Sept. 20, 1932. A. R. WELCH 1,878,081

ART OF PATCHING VENEER

Filed July 22, 1930 7 Sheets-Sheet 1

Fig. 1

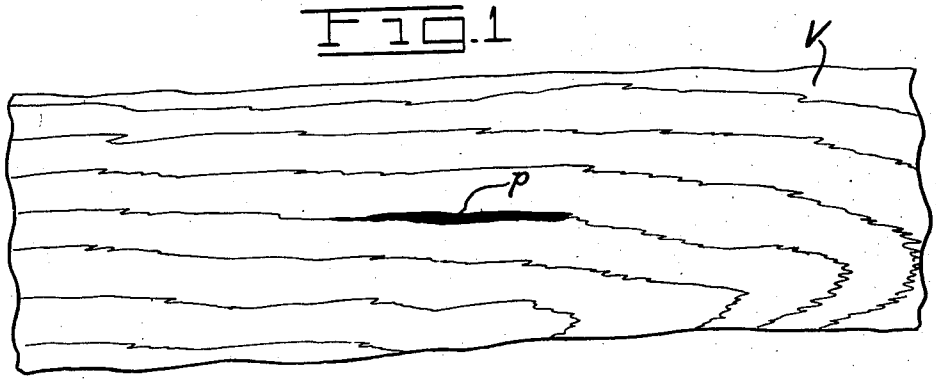


Fig. 2

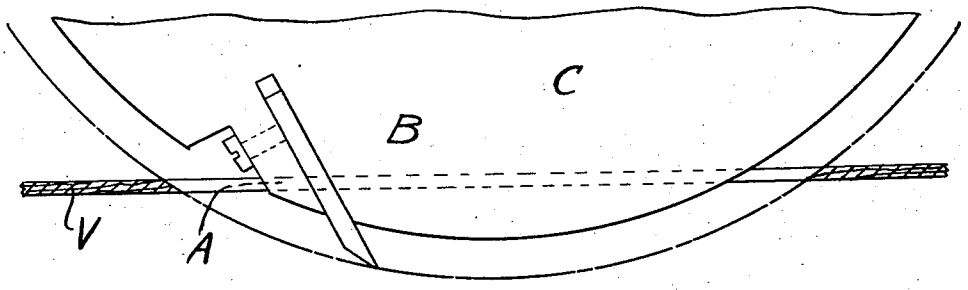
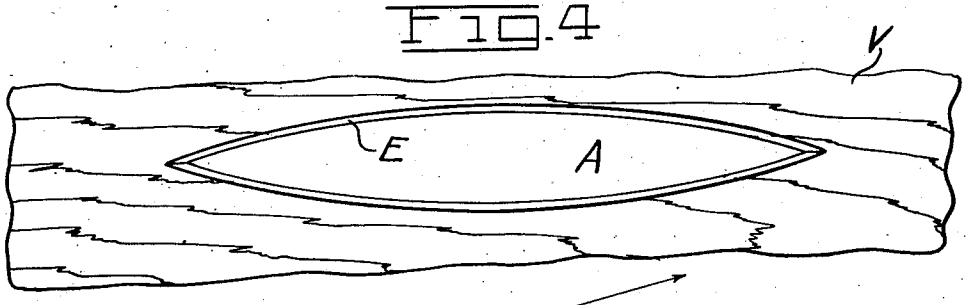


Fig. 4



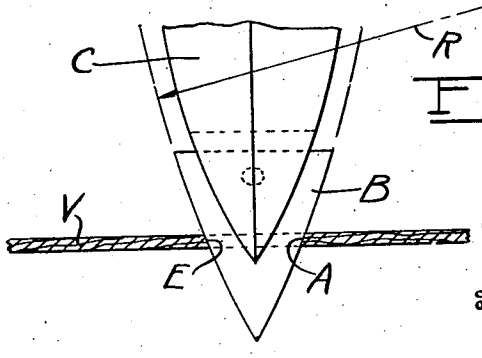


Fig. 3

Inventor

Arthur R. Welch

By Charles L. Reynolds

Attorney

Sept. 20, 1932. A. R. WELCH 1,878,081

ART OF PATCHING VENEER

Filed July 22, 1930 7 Sheets-Sheet 2

FIG. 5

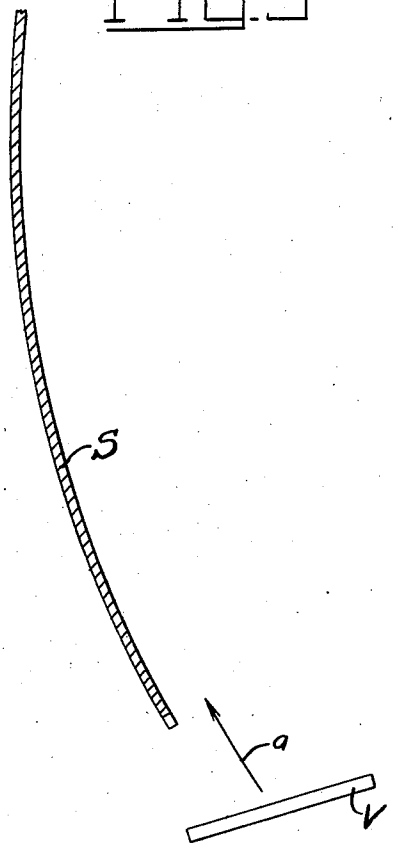


FIG. 6

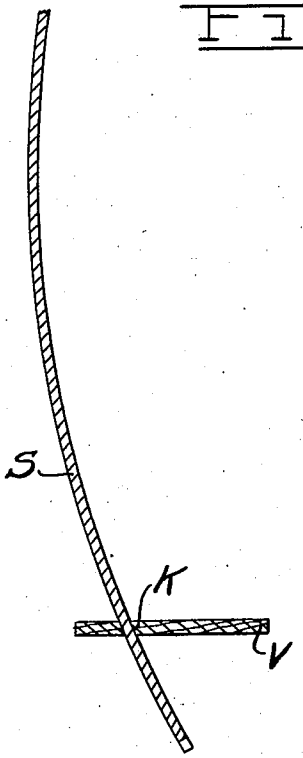
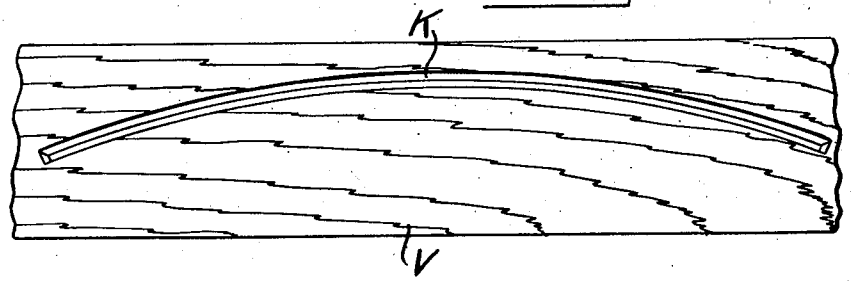


FIG. 7



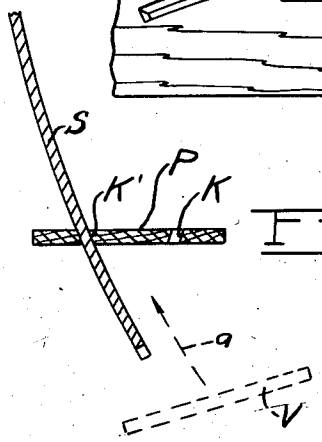


FIG. 8

Inventor

Arthur R. Welch

By Charles L. Reynolds

Attorney

Sept. 20, 1932. A. R. WELCH 1,878,081

ART OF PATCHING VENEER

Filed July 22, 1930 7 Sheets-Sheet 3

Fig. 9

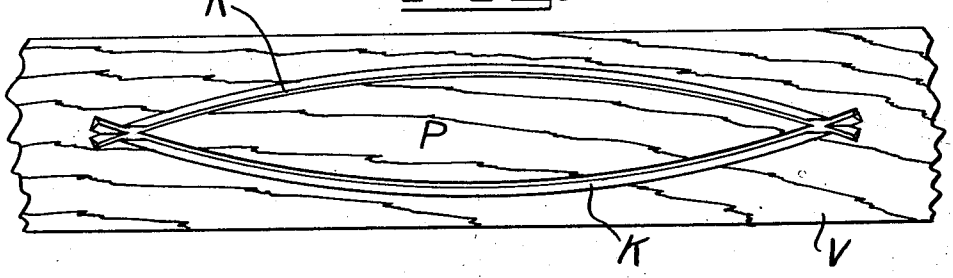


Fig. 10

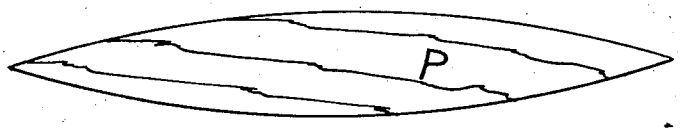


Fig. 11

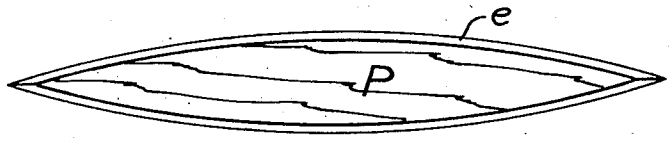
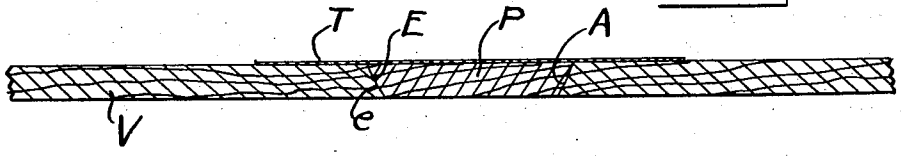


Fig. 12



Fig. 13



Inventor

Arthur R. Welch

By Charles L. Reynolds

Attorney

Sept. 20, 1932. A. R. WELCH 1,878,081

ART OF PATCHING VENEER

Filed July 22, 1930 7 Sheets-Sheet 4

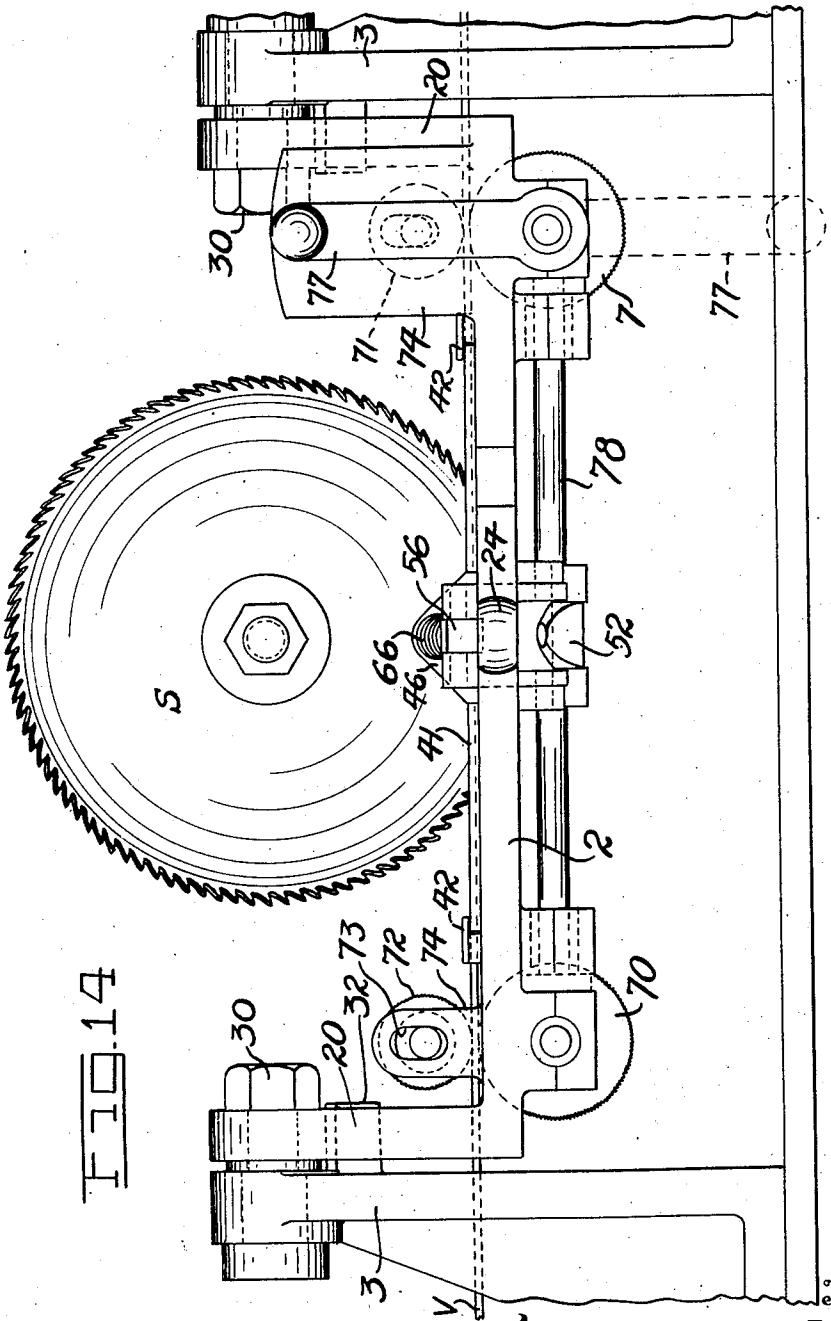


Fig. 14

Inventor

Arthur R. Welch

By Charles L. Reynolds

Attorney

Sept. 20, 1932. A. R. WELCH 1,878,081

ART OF PATCHING VENEER

Filed July 22, 1930 7 Sheets-Sheet 5

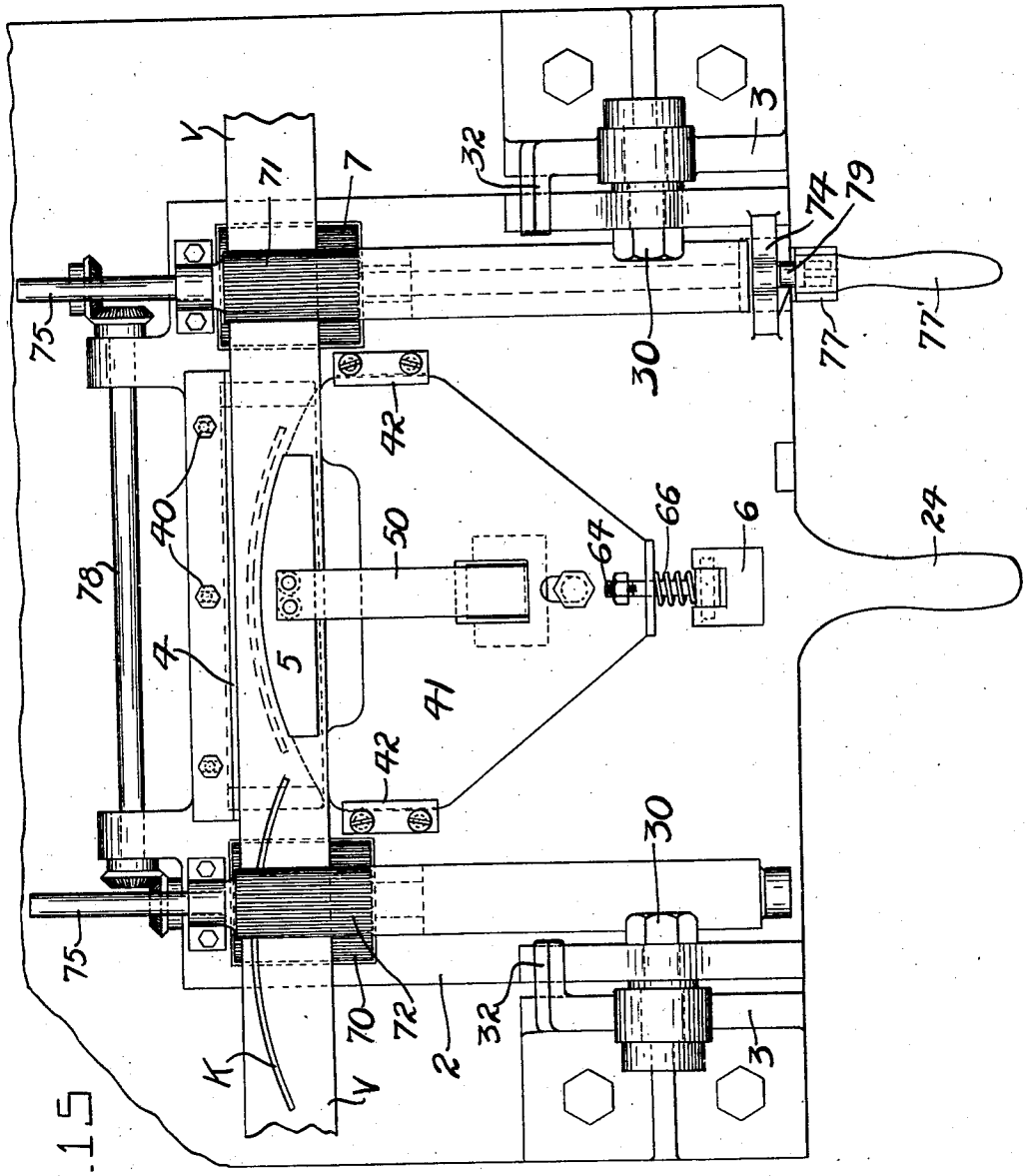


FIG. 15

Inventor

Arthur R. Welch

By Charles L. Reynolds

Attorney

Sept. 20, 1932. A. R. WELCH 1,878,081

ART OF PATCHING VENEER

Filed July 22, 1930 7 Sheets-Sheet 6

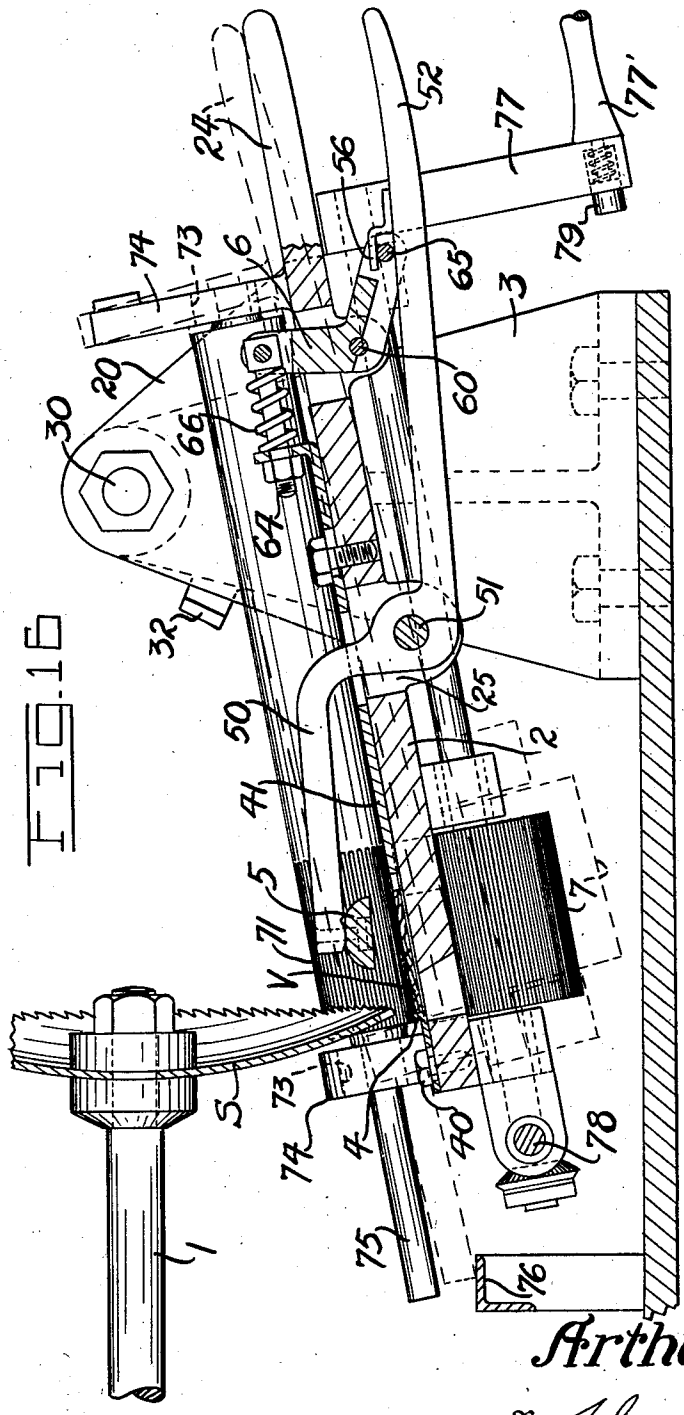


FIG. 16

Inventor
Arthur R. Welch
By Charles L. Reynolds
Attorney

Sept. 20, 1932. A. R. WELCH 1,878,081

ART OF PATCHING VENEER

Filed July 22, 1930 7 Sheets-Sheet 7

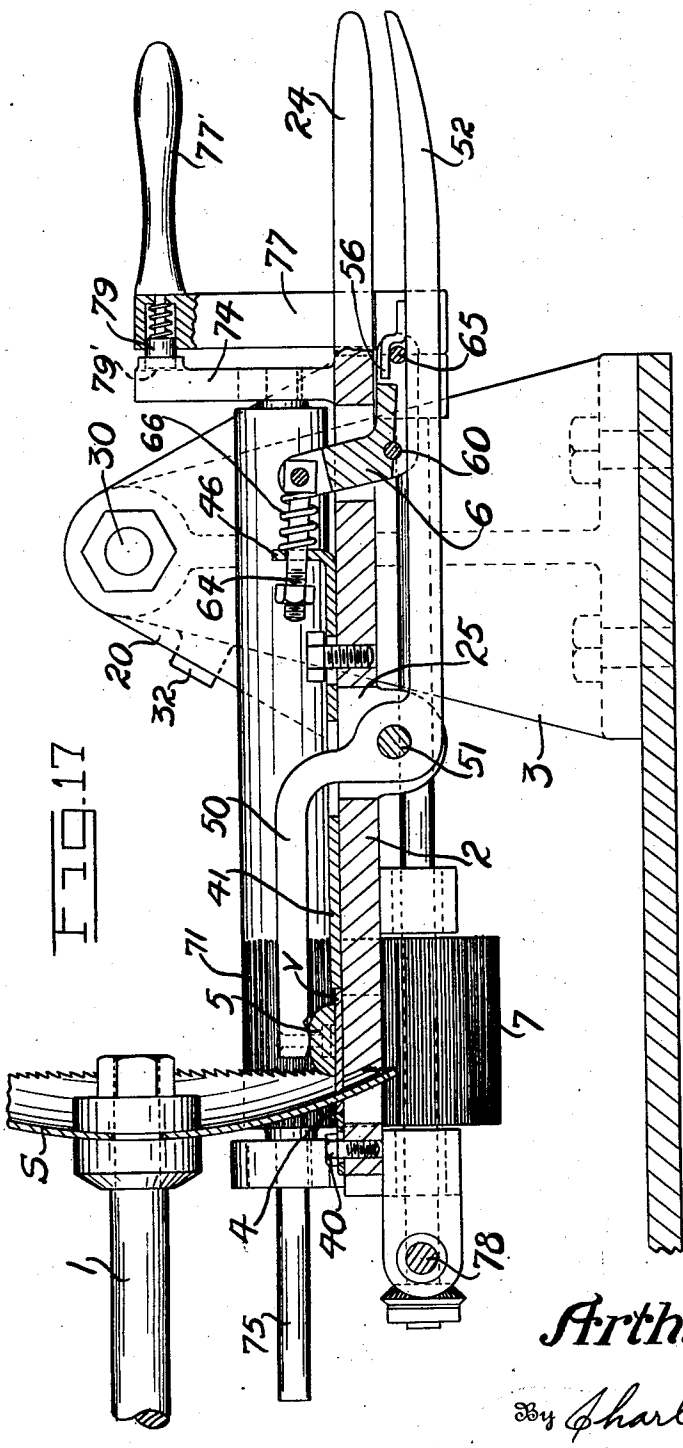


FIG. 17

Inventor
Arthur R. Welch
By Charles L. Reynolds
Attorney

Patented Sept. 20, 1932 1,878,081

UNITED STATES PATENT OFFICE

ARTHUR R. WELCH, OF HOQUIAM, WASHINGTON

ART OF PATCHING VENEER

Application filed July 22, 1930. Serial No. 469,838.

My invention relates generally to the patching of veneer wood or plies, involving the subordinate steps of removing a pitch pocket, and preparing a patch to fit exactly therein. The latter step involves the production of a machine which can accurately produce such patches.

The plies from which veneer or plywood are made up are frequently sound and usable except for occasional pitch pockets. To discard such material, merely because of the presence of these pitch pockets, would be an economic waste, as it would be to cut out a strip the entire width of the veneer ply to include the pitch pocket. On the other hand, the value of the ply and its usability is materially lessened if the pitch pockets are left in place. Attempts have been made heretofore to cut out the pitch pockets and to patch the veneer ply, but such attempts have rendered the patching noticeable, or the patches have been so put in place that they did not permanently hold. Sometimes the patches were put in place so as to fit tightly in the unfinished surface of the veneer, but when this surface is dressed down in finishing the veneer, since the patch does not fit the aperture exactly except at the very surface of the ply, the spacing between the patch and the ply becomes evident, and the outline of the patch becomes plainly apparent, and in addition, the patch is more likely to be lost. Furthermore, such patches, however inserted, were largely noticeable because of the fact that they did not merge into the general grain of the veneer ply, but afforded a sharp break therein transversely of the grain.

It is an object of the present invention to remedy these difficulties, and to produce as a final product a patched veneer ply wherein the outline of the patch is not noticeable however much the ply is dressed down, and wherein there is no sharp break in the grain of the wood, but a gradual merging of the grain of the patch into the grain of the ply itself.

As a subsidiary object, it is an object of the present invention to produce a patch which will exactly and accurately fit the pocket or aperture in the veneer ply, so that there is adhesion between the edge surfaces of the patch and the corresponding edge surfaces of the aperture in the ply, and to produce a method whereby such accurate cutting and fitting of the patch and the aperture in the ply may be done conveniently and without liability of error.

A further subordinate object is the production of a machine for cutting out patches to fit in such apertures, and to produce such a machine which is simple and inexpensive, and convenient and certain in operation, for the patches must be made with extreme accuracy.

Other objects, and more especially such as pertain to the purely mechanical details of my invention, will be ascertainable from a study of the attached drawings, of this specification, and of the appended claims.

My invention comprises the novel process, the novel patch, and the novel machine for making such patches, all as illustrated in the accompanying drawings, as described in this specification, and as will be more particularly defined by the claims.

In the accompanying drawings, I have shown the essential steps of my invention, a typical patch, and the machine for manufacturing the patches, all in forms now preferred by me.

Figure 1 is a plan view of a section of veneer ply in the rough, showing a pitch pocket as it would appear therein.

Figure 2 is a sectional view of a piece of veneer ply, illustrating diagrammatically the cutter entering the same to remove the pitch pocket.

Figure 3 is a transverse sectional view of the veneer ply and the cutter head entered thereinto.

Figure 4 is a plan view of the veneer piece, showing the aperture formed therein.

Figure 5 is a sectional view through the patch-cutting saw and the veneer strip from which the same is to be cut, prior to the first operation, and Figure 6 is a similar view showing the first step in the production of the patch.

Figure 7 is a plan view of a veneer strip, showing the first cut taken therein by the saw, preparatory to forming the patch.

Figure 8 is a section similar to Figures 5 and 6, showing the second and final step in the formation of the patch.

Figure 9 is a plan view of the veneer strip following the second step, and the formation of the patch.

Figure 10 is a top plan view of the patch, standing alone, and Figure 11 is a bottom plan view thereof.

Figure 12 is a transverse section through such a patch.

Figure 13 is a cross section of a veneer ply with such a patch in place therein.

Figure 14 is a front elevation of the patch cutting machine.

Figure 15 is a plan view of the patch cutting machine performing the first step of the patch forming operation.

Figure 16 is a transverse section through the patch cutting machine, showing the same in a position preparatory to performing the first operation, and Figure 17 is a similar view, showing the end of the first step in the forming of the patch.

Pitch seam removing

As may be seen in Figure 1, the surface of the veneer ply V is without a material blemish, other than the pitch pocket *p*, from which pitch oozes, and which is objectionable from that standpoint, in addition to being a blemish so far as the appearance of the veneer is concerned. Accordingly, the first step in my process is to remove the material immediately surrounding the pitch pocket, and this is done by means of any suitable cutter head C, the blades B of which are formed with their side edges lying in spherical surface, this spherical surface having a definitely fixed radius, as indicated at R in Figure 3. This radius may be any which is selected and found suitable, and we may arbitrarily set the same at nine inches. The curvature of the edge of these blades B, then, is that of a sphere of nine inches radius. It follows, then, that as the cutter head enters the veneer strip V, the aperture A which it will cut therein will have two opposed edges which are segments of circles, and the edge surfaces of which are portions of a spherical surface of a radius of nine inches. This is indicated in Figure 4, where these edge surfaces E are shown. The periphery of the aperture A at the lower side of the veneer strip where the cutter blades projected through, would naturally be somewhat smaller than the periphery at the upper surface, where the cutter blades entered. The two curved sides of the aperture will intersect at points at each end of the aperture. The cutter head may enter the veneer ply any given distance, but preferably is caused to enter by any one of a definite number of selected distances, for the reason that the veneer patches, to be described later, are formed in sizes to fit exactly this number of apertures.

Patches

Briefly stated, the patches are formed by moving a veneer strip *v*, desirably of the same thickness as the ply which is to be patched, into engagement with a rotary circular saw S, which saw is dished. This dishing preferably is not a conical dishing, but a spherical dishing, so that the face of the saw is formed on a curve, and this curvature must be of the same radius as the curvature of the cutter head blades B, previously referred to. This being the case, the introduction of the veneer strip *v* to the saw S in the manner indicated by the arrow *a* in Figure 5 and in Figure 6, will cause the production of a saw kerf K in the veneer strip *v*, which kerf will be a circular segment, and its edge surfaces will likewise be curved in the surface of the sphere corresponding to the curvature of the saw S. In other words, the curvature of the edge surface of the kerf K will be precisely the same curvature as the curvature of the edge surfaces E of the aperture A in the veneer ply to be patched.

After the kerf K has been formed in the veneer strip *v*, the strip is reversed edge for edge, and again introduced to the saw, which results in the production of a second kerf K', which kerf K' intersects the kerf K, to remove from the veneer strip *v* a patch P, which is identical in size, shape, thickness and edge curvature with the aperture A. Such a patch is shown in Figure 9 in association with the veneer strip *v* from which it has been cut, and the patch itself is illustrated in top and bottom plan views respectively in Figures 10 and 11. Its edge surfaces *e* are identical with the edge surfaces E, and this is further illustrated in Figure 12.

Ply patching

Now, the patch P may be introduced into the aperture A and held therein in some suitable fashion, usually by the application of glue to the edge surfaces E or *e*, one or both. To retain it in place while drying or while being put through the various subsequent processes, it may be held by a strip or tape of paper, indicated at T, which later may be sanded off or otherwise removed. It will be particularly noted that, because of the edge surfaces E and *e* precisely fitting one another, the veneer ply and its patch may be sanded down as much as might be desired and yet there would not be any appreciable or noticeable gap between the patch and the veneer ply, for they are in close contact over the entire edge surfaces. The patch, in a sense is wedged in place in the aperture, per-

mitting the application of pressure during the setting of the blue which retains it. It will be noted also that the grain in the veneer ply is substantially like the grain in the veneer strip *v*, from which the patch P was taken, and inasmuch as the patch and the aperture receiving it are pointed, the grain in the patch will merge gradually into the grain of the veneer ply, with the result that, in most instances, the location of the patch is extremely difficult to discern, and such patched veneer or plywood can be used in many places where ordinarily the presence of a patch would be noticeable and therefore undesirable.

Patch cutting machine.

Various machines may be employed to cut the patch, but I have found a machine, which I will now describe, to be a convenient one for that purpose. Reference is made to Figures 14 to 17 inclusive. In these views the saw S is shown as secured upon an arbor 1, which arbor is held, by means not shown, in a fixed position, and the veneer strip *v* is brought into engagement with the saw. It is evident that the opposite case might be employed, in which the veneer strip would be held and the saw moved about its own center of curvature into engagement with the veneer strip.

To support the veneer strip, I employ a table 2, which is provided at its opposite sides with ears 20, through which pass bolts 30 received in standards 3 forming part of a bed frame, by means of which the table 2 may be tilted or swung. The axis upon which it swings is normal to the axis of rotation of the saw S, and intersects this axis of rotation of the saw exactly at the center of curvature of the spherically dished saw. Accordingly, when a veneer strip held upon the table 2 is swung with the table along this pivot axis, the effect is the same as though the saw were swung about its center of curvature into engagement with the veneer strip.

To hold the veneer strip upon the table 2, and to position the same thereupon, I may employ a back guide 4 adjustable by means of the bolt and slot connection, indicated at 40, against which one edge of the veneer strip *v* bears, and a follower plate 41, which bears against the opposite edge of the veneer strip *v*, to press it against the back guide 4. The veneer strip is carefully edged to precisely the proper width. Operation of the follower plate 41 is obtained in a manner which will be later described and it is sufficient to note that it is held by guide members 42 secured upon the table 2 for movement toward and from the veneer strip and the back guide 4. A clamping or holding shoe 5 is held for movement toward and from the table to clamp down upon the veneer strip, and to hold it in position upon the table during the operation of cutting the kerf K or K′. Conveniently, such a clamping shoe is supported upon one end of a lever 50, pivoted at 51 upon the under side of the table 2, and passing through an aperture 25 therein, its other end extending to the front side of the table where it may be grasped by the operator. It is placed conveniently with respect to a handle 24, by means of which the table itself may be tilted.

The operation of the follower plate 41 is conveniently attained through the same lever 50, and to this end a bell-crank lever 6 is pivoted at 60 upon the table 2, one end having a pin 65, with which is engaged a hook 56 upon the lever 50, and to the other end of the bell-crank lever 6 is connected a drag link 64, which is received in an aperture in an upstanding ear 46 of the follower plate 41, and a compression spring 66 is interposed between the ear 46 and the bell-crank lever 6. Movement upward of the handle 52 of the lever 50 first compresses the spring 66 and yieldingly forces the follower 41 into engagement with the veneer strip *v* to press it against the back guide 4, and continued upward movement of the handle 52 brings the clamping shoe 5 down upon the veneer strip to hold it in this position.

Now the table may be swung to engage the veneer strip with the saw, following which it is tilted into the position shown in Figure 16 from the position shown in Figure 17, and the handle 52 is released, whereupon the spring 66 causes the shoe 5 to lift, and further downward movement of the handle 52 completely releases the follower plate 41 from engagement with the veneer strip *v*. Suitable stop means may be provided to limit the upward swing of the table 2, and to that end I have shown a stop 32 positioned to engage the ears 20 of the table 2 to limit its swing in this direction.

Following such movement of the table and the cutting a kerf K in the veneer strip *v*, the strip should be advanced into position for a second cut, a number of such cuts being made along one edge of the strip before it is reversed and the cuts K′ made. To enable the feeding of the veneer strip the proper amount, I hold the same between lower live rolls 7 and 70, and upper pressure rolls 71 and 72 respectively. All of these rolls are supported upon the table 2, the feed rollers 7 and 70 being journaled in the under side thereof, and projecting through to the surface to engage the veneer strip. The pressure rollers 71 and 72 are supported to permit some movement toward and from the table 2, as by receiving their respective shafts in the slots 73 of ears 74. The rear ends of the shafts of the rollers 71 and 72 are extended as indicated at 75, and at the extreme limit of their movement to swing the table away from the saw, they are permitted to contact with a fixed stop 76, by means of

which the pressure rollers may be raised above the veneer strip to permit the free insertion of a new strip.

Any convenient means for advancing the veneer strip may be employed, and I have shown a crank 77 upon the end of the shaft of the feed roller 7. The two rollers 7 and 70 are connected at their back side by a cross shaft 78 and suitable gearing (see Figures 16 and 17). The handle 77′ of the crank arm 77 is connected to a spring-projected pin 79, which is receivable in a socket 79′ in one of the ears 74, whereby the crank arm 77 may be positioned exactly in place after having completed a revolution, and the parts are so proportioned that one revolution of the crank arm 77 produces an advance of the veneer strip *v* exactly corresponding to the longitudinal spacing between patches, or between kerfs K or K′.

It is believed that the operation of the machine will now be obvious. A number of kerfs are cut along one edge of the veneer strip, the strip being advanced following the cutting of each kerf, and its withdrawal from the saw by a rotation of the crank arm 77. It is again engaged with the saw by swinging the table 2 upward, and this is repeated until kerfs have been cut the entire length of one edge of the veneer strip *v*. The strip is then removed and reversed edge for edge and kerfs K′ cut along the opposite edge, care being taken that the first of these kerfs matches up and intersects with one of the kerfs K previously made. The strip is again advanced, and since the advance is precisely the same as formerly, all of the second kerfs K′ will match the first kerfs K, and the curved edge patches will be removed from the veneer strip. Naturally, by varying the amount the saw enters the veneer strip, the length and size of the patches will be varied, but they will always have the same curvature, and if their outline and size is always varied in accordance precisely with the variance in the cutting of the apertures A, the patches will always fit precisely the correspondingly sized apertures. This is all dependent upon the stopping of the cutter head and the stopping of the saw alike, and upon the employment of a like radius of curvature for the cutter head blades and for the dish of the saw.

What I claim as my invention is:

1. A veneer ply patch comprising a wooden piece of substantially the thickness of the ply to be patched, and having side edges which are like segments of a sphere, intersecting to form pointed ends.

2. A veneer ply patch cutting machine comprising a veneer strip holding means, a dished circular saw, means for causing a relative swinging movement between the saw and the holding means along an axis normal to and intersecting the saw's axis, to engage the saw with the strip, and means associated with the holding means for advancing the strip, when disengaged from the saw, by a predetermined amount.

3. A veneer ply patch cutting machine comprising a veneer strip supporting means, a strip clamping means associated therewith, a strip advancing means, a dished circular saw, means for causing a relative swinging movement of the strip holding and clamping means relative to the saw, along an axis normal to and intersecting the saw's axis, and means operable by extreme movement of the holding means away from the saw to release said feeding means to permit insertion of a fresh strip.

4. A veneer ply patch cutting machine comprising a table, means for positioning and for holding a veneer strip thereupon, a common control lever for said positioning and said holding means, a spherically dished circular saw, and means supporting said table to swing upon an axis normal to and intersecting the axis of said saw at its center of curvature.

5. A veneer ply patch cutting machine comprising a table, means for positioning and for holding a veneer strip thereupon, a common control lever for said positioning and said holding means, a spherically dished circular saw, means supporting said table to swing upon an axis normal to and intersecting the axis of said saw at its center of curvature, and feed means engaging a strip held upon said table to advance the same at will.

6. A veneer ply patch cutting machine as in claim 4, the positioning means comprising a follower plate slidable along the table, and a cooperative back guide fixed in position upon the table, the holding means comprising a shoe movable towards and from the table surface, and the common control lever being pivoted between its ends upon the table, one end supporting said shoe, and a bell-crank lever engageable with its opposite end, and a drag link and compression spring connecting said bell-crank lever with said follower plate.

7. A veneer ply patch cutting machine as in claim 5, the feed means comprising upper and lower rolls journaled in said table to receive the veneer strip between them, the upper roll being mounted for movement away from the lower roll, means for driving the lower roll and stop means engageable with the upper roll at the limit of swing of the table away from the saw, to lift such roller from contact with the veneer strip.

8. The process of patching veneer which consists in providing a peripheral cutting cutter, the chordal cross section of which would be defined by intersecting circular segmental edges converging on curves towards their outer edge; the segments intersecting each other at sharp angles, and the rotation and projection of such cutter through a ve-

neer ply so as to form an opening, and the application to such opening of a patch formed with two intersecting edge surfaces of curvature the same as the curvature of the edge surfaces of the opening, causing the edge surfaces of the patch to fit the edge surfaces of the aperture.

9. The process of patching veneer which consists in providing a peripheral cutting cutter, the chordal cross section of which would be defined by intersecting circular segmental edges converging on curves towards their outer edge; the segments intersecting each other at sharp angles, and the rotation and projection of such cutter through a veneer ply so as to form an opening, and the application within such opening of a patch formed by two intersecting cuts of a dished circular saw, to fill the opening and cause the edges of the patch to fit the edges of said opening.

10. The process of patching veneer which consists in cutting through a veneer ply to form therein an opening having edge surfaces forming parts of a body of rotation, the chordal cross section of which would be defined by intersecting circular segmental edges converging on curves towards their outer edge; the segments intersecting each other at sharp angles, and the application within such opening of a patch formed with two intersecting edge surfaces of curvature the same as the curvature of the edge surfaces of the opening, to contact the edge surfaces of patch and opening substantially throughout their entire extent.

11. The process of patching veneer plies, prior to their incorporation in plywood, which consists in removing material from the ply to form a hole extending entirely through the ply, such hole having opposed and intersecting edge surfaces formed as like segments of a sphere, applying thereto a patch of identical outline and edge curvature, and causing adhesion over the entire edge surfaces of the patch and ply.

Signed at Seattle, Washington, this 12th day of June, 1930.

ARTHUR R. WELCH.