March 27, 1956 G. J. M. KOK 2,739,628

APPARATUS FOR EDGE SPLICING OF WOOD VENEERS

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Fig. 1.

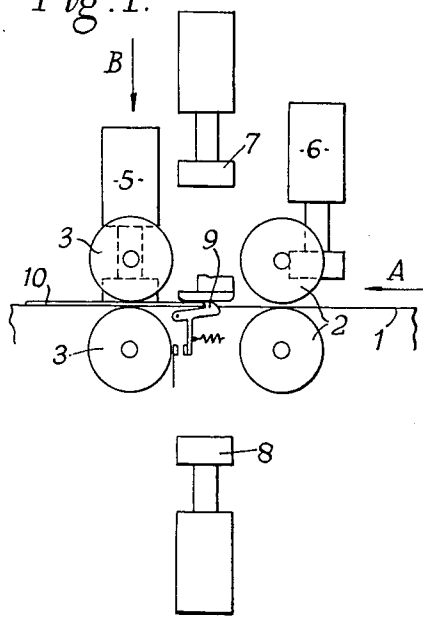


Fig. 2.

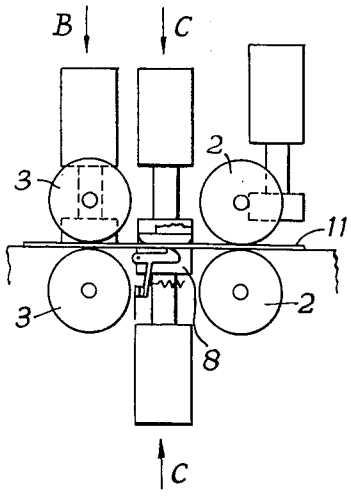


Fig. 3.

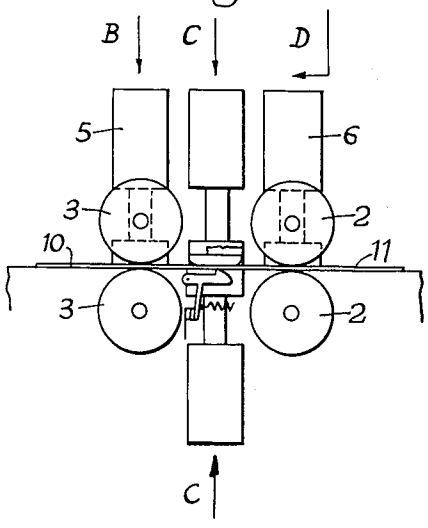
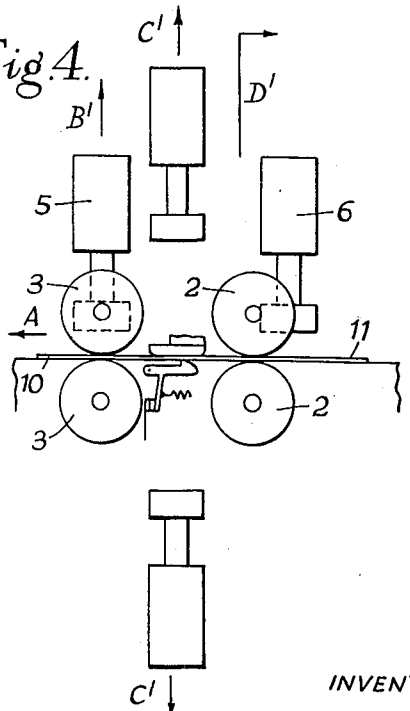


Fig. 4.



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Fig. 5.

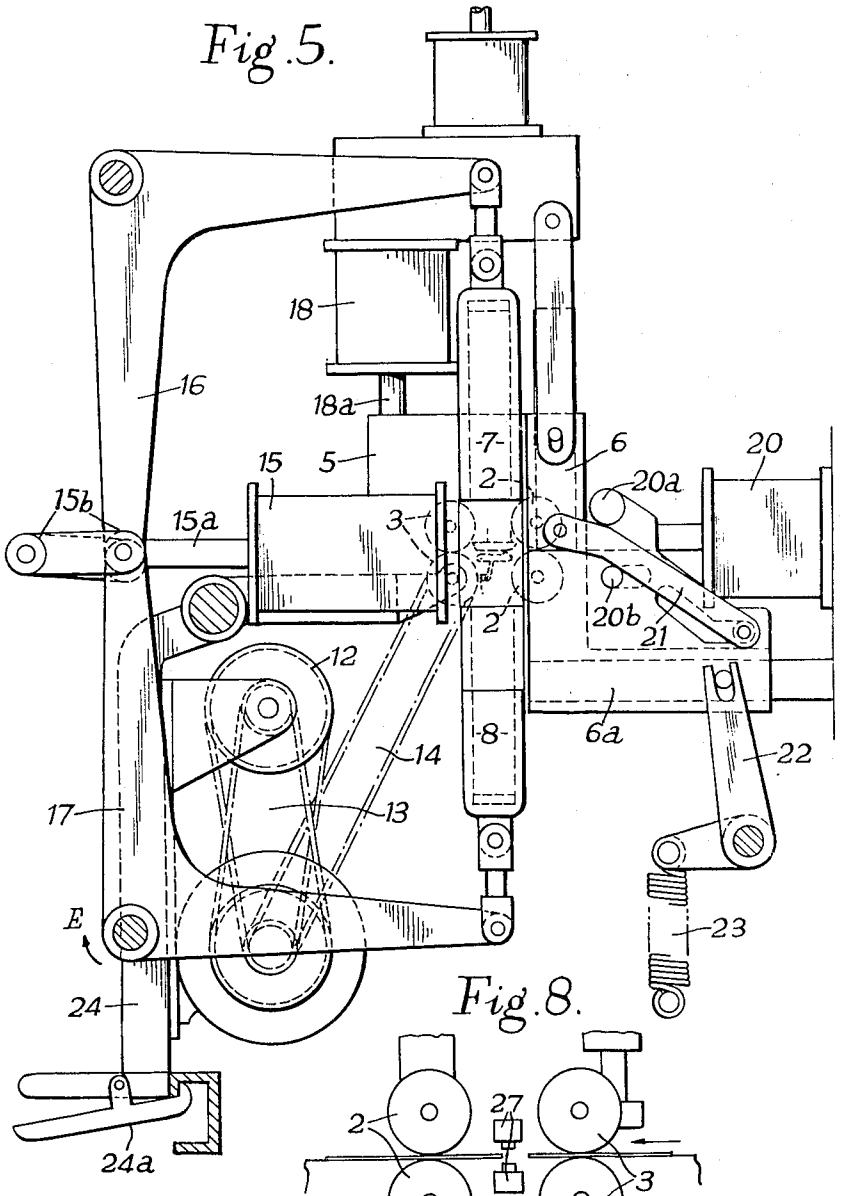


Fig. 8.

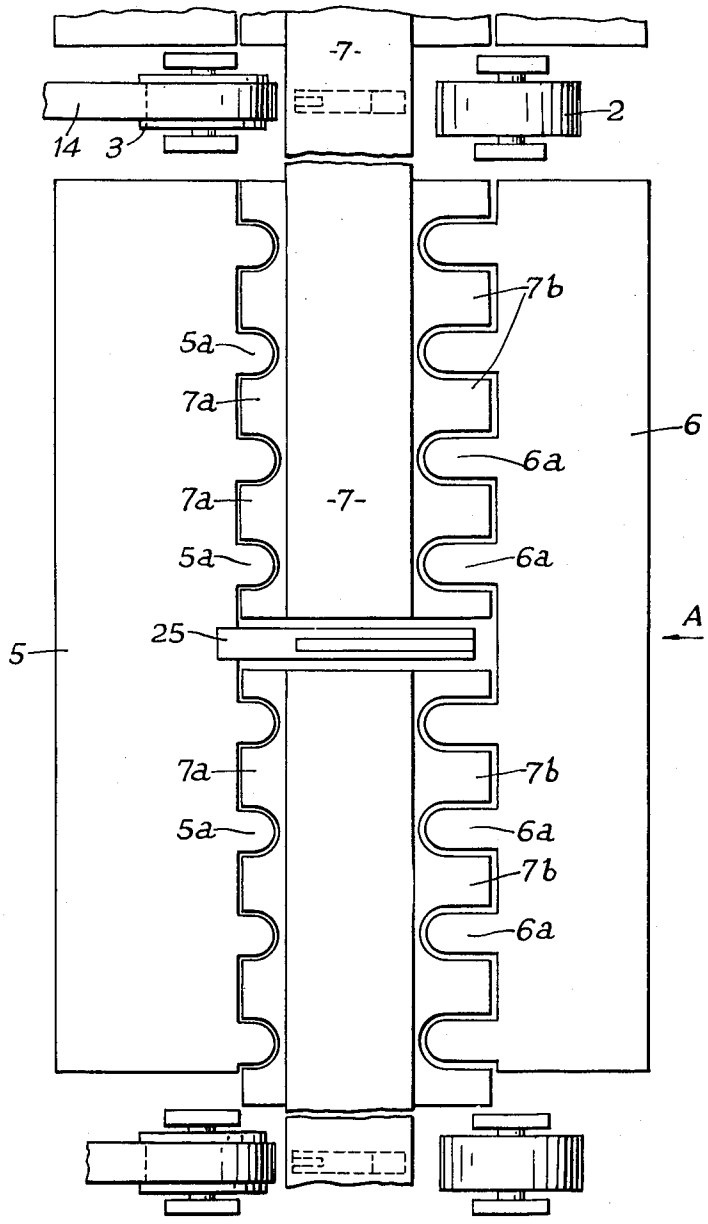
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APPARATUS FOR EDGE SPLICING OF WOOD VENEERS

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Fig. 6.



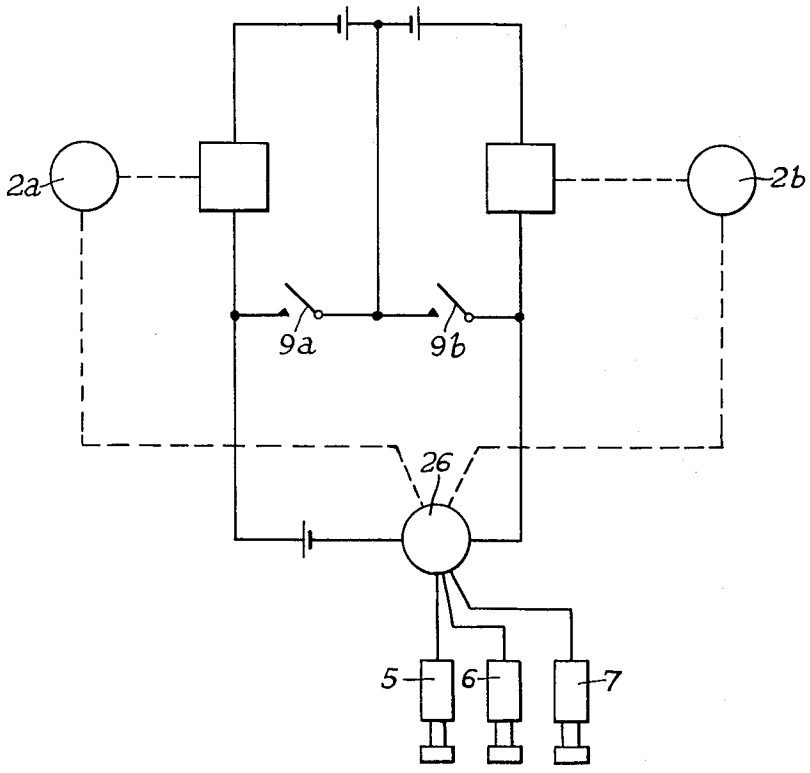
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APPARATUS FOR EDGE SPLICING OF WOOD VENEERS

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Fig. 7.



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APPARATUS FOR EDGE SPLICING OF WOOD VENEERS

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Application June 23, 1954, Serial No. 438,705
Claims priority, application Great Britain June 25, 1953
10 Claims. (Cl. 144—279)

The present invention is concerned with a method and apparatus for effecting the edgewise splicing of sheets of materials, and relates more particularly to the tapeless splicing of wood veneers, for example for use in making plywood by lamination of the spliced veneers.

Two forms of machines have been employed for the tapeless splicing of wood veneers namely, "lengthway" splicers, the most widely used, in which the veneers are advanced in a direction parallel to the glue line, and "crossway" splicers in which the veneers are moved in a direction normal to the glue line.

The "lengthway" splicer is limited in use because a set time is required to set a glue line whether the veneers are narrow or wide and hence in producing a large veneer the rate of production is low as the veneers have to be passed several times through the machine.

On the other hand, the "crossway" splicers are not usually able to splice thin veneers, because it has not been possible to apply pressure to the veneers without buckling them, while the veneers are being passed through the machine.

It is an object of the present invention to provide a method and apparatus which will enable veneers to be spliced "crossways" in a simple and expeditious manner.

It is another object of the present invention to provide an improved method and apparatus for the cross-way splicing of veneers and the like which shall be capable of slicing thinner veneers than could hitherto be handled by crossway splicing.

According to one aspect of the invention a method of effecting the edgewise splicing of sheets of material, for example veneers, comprises passing a sheet in a direction normal to its edges to be spliced halting the passage of the sheet as the trailing edge is in position adjacent a heating element, securing the sheet in the halted position, passing another sheet in the direction of movement of the first-mentioned sheet until its forward edge abuts the trailing edge of the preceding sheet in position for heating, applying heat to the abutting edges of the sheets to effect splicing whilst applying pressure to the sheets to urge the adjacent edges of the sheets together, and thereafter advancing the spliced sheets until the trailing edge of the second-mentioned sheet is in position for splicing to a further sheet.

According to another aspect of the invention, apparatus for effecting the edgewise splicing of sheets of material, for example veneers, comprises a support for the sheets, a heating element adapted to effect the heating of the abutting edges of the sheets, means to advance the sheets in a direction normal to their edges to be spliced, means to halt the passage of a sheet when its trailing edge is in position adjacent the heating element, means to secure the sheet in this position and means to apply pressure to the sheets to urge the adjacent edges of the sheets together during heating to effect splicing, and means for advancing the spliced sheets until the trailing edge of the succeeding sheet is in position for splicing to a further sheet.

One form of veneer splicing machine in accordance with the invention will now be described by way of example and with reference to the accompanying drawings, in which:

Figs. 1 to 4 are diagrammatic views illustrating the operation of the machine,

Fig. 5 is a side view of part of the machine,

Fig. 6 is a plan view of the pressure elements and the heating elements of the machine,

Fig. 7 is a diagrammatic view of the electric circuit, and

Fig. 8 shows a modification.

Figs. 1 to 4 show a work table 1, on the upper surface of which the veneers are fed and glued. The veneers are fed in the direction shown by the arrow A, first of all by intake rollers 2 which are so mounted, that the top and lower rollers lie in the plane of the table, while the top roller has a shaft which is spring loaded, and lies parallel to the plane of the table. The intake rollers 2 are metal and are spring loaded in such a way that although they cause the veneers to move along, as soon as resistance is met, they slip over the veneer surface.

Behind the pair of rollers 2, in the direction of the arrow A, are a further pair of draw out rollers 3, which move the veneers out of the machine.

Pressure elements 5 and 6 fix the veneers to be glued in the gluing position. These elements are hydraulically controlled, the pressure element 5 working perpendicularly in the direction of the arrow B, while the pressure element 6 works in a perpendicular as well as in a horizontal direction. The element 6 thereby serves as a pressure and urging element.

Known heating elements are mounted between the pairs of rollers 2 and 3, and are movable in a perpendicular direction to enclose a strip which extends the width of the sheet and adjacent the abutting edges of the veneers for curing the glue already applied to the abutting edges of the veneers under heat and pressure. These heating elements also serve to apply pressure and heat to the adjacent edges of the glued veneers.

Within the strip covered by the heating elements, control element 9 in the form of, for example feelers, are mounted, which through suitable operating gear control the pressure elements.

The feelers are in the form of spring loaded L-shaped elements having one limb extending through an aperture in the table 1 to engage the edge of the veneer when it reaches the gluing position. The other limb has co-operating contacts associated therewith. When a veneer reaches the heating position, the feelers are depressed to close the associated contacts, closure of the contacts stops the rotation of the intake rollers 2 and causes the pressure elements 5 and 6 to become operative and causes the heating element to move into position adjacent the veneers. After gluing the veneers are moved out of the heating position by the rollers 3 until the veneer passes beyond the feelers whose limbs are permitted to move upwardly to cause the contacts 9*a*, 9*b* associated therewith to open to deenergize the draw out rollers 3.

It will be seen from Fig. 7 that one feeler element 9*a* controls one friction roller 2*a* adjacent one side of the veneer and that another feeler element 9*b* controls another roller 2*b* adjacent the other side of the veneer. It will also be realized that one element 9*a* and one roller 2*a* are mounted on one side of the machine, whereas the other parts 9*b*, 2*b* are mounted on the other side of the machine. If a veneer, having been glued, is passed by the rollers 3 for gluing its trailing edge to the forward edge of the next sheet, has its edges out of parallel, one of the feelers will move upwardly when the edge has passed over it. This action will stop the complementary roller and the other roller will continue to move until the veneer has passed over the other feeler also. This ensures that the trailing edge of the veneer is aligned before gluing to the next succeeding sheet.

When the veneers are passed quickly to the machine, it is considered advisable to locate the feeler elements a

short distance, say three inches, away from the heating position in a direction opposite to the direction of travel of the veneers, to compensate for the time lag between movement of the feelers and the stopping of the rollers.

Fig. 5 is a side view of one side of the machine showing the pressure elements and their associated parts in more detail than Figs. 1 to 4. These parts are repeated in a reflectory manner on the other side of the machine.

The draw out rollers 3 are driven by a motor 12 through a reduction gear 13, by means of a rubber belt 14, which serves at the same time as the rubber covering of the lower rollers 3. The heating elements 7 and 8 are moved towards and away from the adjacent edges of the veneers by a hydraulic cylinder 15 by a piston rod 15*a* fixed to the hinge of two links 15*b*, which are connected to the arms of two levers 16 and 17 while the other arm of these levers 16, 17 is fixed to the cases containing the heating elements 7, 8. When the piston rod 15*a*, starting from the position as shown, moves to the left, then the two lever arms 16, 17 which face each other, will pivot to the left when looking at the drawing, and the heating elements 7 and 8 are pressed against the glued veneer at the level of the work table 1. In this manner it is possible to obtain a fully synchronized movement of both heating elements by means of a single hydraulic cylinder.

The pressure element 5 which is located near the draw out rollers 3 is actuated by a hydraulic cylinder 18, which presses the element 5 in the form of a pressure beam against one of the veneers through its piston rod 18*a*, and so secures it in position.

When the second veneer 11 is brought into position, by means of the draw-in rollers 2, its leading edge touches the trailing edge of the first veneer 10, a hydraulic cylinder 20 is operated, on the piston rod of which, a pressure roller 20*a* and a guiding roller 20*b* is fixed. Between these two rollers a bent bracket 21 runs, which is connected to the pressure element 6. This pressure element 6 is guided on the sides of the machine by means of a parallel guide 22 through an extension 6*a*, and on to this guide a damper 23 is fixed.

By means of the combined operation of the bent bracket 21, parallel guide 22 and damper 23, the rotational movement of this element is attained, so that first the veneer is clamped and subsequently pressed against the other veneer, while when reversing the operation, the veneer is first loosened and then the element 6 is moved back.

In Fig. 5 there is also shown a swinging support 24 on which the motor and the pulleys apertaining to the reduction gear are mounted, and which carries the draw out rollers 3 on arm 14. This support can be swung away in the direction of arrow E after loosening the locking lever 24*a*, so that the draw out rollers 3 may be moved away from their operating position.

As shown in Fig. 6 the top heating element 7 consists of separate elements in line with one another, which are independently sprung to make up for local irregularities. On one long side of the heating element 7 relatively short teeth 7*a* are provided, while on the other side slightly longer teeth 7*b* are provided. These teeth 7*a* and 7*b* interlock with the extensions 5*a* of the pressure element 5, and 6*a* of the pressure and forwarding element 6.

The movement of the teeth is shown by arrow A. The heating element 7 is interrupted on at least one place and a finger 25 is mounted there, which is connected to the pressure element 5, and is mounted level with the working table and overlaps the glue-joint of the fed-in veneer a sufficient distance so that the veneer is brought forward at the right level and prevents overlapping of the two veneers.

As shown in Fig. 7 the contacts 9*a* and 9*b* are each connected in circuit with control means for the complementary rollers 2*a*, 2*b*. The contacts are also connected in circuit with a timing clock 26 for controlling the pressure elements 5 and 6 and the heating elements 7 and 8. The timing clock is started when the elements 5, 6, 7 and 8 are operative and is preset for a time corresponding to the curing time of the glue. At the end of this preset time the timing clock de-energizes the elements and operates the rollers 2 and 3.

In operation, and assuming for the sake of clarity that the first veneer to be glued is fed into the intake rollers 2 in the direction of the arrow A, and reaches, after depressing feeler 9, the draw out rollers 3 and is further transported by these until, as can be seen in Fig. 1, the trailing edge of the veneer 10 has reached the gluing position and the feeler moves up behind this edge. At this point the draw out rollers 3 are stopped and the pressure element 5 is pressed down in the direction of the arrow B until the veneer 10 is pressed tight against the table 1. A further sheet of veneer is then fed into the rollers 2 either by hand or by means of a suitable transport device, which continue uninterrupted, and is pressed against the veneer already fixed in position. The rollers 2, which as mentioned before, can slip over the surface of the veneers when resistance is encountered, ensure at the same time that both glued veneers with their jointed edges are pressed together over their entire width.

When the gluing position is reached, the feeler 9 is again depressed and the heating elements 7 and 8 are pressed against the glue joint from above and below in the direction of the arrow C. Then the pressure element 6 goes down in the direction of arrow D and pushes the second veneer 11 in the manner of the angled arrow D against veneer 10, so that a firm pressing together of both veneers over the entire veneer width is achieved.

Depending on veneer thickness and type of utilised glue, the veneer remains in this position until the glue has set. This time is preset by means of the time clock 26.

At the end of this period the various elements are switched on again, the pressure elements 5 and 6 move in the direction of arrows B and D upwards and the heating elements 7 and 8 are moved away from the glue joint in the direction of the arrow C so that the heat radiation has no further effect on the veneers. The rollers 2 and 3 restart and convey the spliced veneers 10 and 11 along in the direction of arrow A until the trailing edge of veneer 11 has reached the gluing position, being stopped by accentuation of the feeler elements 9, which will cause the roller 3 to stop and after feeding-in a further veneer, the working procedure starts again. With this method it is possible to let the machine work continuously and to produce an endless band of spliced veneer pieces, which can then be cut to the required dimensions. It will be appreciated that after the initial sheets are fed in, the rollers 2 and 3 can operate simultaneously to move simultaneously the two veneers to be spliced.

The modification in Fig. 8 shows the feelers placed by photo-electric elements 27. These elements operate in a similar manner to the feelers, being controlled by passage of a veneer between the elements.

It will be appreciated that the heating elements may take any suitable form such as electric resistance elements or high frequency electric heaters.

What I claim is:

1. Apparatus for effecting the edgewise splicing of sheets of veneers, comprising means to advance the sheets in a direction normal to their edges to be spliced, a heating element to heat the abutting edges of the sheets to be spliced, means to halt the passage of a sheet when its trailing edge is in position adjacent the heating element, a support for the sheets in their halted position, means to move a second sheet in the direction of movement of the first sheet until its leading edge reaches a position adjacent the heating element means to secure the second sheet in its halted position and means to apply pressure to the sheets to urge the adjacent edges of the sheets together during heating to effect splicing.

2. Apparatus for effecting the edgewise splicing of

sheets of veneers, comprising means to advance the sheets in a direction normal to their edges to be spliced, a plurality of short spring heating elements capable of adjusting themselves to different veneer thicknesses and to irregularities in the veneers to heat the edges of the sheets to be spliced, means to halt the passage of a sheet when its trailing edge is in position adjacent the heating element, a support for the sheets in their halted position, means to move a second sheet in the direction of movement of the first sheet until its leading edge reaches a position adjacent the heating element means to secure the second sheet in its halted position and means to apply pressure to the sheets to urge the adjacent edges of the sheets together during heating to effect splicing.

3. Apparatus for effecting the edgewise splicing of sheets of veneers, comprising means to advance the sheets in a direction normal to their edges to be spliced, a heating element to heat the edges of the sheets to be spliced, means to halt the passage of a sheet when its trailing edge is in position adjacent the heating element, a support for the sheets in their halted position, means to move a second sheet in the direction of movement of the first sheet until its leading edge reaches a position adjacent the heating element means to secure the second sheet in its halted position and means to apply pressure to the sheets to urge the adjacent edges of the sheets together during heating to effect splicing, and a finger located at an intermediate position of the heating element to prevent the overlapping of the sheets.

4. Apparatus for effecting the edgewise splicing of sheets of veneers, comprising smooth rollers which are acted on by light pressure to advance the sheets in a direction normal to their edges to be spliced and to slip on the sheets when the veneers encounter a resistance, a heating element to heat the edges of the sheets to be spliced, means to halt the passage of a sheet when its trailing edge is in position adjacent the heating element, a support for the sheets in their halted position, means to move a second sheet in the direction of movement of the first sheet until its leading edge reaches a position adjacent the heating element means to secure the second sheet in its halted position and means to apply pressure to the sheets to urge the adjacent edges of the sheets together during heating to effect splicing.

5. Apparatus for effecting the edgewise splicing of sheets of veneers comprising means to advance the sheets in a direction normal to their edges to be spliced, a heating element to heat the edges of the sheets to be spliced, means to move the succeeding sheet in the direction of movement of the first sheet until its leading edge reaches a position adjacent the heating element, control elements disposed adjacent the heater element to control the means to advance the sheets and the heating element on the passage of the trailing edge of a sheet, and the leading edge of a succeeding sheet, a support for the sheets in their halted position, means to secure the second sheet in its halted position and means to apply pressure to the sheets to urge the adjacent edges of the sheets together during heating to effect splicing.

6. Apparatus for effecting the edgewise splicing of sheets of veneers comprising means to advance the sheets in a direction normal to their edges to be spliced, a heating element to heat the edges of the sheets to be spliced means to move the succeeding sheet in the direction of movement of the first sheet until its leading edge reaches a position adjacent the heating element, control elements adjacent the heater element to control the means to advance the sheets by the passage of the trailing edge of a sheet and the leading edge of a succeeding sheet and to energise the heating element, a support for the sheets in their halted position, means to secure the second sheet in its halted position and means to apply pressure to the sheets to urge the adjacent edges of the sheets together during heating to effect splicing and timing means to deenergise the heating element.

7. Apparatus for effecting the edgewise splicing of sheets of veneers comprising means to advance the sheets in a direction normal to their edges to be spliced, a heating element to heat the edges of the sheets to be spliced, means to move the succeeding sheet in the direction of movement of the first sheet until its leading edge reaches a position adjacent the heating element, control elements adjacent the heater element to control the means to advance the sheets by the passage of the trailing edge of a sheet and the leading edge of a succeeding sheet and to energise the heating element, a support for the sheets in their halted position, means to secure the second sheet in its halted position and means to apply pressure to the sheets to urge the adjacent edges of the sheets together during heating to effect splicing and timing means to deenergise the heating element and to control the means to advance the sheets, when the sheets have been spliced.

8. Apparatus for effecting the edgewise splicing of sheets of veneers comprising two driving rollers located on opposite sides of the sheets to advance the sheets in a direction normal to their edges to be spliced, a heating element to heat the edges of the sheets to be spliced, means to move the succeeding sheet in the direction of movement of the first sheet until its leading edge reaches a position adjacent the heating element, a pair of feeler elements disposed in the path of the sheet and adjacent the heater element each to independently control a respective driving roller to advance the sheets by the passage of the trailing edge of a sheet and the passage of the leading edge of a succeeding sheet over the respective feeler element, a support for the sheets in their halted position means to secure the second sheet in its halted position and means to apply pressure to the sheets to urge the adjacent edges of the sheets together during heating to effect splicing.

9. Apparatus for effecting the edgewise splicing of sheets of veneers comprising means to advance the sheets in a direction normal to their edges to be spliced, a heating element to heat the edges of the sheets to be spliced, means to move the succeeding sheet in the direction of movement of the first sheet until its leading edge reaches a position adjacent the heating element, feeler elements disposed adjacent the heater element to control the means to advance the sheets and the heating element on the passage of the trailing edge of a sheet, and the leading edge of a succeeding sheet, a support for the sheets in their halted position, means to secure the second sheet in its halted position and means to apply pressure to the sheets to urge the adjacent edges of the sheets together during heating to effect splicing.

10. Apparatus for effecting the edgewise splicing of sheets of veneers comprising means to advance the sheets in a direction normal to their edges to be spliced, a heating element to heat the edges of the sheets to be spliced, means to move the succeeding sheet in the direction of movement of the first sheet until its leading edge reaches a position adjacent the heating element, photo electric elements disposed adjacent the heater element to control the means to advance the sheets and the heating element on the passage of the trailing edge of a sheet, and the leading edge of a succeeding sheet, a support for the sheets in their halted position, means to secure the second sheet in its halted position and means to apply pressure to the sheets to urge the adjacent edges of the sheets together during heating to effect splicing.

References Cited in the file of this patent

UNITED STATES PATENTS

1,693,606	Jones	Dec. 4, 1928
1,702,185	Weber	Feb. 12, 1929
2,290,762	Miller	July 21, 1942
2,320,715	Bowling	June 1, 1943
2,366,588	Bolling	Jan. 2, 1945
2,453,185	Bilhuber	Nov. 9, 1948