Nov. 28, 1944. W. C. BAILEY 2,363,927

BALANCED STRIATED PLYWOOD PANEL

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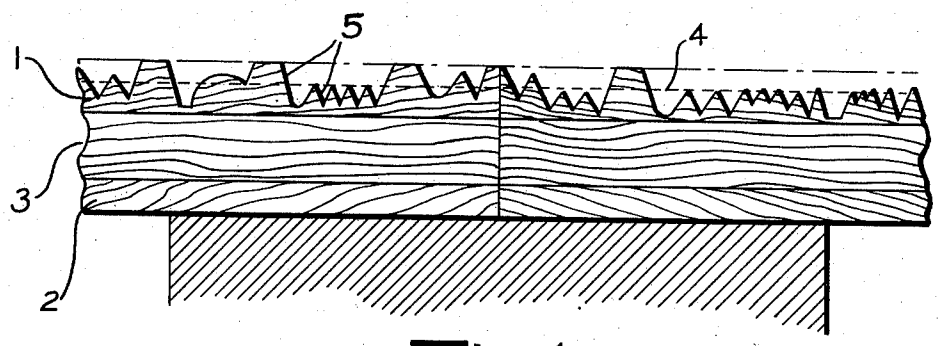

Fig. 1.

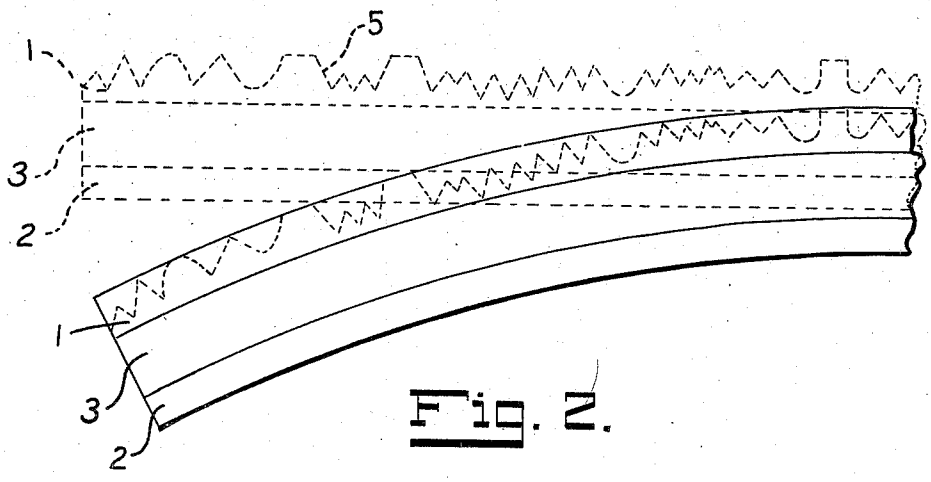

Fig. 2.

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BALANCED STRIATED PLYWOOD PANEL

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Application June 27, 1941, Serial No. 400,115

4 Claims. (Cl. 20—89)

The present invention relates to a plywood panel of the type disclosed in the patent to Donald Deskey, No. 2,286,068, issued June 9, 1942. A copending application was filed March 6, 1942, Serial No. 433,624 on subject matter related to the present application.

Such panels, supplied for the most part in the form of three-ply wallboards made of rotary cut Douglas fir, are striated, that is, they are provided with a multitude of grooves extending generally lengthwise of the grain, in the exposed surface of the outer ply. These grooves are each of random depth, as compared to adjacent grooves, though each groove is of substantially uniform average depth from end to end, but the panel surface is provided with a multiplicity of relatively deep grooves extending nearly to the glue line, and these deep grooves are sufficiently closely spaced and sufficiently distributed over the entire face of the panel so that stresses transversely of the grain, caused by shrinkage or swelling, are not permitted to accumulate across the width of the panel. In this way shrinkage or swelling of the panel as a whole, and checking and cracking of the face ply, are substantially completely avoided.

It has been found, however, that certain other and undesirable effects are produced by this striating of the outer face, and particularly when normal wallboard panels are thus striated. In normal wallboard panels the face plies, as laid up, are of the same thickness. While transverse shrinkage and swelling are almost completely eliminated by striating, the grooving, particularly if the two face plies be of substantially equal initial thickness, weakens the grooved face ply to an extent such that the compression stresses that accumulate in the ungrooved inner face ply may cause the edges of the panel to curl upwardly; that is to say, the grooved ply may become cupped or concaved, and its edges may curl away from the support. This is not true in all cases, for it depends on the drying of the veneer, and on climatic conditions, but it occurs with sufficient frequency that it is desirable to take steps to insure its prevention.

By reason of such edge-curling, even though there is no appreciable shrinking of the panel as a whole, there is visible certain edge separation between two adjoining panels, and it is to prevent this edge separation and this edge curling of the panels, particularly in such striated panels, that the present invention is directed.

The present invention concerns primarily the panel, so formed and so striated that it tends to lie flat and does not curl at the edges, and so striated that the stresses therein are neutralized and balanced in such a way that this edge curling is eliminated or prevented. A copending application, Serial No. 433,624, filed March 6, 1942, is directed to the process of preventing edge-curling.

The principles which distinguish this invention, and its relation to the invention of the Deskey patent referred to above, will appear as this specification progresses, and will be particularly defined by the claims which terminate the same.

The accompanying drawing illustrates, in a somewhat exaggerated fashion, the principles of the present invention.

Figure 1 is an edge view of the abutting edges of two panels, showing the relationship of the plies and of the striations, and the relative position of such panels when assembled in a wall.

Figure 2 is an edge view of a single panel, showing how the same might curl if not constructed in accordance with the present invention, and how it lies flat when grooved according to the present invention.

As has been explained, panels were grooved according to the Deskey disclosures, which panels were normal three-ply wall board panels of rotary-cut fir veneer, wherein the cross core and the longitudinally grained inner and outer face plies were of substantially equal thickness. It was found that while such grooving would prevent any appreciable shrinkage or swelling of the panel as a whole, transversely of the grain, the panel edges would still tend to curl outwardly sometimes, that is, away from the support, so that the striated ply became cupped or concaved. It might have been thought that the striations, by relieving the accumulation of transverse tensional stresses in the plane of the ply would prevent any such curling tendency, but I have discovered that, on the contrary, the failure to relieve the compressional stresses in the inner face ply, and the failure to balance transverse stresses in the opposite face plies, caused this curling.

To relieve this tendency to curl, therefore, I purposely and intentionally unbalance the inner and outer face plies initially, by making the inner face ply the thinner, and the outer face ply the thicker, and then in the process of grooving the thicker outer face ply its effective thickness is reduced substantially to the equivalent of the thickness of the thinner inner face ply. In this way the transverse compressional stresses in the plane of the striated outer face ply, which by reason

of its greater thickness would initially exceed those in the thinner inner face ply, are balanced and equalized with those of the inner face ply, and the result is that with these stresses balanced one against the other there is no appreciable cupping or curving one way or the other, and edge curling is prevented.

Curling can be further resisted by making the cross core somewhat thicker in proportion to the face plies, and I prefer that the panel be so constructed. In other words, the core ply 3 is preferably the thickest. In a wall board panel constructed in accordance with the principles of this invention the core ply is, for example, ⅛ of an inch in thickness. The inner face ply 2 is the thinnest of the three, and in the example chosen is $\frac{1}{16}$ of an inch, whereas the outer face ply 1 is intermediate in thickness between the other two, and in the example given is initially $\frac{1}{16}$ of an inch thick. However, by the striating its effective thickness is reduced so that in effect its thickness, indicated by the dash line 4, is substantially equal to the thickness of the inner face ply 2. In any event the stresses transversely of the grain, which are prevented from accumulating by the grooving in the outer face ply 1, are substantially equalized by this variation in the initial thickness, and by the actual or effective removal of wood through the grooving, until these stresses are substantially equalized with the corresponding stresses in the inner face ply 2.

The process, then, consists primarily in laying up an initially unbalanced panel, that is, one wherein the two face plies are of unequal thickness, or which are unequal to the extent of having different inherent transverse stresses at their edges, and then of striating or grooving the thicker or more greatly stressed face ply to reduce it to an effective thickness which equals the thickness of the opposite, ungrooved face ply. Of course, if the plywood panel has previously been thus unbalanced, there remains only the grooving to be done, yet the previous laying up of the unbalanced panel, for later balancing by grooving, constitutes part of the process. The grooving can be accomplished in several ways, as by actual gouging out and removal of material, according to the disclosure of the Deskey patent (as is preferred), or by crushing in of grooves by pressure rollers or dies, or the like. Primarily the invention concerns the striating back into balance, and the equalization of stresses by such striating, in two opposite face plies which by reason of a difference in their initial relative thickness, hardness, composition, or other quality, would otherwise be or become unbalanced, and which would by such unbalanced stresses transversely, in the edge zones, tend to curl at their edges.

A panel which otherwise would tend to curl in the manner indicated in full lines in Figure 2 (i. e. without the grooving), due to its inherent unbalance, is balanced by striating as indicated at 5, and now exhibits no tendency to curl, but lies flat as shown in dash lines, Figure 2. In this manner the advantages of striating, in eliminating edge separation, checking, and cracking, and in affording a pleasing visual effect, are capable of achievement, yet without introducing the resultant disadvantage of edge curling. None of the advantages are lost, but the ensuing disadvantage is overcome.

What I claim as my invention is:

1. A plywood panel wherein the outer face is of somewhat greater maximum thickness than the inner face, such outer face having a multiplicity of grooves extending substantially lengthwise of its grain, of such depth, width, and spacing as to reduce the stresses transversely of the grain, and in the plane of the grooved face ply, to a value approximating those in the ungrooved inner face, the residual thickness in certain of the grooves of the outer face being less than the thickness of the inner face ply, whereby the maximum thickness of the residual zone of the grooved face ply continuously across the whole width of the panel, as established by the depth of the deepest groove, is substantially less than the thickness of the ungrooved opposite face ply.

2. A three-ply panel of wood veneer, wherein the outer face is of somewhat greater maximum thickness than the inner face, such outer face having a multiplicity of grooves extending substantially lengthwise of the grain, each of constant depth throughout its length, but varying in depth as related to adjacent grooves, distributed along at least its edges, and thence inwardly, said grooves being relatively deep and narrow, and closely spaced, with occasional deep grooves sufficiently closely spaced, relative to other such deep grooves, to localize stress accumulation across the grain between said deep grooves, and in the aggregate approximately equalizing the stresses in the plane of the face, and transversely of the grain, with those in the ungrooved inner face, the residual thickness in certain of the grooves of the grooved face ply being less than the thickness of the ungrooved face ply, whereby the maximum thickness of the residual zone of the grooved face ply continuously across the whole width of the panel, as established by the depth of the deepest groove, is substantially less than the thickness of the ungrooved opposite face ply.

3. A plywood panel having striations in one face ply extending lengthwise of the grain thereof, the opposite face ply being unstriated and its thickness being less than the maximum thickness of said striated face ply, the residual thickness in certain of the grooves of the grooved face ply being less than the thickness of the ungrooved face ply, whereby the maximum thickness of the residual zone of the grooved face ply continuously across the whole width of the panel, as established by the depth of the deepest groove, is substantially less than the thickness of the ungrooved opposite face ply.

4. A plywood panel having striations in one face ply extending lengthwise of the grain thereof, the opposite face ply being unstriated and its thickness being less than the maximum thickness of said striated face ply and substantially equal to its average thickness, the residual thickness in certain of the grooves of the grooved face ply being less than the thickness of the ungrooved face ply, whereby the maximum thickness of the residual zone of the grooved face ply continuously across the whole width of the panel, as established by the depth of the deepest groove, is substantially less than the thickness of the ungrooved opposite face ply.

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