

March 22, 1966

J. C. JUREIT

3,241,585

UNIVERSAL JIG ASSEMBLY

Filed Oct. 5, 1962

3 Sheets-Sheet 2

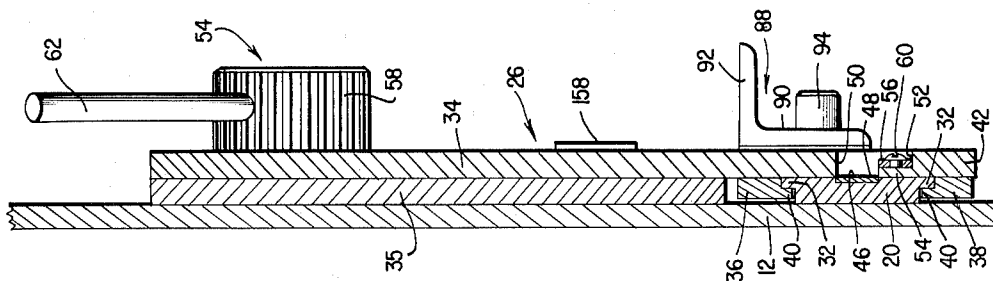


FIG. 3

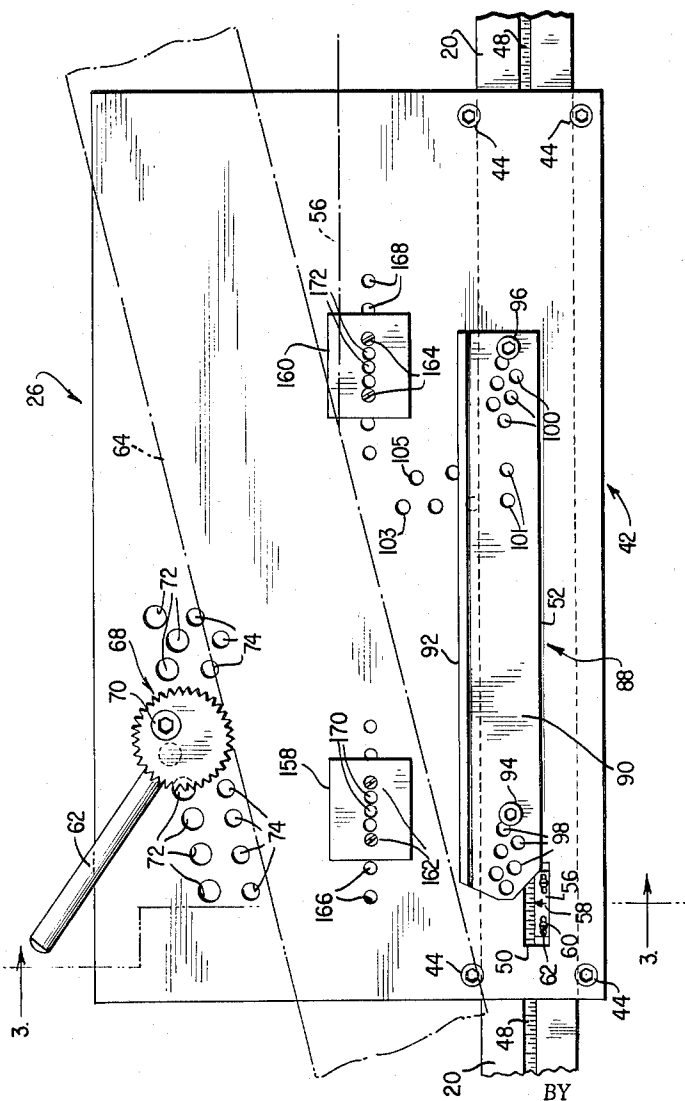


FIG. 2

INVENTOR
JOHN C. JUREIT

LeBlanc and Shur

ATTORNEYS

1

2

3,241,585

UNIVERSAL JIG ASSEMBLY

John Calvin Jureit, Miami, Fla., assignor to Automated Building Components, Inc., Miami, Fla., a corporation of Florida

Filed Oct. 5, 1962, Ser. No. 228,662

3 Claims. (Cl. 144-288)

This invention relates to a jig for use in assembling prefabricated wooden structural members and more particularly relates to an improved jig which is universal in nature in that it is capable of efficient use to prefabricate a wide variety of differently shaped structural members.

In recent years, the building trades have shown a marked trend toward prefabrication, particularly in the construction of relatively low-cost residential housing. Various portions of frame houses have been preassembled in this fashion, the most common prefabricated element probably being the monoplane roof truss. This prefabrication itself has undergone an evolution from hand nailing and bolting of the roof trusses to the vastly improved mode of construction which was made possible by the advent of structural butt joints formed with unitary connector plates of the type described in United States Patent No. 2,877,520, issued March 15, 1959.

In practically all monoplane roof truss assemblage, even the earlier type utilizing hand-nailing, it has been desirable, if not necessary, to preassemble the wooden structural elements on some type of frame or jig which held the elements in the proper position for the application of the connector devices. Generally speaking, these jigs were tailored to the specific structural element being constructed and were adapted to being used to form different structural elements only upon a major modification of the jig. This either necessitated the use of a plurality of different jigs when different types of structural units were to be manufactured, or, involved costly jig assemblies and expensive labor in modifying the jig in order to change from the manufacture of one type of structural unit to another. In both cases costs were adversely affected and the rate of production limited.

According to the present invention it has now been found possible to provide an improved universal jig which, as an example, is capable of performing a wide variety of different shapes and types of roof trusses with only minor resetting of the jig. Further, the jig of the invention is formed in such a manner as to permit rapid jig loading and unloading with a minimum of labor so as to permit a high rate of production at a relatively low cost.

It is accordingly a primary object of the present invention to provide an improved jig assembly for prefabricating wooden structures.

It is another object of the invention to provide an improved jig assembly for prefabricating wooden structures wherein the jig assembly is universal in nature to permit the manufacture of a large variety of different shape and size wooden structures on the same jig without major modification of the jig itself.

It is another object of the invention to provide a universal jig assembly of the foregoing type which permits of rapid loading and unloading of the jig with a minimum of labor.

It is another object of the invention to provide a jig assembly which makes it possible to press connector plates into both sides of the lumber simultaneously.

It is still another object of the invention to provide an improved universal jig assembly for use in prefabricating structural wooden members which permits the use of different sizes of lumber in the wooden members.

These and further objects and advantages of the invention will become more apparent upon reference to the following specification and claims and the appended drawings wherein:

FIGURE 1 is a plan view of a universal jig assembly constructed according to the invention showing wooden structural members clamped in place preparatory to the formation of a gable type truss assembly;

FIGURE 2 is a plan view of a heel reaction pad assembly used in the jig of FIGURE 1;

FIGURE 3 is a vertical sectional elevation taken along the line 3-3 of FIGURE 2;

FIGURE 4 is a plan view of a universal jig assembly constructed according to the present invention set up to produce a hip type truss assembly; and

FIGURE 5 is a vertical section of a portion of the jig assembly of FIGURE 1 taken substantially along the line 5-5 of FIGURE 1.

Referring to FIGURE 1 of the drawings, a universal jig assembly constructed in accordance with the invention is illustrated generally at 10. The jig assembly comprises a jig pad or pallet 12 formed of a large heavy sheet of metal or of a thin sheet of metal suitably reinforced, or of any other suitable structural material upon which the elements of the jig may be mounted. For purposes of clarity, only the center and lefthand portion of the complete universal jig assembly are shown. It is to be realized, however, that the complete assembly consists of a righthand portion which is constructed in substantially the same manner as the lefthand portion shown and is connected to the lefthand portion along the broken line 13.

Mounted at the center of the jig pad 12 and extending transversely and vertically thereacross is a stationary vertical peak guide bar 14 which carries a peak reaction pad 16 slidably mounted for movement thereon. Extending perpendicular to the peak guide bar 14 along the entire length of the jig pad 12 are a series of stationary guide bars generally indicated at 18. These guide bars consist of the heel guide bar 20, which terminates at 22 where it abuts the 1/2 point guide bar 24 which extends to the center of the jig pad. A heel reaction pad 26 is slidably mounted on the heel guide bar 20 while a 1/2 point reaction pad 28 and a splice reaction pad 30 are mounted on the 1/2 point guide bar 24.

The stationary guide bars 14, 20 and 24 are identical in construction and are illustrated in FIGURE 3 which represents a cross section through the heel guide bar 20 along the line 3-3 of FIGURE 2. Referring to FIGURE 3, it will be seen that the guide bar 20 consists of an elongated metal strip having flanges 32 which give the strip a generally T shaped cross section. The guide bar may be secured to the jig pad in any suitable manner, such as by bolting, welding or riveting. The heel reaction pad 26 consists of a metal plate 34 which is slidably secured to the guide bar 20 by a pair of metal strips 36 and 38 having flanges 40 which matingly engage the flanges 32 on the bar 20. A second plate 35 is secured to the back of the plate 34 in any suitable manner, such as by bolting, welding or riveting, and is substantially the same thickness as the guide bar. The strips 36 and 38 are secured to the heel reaction pad 26 in any suitable manner, such as by means of countersunk Allen headed screws 44 best seen in FIGURE 2. These screws may be tightened to lock the reaction pad in position on the guide bar or may be loosened to permit sliding motion of the reaction pad relative to the guide bar.

Running along the centerline of the horizontal guide bar 20 is a channel 46 (FIGURE 3) in which there is mounted a tape 48 bearing suitable indicia, such as foot and inch markings. Referring to the lower left corner of the heel reaction pad seen in FIGURE 2, an elongated

3

slot 50 is cut into the pad directly above the tape 48. Immediately adjacent the slot 50 the heel reaction pad is cut out at 52 (FIGURE 3) to form a thin flange or shelf 54 on which is mounted an elongated pointer plate 56. The pointer plate 56 is provided with a pointer 58 (FIGURE 2) and is adjustably secured in position by means of a pair of screws 60 entering elongated slots 62 to permit accurate adjustment of the position of pointer 58. It will be apparent that by observing the position of the pointer 58 relative to the indicia on the tape, the heel reaction pad can be accurately located on the jig pad 12.

The $\frac{1}{4}$ point reaction pad 28 and the splice reaction pad 30 are provided with similar slots and adjustable pointers indicated generally at 64 and 66, in FIGURE 1.

Referring again to the heel reaction pad shown in FIGURES 2 and 3, a circular cam 68 having a serrated periphery is eccentrically pivoted to the heel reaction pad by a bolt 70, and a handle 72 is provided for rotating the cam about the bolt. The bolt 70 is screwed into any one of a series of threaded holes 72 or 74 which are provided for a purpose presently to be described. The splice reaction pad 30 is provided with similar cams 76 and 78 having handles 80 and 82 (FIGURE 1). The $\frac{1}{4}$ point reaction pad is provided with no cam but with a lumber locating pin 84.

Again referring to the heel reaction pad shown in FIGURES 2 and 3, an elongated angle 88 having a base 90 and upstanding flange 92 is affixed to the heel reaction pad by means of a pair of screws 94 and 96 having Allen heads. The width or height of the upstanding flange 92 must be greater than the length of the teeth in the connector plate to be used so that the lumber will abut the flange when mounted on top of the teeth in order that one step pressing may be accomplished. The screws 94 and 96 pass through any one of a series of holes 98, 100 and 101 in the base 90 of the angle 88 and are received in screw-threaded openings in the heel reaction pad 26. A pair of parallel rows of screw-threaded openings 103 and 105 are also provided in the heel pad in lines perpendicular to the guide bar 20 for a purpose presently to be described.

The $\frac{1}{4}$ point reaction pad 28 and the splice reaction pad 30 are provided with similar angles 102 and 104 as is best seen in FIGURE 1.

Still referring to FIGURE 1, a pair of parallel vertical stationary guide bars 106 and 108 are disposed near the left end and near the center of the jig pad respectively and provide an adjustable mounting for a horizontal $\frac{1}{4}$ point movable guide bar 110. Referring to FIGURE 5, there is shown a detail of the method of securement of the left end of the movable $\frac{1}{4}$ point guide bar. As will be seen, the left end of the movable guide bar 110 is attached to a connector plate 112 slidably mounted on the $\frac{1}{4}$ point stationary guide bar 106. The stationary $\frac{1}{4}$ point guide bars 106 and 108 have a T-shaped cross section similar to the stationary guide bar 18 and the connector plate 112 is slidably secured thereto by means of flanged strips 114 secured in position by means of screws illustrated in phantom at 116 in FIGURE 5.

The right end of the connector plate 112 is slotted at 118 to receive a pin 120 screw-threadedly affixed to the left end of the $\frac{1}{4}$ point movable guide bar 110. This same end of the movable $\frac{1}{4}$ point guide bar 110 is rounded at 122 to permit easy adjustment of the position of the bar. The right end of the movable $\frac{1}{4}$ point guide bar 110 is adjustably mounted on the fixed $\frac{1}{4}$ point guide bar 108 by means of a second connector plate 124 and pivot pin 126 mounted on the movable guide bar and passing through a suitable hole in the connector plate 124. The right end of the movable $\frac{1}{4}$ guide bar is also rounded as indicated at 128.

The fixed $\frac{1}{4}$ guide bars 106 and 108 and the movable $\frac{1}{4}$ point guide bar 110 are provided with ruled tapes 130, 132 and 134 similar to the tape 48 provided in the horizontal guide bar 18 and described in detail in conjunction with FIGURES 2 and 3. In a similar manner, the con-

4

necter plates 112 and 124 are provided with slots and adjustable pointers indicated at 136 and 138 in FIGURE 1.

The construction of the $\frac{1}{4}$ point guide bar 110 with the slotted connection at the left end and the pivotal connection at the right end permits easy movement of the bar by one man. That is to say, the connector plates 112 and 124 may be separately moved without resulting in binding and without the necessity of one man at each connector plate.

The peak reaction pad 16 on the peak guide bar 14 carries a pair of cams 140 and 142 which cooperate with a plurality of positioning pins 144 to properly position the lumber of the truss element. A positioning slot 146 is provided in the center of the reaction pad 16 to permit viewing of a tape 148 situated in the center of the guide bar 14 in a manner previously described.

A $\frac{1}{4}$ point reaction pad 150 is mounted for horizontal movement along the movable $\frac{1}{4}$ point guide bar 110 and is provided with a slot and pointer assemblage 152 for viewing the tape 134 mounted on the movable guide bar 110. A cam 154 cooperates with a locating pin 156 to hold the lumber members in position.

The jig of this invention is intended for use in the manufacture of monoplane roof trusses joined with structural butt joints of the type described in U.S. Patent No. 2,877,520. Those particular joints are formed from butted wooden members held together by unitary connector plates which serve as the sole stress transmitting elements between the butted wooden members. The plates are provided with a plurality of slender elongated and nail-like teeth which serve the dual function of transmitting shear stress, while at the same time providing the necessary withdrawal resistance to hold the plate in position on the wooden members. In utilizing the jig of the invention, a series of plates of the type disclosed in U.S. Patent No. 2,877,520 are spotted on the jig pad with the teeth extending upwardly prior to setting the wooden members on the pad. The wooden members are then disposed on top of the teeth of the plates and a second set of connector plates is then laid on top of the wooden members with the teeth directed downwardly so that a single pressing operation is effective to completely form the roof truss. In order to provide for rapid production line operation, the jig of the present invention provides a means for accurately positioning the connector plates in the jig loading operation.

Referring to FIGURES 2 and 3, the heel reaction pad 26 has mounted thereon a pair of rectangular plates 158 and 160 which are formed of a thickness of sheet metal which is substantially the same as the thickness of the connector plates being used in the truss assembly. The plates 158 and 160 are affixed to the heel reaction pad 26 by means of pairs of screws 162 and 164. In order to provide for the use of connector plates of different sizes and in order to provide for different positioning of the connector plates on the heel reaction pad, the reaction pad carries series of threaded holes 166 and 168 for reception of the screws 162 and 164. The plates 158 and 160 also carry a series of vernier holes 170 and 172 which are more closely positioned than the holes 166 and 168 to provide a vernier positioning arrangement. Similar connector plate positioning arrangements may be used on the other reaction pads.

Referring to FIGURE 1, the jig is shown as being set up to produce a gable type truss consisting of bottom or tie chords 176 and 178, top chords 180 and 182, and web members 184, 186 and 188, the righthand end of the truss being a mirror image of the left side of the truss. In setting up the jig assembly to produce a gable type truss of this type the following steps are taken.

With the desired dimensions of the truss known, the various reaction pads are properly positioned along the guide bars according to previously recorded data by simply aligning the pointers on the respective reaction pads with the appropriate indicia on the underlying tape. The heel reaction pad 26 is placed at a point representing the end

of the bottom chord or tie beam 176 and the $\frac{1}{3}$ point reaction pad is positioned at approximately one-third the length down the bottom chord at the point where the web members 184 and 186 meet the bottom chord 176. The splice reaction pad 30 is positioned to hold together the two pieces of lumber which form the bottom chord and also to hold a king post if one is used. The peak reaction pad 16 is positioned so as to hold together the top chords 180 and 182 and web members 186 and 188.

The $\frac{1}{4}$ point reaction pad 150 is moved both vertically (by moving the connector plates 112 and 124 along guide bars 106 and 108) and horizontally (by movement of the reaction pad 150 along the movable guide bar 110) to the position where the web member 184 abuts the top chord 180. Each of the reaction pads are then secured in place on their respective guide bars by tightening their various locking screws or bolts.

The plates 158 and 160 for locating the joint forming connector plates on the heel reaction pad 26 are fastened to the heel reaction pad by the screws 162 and 164 in their proper predetermined positions for the size plates and truss involved. Similar location of the connector plate locating devices for the other reaction pads is accomplished. Suitable connector plates are then dropped onto the various reaction pads and are positioned by the positioning means such as the metal plates 158 and 160.

The various chord and web members used to form the truss are then placed on the jig over these plates and are secured in position by the various cams. Further metal connector plates are then placed on top of the various chord and web members at the reaction pads with the teeth of the upper connector plates being directed downwardly and the teeth of the lower connector plates being directed upwardly. The jig assembly is then disposed between the base and the head of a suitable press which simultaneously presses both connector plates into the wooden members to complete the assembly of the truss in the one pressing operation.

As this pressing occurs the chords move downwardly from a position above the reaction pads where they are supported by the teeth of the bottom connector plates to a final position in abutment with the reaction pads. During this movement, the serrations on the various cams, being parallel to the axis of rotation of the cams and parallel to the direction of movement of the lumber, permit sliding motion of the wooden members without releasing the cams. The jig assembly may then be removed from the press, the cams released, and the completed roof truss removed as a unit from the jig assembly.

Referring to FIGURE 2, the two rows of holes 72 and 74 in which the bolt 70 mounts the cam 68 are provided for 2 x 4 and 2 x 6 lumber respectively. The plurality of holes in each row are provided for accommodating different slopes and dispositions of the chord members. The multiple holes 98, 100 and 101 in the angle 88 and the threaded holes 103 and 105 in the jig pad, permit adjustment of the position of the angle 88 to provide different cambers and to permit the use of the jig where the bottom chord has a large angle such as, for example, in scissor trusses. In a similar manner, various locating holes are provided in the reaction pads for the lumber locating pins 156 on reaction pad 150 and 144 and on reaction pad 16.

The over-all versatility of the universal jig assembly of the invention may be further understood by referring to FIGURE 4 wherein the jig assembly is set up to produce a hip-type truss. A hip-type truss consists of a center top chord 190, a top chord 192, bottom chords 194, web members 196 and 198, and metal struts 200, 202 and 204. The metal struts may be of the type described in U.S. Patent No. 3,025,577, issued March 20, 1962. The $\frac{1}{4}$ point movable guide bar 110 carries the same $\frac{1}{4}$ point reaction pad 150 as in the preceding embodiment of the invention and carries an additional reaction pad 150', the pads being provided with suitable lumber positioning pins 206 and 208. In a similar manner, the lower guide

bar 20 carries, in addition to the splice reaction pad 30, $\frac{1}{3}$ point reaction pad 90 and heel pad 26, an additional reaction pad 210 having lumber locating pins 212. All of the reaction pads on the guide bar 20 are provided with suitable lumber abutting angles, such as the angle 52 on the heel reaction pad 50. A further pad 214 is provided beneath the junction of the top chord 192 and the strut 200. It will be noted that an additional $\frac{1}{4}$ point movable guide bar 110' is shown in FIGURE 4 and this is done merely to illustrate the versatility of the jig assembly to receive additional guide bars where desired.

It should be noted that if it becomes desirable to manufacture trusses having a high pitch, the peak guide bar 14 may readily be extended by bolting an out-rigger plate at the top of the jig pad 12 and connecting an extension guide bar on the outrigger plate so that it is aligned with and abuts the upper end of the guide bar 14.

Suitable indicia may be provided on the reaction pads adjacent the various holes therein and on the jig pad itself adjacent the various holes so that a jig set-up for a particular type truss may be rapidly accomplished by reference to previously established tables. In this manner, it is possible to easily handle an almost endless variety of roof trusses by simply referring to the tables and mounting the various reaction pads and reaction pad elements accordingly. The universal jig assembly of the invention thus permits rapid jig set-up and efficient, fast truss production. The jig assembly is adapted to handling a very wide variety of shapes and sizes of trusses such that the over-all cost of a truss manufacturing plant is substantially reduced since the same jig assembly may be used in the construction of such a large variety of trusses.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. An improved universal jig assembly for permitting facile prefabrication of wooden structures by forming butt joints between a plurality of wooden structural members through the use of unitary connector plates driven into both sides of such structural members by a pressing operation comprising: a flat rectangular pallet having a top, bottom and side edges; a first stationary vertical guide bar mounted at the center of said pallet; a second and third stationary guide bar mounted parallel to said first guide bar at each edge of said pallet; a fourth stationary guide bar mounted parallel to and between said first and second guide bar; a fifth stationary guide bar mounted parallel to and between said first and third guide bar; a sixth stationary guide bar mounted horizontally along the bottom of said pallet and spaced a predetermined distance from the ends of said first, second, third, fourth and fifth stationary guide bars; a seventh guide bar mounted between and movable along said second and fourth guide bars; an eighth guide bar mounted between and movable along said third and fifth guide bars; a peak reaction pad mounted on and slidable along said first guide bar; a heel reaction pad mounted on each end and slidable along said sixth guide bar; at least three splice reaction pads mounted on and slidable along said sixth guide bar; said heel and splice reaction pads extending toward said top edge from said sixth stationary guide bar a distance less than said predetermined distance; a one-quarter point reaction pad mounted on and slidable along each of said seventh and eighth guide bars; each of said reaction pads having clamping means for securing said pads in a selected position on said guide bars, said clamping means including guiding surfaces for guiding the movement of the structural mem-

7

bers during the prefabrication assembly and means for accurately positioning said reaction pads along said guide bars whereby the arrangement of said jig may be quickly and easily changed.

2. A jig according to claim 1 including means for connecting said seventh and eighth guide bars between said second and fourth and between said third and fifth guide bars, respectively, which permits said seventh and eighth guide bars to be pivotable about their ends for preventing binding.

3. A jig according to claim 1 wherein at least one end

8

of each of said seventh and eighth guide bars is movable in a direction parallel to said side edges of said pallet.

References Cited by the Examiner

UNITED STATES PATENTS

2,973,022	2/1961	Danielson et al.	1—149 X
2,983,292	5/1961	McKinley	1—149 X
3,100,301	8/1963	Black	1—149 X

10 GRANVILLE Y. CUSTER, Jr., *Primary Examiner.*