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A. ELMENDORF

2,564,055

PLYWOOD PANEL

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Fig. 1.

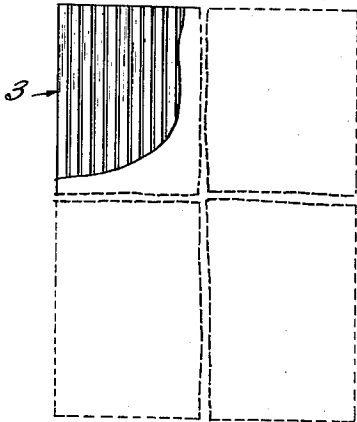


Fig. 2.

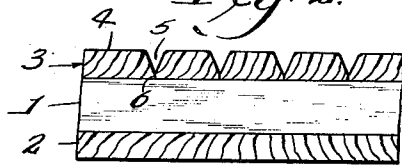


Fig. 5.

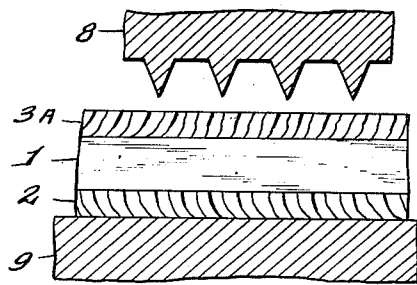


Fig. 6.

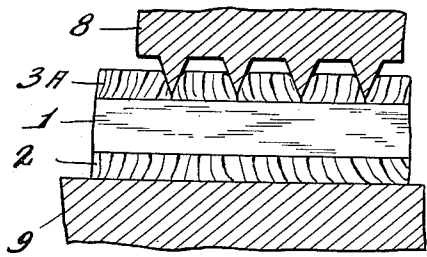


Fig. 3.

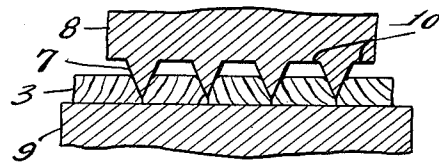
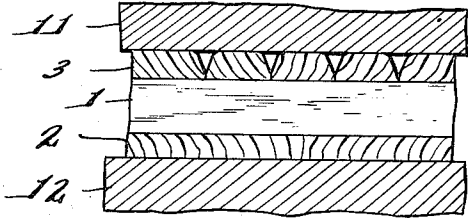


Fig. 4.



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UNITED STATES PATENT OFFICE

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PLYWOOD PANEL

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7 Claims. (Cl. 20—89)

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The use of plywood or other panels faced with wood veneer is sharply limited by the fact that when exposed to the weather the veneer facings check and crack after repeated wetting and drying. In the case of some woods this disadvantage is much greater than in others; as, for example, rotary cut soft wood veneers such as Douglas fir. In such woods the tendency to crack or check is so great that even the protection of heavy coats of paint is frequently not enough to prevent the same.

The object of the present invention is to overcome and control the aforesaid tendencies in wood face veneers to check and crack, thereby making it possible to use plywood successfully under exposure to the weather.

Even if the most waterproof resin adhesives are used and no weakening of the bond between the plies takes place after prolonged exposure to the weather, most plywood gives evidence of disintegration by checking of the face veneers and fractures in the finish within a year or two after exposure to the weather has begun. Several methods have been proposed for reducing this liability of exterior grade plywood, such as impregnation of the exposed veneers with phenol-formaldehyde resins. But this adds greatly to the cost of the plywood and renders it non-competitive with various other types of exterior panelling. Another method proposed consists in increasing the thickness of the face veneer and then cutting numerous parallel grooves by means of notched blades to produce the appearance of raised grain in a weathered, unpainted board. This method calls for the removal of a substantial part of the wood substance in the face veneer, thereby weakening the plywood; but even more serious is the fact that while there is some reduction in the checking of the ridges left after removing the wood from the valleys, checking in the valleys between the ridges appears to be aggravated. Shrinkage stresses in the bulk of the remaining wood constituting the ridge set up tensions in the relatively thin wood at the bottom of the valley in excess of the tension that would have existed in the same place had no wood been removed. A single soaking and drying is therefore generally sufficient to introduce numerous checks over the entire surface of the panel at or near the bottoms of the numerous grooves. Once a minute fissure takes place in the paint, permitting access of moisture to the wood, the process of disintegration begins due to the alternate expanding and shrinking of the wood on either side of the valley just as in ordinary un-

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grooved plywood in the wood on either side of a check in the face veneer.

The present invention has for its purpose to set up stresses, under controlled conditions in the factory, so great that there are artificially introduced along specified zones or lines crevices or checks that are the equivalent of years of weathering and are so large that they may be filled with paint in advance of exposure to the weather. I have found that this can be done without removing wood substance from the exposed face veneer and without altering the flat surface of the plywood over most of the area of the panel. The resultant plywood still presents a flat surface to view.

In my previous application, Ser. No. 520,909, now Patent No. 2,514,318 dated July 4, 1950, I have illustrated one method of pre-stressing the face veneers so as to introduce by artificial means numerous checks along edges of narrow strips, the wood between these strips being highly compressed into narrow valleys. Inasmuch as all the wood substance remains in the valleys the checks or fractures in the weakened zones at the edges of the narrow strips do not grow and do not cross the valleys.

I have now found that similar release of stresses as barriers to the extension of checks or cracks can be introduced at specified closely placed intervals, by wedging the wood apart along closely spaced lines parallel to the grain of the face veneer, the resultant grooves being wide enough to permit easy access of paint by brushing and deep enough to pass substantially through the thickness of the face veneer, the wood on each side of the groove being compressed. No wood substance is removed. When the wedges used to split the wood into narrow strips do not completely sever the face veneer, observation of the bottoms of the grooves shows these to be fractured by numerous fissures into which the paint can penetrate. The face veneers are thus divided into narrow strips effectively separated by breaks in the continuity of the wood.

The wedging may be done by rollers having annular V-ridges at closely spaced intervals or by means of plates having narrow V-ridges closely spaced but far enough apart to provide a flat, unaltered zone between grooves. Heated rollers or plates greatly facilitate the action desired on account of the softening of the wood due to vapor generated within the wood.

The wedging and separating of the wood into narrow strips may be done while the veneer is green, using hot, ridged plates and simultaneous-

ly drying the veneer. The resultant veneers are then glued as face plies into plywood by conventional procedure, just as if they had not been processed in any manner. This is my preferred procedure as it insures good bonding of the face veneers to the core of the panel.

The green or wet veneer may also be grooved and simultaneously dried and glued to the core veneer if certain adhesives are used—for example, combinations of phenolic resin with blood albumen—but the resultant bond is generally not so satisfactory as the glue bond obtained when the face veneers are dried before gluing.

A third method consists in first gluing the plywood by conventional procedure, using face veneers conventionally dried and then wedging the face veneers apart into narrow strips with ridged plates, in a hot press. To do this successfully there may be some weakening of the core veneer when making a 3-ply panel, on account of the pressure exerted at the edge of each ridge of the metal plate, causing indentations in the core veneer at each ridge.

Similar results may also be achieved if face veneers, conventionally dried, are wedged apart into strips, as heretofore described, before the gluing as a separate operation. It involves three operations, namely, drying the veneer, separating it into strips, and gluing; being therefore not as economical as the first method.

Whenever the wedging step is carried out under both pressure and heat, the wood at the sides of the grooves or valleys is case hardened or, in other words, the steam generated in the wood contacting the wedges sets and no longer has a tendency to expand or shrink.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of the invention and its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawing, wherein:

Figure 1 is a face view of a small portion of a panel embodying the present invention, the outline of the whole panel being indicated in broken lines; Fig. 2 is an edge view of the panel on an enlarged scale, only a fragment of the panel being shown; Fig. 3 is a section through a hot press closed on a sheet of wood veneer to process the same, only fragments of the veneer and the press being shown; Fig. 4 is a section through a press closed on a panel assembly including the processed face ply of Fig. 3, to bond the plies together, and only fragments of the panel assembly and press being shown; Fig. 5 is a sectional view of a press about to close on what may be either a panel assembly that includes a face ply to be processed, or a complete panel, only fragments being shown; and Fig. 6 is a view similar to Fig. 5, showing the press closed on the work.

In the drawing I have illustrated my invention as embodied in a plywood panel containing three plies, and the detailed description will be confined to this embodiment, although the invention is applicable to any laminated panel so long as it has a face veneer.

The panel illustrated in Fig. 2 comprises a core ply 1, interposed between two thinner wood veneers, 2 and 3; the latter being the face ply. The thicknesses of the several plies may be varied. By way of example, it may be assumed that the face ply has a thickness of about one tenth of an inch which is a common thickness for faces on structural Douglas fir plywood panels. In such

a construction the face ply is divided into strips 4 that are preferably from one eighth to one quarter inch wide; an average width being about three sixteenths of an inch. Between the strips are valleys 5 that are wide and deep, being preferably V-shaped in cross section; the angle of the V being from 30°–60°. The valleys need not extend entirely through the veneer, provided that they were made in such a manner, or the veneer was afterward manipulated in a manner, that the small thickness of wood at the bottoms of the valleys is ruptured, as indicated at 6; whereby the strips are left joined together with filaments that bridge the gaps and are separated by crevices.

The valleys are created by suitable wedge bars or ridges. These bars or ridges may be of various types so long as they will fashion the desired kind of valleys. In Fig. 3 the plate ridges 7, are wedge-shaped in cross section and are carried by the upper platen of a hot press having upper and lower platens 8 and 9, respectively. The ridges extend across the width of the press, parallel to each other and with their sharp edges from one eighth to one quarter of an inch apart, depending on the widths that the strips are to have. The sides of the ridges that meet at the edges are preferably arranged at an angle of about 45°. Therefore, when the ridges are forced down into the veneer, as in Fig. 3, they produce valleys that are V-shaped and are wide enough at the top to permit paint from a brush to reach the bottom of the valley. The ridges are preferably slightly deeper than the thickness of the veneer to be processed so that when green veneer is placed in the press, with its grain running in the direction of the length of the blades, and the press is closed, venting channels 10 are left above the veneer for the escape of the steam generated in the veneer by the heat delivered to the latter by the hot press.

It will be seen that when the press closes on the veneer in Fig. 3 and the ridges descend, the wood on either side of the wedges is progressively pushed sidewise, compressing the narrow strips laterally along their edges. When green veneer is used, each strip is held in place as in a vise so that the veneer sheet does not lose in overall width, but the gaps 6, previously referred to, are opened.

After face veneer has been processed in the manner just described it may be assembled with plies 1 and 2 and be placed in a press between smooth platens 11 and 12, as in Fig. 4.

Because the green wood in the strips is not constrained, during drying, but is only prevented from moving bodily out of position, and lateral compression more than compensates for shrinkage, no checks, or cracks develop therein during the drying and processing. Consequently, if the veneer is properly handled in the operations to make a plywood panel containing it as a face ply, subsequent changes in moisture content will not result in the usual checking or cracking. The resistance to checking and cracking is, furthermore, augmented by the case hardening of the wood adjacent to the valleys while in the hot press.

The processing of the face veneer may be carried out after a panel has been made in any conventional way. Thus in Fig. 5 there is shown a simple three ply panel composed of plies like those of Fig. 2, except that face ply 3A is continuous. When this panel is placed in the same hot press as that illustrated in Fig. 3, namely, as shown in

Fig. 5, and the press is closed as in Fig. 6, the resulting panel is substantially the same as that produced by the method partly illustrated in Figs. 3 and 4. The panel is of course so positioned in the press that the grain of the wood in ply 3A runs in the general direction of the blades; the effect of closing the press on the panel being the same as in the case of a simple piece of veneer.

Figs. 5 and 6 may also be said to illustrate the combining the two separate steps corresponding to Figs. 3 and 4. In other words, the work in Fig. 5 may be a panel assembly placed in a hot press for bonding; face ply 3A being green or wet veneer. When the press is closed, the face veneer is dried and processed and the several plies are bonded to each other.

I claim:

1. A laminated panel having a wood face veneer containing deep V-shaped valleys extending across a dimension thereof in the general direction of the wood grain and separated from each other by strip-like areas, the wood at the bottom of the valleys being ruptured along the wood grain to form crevices and the wood at the sides of the valleys consisting of wood that originally filled the space within the valleys.

2. A laminated panel having a face veneer containing V-shaped valleys extending in the general direction of the wood grain in the veneer and separated from each other by strip-like areas, the wood at the bottom of the valleys being ruptured along the wood grain, the wood along the sides of the valleys including in a compressed state all of the wood that originally filled the space within the valleys.

3. A panel as set forth in claim 2, wherein the angle between the sloping sides of each valley is between 30° and 60°.

4. A panel as set forth in claim 2, wherein the distance between the centers of valleys adjacent to each other is not more than one quarter of an inch.

5. A panel as set forth in claim 1, wherein the crevices at the bottoms of the valleys are large enough to permit the entry into the same of ordinary paint and the valleys are of a size to permit paint to be brushed into the crevices.

6. A laminated panel having a wood face veneer containing deep V-shaped valleys extending across a dimension thereof in the general direction of the wood grain and separated from each other by strip-like areas, the wood at the bottom of the valleys being ruptured along the wood grain and the wood at the sides of the valleys being in a case-hardened state the wood that originally filled the space within the valleys.

7. A laminated panel having a face veneer containing deep V-shaped valleys extending in the general direction of the wood grain in the veneer and separated from each other by strip-like areas, the wood at the bottom of the valleys being ruptured along the wood grain, the outer faces of the said areas being in the plane of the original outer face of the veneer and the wood at the long edges of said areas being in a compressed state all of the wood that originally filled the space within the valleys and the exposed surfaces of which that form the sides of the valleys consisting of wood that originally was part of the outer surface of the veneer.

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