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Bowling

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[54] **RIDGE ROOF BEAM**

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[52] **U.S. Cl.** **52/79,** 52/90, 52/593, 52/726

[51] **Int. Cl.** **E04c 3/00**

[58] **Field of Search** . 52/729, 726, 730, 79, 90, 642, 52/92, 93, 593; 287/20.92 TG

[56] **References Cited**

UNITED STATES PATENTS

2,334,113	11/1943	Malarkey	287/20.92 T
2,287,229	6/1942	Carpenter	52/79
3,170,198	2/1965	Snider	52/642

FOREIGN PATENTS OR APPLICATIONS

843,330	3/1939	France	287/20.92 T
897,622	7/1949	Germany	52/79
111,712	9/1944	Sweden	52/729

OTHER PUBLICATIONS

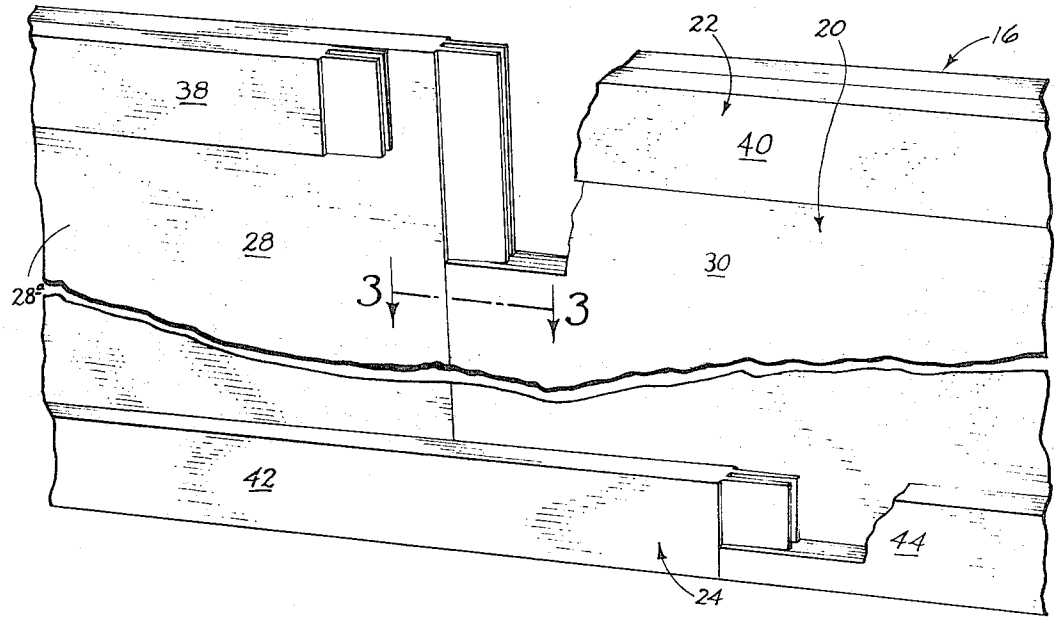
Plywood of the World, by Andrew D. Wood, pp. 423–426, published by Johnston & Bacon Ltd., 1963, TS/870/W6.

Primary Examiner—John E. Murtagh
Attorney, Agent, or Firm—Kolisch, Hartwell & Dickinson

[57] **ABSTRACT**

A ridge roof beam for a modular housing unit. The beam includes an elongated plywood web and a pair of elongated wood flanges extending adjacent and parallel to opposite edge margins of the web and secured in face-to-face relation to one face of the web. The web and flanges are each constructed of elongated wood sections bonded together in end-to-end relation. Finger grooves extending along adjacent end edges of the sections interlock to form a secure joint therebetween.

11 Claims, 5 Drawing Figures



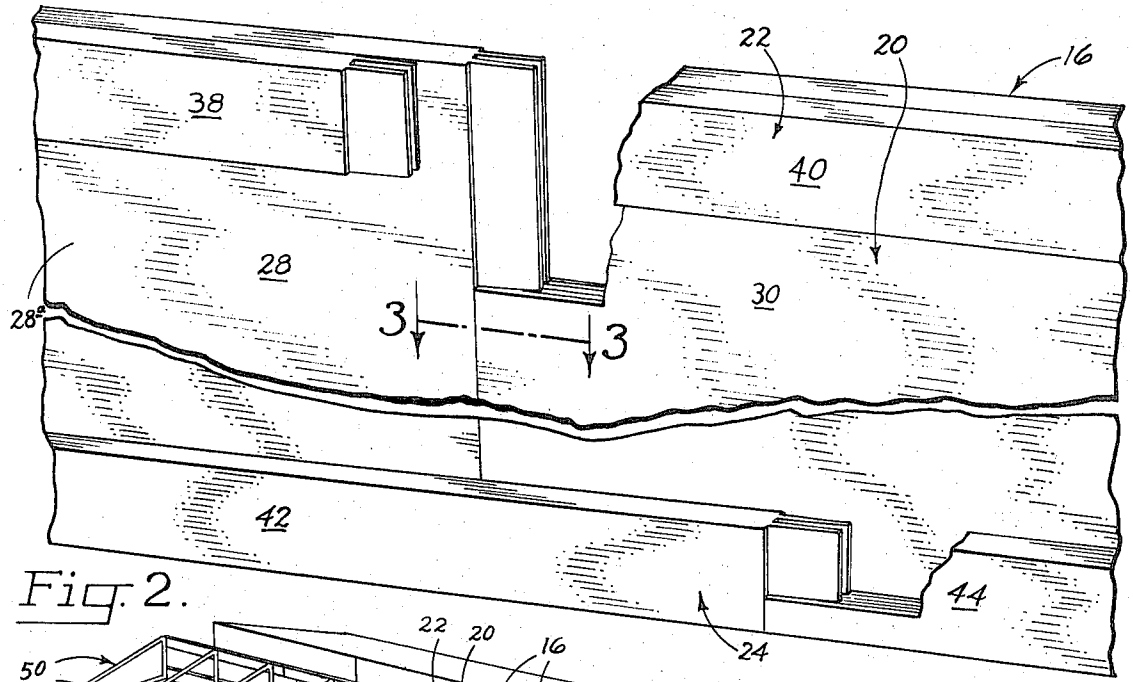


Fig. 2.

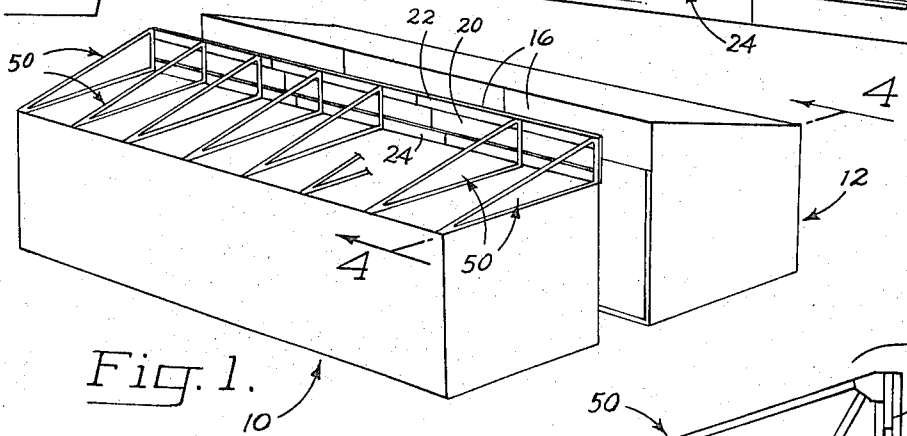


Fig. 1.

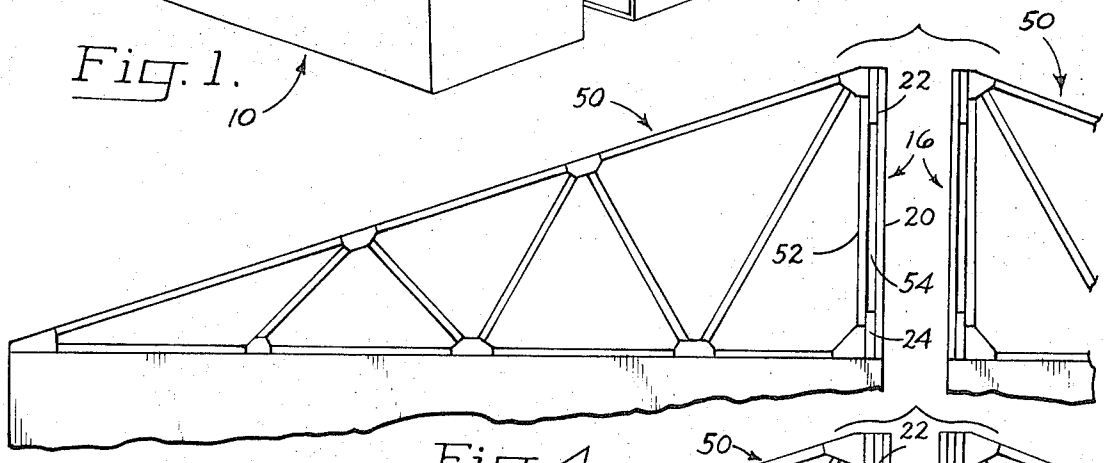


Fig. 4.

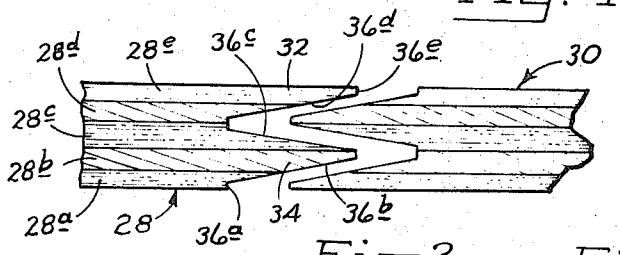


Fig. 3.

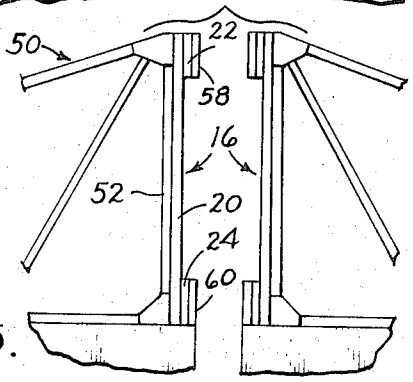


Fig. 5.

RIDGE ROOF BEAM

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to a beam, such as may be used as the ridge roof beam of a housing unit, and more particularly to such a beam which is constructed of multiple end-joined wood sections.

In the construction of modular housing units, which generally are manufactured at a central location and then transported to a desired site, it is desirable to construct the housing unit as light in weight and at as low a cost as possible, while still maintaining sufficient structural rigidity. A problem that has existed in the past is the provision of a ridge roof beam extending lengthwise of a housing unit which provides all of these desirable characteristics, i.e., light weight, structural rigidity, and low cost.

In the past, various types of ridge roof beams have been devised using plywood and/or lumber. Where plywood has been used previously, the beams generally have taken the form of a number of plywood sheets having square cut end edges which are merely laid together in end-to-end relation to form a long section, with a similarly-formed section glued in face-to-face contact wtih the first-mentioned section. The joints between adjacent sheets in the one section had to be offset longitudinally of the beam from joints between adjacent sheets in the other section to provide even minimum strength for the beam. Further, such beams had to be relatively heavy to provide sufficient span strength.

A general object of the invention is to provide a novel flanged beam which may be used as a ridge roof beam in a modular housing unit, which beam has excellent strength characteristics for spanning long distances while being relatively light weight and inexpensively constructed.

More specifically, an object is to provide a beam which has a web constructed of a plurality of elongated plywood web sections bonded together in end-to-end relation at finger joints along adjacent sets of ends of the sections, and flanges secured to one face of the web and extending adjacent and parallel to opposite longitudinal margins of the web. The flanges may be constructed of plywood sections bonded in end-to-end relation at finger joints therebetween. The bonding together of sections in the beam through finger joints produces good continuous strength throughout the length of the beam, and the flanges secured adjacent opposite edge margins of the web provide good load bearing strength with minimal weight.

DRAWINGS

These and other objects and advantages will become more fully apparent as the following description is read in conjunction with the drawings, wherein:

FIG. 1 is a perspective view of a pair of mating, complemetary modular housing units which may be joined together to form an integral structure, each unit employing a ridge roof beam according to the invention;

FIG. 2 is an enlarged perspective view of a section of a ridge roof beam separated from its associated housing unit, with portions of the beam broken away;

FIG. 3 is an enlarged cross-sectional view taken generally along the line 3—3 in FIG. 2 of a finger joint between adjacent sections in the beam;

FIG. 4 is an enlarged view taken generally along the line 4—4 in FIG. 1; and

FIG. 5 is a view of a modified version of the invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings, and first more specifically to FIG. 1, at 10, 12 are illustrated generally a pair of modular housing units. The units are illustrated spaced apart with a pair of mating, complementary sides of the units facing each other. The facing sides of the two units may be moved into engagement with each other and secured together, with the combined units forming an integral structure.

Each unit has an elongated ridge roof beam 16 extending longitudinally along one of its sides for supporting the roof structure of the unit. Referring to FIG. 2, where a portion of a beam 16 is illustrated in detail, it will be seen that the beam includes an elongated web 20 and a pair of spaced-apart elongated flanges 22, 24. The flanges are secured, as by gluing, in face-to-face relation to one face of the web and extend parallel to and adjacent opposite longitudinal edge margins of the web.

Web 20 is constructed of a plurality of elongated plywood web sections, such as those illustrated partially at 28, 30, joined together in end-to-end relationship. Each section is illustrated as being made of 5-ply plywood (as seen in FIG. 3), although it will be understood that plywood of a different number of plies also may be used. The veneer sheets which are glued together along glue lines between their contiguous faces to form section 28 are indicated in FIG. 3 at 28*a*, 28*b*, 28*c*, 28*d*, 28*e*. Veneer sheets 28*a*, 28*e* forming the outer, or opposite, face plies of the web section are disposed with the grain thereof extending generally in a direction longitudinally of the beam and, as is common for plywood sheets, these face plies extend the full length of their associated section.

Housing units as illustrated at 10, 12 may be 50 feet or more in length and beam 16 may extend the full length of the unit. Plywood generally is produced in sheet 8 or 10 feet in length. Thus it may require five or more end-joined web sections to form the web for such beam.

As is seen in the broken-away portion of FIG. 2 and in the cross-sectional view of FIG. 3, adjacent end edges of web sections 28, 30 have mating, complementary grooves extending lengthwise of the edges. Referring specifically to FIG. 3, each grooved end edge provides a pair of fingers, such as those illustrated generally at 32, 34, on panel 28, extending between opposite longitudinal edge margins of the web section and paralleling the faces of the web section. The grooves provided between these fingers receive similar fingers on an adjacent section.

The fingers in the end edge of a panel are formed by making a cut along the edge of the section to produce a first surface 36*a* spaced inwardly from the end edge of the section extending inwardly from an outer face of outer sheet 28*a* at a substantial angle relative thereto and terminating at an inner edge intermediate the faces of sheet 28*a*. A second surface 36*b* extends from the inner edge of the first surface in a plane inclined at a

low angle away from the outer surface of the sheet, across a glue line between veneer sheets **28***a*, **28***b*, to the end edge of the section. A third surface **38***c*, disposed toward the other face of the section from second surface **36***b*, extends away from the end edge of the section in a plane inclined at a low angle, across the glue line between sheets **28***b*, **28***c*, to an inner end spaced from the end edge of the sheet. A fourth surface **36***d* extends substantially parallel to second surface **36***b* from the inner end of third surface **36***c* to the end edge of the section, with the fourth surface intersecting the end edge in a region intermediate the faces of outer veneer sheet **28***c*. A fifth surface **36***e* extends at a substantial angle relative to the outer face of the section between fourth surface **36***d* and the outer face of the veneer sheet.

The grooved end of section **30** has a configuration similar to that described for section **28** and, in fact, may be formed with the same cutter head. Section **30**, as illustrated in FIG. **3**, is merely turned over from the position of section **28** so that their grooved ends are complementary.

Sections **28, 30** are joined together along their adjacent grooved edges by applying adhesive therebetween, and forcing them longitudinally into one another with the fingers on the adjacent edges interlocking. Heat and pressure may be applied against the outer surfaces of the joint during curing of the adhesive to assure that a secure bond is obtained between the sections. Surfaces **36***a*, **36***e* extending at sharp angles inwardly from the outer surfaces of the face plies assure that there will be no splinter edges lying along the outer faces of the sections.

Each of flanges **22, 24** as illustrated are formed of a plurality of elongated plywood flange sections. Portions of a pair of flange sections **38, 40** for flange **22** and portions of a pair of flange sections **42, 44** for flange **24** are illustrated in FIG. **2**. The flange sections are joined together in end-to-end relationship through interlocking adhesively bonded finger joints formed by grooves at their adjacent sets of ends, similar to those described above for the interlocking finger joints between the web sections. The flanges have widths which are less than half the width of the web section and are secured adjacent opposite longitudinal edge margins of web **20**. The flange sections illustrated are formed of 5-ply plywood in which the grain in the outer veneer sheets forming opposite face plies for each flange extends generally longitudinally of the beam. It should be understood that the flanges also may be formed of a plurality of elongated pieces of lumber joined together through adhesively bonded finger joints formed by grooves at their adjacent sets of ends, similar to those described above joining the web sections.

The flanges are secured in face-to-face relationship with one face of the web of the beam by being secured thereto, as by adhesive. Although the figures herein illustrate flanges secured only to one face of the web, it is recognized that in certain instances it may be desirable to provide a beam having flanges secured to both of its faces, and such is intended to be covered by this disclosure also.

As is illustrated in FIGS. **1** and **2**, the joints between adjacent flange sections are offset in a direction longitudinally of the beam from the joints between adjacent sections of the web. This lends to the continuity of strength of the beam along its length. The depth of the web and the widths of the flanges will be dictated by the length of span and the loads to be born by the beam.

In use, a beam is supported at its opposite ends on the end walls of a modular housing unit. Roof trusses, such as those illustrated at **50** in FIGS. **1, 2** and **4**, are secured to and extend laterally outwardly from the beam. As illustrated in FIG. **4**, an upright leg **52** of a truss is secured, as by nailing, to flanges **22, 24** of the beam. A spacer block **54** interposed between leg **52** and web **20** of the beam provides a solid nailing region through which nails or staples can be driven from leg **52** into the web of the beam.

A modular housing unit with such a ridge roof beam may be placed against an adjacent unit with the webs of the beams in face-to-face contact. The beams may be bolted together through their flanges to produce an integral structure.

A modified version of the invention is illustrated in FIG. **5**. A beam **16**, having a web **20** and flanges **22, 24**, may be strengthened, as illustrated in FIG. **5**, by securing other flanges, such as those indicated at **58, 60**, to those faces of flanges **22, 24** which face outwardly and away from the web. Flanges **58, 60** are constructed of multiple finger jointed and adhesively bonded together flange sections as previously described for flanges **22, 24** and extend continuously the length of the beam.

As illustrated in FIG. **5** also, the upright leg **52** of a truss **50** may be secured to the face of the web opposite the face to which the flanges are secured. This obviates the need for a block **54** between leg **52** and web **20** as was required in FIG. **4**. The beam still may be secured, as by bolting, to an adjacent beam in a mating housing unit.

A beam, thus constructed, is relatively inexpensive to produce, has excellent continuous span strength, and does not add greatly to the weight of the housing unit. For these reasons, it has proven to be a desirable support for roof structures in modular housing units.

While a preferred embodiment of the invention has been described herein, it should be apparent to those skilled in the art that variations and modifications are possible without departing from the spirit of the invention.

It is claimed and desired to secure by Letters Patent:

1. A beam comprising

an elongated continuous web including a plurality of elongated plywood web sections joined in end-to-end relation, each plywood web section including a pair of outer veneer sheets extending fully the length of the section with the grain of said outer veneer sheets extending generally longitudinally of the beam, and a plurality of interior veneer sheets therebetween, said veneer sheets being adhesively bonded together in face-to-face relation along glue lines between contiguous sheets, each web section having a groove formed in an end edge thereof receiving an end edge of an adjacent web section, with said adjacent web sections being bonded together along said adjacent edges, and

at least a pair of elongated, laterally spaced flanges extending adjacent and parallel to opposite longitudinal edge margins of said web and secured to at least one face of the web, each of said flanges including a plurality of elongated wood flange sections joined in end-to-end relation, each flange sec-

tion having a groove formed in an end edge thereof receiving an end edge of an adjacent flange section, with said adjacent flange sections being bonded together along said adjacent end edges.

2. The beam of claim 1, wherein the groove in an end edge of a web section extends lengthwise of said end edge.

3. The beam of claim 1, wherein the groove in an end edge of a flange section extends lengthwise of said end edge.

4. The beam of claim 1, wherein the flanges are positioned on said web with the joints between adjacent flange sections offset in a direction longitudinally of the beam from a joint between adjacent web sections.

5. The beam of claim 1, wherein adjacent end edges of adjacent sections have mating complementary groove configurations.

6. The beam of claim 1, wherein the other faces of said outer veneer sheets define outer faces for the section, and a grooved end edge of a web section has a first surface spaced toward the opposite end of the section from said edge, said first surface extending inwardly from an outer face of one of the outer sheets at a substantial angle relative to said face of the sheet and terminating at an inner edge intermediate the faces of said outer sheet, a second surface extending from the inner edge of the first surface in a plane inclined at a low angle away from the outer face of said outer sheet across a glue line between adjacent sheets to the end edge of the section, a third surface disposed toward the other outer veneer sheet from said second surface, said third surface extending away from said end edge of the section in a plane inclined at a low angle relative to the faces of the section across another glue line in the section to an inner end spaced from said end edge, a fourth surface extending substantially parallel to said second surface from said inner end of the third surface to the end edge of the section, said fourth surface intersecting said end edge in a region intermediate the faces of the other outer veneer sheet, and a fifth surface at the end edge of the section extending at a substantial angle relative to the outer face of the section from the intersection of said fourth surface with the end edge to the outer face of said outer veneer sheet.

7. The beam of claim 1, wherein each flange section includes a pair of veneer sheets forming opposite face plies of the section and the grain of said sheets extends generally longitudinally of the beam, and the flanges are adhesively bonded to the web with a face ply of each flange section against an outer face of the web.

8. In a modular housing unit adapted to be joined together along one of its sides with another housing unit, a ridge roof beam extending along said side of the housing unit, said beam comprising

an elongated continuous web including a plurality of elongated plywood web sections joined in end-to-end relation, each plywood web section including a pair of outer veneer sheets extending fully the length of the section with the grain of said outer veneer sheets extending generally longitudinally of the beam, and a plurality of interior veneer sheets therebetween, said veneer sheets being adhesively bonded together in face-to-face relationship, each web section having a groove formed in an end edge thereof receiving an end edge of an adjacent web section, with said adjacent web sections being bonded together along said adjacent edges, and

a pair of elongated, laterally spaced flanges extending adjacent and parallel to opposite longitudinal edge margins of said web and secured to one face of the web, each of said flanges including a plurality of elongated plywood flange sections joined in end-to-end relation, each flange section having a groove formed in an end edge thereof receiving an end edge of an adjacent flange section, with said adjacent flange sections being bonded together along said adjacent end edges.

9. The housing unit of claim 8, wherein the groove in an end edge of a web section extends lengthwise of said end edge.

10. The housing unit of claim 8, wherein the groove in and end edge of a flange section extends lengthwise of said end edge.

11. The housing unit of claim 10, wherein each flange section includes a pair of veneer sheets forming opposite face plies of the flange section and the grain of said sheets extends generally longitudinally of the beam, and the flanges are adhesively bonded to the web with a face ply of each flange section against an outer face of the web.

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