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A. ELMENDORF
PLYWOOD PANEL

2,514,318

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Fig. 1.

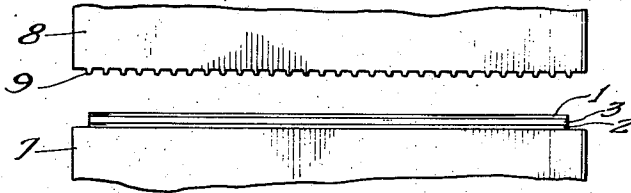


Fig. 2.

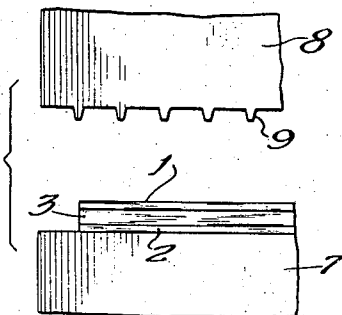


Fig. 3.

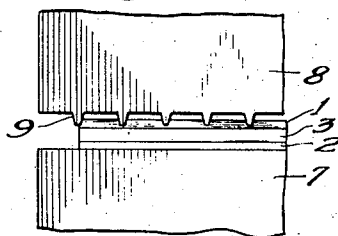


Fig. 4.

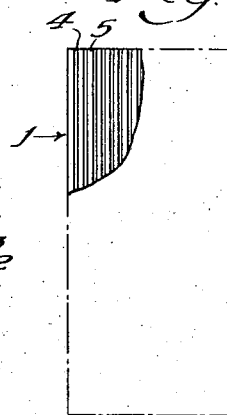


Fig. 5.

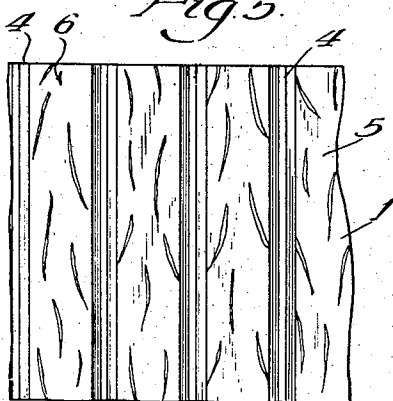


Fig. 6.

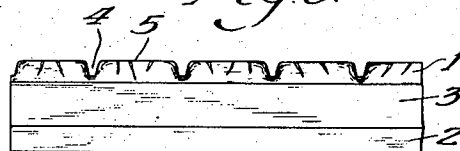


Fig. 7.

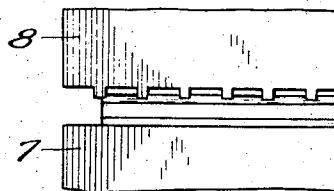
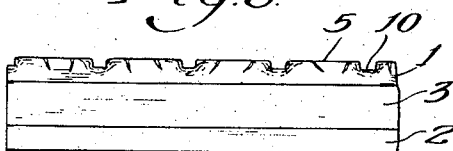


Fig. 8.



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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 the veneer facings check and crack in their final positions of use, particularly when exposed to the weather or to inside conditions where wide changes in moisture content are encountered. In the case of some woods this disadvantage is much greater than in others, as in the case of rotary cut soft wood veneers, of which Douglas fir is a good example. In these latter woods the tendency to check, crack or split is so great in the ordinary panel that even the protection of heavy coats of good paint does not suffice to prevent it.

The object of the present invention is to overcome and control the aforesaid tendencies in wood veneers to check and crack objectionably, so as to permit them to be used successfully for purposes for which they have not heretofore been deemed suitable.

In carrying out my invention I treat the veneers, preferably while still in a green state or, at least, before objectionable checking or cracking has occurred, so as to transform them into structures each composed of parallel, permanently compressed strip-like areas extending in the general direction of the wood grain, alternating with uncompressed or at least relatively uncompressed areas; the uncompressed areas having therein and confined thereto ruptures or checks running along the grain lines and sufficiently numerous to permit the usual expansion and contraction in a sheet to be absorbed in the uncompressed areas. That is, when such a sheet of veneer is bonded to a core member to form a facing for a plywood panel, the stresses that are set up through changes in moisture and which produce expansion and contraction in the wood are not transmitted from one such strip to the others, but are expended within the ruptured uncompressed areas to narrow or widen the little slits or checks; and, therefore, no long wide cracks extending continuously over any considerable portion of the width of the panel can be created, but all breaks must be confined to the width of one of the narrow uncompressed areas. Such breaks as were intentionally created may be effectively concealed by a coat of paint.

The aforesaid treatment of the veneer gives to the surface a corrugated appearance without having removed any of the wood material and without, through cutting or otherwise, exposing any new facets in which checking can occur. In one of its aspects the invention may there-

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fore be said to have for an object to produce a new product in the form of a sheet of wood veneer which, while containing all of the original wood, is permanently corrugated on one face only and is not subject to subsequent checking under conditions that would ruin an untreated piece of veneer.

While sheets of veneer may be worked as individual elements, the transformation of the veneer may take place, and usually will, in the process of bonding together the plies of a laminated panel. In the latter case one or both of the veneers for the faces may be in a green or wet state and be corrugated, bonded to the other elements of the panel, and dried in a single operation. Therefore, viewed in another of its aspects, my invention may be said to have for its object, not only to produce a novel laminated panel, but also a new method of manufacturing a panel and simultaneously drying one or both face veneers.

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 my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawing, wherein:

Figure 1 is an elevational view of portions of an open hot press provided with an embossing die and containing an assembly for a plywood panel to be made in accordance with the present invention; Fig. 2 is a view similar to Fig. 1, showing a smaller fragment of the press, but on a larger scale; Fig. 3 is a view similar to Fig. 2, showing the press closed on the panel assembly; Fig. 4 is a plan view of the panel after it leaves the press, a fragment of the panel being shown in full lines and the remainder being indicated in broken lines; Fig. 5 is a plan view of a corner of the completed panel on a larger scale than Fig. 4; Fig. 6 is an edge view of the panel fragment appearing in Fig. 5; and Figs. 7 and 8 are views similar to Figs. 3 and 5, respectively, illustrating a slight modification.

For the sake of brevity I have shown and shall describe in detail a panel composed of face plies 1 and 2 and a core ply 3, one of the face plies being treated in accordance with my invention; as it will be understood that the number of plies is optional and that what is done to one face ply can also be done to the other, if desired. In Figs. 4, 5 and 6 face ply 1 contains many valleys 4, paralleling the long edges of the panel, namely,

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extending in the general direction of the grain in this ply. The valleys are produced by compressing the wood in the areas corresponding thereto, without similarly compressing the intervening strip-like areas 5. The compression in the valleys must be beyond the elastic limit of the wood and, while usually it will be preferable not to have any compression in the intervening strips, a small amount of compression there will not avoid my invention. Ordinarily the valleys should be narrow, but the width of the uncompressed areas may vary within fairly wide limits. Thus, when a face veneer is corrugated, dried and bonded in a single operation, without compressing the areas between the valleys, the distance between valleys must be small enough to insure good gluing at all points. In such cases the width of the strips 5 may not be greater than that which permit so good a bond to be obtained that there will be some wood failure in the uncompressed areas under any of the usual tests for strength of a glue joint. Generally speaking, the valleys should not be spaced apart a distance less than the thickness of the veneer or more than about six times such thickness. The preferred depth of the valleys varies with different woods, ranging from about two-thirds of the veneer thickness in the case of soft woods to about one-third for hard woods.

When the compressing and corrugating is done while the veneer is still green or wet, the veneer being clamped and constrained in the zones corresponding to the valleys, whereas the intervening areas do not receive any direct clamping pressure, the natural contraction of the wood occurs in these latter areas, the sheet as a whole retaining its original width. Such contraction is accompanied by the opening of many little slits or tears that run along the grain of the wood and which are confined to the uncompressed zones, without being able to cross the valleys from one such zone to another. Since the treated veneer is already as wide as it will ever be, no matter how wet it becomes, all danger of subsequent, additional and objectionable checking is avoided.

In Figs. 1, 2, and 3 there is illustrated a simple method of manufacturing a panel having one face ply corrugated. In these views 7 and 8 represent any usual or suitable platens of a hot press. The embossing die is shown as integral with the upper platen which is provided with ribs 9 that compress the wood and produce the valleys when the press is closed on the work. The ribs are shown as being somewhat deeper than the valleys which they are to press in the wood, so that when the platens are closed on the veneer assembly the upper platen does not touch the rib-like areas 5. The wood in these latter areas is therefore left entirely free to contract and rupture or check, in drying, while the anchored valley areas remain intact.

In practicing my process the plywood assembly, wherein both face piles are preferably composed of green wood veneer, is placed in the hot press which is then closed and kept closed under the same conditions and for the same length of time as though a plain panel were being made. As the press closes, the ribs 9 sink into the upper face veneer, pressing the surface of the wood down and strongly compressing the wood directly below these ribs. The compression is carried beyond the elastic limit of the wood, or the wood may be said to be crushed, so that the valleys will not subsequently vanish through swelling of the compressed wood. As the die sinks into the wood

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stresses are set up in the latter, in the regions along the junctures of the valleys with the intervening flat surfaces, that are comparable to those created when a piece of veneer is bent over a blunt edge extending in the general direction of the wood grain. When these stresses become large enough the surface of the face veneer along these convex zones begin to show tears which may thereafter lengthen farther into the uncompressed areas as shrinkage through drying proceeds. When the ribs 9 are deeper than the valleys in the panel passages are provided between the work and the upper platen; thereby permitting ready escape of steam and fumes evolved during bonding and drying, so that no internal fluid pressures can accumulate in the panel to cause damage when the press is opened.

In Figs. 7 and 8 there is illustrated a slight modification in which the valleys 10 have substantially parallel sides, instead of being more or less V-shaped as in Figs. 5 and 6. Also, the valleys are only about one third as deep as the thickness of the veneer as against a depth equal to two thirds of the thickness of the veneer in the other type. However, the depths of the valleys is largely a matter of choice, as long as there is adequate compression of the wood. So, also, the shape of the valleys may be varied and it is not essential that the bottoms thereof be flat, as shown.

Panels made in accordance with my invention may be alternately soaked in water and dried many times over without material change therein with respect to surface breaks or checks in the corrugated face veneers. Also, during such alternate soakings and dryings, there is no appreciable flattening of the corrugations which remain sharp and well defined. Consequently these panels are well adapted for outside use with corrugated faces exposed to the weather and, of course, for use in interiors where their faces are exposed to a considerable variation in the humidity of the neighboring air.

While I have illustrated and described my invention only in a general way, based on a typical product shown in two slightly different forms and a simple method of manufacture, I do not desire to be limited to the particular details thus illustrated and described; but intend to cover all forms, arrangements and processes which come within the definitions of my invention constituting the appended claims; and in said claims reference to "a" face ply is not intended to exclude a like condition or treatment of the other face ply of the panel, while "uncompressed" is not intended to exclude an amount of compression that does not prevent the attainment of the ends sought by the practice of the invention. Furthermore, when I refer to a laminated panel I mean plywood or any member or body faced on one or both sides with wood veneer.

I claim:

1. A laminated panel having a wood veneer face ply compressed along lines extending across the length of the panel in the general direction of the wood grain in said ply into strips in which the wood is compressed beyond the elastic limit alternating with uncompressed strip-like areas, the said uncompressed areas being ruptured in numerous places along lines defined by the wood grain and terminating at both ends within the limits of each uncompressed strip-like area.

2. A laminated panel having a wood veneer face ply, substantially as wide across the grain as it was while in the green state, compressed

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beyond the elastic limit of the wood along strips extending across the length of, and in the general direction of the wood grain in said ply and lying a substantial distance below the outer surface of the face ply alternating with uncompressed strip-like areas, the said uncompressed areas being ruptured in numerous places along lines defined by the wood grain, the ruptures in each of said uncompressed areas terminating at both ends in that area.

3. A laminated panel having a wood veneer face ply compressed along lines extending across the length of, and in, the general direction of the wood grain in said ply so as to form valleys alternating with uncompressed strip-like areas, the distance between consecutive valleys being from one to six times as great as the thickness of said ply ruptured in numerous places along lines defined by the wood grain and terminating at the valleys, the combined area of the uncompressed areas of the face ply being at least as great as the total area occupied by the valleys.

4. A wood veneer, substantially as wide across the grain as it was while in a green state, compressed beyond the elastic limit of the wood along lines extending across the length thereof in the general direction of the wood grain so as to give one face of the veneer a corrugated contour, wherein narrow strips of compressed wood alternate with strips that are at least as wide as the latter and are uncompressed, wherein such uncompressed strips contain checks resulting from shrinking stresses set up in the veneer in drying from a wet state while constrained against over all contraction, and wherein the wood in the compressed strips is unruptured.

5. A wood veneer compressed, compacted and unruptured along narrow strips extending across the length thereof in the general direction of the

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wood grain and constituting the bottoms of valleys alternating with uncompressed strip-like areas at least as wide as the valleys the said uncompressed areas being ruptured in numerous places along lines defined by the wood grain and terminating at both ends at the valleys.

6. A wood veneer as set forth in claim 5, wherein the valleys are narrow, have a depth of from one third to two thirds of the thickness of the veneer and are spaced between centers a distance from one to six times the thickness of the veneer.

7. A panel as set forth in claim 1, wherein the uncompressed areas possess the same width across the grain in a dry state as like pieces of like wood dried from a soaked condition to said dry state while under constraint against shrinkage across the grain.

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