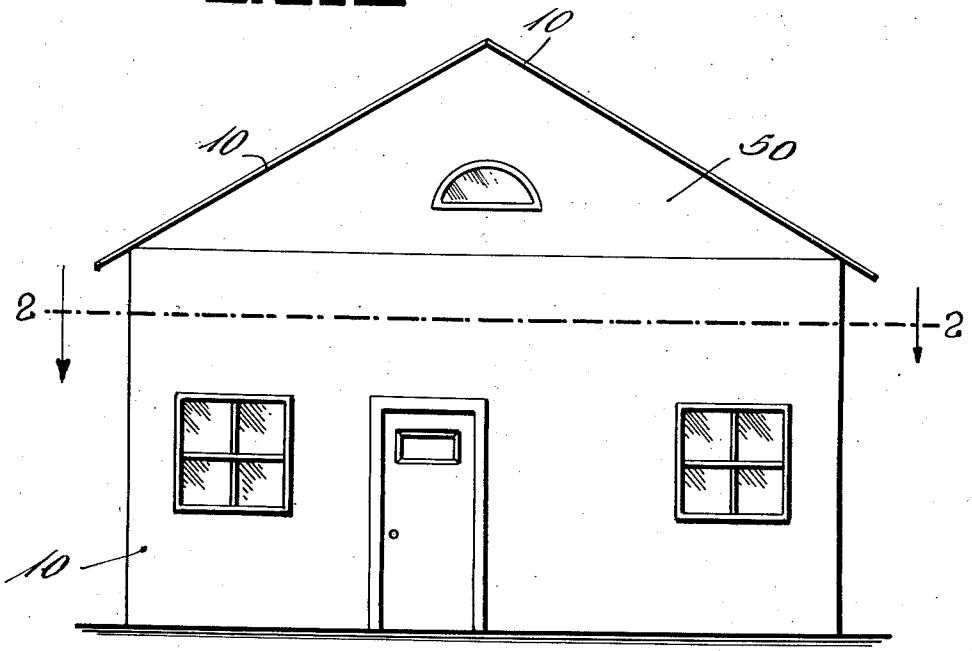
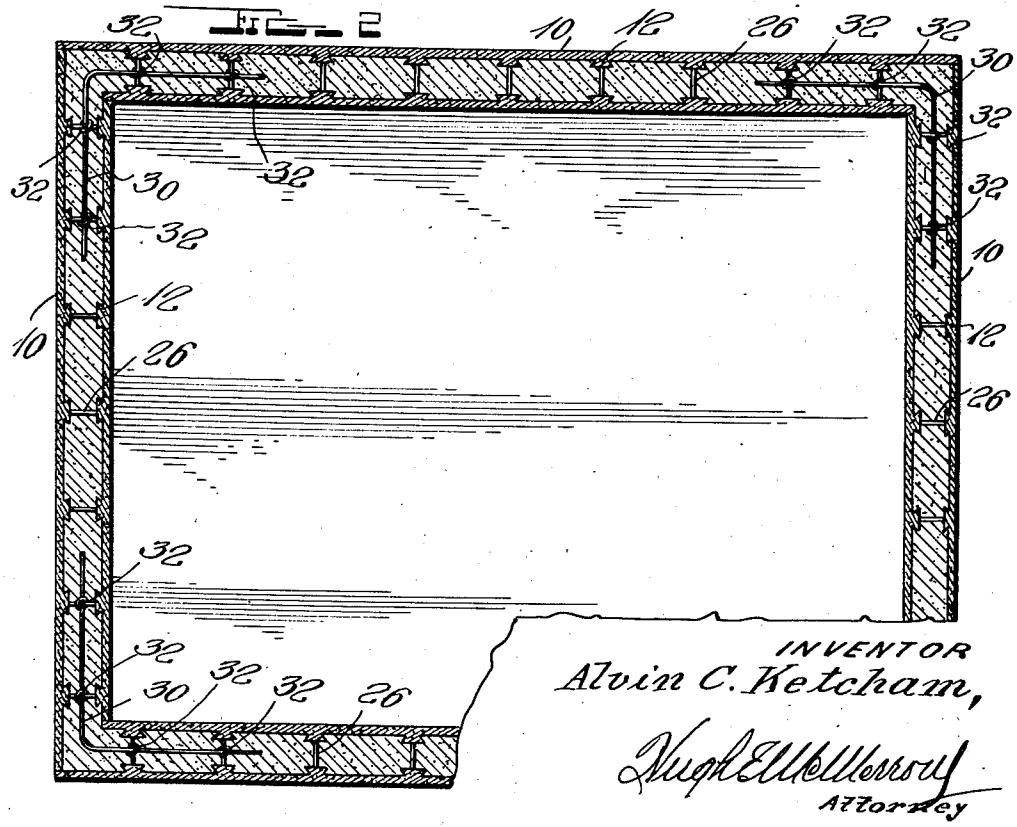


FIG. 2



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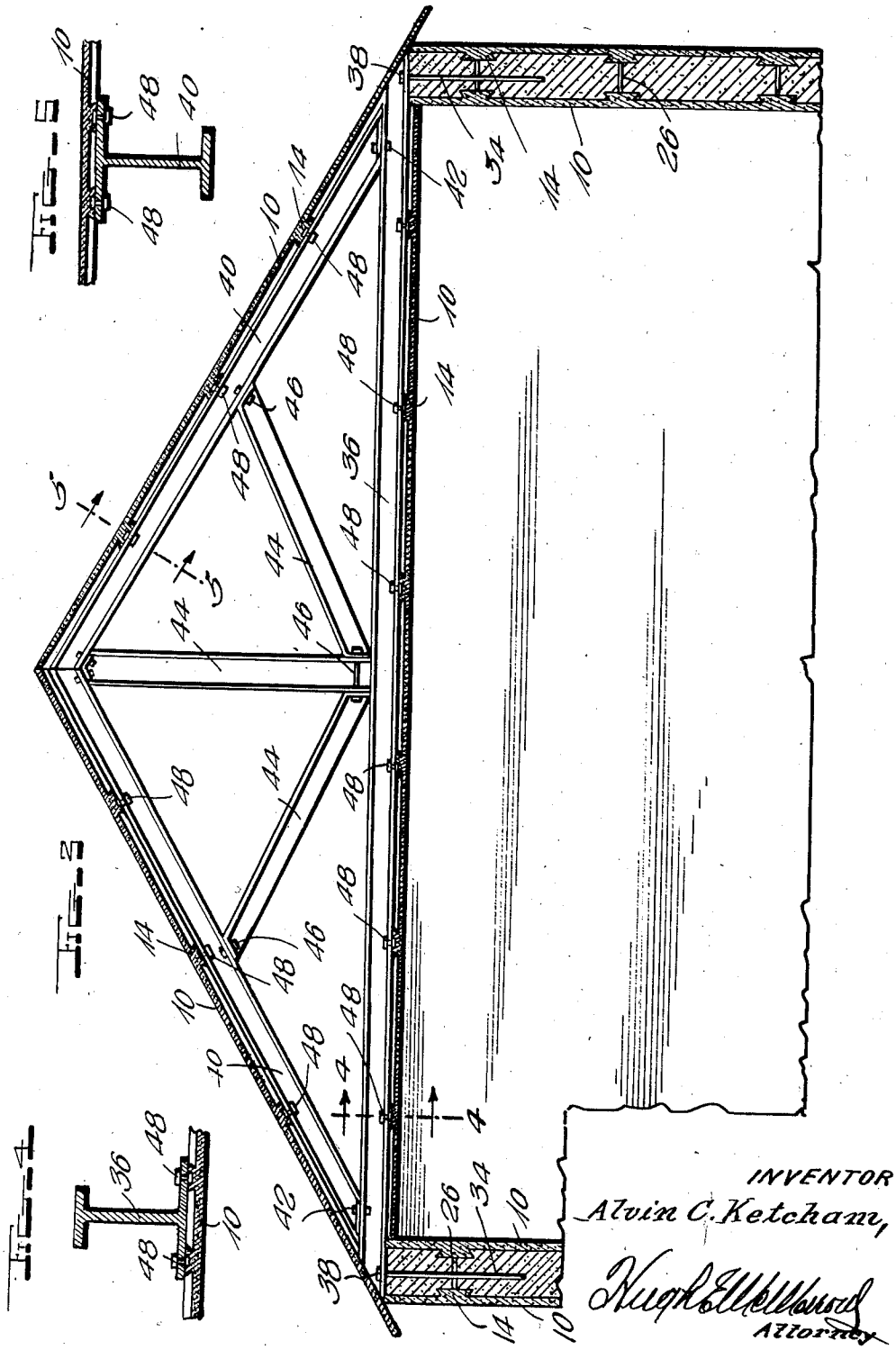


FIG. 5

FIG. 3

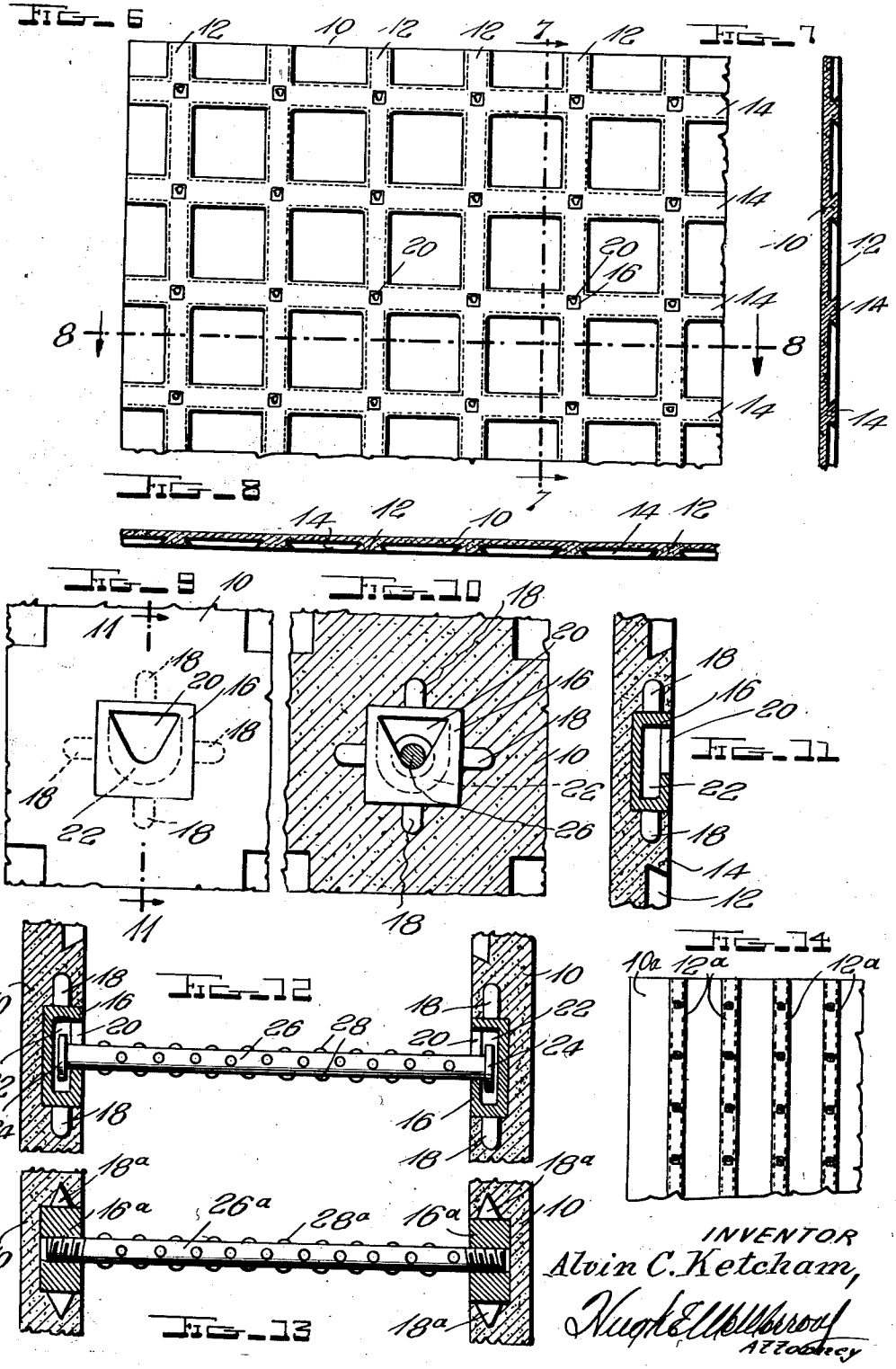
FIG. 4

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2,280,832

UNITED STATES PATENT OFFICE

2,280,832

BUILDING

Alvin C. Ketcham, Chevy Chase, Md.

Application January 2, 1940, Serial No. 312,152

5 Claims. (Cl. 72—1)

My invention relates to buildings, and its general object is to decrease the cost of labor and materials necessary for the construction of fire-proof buildings.

A further object of my invention is to provide for the construction of fire-proof buildings by means of standardized units which may be conveniently constructed at the factory and thereafter transported to the desired location for erection with the use of concrete or the like.

A still further object of my invention is to provide a method and means for constructing a building by means of concrete or the like and factory built units.

A still further object of my invention is to provide novel, pre-formed ceiling, roof, gable-end and side wall portions for buildings, and novel means for joining such portions, to form a building which is strong, sturdy, economical to construct, and which is water, weather, fire and vermin proof.

A still further object of my invention is to provide a building of the character described in which all brick work, plastering, carpenter work, tile, painting and papering will be eliminated, or at least be made unnecessary as far as durability, comfort and appearance of the finished building is concerned.

With these and other objects in view, as will hereinafter more fully appear and which will be more specifically pointed out in the appended claims, reference is now made to the accompany-any drawings forming a part of the application, in which:

Fig. 1 is a front elevational view, showing one end of a building constructed in accordance with my method, in which pre-formed, standardized building units are used;

Fig. 2 is a horizontal section view, on an enlarged scale, taken on the line 2—2 of Fig. 1;

Fig. 3 is a vertical section view on an enlarged scale, partly broken away, showing the ceiling and roof construction;

Fig. 4 is a transverse, vertical sectional view, on an enlarged scale, taken on the line 4—4 of Fig. 3;

Fig. 5 is a transverse, vertical sectional view, on an enlarged scale, taken on the line 5—5 of Fig. 3;

Fig. 6 is a fragmentary view, on an enlarged scale, showing the preferred embodiment of my reenforced, fire-proof structural units, adapted for side wall, ceiling, partition and roofing use;

Fig. 7 is a transverse, vertical section view, taken on the line 7—7 of Fig. 6;

Fig. 8 is a horizontal section view, taken on the line 8—8 of Fig. 6;

Fig. 9 is a face view, on an enlarged scale, showing locking plates in place in the reenforced portion of my side wall construction;

Fig. 10 is a view similar to Fig. 9, showing one end of the locking bar in place in the locking plate;

Fig. 11 is a transverse, vertical section view, taken on the line 11—11 of Fig. 9;

Fig. 12 is a transverse, vertical sectional view, showing one of the locking bars in place between the side walls;

Fig. 13 is a view similar to Fig. 12, showing the type of locking plate used for ceiling, gable-end and roof sections, and which may be used in the side wall and partition construction as a modification; and

Fig. 14 is a fragmentary view of a modified form of my reenforced structural units.

Referring now to the drawings in which similar reference characters represent similar parts, the numeral 10 represents my reenforced side wall, partition, ceiling, gable-end and roofing units, which are preferably made of asbestos fibre, magnesia sand and cement. These units are provided, on one side, with vertical reenforced portions 12 and horizontal reenforced portions 14, which portions are shown as being undercut in order to form a better bond when the concrete or other cementitious substance is poured between the side walls, but it will be understood that these portions may be rectangular in cross-section, if desired, for convenience in manufacturing. These reenforced portions are formed at any desired interval, but preferably about two feet apart, and also at desired intervals, preferably where the reenforced portions meet or join, metal locking plates are embedded flush with the surface of the reenforced portions (see Figs. 9, 10, 11 and 12). These metal locking plates comprise a rectangular housing member 16, provided with horizontal and vertical arms or supports 18, embedded in the unit 10. Housing member 16 is provided with a V-shaped slot 20, back of which is a U-shaped space 22, adapted to receive head portion 24 of locking bar 26, which is held in place by gravity between the side walls in slot 20, and thereby prevents spreading or bulging of the side walls while the concrete or other cementitious mixture is being poured therebetween. These locking bars serve to hold the side walls in perfect alignment at all times and are provided with raised portions 28, in order that the concrete or the like will hold

them more securely, or a more perfect bond be formed when the concrete or the like hardens or sets.

Referring now to Fig. 2, metal rods 30, preferably made of steel, are bent at right angles, and placed horizontally in the corners and adjacent side walls, in order to reenforce such corners. The rods 30 are provided with loops 32, through which locking bars 26 are inserted for the purpose of holding the rods in place while the concrete or the like is being poured.

Referring now to Figs. 3, 4 and 5, when the concrete or the like is poured between the side walls, elongated bolts 34 are embedded in the top of the walls at predetermined intervals, the threaded ends of the bolts extending out of the concrete and slightly above the side walls. Metal I-beams 36 serve as ceiling-joist and the lower flanges of these beams are provided with circular openings adapted to receive bolts 34. Nuts 38 are screwed in place on the ends of the bolts 34, thus holding the joist firmly in place. Rafters 40 are bolted to the joist by bolts 42. These rafters 40 are the same size and weight material as joist 36, the I-beam being inverted, in order that the contacting flanges will correspond. Suitable bracing members 44 for the rafters and joist may be provided and may be bolted thereto and to each other by means of bolts and nuts 46.

The lower flanges of the joist and the outer or upper flanges of the rafters are provided with circular openings at intervals corresponding to locking plates 16*a* of the structural units, whereby the units are securely fastened to the rafters and joist by means of threaded bolts 48 being screwed into locking plates 16*a*.

Referring now to the modification shown in Fig. 14, the structural unit 10*a* is provided with horizontal or vertical reenforced portions 12*a*, instead of both horizontal and vertical reenforced portions, as shown in the preferred embodiment.

Referring now more particularly to Fig. 13, the locking plate is shown as comprising a rectangular threaded nut 16*a* with arms or supports 18*a* embedded in the structural unit. This form of locking plate is used for the ceiling and roofing units, in order that the units may be bolted to the joist and rafters from the inside. However, this form of plate may be used as well for the side wall construction, by providing locking bar 26*a* with right and left hand threads.

The gable ends of the building 50 (Fig. 1), are bolted to the end joist and rafters in the same manner as the roof and ceiling, from the inside, by bolts, not shown, which extend transversely through the joist and rafters and are threaded into locking plate 16*a*.

Suitable openings are formed in the wall units for doors and windows, and an opening for a trap door may be left in the ceiling. Any type of door and window casing may be used, but preferably metal casings to fit the openings are constructed at the factory and shipped with the units, together with windows and doors to fit. Partition walls of the same material and construction as the side walls, may be provided, the exposed surfaces being smooth, as are the interior surfaces of the side walls. These partition walls, not shown, may be joined to the side walls in the same manner that the corners of the side walls are joined. It is to be understood that the interior surface of the side wall, partition and ceiling units will be smooth, so that such surfaces may be painted, papered, etc., if desired, and that the exposed outside surfaces of the side walls and gable ends may be corrugated, or finished in any desired manner.

While any desired suitable foundation may be utilized, it is contemplated that a concrete or the like foundation be laid. When such a foundation is used, a rectangular groove should be formed in the surface to conform to the side and partition walls of the building, and a relatively thick layer of some water-proof material, such as tar or the like, should be placed in the groove for the bottom of the walls to rest upon, in order to prevent the possible entry of moisture into the walls by capillary attraction.

From the foregoing it will be apparent that a building constructed in accordance with my invention will be extremely economical, since the units are not expensive to manufacture. Further, the weight of the individual units will be comparatively negligible, although they are strong and durable, and it is therefore believed that transportation costs will not be excessive. Also, skilled workmen are not necessary in the erection of the building, it only being necessary to follow a few simple instructions. No brick work, carpenter work, plastering, tile, painting or papering is necessary, either for comfort or appearance, and a very considerable saving is thereby effected. Furthermore, the building is not only strong, sturdy, fire-proof, weather-proof, vermin and water-proof, and neat in appearance, but it will last indefinitely as well.

While the building has been illustrated and described as a "bungalow" or one story structure, it will be understood by those skilled in the art that two or more stories can be constructed, and longer side walls built, by joining such side walls by means of vertical I-beams, with bolts through the flanges, similar to the manner in which the ceiling and roof is bolted to the joist and rafters.

While the side wall, partition, ceiling, gable end and roofing units have been described as being constructed of asbestos fibre, magnesia sand and cement, thereby being fire-proof, it will be understood that other rigid or semi-rigid units constructed of other materials known or used in the art such as any of the well known plastics or the like may be utilized.

It will be understood that the I-beams used for joist and rafters, as well as the braces therefor, are preferably made of strong, light weight metal, but may be composed of other known materials, such as plastics or the like, and instead of being bolted together on the building site, may be welded together at the factory and shipped as units. All the units will be preferably shipped in specially built racks or receptacles, in order to minimize the possibility of breakage or injury in transit, and may be transported in specially built trailers, if desired.

While I have illustrated and described the invention in some detail, it is to be understood that the invention is not to be limited to such details, but only by the spirit of the invention and the scope of the appended claims.

I claim:

1. A building of the character described, comprising pre-formed, standardized units, forming side wall, partition, ceiling, gable-end and roofing portions, the side wall and partition units being adapted to form double walls, the inside of said double walls being provided with locking plates, locking bars positioned in said locking plates of opposed wall units connecting these units, the space between the double walls being adapted to receive a cementitious material, a plurality of

angularly formed metallic rods supported by the locking bars positioned between the double walls at the corners, a plurality of ceiling joist and rafter members connected to each other, means for connecting the ceiling unit to the ceiling joist, means for connecting the roofing units to the rafters, and means for connecting the ceiling joist to the side walls.

2. A building of the character described, comprising pre-formed, standardized units forming side wall and partition structure, locking bars positioned in locking plates of opposed wall units connecting these units, pre-formed units forming gable-ends, ceiling and roofing portions, pre-formed ceiling joist and rafters and means for connecting them together, means for connecting the ceiling joist to the side walls, and means for locking the ceiling and roofing units to said joist and rafters, respectively.

3. A building of the character described, comprising pre-formed, standardized units for side wall and partition structure, locking plates comprising recessed, slotted, housing members embedded in the inside face of the wall units, locking bars positioned in the locking plates of opposed wall units connecting these units, the space between said walls being adapted to be filled with a cementitious material, pre-formed units forming gable-ends, ceiling and roofing portions, pre-formed combined ceiling joist and rafters, means for connecting the ceiling joist to the side walls, and means for securing the ceiling and roofing units to said joist and rafters, respectively.

4. A building of the character described, comprising pre-formed, standardized units forming side wall and partition structure, integral, reenforced portions on one side of said units, locking plates comprising recessed, slotted housing members embedded in the reenforced portions of said wall units, locking bars positioned in said locking plates of opposed wall units connecting these units, whereby the walls are held in definite, spaced relation, pre-formed units forming gable-ends, ceiling and roofing portions, pre-formed ceiling joist and means for attaching the ceiling unit thereto, pre-formed rafters and means for connecting said rafters to said ceiling joist, means for connecting the roofing units to the rafters, and means for connecting the ceiling joist to the top of the side walls.

5. A building of the character described, comprising pre-formed, standardized units forming double side walls and partition structure, integral, reenforced portions on the inside faces of said walls, locking bars positioned in locking plates of opposed wall units, connecting these units and maintaining same in a definite spaced relation, pre-formed units forming gable-ends, ceiling and roofing portions, pre-formed combined ceiling joist and rafter members, means for connecting the ceiling joist to the side walls, means for affixing the ceiling unit to the ceiling joist, and means for affixing the roofing portions to the rafters.

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