United States Patent

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[54] METHOD AND MEANS FOR PRODUCING WOOD VENEER

25 Claims, 8 Drawing Figs.

[52] U.S. Cl. 144/327, 144/178, 144/209, 144/214, 144/316, 144/326
[51] Int. Cl. B27l 5/06
[50] Field of Search 144/327, 214, 209, 316, 326, 178, 179, 177

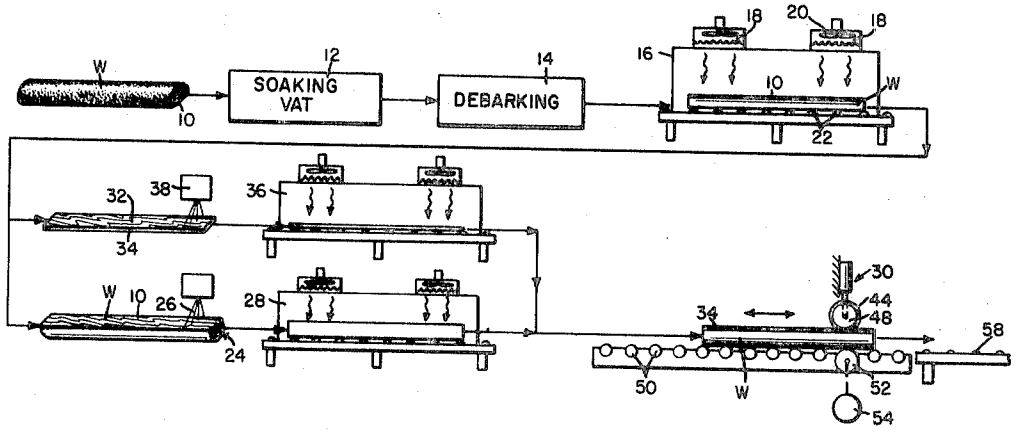
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UNITED STATES PATENTS

3,295,571	1/1967	Bork	144/327
3,397,723	8/1968	Hervey	144/309

Primary Examiner—Donald R. Schran
Attorney—J. Warren Kinney, Jr.

ABSTRACT: The veneer-cutting procedure involves the new step of supporting the workpiece for slicing for forcing a strong backing board to transfer inherent stress to an inherent warp of the workpiece, so that the backing board takes the warp out of the workpiece as the thickness of the workpiece approaches zero value during slicing.



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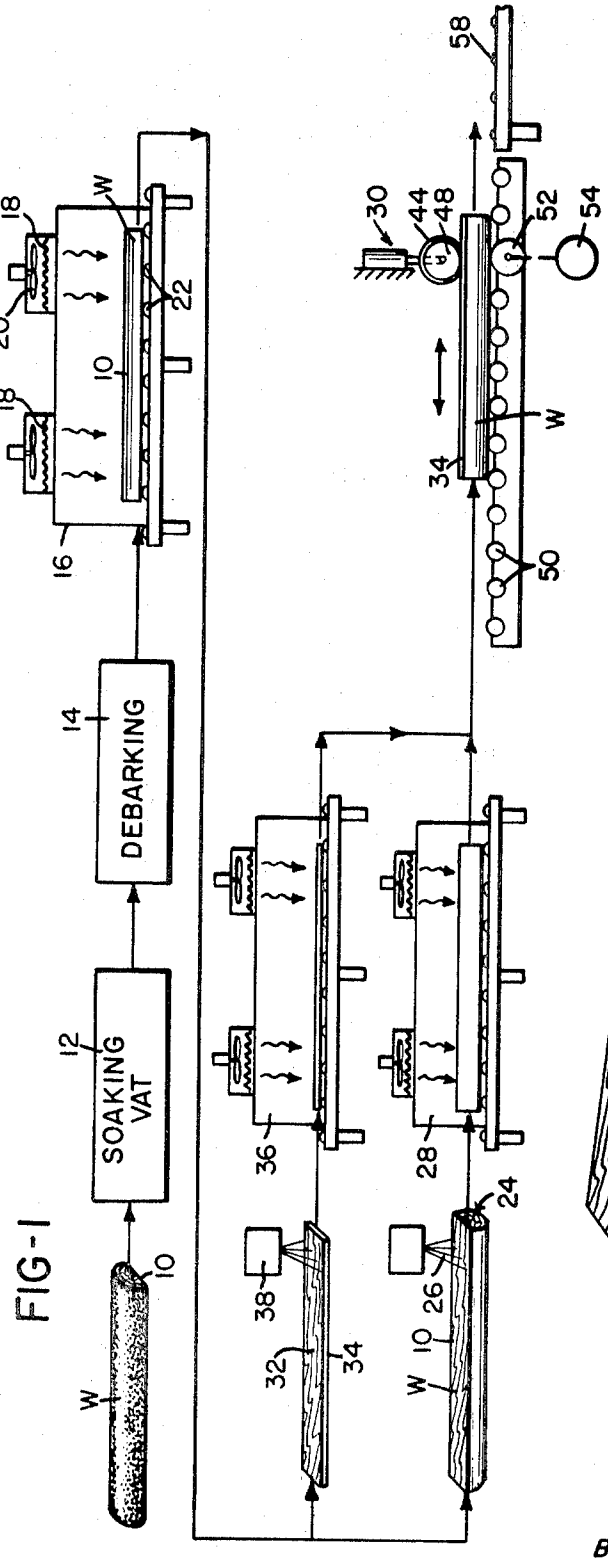


FIG-1

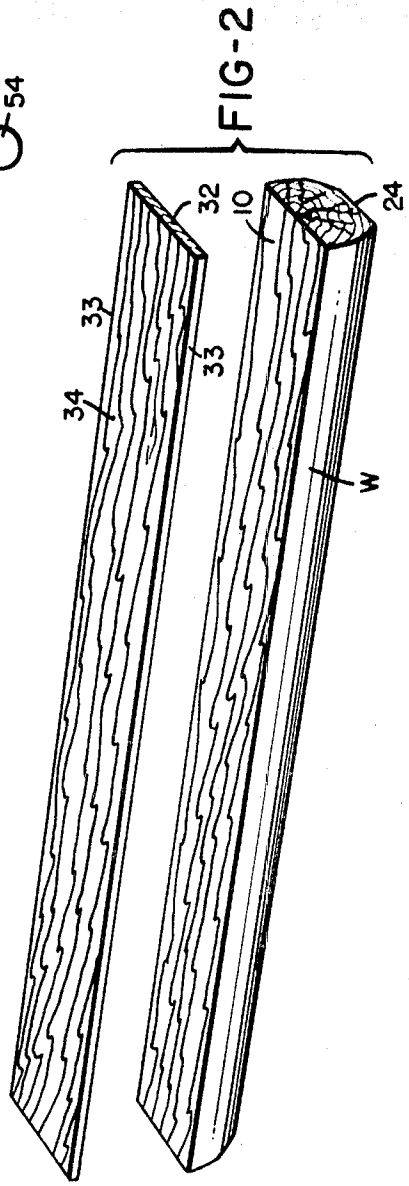


FIG-2

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FIG-3

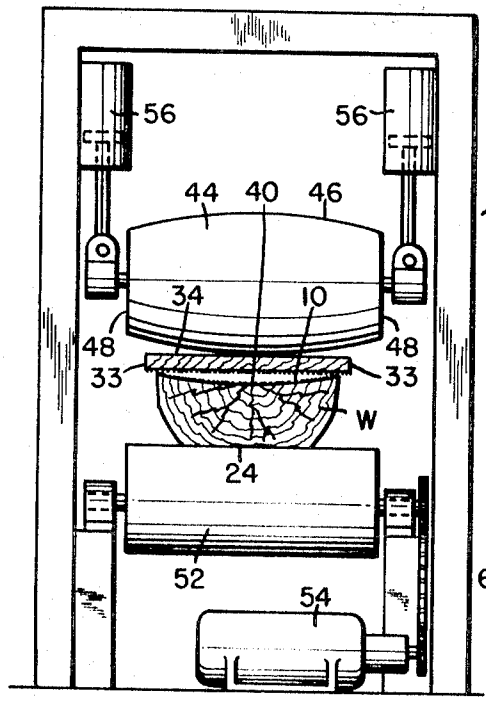


FIG-4

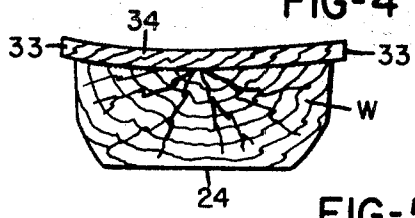
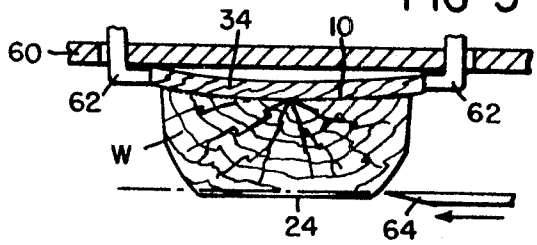


FIG-5



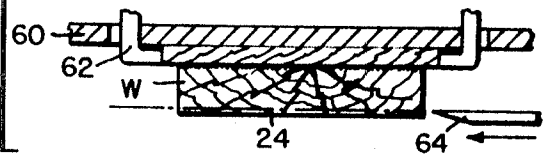


FIG-6

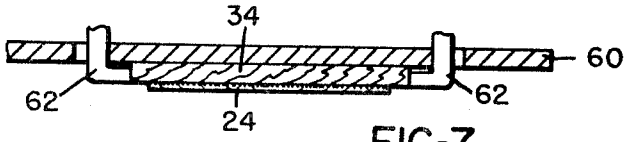


FIG-7

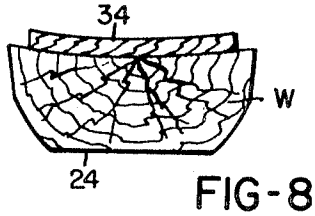


FIG-8

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METHOD AND MEANS FOR PRODUCING WOOD VENEER

The present invention relates to a method and means for producing wood veneer from logs of all kinds.

Several procedures for producing wood veneer are disclosed in the U.S. Pat. No. 3,295,571, dated Jan. 3, 1967 of P. Bork, and reference may be had to said patent for any details of the procedure not necessarily included in the present disclosure. An object of the present invention is to improve upon the Bork procedures so as to reduce production cost, minimize waste, and increase the yield of veneer from workpieces, or log sections.

In the production of wood veneer, common practice has been to first split a length of log down the middle to produce a half-log, debark and clean it, and plane the surface exposed by splitting so as to provide a substantially flat and extensive surface having dimensions approximately the length and width dimensions of the log section. The section of log so prepared is known in the art as a flitch, and the planed substantially flat surface mentioned may properly be referred to as a bonding surface by reason of the fact that it will be bonded with a cement, glue or other adhesive material to a flat backing board or supporting layer.

The flitch or workpiece with the backing board or supporting layer glued thereon is then held in clamps, while a slicing tool or knife repeatedly shaves veneer leaves from the workpiece, the knife or tool operating first at a distance from the backing board and gradually approaching the plane of the backing board as veneer leaves are successively sliced off. The last leaf removed, therefore, will be very close to and in substantial parallelism with the mean plane of the backing board. The knife or slicing tool may operate in a horizontal, vertical, or intermediately inclined plane, depending upon the type of veneer-cutting machine employed.

After the workpiece is so consumed, the backing board or supporting layer is unclamped, removed from the cutting machine, and cleaned of glue and splinters for reuse.

Usually the glueing of the workpiece to the backing board is preceded by a treatment of the workpiece to improve the appearance and facilitate the slicing of veneer leaves therefrom. Various forms of treatment have been employed, the commonest of which involves moisturizing of the workpiece for an extended period of time, usually by means of a hot water bath. After the workpiece has been thoroughly moisturized, the planed bonding surface thereof may be surface-dried or otherwise conditioned for glueing to the backing board.

A serious difficulty encountered when applying the backing board, is that of warping of the bonding surface resulting from the treatment and/or conditioning aforesaid. The warped bonding surface tends to resist firm attachment of the backing board, and also results in the production of objectionably narrow part-leaves as cuts are made closely approaching the backing board. Thus, much waste is produced, or slicing must be terminated before the workpiece is completely used up, and as a result the most desirable part of the log goes to waste. Moreover, any insecure attachment of the backing board to the workpiece may result in accidents and injuries as the cutter shaves or slices off the veneer leaves with great force.

One of the objects of the present invention is to eliminate insecure attachment of the backing board to the workpiece, and at the same time increase the yield of veneer leaves without producing an objectionable amount of waste.

Another object of the invention is to provide an improved method and means for producing veneer, which ensures the production of perfect veneer leaves throughout the thickness of the workpiece and very closely approaching the line of adhesion between the workpiece and the backing board.

A further object of the invention is to so secure the workpiece to the backing board, that the entire veneer-cutting operation may be performed safely and advantageously with clamping force applied exclusively to the side edges of the backing board, rather than partly to said board and to the workpiece.

Another object is to utilize the inherent tendency of the backing board to resume a planar condition after having been flexed and glued to the workpiece, in advantageously presenting the workpiece to the cutter for maximum production of commercially acceptable veneer leaves from a flitch or workpiece.

The foregoing and other objects are attained by the means described herein and illustrated upon the accompanying drawings, in which:

FIG. 1 is a diagrammatic view indicating a procedure embodying the present invention, for treating or conditioning a log section flitch or workpiece preparatory to cutting veneer therefrom.

FIG. 2 is an enlarged perspective view of the flitch or workpiece disposed for attachment of a backing board.

FIG. 3 is an end elevational view of a press used in adhesively attaching the backing board to the workpiece.

FIG. 4 is an end view of the workpiece attached to the backing board by the press of FIG. 3.

FIG. 5 is a view similar to FIG. 4, showing the workpiece and its relationship to the clamp means and cutter of a typical veneer cutting machine, and indicating a relationship of elements prevailing at the beginning of the cutting procedure.

FIG. 6 is a view similar to FIG. 5 but showing a relationship of elements prevailing after a number of veneer leaves have been cut from the workpiece.

FIG. 7 is a view like FIG. 6, showing the relationship of the elements at an advanced stage at or near termination of the cutting procedure.

FIG. 8 is a view similar to FIG. 4 showing a modification.

As FIG. 1 discloses, the workpiece W consists of a half-log of any wood, usually up to 15 feet in length, formed by splitting a log longitudinally down the middle. The exposed under surface 10 where the splitting occurred, has been planed smooth and flat in a planing machine.

The half-log so prepared is then advanced to a soaking vat 12 or equivalent piece of equipment wherein the half-log, or workpiece, is thoroughly moisturized for the purpose of enhancing the appearance of the grain and facilitating slicing in the veneer-cutting machine. For other methods of conditioning, reference may be made to the Bork patent aforesaid.

Following moisturizing, the workpiece is cleaned in the course of debarking at station 14. It is then surface dried, with removal of some of the moisture from flat face 10, particularly if such surface drying is conducive to proper adherence of a glue or adhesive thereto. Surface drying may be performed in an oven or the like 16, wherein air warmed by heaters 18 may be directed onto the flat face 10 by means of one or more motor driven fans or blowers 20. During the drying period, the workpiece may be supported upon suitable conveyor rolls 22 which facilitate handling of the workpiece.

As before stated, a limited surface drying of face 10 may or may not be necessary, depending upon the nature of the adhesive to be applied thereto. Either before or after the drying period, the workpiece may be planed to provide a substantially flat face 24 which preferably is parallel to but not as wide as face 10. The planing at face 24 may be performed by the slicing knife of the veneer cutter, if desired, but it may be considered better practice to plane at 24 prior to cutting veneer from the workpiece.

After leaving the oven 16, the entire face 10 of the workpiece is coated with a glue or adhesive in any suitable manner. In the example shown, a spray 26 of glue or adhesive is applied. Then, if the glue or adhesive so requires, heated air may be directed onto the coated surface 10 in an oven 28 similar to oven 16 previously described. From oven 28, the coated workpiece will advance to a press 30, as will be explained later.

While the workpiece is undergoing coating as above explained, a coating of glue or adhesive may be applied to one face 32 of a backing board or supporting layer 34. Depending upon the nature of the glue or adhesive, the coated backing board or layer may be passed through an oven 36 similar to the oven 16. The coating may be applied in any suitable

manner, as by means of a sprayer **38**, for example. The backing board **34** may be considered similar to the supporting layer **12** of the Bork patent aforesaid.

As suggested by FIG. **2**, the backing board is to be superposed upon the workpiece with the adhesive coated faces **32** and **10** contacting one another. It will be noted that parts **34** and W are of equal length, approximately, and may also be of substantially equal width at faces **10** and **32**. With said faces in substantial contact, bonding of the assembly **34**, W is to be completed in a press such as **30** of FIG. **1**.

It is important here to note that the aforesaid moisturizing and surface drying treatment of workpiece W will usually warp the planed surface **10**, thereby to produce a concavity **40** lengthwise of the workpiece (FIG. **3**), which precludes effective bonding of the coated surfaces of the workpiece and the backing board. The backing board, it may be noted, is in the nature of a thick elongate plank or panel which is substantially flat, and characterized by limited flexibility and a strong tendency to return to planar condition if flexed by external forces.

One of the features of the present invention involves heavily pressing the middle portion of the backing board to deliberately distort and flex it transversely, causing said board to bow into firm adhesive contact with the deep areas of the concave bonding surface **10** of the workpiece. That is, the press force is applied strongly to the backing board intermediate its side edges **33,33**, or along the middle portion thereof. As the adhesive sets under pressure, the result is to adhesively maintain the backing board under stress by adhesion to the concaved bonding surface **10** of the workpiece. This condition is exemplified by FIG. **4**.

In order to bond the parts as above explained, the press **30** may include a pressure roll or matrix **44** whose working face **46** is convex, or curved from end to end with the diameter of the roll diminishing gradually from the midpoint to the opposite ends **48**, **48** of the roll. The convexity of the roll face should approximate or slightly exceed the complementary average warp concavity of a workpiece surface **10**, so that the roll face under pressure will flex the backing board into the deepest area of the warp concavity and effect there a firm bonding of the adhesive coatings, thereby to establish the relationship of FIG. **4**, with a virtual absence of large voids between the parts W, **34**. The pressing of the backing board as above explained, automatically effects firm bonding of the parts laterally in the direction of the side edges **33** as will be understood.

The press **30** may include a series of conveyor rolls **50**, and a support roll **52** driven by a motor **54**. The convex pressure roll or matrix **44** may be forcefully advanced onto the work by means of hydraulic cylinders **56**, **56** or equivalent power means as the driven support roll **52** advances the assembly W, **34** toward a receiving conveyor **58**. The press, of course, may be of a type wherein the pressure roll is replaced by a non-rotating pressure platen or matrix having the required convexity, operating against a flat platen supporting the workpiece. However, the rotary type of press generally shown is preferred.

After the backing board has been firmly secured to workpiece W, the assembly is advanced to the veneer-cutting machine, which usually comprises a table **60** and clamps **62**, **62** operable to grip the side edges **33,33** of the backing board **34**. Inasmuch as the adhesive bond between the backing board and workpiece W is very secure, it is unnecessary to apply the clamps to workpiece W at any stage of the veneer-cutting operation. That is, the backing board itself provides the necessary clamping surfaces throughout the veneer cutting operation. The workpiece initially is supported by the clamps **62** according to FIG. **5**, while cutter **64** reciprocates to slice off successive leaves of veneer from the face **24** of the workpiece.

It will be noted from FIG. **5**, that the backing board **34** initially is held under bending stress by the strong adhesive bond with the concave warped bonding surface **10** of the workpiece. However, as veneer is progressively removed from the workpiece by cutter **64** according to FIG. **6**, the force of the warp in the workpiece gradually weakens and yields to the force inherent in the backing board **34** tending to restore the backing board to planar condition. By reason of the gradual flattening of the backing board and the workpiece secured thereto, the cutter is enabled to continue slicing off perfect veneer leaves of uniform thickness until substantially the entire workpiece is consumed according to FIG. **7**.

Under the procedure disclosed by the Bork patent aforesaid, it has never heretofore been possible to press the backing board or supporting layer into such intimate contact with the warped bonding surface of the workpiece, as to achieve the ideal flat relationship and adhesive bond depicted by the Bork drawing figures. Instead, the workpiece-bonding surface remained concave, and the backing board remained substantially flat, with the result that the bond between them was dangerously insecure, and the cutter in approaching the backing board plane usually produced a divided veneer leaf of reduced commercial value.

The type of veneer-cutting machinery disclosed by the Bork patent, as well as other known types, can be used in practicing the invention herein disclosed. Also, there need be no difference in the nature of the backing boards or supporting layers employed, nor in the nature of the glue or adhesive so long as a strong bond is obtainable. One satisfactory form of adhesive comprises a synthetic rubber-resin combination which is dissolved in a volatile solvent. Such glue should have enough inherent strength to withstand the shearing stresses encountered in the veneer cutting machine, so that the workpiece safely is held to the backing board while undergoing cutting, without interruption, all the way to the glue line.

The backing board may be of wood or any composition of material having the qualities above mentioned. It should be of such nature as to accept and strongly adhere to the glue or adhesive. The board may be wider than the workpiece as in FIG. **4**, or slightly narrower as in FIG. **8**, and should have a thickness between 1 and 2 inches. Also, the board should be soft enough to avoid injuring the veneer slicing blade if struck thereby, and hard enough to withstand the clamping force imposed by the veneer-cutting machine clamps.

For other details not necessarily pertinent to the present invention, reference may be had to the Bork patent hereinbefore identified.

We claim:

1. The method of producing a succession of veneer leaves by repeatedly subjecting a log section workpiece to substantially parallel cuts of a slicing tool, said method comprising the steps of: establishing upon the workpiece an initially substantially flat and extensive bonding surface; subjecting the workpiece to a treatment which facilitates slicing but warps said bonding surface to produce concavity thereof; superimposing upon the concave bonding surface a substantially flat elongate backing board, with an adhesive material therebetween, said backing board being of limited flexibility and characterized by a strong tendency to return to planar condition after flexing; subjecting the workpiece and the superimposed backing board to the compressive action of a highly pressured matrix which applies to the backing board between its side edges a heavy force sufficient to flex said backing board into firm adhesive contact with the deep areas of said bonding surface concavity, thereby to adhesively maintain the backing board under stress by adhesion to said concaved bonding surface; then removing the matrix pressure; then while said backing board is under stress by adhesion alone, slicing veneer leaves successively from the workpiece in substantial parallelism with the mean plane of the backing board until the warping force in the workpiece is gradually weakened by the removal of workpiece material, and until said warping force is substantially overcome by the force inherent in the backing board acting to restore the backing board and the adherent bonding surface of the workpiece to initial substantially flat condition, said slicing continuing into close proximity to said backing board.

2. The method as defined by claim 1, which includes holding the workpiece while undergoing slicing, by clamping the adhesively attached backing board to a support.

3. The method as defined by claim 1, wherein said treatment to facilitate slicing includes moisturizing the workpiece.

4. The method as defined by claim 3, which includes the step of removing some of the moisture from the bonding surface of the workpiece prior to applying the adhesive.

5. The method as defined by claim 1, wherein said backing board is flexed into firm adhesive contact with said bonding surface by rolling.

6. The method as defined by claim 4, which includes holding the workpiece while undergoing slicing, by clamping the adhesively attached backing board to a support.

7. The method as defined by claim 6, wherein the clamping is effected at the side edges of the backing board throughout the veneer-cutting operation.

8. The method of preparing for veneer cutting a loglike workpiece which has a bonding surface planed and subsequently warped to concavity, said method comprising: superposing upon said bonding surface a flat elongate backing board with an adhesive between said board and said bonding surface; said backing board being of limited flexibility and characterized by a strong tendency to return to planar condition after flexing; then subjecting the workpiece and the superposed backing board to the compressive action of a highly pressured matrix which applies to the backing board between its side edges a heavy force sufficient to flex said backing board into firm adhesive contact with the deep areas of said bonding surface concavity, thereby to adhesively maintain the backing board under stress by adhesion to said concaved bonding surface.

9. The method as defined by claim 8, wherein the matrix is in the form of an elongate member having a convex pressure face substantially complementary to the surface concavity of the workpiece.

10. The method as defined by claim 9, wherein said elongate member is a pressure roll whose diametral dimension diminishes gradually from the midpoint of the pressure face toward the opposite ends of the roll.

11. The method as defined by claim 10, wherein the backing board has a width dimension approximating the width dimension of the workpiece.

12. The method as defined by claim 8, wherein the backing board has a width dimension approximating the width dimension of the workpiece.

13. The method as defined by claim 8, which includes the steps of clamping said backing board in a veneer-cutting machine, and slicing veneer leaves successively from the workpiece to diminish the thickness of the workpiece, thereby to weaken the force of the warp thereof and enable the strong tendency of the backing board to return to planar condition, to substantially overcome the warp of the workpiece during the slicing operation.

14. The method as defined by claim 13, wherein the matrix is in the form of an elongate member having a convex pressure face substantially complementary to the surface concavity of the workpiece.

15. The method as defined by claim 14, wherein said elongate member is a pressure roll whose diametral dimension diminishes gradually from the midpoint of the pressure face toward the opposite ends of the roll.

16. The method as defined by claim 15, wherein the backing board has a width dimension approximating the width dimension of the workpiece.

17. The method as defined by claim 8, wherein said adhesive constitutes one coating applied to the warped bonding surface of the workpiece, and another coating applied to one face of the backing board.

18. The method as defined by claim 17, which includes the steps of clamping said backing board in a veneer-cutting machine, and slicing veneer leaves successively from the workpiece to diminish the thickness of the workpiece, thereby to weaken the force of the warp thereof and enable the strong tendency of the backing board to return to planar condition, to substantially overcome the warp of the workpiece during the slicing operation.

19. The method as defined by claim 18, wherein the matrix is in the form of an elongate member having a convex face substantially complementary to the surface concavity of the workpiece.

20. The method as defined by claim 19, wherein said elongate member is a pressure roll whose diametral dimension diminishes from the midpoint of the pressure face toward the opposite ends of the roll.

21. The method as defined by claim 19, wherein the backing board has a width dimension approximating the width dimension of the workpiece.

22. Mechanism for producing veneer from an elongate loglike workpiece having an initially substantially flat and extensive bonding surface, said means comprising in combination; means for subjecting the workpiece to moisture sufficient to warp said bonding surface and impart concavity thereto; an elongate substantially flat backing board of limited flexibility and characterized by a strong tendency thereof to return to planar condition after flexing; means for pressing said board onto the concave bonding surface of said workpiece with an adhesive interposed, said means comprising an elongate pressure member having a convex pressure face substantially complementary to the surface concavity of the workpiece, said pressure member applying heavy force mainly to that area of the backing board which is intermediate the side edges of said board, thereby to flex said backing board into firm adhesive contact with the deep areas of said bonding surface concavity to maintain the backing board under stress by adhesion to said concaved bonding surface; clamp means operative upon termination of the pressing operation, to grip the backing board; and means including a cutter for successively slicing veneer leaves from the workpiece while held by the clamp means and maintained under stress by the adherent stressed backing board, the slicing being performed in planes substantially parallel to the mean plane of the backing board.

23. The combination as defined by claim 22, wherein the combination includes means for surface drying the bonding surface of the moisturized workpiece, and for applying adhesive to said dried surface.

24. The combination as defined by claim 22, wherein the backing board has a width dimension approximating the width dimension of the workpiece.

25. The combination as defined by claim 22, wherein said elongate member is a rotary pressure roll for applying force upon said backing board; and means for progressively advancing the workpiece relative to said pressure roll.

* * * * *