

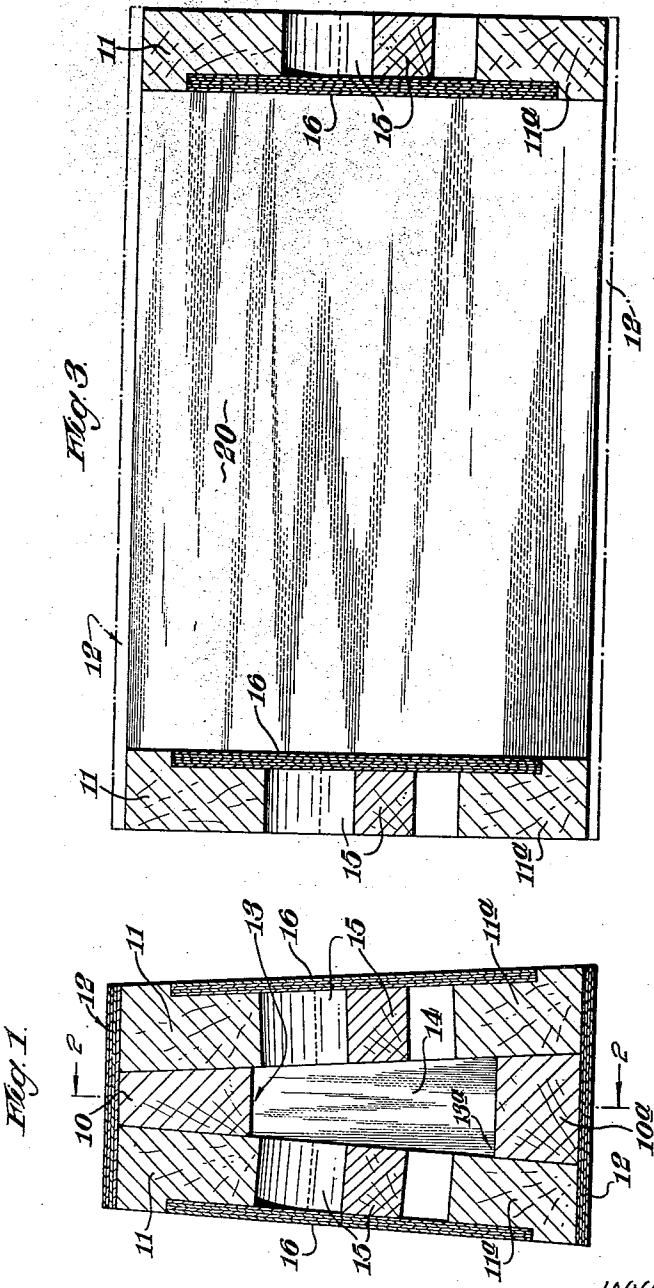
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L. O. L. HANNEN
WEB BEAM STRUCTURES

3,106,752

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2 Sheets-Sheet 1



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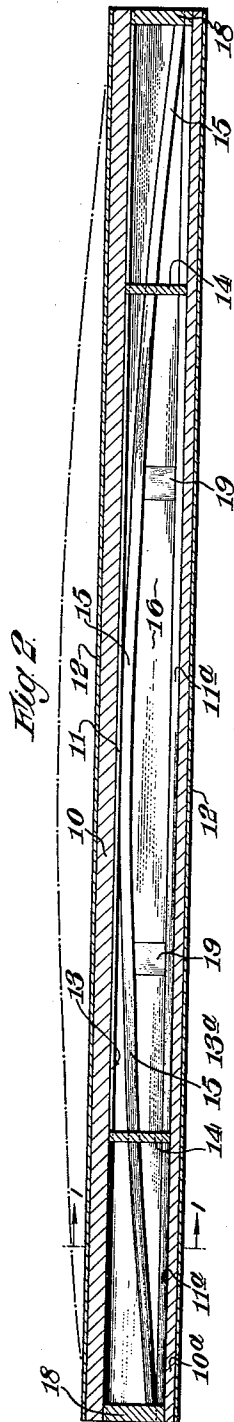
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WEB BEAM STRUCTURES

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1 Claim. (Cl. 20—5)

The present invention relates to beam structures such as fabricated wood beams made from lengths of timber and having webs usually of plywood.

The main object of the invention is to provide a beam of improved construction in which lateral strains are accommodated and shear deflection eliminated. A further object is to provide a fabricated wood beam structure of exceptional stiffness combined with light weight. Beams in accordance with the invention can be used separately for structural components if desired without lateral support, and in an upright position if desired.

Accordingly, the present invention provides a beam comprising upper and lower longitudinal elements extending from end to end of the beam, and a bowed or arched element extending from end to end and located between and engaging the upper and lower elements, said bowed or arched element being secured at each end to the one longitudinal element, and at its top to the other, and having two sets of upper and lower elements each with an arched or bowed element, which sets are united in parallel relation by spacing members.

At least one side face of each set may be faced with a web such as a plywood web.

In one arrangement, the sets of elements are spaced apart by upper and lower spacing elements, the sets being contiguous with the outer faces of the spacing elements. The said spacing elements may be cuneiform in transverse cross-section thereby to impart a taper to the beam.

Stiffeners may be provided to impart added strength, for example between the spacing elements and sets and spaced apart along the beam.

Conveniently, the upper elements or chords, in the form of battens, are separated by and united to a third spacing element therebetween, this third element being of cuneiform cross-section thereby to impart a slight inclination to the two upper elements. In this way a slight divergence is imparted to the planes of the bowed elements, and a similar arrangement can be resorted to at the bottom, the lower elements sloping correspondingly.

In a practical form, side closures or webs and top cover strips of multi-ply are included in the structure. Thus, in a preferred case, the beam is of a wedge shape in cross-section comprising an upper chord assembly, a parallel spaced bottom chord assembly, two identical bowed or arch elements in spaced parallel relation and between said assemblies and in planes which diverge slightly from the tops or arches downwardly, side covers of ply on the outer side of each arch element, cover strips if necessary on the outer faces of the upper and lower chord assemblies, and end closures for the built-up beams.

In another arrangement, the two sets are spaced apart by transverse webs or diaphragms spaced along the beam. In this arrangement, the upper elements can also be bowed or arched, providing a structure eminently suitable for curved roof constructions.

In order that a clear understanding of the invention may be obtained, reference will now be made to the accompanying drawings, illustrating purely by way of example, preferred constructions according to the invention, wherein:

FIGURE 1 is a transverse cross section through one form of beam, on the line I—I FIGURE 2,

FIGURE 2 a longitudinal section, and

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FIGURE 3 a view similar to FIGURE 1 of an alternative arrangement.

As shown in FIGURES 1 and 2 of the drawings, a beam includes an upper chord assembly consisting of a central batten 10 of cuneiform cross-section, and two outer battens 11, 11, each mounted against a sloping face or side of the central batten. The top surfaces of the three battens are co-planar, and covered by a plywood strip 12, and the outer battens are slightly deeper than the central batten to provide a shallow channel 13. A lower chord assembly is provided, this likewise including three battens 11a, 11a and 10a, the central batten 10a being wider than the top central batten 10 and of wedge shape of a cross-section in conformity with the cross-section of the top batten and related by the spacing between top and bottom assemblies. The two assemblies are spaced apart by means of stiffeners 14 spaced at intervals along the assemblies and of wedge shape, the ends being received in the facing channels 13, 13a, top and bottom.

Two bowed or arch elements 15, 15 are provided, each extending from end to end of the assembly, each end being fixed to one end on the top surface of an outer lower batten 11a, whilst the top is secured to the under-surface of the above upper batten 11. These arches are of a width slightly less than the width (from the channel to outer surface) of the outer battens, which latter are cut out from the outer surface whereby a cover strip or web of plywood 16 can be let into each side and there secured, the inner surface of each cover being contiguous with the outer surface of the arch at its side. A bottom cover 12 also is provided as are end closures 18. In the case where the plywood webs are in sections, the abutting ends are joined by suitable blocking on the inside below the arch, such as the blocks 19, FIG. 2.

Beams as above described can be of any convenient dimensions. As a typical example, beams can be of a top to bottom dimension of between 10 inches and 2 feet, of a top width of about 5 inches with an outspread downwardly at each side of approximately three to four degrees, and of a length to suit requirements. The beams can be used in upright position or horizontal. The construction with the arches and outspread enables high working stresses to be allowed for.

In the arrangement illustrated in FIGURE 3, the beam is constructed of members 11, 11a, as described with reference to FIGURES 1 and 2, and with a bowed element 15 between the members 11, 11a, but in this case, the assemblies are set up spaced apart by a plurality of plywood stiffeners, one of which 20 is shown, these being spaced out along the beam. In this arrangement the strip or web 16 is on the facing sides of the two assemblies 11, 11a.

The arrangement of FIGURE 3 is particularly advantageous where the beam is to support an arched roof structure, in which case the upper battens 11 can be bowed or arched according to the roof curvature.

The plywood facings need not be rebated into the members 11, 11a, but can be affixed simply to their outer surfaces. Top and bottom coverings, which can be of hardboard if desired, can be provided and the outer faces of the beam can also be covered in.

I claim:

A fabricated wooden beam, comprising,
a top chord including a pair of upper outer battens 11—11 having convergently related inner faces and an upper central batten 10 having convergently related outer faces wedgingly engaged with said inner faces, said upper and central battens each having a bottom face,
a bottom chord including a pair of lower outer battens

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11a—11a having convergently related inner faces and a lower central batten 10a having an upper face and convergently related outer faces wedgingly engaging with said last mentioned inner faces of the outer battens, said lower and central battens each 5 having an upper face,
vertical stiffeners 14 having top and bottom edge portions respectively engaging with the bottom face of the central batten 10 of the top chord and the upper face of the central batten of the bottom chord, 10
arched elements 15—15 at opposite sides of said vertical stiffeners and each having their ends fixed to the upper face of a related lower batten 11a and having their bowed portions secured to the bottom face of a related upper batten, 15

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and end walls 18 at the terminal portions of the outer battens 11—11+11a—11a.

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