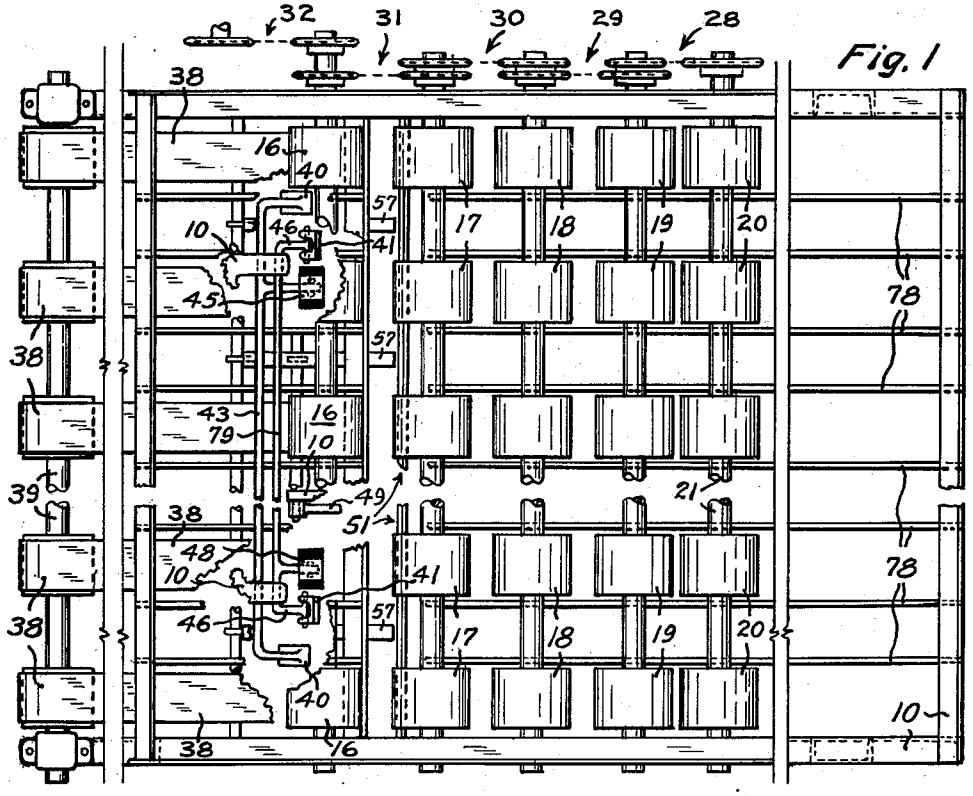
July 7, 1953 D. L. SCHUBERT 2,644,496

EDGE GLUING DEVICE

Filed June 15, 1948 2 Sheets-Sheet 1

Fig. 1



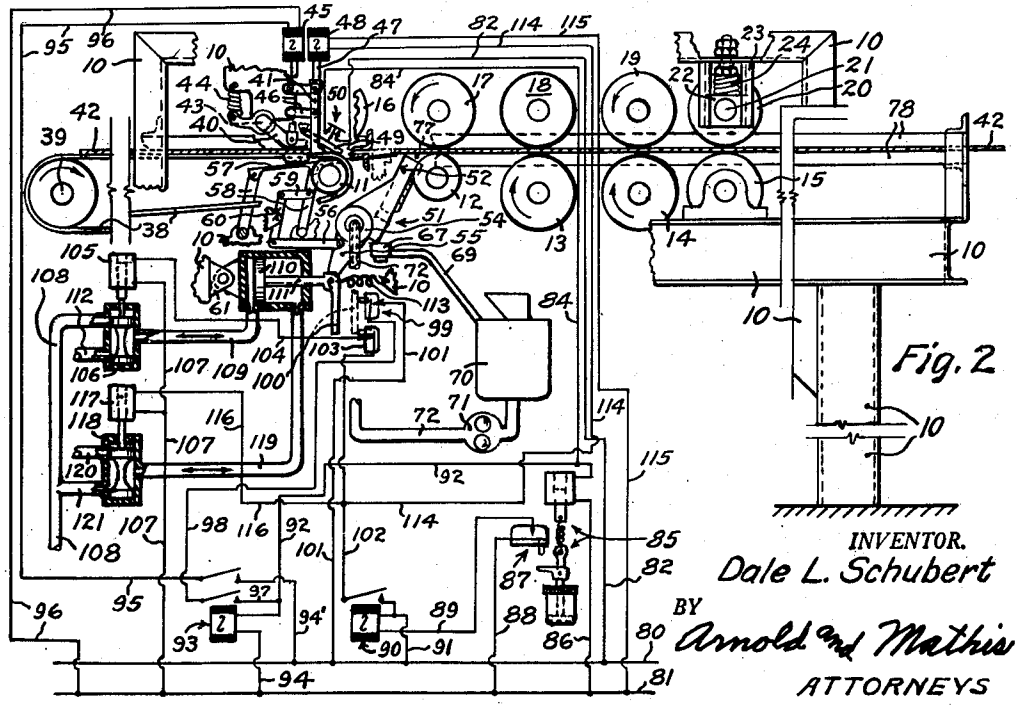


Fig. 2

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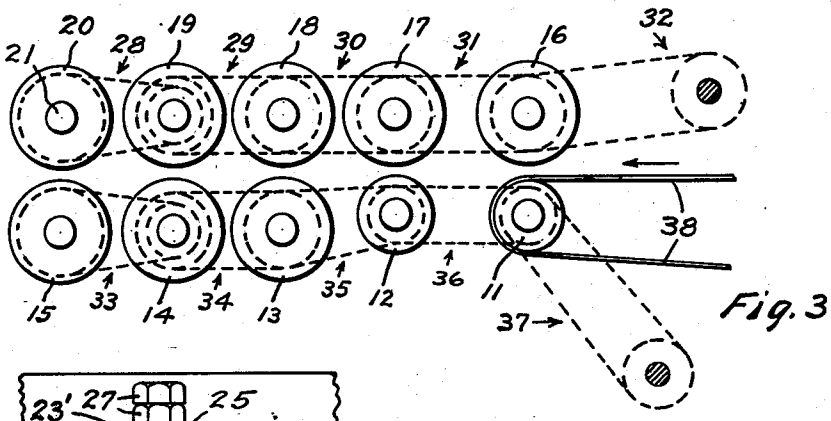


Fig. 3

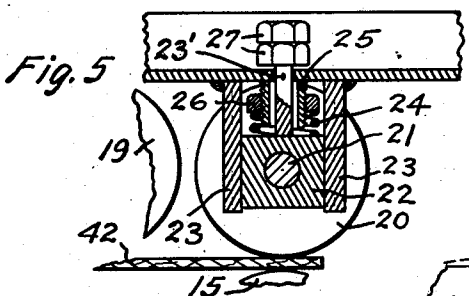


Fig. 5

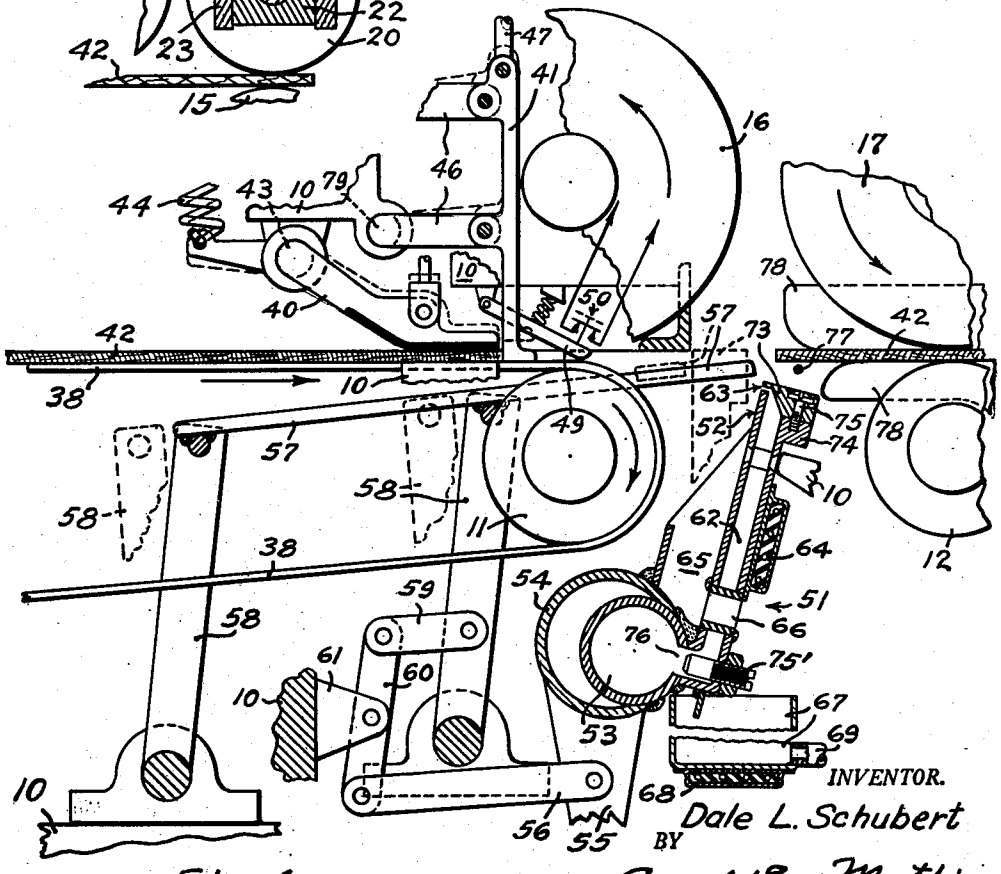


Fig. 4

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Patented July 7, 1953 2,644,496

UNITED STATES PATENT OFFICE

2,644,496

EDGE GLUING DEVICE

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Application June 15, 1948, Serial No. 33,049

9 Claims. (Cl. 144—279)

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This invention relates to apparatus for edge gluing together pieces of material, as sheet stock. As an example, but not as a limitation, the invention is particularly applicable to the gluing together of wood veneer to be employed as the cross banding or face stock of plywood.

This invention is particularly characterized in the employment of a thermoplastic glue or adhesive as distinguished from a thermoset glue or adhesive (in the interest of clarity the term glue will be employed hereinafter to include both glues and adhesives). Generally considered thermoplastic glues melt upon the application of heat and set by cooling while thermoset glues become cured or the chemical reaction is completed upon the application of heat and/or pressure.

It is an object of this invention to provide a glue applicator in the nature of a continuous surface on which is provided a film or flow of glue material and to provide means for relatively moving an edge of a piece of sheet material into contact with the glue on said glue applicator surface.

Primarily the sheets or veneers which are glued together in the plywood industry are glued together on edges which generally follow the grain of the material but it is to be understood that edge as mentioned herein refers to an edge whether it is generally in the direction of the grain of the stock, transverse thereto, or at an angle thereto.

In the prior art it was customary to lay up plywood panels by applying a glue, as a thermoset glue, to both faces of the cross banding stock, and then to manually abut the edges and align the pieces of the cross banding stock. At this stage of the process the veneer has been dried and is wrinkled and is not in a flat plane. Thus in industrial production spaces were left between the pieces of cross banding stock or the cross banding stock misaligned due to the human element involved and it has not been uncommon to find gaps or openings between the individual pieces making up the cross banding stock in plywood.

It is an object of this invention to provide for mechanical means for adhering together the individual pieces of the cross banding stock or of the back face at their abutting edges and thus to eliminate errors caused by human element.

It is a further object of the invention to provide for means to apply a glue to an edge of a piece of sheet stock and to urge said edge of sheet stock into abutting relation with another piece of sheet stock while the glue remains molten or fluid and to maintain said pieces in abutting relation until the glue cools or sets. It is a further

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object of the invention to apply said procedure consecutively to a plurality of pieces so that a continuous sheet material is provided from pieces of sheet stock and which continuous sheet may be later severed at the desired location to provide pieces of desired dimensions.

It is a further object of this invention to provide a device in which pieces of a varying dimension, such as width, may be continuously fed into the machine and which pieces will be separated a predetermined amount so that upon the application of a glue to one edge, the pieces can be urged into engagement and a time period, determined by the relative travel of the pieces toward each other, will obtain.

It is a further object of this invention to provide consecutively traveling pieces of sheet material of a random dimension, as width, and to determine the relative position of a following piece by the position of the trailing edge of its preceding piece.

It is a further object of this invention to provide a glue applicator operable between spaced pieces of traveling sheet stock and retractile stock supporting means operable to span the gap between spaced pieces after the glue applicator has operated. More particularly, it is an object of the invention to provide a retractile stock supporting means operating in such area and one which travels at an accelerated rate of the travel of the conveyor carrying the pieces so that after the operation of the glue applicator the sheet stock material will be laterally supported.

It is a further object of this invention to provide a glue applicator wherein the glue is fed over an applicator surface so that an edge of a piece of sheet stock can be relatively moved into abutting relation with said applicator surface and glue applied to an edge of sheet material.

It is a further object of this invention to provide for circulating a glue over an applicator surface which may be relatively moved into contact with an edge of sheet material. It is a further object of this invention to provide means for severing any glue strings which may be present between a glue applicator and an edge on which glue has been applied from said applicator.

It is a further object of this invention to provide a continuous sheet of cross banding or surface stock of sheet material so that plywood and allied products formed from individual pieces of material can be formed by a continuous process as distinguished from a batch process of laying up and setting up individual pieces of material.

Heretofore it had been suggested that the con-

tinuous laying up of plywood and the continuous pressing thereof was highly desirable but such suggestions have remained in the theoretical fields and have not gone into the practical fields because of the lack of a continuous sheet of cross banding stock or face stock in the plywood industry. The present invention thus makes possible in a practical way some of the prophetical suggestions of the prior art.

It is a further object of the invention to provide a device which will edge glue together stock of relatively narrow width which has been heretofore discarded or utilized merely as waste material. In this connection stock of a width, such as 4", can be readily edge glued together to form a continuous sheet and stock of such dimensions has heretofore been utilized merely as waste material or a by-product.

The foregoing mentioned general objects of this invention are attained by the device illustrated in the accompanying drawings, throughout which drawings like reference numerals indicate like parts:

Figure 1 is a plan view with parts broken away, with some parts shown somewhat schematically (as the glue applicator and the drive for the feed roll means) of a device embodying this invention;

Fig. 2 is a view with parts in elevation, with parts in section, and with parts somewhat schematically shown of the construction illustrated in Fig. 1 of the drawings and also illustrating a wiring and operative diagram;

Fig. 3 is a fragmentary view in elevation of parts in Fig. 1, taken from the opposite side of Fig. 1 from the structure shown in Fig. 2, and illustrating primarily the drive of the feed roll means;

Fig. 4 is a fragmentary elevation view and with parts in section and with parts broken away on an enlarged scale and showing parts shown in Fig. 2 of the drawings and illustrating primarily the glue applicator means and associated parts; and

Fig. 5 is a fragmentary view partly in section and partly in elevation on a larger scale than Fig. 2 and illustrating primarily the resilient mounting of one of the upper feed roll means.

Referring particularly to Figs. 1 and 2 of the drawings, the frame portions are numbered 10 and are for the most part broken away so that the balance of the construction can be more readily observed. Lower driven feed roll means 11, 12, 13, 14, and 15 are employed.

The upper feed roll means 16 to 20 inclusive are also driven and the feed roll means 11 to 15 inclusive form a lower support for veneer stock while the upper feed roll means 16 to 20 inclusive provide for the upper lap of a conveyor to feed veneer stock through the device. Each of the feed roll means preferably comprises a plurality of laterally spaced apart feed rolls on a common shaft. The rolls comprising the feed roll means 16 to 20 inclusive are shown in plan in Fig. 1 and hence the plurality of laterally spaced feed rolls is indicated. The lower feed roll means 11 to 15 inclusive are preferably similar in construction to the upper feed roll means 16 to 20 inclusive except that preferably the feed roll means 11 and 12 are smaller in diameter to provide for a space therebetween for the operation in such space of glue applicator means as will be hereinafter described.

Preferably each of the upper feed roll means 16 to 20 inclusive is spring loaded so as to provide a pressure between two feed roll means as between feed roll means 15 and 20. As an illustration thereof the shaft 21 of the feed roll means 20 (see Fig. 5) has its ends mounted in vertically movable bearings 22 which are supported by guides 23 supported by the main frame 10. Said guides 23 and associated parts are disposed at opposite sides of the machine. A spring 24 is disposed on each shaft 23'. Tubular members 25 are secured to the main frame 10, as by welding, and each shaft 23' is slidable in its tubular member 25. An adjusting nut 26 threadedly engages the tubular member 25 and thus upon movement of the nut 26 in one direction the tension of spring 24 is increased while movement in the other direction decreases the spring tension of spring 24. Each shaft 23' is slidable in the main frame structure 10 and the nuts 27 serve to adjust and lock the relative lower position of the feed roll means 20. Obviously, various constructions can be employed to adjust the lower position of the feed roll means 20 and also to spring load said feed roll means for vertical movement. Also feed beds in the nature of caterpillar tracks may be employed.

The drive for the feed roll means 11 to 20 inclusive is shown somewhat diagrammatically in Figs. 1 and 3 and in Fig. 3 the sprockets and chains are indicated by dash lines. Sprocket and chain means 28 interconnect feed roll means 20 and 19. Sprocket and chain means 29 interconnect feed roll means 19 and 18. Sprocket and chain means 30 interconnect feed rolls 18 and 17. Sprocket and chain means 31 interconnect feed roll means 17 and 16. Sprocket and chain means 32 interconnect feed roll means 16 with a suitable source of power (not shown). The sprocket and chain means 28 to 32 inclusive are shown in plan in Fig. 1 and somewhat diagrammatically by dash lines in Fig. 3. As the feed roll means 16 to 20 inclusive are spring loaded and provision is made for vertical travel, preferably sprocket and chain means are employed between each thereof to provide for rotary movement in the desired direction and also for limited vertical travel.

The feed roll means 11 to 15 inclusive may be connected with any suitable source of power and as an illustration thereof there is indicated diagrammatically in Fig. 3 sprocket and chain means 33 to 37 inclusive.

The lower feed roll means 11 may carry conveyor belts 38 which are the in-bearing conveyor belts. These in-bearing conveyor belts will be driven by the lower feed roll means 11 and are also reeved about pulleys carried by the idler shaft 39 (Fig. 1).

The lower feed roll means 11 to 15 inclusive and the upper feed roll means 16 to 20 inclusive provide for a conveyor means and a squeeze type feeding mechanism. The feed roll means 15 and 20 are each provided with rather sharp knurling so they will control the travel of a piece of stock regardless of the action of the remaining feed roll means. Also, the feed roll means 16 are provided with a knurling less sharp than that of the feed roll means 15 and 20 so that the feed roll means 16 will control the rate of travel of veneer stock despite the action of any of the feed roll means except feed roll means 15 and 20. As will appear from Fig. 3 of the drawings the sprocket and chain means 28 and 33 have a different ratio than the other sprocket and chain means 29, 30, 31, 34, 35, and 36. Thus the feed roll means 11 to 14 inclusive and 16 to 19 inclusive run at an accelerated speed over that of

feed roll means 15 and 20. This may be in the nature of a speed ratio, as an example 2 to 1. The purpose of knurling said roll means 15, 20 and 16 and the variation in speed just mentioned will later be discussed in connection with hold back shoes or movable stop means 40 of the veneer stopping means and bars 41 of the veneer aligning means.

The in-bearing conveyor belt 38 supports sheet material, as veneer stock 42. The veneer stock 42 may be of random width and in an embodiment of this invention a design has been provided wherein widths as narrow as 4" were satisfactorily edge glued together. The in-coming veneer rides on conveyor belt 38 and under hold back shoes or movable stop means 40. Hold back shoes 40 are merely one type of a stop for veneer stock. As soon as the veneer stock reaches the feed roll means 15 and 20 these feed rolls will be sufficiently knurled so that they will control the speed of travel of the veneer stock and the hold back shoes or movable stop means 40 will no longer affect the speed of travel of a particular piece of veneer which extends to and whose speed is controlled by the feed roll means 15 and 20. One function of the shoes or movable stop means 40 is to provide for a spacing between adjacent edges of two traveling pieces of veneer stock to assist bars 41 in dropping in front of the advancing edge of a piece of veneer stock and to positively stop and align the same.

Preferably there is a hold back shoe 40 toward either side of the machine (see Fig. 1) and these hold back shoes may operate above a conveyor belt 38 but preferably the hold back shoes operate between conveyor belts and directly above a portion of the frame structure 10 so that I will have a frictional drag by reason of the hold back shoes or movable stop means 40 on one surface of the veneer stock and a drag by reason of the frame 10 on the other surface. Thus in Fig. 1 of the drawings the hold back shoes or movable stop means 40 are diagrammatically illustrated and in Fig. 4 of the drawings a fragment of the frame 10 is shown which fragment is in front of the one conveyor belt 38 which is illustrated.

Each hold back shoe 40 is pivotally supported by a pivot means or cross shaft 43 carried by the main frame structure 10. An adjustable resilient means 44 functions to urge the veneer engaging portion of the shoes or movable stop means 40 downwardly and in frictional contact with a piece of veneer stock 42. The means to raise and lower the shoe portions of the hold back shoes or movable stop means 40 is illustrated by way of example as a solenoid 45. The operation of this solenoid will be later described in connection with the schematic wiring diagram which is a part of Fig. 2 of the drawings.

A veneer stop means which also functions as a veneer aligning means includes the bars 41. Bars 41 are mounted for travel into and out of the path of traveling veneer stock. This may be accomplished by employing link means 46 (best shown in Fig. 4) pivoted to each bar 41 and in turn pivoted to a part of the main frame structure 10. As a means to raise and lower bars 41 there has been illustrated a rod 47 which is controlled by any suitable means such as solenoid 48. It is desired to stop a trailing piece of veneer so that a space can be provided between it and the preceding piece. Thus a space will be provided between two consecutive pieces of veneer stock so that the bars 41 can stop and align the forward edge of a trailing piece of two such

pieces. It is desirable that the bars 41 ride on a piece of stock and be lifted out of stopping position in response to the position of the trailing edge of a preceding piece of two pieces of veneer stock. This provides for rapid operation. Thus normally solenoid 48 will be de-energized and will be energized when it is desired to permit the bars 41 to rise for a short interval.

A means responsive to the trailing edge of a preceding piece of stock includes the trigger member 49. The trigger member 49 normally rides on the veneer stock 42 and as the trigger member 49 passes off the trailing edge of a piece of veneer stock it closes an electric switch 50. Upon the closing of switch 50, the solenoid 45 is energized and hold back shoes or movable stop means 40 are raised. Through a time delay mechanism hereinafter described the closing of switch 50 after a predetermined time delay energizes solenoid 48 and thus bars 41 are raised. The hold back shoes 40 and bars 41 are close to the shaft of and between the rolls of the feed roll means 16 so that the device will operate on relatively narrow width pieces. In the drawings, and in Figs. 1 and 4 the hold back shoes or movable stop means 40, bars 41 and trigger member 49 are spaced longitudinally of the apparatus from the center of the shaft carrying feed roll means 20. The closer that these parts are together longitudinally of the machine the shorter the width are the pieces of stock which may be handled by this device.

By means hereinafter described the laterally spaced apart hold back shoes or movable stop means 40 stop each piece of veneer. Then the hold back shoes or movable stop means 40 are released and a piece of veneer stock is then permitted to travel and to abut against the laterally spaced apart bars 41 which aligns the piece of stock. Next, the bars 41 are raised and the hold back shoes or movable stop means 40 are maintained in raised position. Then the piece of veneer stock moves forward and its movement is controlled by feed roll means 11 and 16. At the same time that the bars 41 are raised the glue applicator, generally numbered 51, moves from its full line position to the position indicated by the fragmentary dotted line position. The glue applicator extends crosswise of the device and the full width of stock to be glued. After the glue applicator 51 moves to the position indicated the advancing edge of a piece of veneer contacts the gluing applicating surface 52 of the applicator 51. The advancing veneer angularly moves the glue applicator. Upon angular movement of the glue applicator 51 other circuits are energized which causes the glue applicator to be moved to its full line position and out of the way of the veneer stock. Upon energizing of this circuit also the hold back shoes 40 and stop bars 41 are permitted to again ride on the veneer stock. There will be relative movement until the next following piece of stock is stopped by hold back shoes or movable stop means 40 and another cycle of operation results.

The glue applicator means 51 comprises a glue receptacle 53. As a thermoplastic glue is preferably involved, means to heat the glue receptacle 53 are provided, such as a steam jacket 54. The glue applicator 51 is mounted for angular movement about the center of glue receptacle 53. An arm 55 is carried by the jacket 54 and is connected to link 56 (Fig. 4).

In order to prevent veneer stock from buckling and being unsupported in the area between con-

veyors 38 and lower feed roll means 12, a plurality of spaced apart fingers 57 are provided. These fingers 57 are pivotally secured to links 58 which are pivoted to the main frame means 10. Fingers 57 operate between the various laps of the conveyor means 38. One of the links 58 is pivotally secured to a link 59 which link 59 in turn is pivotally secured to another link 60. The link 60 is pivotally secured to the link 56. The link 60 is pivotally supported to a member 61 which is carried by the main frame structure 10. Thus when the glue applicator 51 moves from its dotted line position to its full line position shown in Fig. 4, the fingers 57 are moved forward and support veneer stock in the space between the conveyor means 38 and lower feed roll means 12.

Referring now in more detail to the glue applicator 51, the glue receptacle 53 communicates by a passageway 62 to the slot 63. Glue under pressure from the receptacle 53 passes out slot 63 and flows downwardly over the face of glue applicator surface 52. While the slot 63 may be made up of a plurality of spaced holes, preferably it is provided in the form of a slot. Also, to insure that the glue will not be cooled as it passes through passageway 62, preferably a heater 64, which may be in the nature of an electrically heated element, is provided. Excess glue, not removed by contact of the advancing edge of veneer with the applicator surface 52, passes down into well 65 through openings 66 and into funnel means 67. The openings 66 are transversely spaced and a section through one thereof is indicated in Fig. 4. The funnel means 67 are also preferably heated which may be accomplished by electrical heater 68. Such excess glue entering funnel 67 is delivered via conduit 69 to a glue reservoir and glue melting pot 70 (Fig. 2). Suitable means are provided to melt a thermoplastic glue in the pot 70 and to maintain the same at the desired temperature. Glue from the pot 70 is urged by pump 71 through conduit 72 (a portion of the conduit 72 is broken away in Fig. 2 of the drawings in the interest of clarity). The conduit 72 is connected with the glue receptacle 53 (within jacket 54) and suitable provision is made to permit the glue applicator 51 to move relative to the conduit 72. Primarily fresh glue will be delivered to the glue receptacle 53 but provision is also made to salvage any excess glue passing downwardly on face 52. As the amount of glue needed will depend upon the number of joints to be formed and as random width pieces of veneer stock are involved, it will be necessary to pump enough glue for the maximum joints which may be involved. This invention utilizes thermoplastic glues such as those illustrated in the copending application of Clarence D. Stone, Robert J. Hilton, and John G. Meiler, entitled "Adhesive for Edge Gluing, Method of Edge Gluing, and Edge Glued Product," Serial No. 33,215, now Patent No. 2,616,824. Such thermoplastic glues are maintained at a temperature generally in the range of 160° to 220° C. and thus preferably all conduits and parts contacting the glue should be provided with suitable heating means (not shown).

Such thermoplastic glues tend to fill the space between adjacent edges of sheets even though the edges do not continuously abut. However, thermoset glues may be employed in the devices of this invention. Also, if desired clipper mechanisms may be also included in a device of this invention or the material may be preclipped to provide parallel and straight edges to a piece of veneer.

The slot 63 is provided between gluing surface 52 and the head member 73. The head member 73 is removably attached to housing 74, as by screws 75, and by use of appropriate shims between the head member 73 and the housing 74 the slot 63 is adjustable to regulate the flow of glue. A plurality of laterally spaced apart screws 75' are provided to control the flow of glue from the receptacle 53 to the passageway 62 and to the slot 63. The screws 75' are movable into and out of the opening 76. Thus screws 75' function as additional adjusting means.

The thermoplastic glues have relatively high viscosity and tend to form strings between the edge of the veneer on which glue has been applied and the applicator surface 52. Thus preferably an electrically heated wire 77 (shown best in Fig. 4 adjacent roll 12) is provided so that it will cut any such strings of glue as the veneer stock moves past this wire.

As previously mentioned the feed roll means 16 have their surfaces somewhat knurled and thus the leading edge of a piece of stock is urged thereby toward and against the glue applicator surface 52.

After the glue applicator 51 is moved out of the line of travel of a piece of stock, the advancing edge of such stock with glue on the edge thereof, abuts the trailing edge of the preceding piece. The preceding piece is traveling at a slower rate due to the control by the feed roll means 15 and 20. These feed roll means 15 and 20 not only travel at a slower speed than the other feed roll means but they are more sharply knurled so as to positively control the travel of the stock out of the machine.

A plurality of longitudinally extending and laterally spaced grids 78 are employed to prevent the veneer from buckling as one piece of stock is urged against its preceding piece. These grids 78 are supported by the frame structure 10. They define a passageway for the stock after two edges of stock have been glued together. The upper grids 78 are preferably adjustable toward and away from the lower grids 78 to permit the device to operate on sheets of different thicknesses. The lengths of the grids 78 is such as to permit the glue bond to become set while the stock is supported and the pieces are being crowded against each other. If desired a cooler can be employed in connection with the grids 78 to shorten their length. Of course if a thermoset type of glue is employed in the structure herein then curing means, as infra-red light or the like, may be employed in association with stock between the grids 78.

The shoes 40 are interconnected by a cross shaft or pivot means 43 as best shown in Fig. 1 of the drawings. Also the bars 41 are interconnected by a transverse shaft 79 as also is best shown in Fig. 1. With the shoes or movable stop means 40 and bars 41 riding on a piece of material the conveyors 38 on the lower feed roll means 11 and upper feed roll means 16 will urge the piece of stock into abutting relationship with the piece of stock preceding it. When this piece of stock passes shoes or movable stop means 40 the next succeeding piece of stock will be stopped by the shoes or movable stop means 40. The piece of stock which is stopped by the shoes or movable stop means 40 may be misaligned. Thus when the shoes or movable stop means 40 move upward in response to the trigger member 49,

which closed a switch because of the trailing edge of the preceding stock passing such trigger member 49, the conveyor 38 moves a piece of stock into edge abutting relation with the bars 41 and thus align a piece. It is to be remembered that there is a time delay between the raising of shoes 40 and bars 41.

Upon closing of switch 50 by reason of trigger member 49 various circuits are involved. Conductors 80 and 81 represent a suitable source of electrical energy. The energy on conductor 80 is carried by conductor 82 to switch 50. Switch 50 is normally closed and is opened by the presence of veneer stock below it. Thus as the trailing edge of stock passes from under trigger 49 switch 50 is closed. Switch 50 is connected by conductor 84 to time delay mechanism 85. While the mechanism 85 is a somewhat schematically shown it represents an electric switch which after being energized has an adjustable time delay period following before it closes the switch. The time delay desired will depend upon the travel of the veneer stock through the device and with veneer traveling at the rate of 40 feet a minute the time delay need only be in the nature of a fraction of a second. The time delay switch 85 is connected by conductor 86 with the other source of energy 81. After a time delay the switch blade mechanism 87 of the time delay mechanism 85 is closed. Upon closing of such switch blade mechanism 87 a circuit is completed commencing with conductor 81, conductor 88, conductor 89, relay 90, and conductor 91 to the other source of electrical energy, conductor 80.

The mechanism which is operated by closing of relay 90 will be later discussed. The closing of switch 50 of trigger member 49 has energized another circuit. The energy on conductor 84 is also impressed on a conductor 92. The energy on conductor 92 passes through relay 93 and by conductor 94 to the other source of energy, conductor 81. Previously the circuit between the source of energy 80 and conductor 84 was traced.

Upon closing of relay 93 two other circuits are involved. One of these circuits commences with source of energy 80, conductor 94', through one of the poles of the double pole switch mechanism of the relay 93, thence along conductor 95, through solenoid 45, and thence by way of conductor 96 to the other source of energy, conductor 81.

Upon energizing of solenoid 45 the hold back shoes 40 will be raised. Thus upon the closing of switch 50 by reason of the trigger member 49 moving off the trailing end of a piece of veneer stock, the hold back shoes or movable stop means 40 are immediately raised.

The other circuit which is involved with the closing of relay 93 commences with conductor 81, along conductor 94, through the coil of relay 93, along conductor 97, through one of the poles of the double pole switch of relay 93, along conductor 98 to switch mechanism 99. Switch mechanism 99 will be open under the conditions mentioned. The switch mechanism 99 is positioned to be opened and closed by a lever 100. The lever 100 connects with arm 55 carried by the glue applicator 51. When the glue applicator is in the position shown in full lines of Fig. 2 of the drawings, then switch mechanism 99 is opened. As the glue applicator starts to move from the full line position to the dash line position then switch 99 closes. It is necessary to close switch 99 before switch 50 opens so that relay 93 will be held closed even though switch 50 opens. After a time delay and before a piece of veneer enters under switch 50 to open it, the circuit to the solenoid 48 operating bars 41 and the circuit to the means for angularly moving the glue applicator 51 are both closed. When the switch 99 is closed the energy from conductor 98 passes through said switch 99 to conductor 101 and thence to the other source of energy, conductor 80.

After the time delay caused by time delay mechanism 85, the relay 90 closes. Thus energy from a source of energy 80 passes along conductor 91 through the then closed switch of relay 90 to conductor 102, through switch 103. Switch 103 is normally closed and is opened by the lever 100 connected with the glue applicator means 51. Thus until the glue applicator reaches its dotted line position switch 103 is closed and at the time in the cycle now being considered it will be closed. Energy then passes through the closed switch 103 to conductor 104 through the solenoid 105. The solenoid 105 functions to open or close valve means 106. Energy then passes from solenoid 105 to conductor 107 and thence to the other source of energy, conductor 81.

Instead of employing the solenoid 105 to directly move the glue applicator 51 from its full line position to its dotted line position, there is shown the solenoid 105 to indirectly accomplish this purpose by a control valve which controls the operation of an air cylinder which moves the applicator 51. Upon energizing of the solenoid 105 compressed air source conduit 108 is connected with conduit 109. Air from conduit 109 is then moved back of piston 110 and piston rod 111 moves arm 100 which moves the glue applicator 51 from the full line position to the dash line position. While the arm 100 was thus so moving it also functioned to first open switch 103 and then in sequence to close switch 99. The switch 99 is in the circuit of relay 93 and thus as long as switch 99 is closed even if switch 50 becomes open, relay 93 will be held closed. As soon as the arm 100 moves sufficiently to open switch 99, then solenoid 105 will remain de-energized and valve 106 will move to close off air from source conduit 108 and will connect conduit 109 with exhaust conduit 112. Thus at the time veneer stock runs into the glue applicator 51, the glue applicator is not being held by air pressure and is merely being held in place by spring 113 which has little tension so that the veneer will abut the glue applying surface 52 of the applicator 51 and will turn the applicator slightly in a clockwise direction or from the dotted line position toward the full line position. This movement of the applicator 51 causes switch 99 to open and switch 103 to close.

At the same time that solenoid 105 was energized by reason of the circuit explained, another circuit was simultaneously set up to energize solenoid 48 and raise bars 41. This circuit commences with source conductor 80, along conductor 91, through the switch of relay 90, along conductor 102, along conductor 114, through solenoid 48, along conductor 115 to the other source, conductor 81. Thus as soon as solenoid 105 is energized to start to move applicator 51, solenoid 48 was energized and raised bars 41 to release stock so it will pass between veneer feeding mechanisms 11 and 16 and be in a position to abut the glue applicator 51. Whenever relay 90 is closed, the energy on conductor 102 will also pass to conductor 116, through solenoid 117 which operates valve 118, to conductor 107 and

thence to source conductor 81. Upon energizing of solenoid 117 any air to the right of piston 110 is exhausting via conduit 119, through the valve 118, and out the exhaust conduit 120.

The valves 106 and 118 are shown as valves which are moved by gravity to their normal positions and are interlocked through the circuits of solenoids 105 and 117 so that when valve 106 moves to the position of delivering air to the left of piston 110, then air will be exhausting from the right side of piston 112 through the valve 118. In the normal position with the applicator in the full line position shown, and with neither solenoid 105 or 117 energized, air will pass from source conduit 108, through conduit 121, through valve 118, through conduit 119, and to the right of piston 110, urging the piston 110 and associated parts so that the applicator is held normally in the full line position.

When the moving veneer moved into engagement with the applicator, the applicator was turned slightly which opened switch 99 and closed switch 103. Immediately the relays 90 and 93 became de-energized which de-energized solenoids 45 and 48. Also solenoids 105 and 117 are de-energized. Thus all parts assume their normal position which means that solenoid valve 117—118 became de-energized and air rapidly moves the applicator 51 to its full line position. Also the shoes or movable stop means 40 drop and are in the position to ride on stock passing therebelow. Also the bars 41 drop and will ride on stock passing therepast. Thus the apparatus in its normal position is ready for another cycle to be started whenever the trigger member 49 relatively passes off the trailing end of a piece of stock. The air which functions through valve 118 to move the applicator 51 to its normal position provides the desired speed so that the applicator is moved out of the way of the advancing stock and at a faster speed than said stock. At the same time the applicator was under slight pressure (only the pressure of spring 113) at the time veneer engaged the same. The applicator bar 51 traveled only a short distance before it opened switch 99 and closed switch 103.

In a summary way the mode of operation of the structure hereof may be considered starting with a position where a piece of stock is traveling past hold back shoes or movable stop means 40, bars 41, trigger member 49, and with its leading edge coated with glue. The feeding means comprising upper feed roll means 16 will be advancing this piece of stock at a rate in excess of preceding pieces whose rate of travel is controlled by the feed roll means 20—15. Thus the forward edge of the piece of veneer stock in question will abut against and be urged into contact with the trailing edge of the piece of stock preceding it. The stock will be prevented from buckling by grids 78. Also at this stage of the cycle the glue applicator 51 will be in its full line position.

The piece of stock under question will be followed by a second piece and when the second piece passes under hold back shoes or movable stop means 40, the said second piece will be stopped. However, the said preceding piece will continue until its training edge passes under trigger member 49 and then a series of operations ensue. First, the hold back shoes or movable stop means 40 are raised to permit the conveyor 38 to align the second piece of stock against the bars 41. After a predetermined time delay after the raising of hold back shoes or movable stop means 40, the bars 41 are raised. At the same time the bars 41 are raised the glue applicator 51 moves forward to be in a position to be contacted by the leading edge of the piece of stock now passing under feed roll means 16. While the glue applicator means 51 was being moved forward under air pressure to its dotted line position, the air pressure is turned off and the exhaust opened so that at the time the leading edge of the piece of stock in question contacts the glue applicator 51, the glue applicator is not being held by air pressure and is in a position to be moved by the pressure exerted by the traveling piece of stock. The traveling piece of stock not only receives glue on its leading edge by reason of contact with the glue applicator, but the traveling stock also moves the glue applicator. This slight movement of the glue applicator causes air pressure to move the glue applicator rapidly out of the path of the traveling stock and also causes the fingers 57 to move rapidly in place so they will function as a supporting means. At this stage the air pressure also is employed to maintain the glue applicator in its normal position out of the way and to maintain the fingers 57 in a stock supporting position. When the piece of stock now in question passes the trigger member 49 a new cycle of operation is commenced.

Obviously changes may be made in the forms, dimensions, and arrangement of the parts of this invention without departing from the principle thereof, the above setting forth only a preferred form of embodiment of the invention.

I claim:

1. An edge gluing device for gluing a continuous series of pieces of random width stock to form a continuous sheet, comprising a conveyor for transferring a continuous series of pieces of sheet stock crosswise and one after another; means separating a leading and its trailing piece of stock comprising movable stop means positioned in the path of travel of pieces on said conveyor, said stop means being normally in sheet stopping position; control means for said stop means disposed in the path of travel of said pieces on said conveyor and operable by the trailing edge of the leading piece to move the stop means out of sheet stopping position of the trailing piece; glue applicator means movable into and out of glue applying position between the spaced pieces to apply glue to one of the two spaced edges of the separated pieces of sheet stock; glue applicator moving means; control means for said glue applicator moving means actuated by said control means for said stop means; and means relatively urging the trailing piece of stock in edge abutting relation with the leading piece after said glue has been applied.

2. An edge gluing device for gluing a continuous series of pieces of random width stock to form a continuous sheet, comprising a conveyor for transferring a continuous series of pieces of sheet stock crosswise and one after another; means separating a leading piece and its trailing piece of stock and alining the trailing piece comprising movable stop means and movable alining means positioned in the path of travel of pieces on said conveyor, said stop means and alining means being normally respectively in sheet stopping and sheet alining positions; control means for said stop means and said alining means disposed in the path of travel of said pieces on said conveyor and operable by the

trailing edge of the leading piece to move the stop means and alining means out of sheet stopping and alining positions relative to the trailing piece; glue applicator means movable into and out of glue applying position between the spaced pieces to apply glue to one of the two spaced edges of the separated pieces of sheet stock; glue applicator moving means; control means for said glue applicator moving means actuated by said control means for said stop means; and means relatively urging the trailing piece of stock in edge abutting relation with the leading piece after said glue has been applied.

3. An edge gluing device for gluing a continuous series of pieces of random width stock to form a continuous sheet, comprising a conveyor for transferring a continuous series of pieces of sheet stock crosswise and one after another; means separating a leading and its trailing piece of stock comprising movable stop means positioned in the path of travel of pieces on said conveyor, said stop means being normally in sheet stopping position; control means for said stop means disposed in the path of travel of said pieces on said conveyor and operable by the trailing edge of the leading piece to move the stop means out of sheet stopping position of the trailing piece; glue applicator means movable into and out of glue applying position between the spaced pieces to apply glue to one of the two spaced edges of the separated pieces of sheet stock; glue applicator moving means; control means for said glue applicator moving means actuated by said control means for said stop means, said control means including time delay mechanism causing sequential operation of said stop means and glue applicator moving means; and means relatively urging the trailing piece of stock in edge abutting relation with the leading piece after said glue has been applied.

4. An edge gluing device for gluing a continuous series of pieces of random width stock to form a continuous sheet, comprising a conveyor for transferring a continuous series of pieces of sheet stock crosswise and one after another; means separating a leading and its trailing piece of stock comprising movable stop means positioned in the path of travel of pieces on said conveyor, said stop means being normally in sheet stopping position; control means for said stop means disposed in the path of travel of said pieces on said conveyor and operable by the trailing edge of the leading piece to move the stop means out of sheet stopping position of the trailing piece; time delay mechanism disposed between said control means and said movable stop means to provide sequential operation thereof; glue applicator means movable into and out of glue applying position between the spaced pieces to apply glue to one of the two spaced edges of the separated pieces of sheet stock; glue applicator moving means; control means for said glue applicator moving means actuated by said control means for said stop means; and means relatively urging the trailing piece of stock in edge abutting relation with the leading piece after said glue has been applied.

5. An edge gluing device for gluing a continuous series of pieces of random width stock to form a continuous sheet, comprising a conveyor for transferring a continuous series of pieces of sheet stock crosswise and one after another; means separating a leading and its trailing piece of stock comprising movable stop means positioned in the path of travel of pieces on said conveyor, said stop means being normally in sheet stopping position; control means for said stop means disposed in the path of travel of said pieces on said conveyor and operable by the trailing edge of the leading piece to move the stop means out of sheet stopping position of the trailing piece; glue applicator means movable into and out of glue applying position between the spaced pieces and to be engaged by and apply glue to the leading edge of the trailing piece and to be initially moved by said piece; glue applicator retracting means having control means positioned in the path of travel of said glue applicator and actuated by said glue applicator during the initial movement imparted to it by an advancing piece; and means relatively urging the trailing piece of stock in edge abutting relation with the leading piece after said glue has been applied.

6. The combination of claim 5 wherein the glue applicator retracting means imparts an accelerated travel to said glue applicator over the travel of pieces on said conveyor.

7. An edge gluing device for gluing a continuous series of pieces of random width stock to form a continuous sheet comprising spaced apart and alined conveyors for transferring a continuous series of pieces of sheet stock crosswise and one after another; means separating a leading piece and its trailing piece of stock and stopping the trailing piece on the leading end portion of the trailing conveyor comprising movable stop means positioned in the path of travel of pieces on said trailing conveyor, said stop means being normally in sheet stopping position; control means for said stop means disposed in the path of travel of said pieces leaving said trailing conveyor and operable by the trailing edge of the leading piece to move the stop means out of sheet stopping position of the succeeding piece; glue applicator means movable into and out of glue applying position between the spaced pieces, and in the space between conveyors to apply glue to one of the two spaced edges of the separated pieces of sheet stock; glue applicator moving means; control means for said glue applicator moving means actuated by said control means for said stop means; a retractile stock supporting means movable into stock supporting position between said conveyors as the glue applicator moves out of applicating position and out of stock supporting position as the glue applicator moves into applicating position; link means interconnecting said stock supporting means and said glue applicator means; and means relatively urging the trailing piece of stock in edge abutting relation with the leading piece after said glue has been applied.

8. The combination of claim 6 wherein the glue applicator and retractile stock supporting means are both pivotally mounted and are connected with each other by link means.

9. An edge gluing device for gluing a continuous series of pieces of random width stock to form a continuous sheet, comprising a conveyor for transferring a continuous series of pieces of sheet stock crosswise and one after another; means separating a leading and its trailing piece of stock; control means for said separating means disposed in the path of travel of said pieces on said conveyor and operable by the trailing edge of the leading piece; glue applicator means movable into and out of glue applying position between the spaced pieces to apply glue to one of the two spaced edges of the separated pieces of

sheet stock; glue applicator moving means; control means for said glue applicator moving means actuated by said control means for said stop means; and means relatively urging the trailing piece of stock in edge abutting relation with the leading piece after said glue has been applied.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
915,504	Sutter	Mar. 16, 1909
1,371,942	Sorci	Mar. 15, 1921
1,646,645	Frederickson et al.	Oct. 25, 1927
1,702,185	Weber	Feb. 12, 1929
1,739,088	Perry	Dec. 10, 1929
2,084,676	Friz	June 22, 1937
2,207,782	Carlson	July 16, 1940
2,357,880	Dike et al.	Sept. 12, 1944
2,376,832	Svikhart	May 22, 1945
2,408,064	Hall	Sept. 24, 1946
2,409,777	Maurer	Oct. 22, 1946
2,453,185	Bilhuber	Nov. 9, 1948