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L. L. HAYES

3,381,727

OSCILLATING PLYWOOD LATHE KNIFE

Filed March 10, 1966

4 Sheets-Sheet 1

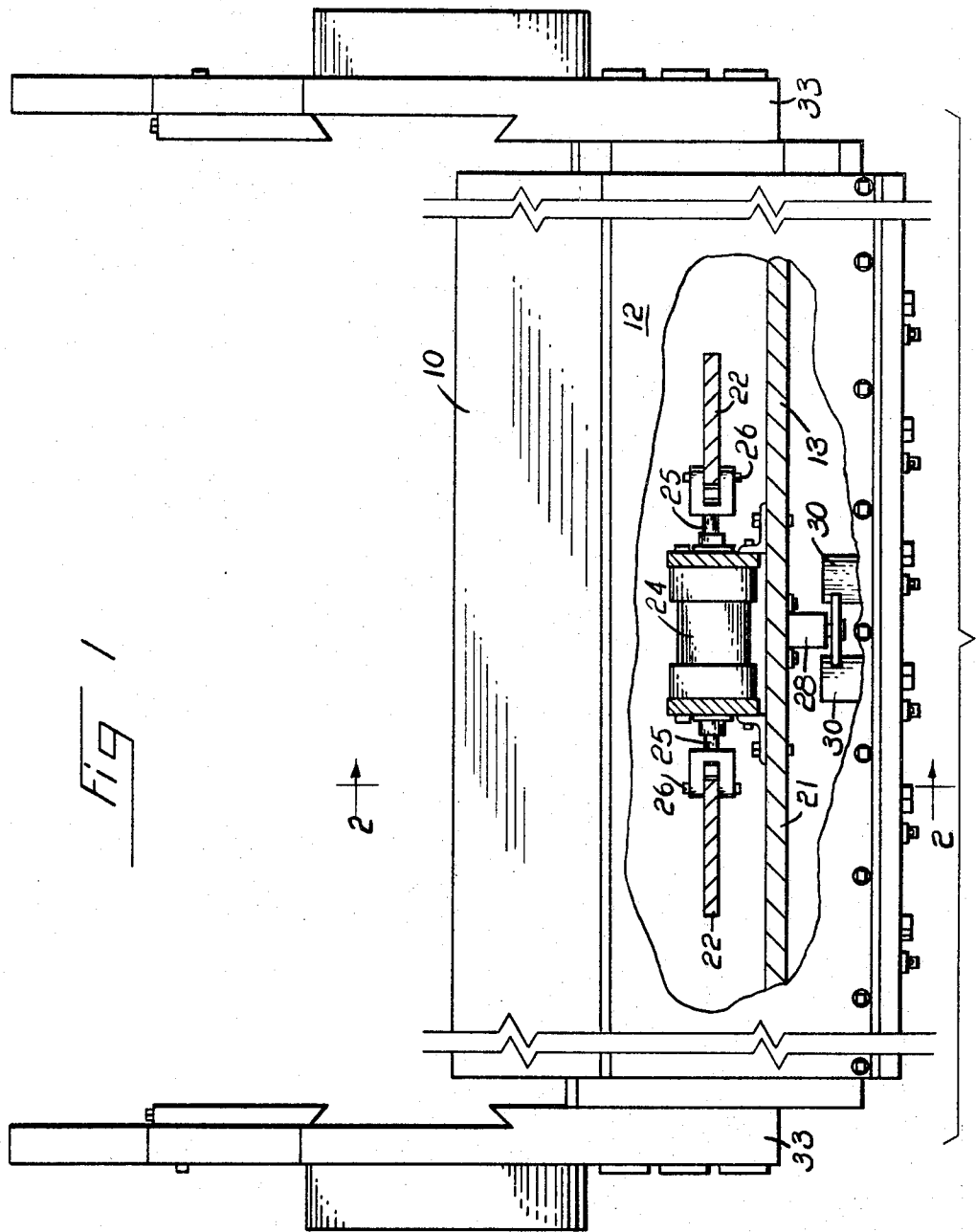


Fig. 1

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Fig 2

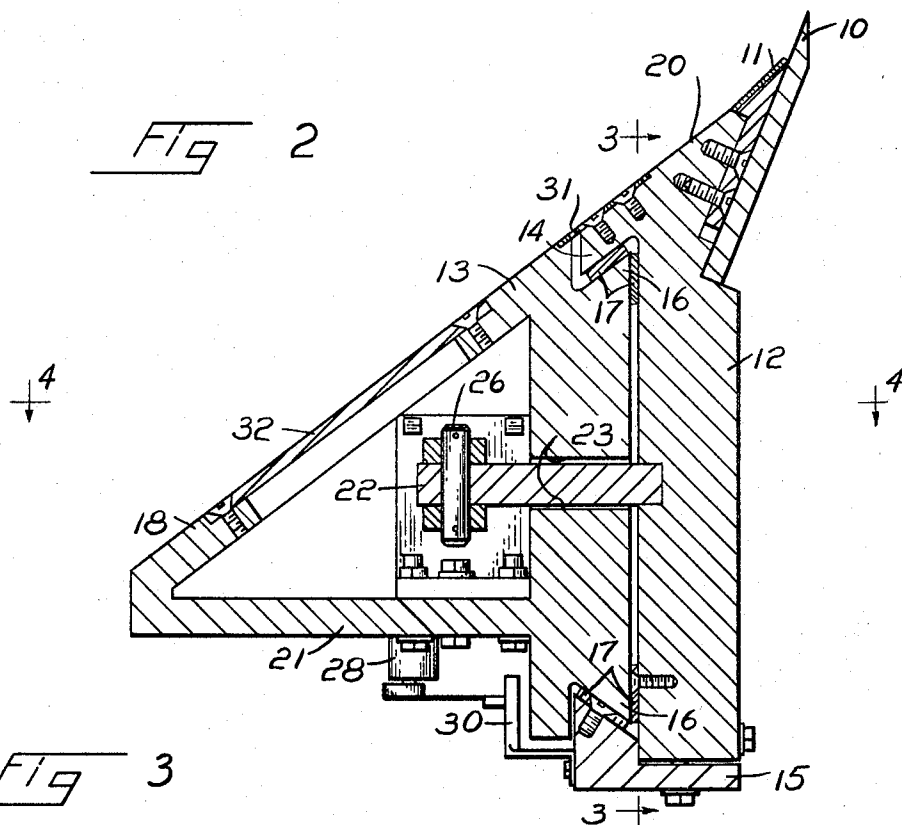
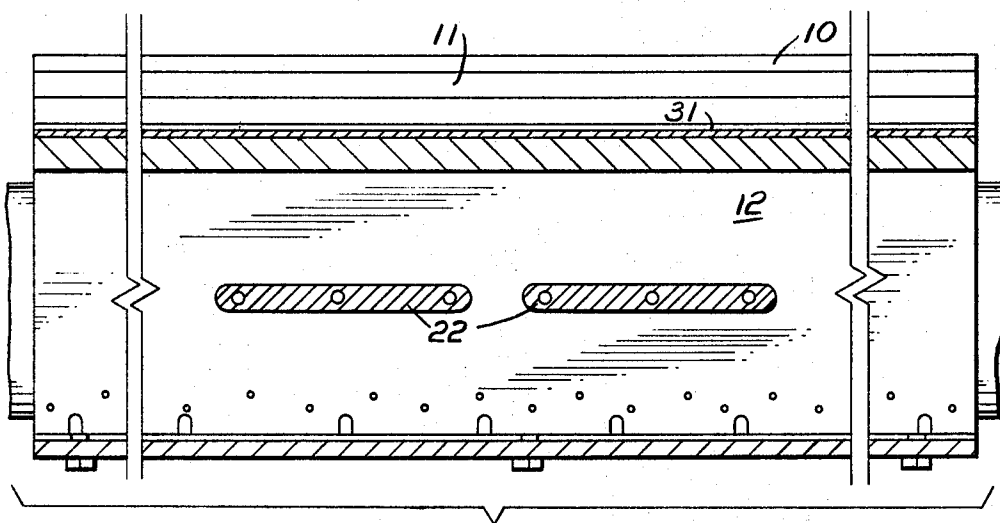


Fig 3



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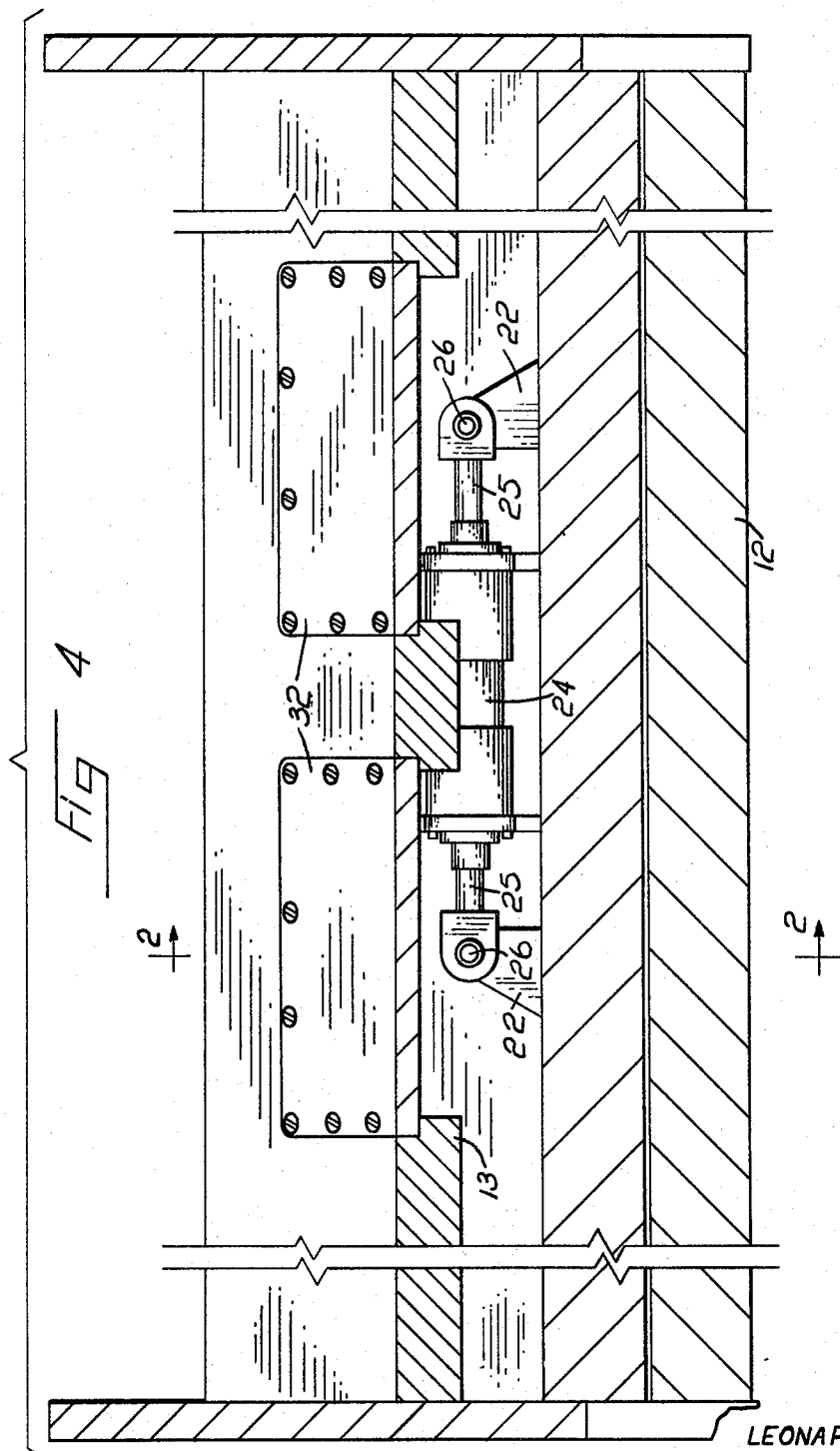
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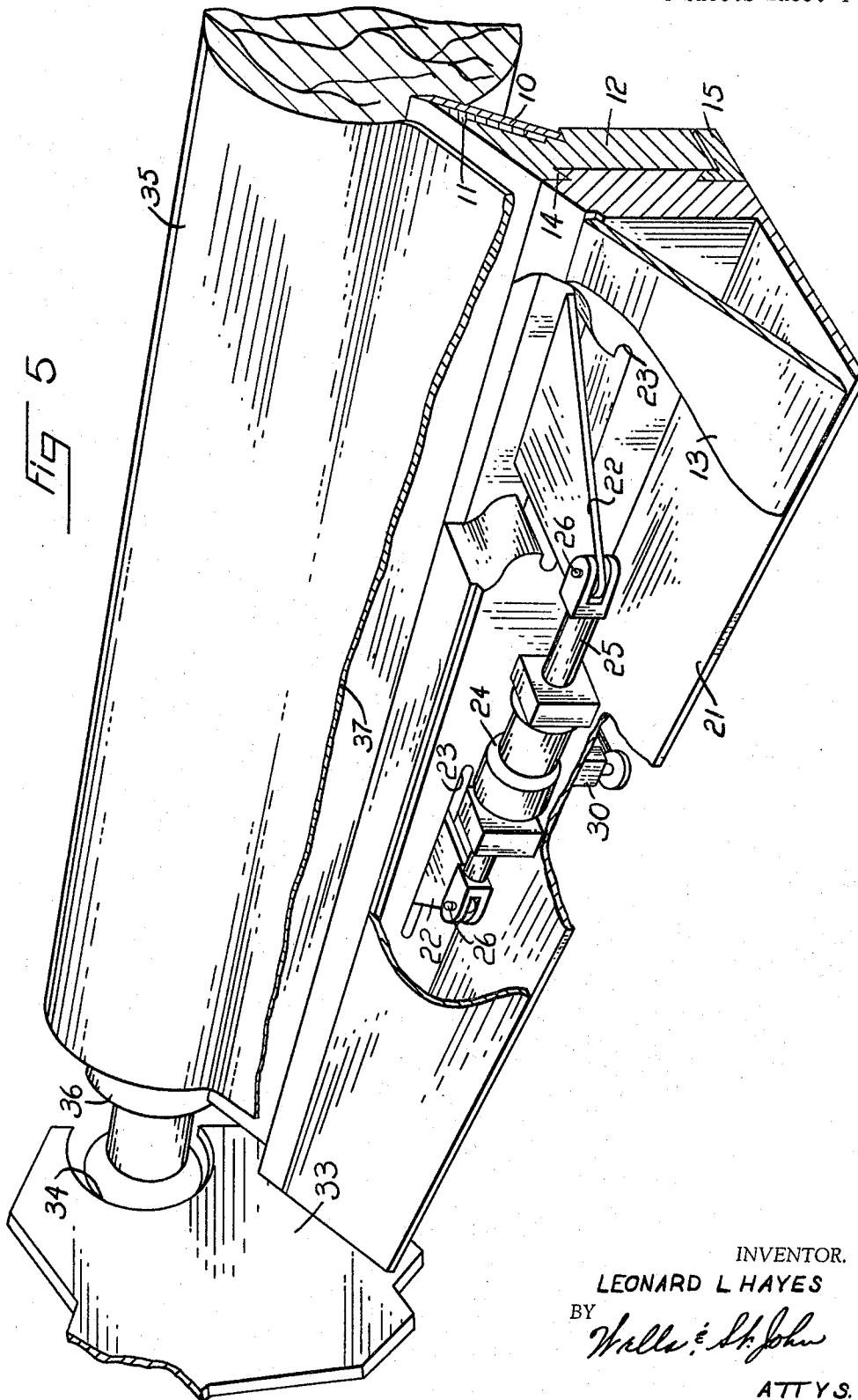
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OSCILLATING PLYWOOD LATHE KNIFE

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3 Claims. (Cl. 144-212)

This invention relates to an oscillating plywood lathe knife adapted for mounting on a conventional knife carriage to facilitate the peeling of logs in a plywood operation.

Conventional lathe knives used in the preparation of plywood veneers are transversely stationary relative to the log being peeled. Such knives are subjected to damage and wear, and the knife surface can score or otherwise mar the veneer surface as it is being cut. In addition, the stationary knife produces high frictional forces between the knife and log, requiring greater power to turn the log and limiting the speed of the cutting operation.

The device disclosed herein provides an oscillating knife assembly whereby the cutting knife is reciprocated transversely relative to the log parallel in direction to the longitudinal log axis. The slight transverse movement of the knife minimizes the frictional resistance of the log to the cutting action in much the same manner as a moving knife used in the cutting of other objects. In addition, the movement of the knife minimizes damage to the wood surfaces due to imperfections in the knife edge. A hard fiber or knot met by the knife will not be forced into softer parts of the wood before being severed, since the moving knife is capable of slicing through fibers and knots. Fibers cannot sit astride the moving knife in the manner that occurs with relation to a fixed knife edge. The moving knife is self-cleaning.

It is a first object of this invention to provide an oscillating knife assembly which is readily adaptable to conventional plywood machinery, requiring a minimum of special tooling or modification of conventional equipment.

Another object of this invention is to provide an apparatus for reciprocating a plywood knife in reversible directions, the type of action imparted to the knife being such that the period of reversal is extremely small compared to the time the knife is moving and the velocity of the knife during movement being substantially constant.

Another object of this invention is to provide a simple knife assembly wherein the moving parts are shielded from dust and dirt in the vicinity of the knife so as to insure a long wearing and accurate mounting for the moving knife.

These and further objects will be evident from the following disclosure, taken together with the accompanying drawings which illustrate a preferred form of the invention.

In the drawings:

FIGURE 1 is a rear view of a typical knife carriage assembly provided with the instant equipment, portions of the knife carriage being broken away to minimize the length of the carriage illustrated and a portion of the protective cover being broken away to show the cylinder and attached mechanisms;

FIGURE 2 is an enlarged sectional view taken along line 2-2 in FIGURE 1;

FIGURE 3 is a sectional view of the knife carriage taken along line 3-3 in FIGURE 2;

FIGURE 4 is a view through the knife carriage taken along line 4-4 in FIGURE 2; and

FIGURE 5 is a perspective sectional view taken through the knife carriage and a log during a peeling operation

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with portions of the carriage being broken away to show the operating mechanisms.

The present invention provides an oscillating or transversely reciprocable knife assembly for a conventional knife carriage on a plywood lathe. In a typical plywood operation, the log being turned is held at its longitudinal ends on spindles for rotation about the longitudinal center line of the log coaxially with the rotational axis of the spindles. The cutting knife is positioned on a movable knife carriage for motion toward the log axis as the cutting operation progresses. The rotation of the log and the inward movement of the knife carriage result in the cutting of a wood sheet of constant thickness having a width equal to the log length.

As seen in the drawings, the knife 10 is fixed against a knife backing plate 11 on an upright knife carrier 12. Knife 10 can be any desired length, conventionally up to 135 inches. The remaining apparatus will obviously be of the same length as knife 10, the particular length of the knife and carriage apparatus being of no consequence with relation to the mechanism described herein. For this reason, the excess length of the apparatus is broken away in the longitudinal drawings so as to aid in the illustration of the operating mechanism, which would typically be mounted at the center of the knife carrier 12.

The knife carrier 12 is slidably supported on a knife carriage 13. Carrier 12 is provided with a downwardly and inwardly directed upper shoulder 14 and a complementary carrier gib 15 bolted along its lower surface. The shoulder 14 and gib 15 provide surfaces complementary to dovetail ways 16 formed along the front surface of knife carrier 13. Suitable bushings or bearing plates 17 are provided between respective adjacent parallel surfaces of the knife carrier 12, its upper shoulder 14, gib 15 and the dovetail ways 16 of the knife carriage 13. Thus, the knife carrier 12 and the knife 10 fixed thereto are slidably guided for reciprocating movement in a straight line direction relative to the supporting knife carriage 13. The use of a detachable gib 15 facilitates removal of carrier 12 for repair or replacement purposes.

The knife carriage 13 has an upper surface 18 which extends forwardly and downwardly in a straight line relative to the upper surface 20 of the knife carrier 12. These upper surfaces provide a smooth transverse surface across which the peeled veneer can slide without damage. The interior of the carriage 13 is hollow (FIGURE 2) having a triangular cross sectional configuration. This hollow chamber is bounded along the bottom by a horizontal plate 21.

Only a small amount of reciprocating movement is necessary to provide the desired oscillation of knife 10. An inch or less movement is sufficient for this purpose. This movement is provided by way of rearwardly protruding lugs 22 fixed to the knife carrier 12 and freely received through horizontal slots 23 that are formed through the front section of the knife carriage 13. The lugs 22 protrude into the triangular recess formed within the carriage 13. A suitable double acting hydraulic cylinder 24 is located in a horizontal position within carriage 13 and has a piston rod 25 extending beyond each end thereof, the respective ends of rod 25 being connected by pins 26 to the lugs 22. The movement of rod 25 will therefore be imparted through lugs 22 to the knife carrier 12 and to the knife 10.

Cylinder 24 is controlled by a conventional solenoid operated valve (not shown). The valve may be mounted at any convenient location and is controlled by a reversible switch 28 selectively actuated by alternate switch activators 30 fixed to the gib 15 (FIGURES 1 and 2). The switch 28 is alternately operated by the activators 30 at the respective limits of reciprocating movement im-

parted to the carrier 12 by cylinder 24. When switch 28 is actuated, it reverses the position of the valve, causing cylinder 24 to impart a reverse direction of movement to the piston rod 25.

A flush protective plate 31 of thin metal or other suitable material is anchored along the lower portion of the surface 20 on carrier 12, overlapping the upper surface 18 of carrier 13 and preventing dust and other particles from entering the area between the movable carriage 12 and the relatively stationary carrier 13. In addition, removable cover plates 32 are provided along the surface 18 adjacent the cylinder 24 and lugs 22 to facilitate entry into the carriage 13 for repair and maintenance purposes.

The knife carriage 13 is mounted on conventional mounting plates 33 guided by ways 34 for movement toward or away from the center of a log being peeled. As illustrated in FIGURE 5, the carriage is shown in use to peel a log 35 held for rotational movement about the log longitudinal axis by a spindle or lathe chuck 36. It is to be understood that a second mounting end plate and chuck are provided to complete the assembly, which is shown in section in FIGURE 5.

Log 35 rotates about a fixed axis on a framework of the supporting machinery during the peeling operation. The knife carriage 13 is moved in a definite relationship to the turning of log 35 so as to provide a veneer layer 37 of constant thickness. During such movement, the cylinder 24 imparts a reciprocating movement to the knife 10 to facilitate the slicing action imparted to the knife 10. The movement imparted to knife 10 by the hydraulic cylinder 24 is substantially constant over any given period of time. The nature of the hydraulic cylinder and valve 27 must be such as to minimize the time of reversal, the movement of the piston rod 25 being substantially constant along its full length of travel. The resistance to the motion of log 35 is therefore substantially constant, reducing the power needed to turn log 34 and increasing the speed at which the logs 35 can be successfully peeled.

The oscillating speed of the knife 10 can be effectually controlled to suit a particular application or wood being cut by use of a flow control valve (not shown) in the hydraulic circuit connected to cylinder 24 through the controlling valve. Other conventional hydraulic control equipment could obviously be used to achieve the desired result of constant piston rod speed and relatively quick reversal of movement thereof.

The movement of knife 10 imparted by the above described mechanism has the advantage of cutting veneer more smoothly than is possible in the case of a relatively stationary knife. The moving knife is capable of slicing through fibers and knots, where the stationary knife might force a hard fiber or knot into softer parts of wood before severing it. In addition, a fiber often will sit astride a fixed knife edge without being cut, marking the veneer until the knife is cleansed.

The oscillating movement of the knife 10 described herein makes the knife edge substantially self-cleaning. The decreased resistance to cutting provided by the reciprocating movement of knife 10 appreciably decreases the force exerted by the knife on the log 35 which consequently decreases the deflection along the elongated knife and carriage, particularly when the log 35 is at a small diameter. Such deflections must be minimized if veneer thickness is to be maintained constant. The lowered knife forces permit controlled peeling at higher speeds than have been achieved previously.

The lowered cutting forces exerted by the moving knife 10 minimizes the possibility of log 35 "spinning

out" or taking on a cigar profile at small diameters due to deflection of the knife and carriage along the central portions thereof. Obviously this results in greater peeling efficiency and greater production of usable veneer.

The positions of the limit switch and activators shown in the drawings are obviously not the only ones possible. The controlling switch or switches could be operated directly from the knife or its supporting carriage 12 and could also be protectively mounted within knife carrier 13. Other modifications will be obvious.

Having thus described my invention, I claim:

1. An oscillating knife apparatus mounted on a plywood veneer lathe for peeling a rotating log mounted longitudinally between opposing lathe spindles, said apparatus comprising:

(a) an elongated horizontal knife carriage mounted on the lathe for transverse movement to and from the rotating log, said carriage having a right triangular-shaped vertical cross section that is hollow in which an inclined upper surface defines the hypotenuse of the triangle, a horizontal plate defines one leg of the triangle, and a vertical front section defines the other leg of the triangle, said vertical front section of the carriage having vertically spaced longitudinal dovetail slide ways formed thereon and two horizontal slots that are formed therethrough between the slide ways;

(b) a vertical knife carrier movably mounted on said slide ways for movement parallel to the log, said knife carrier having an inclined top surface that forms a flat surface coplanar with the upper surface of the carriage to facilitate the discharge of veneer, and a front surface directed toward the log, and lugs that extend rearwardly from the carrier through the slots of the carriage;

(c) a longitudinal knife fixed to the knife carrier for peeling the log, said knife having a cutting edge projecting tangentially relative to the log surface engaged thereby; and

(d) hydraulic drive means mounted within the hollow of said carriage and operatively connected to the carrier lugs for reciprocating the knife carrier and knife relative to said knife carriage to facilitate the peeling operation.

2. The oscillating knife apparatus as defined in claim 1 wherein the hydraulic drive means includes:

(a) a double-acting hydraulic cylinder aligned parallel with the log with piston rods extending from both ends thereof that are connected to respective carrier lugs; and

(b) control means on said carriage and operatively cooperative with the knife carrier for controlling the stroke of the knife carrier relative to the said knife carriage.

3. The oscillating knife apparatus as defined in claim 2 wherein a gib is mounted to the bottom of the carrier for guiding the carrier on the carriage slide ways and wherein further the control means includes a switch mounted on the carriage and two spaced switch actuators mounted on the gib and projecting into the path of the switch for alternatively actuating the switch to reverse the movement of the carrier and knife relative to the carriage.

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