Jan. 22, 1952 P. F. SKOOG 2,583,396

PROCESS OF INLAYING SHEET MATERIAL AND THE PRODUCTS THEREOF

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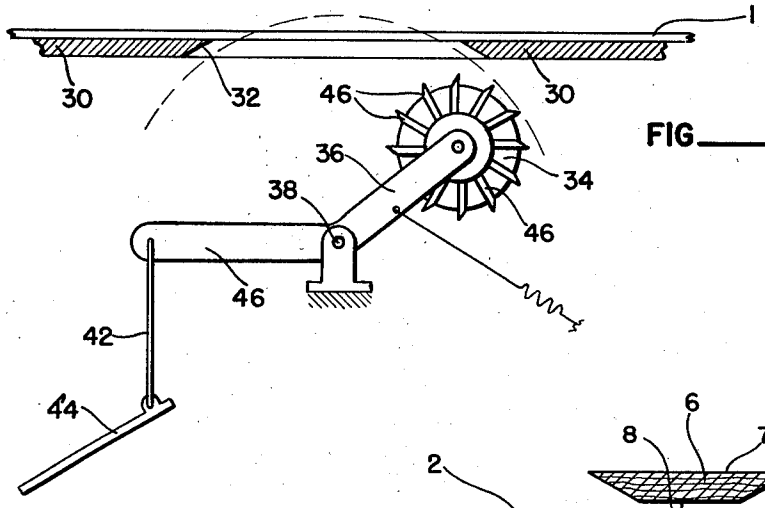


FIG. 1

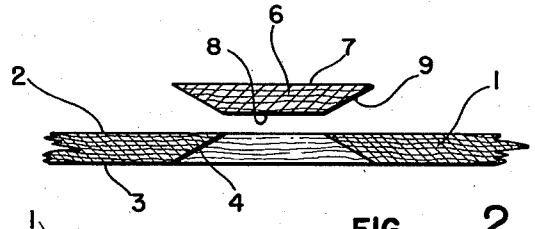


FIG. 2

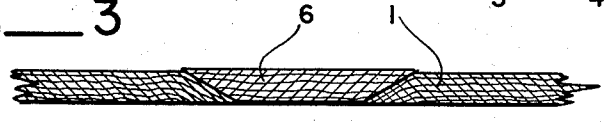


FIG. 3

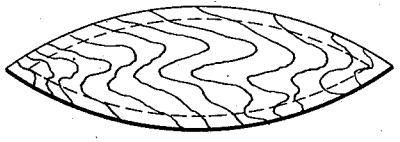


FIG. 6

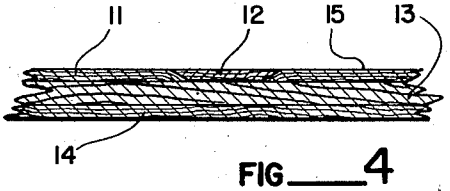
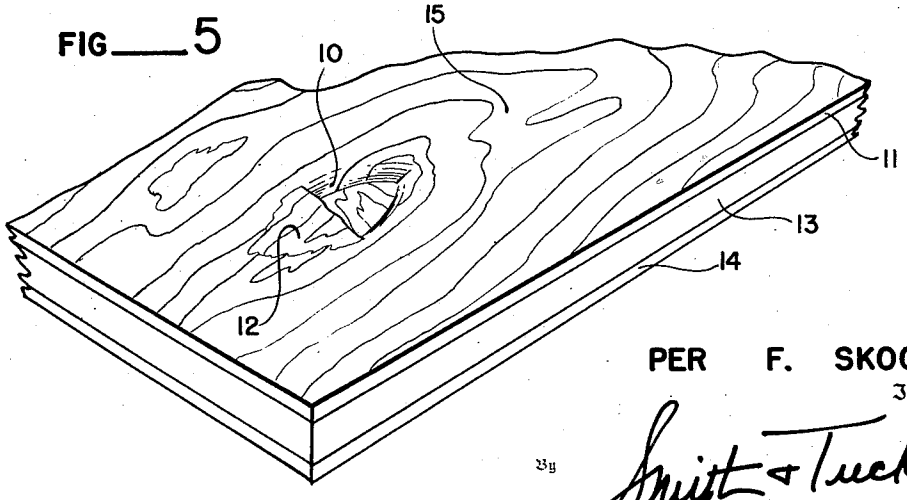


FIG. 4

FIG. 5



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PROCESS OF INLAYING SHEET MATERIAL AND THE PRODUCTS THEREOF

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4 Claims. (Cl. 20—89)

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My present invention relates to a process of inlaying sheet material and the products thereof, and, more particularly, is the provision of a novel method of patching wood veneer and the patched veneer and plywood products resulting from said method.

The description of my invention as to its use in the plywood industry will be employed herein for purposes of exemplification. It will be apparent, however, that the invention will have application in other ways well within the abilities of those skilled in the field of sheet material production and ornamentation.

In the prior art of patching veneer sheets, it has been usual to cut out the damaged part of the sheet so that there is an opening with either straight sides, or sides which slope inwardly from the face of the sheet. A patch is formed of a configuration that is intended to be the same as the opening so that when the two are fitted together the walls of the opening will contact the walls of the patch. However, a close fit has never been fully obtainable. In order to practice the process of the prior art, it was necessary for the patches to be very accurately cut to closely fit the opening in the veneer sheet. If the work was not properly done, as is usually the case, the fiber ends of both the patch and the sheet would buckle upwardly and show on the face of the sheet. This is particularly true where the fibers have been cut at more or less right angles to the grain of the sheet. Gaps around the patch would occur which requires a second step of patching. In many cases the resulting prior porduct, even after sanding, had a surface which was unsightly, which would not take stain or paint in an even manner, and in which the patch was most obvious, thus rendering the finishing of the surface difficult and unsatisfactory. At this time the face patching of quality veneer and plywood is practically unknown or so expensive as not to be economically possible.

Having in mind these and other defects of the prior art, it is among the important objects of this invention to provide a process of inlaying sheet material, of which veneer is a good example, so that the inlayed piece is practically invisible; a process that is economically usable in the inlaying or relatively low-cost sheet material for the purpose of up-grading the same and making it more valuable in industry; a process which, in the woodworking industry, permits a greater use of the less perfect products of the forest in the manufacture of veneer and plywood; a process which is simple and easy to perform and may be practiced with a modicum of equipment and relatively unskilled labor; and a process of patching veneer for overlaying and plywood uses in which there is a feathering of the edges of the patch so that the same may be sanded and finished and will blend with veneer without the formation of a distinct and apparent line of juncture in the sheet material. Other objects include the provision of a novel veneer and a novel plywood as products in industry and characterized by having superior face qualities without the requirement that they be produced from superior products or with the employment of great skill and labor to overcome surface defects in the exposed face.

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The defects mentioned above in the prior art are remedied, and the foregoing objects are attained by forming in a sheet of veneer, for example, an opening which is flared and has sloping walls. Assuming one particular face of the sheet to be that to be exposed, the opening flares from that face toward the other face through the sheet, which means that the edges of the opening on the face side of the sheet overhang. A flare-edged patch similar in configuration to the three-dimensional area of the opening is formed and positioned so that the smaller face of the patch and the smaller end of the opening are adjacent each other, and the slope of the patch is opposite the slope of the walls of the opening. In this relation the larger face of the patch, which is that that will be exposed in the face of the veneer, is offset from the veneer sheet and the smaller face if the patch is facing the veneer face. The patch and opening are axially aligned. An adhesive material is applied between the edges of the patch and the veneer that it will contact, and the patch is pressed to the veneer to cause the two elements to assume a coplanar relationship. Such pressing forces the overhanging edges of the veneer around the opening to be deflected so that the face fibers of the veneer around the opening lie along the slope of the patch walls, or, to put it another way, the opening is reversed. When the adhesive has set, the pressure is removed and the veneer has been patched. After the veneer has been glued onto another layer of wood (crossband) the routed section of the sheet under the patch, as well as the exposed center portion of the patch, is firmly bonded to the crossband and held in line therewith. Subsequent sanding of the face of the veneer when in place on a backing structure removes outstanding fibers of the patch and feathers the patch edge onto the veneer face so

as to substantially hide the patch in the grain of the veneer. By careful selection of the material for the patch and veneer as to the matching of the grain between the two, invisible patching is possible.

The process described briefly above and the products of this invention are illustrated in the accompanying drawing, in which

Figure 1 is a detailed view illustrating the manner of forming an opening in a sheet to be inlayed;

Figure 2 is an enlarged sectional view, taken along the fiber or grain of the sheet, and showing a patch positioned for insertion into the sheet;

Figure 3 is a sectional view similar to Figure 2 showing the patch in place in the sheet;

Figure 4 is a sectional view of plywood sheet having a face ply patched or inlayed according to my invention;

Figure 5 is a perspective view of a veneer sheet patched according to this invention and having parts broken away and shown in section for convenience of illustration; and

Figure 6 is a plan view of the broad face of a boat-shaped veneer patch.

While inlays of various shapes may be obtained according to this invention, since its application is described in connection with its use in the plywood and veneer industry, I have found that the boat-shaped patch having double convex edges and either pointed or slightly rounded ends is most desirable since it blends well with grain structure and is the most simply produced and used. However, it will be apparent that frusto-conical patches and diamond shaped patches are also entirely possible and, under certain circumstances, desirable or useful.

I have shown in Figure 1 the manner in which the veneer sheet is cut to provide the desired opening. The sheet 1 is placed on a table 30 having an opening 32 over which the defect of the sheet is oriented prior to cutting. Cutter-head 34, suitably rotated, is mounted on arm 36 to swing about the axis of crank pin 38, to which is attached lever 40 that is connected by link 42 to foot pedal 44. A spring 46 will serve to return the cutter head. Preferably, the cutters 46 of head 34 are V-shaped and are ground to an angular relationship to the plane of table 30 that is desirable for the particular veneer being inlayed.

It will be understood that the showing of Figure 1 is schematic as other equipment is contemplated, and it will be quite obvious that the cutting of the veneer can be a manual operation employing the most simple hand tools.

In Figure 2 is shown a sectional view of a sheet of wood veneer having an elongated opening therein to be patched and, adjacent to the opening, a matching patch for insertion therein. The sectional view is taken along the longitudinal fibers of the sheet and patch. The opening in the sheet may be of any suitable form, either round or boat-shaped, boat-shaped being usual in the patching of veneer. The veneer sheet 1 is considered to have a face 2 and a back 3. The opening in the sheet has sloping walls 4 which flare from the face 2 to back 3. The angles which the walls of the opening make with the face of the sheet is not critical and vary between 5° and 45°, but in Douglas fir veneer I have found that an angle of 15° is most practical to use. The patch 6 for the opening has a face 7 and a back 8 with sloping edge walls 9. The angle which the face of the patch makes with the sloping walls is

generally equal to the angle which the face of the sheet makes with the walls of the opening. It is to be observed that if the back of the patch is placed in the plane of the face of the sheet, the walls of the opening will intersect the edge walls of the patch on the line of the sheet face opening, and that the face of the sheet will be a bisector of the angle formed by the intersection of said walls. If the angle of the walls of the opening varies around the opening, then the angle of the walls of the patch should vary in the same manner around the patch, so that the face of the sheet continues to be a bisector of the intersecting walls; that is, the acute angle of the edge of the opening will be substantially the same as the acute angle of the edge of the patch. The patch is formed with the same conformation as the opening to be filled, with the exception of the slope of the patch edge-wall being inward from the face 7, whereas the slope of the opening wall is outward from the face of the sheet. Generally, the patch is cut so that its grain will lie parallel to the grain of the sheet.

Insertion of the patch in the opening is had, first, by bringing the patch into registry with the opening as shown in Figure 2 and applying a suitable adhesive to the walls of the patch and around the opening. However, the adhesive may be applied before bringing the patch into registry. Second, the patch is then forced into the opening in any suitable manner, as by the use of pressure platens that may be heated where thermoplastic or thermosetting adhesives are used. This forcing of the patch into the sheet opening will bend the sheet fibers overhanging around the opening, downward so that the fibers of the face around the opening will lie along the sloping wall of the patch, and the end of the sheet fibers at the opening will show on the back side of the sheet. This condition is shown in Figure 3.

The turning down of the edge of the opening of the sheet insures that the ends of the sheet fibers will not show on the face and will aid in feathering the edge of the patch. It is to be understood that the veneer fibers at the side of the patch, which have not been cut in making the opening, will not have ends showing on the back side of the sheet. This condition is illustrated at 10 in Figure 5, where the patch has been shown partly broken away after having been inserted in the veneer. The use of suitable heated platens and adhesives will set the adhesive applied to the patch and sheet so that, at the end of the patching operation, the patch will be securely held in place, as shown in Figure 3. However, if the adhesive is a slow setting adhesive, the plywood sheets may be left in the press or placed in a stack with other sheets under pressure until the adhesive has set.

Following insertion of the patch, the face of the sheet and patch may be sanded to remove any surface roughness, and to feather the edges of the patch. This sanding and further feathering of the edges of the patch aid in obscuring the glue line between the patch and sheet but will not uncover fiber ends of the sheet, as often happens in the prior art patching process.

Figure 4 shows a veneer sheet 11 having therein a patch 12 inserted in the manner of the present invention and, incorporated with the filler, or core, 13 and backing veneer 14, the three sheets form a plywood sheet. When a veneer sheet, patched in accordance with the present invention, is incorporated properly in a plywood

sheet, the end fibers of the free face 15 of the sheet adjacent to the patched opening are hidden and buried against the core stock 13.

Ordinarily, it is desirable that the patch inserted into the veneer sheet not be pressed in farther than to align with the back face 3. It is even possible to secure excellent results where the patch is only partially inserted, since any cavity thereunder is usually filled with adhesive when the veneer is layed up into plywood or on a piece of core stock. The important consideration is that the face of the patch lies slightly above the face of the sheet so that when sanding of the sheet is had, the patch will be cut down to the level of the sheet. While sanding is best practiced when the veneer has been mounted on a core or stiff backing, it is also possible to perform the same on the relatively thinner veneer sheets.

It has been found that, in finishing sheets processed in accordance with the present invention, they take stain, paint, varnish, or other surfacing materials much better and more evenly than do the prior art sheets, as there are none of the ends of the sheet fibers exposed and only a very few ends of fibers from the patch exposed.

Having thus described my invention, I claim:

1. A patched veneer sheet having secured in an opening therein a flat-faced patch having substantially normal and undistorted cell and grain structure and having its edge walls cut to flare from the back to the face of said veneer sheet; the face of said patch being positioned substantially in the plane of the face of said sheet and the back of said patch being positioned substantially in the plane of the back of said sheet; the walls of said opening being formed of grain structure integral and originally coplanar with the face grain of the veneer sheet and bent to lie along said walls of the patch, and being tensed to press against said walls of the patch; and the portion of said veneer sheet forming that surface of the back immediately bordering said patch lying substantially in the same plane as the rest of the back of the veneer sheet and being formed of material originally constituting the walls of an opening in said veneer sheet which flared from the face to the back of said veneer sheet.

2. The product of claim 1 in which the patch is boat-shaped and the opening in the veneer conforms thereto.

3. A plywood assembly in which a face veneer sheet is patched by having secured in an opening in the veneer sheet a flat faced patch having substantially normal and undistorted cell and grain structure and having its edge walls cut to flare from the back to the face of the veneer sheet; the face of said patch being positioned substantially in the plane of the face of said sheet and the back of said patch being positioned substantially in the plane of the back of said sheet, and the portion of said veneer sheet forming that surface immediately bordering said patch lying substantially in the same plane as the rest of the

back of the veneer sheet and being formed of material originally constituting the walls of an opening in said veneer sheet which flared from the face to the back of the veneer sheet the walls of the first mentioned opening being formed of grain structure integral and originally coplanar with the face grain of the veneer sheet and bent to lie along said walls of said patch and being tensed to press against said wall of the patch, and said patch being adhesively bonded at its inner face to the veneer sheet of said plywood assembly next underlying said face veneer sheet.

4. In the art of disguising defects in wooden veneer sheets by wooden patches, the method, comprising: forming an opening in a wooden veneer sheet in an area having a defect so as to remove the defect and a portion of the veneer sheet therearound, the forming of the opening being conducted when said area is in its natural, undistorted position in said sheet and before the patch is placed in the position it is to occupy in said sheet, said opening being formed with walls flaring from the face to the back of said sheet; forming separately a patch with a face, back and sloping walls having substantially the same shape and size as said opening but with the walls converging from the face to the back of said patch when the patch is in a natural, undistorted condition; placing said patch in a position off-set to the face of said sheet and in registry with said opening with the slope of the walls of said patch and said opening directed opposited and non-parallel and with the back of said patch on the side thereof towards said sheet and with the face of said patch on the side thereof away from said sheet; and then, lastly, pressing said patch toward said sheet to wedge the same into said sheet and opening to cause the face of said sheet adjacent said opening to be deflected toward the back of said sheet to lie along said patch walls and forcing said flaring walls of said opening to lie generally in the same plane as the back of said sheet and with the face of said patch generally lying in the plane of the face of said sheet and with the back of said patch generally lying in the plane of the back of said sheet, said patch remaining substantially undistorted, and adhesively bonding said patch in place.

PER F. SKOOG.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
256,567	Holmes	Apr. 18, 1882
1,498,545	Fox et al.	June 24, 1924
1,703,890	Loetscher	Mar. 5, 1929
1,878,081	Welch	Sept. 20, 1932
2,175,654	Alenius	Oct. 10, 1939
2,536,665	Skoog	Jan. 2, 1951