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Miami, Fla.
 [32] Priority **Apr. 16, 1969**
 [33] **Great Britain**
 [31] **19428/69**

3,487,430 12/1969 Schmitt 227/152 X
FOREIGN PATENTS
 613,229 8/1935 Germany 100/272
Primary Examiner—Billy J. Wilhite
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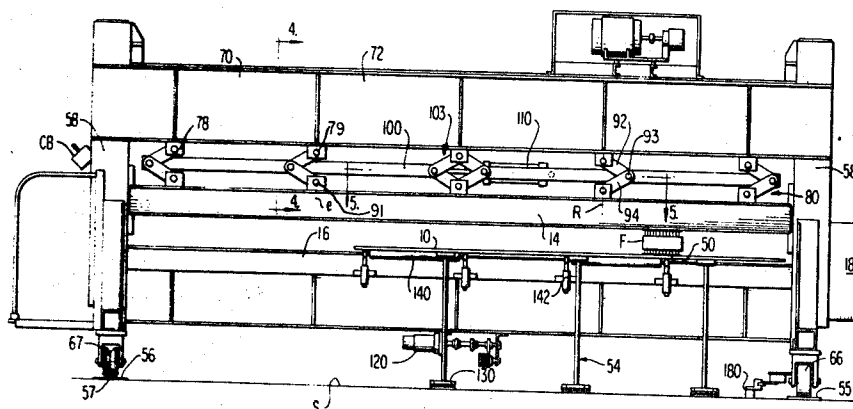
[54] **FABRICATING APPARATUS FOR WOODEN TRUSSES, PANELS, AND THE LIKE**
 27 Claims, 18 Drawing Figs.

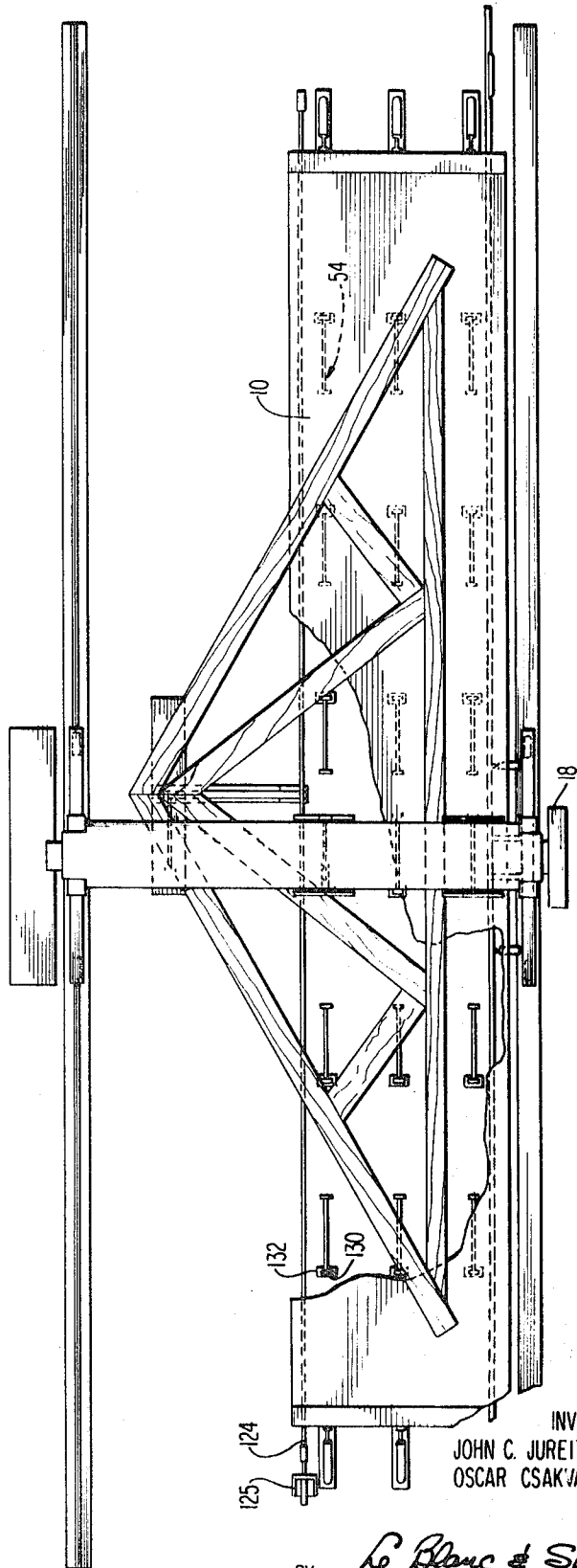
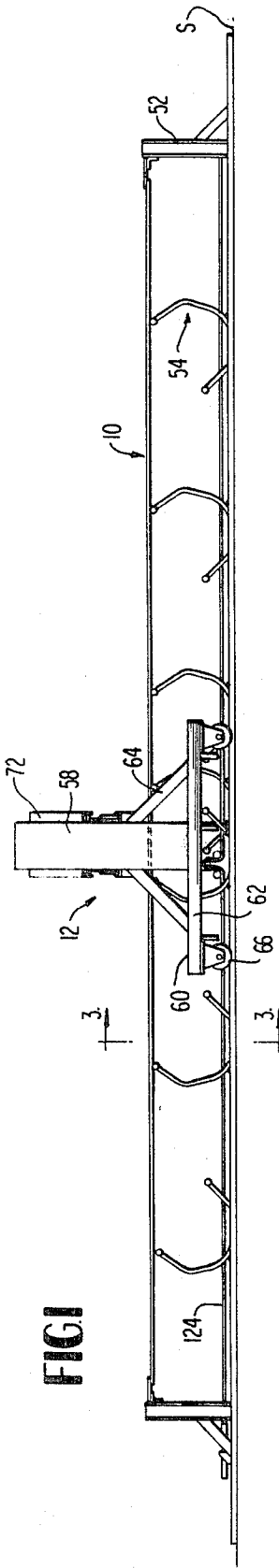
[52] U.S. Cl. **100/48,**
 100/53, 100/100, 100/272, 248/188.8
 [51] Int. Cl. **B30b 15/18**
 [50] Field of Search 227/152;
 100/48, 49, 53, 100, 272, 226

[56] **References Cited**
UNITED STATES PATENTS

2,622,511	12/1952	Marsico et al.	100/100
3,334,579	8/1967	Smith	100/226
3,334,580	8/1967	Smith	100/226
3,388,657	6/1968	Jureit	227/152 X

ABSTRACT: The fabricating apparatus comprises a jig table carrying wooden framing members positioned to form a truss. Nailplates are located on opposite sides of the butt joints of the wooden members for embedment into the joints by a press movable lengthwise along the jig table. The jig table is supported by a plurality of longitudinally spaced pivoted wands comprised of substantially U-shaped members. One leg of each of the pivoted wands engages the undersurface of the jig table to support the latter while its opposite leg lies below the lower press platen and bears against a support preventing pivotal movement of the wand from its table supporting position. As the press traverses the table, the lower press platen successively pivots the wands to locate the other legs of the wands in supporting engagement with the jig table while the previously supporting legs of the wands are pivoted below the lower press platen. The press is controlled via a circuit responsive to switch actuating pins disposed at selected positions along a track for automatically and sequentially stopping the press when the press overlies successive butt joints, actuating the press to embed the nailplates, and restarting the press for movement along the jig table.





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FIG3

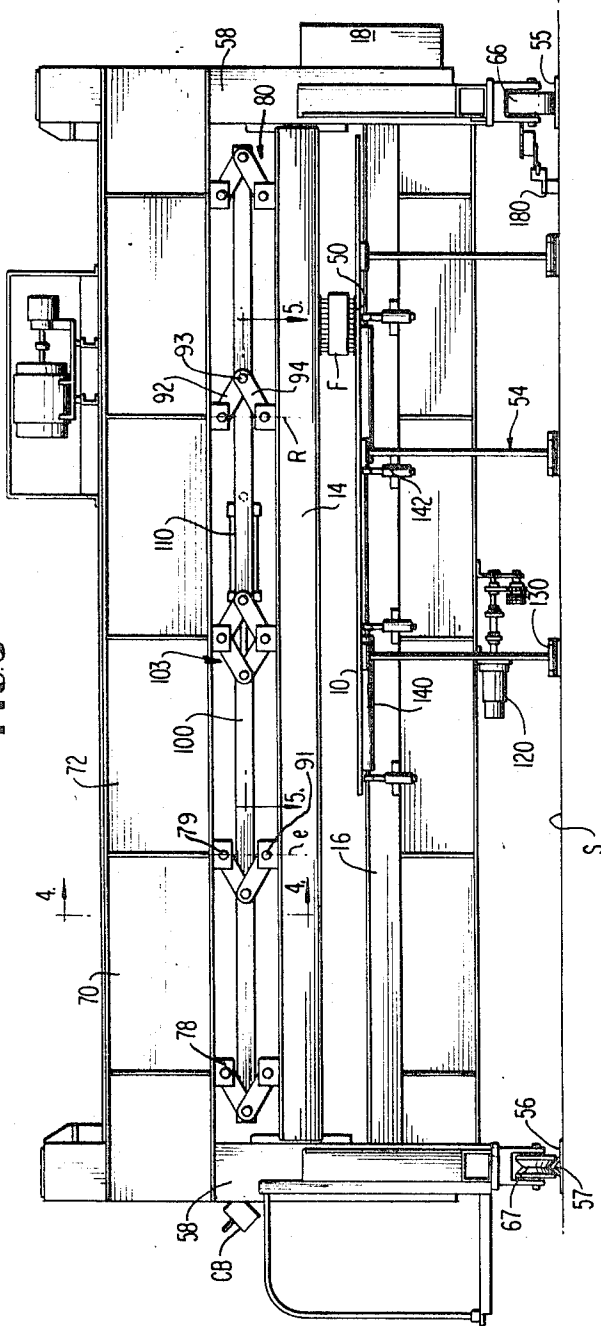


FIG4

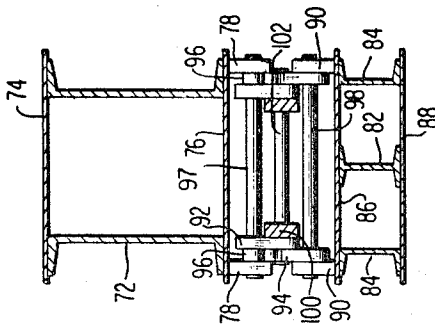


FIG6A

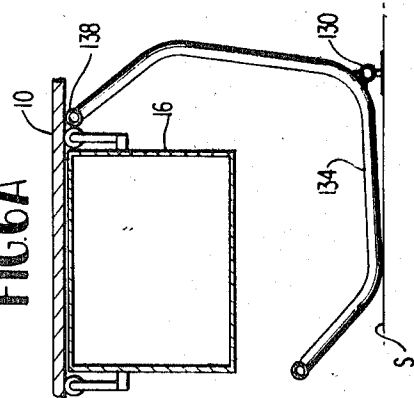


FIG6B

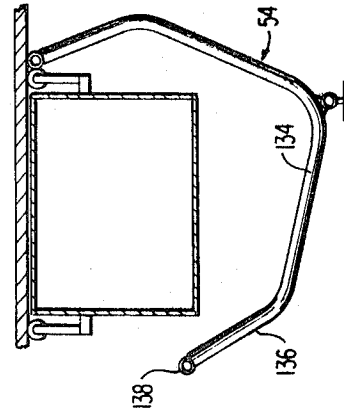


FIG6C

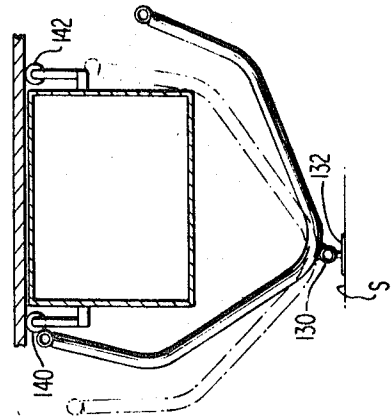


FIG6D

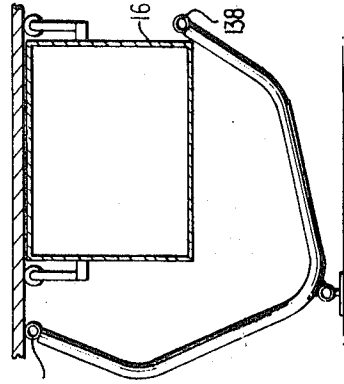


FIG 13

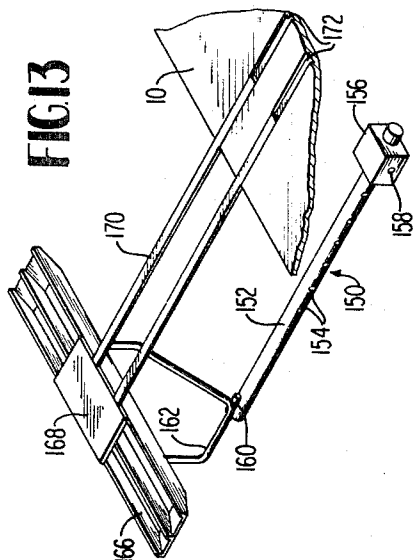


FIG 5

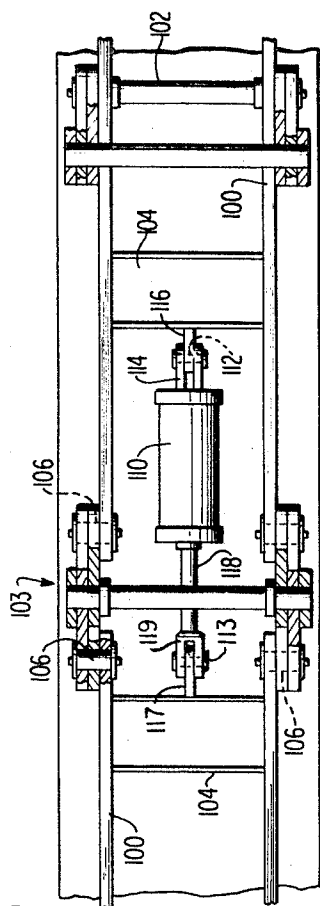


FIG 8

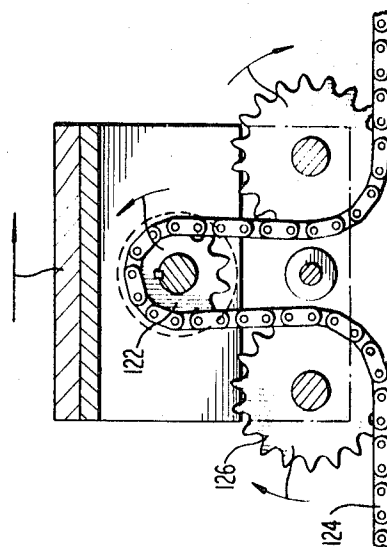


FIG 7

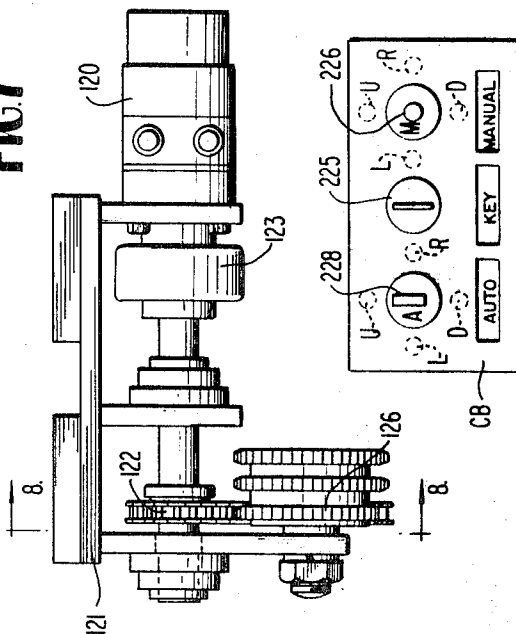


FIG 11

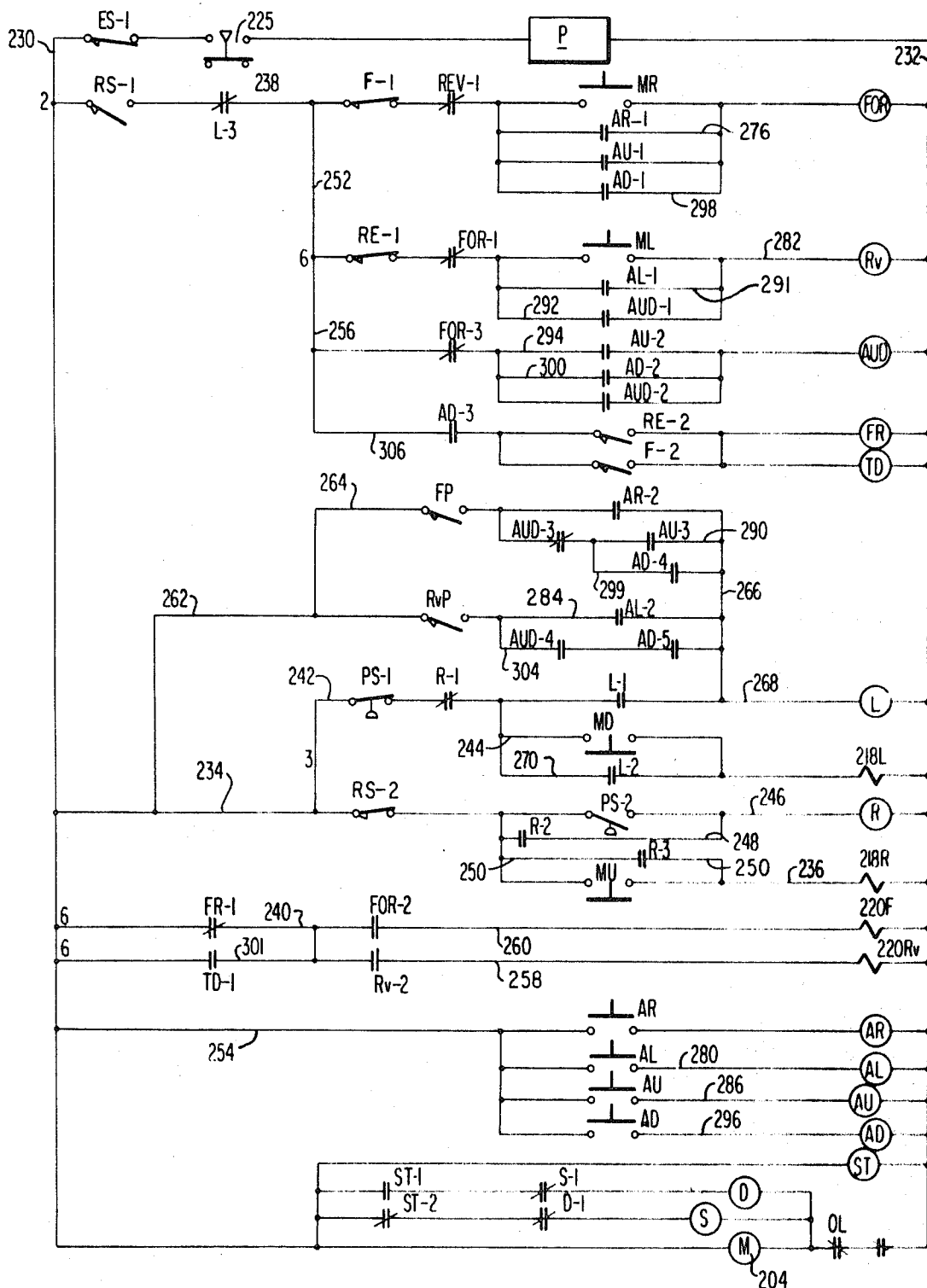
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FIG. 10



FABRICATING APPARATUS FOR WOODEN TRUSSES, PANELS, AND THE LIKE

This application relates to a species of the invention disclosed in copending application Ser. No. 810,501, filed Mar. 26, 1969, which application is a division of application Ser. No. 676,943, filed Oct. 20, 1967, now U.S. Pat. No. 3,443,513, dated May 13, 1969.

The present invention relates to a system for fabricating wooden trusses, panels or the like and particularly to a jig table, press and control apparatus for the press, whereby nailplates are successively embedded into the spaced butt joints of wooden frame members supported by the jig table and which members form trusses, panels or the like.

The wooden building construction industry has recently made tremendous strides forward with the advent of fabrication techniques wherein butt joints of wooden frame members forming trusses, panels and the like are fastened together by embedding nailplates of the type having a plurality of teeth struck therefrom into the joints, typical nailplates for this purpose being described in U.S. Pat. No. 2,877,520. Previous methods of applying the nailplates to the butt joints, such as hand nailing, employing individual power-operated presses at each joint, etc. have been not only time consuming, laborious and accordingly expensive, but do not lend themselves to large scale automated truss fabrication on an assembly line basis.

In conventional fabrication techniques which utilize power-operated truss presses, wooden frame members, consisting of elongated chords and cross members, are prepositioned in assembled relation on a jig table with connector plates located on opposite sides of the truss, panel or the like at the butt joints. Thereafter, the connector plates are pressed into the butt joints to fasten the frame members together and form the completed truss, panel or the like. A press capable of providing the foregoing action is disclosed in U.S. Pat. No. 3,079,607. While this type of truss press is satisfactory, this press per se and others employed for like purposes are not particularly adapted for operation in conjunction with elongated trusses having widely spaced butt joints wherein the press head must be repeatedly raised and lowered and the jig table carrying the truss manually manipulated to locate each of the butt joints of the truss below the press head or platen for each press operation.

Other conventional fabricating techniques employ a plurality of fluid-operated press heads, each mounted on bases movable in longitudinal and transverse directions whereby the press heads are individually located relative to each butt joint of a particular size and type of truss. The plural presses are then simultaneously actuated to embed the several nailplates into the butt joints. The press heads thus employed, however, must be accurately and often laboriously repositioned for different sizes and types of trusses, panels or the like having different locations and spacing between the butt joints. Additionally, in most instances, the press heads must be moved transversely of the truss, panel or the like to permit the same to be withdrawn from the press, thus necessitating repositioning of the several press heads for the completion of each truss, panel or the like, with the result that rapid, efficient and inexpensive fabrication of large numbers of even the same size and type of truss cannot be realized.

One such technique utilizes a jig table supported by pivoted V-shaped wands, the jig table mounting the frame members in a truss configuration. A manually operated and movable press is then located over the joints and actuated to embed the connector plates into the joints, the press pivoting the wands between table supporting and nonsupporting positions. This system however is not automated and is limited to small truss sizes.

The present invention provides a novel, improved and unique fabrication system for automatically or manually forming completed trusses, panels or the like, hereinafter referred to as trusses. To accomplish this, wooden frame members are

prepositioned on a jig table to form a truss and nailplates of the foregoing type are positioned on opposite sides of the butt joints. A fluid actuated toggle-type press having upper and lower press platens located on opposite sides of the jig table is movable lengthwise along the jig table and operable to press the nailplates into the butt joints. The upper press platen is movable toward and away from the jig table by a fluid actuated cylinder operating on toggle links connecting the upper platen to the frame of the press. The jig table is supported by a plurality of longitudinally spaced U-shaped wands pivoted at their apices. The ends of each wand are adapted to alternately engage and support the jig table. To accomplish this, one leg of each U-shaped wand extends from its pivot to an overcenter position to engage the jig table while the other wand leg bears against a lower support to prevent movement of the wand under the weight of the table, such other leg being spaced below the lower press platen as to permit the passage of the lower press platen thereover. As the press traverses the table, rollers carried by the press lift the jig table from the table supporting wand. The lower platen then engages the table supporting wand leg and pivots the wand such that the other wand leg moves into supporting engagement with the jig table. The lower press platen momentarily supports the jig table as the wand legs are pivoted between table supporting positions. The wands thus sequentially pivot in response to movement of the press through the wand positions.

A control apparatus is provided to successively stop the press at predetermined positions along the jig table in accordance with the predetermined successive longitudinal spacing between the butt joints of the prepositioned frame members to successively locate the movable upper press platen in pressing position over the butt joints. In the automatic mode of operation, the press is stopped, the upper press platen is lowered to press the nailplates into the butt joints, and subsequently raised therefrom, and the press is advanced in response to sequential actuation of a control circuit actuating switch, the latter being successively actuated as the press moves longitudinally between the successive spaced butt joints. This switch is activated by pins selectively spaced one from the other along the path of movement of the press in accordance with the longitudinal spacing between the successive joints. The pins can thus be selectively located to advance and control the press to embed the nailplates in trusses of different sizes and types having variously spaced butt joints. The switch through the control circuit, cycles the press stop, pressing operation and the press advance. After fabricating the truss and at the end of the press advance the press actuates limit switches which operate to return the press along the jig table to its initial position whereupon the completed truss is unloaded. Additional framing members can then be assembled on the jig table as before and the press again cycled by the control system and pin actuated switch to repeat the foregoing process to fabricate additional trusses.

To program the press control system for trusses of different sizes and types, the pins are readily and selectively located along the track of the press to vary the spacing between adjacent pins in accordance with the known spacing between successive joints.

The control circuit is moreover adapted for five modes of operation as desired: 1. manual press forwarding and press control; 2. automatic press forwarding and pressing and manual press return; 3. automatic press forwarding and pressing and automatic press return and pressing; 4. automatic press forwarding and pressing and automatic press return without pressing; and 5. automatic press forwarding and pressing on a second jig table and automatic press reversal and pressing on a first jig table, continuous cycling.

Accordingly, it is an object of the present invention to provide a novel, improved fabricating apparatus for successively embedding nailplates into the spaced butt joints of wooden frame members forming a truss, panel and the like.

It is another object of the present invention to provide a fabricating apparatus having the capability to readily form

trusses, panels and the like of different types, sizes, and shapes.

It is a further object of the present invention to provide a fabricating apparatus for trusses, panels and the like which can be operated automatically or manually as desired and which occupies a minimum amount of space.

It is still another object of the present invention to provide a fabricating apparatus including a press movable along a jig table supporting prepositioned frame members which form the trusses, panels, and the like and a control therefor wherein the press can be indexed for a particular size and type of truss with any number of identical trusses fabricated without resetting the control for each truss run.

It is a further object of the present invention to provide a truss fabricating apparatus having a press movable under automatic control along a jig table carrying prepositioned frame members which form the trusses, panels and the like and wherein the jig table is at all times supported intermediate its ends notwithstanding the traversing movement of the press between opposite ends of the jig table.

It is still a further object of the present invention to provide a truss fabricating apparatus including a toggle actuated press movable lengthwise along a jig table wherein the press supports the jig table during the pressing operation.

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

FIG. 1 is a side elevational view of the general arrangement of a fabricating apparatus constructed in accordance with the present invention and illustrating the jig table, the movable supports therefor, and the press;

FIG. 2 is a plan view of the fabricating apparatus of FIG. 1 with portions broken out for ease of illustration;

FIG. 3 is an enlarged cross-sectional view thereof taken generally about line 3—3 of FIG. 1;

FIG. 4 is an enlarged fragmentary cross-sectional view of the press taken generally about line 4—4 of FIG. 3;

FIG. 5 is an enlarged fragmentary cross-sectional view of the press taken generally about on line 5—5 of FIG. 3;

FIGS. 6a—6d schematically illustrate the cooperation between the lower press platen and jig table support wands as the press traverses the jig table;

FIG. 7 is an end elevational view of the drive mechanism carried by the press;

FIG. 8 is a cross-sectional view thereof taken generally about on lines 8—8 in FIG. 7;

FIG. 9 is a fragmentary enlarged perspective view of the control switches for the press and the switch actuating pins carried by the control track;

FIG. 10 is a schematic illustration of an electrical control circuit for the press;

FIG. 11 is a plan view of a control box for selecting the various modes of operation;

FIG. 12 is an electrical hydraulic schematic diagram illustrating a fluid control circuit for the press;

FIG. 13 is an enlarged fragmentary perspective view of an outrigger support for handling trusses having high peaks;

FIG. 14 is a schematic illustration of one mode of operation of the fabricating apparatus hereof and employing two jig tables; and

FIG. 15 is a fragmentary cross-sectional view of an alternative embodiment of a jig table support.

Referring to FIG. 1, there is shown a fabricating apparatus constructed in accordance with the present invention comprising generally a jig table 10, a press 12 having upper and lower press platens 14 and 16 respectively (FIG. 3), and mounted for movement lengthwise along jig table 10, and a control system including a cabinet 18 carried by press 12 and housing the electrical circuitry to be described. Jig table 10 comprises an elongated generally rectangular member comprised of a composite of a sheet steel and synthetic fiberboard mounting a plurality of longitudinally and transversely extending tracks, not shown, and a plurality of reaction pads, not

shown, for longitudinal movement along the tracks. The reaction pads mount clamps and reaction supports such as pins which engage on opposite sides of the framing members F which form the truss, panel or the like, adjacent the butt joints thereof to maintain framing members F prepositioned prior to embedding nailplates into opposite sides of the joints to finally form the truss, panel or the like in the manner to be described. The clamps, tracks, reaction pads and the jig table 10 may be of the type described and illustrated in U.S. Pat. No. 3,238,867 of common assignee herewith, the disclosure of which is incorporated herein by reference in its entirety. It is believed sufficient to note that any of the plurality of known types and sizes of trusses can be assembled utilizing the jig table noted in that patent and the fabricating apparatus hereof. Nailplates 50 (FIG. 3) are provided at the butt joints of the truss on opposite sides thereof for embedment into the joints of the members by the press 12 in a manner to be described. The nailplates may be of the type disclosed in U.S. Pat. No. 2,877,520 which patent is incorporated herein by reference in its entirety.

Opposite ends of jig table 10 are connected to a plurality of upright stanchions 52 fixed to a base support or floor indicated at S. Jig table 10 is supported intermediate its ends by a plurality of pivoted support members or wands generally indicated at 54 and described in detail hereinafter. A pair of tracks 55 and 56 are secured to floor S and extend generally along opposite sides of jig table 10. Track 55 comprises a flat strip of metal whereas track 56 carries an inverted angle iron 57. Press 12 is mounted for traversing movement lengthwise along jig table 10 on tracks 55 and 56 and comprises transversely spaced upright beam assemblies 58, each of which is supported by a carriage assembly 60. Assembly 60 includes a horizontal beam 62 and a pair of diagonal beams 64 carried adjacent opposite ends of beam 62 and suitably connected to upright beam assembly 58. A pair of flat rimmed wheels 66 are provided on opposite ends of horizontal beam 62 on one side of press 12 and engage along track 56. A pair of grooved wheels 67 are provided on the opposite ends of the beam 62 on the other side of press 12 and engage along angle iron 57. Note that the lower press platen 16 is secured at opposite ends to the beam assemblies 58 and extends therebetween below jig table 10.

An upper press head assembly indicated at 70 extends between beam assemblies 58 in spaced relation above jig table 10. Head assembly 70 (FIG. 4) may be comprised of a pair of spaced channel members 72 and upper and lower head plates 74 and 76 respectively secured to members 72 forming a boxlike structure. A plurality of brackets 78 are secured along the underside of the lower plate 76 on each side thereof. Movable press platen 14 depends from upper fixed head assembly 70, more particularly, the brackets 78, by means of a plurality of toggles generally indicated at 80. Movable upper press platen 14 preferably comprises a central I-beam 82 and a pair of outer channel beams 84 to which upper and lower plates 86 and 88 respectively are suitably secured. Upper plate 86 mounts a plurality of brackets 90 spaced one from the other along opposite sides of plate 86 and spaced below brackets 78. Each toggle 80 comprises an upper link 92 and a lower link 94 joined together at adjacent ends to form an intermediate pivotal joint 93. Toggles 80 are pivotally supported inwardly of toggle brackets 78 and 90 adjacent opposite sides of the press and form pairs of transversely spaced toggles 80 at transversely spaced positions along press 12. As seen in FIGS. 3 and 4, the upper ends of toggle links 92 are pivotally secured to brackets 78 by shafts 97 which extend through openings formed in the upper ends of toggle links 92, through suitable spacers 96, and into suitable openings formed along toggle brackets 78. The lower ends of lower toggle links 94 are similarly secured to toggle brackets 90 by means of shafts 98 which extend through openings formed in the lower ends of toggle links 94 and within openings spaced along toggle brackets 90.

The longitudinally spaced intermediate joints 93 of the paired toggles on opposite end portions of press 12 extend in opposite directions from one another. As seen in FIG. 3, the joints 93 of the paired toggles (3 being shown) to the left of center of the press extend on respective identical sides of straight line *e* joining the pivoted ends of links 92 and 94 to the toggle brackets 78 and 90 respectively, while the joints 96 of the paired toggles (3 being shown) to the right of center of the press extend on respective identical but opposite sides of straight lines *f* joining their pivoted ends to toggle brackets 78 and 90. The joints 93 on opposite sides of the press are joined together by a pair of laterally spaced transfer bars 100. Each pair of transfer bars 100 on opposite sides of press 12 connect with the outermost paired links by means of a shaft 102 which extends through suitable openings formed in the transfer bars 100 and within the openings formed through the opposite ends of toggle links 92 and 94.

As particularly illustrated in FIG. 3, the central four pairs of toggles 80 form a double scissors arrangement generally indicated at 103 and are pivotally connected at their upper and lower ends similarly as the toggle links spaced endwise therefrom. An I-beam bracket 104 (FIG. 5) connects between the inner end portions of each of the pair of transfer bars 100 on opposite sides of press 12, the intermediate pivotal joints 93 of the toggles forming the central scissors arrangement including pins 106 extending through the openings in respective adjacent ends of toggle links 92 and 94 and through openings formed through the inner ends of the transfer bars 100.

A free floating piston and cylinder are connected between brackets 104 which connect between the pairs of transfer bars 100 on opposite sides of press 12. Cylinder 110 is pivotally supported at one end by a pin 112 engaging through brackets 114 and 116 secured to cylinder 110 and bracket 104 respectively. The end piston 118 carries a clevis 119 which is pivotally mounted by a pin 113 to a bracket 117 secured to the other bracket 104. It will thus be seen that extension or retraction of piston 118 reciprocates the toggle joints 93 on opposite sides of the press toward and away from one another. This horizontal reciprocation is translated through the toggle action into vertical reciprocation of the upper press platen 14 under the control of an electrical-hydraulic control system described hereinafter.

A hydraulic motor 120 is carried by a bracket 121 along the underside of lower press platen 16 and drives a sprocket 122, through a coupling 123. As seen in FIG. 1, a chain 124 extends below jig table 10 along support S and between opposite ends thereof. Chain 124 is suitably connected to the stanchions 52 by chain tensioning devices of known construction and indicated at 125. Bracket 121 also carries idler sprockets 126. Chain 124 is looped about the drive sprocket 122 and about the idler sprockets 126. It will be appreciated that actuation of hydraulic motor 120 in cooperation with the chain 124 drives press 12 lengthwise along jig table 10 on tracks 55 and 56 in either direction, depending upon the direction of rotation of hydraulic motor 120.

In order to support jig table 10 between its ends as press 12 moves therealong with the upper and lower press platens 14 and 16 on opposite sides of jig table 10, with beam assembly 58 substantially encompassing table 10, a plurality of pivoted support members or wands 54 are longitudinally and transversely spaced along the respective length and breadth of jig table 10. Referring now to FIGS. 1, 2, and 6, pivoted wands 54 are arranged in longitudinally extending, transversely spaced rows, three being illustrated, with each wand 54 comprising a substantially U-shaped member pivoted at its apex as at 130 to a bracket 132 fixed to the base support or floor S. Each member 54 comprises opposite legs having base and upper leg portions 134 and 136 respectively, forming an included angle with one another. The end of each of upper leg portions 136 mounts a support head or roller 138. As seen particularly in FIG. 6a, each U-shaped wand 54 is formed such that the support head 138 on the end of one of its legs engages the under-surface of table 10 when the base portion 134 of the other leg

bears against base support or floor S. Note that the support head 138 engaging table 10 is slightly overcenter relative to pivotal axis 130 whereby a vertically downward force on the table supporting roller 138 tends to pivot member 54 in a counterclockwise direction, as seen in FIG. 6a, to press the base portion 134 of the other leg against the floor S. In other words, the weight of table 10 as well as the frame members of the truss, panel or the like prepositioned thereon, precludes pivoting of member 54 from its overcenter table supporting position. It will be noted that both legs of member 54 are similarly arranged so that a like supporting action is provided when either of the support heads or rollers 138 engage the underside of table 10 in the slightly overcenter position. Note also that when the press is initially mounted on the table, the members 54 to one side of the press are located such that the legs in table supporting position are those legs in which the included angle between the base and upper portions 134 and 136 respectively open toward the press, as best seen in FIG. 1.

Referring now to FIGS. 6a-6d, it will be noted that, when one of the heads 138 lies in a table supporting position, the other nonsupporting head 138 lies below the underside of lower press platen 16. Thus, for example, when the right-hand legs of the three transversely aligned wands 54 lie in table supporting positions and the press 12 moves from left to right as seen in FIGS. 1 and 6a, the lower press platen 16 clears and passes over the nonsupporting heads 138 and engages against their supporting heads 138. Further movement of press 12 to the right pivots the wands 54 clockwise as seen in FIG. 6b such that the previously supporting heads 138 are pivoted to positions lying on the opposite sides of the pivotal axis 130 whereupon wands 54 are free for further clockwise pivotal movement. Continued movement of press 12 to the right further pivots members 54 tending to lower the previous jig table supporting heads 138 and raising the previous jig table nonsupporting heads 138 as illustrated by the dashed and full line illustrations of a wand 54 in FIG. 6c. FIG. 6d represents the position of the members 54 just prior to movement of the previous nonsupporting heads 138 into support positions below table 10 and just prior to the movement of the previously supporting heads 138 to positions below press platen 16 whereby the latter may pass over the latter-mentioned heads and through the table supporting position. When the press platen 16 passes over the previously supporting heads 138, the previously nonsupporting heads 138 move overcenter to support positions with the base positions 138 of their opposite legs bearing against floor S. The positions of the support members 54 to the left of the press in FIG. 1 illustrate the final positions thereof after the press has moved through that support position in a direction from left to right.

To facilitate movement of the members 54, a plurality of rollers 140 are carried on opposite sides of the lower press platen 16, the rollers being carried by spring biased shafts 142 to project slightly above the pressing surface of lower platen 16. As the press approaches a transversely spaced set of support members 54, the rollers 140 lift jig table 10 from lower platen 16. In this manner, the table supporting head 138 is free to swing through the overcenter position without engaging the underside of table 10. When the press has passed through this set of support members, the table 10 settles onto and is supported by the support heads 138 which have just been pivoted into support position below the table 10. Additionally, the support heads 138 lie in an intermediate pivoted position, between the positions illustrated in FIGS. 6b-6c, when the upper press platen 14 moves downwardly to press the nail-plates into the truss. In this manner, the wands 54 are out of the way and do not interfere with the pressing action, the table 10 being supported at each pressing position by the press itself.

Turning now to FIG. 1, when press 12 is moved from left to right, support members 54 trailing press 12 lie in the positions illustrated to the left of the press in FIG. 1. When the press 12 moves from right to left as seen in FIG. 1, support members 54 trailing the press 12 will be pivoted in the reverse or counter-

clockwise direction (as described with reference to FIGS. 6a-6da) to positions illustrated to the right of the press in FIG. 1 and when the press has moved to the left-hand end of jig table 10, all of the members 54 will assume the positions illustrated by the members to the right of the press in FIG. 1. By the foregoing, it will be seen that the jig table 10 is supported intermediate its ends at each of the support positions defined by members 54. Moreover, as the press moves through a support position, and the transversely spaced support members thereat pivot such that neither of rollers 138 on the ends of legs 136 support table 10 (when the members 54 assume the intermediate positions illustrated in FIGS. 6b-6c), the press platen 16 provides the support for jig table 10 in that position.

In an alternate form hereof illustrated in FIG. 15 a plurality of longitudinally and transversely spaced support tubes 129 suitably pivoted at their lower ends as at 130a to base support S upstand between support S and table 10 with their upper ends terminate in support heads 138a which engage the underside of table 10. A coil spring 127 encompasses each tube 129 adjacent its lower end to normally maintain tube 129 in an upright table supporting position. When press 12 traverses and moves through each support position, rollers 140 lift table 10 from heads 138a and lower platen 16 engages and pivots the tubes 129 out of the table supporting position against the bias of spring 127. Further movement of the press pivots tubes 129 to the extent that the undersurface of platen 16 passes over tubes 129 whereupon the latter snap back under the bias of springs 127 to again engage and support the table.

It will be appreciated that a large number of the trusses panels and the like fabricated by the foregoing described system will have a width generally less than 8 feet. In other words, the distance between the truss peak and the lower chord for a large number of trusses will be less than 8 feet. Accordingly, a jig table width of about 8 feet can be employed to fabricate a majority of the trusses. For those trusses which have a peak to lower chord height greater than the jig table width, there is provided, in accordance with the present invention and referring particularly to FIGS. 2 and 13, an outrigger assembly generally indicated at 150 wherein these larger width trusses, panels and the like can be readily fabricated without changing or providing larger jig tables. To this end, the outrigger support assembly 150 comprises a support tube 152 having a plurality of openings 154 spaced longitudinally therealong. Support tube 152 lies transversely between tracks 55 and 56 and is slidably received in a bracket 156 underlying the inside edge of jig table 10. Bracket 156 has a pair of longitudinal openings 158 for receiving a pin whereby tube 152 can be selectively positioned relative to jig table 10. The opposite end of support tube 152 carries a pivotal mounting 160 which receives a pivoted member 162 of identical shape as members 54.

An outrigger support member 166 is provided and carries a support pad 168 for the peak portions of the truss, panel or the like. The support pad 168 is provided with suitable tapped openings to receive clamps and the like similar to the clamps provided jig table 10. Support member 166 is connected to jig table 10 by a pair of bars 170 which extend from support member 166 inwardly for reception in a pair of grooves 172 formed in jig table 10. In this manner, the distance between the support member 166 and the inner edge of jig table 10 can be selected in accordance with the size of the truss being fabricated. Tube 152 is similarly spaced relative to jig table 10 and it will be appreciated that member 162 supports member 166 in a manner to permit passage of press 12. Particularly, member 166 is supported by one of the leg portions of pivoted member 162 while the other leg portion bears against support S. As the press engages the supporting leg, it pivots from its supporting position overcenter into a position bearing against support S while the opposite leg pivots from its position on support S to a pad supporting position. The action of the member 162 is similar as the action of the members 54 as described with respect to FIGS. 6a-6d. Accordingly, for those trusses having a height greater than 8 feet, the peak joint can

be formed on the outrigger pad 168, the latter being supported by the pivoted member 162.

Referring now to FIGS. 3 and 9, there is illustrated a portion of the control system for the press drive. Particularly, a tubular member 180 is spaced inside of track 55 and lies coextensively therewith. Tubular member 180 has a plurality of openings 182 through its upper face. Openings 182 are spaced equal distances one from the other along the length of member 180. For reasons as will become apparent, a plurality of pins 184 are selectively receivable in openings 182 in accordance with the distances between successive butt joints.

A pair of angled brackets 186 are secured on the inside of beam 62 and respectively carry microswitches FP and RV. Each switch mounts an actuating arm 188 which extends inwardly such that its end portion, which mounts a roller 190, overlies tubular track 182. Accordingly, as the press traverses jig table 10, rollers 190 successively engage pins 184. That is to say, when press 12 moves from left to right as seen in FIGS. 1 and 2, microswitch FP is successively actuated in accordance with the predetermined spacing between next adjacent pins 184 which, in turn are inserted into the openings 182 in accordance with the spacing between the butt joints of the truss being fabricated. Thus, by inserting pins 184 into selected openings 182, trusses of various sizes and types having various spacing between their butt joints can be readily fabricated. It will be appreciated that the microswitches FP and RV, through an electrical circuit to be described and depending on the direction of movement of the press, stop the press at selected pressing positions, that is, over the butt joints, initiate the pressing cycle, and start the press moving again at the end of the pressing cycle.

Also mounted at opposite ends of beam 62 are angle brackets 192. Brackets 192 carry microswitches F-1 and RE-1 respectively having inwardly extending actuating arms. The arms of these switches are shortened however, as to be outwardly spaced from pins 184. At opposite ends of the jig table 10, tube 180 mounts outwardly projecting angle brackets 194. At the end of the press movement in either direction, the actuating arm of either switch F-1 or RE-1 engages the associated angle bracket 194 to actuate the corresponding switch.

Referring now to FIG. 12, an electrically controlled fluid circuit is provided and arranged in controlling relation to drive motor 120 and to press actuating cylinder 110. A pair of fluid lines 198 and 200 alternately supply pressurized fluid to opposite sides of cylinder 110 to reciprocate upper platen 16 toward and away from jig table 10. Fluid from a reservoir 202 is pressurized by an electrically driven pump 204 with the pressurized fluid from pump 204 flowing to a four-way three-position control valve 206 via a conduit 208. Valve 206 is biased to the illustrated neutral position by a pair of springs 210. In this neutral position, input conduit 208 communicates with an intermediate conduit 209 connected to a similar four-way three-position control valve 212. Valve 212 is similarly biased to the illustrated neutral position by springs 214 wherein conduit 209 communicates with a return conduit 216 emptying into reservoir 202.

A pair of solenoids 218R and 218L are arranged to shift valve 206 to alternately lower and raise press platen 16 in a manner to be described. Actuation of solenoid 218L shifts valve 216 to the left as seen in FIG. 12 to provide pressurized fluid via conduits 208 and 198 to cylinder 110 to retract piston 118 and thereby lower platen 16 with pressure fluid exhausting from the other side of the piston through conduits 200, 209 and 216 into reservoir 202. Actuation of solenoid 218R shifts valve 206 to the right to provide pressurized fluid via conduits 208 and 200 to cylinder 110 to extend piston 118 from cylinder 110 and thereby raise platen 16 with pressure fluid exhausting from the opposite side of piston 118 to the reservoir 202 via conduits 198, 209 and 216.

A pair of solenoids 220F and 220R are arranged to shift valve 212 and are actuated in a manner to be described to alternately operate hydraulic motor 120 in the forward or

reverse directions, thereby respectively advancing or retracting press 12 along jig table 10. It will be noted, with reference to the control circuit hereinafter described, that valve 206 is always in the neutral position when the press is being either advanced or retracted along jig table 10 and that valve 212 is always in the neutral position when press platen 16 is being lowered or raised. Actuation of solenoid 220F shifts valve 212 to the left as seen in FIG. 12 to provide pressurized fluid via conduits 208, 209 and 222 to motor 120 to drive the press 12 forwardly (for example, from left to right in FIG. 1) with exhaust fluid returning to reservoir 202 via conduits 224 and 216. Actuation of solenoid 220Rv shifts valve 212 to the right to provide pressurized fluid to motor 120 via conduits 208, 209 and 224 to drive press 12 along jig table 10 in the reverse direction (from right to left as seen in FIG. 1) with exhaust fluid returning to reservoir 202 via conduits 222 and 216.

The electrical circuit illustrated in FIG. 10 is arranged to advance the press along the jig table and actuate the pressing cycle in five modes of operation as follows: A. Manual press advance and press control; B. Automatic press forwarding and pressing, manual press reversal; C. Automatic press forwarding and pressing and automatic press reversal and pressing; D. Automatic press forwarding and pressing plus automatic press reversal without pressing; and E. Automatic press forwarding and pressing on a second jig table plus automatic press reversal and pressing on a first jig table, continuous cycling. (The latter mode being described hereinafter with reference to FIG. 14).

In modes B-E, the electrical circuit is arranged to sequentially shift valves 206 and 212 to advance press 12 along jig table 10, stop press 12 at a pressing position wherein the upper and lower press platens lie on opposite sides of the butt joint, lower and then raise the upper press platen 16, and restart motor 120 to again advance press 12 along jig table 10, to repeat the foregoing press advancing, stopping, pressing and advancing cycle successively as the press 12 is located in successive pressing positions corresponding to the consecutive butt joints of the prepositioned frame members on jig table 10.

Referring to FIG. 11, there is illustrated a simplified control box CB including a key slot 225, a manual operating lever 226 having four switch actuating positions indicated at U, R, D and L and an automatic mode operating switch indicated at 228 having four switch operating positions U, R, D and L. Manual switch 226 is spring biased into the neutral position. By use of this simplified control box, all of the various modes of operation described above can be obtained.

The control circuit illustrated in FIG. 10 is illustrated in a deactivated contact mode wherein the various relays represented by circles open and close associated contacts in a manner to be described, normally open and closed contacts being denoted by the vertical pairs of parallel lines and the slashed pairs of vertical parallel lines respectively with the contacts being lettered to correspond to their associated actuating relays. Also, the switch actuating positions are indicated by the prefixes M and A to indicate either manual or automatic mode of operation.

Referring now to FIG. 10, a power supply P is provided across a pair of supply lines 230 and 232, the supply line including, key operated switch 225 and an emergency switch ES-1 which, when opened, breaks whatever completed circuit is controlling the press system. To start the fabricating system, fluid pump 204 is actuated by closing the key activated switch 225 to complete a circuit across supply lines 230 and 232 and pump 204. Actuation of fluid pump 204 pressurizes the fluid circuit described hereinbefore with reference to FIG. 12 whereby fluid is maintained available for operation of cylinder 110 and motor 120.

Frame members F are now prepositioned and clamped on jig table 10 with nailplates located on opposite sides of the butt joints. To commence fabrication in the manual mode of operation, manual switch MU is closed to energize a circuit via lead lines 230, 234, 236 and 232 to actuate solenoid 218R. Actuation of solenoid 218R shifts valve 206 to the right as

seen in FIG. 12 to provide pressure fluid to cylinder 110 to extend piston 118 whereby upper press platen 14 is moved to its uppermost position. This insures that the opening between the press platens is sufficiently large as to receive the jig table, frame members, and nailplates therebetween. When the press platen 14 is in its uppermost position, switch RS-1 closes and switch RS-2 opens.

To advance the press, for example, from left to right as seen in FIG. 1, manual switch MR is closed to energize a circuit via lead lines 230, 238 and 232 to actuate relay FOR. Actuation of relay FOR closes normally open contacts FOR-2 to energize solenoid 220F via a circuit through lead lines 230, 240 and 232. Actuation of solenoid 220F shifts valve 212 to the left as seen in FIG. 12 to drive motor 120 and hence press 12 in the forward direction (from left to right in FIG. 1) as hereinbefore described.

When the press advances such that the upper and lower press platens lie on opposite sides of the initial butt joint as determined by the operator, the operator manually closes switch MD to stop the advance of the press and to initiate the pressing cycle. Particularly, by moving lever 226 from the MR position to the MD position, switch MR is opened and relay FOR is deenergized thereby returning contacts FOR-2 to their normally open position and deenergizing solenoid 220F. Deenergization of the latter permits valve 212 to return to its neutral position wherein hydraulic motor 120 and hence press 12 is stopped. By closing switch MP, solenoid 218L is actuated via a circuit including lead lines 230, 234, 242, 244 and 232. Energization of solenoid 218L shifts valve 206 to the left as seen in FIG. 12 to retract piston 118 and thereby lower press platen 14 as previously described. At the bottom of the press stroke, normally closed pressure actuated switch PS-1 opens and normally open switch PS-2 closes. When switch PS-1 opens, solenoid 218L is deenergized and valve 206 returns to its neutral position. Closing of switch PS-2 energizes relay R via lead lines 230, 234, 246, and 232. Actuation of relay R opens normally closed contacts R-1 and closes normally open contacts R-2 and R-3. The closing of contact R-2 provides a holding circuit for relay R via lead line 248. Closing contact R-3 energizes solenoid 218R via lead lines 230, 234, 250, 236 and 232 to thereby shift valve 206 to the right as seen in FIG. 12 and consequently raise press platen 14 as previously described. At the top of the press stroke, switch RS-2 opens and switch RS-1 closes. Opening switch RS-2 deenergizes relay R thereby returning contacts R-2 and R-3 to their normally open position and accordingly deenergizing solenoid 218R. Closing switch RS-1 readies the circuit including lead line 238 for the next closing of switch MR whereupon press 12 can be advanced similarly as described. It will be appreciated that the operator can thus close switch MR to advance the press and, when the latter is located at a pressing position over one or more butt joints, close switch MD to initiate the pressing cycle. Note that the operator must continuously hold switch lever 226 in the switch closing positions in order to maintain their corresponding functions.

At the end of the press advance, the operator can retract the press in the opposite direction by moving lever 226 to close switch ML. Closing switch ML energizes relay Rv via a circuit including lead lines 230, 252 and 232. Energization of relay Rv closes normally open contact Rv-2 to energize solenoid 220Rv via lead lines 230, 240, 258 and 232. Energization of solenoid 220Rv shifts valve 212 to the right as seen in FIG. 12 to thereby operate hydraulic motor 120 in the reverse direction as previously described. By maintaining switch ML closed, the operator can retract press 12 the full length of jig table 10 to its initial position. The completed truss can then be removed from jig table 10 and additional framing members F located to form an additional truss. Alternately, the press can remain at the forward end of travel and can be retracted in the reverse direction with the operator stopping the press at the butt joints to initiate the pressing cycle. Thus, merely by alternately closing switches ML and MD, the operator can manually reverse the press and commence pressing operations

on the press return. In this latter operation, the finished truss would be removed from the jig table 10 after forward movement of the press with the press remaining at the forward end of the jig table until additional framing members F and nailplates are prepositioned on jig table 10 to permit embedment of the nailplates on the return of press 12.

To advance the press and cycle the pressing operation in the automatic modes B-E as indicated previously, the operator places pins 184 in openings 182 in tube 180 in positions underlying the butt joints of the prepositioned frame members F on jig table 10. That is to say, the operator selects openings 182 directly underlying each of the consecutive butt joints and inserts pins 184 into such openings. It will thus be appreciated that when the press 12 advances, the switch actuating arm, associated with the switch FP engages each of the pins 184 underlying the consecutive butt joints to momentarily close normally open switch FP.

After setting pins 184, the operator closes switch AR to energize relay AR via a circuit including lead lines 230, 254, and 232. Energization of relay AR closes normally open contacts AR-1 and AR-2. Since the press platen 14 is initially in its uppermost position, switch RS-1 is closed and relay FOR is thus energized via a circuit including lead lines 330, 238, 276 and 232. Energization of relay FOR opens normally closed contacts FOR-1 and FOR-3 and closes normally open contacts FOR-2, the latter permitting energization solenoid 220F via a circuit including lead lines 230, 240, 260 and 232. Energization of solenoids 220F causes the press 12 to advance as previously described. When the press advances to the initial joint, the switch actuating arm associated with switch FP engages the first pin 184 to momentarily close normally open switch FP. By closing switch FP, relay L is energized via a circuit including lead lines 230, 262, 264, 266, 268 and 232. Energization of relay L closes normally open contacts L-1 and L-2 and opens normally closed contacts L-3. By opening L-3, relay FOR is deenergized and consequently solenoid 220F is deenergized, whereby press 12 stops at the position selected by the placement of the initial pin 184. By closing contacts L-1 and L-2, there is respectively provided a holding circuit for relay L via lead lines 230, 234, 242, 268 and 232 and solenoid 218L is energized via lead lines 230, 234, 242, 270 and 232. Energization of solenoid 218L shifts valve 206 to the left as seen in FIG. 12 to lower press platen 14 as previously described. At the bottom of the press stroke, pressure actuated switch PS-1 and PS-2 momentarily open and close respectively. Opening switch PS-1 deenergizes relay L thereby returning contacts L-1 and L-2 to their normally opened position and thereby deenergizing solenoid 218L. By momentarily closing switch PS-2, relay R is energized via a circuit including lead lines 230, 234, 246 and 232. Energization of relay R returns contact R-1 to its normally closed position and closes normally opened contacts R-2 and R-3 to respectively provide a holding circuit for relay R via lead lines 230, 234, 246 and 232 and energize solenoid 218R via lead lines 230, 234, 250, 236 and 232. Energization of solenoid 218R shifts valve 206 to the right as seen in FIG. 12 to retract upper press platen 14 to its uppermost position. At the top of the press stroke, switch RS-1 closes and switch RS-2 opens. As contacts AR-1 are maintained closed by the continuous energization of relay AR, relay FOR is again energized via lead lines 230, 238, 256 and 232 to again advance press 12 along jig table 10 as previously described. As press 12 advances, the actuating arm of switch FP engages the next pin 184 underlying the second butt joint and the press stopping and press lowering and raising cycle is repeated as previously described. After embedding the nailplates into the second butt joint, the press again advances to embed the nailplates at each of the consecutive butt joints until the press 12 has traversed the entire length of jig table 10.

At the end of the forward travel of the press, switch actuating arm of normally closed switch F-1 engages angle iron 194 to open switch FOR-1 and thereby deenergize relay FOR which, in turn, deenergizes solenoid 220F by returning con-

tacts FOR-2 to their normally open position. The press accordingly stops.

At this point, the operator can choose between manually returning the press by closing switch ML as previously described, or closing switch AL to provide pressing on the return of the press. It will be appreciated that should the operator choose to return the press manually, he would close switch ML and when, the press is returned to its initial position, the finished truss would be removed and additional frame members would be positioned whereby a similar pressing operation as described would be commenced. It will be appreciated that where a different size or type of truss is to be fabricated, the pads on jig table 10 are moved to underlie the joints and the pins 184 are similarly realigned with the joints.

Should the operator choose to return press 12 with the press being cycled for pressing operation on the return stroke, the finished truss is removed from jig table 10 and additional framing members are then prepositioned thereon as previously described. Once prepositioned, the operator would close switch AL and the press would automatically stop at and embed the nailplates at each of the butt joints of an additional truss identical to the first truss. Should a different truss with differently located butt joints be positioned on jig table 10, pins 184 in addition to the pads on jig table 10, would be repositioned to underlie the butt joints such that the press can press the nailplates into the butt joints on its return. In either case, by closing switch AL, relay AL is energized via a circuit including lead lines 230, 254, 280 and 232. Energization of relay AL closes normally opened contacts AL-1 and AL-2. By closing contacts AL-1 relay Rv is energized via lead lines 230, 238, 252, 291, 282 and 232. Energization of relay Rv closes normally opened contacts Rv-2 to energize solenoid 220Rv via lead lines 230, 240, 258 and 232. Energization of solenoid 220Rv shifts valve 212 to the right as seen in FIG. 12 to operate motor 120 in the reverse direction and thereby move press 12 from right to left as seen in FIG. 1. When the switch actuating arm of switch RvP engages the first pin 184 on the return of the press, it closes to energize relay L via lead lines 230, 262, 284, 268 and 232. Energization of relay L closes normally open contacts L-1 and L-2 and opens normally closed contact L-3 to stop the press and commence the press platen lowering cycle as previously described. Press platen 15 lowers and raises as previously described and, when the press platen 14 obtains its uppermost position, switch RS-1 closes to again energize relay Rv to advance press 12 in the reverse direction. The actuating arm of switch RvP engages the next pin 184 underlying the next butt joint and the preceding press stopping, press platen lowering and raising and press advancement in the reverse direction is repeated. The foregoing is repeated each time the switch RvP is actuated by a pin 184 and the press 12 is ultimately returned to its initial position, for example, at the left end of jig table 10 as seen in FIG. 1. Upon return of press 12 to its initial position, switch RE-1 is opened by the engagement of its switch actuating arm against bracket 192 to thereby deenergize relay Rv whereupon the press stops in the manner previously described. At this point, the completed truss is removed from jig table 10 and additional framing members are prepositioned for the fabrication of a like or different truss as desired.

In the fourth mode of operation, that is, automatic forwarding of the press and pressing together with automatic reversal of the press at the end of its forward movement and without pressing, the operator initially closes switch AU. By closing switch AU, relay AU is energized via lead lines 230, 254, 286 and 232. Energization of relay AU closes normally open contacts AU-1, AU-2, and AU-3 to energize relays FOR and AUD. Energization of relay FOR causes press 12 to advance as previously described, for example, from left to right as seen in FIG. 1, with the press stopping, pressing and starting again all as previously described. Particularly, when switch FP is closed upon the press reaching the first pin 184, relay L is energized via a circuit including lead lines 230, 262, 264, 290, 266, 268 and 232. Energization of relay L commences the

press lowering and raising cycle at the end of which, switch RS-1 is closed to again energize relay FOR as previously described. This cycling is repeated until press 12 reaches the end of its forward travel whereupon switch F-1 is opened to stop the press advance as previously described. Immediately, upon opening switch F-1, contacts FOR-1 are returned to their normally closed position and relay Rv is energized via lead lines 230, 238, 252, 292, 282 and 232, normally opened contact AUD-1 being closed by energization of relay AUD via lead lines 252, 256, 294 and 232. Energization of relay AUD closes normally open contacts AUD-1, AUD-2, and AUD-4 and opens normally closed contact AUD-3. Closing contact AUD-2 provides a holding circuit for relay AUD and opening contacts AUD-3 disables the lowering relay L. When the press 12 has returned to its initial position, switch RE-1 is opened deenergizing relay Rv.

Referring now to FIG. 14, there is schematically illustrated the fifth mode of operation. That is to say, in this form, a pair of jig tables are disposed in end to end relation one to the other. The supports for the jig tables are similar as the supports for the jig table illustrated in FIG. 1. The framing members F can be prepositioned on jig table 10a as the prepositioned members on jig table 10b are pressed by the press 12 and vice versa. Particularly, press 12 is adapted to pass over table 10a and commence pressing operations on table 10b, and, after a short time delay, pass over table 10b in the reverse direction and commence pressing operation upon table 10a. At the end of the reverse pressing operation on table 10a, and after a short time delay, the press advances forwardly to again press on table 10b in the forward direction. The press is continuously cycled in this fashion such that the completed truss on table 10b after the press has passed by can be removed and additional framing members prepositioned to form a new truss. Similarly after the press passes table 10a in the reverse direction, the completed truss on table 10a can be removed and additional framing members disposed thereon to form a new truss. To provide this mode of operation, a pair of tubes 180a and 180b are disposed below jig tables 10a and 10b and are transversely offset one from the other as seen in FIG. 14. The microswitches FP and RvP are also offset one from the other and the actuating arm of switch FP is raised above the actuating arm of switch RvP with its pin engaging end bent downwardly into the horizontal plane of the arm associated with switch RvP. In this manner, when the press advances forwardly, that is from left to right as seen in FIG. 14, the actuating arm of switch FP is vertically offset from the pins in tube 180a and engages only the pins in tube 180b while the actuating arm of switch RvP is outwardly spaced from the latter pins and remains unengaged. Similarly, on the return of the press, switch RvP is actuated only by the pins in tube 180a while the switch actuating arm of switch FP is vertically spaced from the pins along tube 180a.

To obtain continuous cycling along tandem jig tables, switch AD is closed to energize relay AD via lead lines 230, 254, 296 and 232. Energization of relay AD closes normally open contacts AD-1, AD-2, AD-3, AD-4 and AD-5. Closing contact AD-1 energizes relay FOR via lead lines 230, 238, 298 and 232. Energization of relay FOR closes contact FOR-2 to energize solenoid 220F via lead lines 230, 240, 260 and 232 to advance the press. Energization of relay FOR opens normally closed contact FOR-3 to disable relay AUD. When the press advances beyond jig table 10a and begins traversing along jig table 10b, the initial pin 184 in tract 180b closes switch FP to energize the relay L via lead lines 230, 262, 264, 290, 299, 266, 268 and 232. Energization of relay L closes normally opened contact L-2 to energize solenoid 218L via lead lines 230, 234, 242, 270 and 232. Energization of solenoid 218L shifts valve 218 to the left as seen in FIG. 12 as previously described to lower press platen 14. The press lowering and rising of the cycle has been previously described.

At the end of this press lowering and raising cycle switch R-1 is closed to again energize relay FOR to advance the press as previously described. The press stops and the pressing cycle

is actuated at each position of the pins 184 along tube 180b until the press reaches the end of jig table 10b. At the end of the press travel, normally closed switch F-1 opens to deenergize relay FOR. Upon deenergization of relay FOR, contact FOR-1 and FOR-3 return to their normally closed positions whereupon relay AUD is energized via lead lines 230, 238, 252, 256, 300 and 232. Energization of relay AUD closes normally opened contacts AUD-1 to energize relay Rv and close normally opened contacts AUD-2 to provide a holding circuit for relay AUD. Switch F-2 is ganged to switch F-1 and closes when switch F-1 opens to energize relays FR and TD. Energization of relay FR opens normally closed contacts FR-1 and energization of TD closes contacts TD-1 after a short time delay. Contacts Rv-2 is also closed by energization of relay Rv. Accordingly, after a short time delay, solenoid 220Rv is energized via lead lines 230, 301, 258 and 232 to shift valve 212 to the right as seen in FIG. 12. Whereupon the press moves along jig tables 10b and 10a in the reverse direction.

When the press reaches the first pin in the tube 180a associated with table 10a during its reverse travel, switch RvP closes to energize relay L via lead lines 230, 262, 304, 268 and 232 to actuate the press lowering and raising cycle as previously described. At the end of the press cycle, switch RS-1 is closed and relay Rv is again energized, the latter closing contacts Rv-2 to energize solenoid 220Rv via a circuit including lead lines 230, 240, 258 and 232. Note that the closing of switch F-2 at the forward most end of the press travel is only momentarily and that as the press advances over the pins in rail 180a, the solenoid providing the reverse drive of the press is actuated through the normally closed contact FR-1. In this manner, a time delay at each press actuating position is eliminated. At the end of press advance in the reverse direction, switch RE-1 is opened thereby deenergizing relay Rv to stop the press. Switch RE-1 is ganged to switch RE-2 and the latter closes to again energize relays FR and TD via lead line 230, 238, 252, 306 and 232. Deenergization of relay Rv returns contact Rv-1 to its normally closed position whereupon relay FOR is energized. Concurrent energization of relay FOR, FR and TD respectively close normally opened contact FOR-2, open normally closed contact FR-1 and close normally opened contact TD-1 to energize solenoid 220F after a short time delay via lead lines 230, 301, 260 and 232. Consequently, after a short time delay, the press is again advanced in the forward direction past jig table 10a for pressing operations on table 10b as previously described. In this manner, assembly line production of trusses is effected with at least two trusses being substantially simultaneously fabricated.

What is claimed and desired to be secured by U.S. Letters Pat. is:

1. A fabricating apparatus for successively embedding connector plates in the spaced butt joints in prepositioned wooden frame members forming trusses or the like comprising: means for supporting the wooden frame members, a press movable along said support means for pressing the connector plates into the butt joints of the frame members, drive means for moving said press along said support means, and means arranged in controlling relation to said press including index means operable in response to the movement of said press along said support means successive distances equal to the distances between consecutive butt joints to successively actuate said press and press the connector plates into the butt joints.

2. A fabricating apparatus according to claim 1 wherein said index means is arranged in controlling relation to said drive means to successively stop said press in response to movement thereof along said support means successive distances equal to the distances between consecutive butt joints.

3. A fabricating apparatus according to claim 2 wherein said control means includes switch means and said index means includes a member carrying a plurality of spaced switch actuating elements, the spacing between adjacent actuating elements being proportional to the predetermined spacing between the butt joints, and means providing for relative

movement between said switch means and said member for successive actuation of said switch means.

4. A fabricating apparatus according to claim 3 wherein said member has a plurality of carrying positions for said elements, said elements being movable between carrying positions to selectively vary the spacing between adjacent elements.

5. A fabricating apparatus according to claim 4 wherein said member comprises a tube extending along said support means and having a plurality of openings, said elements including pins insertable into said openings, said switch means being carried by said press and having a switch actuating arm engageable with said pins.

6. A fabricating apparatus according to claim 2 wherein said drive means includes a fluid motor and a fluid circuit therefor having valve means in controlling relation to said fluid motor, said index means including switch means arranged in controlling relation to said valve means to shift the latter and stop said press drive means.

7. A fabricating apparatus according to claim 1 wherein said press includes a press platen and at least one fluid actuated cylinder operable to move said platen toward and away from the joints, said control means including a fluid control circuit having electrically actuated valve means operably connected with said cylinder, an electrical circuit arranged in controlling relation to said valve means, and switch means in said electrical circuit, said indexing means being operable to actuate said switch means to energize said electrical circuit and shift said valve means to move the press platen toward and away from the joint.

8. A fabricating apparatus according to claim 2 wherein said press drive means includes a fluid motor and said press includes a press platen and at least one fluid actuated cylinder operable to move said platen toward and away from the joints, said control means including a fluid control circuit having electrically actuated valves operably connected with said fluid motor and said cylinder, an electrical circuit arranged in controlling relation to said valves, and switch means in said electrical circuit, said indexing means being operable to actuate said switch means to energize said electrical circuit to shift said valves to stop the movement of said press along the conveyor and move the press platen toward and away from the joint.

9. A fabricating system according to claim 2 wherein said press drive means includes a fluid motor and said press includes a press platen and at least one fluid actuated cylinder, said control means including a fluid control circuit having valve means operably connected with said fluid motor and said cylinder, and means for actuating said valve means to move said platen toward and away from the joints and to selectively stop and advance said press along said support means, said valve actuating means being operable in response to the movement of said press platen away from the joints to move said press along said support means.

10. A fabrication system according to claim 9 wherein said control means includes means located adjacent one end of said support means for actuating said valve means to stop the movement of said press along said support means.

11. A fabricating apparatus according to claim 1 wherein said press includes upper and lower press platens and a press frame, means mounting one of said press platens on said frame for movement toward and away from the other press platen including a plurality of toggles connecting between said one press platen and said frame, said control means including means operable to move said one press platen toward and away from said other press platen and including means connected to said toggles for moving an end thereof toward and away from the other end in a direction generally parallel to the movement of said one press platen.

12. A fabricating apparatus according to claim 1 wherein said support means includes a table for carrying the frame members and means movable between table support and nonsupport positions, said movable means being spaced below said table at predetermined positions therealong and movable

from said table support positions to said nonsupport positions in response to movement of said press through said positions.

13. A fabricating apparatus according to claim 12 including means for returning said movable means to said table support positions in response to movement of said press through said positions.

14. A fabricating apparatus according to claim 1 wherein said support means includes a table for carrying the frame members and a plurality of members pivotal between table support and nonsupport positions, said pivotal members being spaced below said table at predetermined positions therealong and pivotal from said table support positions to said nonsupport positions in response to engagement of said press with said members as said press moves through said positions.

15. A fabricating apparatus according to claim 14 wherein said members are substantially U-shaped and pivoted at their respective apices, the legs of each of said members having table engaging heads adjacent their free ends with the head on one leg lying in engagement with said table in a table support position while the head of the other leg is spaced below said table in a nonsupport position, said press being engageable with said members as it moves through said predetermined positions to pivot said members such that said one head of said members pivots from said table support position to said nonsupport position and the other head of said members pivots from said nonsupport position into said table support position.

16. A fabricating apparatus according to claim 14 wherein said members are pivoted at their lower ends with the upper ends thereof carrying table engaging support positions, said members being pivotable to said nonsupport positions in response to movement of said press through said predetermined positions.

17. A fabricating apparatus according to claim 14 wherein said press includes upper and lower press platens and a press frame, means mounting one of said press platens on said frame for movement toward and away from the other press platen including a plurality of toggles connecting between said one press platen and said frame, said control means including means operable to move said one press platen toward and away from said other press platen and including means connected to said toggles for moving an end thereof toward and away from the other end in a direction generally parallel to the movement of said one press platen.

18. A fabricating apparatus according to claim 1 wherein said support means includes an elongated jig table for carrying the frame members, and an outrigger support pad spaced transversely from said jig table to carry portions of trusses which exceed the width of said jig table.

19. A fabricating apparatus according to claim 18 wherein said support means includes means movable between table and pad support and nonsupport positions, said movable means being spaced below said table at predetermined positions therealong and below said pad, said movable means being movable from said table and pad support positions to said nonsupport positions in response to movement of said press through said positions.

20. A fabricating apparatus according to claim 19 including means for returning said movable means to said table and pad supporting positions in response to movement of said press through said positions.

21. A fabricating apparatus according to claim 18 wherein said pad is adjustably spaced from said jig table.

22. A fabricating apparatus according to claim 14 wherein said support means includes a table for carrying the frame members and a plurality of members pivotal between table support and nonsupport positions, said pivotal members being spaced below said table at predetermined positions therealong and pivotal from said table support positions to said nonsupport positions in response to engagement of said press with said members as said press moves through said positions.

23. A fabricating apparatus according to claim 1 wherein said support means includes a pair of jig tables located in endwise relation one to the other with the frame members

prepositioned on each table to form a truss, said control means controlling said press to first press the connector plates into the consecutive butt joints of the frame members on one of said jig tables and then to press the connector plates into the consecutive butt joints of the frame members on the other of said jig tables.

24. A fabricating apparatus according to claim 23 wherein said control means includes means providing for a time interval between the pressing action on said first and second tables.

25. A fabricating apparatus according to claim 23 wherein said control means controls said press for movement in one direction while pressing the connector plates into the butt joints of the members on said one jig table and for movement in the opposite direction while pressing the connector plates into the butt joints of the members on the other of said jig tables.

26. A fabricating apparatus for successively embedding connector plates in the spaced butt joints of prepositioned wooden frame members forming trusses or the like comprising: means for supporting the wooden frame members, a press for embedding the connector plate into the butt joints of the members, means for providing relative movement between said support means and said press to locate the latter and the successive butt joints carried by said support means in successive press positions for embedment of the connector plates in the butt joints, means arranged in controlling relation to said moving means including index means operable in response to relative movement of said support means and said press successive distances equal to the distances between consecutive

butt joints to successively actuate said press and embed the connector plates into the butt joints, said support means including a table for carrying the frame members and means movable between table support and nonsupport positions, said movable means being spaced below said table at predetermined positions therealong and movable from said table support position to said nonsupport position in response to relative movement of said press and said support means.

27. A fabricating apparatus for successively embedding connector plates in the spaced butt joints of prepositioned wooden frame members forming trusses or the like, comprising: means for supporting the wooden frame members including a table, a press for embedding the connector plates into the butt joints of the members and including upper and lower press platens on opposite sides of said table and a press frame, means for providing relative movement between said support means and said press to locate the latter and the successive butt joints carried by said support means in successive press positions for embedment of the connector plates in the butt joints, and means arranged in controlling relation to said moving means including index means operable in response to relative movement of said support means and said press successive distances equal to the distances between consecutive butt joints to successively actuate said press and embed the connector plates in the butt joints, said control means including means operable to move one of said press platens toward and away from the other of said press platens and including toggle means connecting between one press platen and said frame.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,603,244

Dated September 7, 1971

Inventor(s) John Calvin Jureit and Oscar Csakvary

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Abstract, line 5, both occurrences, "jib table--" should read --jig table--. Line 8, "jib" should read --jig--. Line 16, "pressis" should read --press is--.

In Column 5, line 59, "jib" should read --jig--.
In Column 7, line 2, "6a-6da)" should read --6a-6d--.
In Column 7, line 62, "jib" should read --jig--.
In Column 8, line 63, "valve 216" should read --valve 206--.
In Column 11, line 23, "lines 330" should read
--lines 230--.
In Column 11, line 74, "switch FOR-1" should read
--switch F-1--.
In Column 12, line 44, "platen 15" should read --platen 14--.
In Column 14, line 22, "relay L" should read
--relay LOW--.

Signed and sealed this 4th day of April 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents