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A. ELMENDORF ET AL

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METHOD AND APPARATUS FOR MAKING A VENEER PRODUCT

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fig. 1.

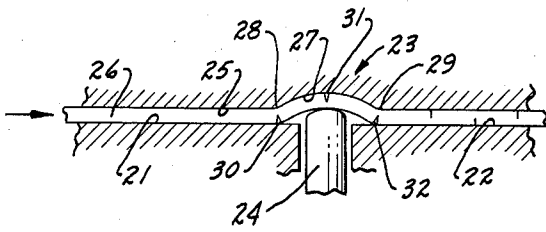
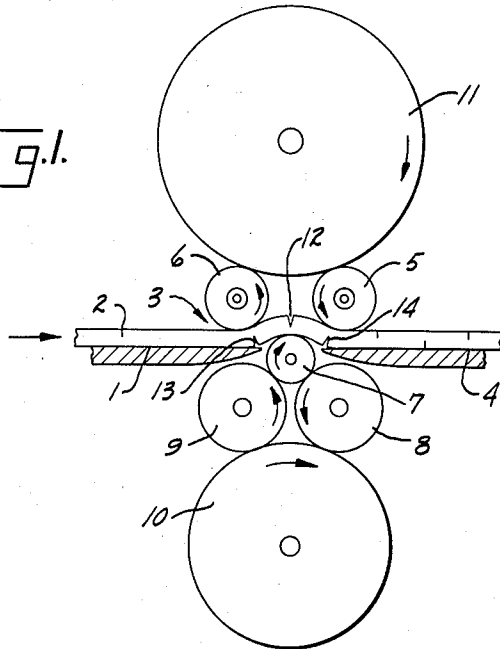


fig. 2.

fig. 4.

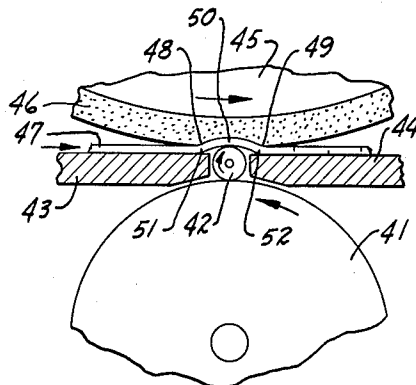
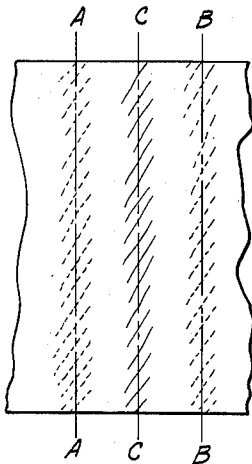


fig. 3.

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METHOD AND APPARATUS FOR MAKING A VENEER PRODUCT

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5 Claims. (Cl. 144—320)

The present invention is directed to a method and apparatus for distending veneer and making it pliable. The invention pertains to a method and apparatus for rupturing both surfaces of veneer simultaneously along closely spaced lines parallel to the grain of the veneer and thereby to distend or stretch it across the grain.

In many uses of veneer, it is desirable to provide space within the sheet into which the wood can expand. In one method in commercial use to achieve this result, the veneer is wedged into a plurality of strips without structural connection between the strips. Paper faces are bonded to the surfaces of the wedged veneer thereby producing a board that has many uses. A disadvantage found in this product resides in the fact that the spaces between the strips telegraph through the paper facings. The spaces show up as a plurality of evenly spaced parallel lines. Such lines are objectionable in many of the uses of the board, such as for the construction of luggage and for furniture panels.

In the case of very thin veneers, it is common commercial practice first to bond a flexible backing to the veneer and thus to rupture the exposed surface of the veneer at closely spaced intervals by stretching this surface. The rupturing of the surface of the veneer in this method causes the sheet to curl and it is necessary to pass the sheet through the machine a second time with the veneer on the reverse side so that the backing is stretched and the resultant sheet is flattened out. This is possible with cloth backing because the cloth can also be stretched. With paper backing, the spread of the veneer often makes it difficult to unfurl the sheet for the second pass.

The present invention pertains to a method and apparatus for distending veneer which may be used with either thin or thick veneers without a backing and is especially useful for distending veneers of a thickness from $\frac{1}{16}$ inch to $\frac{3}{16}$ inch.

Veneer processed in accordance with the method and apparatus of the present invention has been ruptured on both surfaces; its width is thereby increased from 2% to 15%. When veneers distended in this manner are faced with strong paper they can expand internally in about the same amount and they remain relatively flat notwithstanding the expansion. When the opposite surfaces of the veneer are ruptured simultaneously in accordance with the present invention, no visible spaces or voids are created within the veneer sheet, and there are no lines to telegraph through the paper faces of the final board product.

Another purpose of the present invention is the provision of a method and apparatus for simultaneously bending a sheet of veneer to the point of rupture along parallel lines on opposite surfaces of the veneer whereby the veneer is ruptured at close intervals following the grain of the wood crossing those lines.

Another purpose of the present invention is the provision of a method and apparatus for progressively rupturing opposite surfaces of a veneer sheet along parallel

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lines, as the veneer is fed in a direction transverse to these lines, the rupture lines following the grain of the wood.

Other purposes will appear from time to time in the course of the ensuing specification and claims.

Referring generally now to the drawings:

Figure 1 is an end view of a machine for flexing veneer in accordance with the present invention, with certain parts being known in section for purposes of clarity;

Figure 2 is a diagrammatic illustration of another apparatus for performing the method of the present invention;

Figure 3 is a diagrammatic showing of another apparatus for performing the method of the present invention; and

Figure 4 is a plan view of a sheet of veneer treated in accordance with the present invention and showing the lines of rupture on the opposite surfaces of the veneer.

Like elements are designated by like characters throughout the specification and drawings.

In accordance with the method of the present invention, sheets of veneer are fed in a direction transverse to the grain of the veneer. The sheet of veneer progresses in this direction to a rupturing zone of treatment. At the rupturing zone the veneer is bent or flexed to the point of rupture along three parallel lines, one line being along one surface and the other two along the opposite surface, the rupture lines following the grain of the wood. As the wood fibers at the parallel lines are seldom exactly parallel to these lines, the rupture lines generally cross the parallel lines at small acute angles as illustrated in Figure 4. The veneer is simultaneously bent along these lines to curvatures sufficiently sharp to rupture the veneer along the lines, the ruptures following the grain of the wood. For different woods and different thicknesses of veneer, the radius of curvature necessary to produce rupture may vary. For any given wood or thickness thereof, the radius of curvature necessary to produce adequate rupture may be determined.

It is preferable to feed the sheets of veneer continuously through the rupturing zone. The rupture lines or fissures thus formed in the sheet of veneer are not evenly spaced and some are more pronounced than others but they are always close together if the bending curvature is sharp. They are not visible when the veneer is flattened out. They are seldom very long, consequently, although the veneer may have been rendered quite limp, it still holds together and can be readily handled.

With particular reference now to Figure 1, a supporting surface is shown at 1. A second supporting surface is shown at 4. The surface 4 is adapted to support a sheet of veneer after it has been ruptured in the rupturing zone 3. The machine includes small flexing rollers 5, 6 and 7 which are adapted for rotation in the direction of the arrows shown in Figure 1. The rollers 5, 6 and 7 are adapted for rotation about parallel axes that are triangularly arranged (as viewed in Figure 1). The roller 7, which may be designated a pressure surface, is positioned so that its axis is beneath the supporting surfaces 1 and 4, but with its peripheral surface extending to a level above the supporting surfaces 1 and 4. The upper flexing rollers 5 and 6, which may be designated constraining surfaces, are spaced above the lower pressure roller 7, and with their axes spaced on opposite sides of a vertical plane passing through the axis of the roller 7. The lower surfaces of the rollers 5 and 6 form constraining fulcrums for the veneer as it is thrust up by the roller 7.

It should be understood that the rollers shown in Figure 1 are each provided with journals which are supported in bearings in the machine frame (not shown). The rollers 10 and 11 may be driven from a common

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power source in a manner such as to rotate the rollers 5, 6 and 7 at equal peripheral speeds. Idler rollers 8 and 9 are positioned between the drive roller 10 and pressure roller 7.

In using the apparatus illustrated in Figure 1, sheets of veneer are fed along the supporting surface 1 in the direction of the arrow shown at the left-hand side of Figure 1. The veneer is fed in this direction with its grain extending generally parallel to the axes of the flexing rollers. When the edge of the veneer contacts the peripheral surface of the roller 7, the veneer is forced upwardly. As the veneer progresses through the space between the rollers 5 and 6, the leading edge thereof contacts the roller 5 which then forces the veneer downwardly. As the leading edge continues downwardly, it contacts the supporting surface 4 and slides along this surface. As the sheet of veneer progresses along this path, each succeeding portion of the veneer is ruptured along lines parallel to the flexing rollers designated at 12, 13 and 14 each rupture following the grain of the veneer.

Figure 2 is a diagrammatic showing of another apparatus that may be used to perform the method of the present invention. In this figure, the veneer is fed along entry and exit surfaces 21 and 22, respectively. The veneer is fed in the direction of the arrow with the grain of the veneer transverse to the direction of movement. A rupturing zone is designated at 23. In Figure 2 an upper surface 25 is adapted to constrain the sheet of veneer 26 in a substantially rectilinear path while it passes through the rupturing zone. A plunger 24 is positioned between the surface 21 and 22 and is adapted to be reciprocated in a vertical direction transverse to the movement of the veneer. The plunger 24 is adapted to be reciprocated from a point spaced above the surfaces 21 and 22 to a point spaced below the surfaces. The plunger 24 may have a curvilinear upper surface or pressure surface which is adapted to bear against the lower surface of the veneer.

That portion of the surface 25 which is opposite to the plunger 24, is curvilinear as at 27. The radius of curvature of the portion 27, which may also be considered a constraining surface, should be slightly less than the radius of curvature which will produce rupture. The portion 27 extends to points 28 and 29 on opposite sides of the plunger 24. The arrangement is such that when the plunger 24 is in its uppermost position, the veneer 26 is constrained in the gap between the surfaces 21 and 25 and rupture of the convex surfaces of the veneer takes place along the lines parallel to the edge of the plunger 24 at 30, 31 and 32.

The plunger 24 is adapted to be reciprocated at a speed correlated with the desired speed of the feed of the veneer 26 which moves forward a short distance each time that the plunger is out of the way. As in the case of the apparatus shown in Figure 1, rupture will occur at 32 if rupture has not previously occurred along this line when the veneer entered the rupturing zone.

Figure 3 illustrates a preferred form of apparatus with which to practise the method of the present invention. In Figure 3 an anvil roller 41 is adapted to drive a small flexing roller 42. Supporting surfaces are provided on opposite sides of the flexing roller 42 as shown at 43 and 44. A cushion roller is employed as shown at 45. The roller 45 carries a layer of resilient material 46 on the peripheral surface thereof. The layer 46 may be made of soft rubber or rubber-like material. When a sheet of veneer 47 is fed in the direction of the arrow shown in Figure 3 (transverse to the grain of the veneer) the leading edge of the veneer sheet is clamped or constrained between the supporting surface 43 and rubber surface 46 in what is known as a clamping zone. When the leading edge contacts the pressure roller or flexing roller 42, it is forced upwardly, thus compressing the layer of resilient material 46 and bending

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the veneer to the rupture point along a line 51 parallel to the flexing roller 42. As the leading edge of the veneer passes over the roller 42, it is forced downwardly by the rubber towards the exit surface 44 and then progressed outwardly from the rupturing zone. In this passage it is successively ruptured along the upper surface at 50 and then along the lower surface at 52. The veneer is ruptured simultaneously along one line on one surface of the veneer and along two lines parallel to it on the opposite surface.

The radius of curvature of the flexing roller is less than that minimum radius which will produce rupture of the surface of the veneer. As in the case of the embodiments illustrated in Figures 1 and 2, the surface of the veneer opposite to the upper edge of the flexing roller 42 is ruptured at 50 while ruptures occur in the opposite surface of the veneer along the lines at 51 and 52.

In Figure 3 feeding of the veneer is automatically provided by the clamping action exerted on the veneer by the surface of the rubber 46 and the supporting surface 43. The thrust so provided performs an important function as it causes the veneer to overcome the resistance imparted to the leading edge by the flexing roller. Without this thrust, thick veneers are stopped by the flexing roll. This thrust is especially important when veneer $\frac{1}{16}$ inch to $\frac{3}{16}$ inch are to be made flexible. Once the veneer edge has been pinched between the flexing roll and the cushion roll, it proceeds on through the machine continuously and without hindrance. I have found that the friction between the cushion and the veneer is greater than the combined resistance of the friction on the supporting metal surface and the resistance of the flexing roller.

Figure 4 is a plan view of a sheet of veneer which has been treated in accordance with the present invention. For veneers that range in thickness from $\frac{1}{16}$ inch to $\frac{3}{16}$ inch, we obtain satisfactory results with a flexing roller $\frac{3}{8}$ inch in diameter positioned so that its upper edge is from $\frac{1}{32}$ inch to $\frac{1}{16}$ inch above the supporting surface 43, with the cushioning surface positioned so that the space between it and the supporting surface is less than the thickness of the veneer, the exact distance depending upon the softness of the rubber used for the cushioning roller. Satisfactory results are obtained with a rubber cushion $\frac{1}{2}$ inch thick, and the rubber having a durometer of 40, and the diameter of the cushion roller being 12 inches.

In Figure 4, which is a plan view of the flexed veneer, zones AA and BB show the fissures following the grain of the wood produced by the bending of the lower surface of the veneer and CC shows the fissures caused by the bending of the upper surface of the veneer. This result is obtained with each of the devices shown in Figures 1, 2 and 3. When the veneer is flattened out, these fissures are substantially invisible, even though the width of the veneer has been increased by the flexing action from 2% to 15%. When veneers so processed are faced with paper, no fissuring can be seen nor do any rupture lines telegraph through the paper.

Zone CC in Figure 4 corresponds to the rupture line or zone 12 in the upper surface of the veneer in Figure 1, while zones AA and BB correspond to the rupture lines or zones 13 and 14 in the lower surface of the veneer in Figure 1.

Whereas we have shown and described an operative form of the method of the invention, and certain operative forms of apparatus that may be used with the invention, it should be understood that this showing and description thereof should be taken in an illustrative and diagrammatic sense only. There are many modifications of the invention which will fall within the scope and spirit thereof and which will be apparent to those skilled in the art. The scope of the invention should be limited only to the scope of the hereinafter appended claims.

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We claim:

1. A method of distending veneer and making it pliable including the steps of feeding the veneer in a direction perpendicular to the grain into a clamping zone, clamping the veneer between an unyielding surface and a moving yielding surface, then bending the veneer by progressively increasing the compression of the yielding surface as the veneer advances until a point of maximum compression is reached, then progressively releasing the compression while bending the veneer in the reversed direction, then bending the veneer in the same direction as the first bending while progressively clamping the veneer between said moving yielding surface and a second unyielding surface, thereby increasing the width of the veneer at least 2 percent.

2. The method of claim 1 wherein the distance between the uncompressed yielding surface and either one of said unyielding surfaces is less than the thickness of the veneer.

3. A method of distending veneer and making it pliable including the steps of continuously feeding the veneer in a direction perpendicular to the grain into a rupturing zone, continuously maintaining a variable pressure over the entire area of one surface of the veneer as it passes through the rupturing zone, said continuously maintained pressure being a minimum as the veneer enters and leaves the rupturing zone and progressively increasing to and decreasing from a maximum as it passes through the rupturing zone, continuously maintaining pressure upon the opposite surface of said veneer as it enters and leaves the rupturing zone and continuously applying pressure to said second-named surface of the veneer at a point intermediate said entering and leaving points of maintained pres-

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sure to bend the veneer in reverse curvature as it passes through said rupturing zone so as to simultaneously rupture both surfaces of said veneer.

4. The method of claim 3 further characterized in that the point of maximum pressure on said first surface of the veneer is aligned with the point of pressure application on the opposite surface of the veneer.

5. The method of claim 4 further characterized in that said veneer is first bent away from the point of pressure application to said second-named side, then back toward said point of pressure application, and then is bent in the direction of said first-named bending.

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