United States Patent

O'Brien, deceased

[15] **3,678,974**

[45] **July 25, 1972**

[54] VENEER TENDERIZING APPARATUS

[72] Inventor: **John C. O'Brien, deceased,** late of Vancouver, Wash. by Violet D. **O'Brien, executrix**

[73] Assignee: **Jack-O-Line Corporation**

[22] Filed: **May 6, 1970**

[21] Appl. No.: **35,194**

[52] **U.S. Cl.** .....**144/2 R,** 144/309

[51] **Int. Cl.**.....**B27d 5/00**

[58] **Field of Search**.....144/136, 315, 328, 327, 282, 144/245, 246, 309 R, 2 R, 2 J, 2 K, 309–327

[56] **References Cited**

UNITED STATES PATENTS

2,940,489	6/1960	Feiner	144/136
1,836,751	12/1931	Delaney	144/245
2,896,682	7/1959	Elmendorf	144/327
3,541,592	11/1970	Lewis	144/315

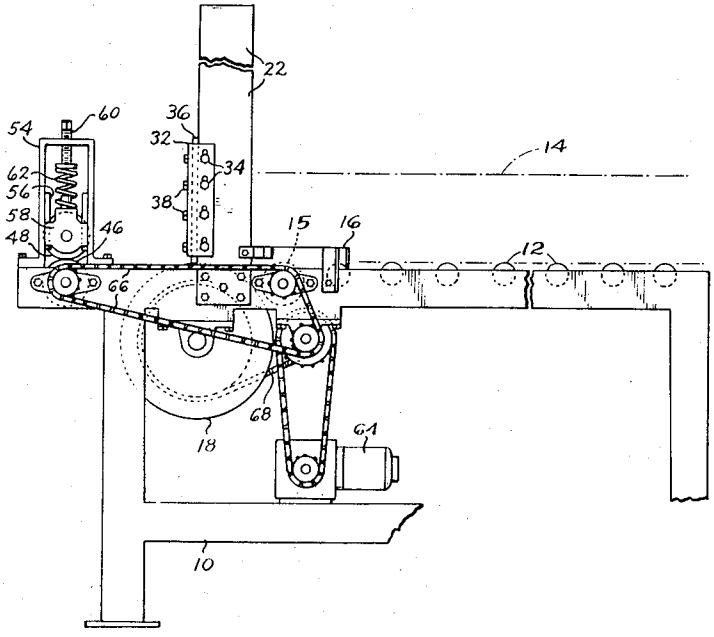
Primary Examiner—Donald R. Schran

Attorney—Eugene D. Farley

[57] **ABSTRACT**

Wood veneer tenderizing apparatus incises wood veneers across the grain to render them flexible and limp for subsequent application in the manufacture of plywood. The apparatus includes an incising assembly comprising an incising roll and a drive roll rotatably mounted in axially aligned cooperating relation. Metering feed means feed the wood veneers to the incising assembly one at a time from the bottom of a stack of wood veneers. As they pass through the assembly, the veneers are incised with a plurality of surface incisions in a pattern determined by the pattern of incising elements on the incising roll.

10 Claims, 7 Drawing Figures



Patented July 25, 1972 3,678,974

2 Sheets-Sheet 1

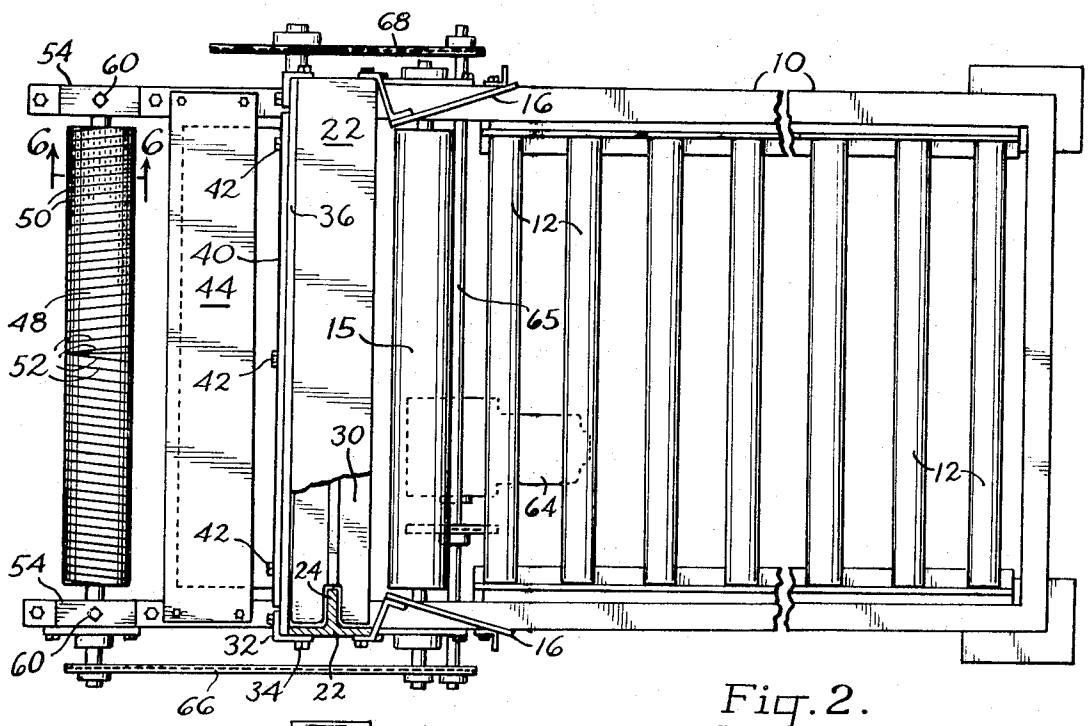


Fig. 2.

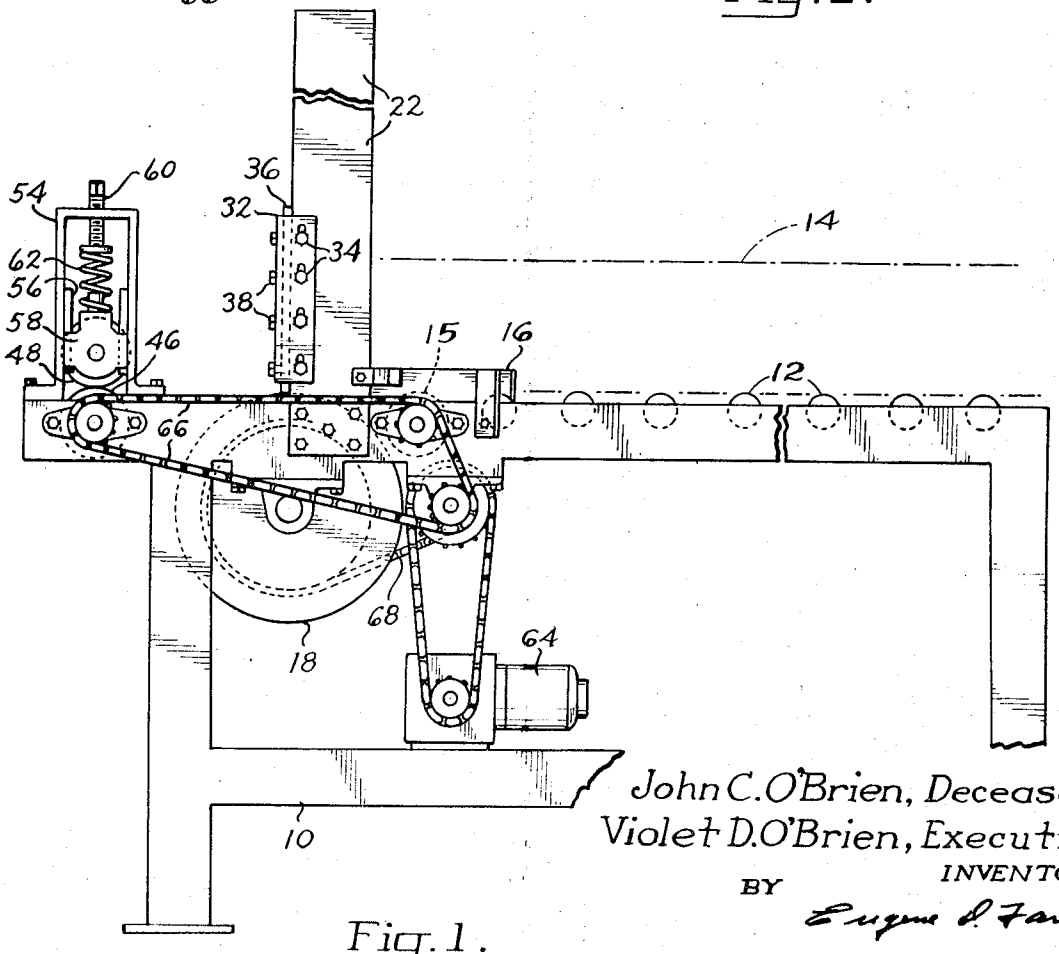


Fig. 1.

John C. O'Brien, Deceased
Violet D. O'Brien, Executrix
INVENTOR
BY Eugene L. Farley
Atty.

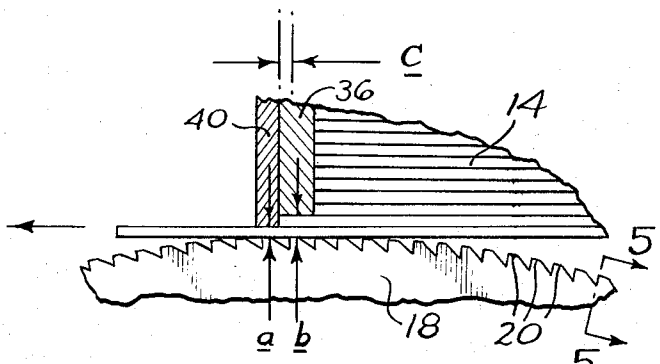


Fig. 4.

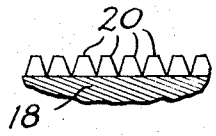


Fig. 5.

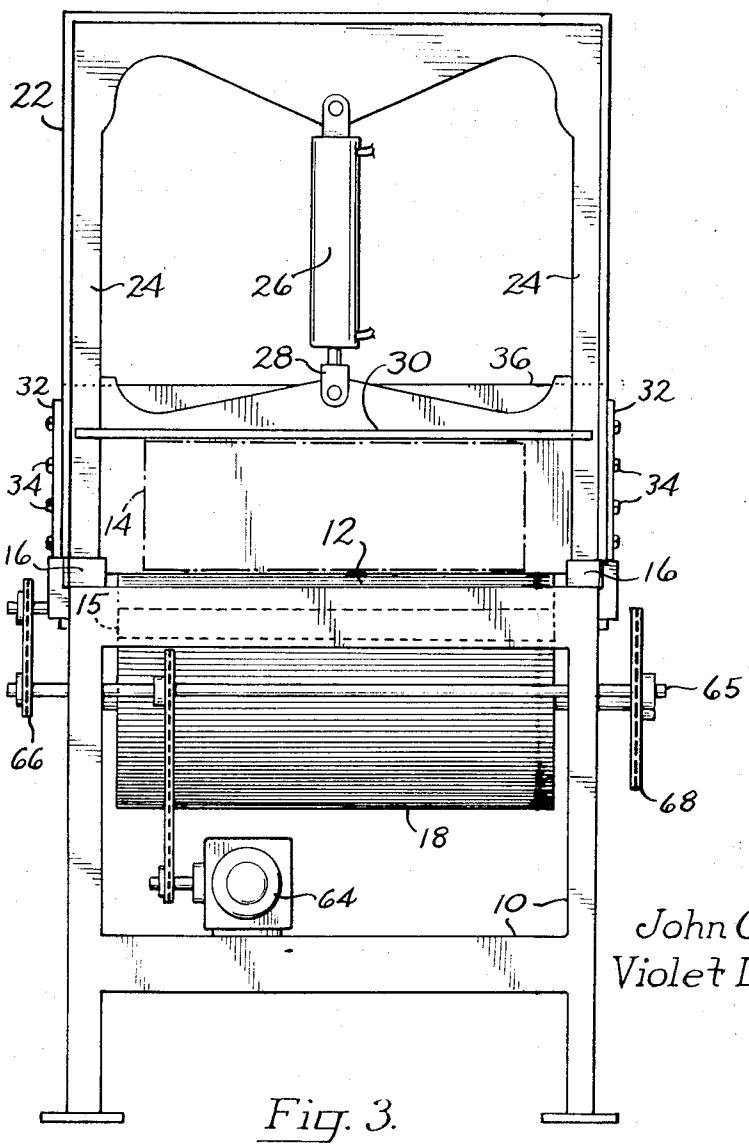


Fig. 3.

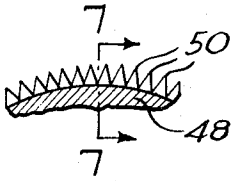


Fig. 6.

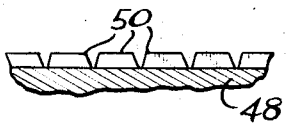


Fig. 7.

John C. O'Brien Deceased
Violet D. O'Brien, Executrix
INVENTOR

BY Eugene D. Farley
Atty.

VENEER TENDERIZING APPARATUS

This invention relates to wood veneer tenderizing apparatus. It pertains particularly to apparatus for incising wood veneers with a pattern of cross-grain incisions designed to render the veneer limp so that it will lie flat during subsequent processing operations.

In the manufacture of plywood it is usual practice to pass a core veneer between glue applicator rolls which coat both surfaces of the veneer with glue. The glue-coated veneer is placed in cross band relation with underlying and overlying veneers. The resulting assembly then is pressed to adherently unite the cross-banded veneers into the finished plywood sheet.

In the foregoing sequence, a difficulty is presented by reason of the fact that internal stresses are present in the core veneer. These warp the veneer so that it will not lie flat. This causes difficulty in feeding and assembling the veneers. It also results in the formation of blow holes in the final plywood product, caused by imperfect bonding of the surface veneers to the core veneer. In many mills, as much as 10% of the product is downgraded because of the presence of such blow holes.

It is the general purpose of the invention to provide apparatus for incising the veneers, i.e., for "tenderizing" them, so that the internal stresses are relieved. As a result, the veneers lie flat when assembled withother veneers in the manufacture of plywood, eliminating problems of assembly, glue coating, and blow hole formation.

It is a further purpose of the invention to provide wood veneer tenderizing apparatus which may be fed from a bulk stack of wood veneers from which veneers are selected one at a time, making possible lift truck handling of the veneers at both the infeed and outfeed stations.

Still a further object of the invention is the provision of wood veneer tenderizing apparatus which is simple in construction, which may be included without difficulty in conventional plywood production lines, and which is capable of operation at a very high rate of speed.

The manner in which the foregoing and other objects of this invention are accomplished will be apparent from the accompanying specification and claims considered together with the drawings, wherein:

FIG. 1 is a view in side elevation of the herein described wood veneer tenderizing apparatus;

FIG. 2 is a plan view thereof;

FIG. 3 is an end elevation thereof, viewed from the infeed end;

FIG. 4 is an enlarged fragmentary detail view illustrating the manner of metering wood veneers through the apparatus;

FIG. 5 is a detail transverse sectional view taken along line 5—5 of FIG. 4; and

FIGS. 6 and 7 are fragmentary, detail, sectional views taken along lines 6—6 of FIG. 2 and 7—7 of FIG. 6, respectively.

Broadly considered, the herein described wood veneer tenderizing apparatus comprises an incising assembly including an incising roll and a drive roll rotatably mounted in axially aligned cooperating relation. The incising roll has a peripheral surface studded with a predetermined pattern of incising teeth arranged crosswise of the grain of the wood veneers to be tenderized. Drive means is connected to the drive roll for rotating it in the feed direction and accordingly for passing veneers through the assembly. Metering feed means are arranged for feeding wood veneers to the incising assembly, one at a time, from the bottom of a stack of wood veneers supported at the infeed station. As the veneers pass through the apparatus, their surfaces are incised with a pattern of incisions which interrupts the grain and renders the veneers limp so that they will lie flat and readily adaptable for further subsequent processing.

Considering the foregoing in greater detail and with particular reference to the drawings:

The herein described wood veneer tenderizing apparatus is mounted on a frame indicated at 10. A horizontal stretch of the frame at the infeed end of the apparatus mounts a plurality of idler rolls 12. These provide a bed which supports a stack

14 of plywood veneers, e.g., plywood core veneers. The stack conveniently may be deposited on the roll bed by lift truck operation.

The leading end of the stack rests on a feed roll 15 journaled in bearings supported on frame members immediately downstream from rollers 12. The feed roll drives the stack forwardly and centers it through the action of side guide plates 16.

Means are provided for feeding the veneers one at a time from the bottom of the stack to the downstream elements which effectuate the incising operation.

The metering feed means employed for this purpose comprise a second drive roll 18. This roll is of substantial diameter. Its peripheral surface is studded with a plurality of teeth 20 inclined in the feed direction, as illustrated in FIGS. 4 and 5, and adapted to advance the work through the apparatus.

As noted, the wood veneers comprising stack 14 tend to warp and wind, making difficult their extraction from the bottom of the stack one at a time. Accordingly, hold-down means are provided for holding them down firmly against the upper peripheral surface of feed roll 18.

The hold-down means comprises a yoke-shaped standard 22, FIGS. 1 and 3. The side members of the standard have vertical guides 24. The central member of the standard mounts the case of a pneumatic cylinder 26. The piston rod of the cylinder is connected by means of a pin and clevis 28 to a ram 30. The ends of the ram are recessed to provide slides which receive guides 24, FIG. 2. The veneer stack accordingly is held snugly against feed roll 18 by pressure determined by the force exerted by cylinder 26. This pressure is exerted uniformly on the stack across its width and is substantially undiminished as the stack is depleted, due to the following action of ram 30.

Wood veneers are metered one at a time from the underside of stack 14 by gate means, the construction of which is shown particularly in FIGS. 3 and 4.

Angle irons 32 are mounted slidably on the side pieces of standard 22 by means of adjustment bolts 34. A first plate 36 is secured in a vertical plane to angle irons 32 by means of bolts 38. The lower edge of this plate is spaced vertically from the peripheral surface defined by the outer edges of teeth 20 by the spacing *b* of FIG. 4.

A second vertical plate 40 is mounted across plate 36 face to face therewith by means of mounting bolts 42. Its lower edge is spaced from the peripheral surface of drive roll 18 by the spacing *a* of FIG. 4.

The central plane of plate 36 is substantially aligned with the axis of roll 18. The central plane of plate 40 is offset therefrom in the downstream direction by a distance *c* which is substantially equal to the thickness of the veneers to be processed.

Spacing *a* between the lower edge of plate 40 and the periphery of roll 18 also is substantially equal to the thickness of one of the veneers. Spacing *b*, however, is substantially equal to twice the thickness of the veneers. Spacing *a*, which defines the gate, is adjustable by operation of adjustment bolts 34.

Accordingly when the stack of veneers 14 is placed on rolls 12, with roll 18 in its running, driving position, the entire stack is urged forwardly until its leading end abuts plate 36. Continued operation of the roll drives the bottom veneer through the gate provided by spacing *a* while contemporaneously moving the next to the bottom veneer into abutment with the rearward margin of plate 40. After the lowermost veneer has passed completely through the gate, the weight of the stack, combined with the pressure applied by cylinder 26, moves the next above veneer into operative position so that it passes through the gate. In this manner all of the veneers are metered in sequence, one at a time, from the underside of the stack.

As each veneer passes through the gate it traverses a support plate 44 and then enters the incising assembly. This comprises a lower drive roll 46 and an upper incising roll 48.

Drive roll 46 is analogous to feed roll 15 in its construction. Like the latter roll, it has a rough friction surface. Both rolls

may have a studded surface similar to that illustrated in FIGS. 4 and 5.

Incising roll 48 has a peripheral surface studded with a plurality of sharp teeth 50. These in general are of substantial width, and are arranged along the roll as required to sever the wood fibers as they incise the upper surface of the wood veneer. They normally are spaced somewhat laterally from each other, and arranged in rows, the successive ones being offset slightly from each other so that the entire width of the veneer is incised at repeated intervals.

In addition, the peripheral surface of incising roll 48 is spirally grooved in the manner particularly apparent in FIG. 2. The groovings 52 are arranged in two series and spiral toward the center of the roll. This has the effect of centering the veneers. As it does so, it moves the veneers slightly laterally with respect to teeth 50 of roll 48 so that a slight tearing effect is exerted on the fibers of the wood, thereby increasing the efficiency of the incising operation.

Roll 48 is mounted in a resilient pressure mounting which includes a pair of brackets 54, FIG. 1. These in turn mount guides 56 which are received in slides 58 mounting the roll.

An adjustment screw 60 is threaded through the central portion of each bracket 54. A compression spring 62 is interposed between the screw and slide 58. In this manner the pressure exerted by roll 54 may be adjusted as desired.

Suitable drive means are provided for driving the various driven members of the assembly.

A motor 64 is mounted on frame 10. It drives a power transmission shaft 65. One end of the latter drives drive chain 66 which in turn drives drive rolls 15 and 46 in the same direction and at the same speed.

The other end of shaft 65 drives a drive chain 68 which in turn drives feed roll 18.

OPERATION

The manner of operation of the herein described wood veneer tenderizing apparatus is as follows:

A stack 14 of wood veneers is lift-truck-placed on roll bed 12 with its leading end engaging feed roll 15. This drives the stack into abutment with plate 36 which forms part of a metering gate assembly.

Cylinder 26 is extended to exert a continuing resilient pressure on the upper surface of the stack. This presses the stack downwardly against major drive roll 18.

The rough friction surface of drive roll 18 drives the lower veneer of stack 14 through a gate defined by spacing *a* of FIG. 4. The next to the bottom veneer is progressed into abutment against plate 40 of the gate, entering the aperture created by spacing *b* of FIG. 4.

The lowermost veneer then passes through the incising assembly comprising drive roll 46 and incising roll 48. The latter incises the upper surface of the veneer in a pattern corresponding to the pattern of the incising teeth which it bears. Spiral grooving 52 centers the veneer and contemporaneously tears the wood fibers laterally. The combined effect of these various operations tenderizes the veneer so that there results a limp product which is readily amenable to handling in the various plywood manufacturing operations.

Having thus described my invention, I claim:

1. Wood veneer tenderizing apparatus comprising
   a. an incising roll assembly including an incising roll and a drive roll rotatably mounted in axially aligned, cooperating relation,
   b. the incising roll having a peripheral surface studded with a predetermined pattern of laterally elongated incising teeth arranged crosswise of the grain of wood veneers to be tenderized,
   c. drive means connected to the drive roll for rotating it in the feed direction, and
   d. metering feed means arranged for feeding wood veneers to the incising assembly, one at a time, from the bottom of a stack of wood veneers supported at the infeed side of the assembly.

2. The wood veneer tenderizing apparatus of claim 1 wherein the peripheral surface of the incising roll is scribed with two series of spirally arranged peripheral grooves directed centrally of the roll for engaging and centering the veneers and imparting lateral thrust to the veneer against the incising teeth with the centering motion of the veneers.

3. The wood veneer tenderizing apparatus of claim 1 wherein the metering feed means includes a bottom drive roll having a studded peripheral surface and a cooperating superimposed hold-down ram positioned for pressing the veneers against the roll.

4. The wood veneer tenderizing apparatus of claim 3 wherein the ram comprises a vertically arranged fluid-operated cylinder, a flat plate arranged as a cross head for the cylinder, and slide and guide means guiding the movement of the plate toward and away from the veneer stack.

5. The wood veneer tenderizing apparatus of claim 1 wherein the metering feed means includes a transverse drive roll and a gate comprising a first vertical plate aligned with the drive roll axis and a second vertical plate mounted on the first plate in a plane parallel thereto, with the lower edge of the second plate being offset in a downstream direction from the first plate by a distance substantially equal to the thickness of one veneer, and the bottom edge of the second plate being spaced from the upper peripheral surface of the drive roll also substantially by the thickness of one veneer.

6. The wood veneer tenderizing apparatus of claim 5 wherein the lower edge of the first vertical plate is spaced from the upper peripheral surface of the drive roll substantially by twice the thickness of one veneer.

7. The wood veneer tenderizing apparatus of claim 1 wherein the metering feed means includes a gate arranged across the travel path of the veneers and including a transverse abutment plate positioned for abutment by the veneer stack, and arranged to define a gate opening dimensioned to pass a single veneer only, and wherein the apparatus includes guide means positioned for engaging the sides of the stack and shifting it with its forward progression into proper registration with the gate.

8. Wood veneer tenderizing apparatus comprising
   a. an incising roll assembly including an incising roll and a drive roll rotatably mounted in axial aligned, cooperating relation,
   b. the incising roll having a peripheral surface studded with a predetermined pattern of incising teeth arranged crosswise of the grain of wood veneers to be tenderized, the peripheral surface of the incising roll also being scribed with two series of spirally arranged peripheral grooves directed centrally of the roll for engaging and centering the veneers and imparting lateral thrust to the veneer against the incising teeth with the centering motion of the veneers,
   c. drive means connected to the drive roll for rotating it in the feed direction,
   d. metering feed means arranged for feeding wood veneers to the incising assembly, one at a time, from the bottom of a stack of wood veneers supported at the infeed side of the assembly, and
   e. the incising teeth being elongated and arranged parallel to the incising roll axis.

9. The wood veneer tenderizing apparatus comprising
   a. an incising roll assembly including an incising roll and a drive roll rotatably mounted in axially aligned, cooperating relation,
   b. the incising roll having a peripheral surface studded with a predetermined pattern of incising teeth arranged crosswise of the grain of wood veneers to be tenderized,
   c. drive means connected to the drive roll for rotating it in the feed direction, and
   d. metering feed means arranged for feeding wood veneers to the incising assembly, one at a time, from the bottom of a stack of wood veneers supported at the infeed side of the assembly, the metering feed means including a bottom drive roll having a studded peripheral surface and a

cooperating superimposed hold down ram positioned for pressing the veneers against the roll.

10. The wood veneer tenderizing apparatus of claim 9 wherein the ram comprises a vertically arranged fluid-operated cylinder, a flat plate arranged as a cross head for the cylinder, and slide and guide means guiding the movement of the plate toward and away from the veneer stack.

* * * * *