Dec. 22, 1953 R. V. PETERSON 2,663,332

VENEER SHEET PATCHING MACHINE

Filed Dec. 26, 1950 4 Sheets-Sheet 1

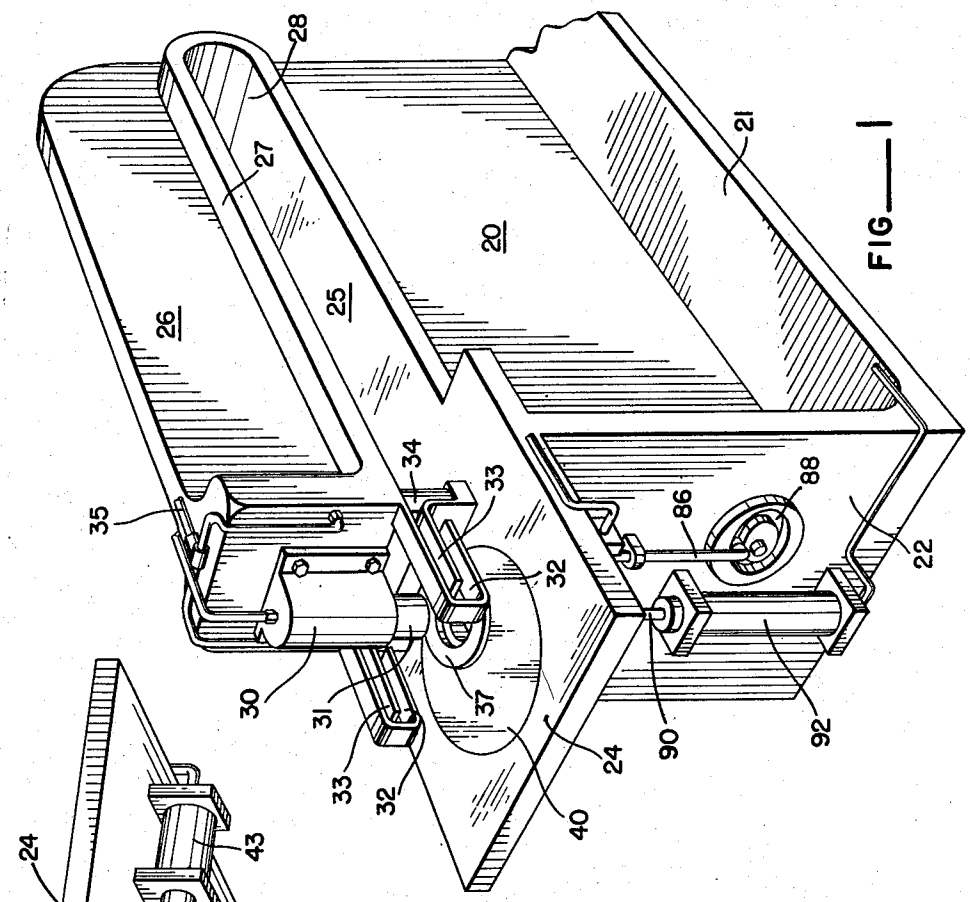

FIG. 1

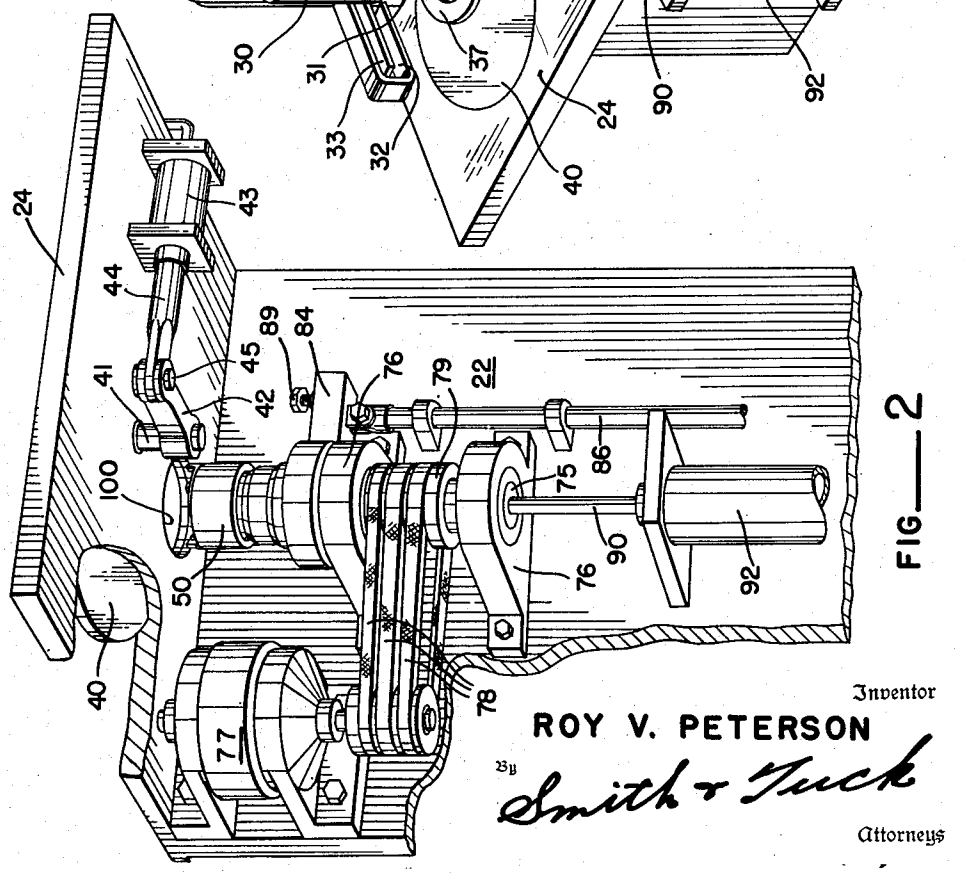

FIG. 2

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VENEER SHEET PATCHING MACHINE

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FIG. 3

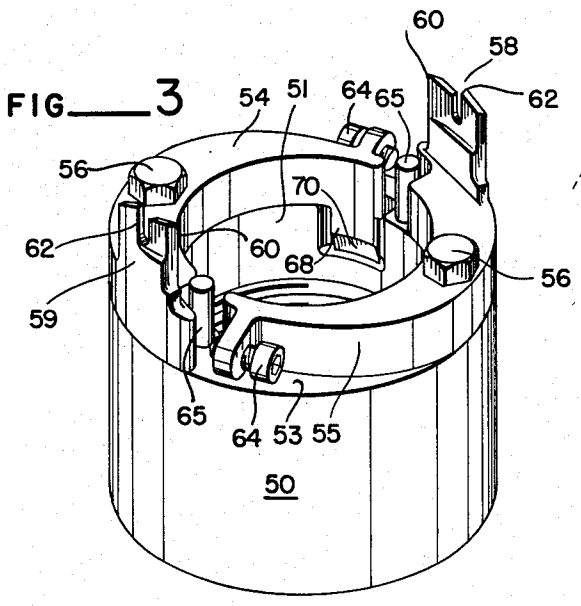
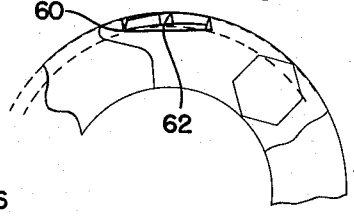


FIG. 6



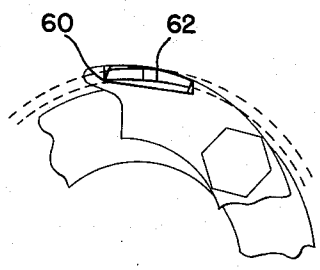


FIG. 7

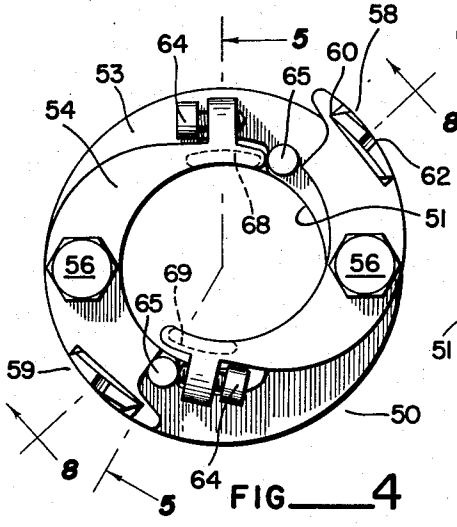


FIG. 4

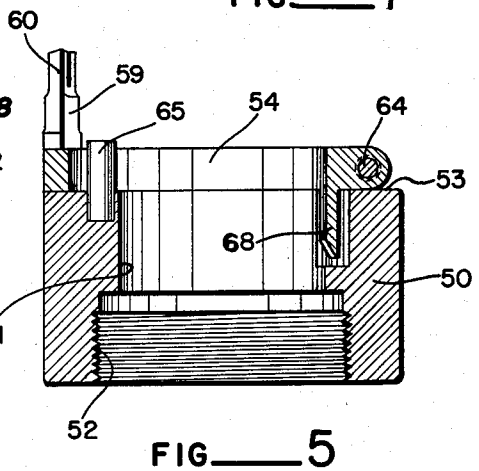


FIG. 5

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VENEER SHEET PATCHING MACHINE

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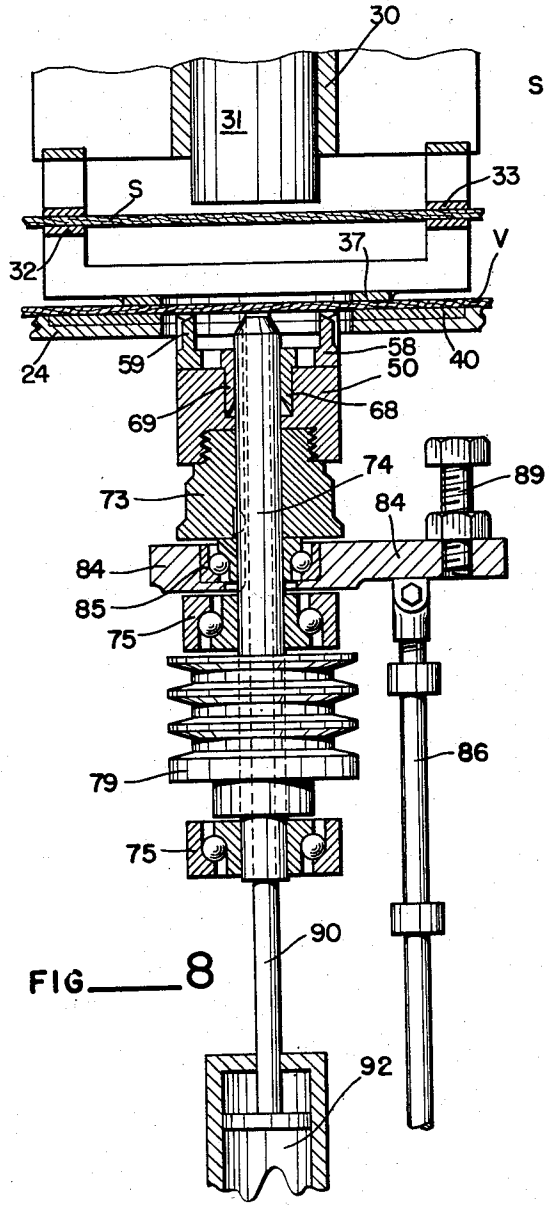

FIG. 8

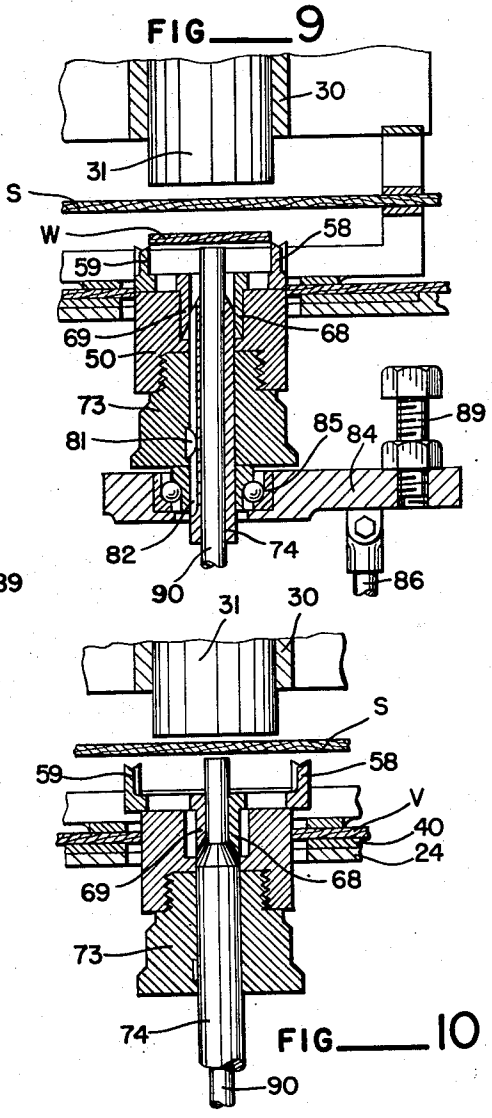

FIG. 9

FIG. 10

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VENEER SHEET PATCHING MACHINE

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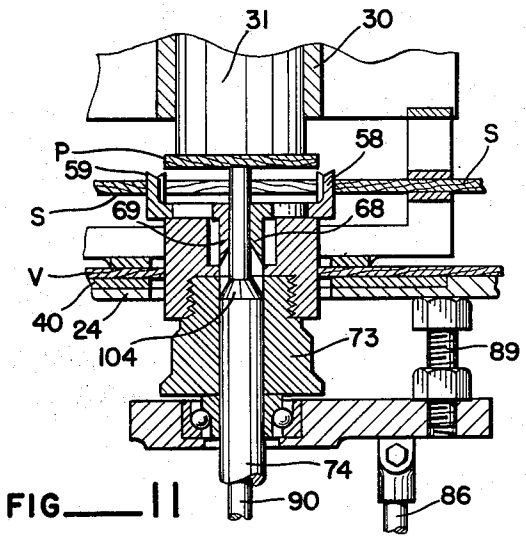

FIG. 11

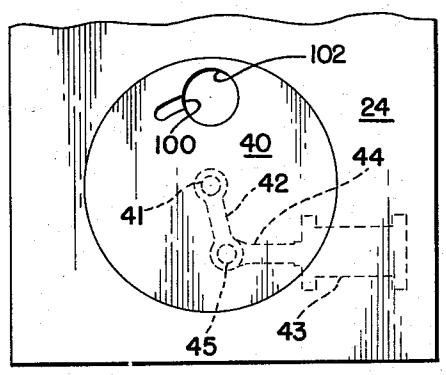

FIG. 14

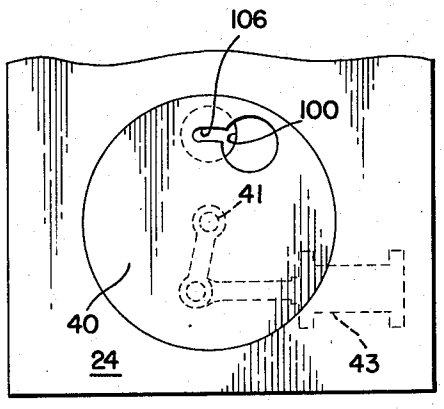

FIG. 13

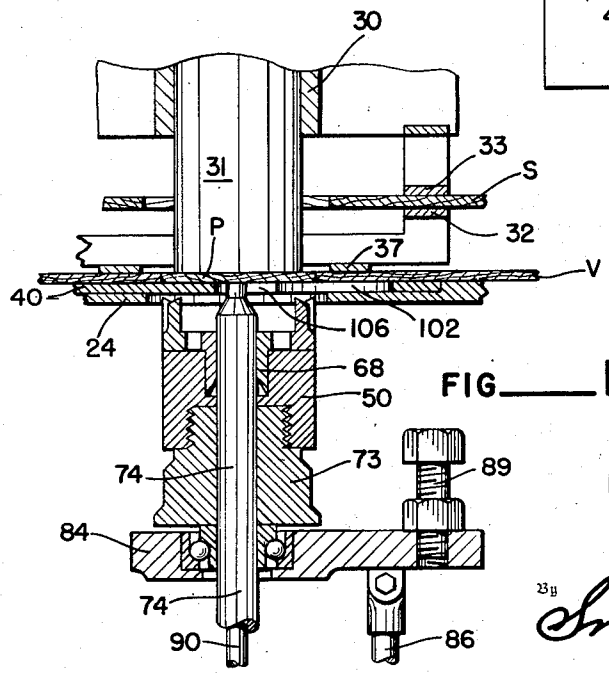

FIG. 12

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UNITED STATES PATENT OFFICE

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VENEER SHEET PATCHING MACHINE

Roy V. Peterson, Tacoma, Wash.

Application December 26, 1950, Serial No. 202,603

5 Claims. (Cl. 144—2)

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This present invention relates to a veneer patching machine which is characterized by construction wherein a rotary cutter is mounted for vertical movement and the cutter head has pivoted cutters capable of cutting a patch hole in a sheet of veneer and then passing up through the veneer to cut a patch from a veneer strip that will fit the hole. Means are then provided for seating the patch in the hole previously cut all in a single sequential operation.

The unprecedented demand for plywood is gradually exhausting the supply of choice peeler logs and forcing the manufacturers to resort to the use of logs that are not choice from which they peel the veneer and produce a veneer sheet having blemishes therein. These conditions in turn call for some means to expedite the patching of defective portions of the veneer and do it in a manner which renders the veneer fully acceptable for its intended purpose.

Even in this mechanical age a very large proportion of the patching of the veneer is still a tedious hand operation where a workman with a die and mallet cuts out the defective portions and then cuts a patch to fit this portion. This is on one hand a very tedious and expensive operation and on the other hand it does not produce a tight joint along the margin of the patch so that the resulting plywood is not acceptable for many uses. A number of attempts have been made in the past to produce machines for the patching of plywood. Most of these machines however use pre-cut patches or they stamp out the defective material from the veneer sheet in their operations. Such patching can only by accident produce a perfect joint and their general use has resulted to a large degree in the downgrading of the finished product.

In this present machine a sequential series of operations is performed in which a hole of a proper bevel is cut, then a patch is cut which will accurately fit into this hole and lastly the patch is seated in the pre-cut hole in such a manner that the grain direction is under control and can be made to match the original grain.

The principal object of this present invention is to provide a machine which will achieve a series of sequential operations which will form a perfect patch in a plywood sheet.

A further object of this invention is to provide a veneer sheet patching machine in which the hole including the defective portion of the sheet is cut out with a high speed revolving cutter and this same cutter, using the opposite edges of the cutter proper, cuts a patch by the same method to fit accurately the hole cut in the veneer sheet.

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A further object of this invention is to provide a plywood patching machine in which a rotary cutter having a plurality of pivoted cutting members so arranged that the outer margins of the cutter will cut the hole in the damaged piece of veneer stock. By progressing upwardly the inside margins of the cutter element will cut the patch to fit the hole previously cut in the sheet.

A further object is to provide an improved method of patching veneer in which a faulty area of the veneer is removed, an identically shaped patch is cut, and the patch is positioned in the veneer in one sequence of operation, providing in the process that the patch is accurately oriented above opening and that the grain of the patch runs in the same direction as the grain in the vener.

Further objects, advantages and capabilities will be apparent from the description and disclosure in the drawings, or may be comprehended or are inherent in the device.

In the drawings:

Figure 1 is a perspective view of a specific embodiment of my veneer sheet patching machine;

Figure 2 is in perspective, on enlarged scale and in fragmentary form, viewing operating members below the table top;

Figure 3 is a perspective view, on enlarged scale, of the cutter head;

Figure 4 is a top view of the cutter head;

Figure 5 is a view, partly in section, taken on line 5—5 of Figure 4;

Figure 6 is a schematic top view of a portion of the cutter head with the cutters in retracted position;

Figure 7 is similar to Figure 6 with the cutters in expanded position;

Figure 8 is a view of operating members partly in vertical cross-section and with the cutter head sectioned as indicated by line 8—8 of Figure 4;

Figure 9 is a view of part of the operating members as shown in Figure 8 and in their next position in the sequence of operation;

Figure 10 is similar to Figure 9 with the operating members in their next position in the sequence of operation;

Figure 11 shows the position of the operating members following their position in Figure 10;

Figure 12 shows the final position of the operating members in their patching sequence;

Figure 13 is a top view showing the oscillating plate in its first position; and

Figure 14 is a top view showing the oscillating plate in its second position.

Referring more particularly to the disclosure in the drawings, the numeral 20 designates gener-

ally the frame of this machine. This may be variously constructed, however, due to the requirement of strength and weight, it can be very properly formed as a large casting or welded together of heavy plate stock. The frame consists essentially of the base portion 21, and upright support pillar 22 and a table 24. Table 24 should have considerable extent so that a defective portion of plywood can be processed even when it is near one margin of the sheet without the necessity of turning the sheet around. To this end, table 24 is provided with the extension portion 25. This calls for the provision of an overhanging arm or support portion 26, and as this unit must support the spreading effect of the patch feeding ram, it must be generously proportioned so as to have the requisite strength for its function. To this end it has been found convenient to provide a wide heavy rib as 27 extending entirely around the head of the veneer-receiving opening 28. Fixedly secured to the end face of arm 26 is the ram air cylinder 30 within which is housed the patch seating ram 31. Also secured to the end face of arm 26 are the similar veneer strip holding brackets 32. Adapted to coact with the lower bar portion of bracket 32 are the presser bars 33. These bars are movable and under control of spaced pistons 34 which are in turn supplied by the fluid line 35. Pressure bars 33 are preferably cross-connected so that a pressure ring 37 can be secured to the same pistons 34 and be actuated by them in order to provide means for backing up the veneer that is being patched when the rotary cutters are fed up from beneath them.

In order to provide a similar backing for the veneer sheet when the patch is being seated therein by rams 31, some means must be provided which can be removed from the path of the cutter during the cutting operation and then be moved so as to back up the plywood and support it especially near the margins of the cut-out opening because any opening in table 24 capable of passing the cutter upward through it will be considerably larger than the hole cut in the plywood by the cutters.

One satisfactory solution to this problem is to employ an oscillating plate 40 which has fixedly secured to it at its center the downwardly extending shaft 41, which passes through table 24 and in turn has secured to it an arm 42 which can be actuated by any convenient means. One such means is shown as the fluid cylinder 43 having a piston 44 which is capable of giving the required oscillation to plate 40 so that it may take the alternate positions shown in Figures 13 and 14. Suitable slotting is essential in the end of piston 44 which engages pin 45 so that a free swing can be achieved without binding.

In order to achieve accuracy in cutting the hole in the veneer sheet containing the defect and to cut the patch to fit the same it has been found desirable to employ a special form of cutter head. My cutter head is probably best illustrated in Figures 3 through 7 in which a cutter base 50 is employed. This base is in the form generally of a sleeve having the interior bore 51 and a threaded lower portion of the same 52 which provides the mounting for the cutter on a vertically movable, power driven holder.

Pivotably secured on the upper face 53 of base 50 is a plurality of tapering cutters as 54 and 55. These members are pivoted as on bolts or cap screws 56. On their heavier end, cutters 54 and 55 are each provided with a plurality of cutting devices or blades as 58 and 59.

It is to be noted that these cutters are provided with properly shaped cutting edges 60 for cutting accurately to size a piece of wood contained within the circle described by the cutters. This edge is used for cutting the patches from strip stock made normally of the same thickness veneer as the veneer sheet. Juxtapositioned with the edges 60 are the cutting edges 62. These are oppositely directed so that they will produce an accurate cut on the outside of the circle described by the cutters. These are used to cut the hole required by the patching operations in the veneer. Attention is directed to the fact that a U-shaped opening is provided between the two sets of cutting blades on each cutter. This makes it possible to properly dress the cutting edges 62 and gives clearance for waste that might otherwise tend to lodge against the cutter blades.

The lighter weight ends of cutters 54 and 55 are each provided with an adjusting screw 64 positioned in suitable outstanding bosses. These screws abut the stop pins 65 and provide an accurate limit for the rotary or pivoted motions of the cutters when the same are fully extended by centrifugal force when they are cutting through the veneer patch. A limit stop is also provided by the downwardly extending lugs 68 and 69 which are suitably engaged on their inner surfaces by devices to be later described. Both of the lugs 68 and 69, one on each of the cutters, is provided with a beveled cam space 70.

The cutter assembly is mounted for use on a hollow arbor or holder 73, attached to the same by having exterior threads on the upper end of holder 73 adapted to engage threads 52 of the cutter assembly, the cutter head being designed to operate in one direction of rotation only. The holder is slidably mounted upon the tubular power shaft 74 which is journaled upon suitable bearings 75 which in turn are appropriately supported in bearing housings 76 secured to the supporting wall 22 of the main frame.

Any proper form of drive may be provided for the drive shaft 74, as for instance, the electric motor 77 mounted upon wall 22 and connected as by a plurality of V belts 78 to a multiple sheave 79 which is fixedly secured to shaft 74. The holder 73 is provided with a key 81 adapted to slide in keyway 82 of the hollow shaft 74 and thus provide rotation for the cutter head assembly.

A positioning plate 84, for moving holder 73 vertically, encircles shaft 74 and houses an antifriction bearing 85 provided so as to prevent any frictional load on plate 84 due to the weight of holder 73 and the cutter assembly 60. As it is necessary that the cutter be raised and lowered in timed sequence, a push rod 86 is provided which is controlled by the cam member 88 which may be rotated by any suitable means. An adjustable stop 89 is provided to limit the upward travel of plate 84 and prevent interference between the cutter elements and the pressure ram 31.

A patch holding rod 90 is provided for holding the cut patch in its proper position with respect to ram 31. This rod, to avoid interferences, passes through the axis of the hollow shaft 74 and may be controlled in an upward positioning by any convenient means. However inasmuch as a constant pressure is desired during its operational cycle a fluid cylinder and piston assembly as 92 appears to be the preferred structure. The operation of the moving means for rod 90 must

be so timed as to function at its proper point in the patching cycle.

Methods of operation

In using this present machine for the patching of defective plywood veneer or veneer sheets, the sheet is placed upon table 24 and as much of it as necessary can be extended into the slot or opening 26. The defect or blemish in the veneer is then placed under ram 31. This places it over an opening 100 in table 24 and in this stage of the cycle, backing disc 40 is in the position shown in Figure 14 with the opening 102 aligned with opening 100. A strip of veneer of sufficient width to make it possible to cut the required size patches is placed on bars 32 and under the movable bars 33. The first functional operation is that of the moving of cylinders 34 which move downwardly thus supporting the perimeter of the projected hole in the veneer sheet under ring 37 and at the same time the strip stock is held between bars 32 and 33. The next operation in sequence is for the revolving cutter assembly 50 to be moved upwardly through hole 100 by means of the actuation of push rod 86 raising plate 84. This step is illustrated in Figure 8. The cutter assembly then moves upwardly after the showing of Figure 9 and the waste patch W is cut from the veneer sheet V. This circle of veneer is waste and can be disposed of in any convenient manner. The most generally useful arrangement is an air blast which blows the waste circle out of the machine and directs it to a suitable hopper for disposal. As the cycle continues, the condition of Figure 10 is reached, where the cutting members 54 and 55 have moved up high enough so that boss members 68 and 69 no longer lie on shaft 74, and due to the fact that the cutters themselves are arranged with the heaviest portion of the same at the end carrying the cutting blades, centrifugal force acting on the revolving unit throws the cutting element upwardly and this position is shown in Figure 10.

Figure 11 is the next step in the operation and patch P has been cut from the strip veneer S. In this operation a different set of cutting edges has been used to produce the patch. In this instance the cutting edges 60 of the cutters have been used whereas to cut the hole in the veneer the rearwardly disposed cutting edges 62 were employed. This is required in order that the hole on one hand has its surface cut by a cutting edge that is most favorably ground to give a good clean surface and likewise the patch P is also cut by a plurality of cutters which are ground to give a most perfect cut on the outside of the disc. It is in this manner that the perfect junction can be had between the patch and the veneer that is being prepared. As the patch P is being cut the holding rod 90 has been actuated by pressure means 92 and is extended upwardly to hold the patch in firm contact with the bottom of ram 31.

During the period covered by this foregoing operational step, disc 40 has been shown in the position in Figure 14 in which opening 102 is aligned with opening 100 in table 24. However as soon as the cutters are retracted downwardly, cam surfaces 70 of the cutter lugs 68 and 69 again contact the tapered ends 104 of shaft 74 and this forces the cutting elements back to their smallest diameter so that they can be withdrawn through the hole already produced in the plywood sheet even though during the process of

cutting the patch the cutters were extended beyond the diameter of that hole. The next operation is that shown in Figure 13 in which plate 40 is partially revolved so that except for the narrow slotted portion 106 necessary to permit the push rod 90 to remain in contact with the patch P, the disc and table 24 now fully supporting the margins of the plywood around the hole cut. The next operation is for the ram 31 to move downwardly and this explains the desirability of using a fluid cylinder assembly as 92 in that a constant pressure can be maintained on the patch by rod 90 yet this can be overcome by the large diameter of ram 31. The continuation of this operation fully seats the patch in the veneer stock. If desired, glue can be applied by means well known in the trade. However, normally, if the patch is snapped into place much like the seating of a plastic crystal in a wrist watch, a very tight engagement is had without the need of gluing and then, when the veneer is made up into final stock, the gluing between the various plys is adequate to hold the unit in place. The final operation is the retraction of rod 90 and ram 31 and to release pressure on ring 37 and bars 33 so both the veneer sheet and the veneer strip can be moved to a new position, disc 40 positions itself after the showing of Figure 14 and the device is ready to start a new cycle.

It is believed that it will be clearly apparent from the above description and the disclosure in the drawings that the invention comprehends a novel construction of a veneer sheet patching machine.

Having thus disclosed the invention, I claim:

1. A veneer patching machine, comprising: a horizontal table having an access opening therein; a vertically movable ram positioned above said access opening; a supporting bracket for a patching sheet positioned below said ram and above said table; means for clamping such patching sheet on said bracket; means for clamping a veneer sheet on said table above said access opening; a vertical power shaft having its upper end positioned near said access opening and under said ram; a cutter head movable longitudinally of and connected to rotate with said shaft; means for moving said cutter head vertically; means for rotating said power shaft; a patch holding rod journaled in said power shaft; means for moving said rod vertically; and a plurality of cutters pivotally mounted on the upper portion of said cutter head at points evenly spaced from the axis of rotation of said power shaft, each cutter having a heavy end on one side of its pivot of such weight that said heavy end will tend to swing outward when said cutter head is rotated, stop means limiting the outward movement of said heavy end, coacting cam means between each cutter and said power shaft holding said heavy end in a retracted position when said cutter head is in a lower position, and two cutting edges on said heavy end of each cutter, one of said cutting edges being disposed to cut inside of the other of said cutting edges, the outside cutting edge being for cutting a patching opening in such veneer sheet and the inside cutting edge being for cutting a patch from such patching sheet of the same size as said patching opening.

2. A veneer patching machine, comprising: a horizontal table having an access opening therein; an oscillating plate mounted in said table having in a first position a plate opening aligned with said access opening and having in a second

position a narrow slot aligned with said access opening and connecting with said plate opening; vertically movable ram means positioned above said access opening; means for supporting and securing a patching sheet between said ram means and said access opening; a vertical patch holding rod positioned below said ram and vertically movable to coact with said ram and of a size to fit said slot and aligned therewith when said oscillating plate is in said second position; means for clamping a veneer sheet on said table above said oscillating plate; a cutter head; means for moving said cutter head vertically upward through said access opening to contact said veneer sheet and said patching sheet; cutters on said cutter head; means positioning said cutters to cut in such veneer sheet a patching opening, in a lower position, and to cut from said patching sheet a patch of the identical size of said patching opening, in an upper position said cutters being positioned more widely spaced apart in said upper position than in said lower position; and means for oscillating said oscillating plate to move to said second position as said ram means descends to position said patch in said patching opening and for oscillating said oscillating plate to move to said first position as said cutter head moves upwardly.

3. A veneer patching machine, comprising: a table having an access opening therein; a ram having its longitudinal axis normal to the plane of said table and aligned with said access opening, said ram being movable toward and away from said access opening; a supporting bracket for a patching sheet positioned between said ram and said table; means for clamping such patching sheet to said bracket; means for clamping a veneer sheet to said table between said access opening and said supporting bracket; a power shaft having one end positioned near said access opening on the opposite side from said ram and having its longitudinal axis normal to the plane of said table; a cutter head positioned on said shaft and connected to rotate with said power shaft; means for moving said cutter head toward and away from said ram; means for rotating said power shaft; cutters on said cutter head and evenly spaced from the axis of rotation of said power shaft; and means positioning said cutters in a first position so that a patching opening is cut in such veneer sheet as said cutters contact said veneer sheet and in a second position more widely spaced apart than in said first position so that a patch is cut from such patching sheet, as said cutters contact such patching sheet, of the same size as said patching opening.

4. In a veneer patching machine, a cutter assembly, comprising: a power shaft having on one end a tapered cam surface; a cutter head mounted on said power shaft to rotate therewith and slidable longitudinally of said power shaft; cutter means pivotally mounted on said cutter head having a heavy end on one side of its pivot whereby said heavy end will tend to swing outward when said cutter head is rotated and having a light end on the other side of said pivot, said light end having a cam portion directed toward said tapered cam surface to coact therewith, on contact therebetween, to move said heavy end inward, stop means limiting outward movement of said heavy end, and cutting edges mounted on said heavy end to cut a patching opening when said heavy end is in an inward position and to cut a patch when said heavy end is in an outward position.

5. In a veneer patching machine, a cutting assembly, comprising: a cutter head having on one end and evenly spaced from the center of said cutter head a plurality of pivots; a cutter mounted on each of said pivots, said cutter having a heavy end on one side of its pivot whereby said heavy end will tend to swing outward when said cutter head is rotated, means for pivoting said heavy end inward, stop means for limiting outward movement of said heavy end, and two cutting edges on said heavy end, one of said cutting edges being disposed, when said heavy end is in its inward position, to cut a patching opening of the same size as the patch which the other cutting edge is positioned to cut when said heavy end is in an outward position.

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