Feb. 17, 1948. O. S. BOLLING 2,436,091

VENEER EDGE-GLUING MACHINE

Filed March 4, 1944 5 Sheets-Sheet 1

Fig. 1

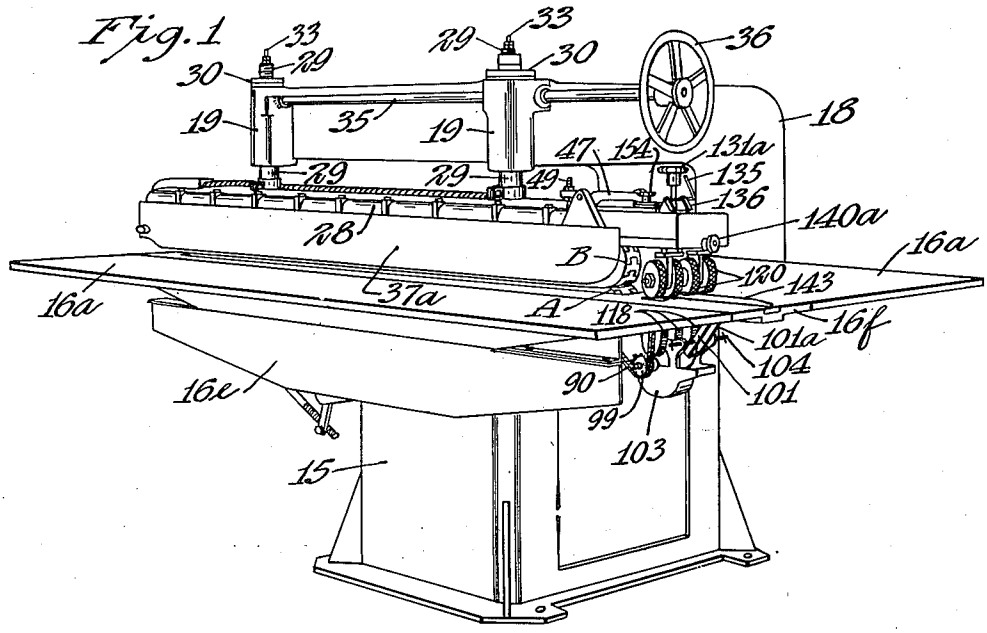
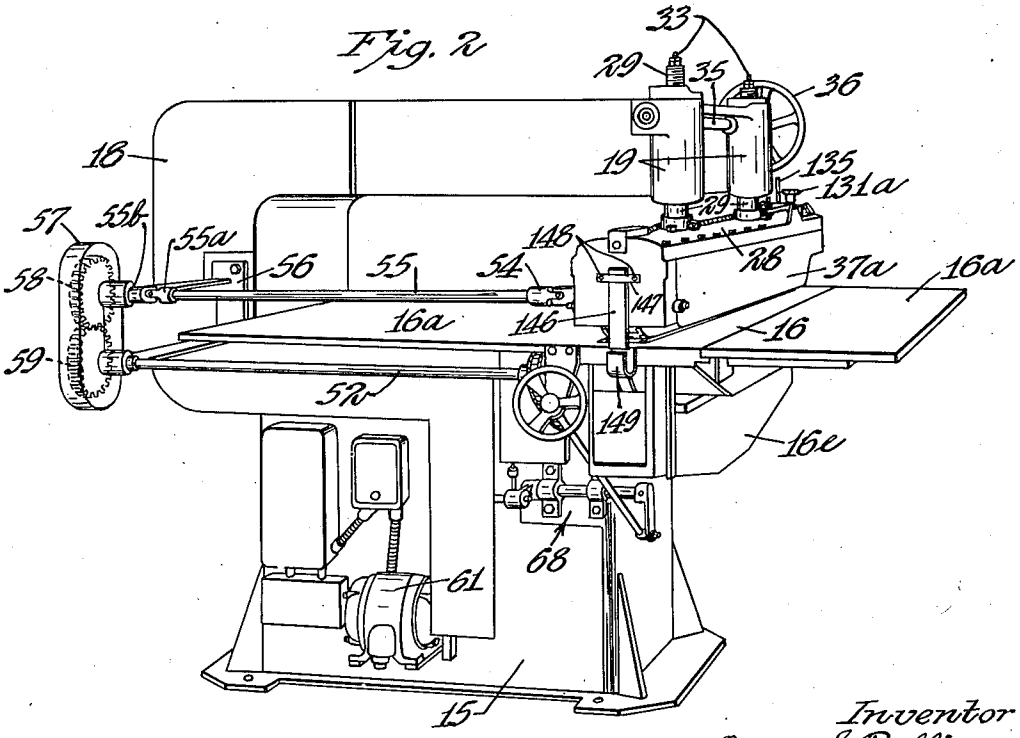


Fig. 2



Inventor
Oscar S. Bolling
By Merchant & Merchant
Attorneys

Feb. 17, 1948. O. S. BOLLING 2,436,091

VENEER EDGE-GLUING MACHINE

Filed March 4, 1944 5 Sheets-Sheet 2

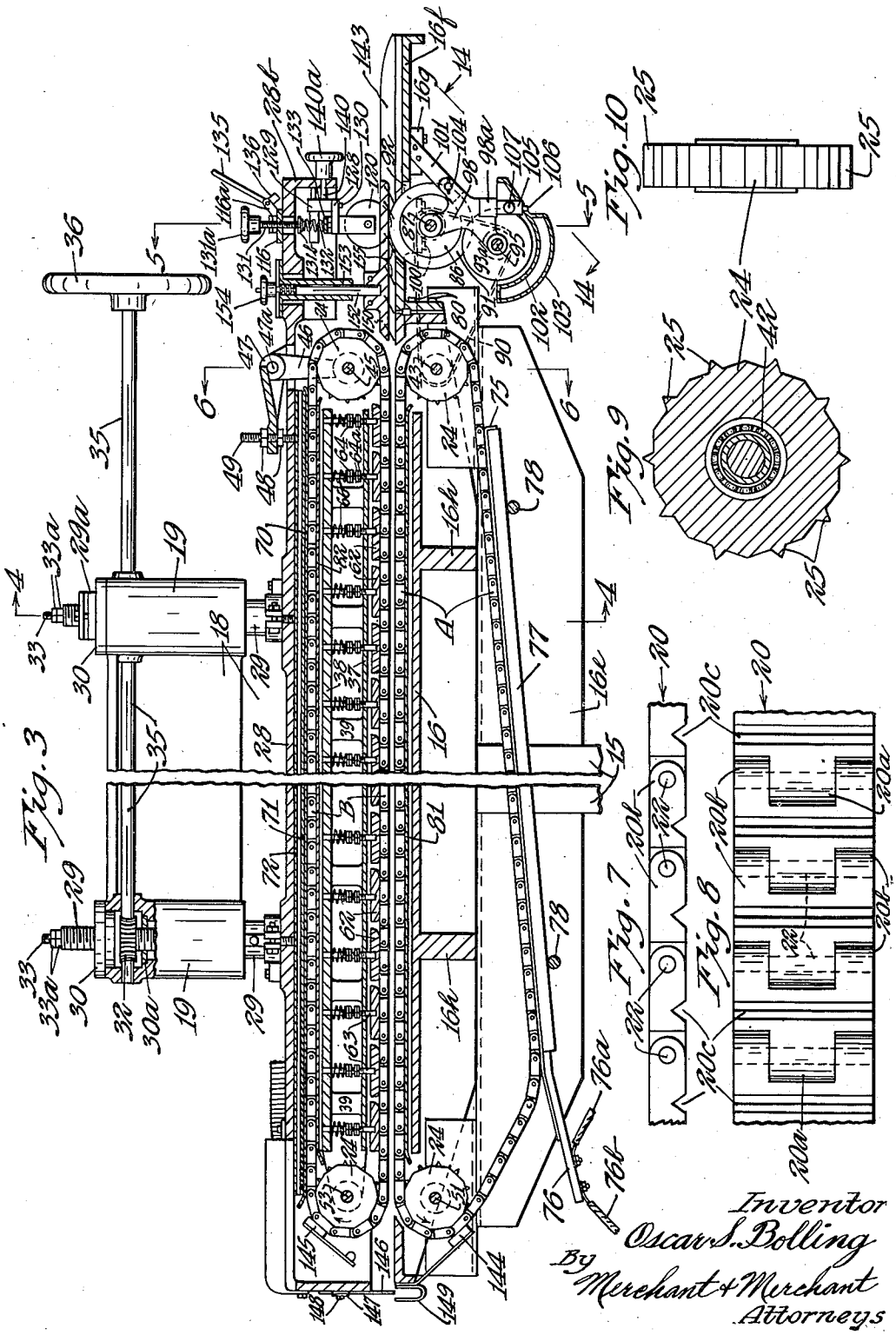


Fig. 3

Fig. 10

Fig. 9

Fig. 7

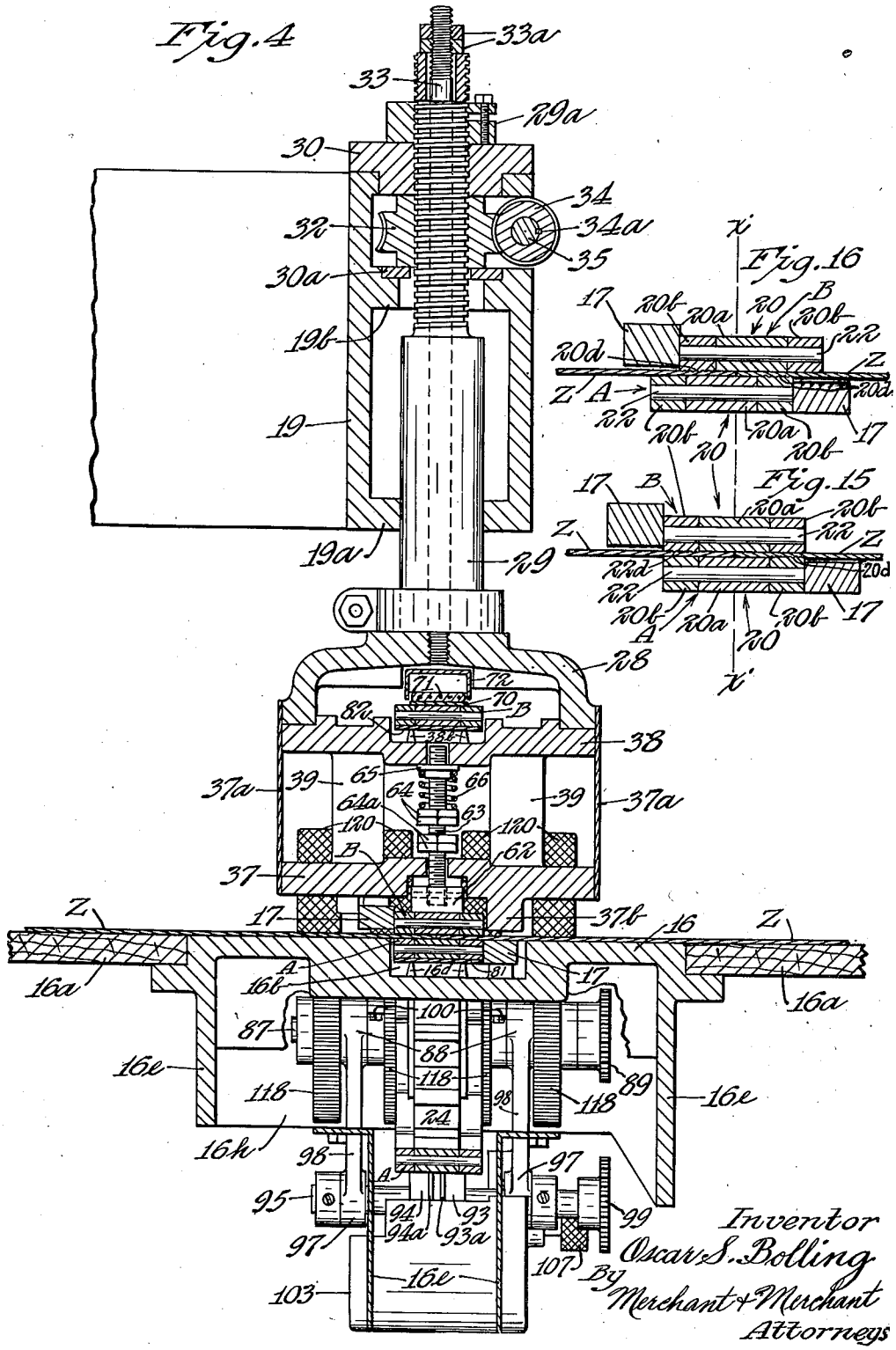
Fig. 8

Inventor
Oscar S. Bolling
By Merchant & Merchant
Attorneys

Feb. 17, 1948. O. S. BOLLING 2,436,091

VENEER EDGE-GLUING MACHINE

Filed March 4, 1944 5 Sheets-Sheet 3



Feb. 17, 1948. O. S. BOLLING 2,436,091

VENEER EDGE-GLUING MACHINE

Filed March 4, 1944 5 Sheets-Sheet 4

Fig. 6

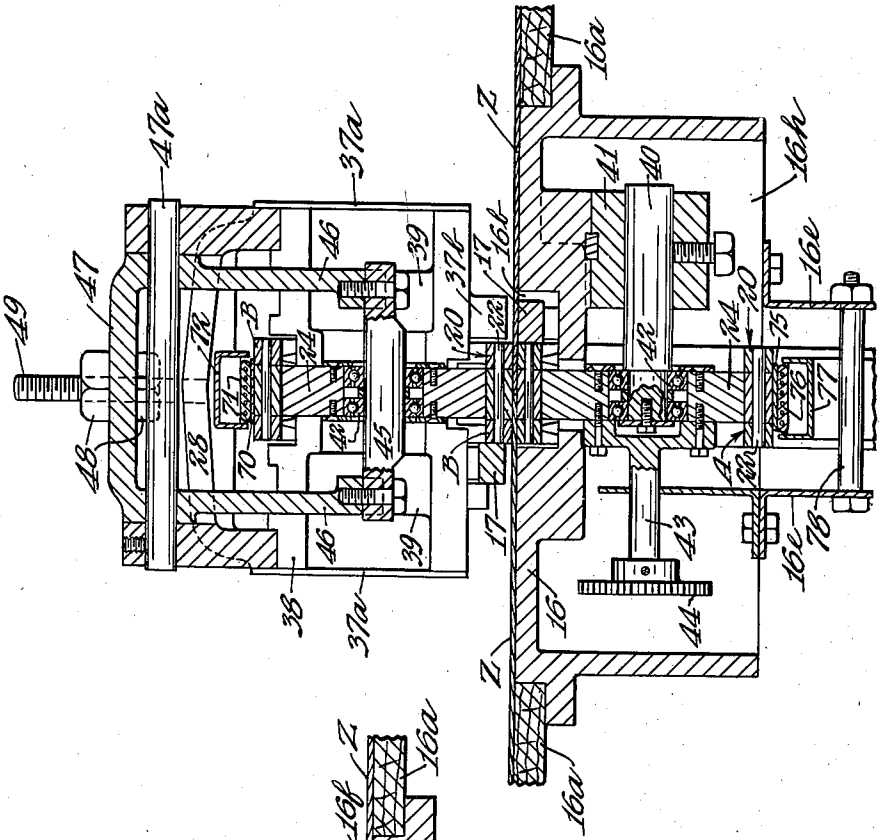
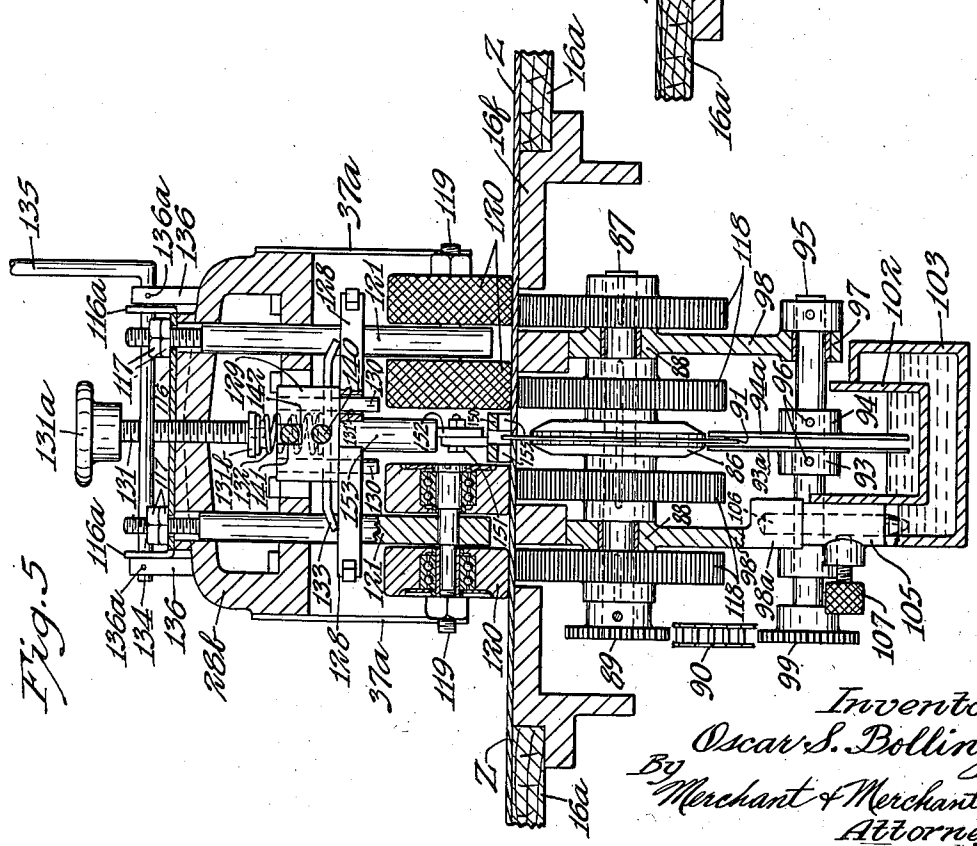


Fig. 5



Inventor
Oscar S. Bolling
By Merchant & Merchant
Attorneys

Feb. 17, 1948. O. S. BOLLING 2,436,091

VENEER EDGE-GLUING MACHINE

Filed March 4, 1944 5 Sheets-Sheet 5

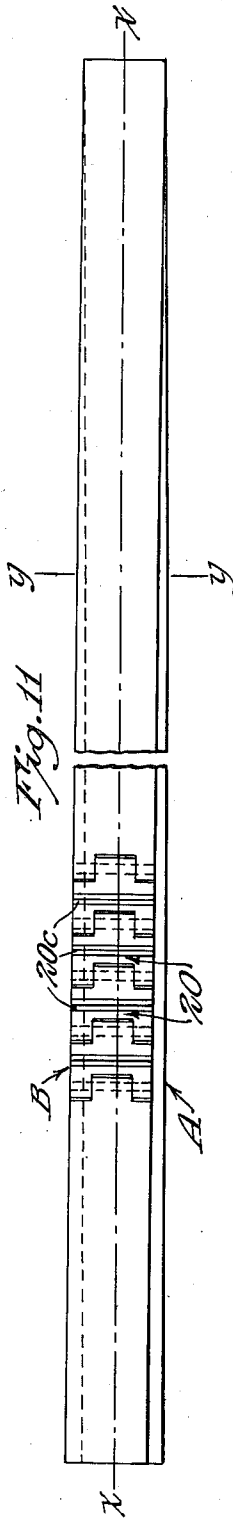


Fig. 11

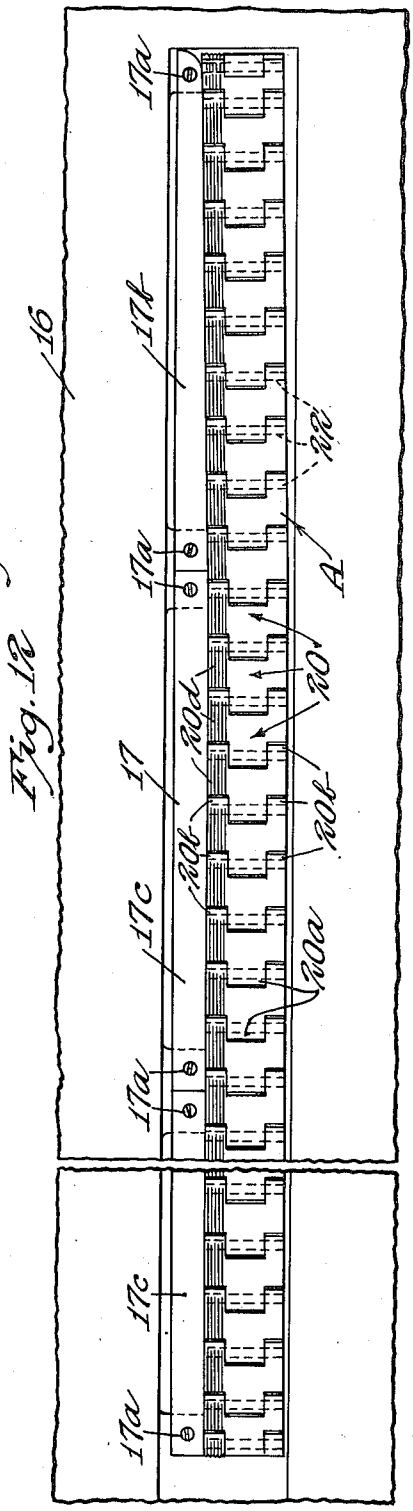


Fig. 12

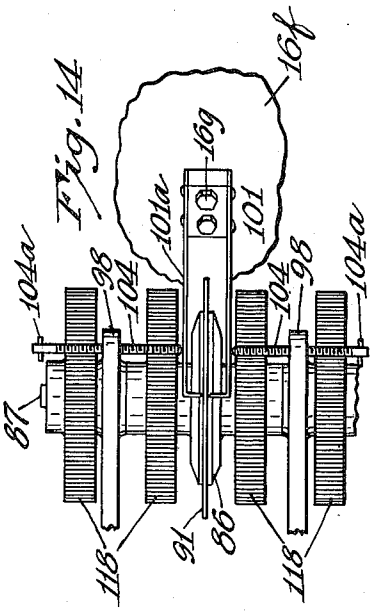


Fig. 14

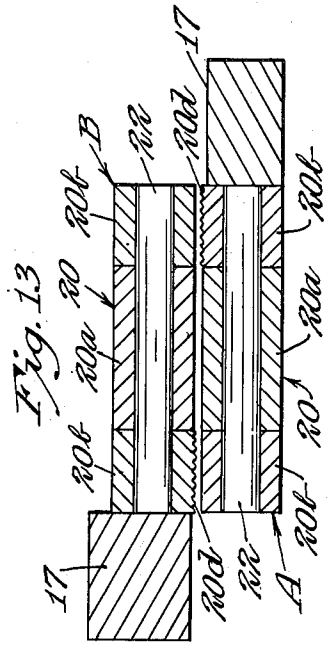


Fig. 13

Inventor
Oscar S. Bolling
By Merchant & Merchant
Attorneys

Patented Feb. 17, 1948

2,436,091

UNITED STATES PATENT OFFICE

2,436,091

VENEER EDGE-GLUING MACHINE

Oscar S. Bolling, Minneapolis, Minn., assignor to Mereen-Johnson Machine Company, Minneapolis, Minn., a corporation of Minnesota

Application March 4, 1944, Serial No. 525,037

9 Claims. (Cl. 144—279)

1

This invention relates to a machine for assembling and gluing together the edges of sheet material, and one use of the same in practice has been for so assembling and gluing together the edges of wooden veneer sheets or strips.

As is well known, many sheet materials and the said wooden sheets or strips are thin and have very thin or narrow edges which must be brought together very accurately immediately after the glue or other adhesive has been applied to said edges and said sheets must then be firmly held together while the glue is being dried or set.

It is an object of this invention to provide an improved and efficient mechanism for bringing the previously glued edges of sheet material into edge-to-edge contact and maintaining the same in such edge-to-edge contact during the glue setting or drying period. In accordance with the present invention, this is accomplished by progressing the said sheets between endless feed belts or chains having areas of relatively greater or lesser coefficients of friction providing gripping surfaces or areas for engaging opposite sides of opposite sheets, and which gripping surfaces of the opposite belts or chains converge from the input end of the machine toward the output end of the machine, whereby the previously glue-treated edges of the opposite sheets fed between the belts or chains will be moved laterally toward one another and into tight edge-to-edge contact during their initial feeding movements between the opposite belts or chains, and will thereafter be maintained in such tight edge-to-edge contact during the remainder of their travel through the space between the said belts or chains.

It is also an object of the invention to provide such a machine as set forth in the preceding paragraph with members being arranged to move one of said belts in one direction laterally and to move the other of said belts laterally in the other direction.

It is also an object of the present invention to provide a machine for assembling and securing toegther, by heat-setting glue or other adhesive, pieces of sheet material, and which machine comprises an endless belt having face portions adapted to engage the said material in close proximity to the glued surfaces thereof and progress the same through the machine, said belt having an operative run during which it engages the material and having an idle or return run during which the belt is out of engagement with the material.

A further object of the invention is the provision, in a gluing machine of the general character described, and which involves an endless belt or chain for progressing previously glued pieces of material through the machine while the said pieces of material are maintained under relative squeezing pressure, of a novel means and arrangement for applying heat to the said endless belt or chain whereby the heat applied to the belt or chain will be transmitted to the glued pieces of material for the purpose of accelerating the drying or setting action of the glue or other adhesive during the travel of the material through the machine. In prior art devices, such, for example, as are disclosed in my United States Patent No. 2,398,353, heat was applied to the glued surfaces of pieces of material during their progress through the machine by heat applied to the endless belts or chains from the inner face or faces thereof during their operative run or runs through the machine. The present invention, however, provides a new and improved arrangement whereby the one or more endless feed belts or chains are heated during their inoperative or return runs by heat applied directly to the outer or operative face portion or portions of the feed belt or belts. Not only does the the present invention result in improved heating efficiency, but it has the further advantages of simplifying the construction of the machine, locating the heating elements where they are much more readily accessible for repair or replacement, and greatly simplifying the problem of maintaining pressure on the endless belt or chain during its operative run through the machine.

2

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings in which like reference characters refer to similar parts throughout the several views and in which:

Fig. 1 is a perspective view looking principally at the receiving end of the machine;

Fig. 2 is a perspective view looking at the machine principally at the delivery end of the machine;

Fig. 3 is a view partly in side elevation and partly in longitudinal vertical central section, some parts being broken away;

Fig. 4 is a transverse vertical section taken substantially on line 4—4 of Fig. 3;

Fig. 5 is a transverse vertical section taken on line 5—5 of Fig. 3;

Fig. 6 is a transverse vertical section taken on line 6—6 of Fig. 3;

Fig. 7 is a partial view in side elevation of one of the chains used;

Fig. 8 is a partial bottom plan view of said chain;

Fig. 9 is a vertical section through one of the belt sprockets;

Fig. 10 is a view in side elevation of said sprocket;

Fig. 11 is a somewhat diagrammatic view in plan of the two belts;

Fig. 12 is a plan view of the lower belt and adjacent parts;

Fig. 13 is a transverse vertical section taken through both belts and cam members at the input end of the machine;

Fig. 14 is a partial bottom plan view of the feeding and gluing apparatus looking in the direction of the line 14—14 and arrows in Fig. 3; and

Figs. 15 and 16 are transverse sectional views through both belts and their cooperating cam members, the former being taken at the input end of the machine and the latter being taken at the output end of the machine, and each of said views incorporating pieces of edge-glued sheet material between the opposite chains thereof.

Referring to the drawings, particularly Figs. 1 and 2, a commercial form machine is shown mounted on a base 15 preferably in the form of a cast metal box-like structure. The top of this base supports a horizontal feed table shown as made up of a primary or main section 16 and extended leaves 16a. The main table 16 (see particularly Figs. 4 and 6) is formed with a channel 16b and in which a belt shifting or moving cam member or rail 17 is disposed. Said member 17 extends longitudinally of and through the major portion of the feed table as shown in Fig. 12, and is secured to lugs in the bottom of said channel by suitable screws 17a.

The feed table illustrated is very wide and projects far beyond the main table section 16. To support mechanism above said channel 16b of table section 16 the upper portion of the base 15 at one side of said table has a heavy metal arm 18 cast integral with the base or otherwise rigidly secured thereto, which arm overlies and is spaced from the feed table and at its end is formed with heavy integral or rigidly secured sleeves 19. (See particularly Figs. 1, 2, 3 and 4.)

In the preferred embodiment of the invention herein illustrated, the endless upper and lower belts, indicated as entireties by B and A respectively, are in the nature of link belts or chains of novel construction and arrangement. These link belts, both upper and lower, are of substantially identical construction but are reversed end-for-end, as will be hereinafter made apparent. Each of these link belts or chains comprise links 20, each having a central lug 20a at one end and a laterally spaced pair of lugs 20b at its other end. The lug 20a of each link is disposed between the laterally spaced lugs 20b of an adjacent link, and said links are pivotally connected by transverse hinge pins 22 extending through cooperating lugs 20a and 20b.

As an important feature of the invention, one side of the outer or operative face of each link belt is formed to provide a gripping surface 20d and an adjacent area of relatively lesser coefficient of friction. In the preferred arrangement illustrated, these gripping surfaces 20d of the chains are provided by serrating or knurling the said side portions of the chains to provide a series of gripping teeth and intervening grooves. As illustrated and preferably, these teeth of the gripping surfaces 20d of the chains will project slightly outwardly of the plane of the laterally adjacent smooth outer surfaces of the link belts, but not enough, however, to make any serious imprint in the material passed between the chains or belts. As illustrated and preferably, the said gripping surfaces 20d of the link belts are of approximately the width of the link lug portions 20b and the balance of the outer faces of the links are relatively smooth to reduce frictional gripping action therebetween and the interposed material to a minimum. Now, by reference, for example, to Fig. 13, it will be seen that the like upper and lower chains or belts, being reversed end-for-end, have their side gripping surfaces disposed at opposite sides of a vertical plane intersecting the transverse center of the belts or chains. This will also be clearly evident by reference to Figs. 15 and 16.

The links 20, as shown in Figs. 7 and 8, are provided with V-shaped notches 20c that adapt them to run on properly constructed sprocket wheels such as shown in Figs. 9 and 10. Said sprocket wheels 24 are shown as provided with V-shaped teeth 25 adapted to seat in the notches or depressions 20c.

Supported above the feed table and extending longitudinally of chain or belt-guiding channel 16b is a hanger frame or hood 28 that is rigidly secured to the lower end of a pair of suspending posts 29 (see Figs. 3 and 4) that extend vertically through and are vertically adjustable in the head-forming sleeves 19 of arm 18. The upper portions of these posts are externally threaded and extend upward through top plates 30 and fit in flanges 19a at the lower ends of sleeves 19. Stop nuts 29a are provided at the upper ends of sleeves 19. Working as a nut on the threaded ends of post 29 are post-adjusting elements shown as in the form of worm gears 32. These worm gears are held against endwise or vertical movements by the plates 30 and a washer 30a seated in inwardly extending flanges 19b of heads or sleeves 19. Posts 19 are hollow and have extending therethrough threaded rods 33 equipped with nuts 33a, the lower ends of said rods being screwed into seats in the hood 28. The worm gears 32 are in mesh with worms 34 secured in any suitable manner as with a key 34a to a shaft 35, which shaft is journalled in heads 19 and as best shown in Fig. 3, is provided at its end with an operating wheel or handle 36. By turning shaft 35 by means of wheel 36 nut-forming worm gears 32 may be simultaneously rotated to raise both ends of the hood or to lower the same. Rigidly secured to the hanger frame hood 28 and located below the same is an upper belt or chain-carrying frame shown as made up of a laterally spaced lower plate 37, an upper plate 38 and longitudinally spaced vertical struts 39. Housing plates 37a are shown as applied and secured in any suitable manner to plates 37 and 38. All of said elements 28, 37, 38 and 37a are secured together for common bodily vertical adjustments. Plate 37 has a depending flange 37b and the upper endless belt or chain already described is disposed at one side of said flange and above the lower chain A, which latter is disposed in channel 16b.

Another chain shifting or moving cam member or rail 17, similar to that shown in Fig. 12, is disposed at one side of chain B and it will be noted, as shown in Figs. 4 and 6, that the lower

member 17 is at one side of the lower belt A while the upper member 17 is at the opposite side of the upper belt B. As shown best in Figs. 13, 15, and 16, the upper chain-guiding cam member 17 engages the upper chain B at the side thereof immediately adjacent the gripping surface 20d of the upper chain, and the lower chain-guiding cam member 17 engages the lower chain A at its opposite side and immediately adjacent its gripping surface 20d. The upper and lower chain-guiding cam member 17 are, in the preferred embodiment illustrated, each made up of a primary section 17b and secondary sections 17c (see particularly Fig. 12).

It will be seen, particularly by reference to Fig. 11, that the upper chain B, in the illustrated embodiment of the invention, is directly over and substantially in vertical alignment with the lower chain A at the input end of the machine, but said chains are laterally offset with respect to a transverse center line X—X at the output end of the machine. In other words, the upper and lower chain sprockets 24 at the input end of the machine are disposed substantially directly one above the other; whereas, the sprockets 24 at the output end of the machine are each slightly offset laterally or axially in opposite directions with respect to the transverse center line X—X of Fig. 11, so that the upper and lower chains, as entireties, diverge from the input toward the output end of the machine, as is exemplified in Fig. 11 and as is made further apparent by a comparison of Figs. 15 and 16. As an aid in comparing Figs. 15 and 16, a center line X'—X' has been made common to said Figs. 15 and 16. Now, the fact that the upper and lower chains B and A respectively are shown as diverging from the input toward the output end of the machine, should not be permitted to become confusing, since, by reference particularly to Figs. 15 and 16, it will be seen that the gripping surfaces 20d of opposite chains, being located always at opposite sides of a longitudinally extended transverse center line, actually converge with respect to one another and such center line from the input toward the output end of the machine. As will hereinafter be made apparent, it is the relative convergence of the gripping surfaces 20d of opposite link belts or chains B and A that causes opposite edge-glued sheets to be crowded together into tight edge-to-edge contact during the movement of such sheets through the machine under the feeding action of said link belts or chains.

Now, it wil be seen, particularly by reference to Figs. 11 and 12, that the operative runs of the link belts or chains do not extend in absolutely straight line directions from input end to output end of the machine but are, in fact, forced somewhat out of such a straight line by their respective chain-guiding cam members 17. By reference to Fig. 12, it will be seen that the primary sections 17b of the members 17 have their chain-guiding sides disposed at a slight angle with respect to the chain-engaging sides of the secondary sections 17c, and this is true of both the upper and lower chains. In other words, the chain-guiding surfaces of the upper and lower members 17 converge with respect to one another throughout their entire length, but converge more rapidly and at a greater angle one with respect to the other for the length of the primary section 17b thereof than during the remainder, and, in fact, major portion of their lengths. It will be understood that the upper and lower link belts or chains, being made up of pivotally connected

links, are somewhat flexible laterally so that they will follow the relatively angularly disposed surfaces of the sections 17b and 17c of the cams or guide members 17 through their operative runs, which will cause the gripping surfaces 20d of the upper and lower chains to converge one with respect to the other at a greater angle while traveling past the primary sections 17b of the cam-acting members 17 than during their travel past the secondary sections 17c of cam members 17.

The lower right hand sprocket 24 (see Figs. 3 and 6) is journalled on a stud or spindle 40 fixed in a block 41 rigidly secured to the bottom of the feed table 16. Preferably, ball bearings 42 hold the said sprocket against lateral displacement or said stud. The lower right hand sprocket, as will presently be noted, is driven by the lower chain but serves to transmit motion to a glue-applying wheel to be later described and hence said sprocket is provided with an axially projecting shaft 43 that carries a sprocket wheel 44.

The upper right hand sprocket 24 is journalled on a spindle 45, the ends of which are rigidly secured to the depending arms 46 of a bell crank lever 47, the upper arm of which is apertured to have pass therethrough a stud 49 having threaded thereon at each side of said upper arm the nuts 48. It will be seen that nuts 48 can be adjusted to vary the position of said upper arm and thus the position of spindle 45 thereby tightening or loosening upper chain B. Bell crank 47 is pivotally connected to lugs on the frame or hood 28 by a pivot bolt 47a.

The two sprockets 24 at the left hand ends of the belts as seen in Fig. 3, drive the opposing portions of the feed belts or chains A and B in a direction from right toward the left and hence keep the cooperating adjacent portions of said belts under tension to produce the proper feeding action without buckling of said belts. The upper and lower left hand sprockets 24 are thus rotated in reverse directions as indicated by the arrows in Fig. 3. It may be also noted here that the lower belt A is disposed in the groove or channel 16b in the feed table and at its ends said belt A passes through openings in said feed table as clearly shown in Fig. 3. As stated, the upper and lower left hand sprockets 24 are the belt-driving members. The lower left hand sprocket 24 is mounted on a shaft 51 journalled in a fixed bearing of the feed table and is connected to or formed as an extension of quite a long shaft 52. The upper left hand sprocket 24 is secured to and carried by a shaft 53 (see Fig. 3) which is connected in any suitable manner as by a universal knuckle joint 54 to quite a long shaft 55 (see Fig. 2). Shaft 55 is also shown as connected by another universal knuckle joint 55a to a shaft 55b. Shaft 55b and shaft 52 are journalled in bearings carried on a bracket 56 secured to the stud of arm 18 as clearly shown in Fig. 2. Said bracket 56 also carries a gear housing 57. Shaft 55b is provided with a spur gear 58 that meshes with a similar gear 59 secured to shaft 52, both of said gears being enclosed in housing 57.

Shaft 52 may be treated or considered as a major power-transmitting element that receives power or is driven from any suitable source, such, for example, as an electric motor 61 mounted on the base 15 and connected to shaft 52 by any well-known or suitable speed reducing transmission mechanism. The group of elements designated generally as 68 may be assumed to be parts of such a transmission mechanism, which mechanism constitutes no essential part of the

present invention and need not, for the purpose of this case, be further described.

The links 20 in the operating or lower run of upper chain B are engaged on their upper sides by pressure shoes 62. These shoes are spaced along the length of said run of said belt as shown in Fig. 3. Shoes 62 are engaged by pressure plungers 63 (see Figs. 3 and 4). These plungers pass through openings in lower plate 37 and have their upper ends disposed in openings in upper plate 38, said openings in both of said plates being of larger diameter than said plungers. Plungers 63 have surrounding the same adjacent plate 38 washers 65 and also have threaded thereon nuts 64. Coiled compression springs 66 surround studs or plungers 63 between washers 65 and nuts 64 and thus press downwardly on said plungers. Plungers 63 also have nuts 64*a* threaded thereon some distance above plate 37 which act as stops and act to lift pressure shoes 62 when head 28 is raised and said nuts 64*a* may be adjusted to the desired position. It will be noted that shoes 62 have their forward ends curved so that belt B will move easily thereunder. Lower belt A has its upper or operating run slidable on a plate 81 which is supported on ribs 16*d* upstanding from the bottom of channel 16*b* in the feed table. Said member 81 has its front and rear ends curved downwardly and said member is substantially the width of chain A as shown in Fig. 4. The upper run of belt B is supported upon a plate 82 supported upon ribs 38*b* upstanding from a central channel in plate 38. Said member 82 is substantially the width of chain B as shown in Fig. 4 and has its front and rear ends turned downwardly as shown in Fig. 3. Said upper run of chain B is engaged on its top side by a plate 70 having its ends turned upwardly somewhat, said plate being secured to an electrical heating element 71 disposed immediately thereabove and in heat-conducting relation therewith. Heating element 71 is secured in any suitable manner to the bottom of housing 28. The heating element 71 will be supplied with current by suitable conductors (not shown). The lower run of belt A is supported upon and engages a plate 75 supported on an electrical heating element 76 disposed in heat-conducting relation therewith and which will be supplied with current by suitable conductors 76*a* and 76*b*. Heating element 76 is supported in a member 77 which is in turn supported on headed and nutted bolts 78 extending transversely between the depending heat retaining plates 16*e* which are fastened to portions or flanges 16*h* of feed table 16. As shown in Fig. 3, plate 75 has its right hand end bent down over the end of member 77 and has its left hand extending some distance beyond said member.

In Figs. 5 and 6, the thin veneer strips that are to be assembled and glued together by this machine are indicated as Z. In cooperation with the machine so far described, an improved form of glue-applying mechanism is provided, which is best shown in Figs. 3 and 5. To form suitable supports for the parts of said glue-applying mechanism the crown plate 28 is forwardly extended beyond the receiving portions of the feed chains, said extended portion being designated 28*b* and the feed table 16 is provided with an extension 16*f* rigidly secured to a depending flange on the main portion by bolts 80. A glue-applying wheel 86 is provided carried by a transverse shaft 87 journalled in bearings 88 secured on the bottom of the table extension 16*f*. This shaft 87 at one end has secured thereto a sprocket 89 over which and sprocket 44 runs a chain 90. Wheel 86 has a thin or narrow glue-applying blade 91 disposed in a vertical plane aligned with the medial, longitudinal vertical plane of the feed belts or chains A and B, said blade projecting through an opening 92 formed on the table extension 16*f*. The blade 91, which is of annular form, at the lower side of wheel 86 is disposed between the flanges or discs 93*a* and 94*a* carried respectively on wheels 93 and 94, having hubs secured to a shaft 95 in any suitable manner as by the pins 96. Shaft 95 is journalled in bearings 97 carried at the lower end of downwardly extending flanges or brackets 98 secured in turn to flanges or lugs depending from the bottom of extension 16*f*. Brackets 98 are secured by bolts 100 (see Figs. 3 and 4). Shaft 95 at one end has secured thereto a sprocket wheel 99 disposed in the plane of sprocket wheels 44 and 89 and over which will run the chain 90. The flanges 93*a* and 94*a* at their lower ends are disposed so as to run in the liquid glue contained in a glue pot 102. Glue pot 102 has a surrounding casing 103 and said pot and casing are connected to an apertured lug 105 adapted to be moved over and receive a pin 106 secured in a lug 98*a* on bracket 98. Lug 105 has a laterally projecting boss tapped to receive a threaded set screw 107 having a knurled head. It will be seen that lug 105 and thus pot 102 and its casing 103 can be vertically adjustably locked on pin 106 by set screw 107. Secured to opposite sides of a block or lug 16*g* depending from the lower side of extension 16*f* are comparatively thin bars or strips 101 and 101*a*. These extend downwardly toward wheel 86 and have their ends bent substantially at right angles, the terminals of said ends being disposed in close proximity to the sides of the blade 91 of wheel 86. Threaded rods 104 extend through and are threaded into brackets 98 and have their ends disposed so as to engage the sides of strips 101 and 101*a* respectively. Rods 104 have handle-forming pins 104*a* extending therethrough adjacent their outer ends.

As a primary feed device, the glue wheel-carrying shaft 87 is provided with spaced feed wheels 118 having serrated peripheries having their upper portions extending through openings or slots in table extension 16*f*. The upper portions of feed wheels 118 are substantially flush with the top of table 16 and its extension 16*f*. Located over the feed wheels 118 are primary rollers 120 shown as journalled on shafts 119 carried by plungers 121, which plungers are loosely mounted for vertical and rotary movements in the front extension 28*b* of hood member 28 and are yieldingly biased downwardly by springs 132 against adjustable stop nuts 117. Plungers 121 are reduced and threaded at their upper ends to receive nuts 117 which engage a plate 116 overlying portion 28*b*. The primary rollers 120 are preferably toed in, one in respect to the other, in the direction of feed, and for adjusting the rollers to obtain the desired adjustment, the said plungers 121 at their intermediate portions are respectively provided with inwardly projecting arms 128. Overlying the inner ends of arms 128 is a floating coupling block 129 which has depending pivot-forming pins 130 extending through slots or slightly enlarged holes 131' in the inner and free ends of arms 128. The plate 116 rests loosely on the top of portion 28*a* and has upwardly extending ends 116*a* in which is

journalled a crank shaft 134. This crank shaft has at one end a handle 135 and adjacent said handle and adjacent one of the ends 116a has rigidly secured thereto in any suitable manner as by pins 136a lift lugs 136. Lift lugs 136 are also shown in Fig. 3, where they are turned to inoperative position. As best shown in Fig. 5, a tension screw 131 is provided which is threaded into the top of hood portion 28 and works freely through an opening in plate 116. Screw 131 is provided with an operating hand wheel 131a at its upper end. Screw 131 has a plate 131b at its lower end with a projecting boss fitting in and pressing downwardly upon a compression coiled spring 132, which spring in turn presses against a bar 133 that extends between and rests on top of the arms 128. Pressure is thus applied through screw 131 and spring 132 to arms 128 and thus to rollers 120, which in operation are disposed in contact with the top surfaces of the veneer strips Z.

The numeral 140 (see Figs. 3 and 5) indicates an adjusting screw that works through the flange formed on the front end of hood extension 28b, the same having an operating hand wheel 140a at its outer end. Screw 140 has threaded enment with the coupling block 129, whereby to rotatively adjust the rollers 120 on the axes of plungers 121. A stud or pin 141 is rigidly secured to said flange carrying screw 140 and has its end disposed in a notch or slot 142 formed in said block 129. Said stud or pin 141 merely guides block 129 for forward and rearward sliding movements and preventing any rotary movement.

The downward pressure exerted on the rollers 120 may, as above indicated, be varied by adjustments of screw 131. By adjustments of the screw 140 the plungers 121 may be oscillated and rollers 120 may be set at angles slightly converging forwardly or in the direction of feed of the veneer strips. When the rollers are so set they will tend to force the veneer strips toward a thin plate-like aligning flange 143 upstanding from table extension 16f. Said strips will thus be properly aligned for the application of glue thereto from the flange or blade 91 of the glue wheel 86. Here it may be stated that the lower feed rollers 118 are set parallel and are preferably provided with transversely grooved peripheries, which, while they have strong frictional feeding action, will not materially resist the slight shifting action produced by the converging upper rollers.

Again referring to Figs. 3 and 5, it will be noted that overlying the glue-applying roller 86 and its blade 91 is an initial guide shoe 150 that is slotted or bifurcated to clear the flange 91. This shoe 150, by means of overlapping lugs and a coupling bolt 151 is hung from the lower end of a rod or plunger 152 that moves slidably through a sleeve 153 which is, in turn, rigidly secured to and depends from front extension 28b. The upper end of sleeve 153 has a flange overlying and rigidly secured to extension 28b as best shown in Fig. 3. The upper end of plunger 152 is reduced and threaded to receive a hand wheel nut 154 by rotation of which plunger 152 and shoe 150 may be vertically adjusted. Said shoe 150 is shown as provided on its underside with depending thin spring blades 155 extending forwardly and downwardly that directly engage the veneer strips Z and press the same downwardly with a pre-determined pressure, which pressure may be controlled by vertical adjustment of plunger 152.

In Fig. 3, at the left hand end or delivery end of the machine, chain wipers 144 and 145 are shown engaging respectively the lower and upper belts A and B. A thin scraper blade 146 is shown as secured to the end of member 28 adjustably held in a strip 147 secured by bolts 148 so that its lower edge may be disposed close to the veneer strips Z to remove therefrom any glue which may be on their upper surfaces adjacent their joint edges. A U-shaped scraper 149, the outer edges of which remove the excess glue, is secured to rear end of feed table 16.

The operation of the machine above described may be summarized as follows:

The veneer strips Z are placed on the receiving end 16f of the feed table 16 with their adjacent edges pressed against the sides of the aligning flange 143 and are manually so placed and moved to the initial feed rollers 118 and 120 and will be moved forwardly with the adjacent edges of the strips pressed against the blade 91 of the glue-applying wheel 86. It will be understood that the belts or chains A and B will be driven by movement of the rear sprockets 24 in the direction indicated by the arrows on said sprockets in Fig. 3 and the wheels 86 and 93 and 94 will be driven by chain 90 as above described. Glue will be carried up from glue pot 102 between the adjacent discs or flanges 93a and 94a and this glue will be transferred to or delivered to blade or flange 91. The thickness of the layer of glue on blade 91 may be nicely determined by adjustment of strips 101 and 101a by the screws 104. When the upper rollers 120 are set in slightly converging position, they will keep the edges of the veneer strips pressed against blade 91 and against the aligning flange 143. When said veneer strips pass the delivery end of aligning flange 143, said strips with the glue applied to the edges thereof will be delivered to the upper and lower main feeding mechanism, namely the upper and lower feed chains or belts A and B and thereafter the feeding movement of the veneer strips will be controlled by said belts or chains. The veneer strips or sheets Z will be fed into the space between the upper and lower chains with their glued edges very slightly spaced apart and approximately at the transverse centers of said chains, which at the input end of the machine are substantially in vertical alignment. As the veneer strips move into the space between the cooperating upper and lower belts or chains, they will be gripped with a vise-like action between the chains, which will be maintained throughout the travel of the strips between the chains. This clamping action of the opposite chains on the interposed strips or sheets will insure ample feed gripping action between the gripping surfaces 20d of the chains and the opposite sides of opposite sheets. This same vise-like gripping action of the chains on the material will also insure maintenance of the opposite strips or sheets in the same horizontal plane and prevent buckling or overlapping of the sheets or strips under edgewise pressure applied thereto during the feeding movement through the machine, due to the relative convergence of the gripping surfaces 20d of the chains. Now, from an examination particularly of Figs. 11, 12, 15 and 16, it will be clear that, whereas opposite chains A and B, taken as entireties, each engage an opposite side of both sheets, the gripping surfaces 20d of opposite chains A and B engage only one sheet or strip Z each. Hence, it will be clear that the grip-

ping surfaces 20d of opposite chains, due to the relative convergence from the input toward the output end of the machine, will tend to move the opposite sheets Z toward one another as they progress through the machine. Hence, during the initial movement of the sheets through the machine, their previously glued edges will be brought into tight edge-to-edge contact by the converging line of movement of the gripping surfaces 20d of opposite chains, and will thereafter be maintained in tight edge-to-edge contact during the remainder of their travel through the space between the opposite chains by continued convergent lines of movement of the gripping surfaces 20d of opposite chains. Of course, with the chain-engaging cam members shaped as illustrated and previously described, the rate or angle of convergence of the gripping surfaces of the opposite chains one with respect to the other is greater per unit of linear travel while passing the input sections 17b of the cam members 17 than during the balance of the travel through the chains, and this is important, since it is during the initial movement of the sheets through the machine that they are shifted laterally into edge-to-edge contact. It will be clear that after the sheets have once been brought into tight edge-to-edge contact, a somewhat reduced angle of convergence of the gripping surfaces of opposite chains will be necessary to maintain such tight edge-to-edge engagement of the sheets. In Fig. 11, the line Y—Y indicates the approximate vertical plane at which the angle of convergence of the cam members 17 and chains A and B changes. It will, of course, be further appreciated that there will be a slight lateral slippage of the chains on the interposed sheets during that portion of their travel through the space between the chains after the edges of the strips or sheets have been brought into tight contact. In the drawings, particularly Figs. 11, 12, 15, and 16, the amount or degree of angularity between upper and lower chains has been exaggerated for the purpose of illustration.

As upper belt B moves along and in engagement with the veneer strips, it is pressed downwardly by the spring 66 acting on the shoes 62. As described, this pressure can be varied by adjustment of nuts 64. There will be several sections of the cam bars or rails 17. In one practical embodiment of the machine, the table was about 76 inches long and the sections of the cam bars were made about 16 inches.

As the chains A and B pass over the sprockets 24 at the output end of the machine (the left hand end of the machine with respect to Fig. 3) and move into their inoperative or return runs, the outer operative faces thereof soon come into engagement with surfaces heated by the heating elements 71 and 76 respectively and remain in engagement with such heated surfaces during most of their long travel through the outer or inoperative return runs. During this long travel of the chains with their operative faces in surface contact with the heating elements or surfaces heated directly thereby, the link belts or chains will be brought up to the desired temperature, so that when they pass around the sprockets 24 at the input end of the machine and into their operative runs, they will transfer the desired amount of heat to the glued edges of the material to dry or set the said glue or other adhesive. Due to the heated links of the upper and lower chains, the adhesive or glue will be completely set during the travel of the veneer strips through the chains and said strips will be permanently glued together after passing through said chains. The lower feed belt or chain does not require any slack adjuster but the upper belt should be kept free from slack and this is accomplished through the provision of the bell crank lever 46 and the adjusting screw 49.

In Figs. 3 and 5, the lever 135 is shown as raised so that the initial feed rollers 120 will be yieldingly pressed down by spring 132. However, when lever 135 is pressed downwardly, lift lugs 136 engage the top of extension 28b and lever 135 then acts to raise feed rollers 120 out of cooperative relation with respect to the lower feed rollers 98. As already described, the upper frame or hood 28 is made vertically adjustable by rotation of shaft 35 and when this frame 28 is raised or lowered, all the parts carried thereby, including the upper link belt or feed chain and the pressure shoes 62 will also be vertically raised or adjusted. Such adjustments adapt the machine to be set for proper operation upon different thicknesses of veneer strips. As stated, any surplus glue on the strips may be removed by blades 146 and 149. The chains will also be kept in proper clean condition by the wiper shoes 144 and 145.

From the above description, it will be seen that I have provided an improved and very efficient machine for joining strips of sheet material such as veneer. The strips are easily and quickly placed on the machine and when once engaged by the feeding mechanism, are automatically progressed and brought into the desired abutting relation so as to be effectively united by the adhesive. The desired amount of heat is applied to the strips so that the glue or adhesive will set and be in final desired condition when the strips leave the machine. The casing 103 about glue pot 102 may contain a suitable liquid for keeping the glue in pot 102 in the desired fluid condition. The machine has been amply demonstrated in actual practice, found to be very successful and efficient, and is being commercially made.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts, without departing from the scope of my invention, which, generally stated, consists in a device capable of carrying out the objects above set forth, in the parts and combinations of parts disclosed and defined in the appended claims.

What is claimed is:

1. In a gluing machine, an endless belt adapted to engage sheet material and progress the same, said belt having an operative run arranged to engage and progress said material and having an inoperative idle run, and a heated stationary plate engaging the work-engaging face of the belt on its inoperative idle run.

2. In an edge gluing machine, means for imparting like longitudinal feeding movements to a pair of edge glued butt jointed sheets of material and maintaining the butt jointed edges of the adjacent sheets under tight lateral squeezing pressure during said longitudinal feeding movements, said means comprising a cooperating pair of opposed endless feed belts each supported to provide an elongated relatively flat work-engaging run portion and an idle run portion, the work-engaging faces of said belts being longitudinally divided into smooth and serrated gripping surface portions, the serrated gripping surface portions of opposite belts being located on opposite sides of a plane normal to the work-

engaging faces of the operative run portion of the belts and extending through the jointed edges of the sheets, and belt guiding members engaging transversely opposite edges of the operative run portions of opposite belts for progressively moving said belts laterally toward one another.

3. In an edge gluing machine, cooperating endless feed belts each supported to provide an elongated relatively flat feed run portion and an idle run portion, said belts having work-engaging faces that are divided into adjacent laterally parallel areas of relatively greater and lesser coefficients of friction, said cooperating belts having spaced opposed substantially parallel work-engaging run portions, the greater frictional work-engaging areas of the feed run portions of opposite belts being located on opposite sides of a plane normal to the work-engaging faces of the belts and extending in the direction of longitudinal feeding movements of material passed between the belts, and said belts converging in spaced planes normal to the first said plane.

4. In an edge gluing machine, cooperating endless feed belts each supported to provide an elongated relatively flat feed run portion and an idle run portion, said belts having work-engaging faces that are divided into adjacent laterally parallel areas of relatively greater and lesser coefficients of friction, said cooperating belts having spaced opposed substantially parallel work-engaging run-portions, the greater frictional work-engaging areas of the feed run portions of opposite belts being located on opposite sides of a plane normal to the work-engaging faces of the belts and extending in the direction of longitudinal feeding movements of material passed between the belts, and the said greater frictional areas of the feed run portions of the opposite belts converging with said plane in the direction of feed.

5. The structure defined in claim 3 in further combination with belt guiding angularly converging cam members engaging opposite edges of opposite belts during their operative runs to prevent lateral spreading thereof.

6. The structure defined in claim 4 in further combination with belt guiding angularly converging cam members engaging opposite edges of opposite belts during their operative runs to prevent lateral spreading thereof.

7. The structure defined in claim 3 in further combination with angularly extending belt guiding members engaging transversely opposite edges of the operative run portions of opposite belts, each member having portions differently inclined with respect to said plane for progressively moving said belts laterally toward one another more rapidly at one portion of their travel than at the other.

8. The structure defined in claim 4 in further combination with angularly extending belt guiding members engaging transversely opposite edges of the operative run portions of opposite belts, each member having portions differently inclined with respect to said plane for progressively moving said belts laterally toward one another more rapidly at one portion of their travel than at the other.

9. The structure defined in claim 3 in further combination with elongated angularly converging belt guiding camming members engaging transversely opposite edges of the operative run portions of opposite belts, each member having portions differently inclined with respect to said plane for progressively moving said belts laterally toward one another more rapidly adjacent the input end of the machine than adjacent the output end of the machine.

OSCAR S. BOLLING.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
709,864	Boenning	Sept. 30, 1902
1,436,023	Elmendorf	Nov. 21, 1922
1,643,194	Black	Sept. 20, 1927
1,646,645	Frederickson et al.	Oct. 25, 1927
1,903,373	Dennis	Apr. 4, 1933
2,071,999	Dike	Feb. 23, 1937
2,084,676	Friz	June 22, 1937
2,269,816	Gustin	Jan. 13, 1942
2,305,525	Gustin	Dec. 15, 1942
2,351,946	Friz	June 20, 1944