April 22, 1958 W. E. PHELPS 2,831,441

ROOF STRUCTURE FOR BUILDINGS

Filed June 6, 1955 2 Sheets-Sheet 1

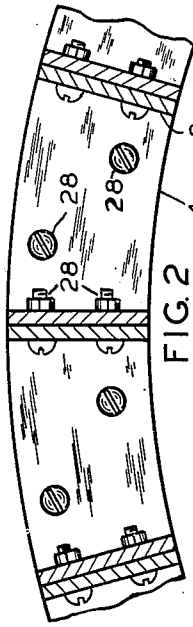


FIG. 2

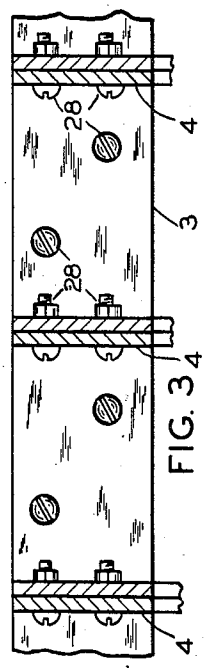


FIG. 3

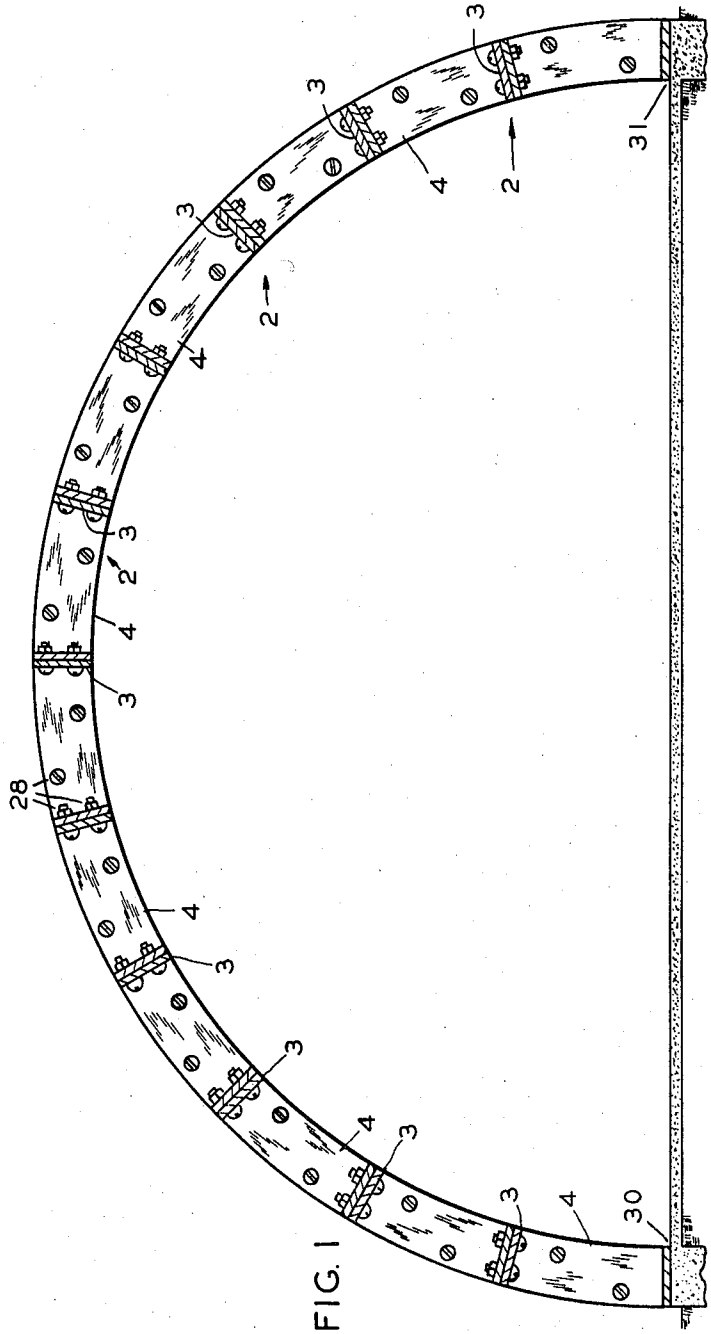


FIG. 1

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ROOF STRUCTURE FOR BUILDINGS

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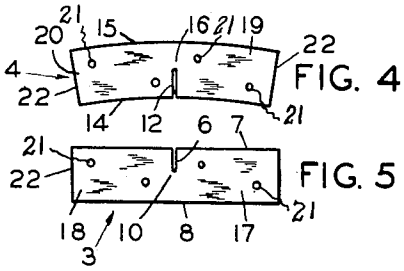


FIG. 4

FIG. 5

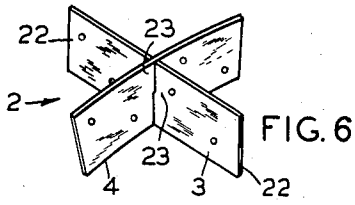


FIG. 6

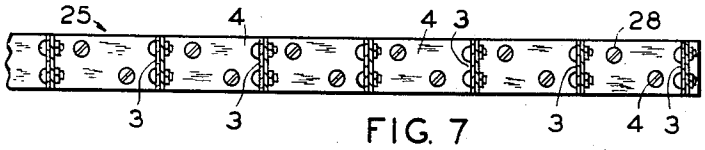


FIG. 7

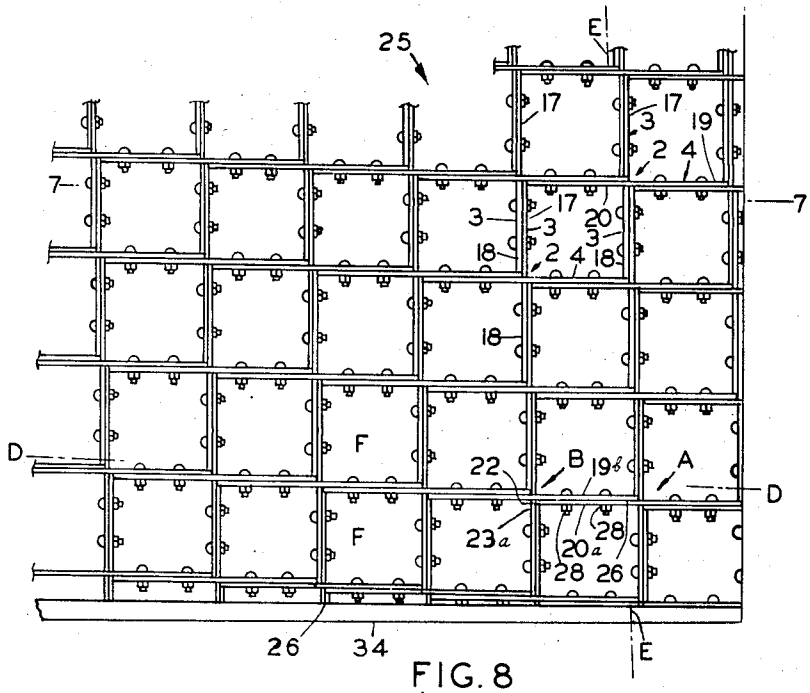


FIG. 8

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ROOF STRUCTURE FOR BUILDINGS

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Application June 6, 1955, Serial No. 513,334

1 Claim. (Cl. 108—1)

This invention concerns roof structure for buildings.

More particularly the invention concerns construction units and a structure composed of such units which constitutes a roof or other bridging part of a building wherein beams, rafters, and joists are unnecessary and not used.

One of the objects of the invention is to provide roof building units composed of two pieces of plywood, or the like, notched centrally on opposite sides and fitted together in the notches to form a cross; these units are then fitted together with their sides and ends abutting to form a composite structure which is braced both longitudinally and transversely;

Another object is to provide a roof structure composed of pieces of plywood, as above stated, which are notched and fitted together to form crosses, and wherein one of the pieces of plywood has curved top and bottom edges, whereby the structure may have a pre-determined curve in one direction and thereby attain additional support due to the curve of the interlocking pieces;

Another object is to provide a composite roof structure composed of units of crossed material wherein the units are fitted together to form a substantially diagonal line of juncture which will provide diagonal bracing:

An additional object is to provide a composite structure, as aforesaid, where the diagonal bracing is provided longitudinally and transversely;

Still another object is to provide a method for fitting together units of notched and crossed flat material so that the assembled structure will have load sustaining properties due to the mechanical advantage and leverage gained by abutting the ends of the unit elements against the sides of the crossing elements;

Other objects will appear hereinafter.

I attain the foregoing objects by means of the structure, structural units, parts and combinations of parts shown in the accompanying drawings, in which—

Figure 1 is an end view of an arched roof composed of units embodying my improvements;

Figure 2 is an elevation of a fragmentary portion of said roof structure drawn on an enlarged scale;

Figure 3 is a side view of a longitudinal composite supporting beam of such units drawn on an enlarged scale;

Figure 4 is a side view of a transverse element of one of the structural units, drawn on a somewhat smaller scale;

Figure 5 is a side view of a longitudinal element of one of the structural units;

Figure 6 is a perspective view of one of the structural units;

Figure 7 is an end sectional elevational view of a portion of a flat roof composed of said structural units taken on a line 7—7, of Figure 8; and

Figure 8 is a plan view of a flat roof structure.

Similar numerals refer to similar parts in the several views.

A structural unit as herein concerned is best illustrated in Figures 4, 5 and 6 and consists of what may be termed

a longitudinal element 3 and a transverse element 4. The longitudinal element has a centrally disposed notch 6 which extends from its upper edge 7 approximately halfway through the body towards the lower edge 8. The bottom of the notch is designated by numeral 10.

The transverse element has a central notch 12 extending upward from its bottom edge 14 toward its top edge 15 to a position 16 approximately halfway through its body.

The ends of each element on each side of the notches may be termed wings. Thus, the longitudinal element has rectangular shaped wings 17 and 18 while the transverse element has wings 19 and 20 with curved top and bottom edges. These elements are, therefore, not rectangular but are generally arcuate in shape.

The wings of all elements are perforated by bolt holes 21.

When fitted together the elements form a building unit 2.

To form a roof structure, as shown in Figures 1 and 8, the units 2 are fitted together so that their longitudinal as well as their transverse wings overlap. These wings not only overlap but the proportions of the wings are such that the end edges 22 of each wing fit tightly against the flanks 23 of the crossed elements of the adjacent unit. Thus, in Figure 8, it is seen that the unit marked "A" is fitted to the unit marked "B" so that the end edge 22 of transverse wing 20*a* of unit "A" abuts against the flank 23*a* of unit "B."

The adjacent faces of each of the overlapping wings, such as 20*a* and 19*b*, are secured together tightly by glue 26 and bolts and nuts 28. This method of joining persists throughout the entire structure.

Considering the plan view, as shown in Figure 8, it is to be noted that various units are put together so that their transverse wings are attached with their adjacent surfaces secured as above described, and so that each additional unit, transversely, is offset, staggered, or made relatively diagonal longitudinally as much as the thickness of the material of the transverse elements of the units. Thus, a diagonal line of juncture D—D extends somewhat diagonally transversely across the structure 25.

Similarly, the plane of juncture of the longitudinal wings is offset, or slightly staggered angularly so that each successive unit is set over the thickness of the material of each longitudinal element. Thus, there is a somewhat diagonal line of juncture, E, extending lengthwise, or longitudinally, of the entire structure.

Due to these angular or semi-diagonal lines of juncture the wings at the ends of the structure must be trimmed in order to make the wall ends square. This, however, is done after the structure is substantially completed. Building the roof starts with the placing of rows of joined units at one corner and proceeds by adding and attaching units 2 both longitudinally and transversely. After a portion of the structure is completed it may be braced as a unit and scaffolding for the whole structure is not needed. Once the structure has been assembled from side to side, or end to end, it is self-supporting and no further bracing or scaffolding is necessary. Very little scaffolding is necessary in any event for the additional reason that the workers installing the units use the completed portions of the structure as a ladder. When the entire structure is finished the side edges are supported upon the usual wall footings 30 and 31, while the end edges abut and are attached to an end wall 34.

Optionally, the roof structure 25 may be made flat as shown in Figures 8 and 3 by the use of units composed of elements both provided with straight top and bottom edges. On the other hand roofs may be developed by using units composed of elements curved in both directions.

As heretofore used the units have been made of fir plywood approximately 1 inch thick. The central notches were cut to receive the crossing elements tightly. The elements were approximately 12 inches deep and approximately four feet long. The structure, when put together, therefore, includes cells, marked "F" in Figure 8, approximately two feet square.

Dimensions vary according to the size of the structure. Likewise the relative depth of elements 3 and 4 may vary according to the load which they carry. Thus, in roofs where the transverse composite supporting elements, along lines parallel to line D—D carry more weight than the longitudinal composite elements, the latter may be made with less depth from the top to the bottom edge. Material may be saved by this means.

While the staggered or angular overlap method of joining wing faces makes it possible to use preformed uniformly sized and perforated elements, it is to be understood that alternate joining of the wing sides may be had. But this is not preferred because it requires individual fitting together of the units and drilling of the bolt holes after fitting.

I claim:

Roof structure composed of attached structural units of crossed flat rectangular elements having upper and lower edges and end edges and centrally disposed notches extending inward from opposite edges, respectively, of each element at the crossing position; each element being fitted to the other so that the portions extending from the crossing joint constitute wings having vertical side flanks; said units being fitted together to form a roof structure with the side flanks of each element of said respective units lapped and attached onto the side flanks of the elements of each adjacent unit, transversely and longitudinally, with the end edges of each element abutting the central portion of the flank of the crossing element of each adjacent unit; said element end portions being lapped on the same flank side successively, transversely and longitudinally of the roof structure forming lines of juncture angularly disposed relative to the sides and ends, respectively, of the roof structure.

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