Aug. 15, 1939. M. K. PEDERSON 2,169,474

BUILDING FRAME CONSTRUCTION

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Fig. 1

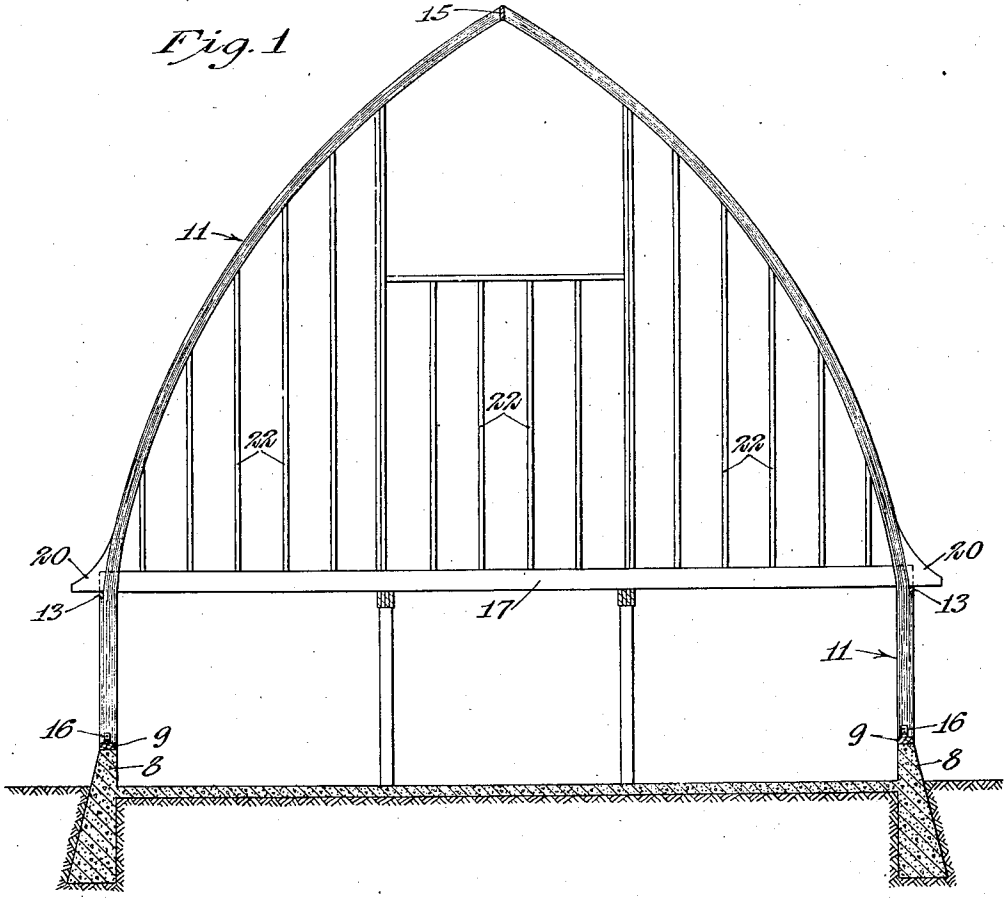


Fig. 4

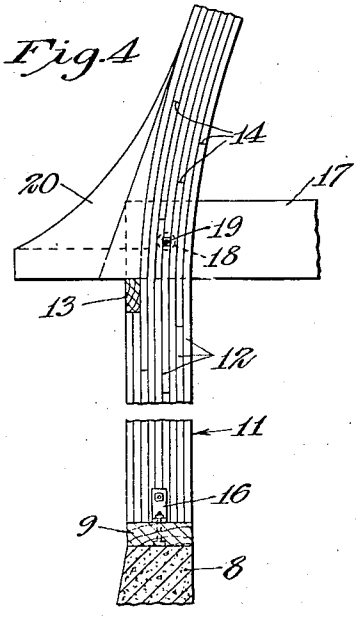


Fig. 5

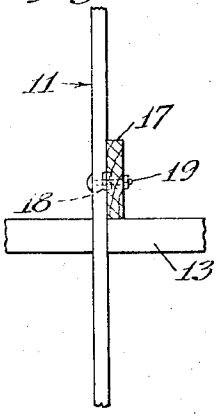


Fig. 6

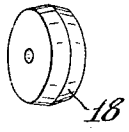
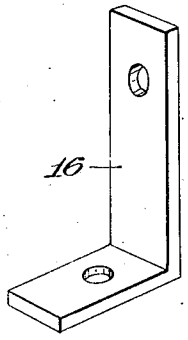


Fig. 7



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Fig. 2.

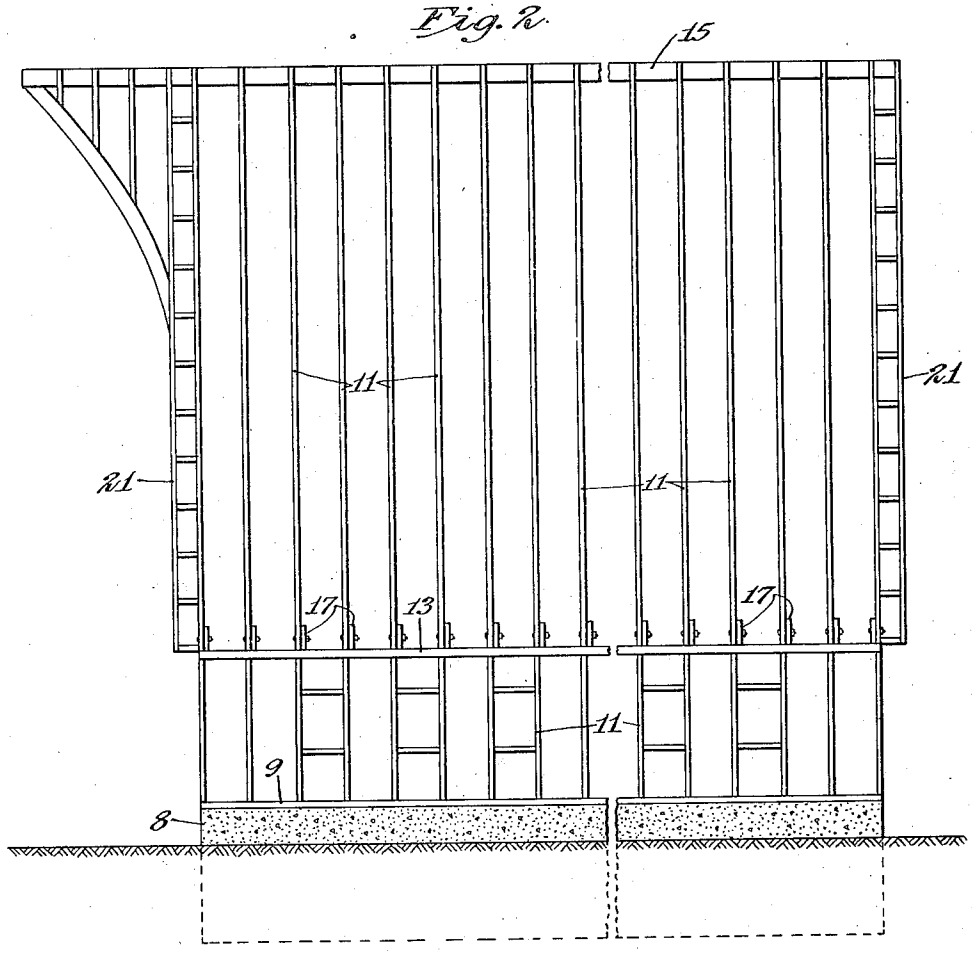
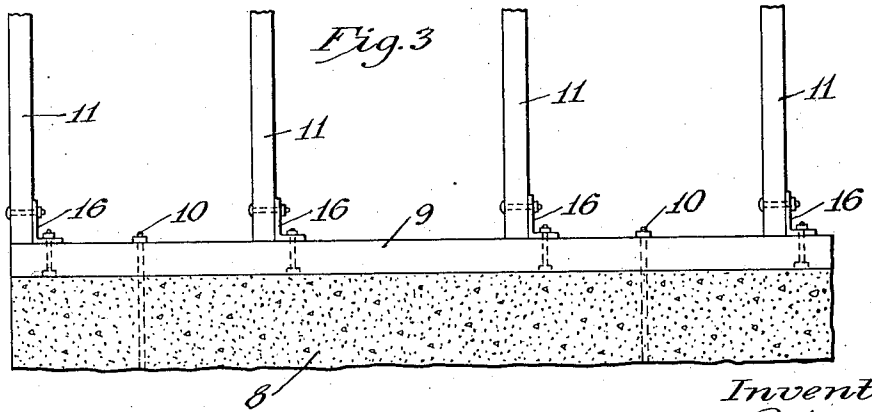


Fig. 3



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BUILDING FRAME CONSTRUCTION

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Application March 18, 1938, Serial No. 196,686

1 Claim. (Cl. 20—1)

It is an object of this invention to provide a novel building frame which is unusually rigid and strong and adapted to reduce the cost and time required for construction of buildings.

Another object is to provide a wood frame for a building having an arch roof wherein the usual trusses are eliminated and the quantity of framing material is reduced by a novel arrangement of arcuate rafters each composed of a number of laminations which are unusually resistant to sagging and in which internal stresses are reduced to a minimum by securing the abutting surfaces of the laminae together uniformly and continuously throughout their length.

A particular object is to construct combined or continuous studding and arcuate rafter members from a multiplicity of small, inexpensive wood strips of such width and thickness and so proportioned and secured together that greatly increased strength and rigidity is obtained in the composite members while internal stresses are uniformly distributed and minimized.

A further object is to provide a novel and unusually strong wood frame for buildings of the Gothic type wherein the principal load supporting members extend continuously from the foundation to the ridge.

My improved rafter is particularly although not exclusively adapted for use in constructing barns and other farm buildings.

In the accompanying drawings the invention is illustrated as a frame for a large barn of the Gothic type.

Referring to the drawings:

Figure 1 is a vertical cross section through my improved frame;

Fig. 2 is a side elevation of the same;

Fig. 3 is an enlarged fragmentary side elevation showing my preferred type of connection between the frame and foundation.

Fig. 4 is an end view showing one of my improved frame members in a preferred relationship to foundation, sill, girt, joist and sweep;

Fig. 5 is a side view showing one of the joints between a rafter, floor joist and girt;

Fig. 6 is a perspective view of one of the dowels for joining the floor joists to the rafters, and

Fig. 7 is a perspective view of one of the metal angles employed in connecting the lower ends of the rafters to the sills.

In the drawings the numeral 8 indicates a suitable foundation for the walls of a building. Sill plates 9 for the side walls are anchored to the foundation by bolts 10 (Fig. 3). My combined studding and rafter members are indicated generally by the numeral 11 and each is composed of a multiplicity of strips 12 (Fig. 4) of wood, preferably not more than one inch in thickness and about two inches in width. These strips are secured together, face to face, throughout their length by strong, water-resistant adhesive. For most large barns the studding or upright portion of each of the members 11 is composed of nine laminae of the strips 12 and the rafter portions, above the girts 13, are composed of seven thicknesses of the strips 12. Each lamina is formed from a plurality of relatively short strips 12 placed end to end, the end joints 14 being staggered, as indicated in Fig. 4 to avoid unnecessary weakening of the composite member at any point.

Each of the members 11 is pre-fabricated and its arcuate shape is permanently imparted to it by bending the component, freshly glued strips 12 into a form having the desired curvature and then applying substantially uniformly distributed pressure, preferably in excess of two hundred pounds per square inch, edgewise of the composite member, for a period of hours while the adhesive sets and dries. The composite rafter and wall members for the larger buildings are thus provided in lengths in excess of thirty feet and upon removal from the forms have great rigidity and strength against sagging. They retain their arcuate form permanently independently of other frame members by reason of the fact that the grain of the wood in strips of not more than an inch in thickness is only slightly stressed when such strips are bent to arcuate form and the adhesive and adjoining members distribute the longitudinally directed shearing force uniformly throughout the length of the component members, the adhesive having greater strength than the wood itself. The quality thus imparted to the rafter members makes them practically sag-proof and unlike laminated framing members in which nails, bolts or other spaced fastening devices are used in wood. Experience has shown that such spaced fastening devices work loose in the relatively soft wood and cause sagging of the roof supported thereby, after a period of use. The several strips of my improved rafter members are prevented from straightening by the adhesive, but their tendency to straighten out to the original shape places them, individually, under moderate stress radially of the roof arch and this imparts to the composite structure great resistance to roof loads and forces tending to produce sag or other distortion.

As best shown in Fig. 1, each of the members

11 extends continuously from a sill plate 9 to the ridge pole 15 of the building and a pair of the members 11, extending in a common vertical plane, one opposite the other, define the complete arch of the roof and side walls. Pairs of the members 11 are secured to the ridge pole 15 at suitable spaced intervals, as indicated in Fig. 2 and the lower end of each of the members 11 is fastened to one of the sill plates 9 by a metal angle 16 and bolts passed through perforations in the sill plate, metal angles and members 11, as best shown in Figs. 3 and 4.

The girts 13 are preferably supported on shoulders formed by the upper ends of two of the strips 12 of each of the several members 11 and are secured to the several members 11 by nailing or otherwise, as desired. The floor joists 17 for the second floor or loft of the building rest on the girts 13 and each of these joists has ends which overlap the members 11 and are severally secured thereto by a dowel 18 and bolt 19. The dowels 18 are countersunk into the adjoining faces of the joists 17 and members 11 as indicated in Fig. 5 and the bolts 19 are inserted through perforations in the members 11, dowels 18 and joists 17. By this arrangement the floor load is transmitted through the dowels 18 and the bolts 19 are merely employed to confine the joists against the members 11.

In the frame illustrated, sweeps 20 are provided to support the eaves of the building and are secured to the outer edges of the members 11 above the girts 13. Rafters 21 for supporting the gable end projections are mounted in spaced parallel relation to the end members 11. These rafters 21 may be formed from a fewer number of laminations than the main load supporting members 11. The framing for the end walls of the building may be arranged in the usual or suitable manner and, as illustrated in Fig. 1, comprises studding 22.

Tests have shown that the members 11 are approximately 25% stronger than ordinary rafters of like material and have much greater resistance to sag by reason of the laminated structure and uniform distribution of radial stress hereinbefore described. This makes it unnecessary to employ trusses to give the necessary rigidity to the roof and makes it practical to construct a large hay loft with entirely unobstructed space between the rafters, an obviously advantageous feature. By the use of my improved, unitary and continuous rafter and wall members, construction of the building is greatly facilitated and the time consumed in erecting the frame is greatly reduced because of the greatly reduced number of members embodied in the frame. A large saving in the cost of the building also results from the fact that the continuous wall and rafter members are constructed from short, inexpensive, small strips which are prefabricated or joined together and permanently shaped to the exact arc required at relatively small expense.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

A frame for a building having a foundation, comprising a multiplicity of parallel arch and wall members, each member having a vertical wall portion and an arch portion continuous therewith, and each member constructed of a multiplicity of thin laminations secured together in broadside relation, said wall portion of said member having additional lamination extending from the foundation to a point adjacent to the arch portion to form at their upper ends horizontally aligned shoulders, girt members supported on said shoulders and floor joists supported on said girt members and laminated members.

MYRON K. PEDERSON.