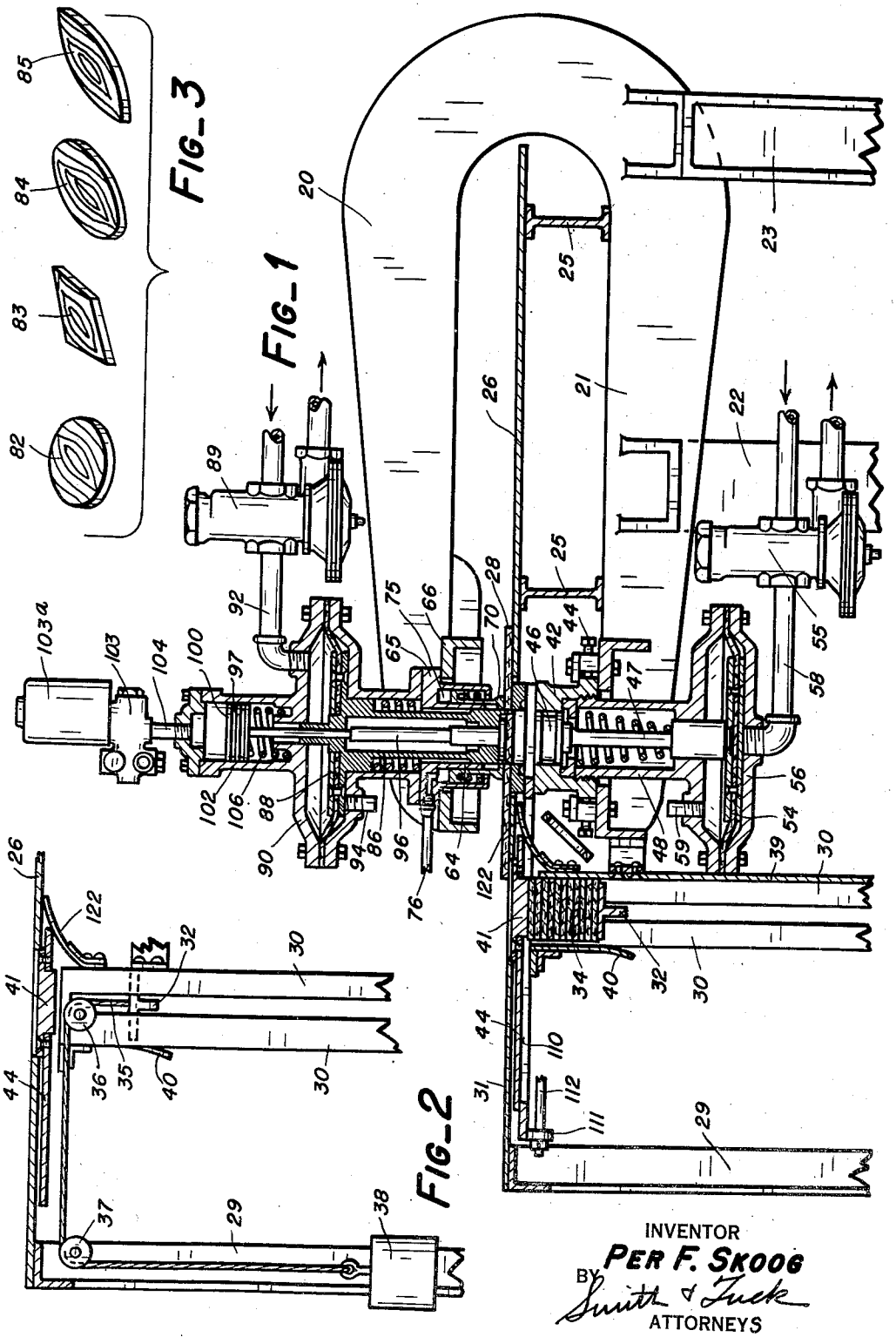
Dec. 14, 1943. P. F. SKOOG 2,336,704

MEANS FOR PATCHING VENEER SHEETS

Filed April 21, 1941 3 Sheets-Sheet 1



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MEANS FOR PATCHING VENEER SHEETS

Filed April 21, 1941 3 Sheets-Sheet 2

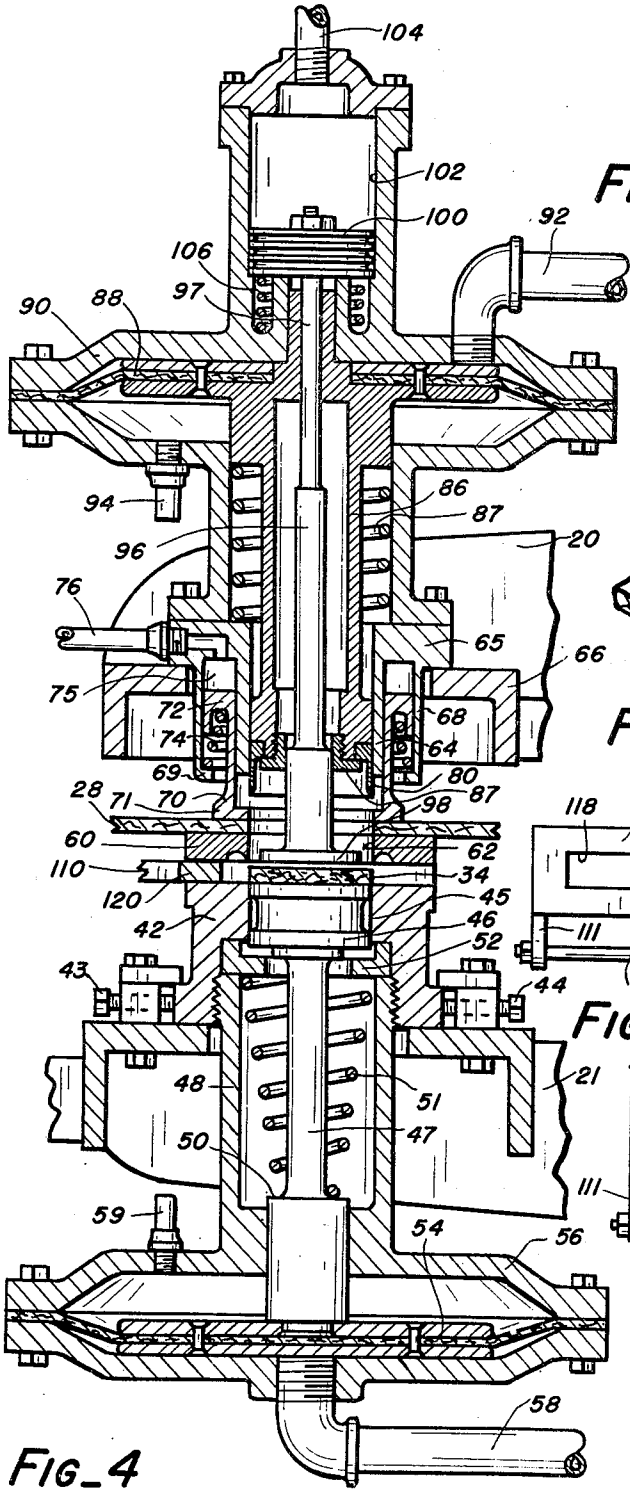


FIG_4

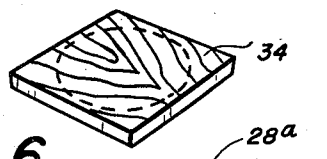


FIG_6

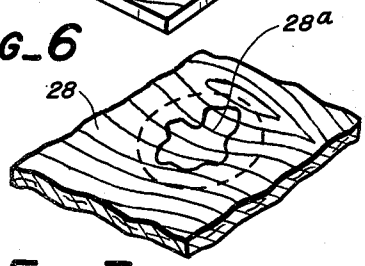


FIG_7

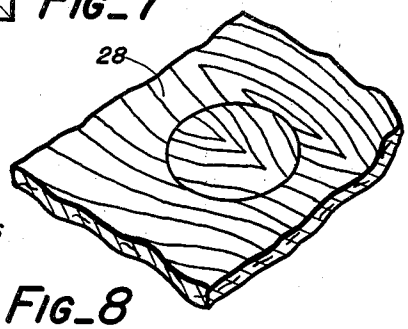


FIG_8

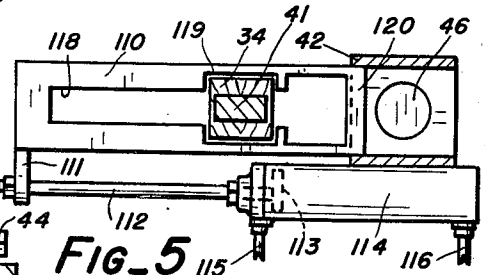


FIG_5

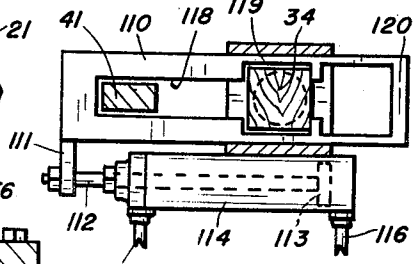


FIG_5a

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MEANS FOR PATCHING VENEER SHEETS

Filed April 21, 1941 3 Sheets-Sheet 3

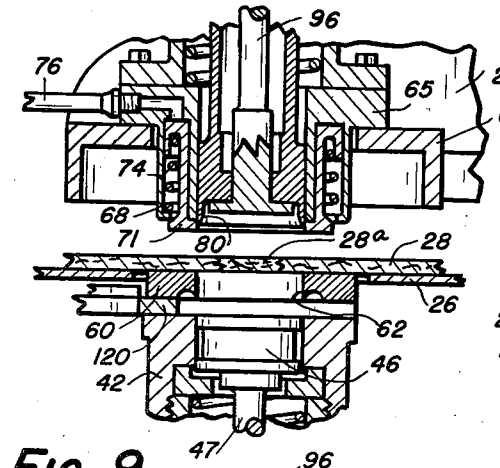


FIG_9

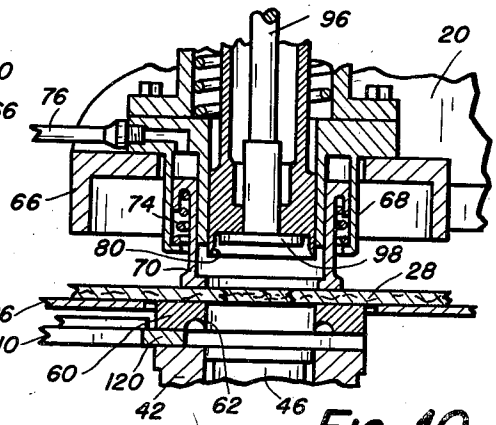


FIG_10

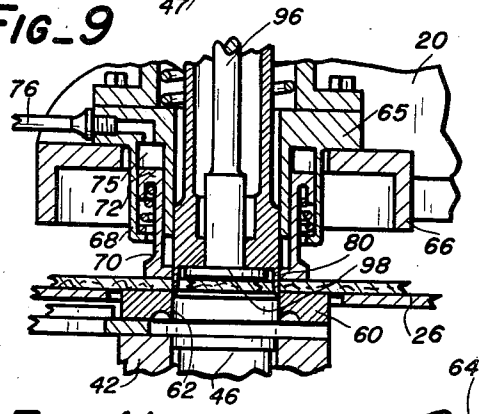


FIG_11

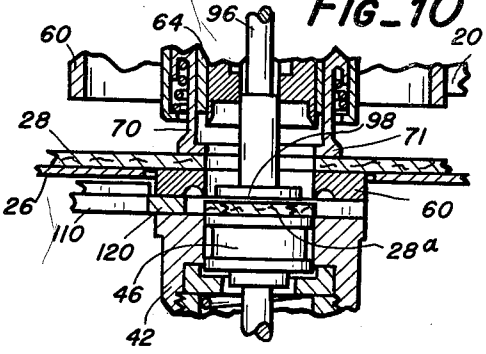


FIG_12

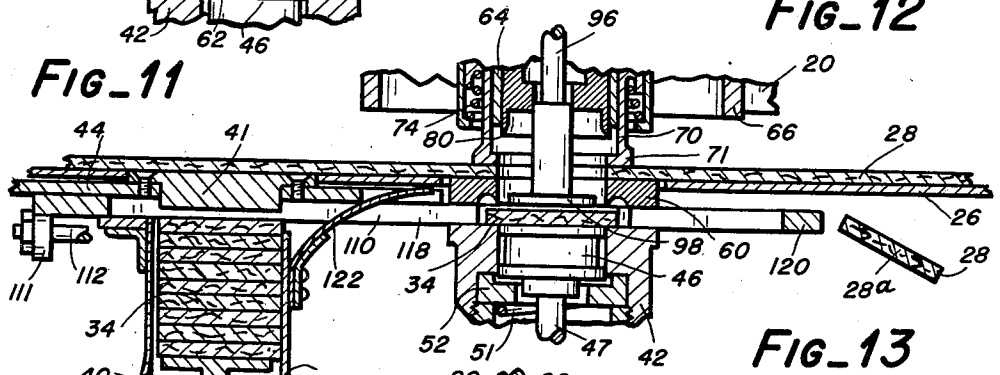


FIG_13

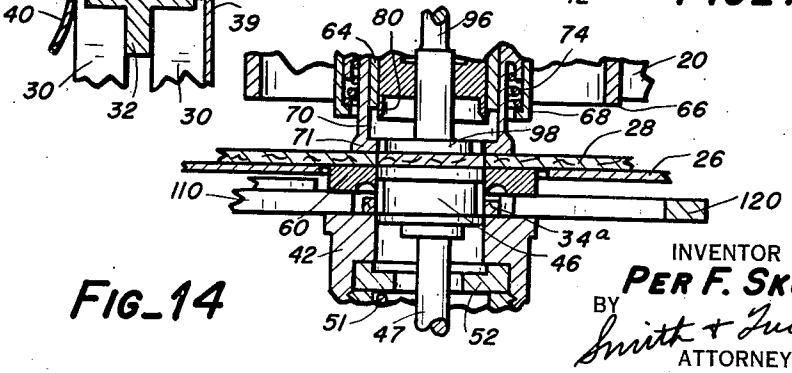


FIG_14

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Patented Dec. 14, 1943

2,336,704

UNITED STATES PATENT OFFICE

2,336,704

MEANS FOR PATCHING VENEER SHEETS

Per F. Skoog, Bellingham, Wash., assignor to Olympia Plywood Machinery Corporation, Olympia, Wash.

Application April 21, 1941, Serial No. 389,533

8 Claims. (Cl. 144—2)

This invention relates to an improved method and means for patching veneer sheets and is particularly adapted for use in the patching of thin wood veneer such as is produced in the lumber industry. In the practice of peeling logs, as compared to the older method of slicing the wood, to form veneer sheets it is common to have certain pieces that are defective by reason of the fact that they have disfiguring knots or other marred areas.

Ordinarily the patching and salvaging of such stock is a manual operation that requires a great amount of labor and is never satisfactorily done by hand. A suitable mechanically operable salvage means and method to effect such patching is desirable as such stock is usually of such low grade that it is unuseful in the manufacture of plywood of the standard or better grades. In manually patching veneer stock it is customary for a workman to cut by hand with a sharp knife, a boatshaped patch, or to cut a round patch by the use of a rotary saw. Subsequently, usually at another location a patch is cut from a piece of similar patching stock. This patch is placed in position where it is glued in the cutout area from which the marred veneer has been removed. This forming of patching is usually a three-step operation, the first being the cutting operation, the second being the formation of a patch suitable to fit in the cut-out portion, and the third the placement of the patch and its gluing into the stock being patched.

Ordinarily such patching operations are formed in a series of steps along a table set aside for that purpose. A considerable amount of time is consumed in effecting such patching. Patching is not, therefore, very satisfactory by this method because ordinarily it does not raise the grade sufficiently to extend any material advantage to the industry to offset the cost. As a result much good material can only command a relatively low sale price.

An important object of my invention is the provision of method and means for patching veneer sheets wherein the operation may be carried on at a single position and with great rapidity and efficiency.

Another object of my invention has been the provision of means for making a patch in veneer stock wherein the preparation of the material to be patched, the cutting of the patch, and the placement of the patch, is performed in a series of sequential steps all encompassed within a brief moment required for the operation.

A further object of my invention comprises the provision of a method of cutting a patching plug plank to the size and shape of a punch-cut area to be patched and inserting that cut plug into said area while always maintaining the plug compressed against edgewise expansion and warping so that when the plug is finally placed it will securely engage in the area that is patched.

Still another object of my invention relates to the provision of means for punch-cutting a marred area in sheet veneer which means will clamp such sheet about the marred area and hold it throughout the cutting and patching steps of my method.

Another and further objects of my invention relates to the provision of means for cutting and compressing a plug for placement in a veneer sheet while maintaining that cut plug against buckling or expansion as it passes through a cutting die, at one edge of which the plug is cut, until it is inserted into the area being patched.

A further object of my invention is the provision of plug-cutting and patching mechanism which is simple to manufacture and easy to assemble and capable of constant use with a minimum of maintenance and repair, and which mechanism may be operated under electrically controlled, timed valving mechanism or the equivalent.

Other objects and advantages of the invention will be apparent in the course of the following description wherein I have described a preferred form of my invention as shown in the accompanying drawings.

Figure 1 is a detailed assembly view of my plug-cutting and patching mechanism with portions shown in section and portions omitted for convenience of illustration.

Figure 2 illustrates the mechanism by which plug blanks are constantly fed for introduction into the patching mechanism.

Figure 3 is a bracketed view showing various types of plug which may be cut for use in patching operations practiced according to my described invention,

Figure 4 is an enlarged vertical sectional view of the principal elements of the plug-cutting and patching mechanism together with the operating parts therefor,

Figures 5 and 5A show sequentially in plan the plug blank feeding mechanism as utilized in my mechanism,

Figure 6 is a perspective view of a plug blank,

Figure 7 is a perspective view of a portion of a veneer sheet indicating a marred area to be patched and indicating, in dashed lines, the por-

tion that will be cut therefrom and subsequently patched,

Figure 8 is a perspective view of a fragment of a veneer sheet after the patching operation has been completed,

Figures 9, 10, 11, 12, 13, and 14 are fragmentary sectional views illustrating the movements of the various parts and the various steps of my method and means for patching veneer sheets.

Referring to the drawings, throughout which like reference characters indicate like parts, numeral 20 designates a horseshoe-shaped frame member utilized for supporting the mechanism I have devised for cutting plug patches for veneer sheets. The lower arm 21 of the frame member 20 is supported upon suitable legs 22 and 23 that may be mounted upon a work floor, the showing of the actual footing being eliminated for convenience of illustration.

By means of suitable structural members 25 a web table 26 is disposed within the arms of the frame 20 in a horizontal position for the reception of a sheet of veneer stock 28 that may be laid thereon for patching. While I have shown the sheet 28 as being of relatively small size it will be understood that it is intended that this mechanism is for the patching of extremely large size veneer sheets of the nature that are now commonly being cut in veneer plants.

Positioned adjacent the mouth of the frame member 20 is a pair of supporting legs 29 and 30—30 which mount the table element 31 that is aligned horizontally with the table element 26. The legs 30—30 are spaced apart and a vertically movable lifter bar 32 is guided there-between. Bar 32 supports a plurality of plug patch blanks 34 as indicated in Figure 1. At its end member 32 has coupled thereto a cord or cable 35 that passes over sheaves 36 and 37 and has attached thereto a weight 38 that hangs at some remote point and constantly urges the member 32 upwardly. The blanks 34, resting on bar 32, are aligned on their forward edges against the plate 39 and on their rear edge they are kept in alignment by means of the shoe 40.

As the individual members of the group of plug blanks supported by the bar 32 are forced upwardly they come against the bottom face of stop block 41 that is positioned in a hole in plate 44 that is disposed just under the table 31.

Supported on the lower arm 21 of the frame member 20 is a base block 42 that is adapted to be shifted for very careful adjustment by a suitable screw mechanism for proper positioning in alignment with other parts of my device which is ordinarily mounted directly thereabove for cutting and patching veneer sheets. For example the block 42 may be shifted longitudinally by backing off adjustment screw 43 while advancing a similar adjustment screw 44.

Fitted into an opening 45 within the base-block 42 is a ram or plunger member 46 that has a shank 47 extending downwardly therefrom into a chamber in the cylinder 48 which depends from the base member 42. The shank 47 is shouldered at 50 and a coil spring 51 encircling the shank is seated between the flange ring 52 in the upper portion of the chamber and the shoulder 50 below to constantly urge the member 26 downward. At its lower end the shank 47 is associated with the diaphragm 54 in the diaphragm chamber or housing 56 to which air or other fluid pressure means may be supplied and exhausted by means of the tubes 58 and 59.

Above the base member 42 is a cutting die 60 which has an interior passage 62 that is normally aligned with the opening 45 on the base 42. The die 60 is so formed that it has a cutting or shearing edge at its upper end as well as one on its lower end of the opening 62.

On the upper arm of the frame 20 is mounted a cylinder 64 having an upper flange 65 that rests upon a suitable support member 66 associated with the arm. An auxiliary cylinder 68 depends also from flange 65 and encloses in spaced relation the cylinder 64. Positioned therebetween is the clamping shoe 70 having a foot 71 and an enlarged head 72 adapted to close the area between the cylindrical walls 64 and 68. An expansion coil spring 74 is positioned between a flange 69 on the cylindrical wall 68 and the under side of the head 72 of the clamp member 70 and constantly urges the member 70 upwardly.

Air supplied to the chamber 75 through the conduit 76 will permit the downward extrusion of the clamping member 70 into a clamping position upon a sheet of veneer stock indicated by the numeral 28.

Mounted for sliding movement in the inner face of the wall 64 is a knife member 80 which will hereinafter be described as circular although it will be apparent that the shape of the knife may conform to the shape of any of the patch plugs that are suggested in the bracketed view of Figure 3. For example the circular plug 82 could be cut by the member 80, whereas a diamond-shaped plug 83 an oval plug 84, or a boat-shaped plug 85 would be cut by tools shaped for that purpose.

The knife member 80 is engaged on the lower end of a tube 86 and is held in place by means of the nut 87. The upper end of the tube 86 is associated with the diaphragm 88 in the housing 90 to which air or other fluid under pressure may be supplied and from which it may be exhausted by means of the tubes 92 and 94.

A vertically movable shank 96 is slidably mounted in the nut member 87 and in an upper journal extension 97 of the tube 86. On its lower end the shank 96 has the pressure foot or shoe 98 that, in the case of the circular knife or cutter 80, is slightly smaller in diameter and adapted to be enclosed thereby on occasion.

On the upper end, shank 96 has the piston 100 mounted in the cylinder 102 to which air under pressure may be supplied through the conduit 104.

The piston 100 is normally urged upwardly as is also the shank 96 and the shoe 98 by means of a coil spring 106 positioned between the under side of the piston and the bottom of the piston chamber.

For introducing a plug-blank 34 to the under side of the die 60 or between member 42 and member 60 I employ the transversely slidable carrier bar 110 which has an offset arm 111 to which may be connected the rod 112 of the piston 113 within the chamber 114. The piston 113 may be moved either to the right or to the left, as seen in Figures 5 and 5A, by air or other fluid under pressure supplied to the tubes 115 and 116.

A slot 118 in the carrier bar is provided and has sufficient width to fit either side of the hold-down member 42 and to slide on either side of that member while at the same time advancing one of the plug-blanks 34 in the opening 119 in the arm into position for cutting. On its advanced or forward end the carrier or bar 110 carrying a clean-out bar or cross-head 120 which travels across the upper face of the member 42

and the member 46 and will wipe therefrom any debris from the veneer sheet cutting operation that may be deposited thereon. Spring 122 operates upwardly against the under side of the plug blank as it is being fed to the carrier bar to the cutting position and holds it against dislodgement during that travel.

To assist in cleaning out any debris that may remain in the carrier arm 110 after a blank has been cut into the proper shape for a patch, I employ the upwardly urged spring leaf 122 that may best be seen in Figures 1 and 13 and which rides in the slot 118 and the opening 119 and will deflect downwardly any such debris therein.

In the showings of the Figures 9 through 14, are illustrated, the various elements of the invention and the steps of the method by which the invention is practiced. In the Figure 9 I have shown fragments of the essential portions of the mechanism and this mechanism is shown in the "at rest" position. In this position the veneer sheet 28 is inserted between the member 60 and the clamping mechanism positioned thereabove so that the marred area 28a that is to be cut from the sheet 28 is within the effective cutting area of the knife 80.

In Figure 10 the first mechanical movement of the device is illustrated as having occurred. In that case the sheet 28 is clamped on the die 60 by means of the clamp mechanism 70 which is extruded downwardly from its upwardly supported position on the spring 74, through the urgence of air which has been introduced into chamber 75 against the upper face of the member 70 through the tube 76. When air is supplied to the tube 76 the member 70 seats firmly so that its foot 71 presses against the upper face of the sheet 28 and holds it tightly in place.

The next step in the method is illustrated in Figure 11 in which instance the knife 80 and the hold down member 98 have been forced downwardly under the urgence of air applied to the upper surface of the diaphragm 88 and also into the chamber 102 against the piston 100.

The thin knife edge of the member 80 shears out the marred portion 28a of the sheet 28 that is to be cut away and carries it downwardly. The debris is removed from within the knife by means of the foot 98 stripping it therefrom as the member 80 is withdrawn. This latter operation can be clearly seen in Figure 12 in which instance it will be noted that the clamp member 70 is still firmly holding the sheet 28 against the die 60. The debris or marred area 28a that has has been cut away is now lying on the upper surface of the upwardly movable ram member 46, from which it is to be removed by the operation of the laterally movable cross-head 120 on the carrier arm 110. Arm 110 moves across the upper face of member 46, between members 42 and 60, so that, as will be seen in Figure 13, the debris 28a is kicked out of the mechanism and falls in a suitable manner for disposal.

At the same time, through the movement of the carrier arm across the member 40, a patching plug blank 34 is carried into position on to the upper face of the member 42 under the hold-down shoe 98. When a patch 34 is properly positioned under the die 60 the upwardly moving plunger 46 rises under the urgence of air supplied to the under side of the diaphragm 54 and the plug blank 34 is securely clamped between the ram and member 98 as it passes against the lower cutting edge of the die member 60 and through the opening or passage 62 therein. The cutting operation will bend certain of the wood fibers along the cut edge that will expand when freed from the die block to grip the inner edges of the opening in the veneer sheet. The cut plug patch is held under compression from top and bottom between the members 98 and the lower ram member 46 all of the time that it passes through the opening 62 in the cutting die 60. The plug and its bent fibers along the edge are held against edgewise expansion by the walls of the opening or passage 67 of the member 60 so that the patch plug has no opportunity to expand larger than its cut size. This compression is maintained all of the time until the plug shown in Figure 14 is brought into position in the member 28 whereupon the plug body and edge fibers are free to expand in the opening therein.

By means of suitable timing mechanism, these various steps hereinabove described are carried on sequentially with split-second timing where necessary. The details of such control mechanism is not shown as many types would perform suitably such simple functions.

The moment that the plug is placed in the opening as shown in Figure 14, the shoe 98 rises and the ram 46 is forced downwardly by the action of the spring 51 or by means of air that may be supplied to the upper side of the diaphragm 54. The cutting and patching mechanism returns to the "at rest" position as shown in Figure 9. Whereupon the carrier arm 110 retracts, from the position of Figure 5A to that of Figure 5, and any debris 34a that may be on the upper face of the member 42 is withdrawn, to the left in the showing, and is stripped from the slotted carrier arm 110 by means of the leaf spring 122 which extends into the slot 118. In Figure 1 this last mentioned operation may be seen with the debris shown as falling out of the carrier arm and downwardly for disposal by gravity or otherwise.

The lower and upper diaphragms 54 and 88, are ordinarily controlled by means of a supply of air or other fluid under pressure which passes through the valve mechanisms 55 and 89 respectively. These valve mechanisms may be of the solenoid operated type, and an electrical controller means (not shown in the drawings) will control the opening and closing of these valves, permitting the influx or exhaust of air to the diaphragms. In such cases where there is no direct supply of air furnished to the diaphragms to return them to the original or "at rest" position, this function is performed by the springs 51 and 87. Air may freely flow in or out through the members 59 and 94 so that exhaust may be provided to break the vacuum on retracting movement. The supply of air pressure to the chamber 102 through the valve 103 is controlled by the electrically operated mechanism 103a indicated in Figure 1.

It will be noted that during practically all of the operations of my invention in cutting and patching a sheet of veneer that the holding or clamping mechanism is constantly maintaining the sheet against the die to hold it in position during the punch cutting operation, as well as during the patching cycle.

The clamp means is so constructed that it surrounds the punch and also the area to be punch-cut and prevents breaking or cracking of the wood during the punching cycle. This is extremely important for, in fibrous wood as well

as in brittle sheets, if the material being cut were not firmly held it would tend to splinter and to crack and to otherwise destroy itself when the knife is brought downwardly to perform its shearing function. It is to be noted that the important operation of cutting the required area from a sheet of veneer stock is performed by a knife that moves and cooperates with a fixed die and that this cutting operation is not merely a punching or stamping operation but also a shearing operation. The former is impractical because of the large sheet being cut and because the material within the cut is usually weak and will not stand punching. The converse is true when the plug patch blank is cut to form a patching plug for in that case the stock is sufficiently strong to be forced upwardly against a fixed die due to the operation of the vertically rising plunger.

While I have shown as a preferred form of my invention, the use of air-operated diaphragms and piston mechanisms for the actuation of the various mechanical elements of my device it is to be understood that these form no important part of my invention as the combination of elements forming the cutting mechanism is the heart and soul of the invention.

I claim:

1. Sheet veneer cutting mechanism comprising a die block having a central opening provided with an upper and lower similar shearing edge, a clamp member adapted to secure a veneer sheet to said die block about the central opening, means for pressing said clamp member to said die block and means for retracting said clamp member from its pressing position, a reciprocal knife adapted to cooperate with said die block opening and the upper shearing edge to shear a portion of a veneer sheet clamped thereto, means for operating said knife, a clamp shoe to pass such a cut out portion from a veneer sheet through the central opening in the die block, means for positioning a patch blank of sheet veneer below said opening, a ram adapted to engage and force a portion of said blank through said die opening past the lower shearing edge whereby to cut said blank to the shape thereof, means for advancing said ram and cut blank through said die block opening to position the cut blank in the opening of a veneer sheet, said clamp shoe pressing the blank to hold it against the ram during the cutting operation and subsequent thereto while the cut blank is passed to position in said veneer sheet, the wall of said die block opening serving to prevent lateral expansion of the cut blank during its passage through the die block opening.

2. Sheet veneer cutting mechanism comprising a die block having a central opening provided with upper and lower shearing edges, a clamp member adapted to secure a veneer sheet to said die block about the central opening, means for pressing said clamp member to said die block and means for retracting said clamp member from its pressing position, a reciprocal knife adapted to cooperate with the upper shearing edge of said die block to shear a portion from a veneer sheet clamped thereto, means for operating said knife, means for passing such a cut out portion from a veneer sheet through the central opening in the die block, means for positioning a patch blank of sheet veneer below said opening, a ram adapted to engage and force a portion of said blank through said die opening past the lower shearing edge whereby to cut said blank, and means for advancing said ram through said block opening to position said cut blank in the opening of the veneer sheet.

3. Sheet veneer cutting mechanism comprising a die block having a central opening provided with similar upper and lower shearing edges, means for clamping the veneer sheet to the die block, a reciprocal knife adapted to cooperate with the upper shearing edge of said die block opening to shear a portion from a veneer sheet clamped thereto, means for operating said knife, means for positioning a patch blank of sheet veneer below said opening, a ram adapted to engage and force a portion of said blank through said opening and past the lower shearing edge whereby to cut said blank, and means for advancing said ram through said die block to position said cut blank in the opening of the veneer sheet.

4. A patching mechanism for veneer sheets comprising a die block having an opening therethrough provided with an upper and lower similar shearing edge, a clamp operable to hold a veneer sheet against one face of said die, a knife cooperating with said die opening and the upper shearing edge for punch cutting said veneer sheet, means for positioning a patch plug blank against the lower face of said die, a ram for forcing said patch plug blank against said die to trim it to the shape of the opening and to force it through said die, and means for holding said patch plug against the ram during its cutting period and during its passage through the opening in said die and while it is introduced into the cut out area of the veneer sheet being patched.

5. A patching mechanism for veneer sheets comprising a die block having an opening therethrough provided with upper and lower similar shearing edges, means for clamping a veneer sheet against the upper face of said die, means cooperating with said upper cutting edge for punch cutting said veneer sheet, means for positioning a patch plug blank against the lower face of said die, means for forcing said plug blank against said lower cutting edges to trim it to the shape of the opening, said means also serving to force the cut plug through said die and into the opening in the veneer, the wall of said die block opening being of a size to hold said patch plug against expansion or buckling during its cutting period and during its passage through the opening in said and while it is introduced into the cut out area of the veneer sheet being patched.

6. In a veneer patching machine, a cutting mechanism; comprising: a die block having similar shearing edges on the upper and lower faces of the block and a passage therethrough from edge to edge, means for clamping and means cooperating with one shearing edge for cutting a portion from a veneer sheet positioned on one face adjacent said edge of the die block, means for positioning a veneer blank adjacent the face of said die block, means cooperating with the other shearing edge for cutting a patch from said blank and for passing it through said passage for insertion into the cut opening in the veneer sheet, and means cooperating with said last mentioned means for preventing buckling of said patch during cutting and until insertion into the veneer sheet opening.

7. In a veneer patching machine, a cutting mechanism, comprising: a die block having similar shearing edges on the upper and lower faces of the block and a uniform passage therethrough

from edge to edge, means for clamping and means cooperating with one shearing edge for cutting a portion from a veneer sheet positioned on one face adjacent said edge of the die block, means for positioning a veneer blank adjacent the other face of said die block, means cooperating with the other shearing edge for cutting a patch from said blank and for passing it through said passage for insertion into the cut opening of the veneer sheet, and means cooperating with said last mentioned means for preventing buckling of said patch during cutting and until insertion into the veneer sheet opening, said passage walls being of a size to restrain the cut patch from lateral expansion during its travel through the die block.

8. In a veneer patching machine, a cutting mechanism, comprising: a die block having similar shearing edges on the upper and lower faces of the block and a uniform passage therethrough from edge to edge, means for clamping and means cooperating with one shearing edge for cutting a portion from a veneer sheet positioned on one face adjacent one cutting edge of the die block, means for positioning a veneer blank adjacent the other face of said die block, a ram cooperating with the other shearing edge for cutting a patch from said blank against the other cutting edge and for passing it through said passage for insertion into the opening in the veneer sheet, and presser means for cooperating with said ram to prevent buckling of said patch during cutting and until insertion into the veneer sheet.

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