O. H. BASQUIN.

BENT PLY WOOD AND METHOD OF BENDING SAME.

APPLICATION FILED NOV. 14, 1919.

1,346,161. Patented July 13, 1920.

2 SHEETS—SHEET 1.

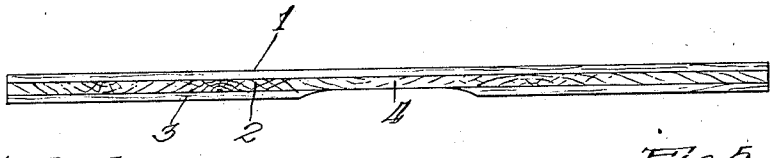


Fig. 1.

Fig. 4.

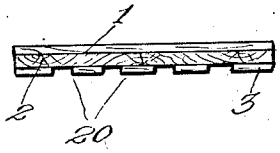
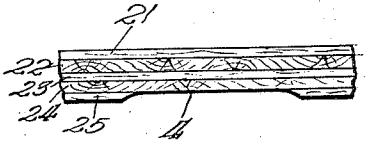


Fig. 5.



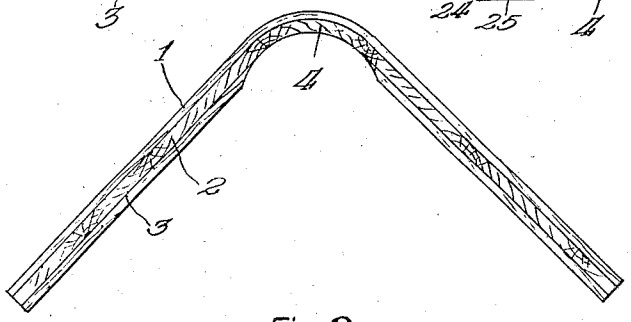
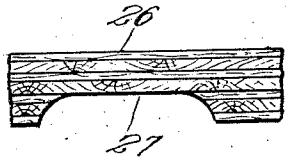


Fig. 2.

Fig. 6.



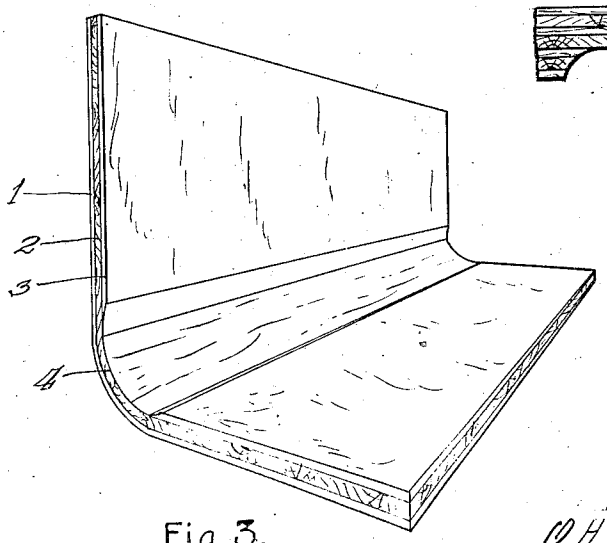


Fig. 3.

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2 SHEETS—SHEET 2.

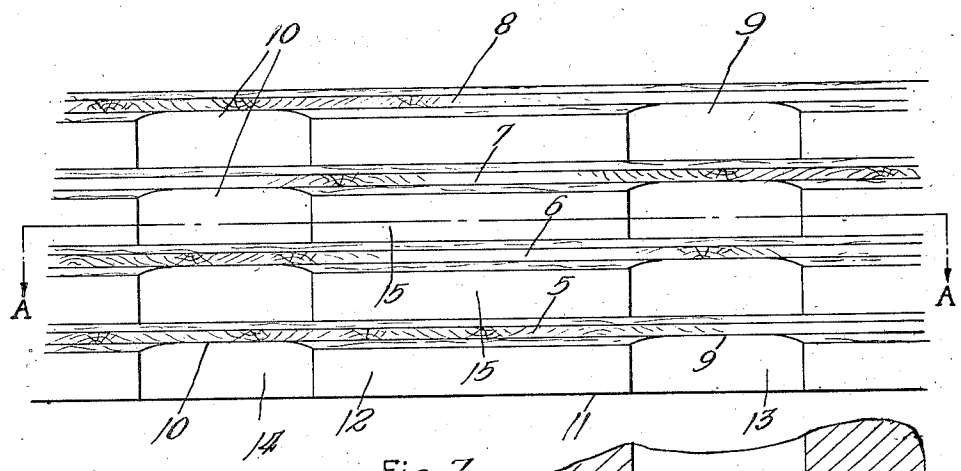


Fig. 7.

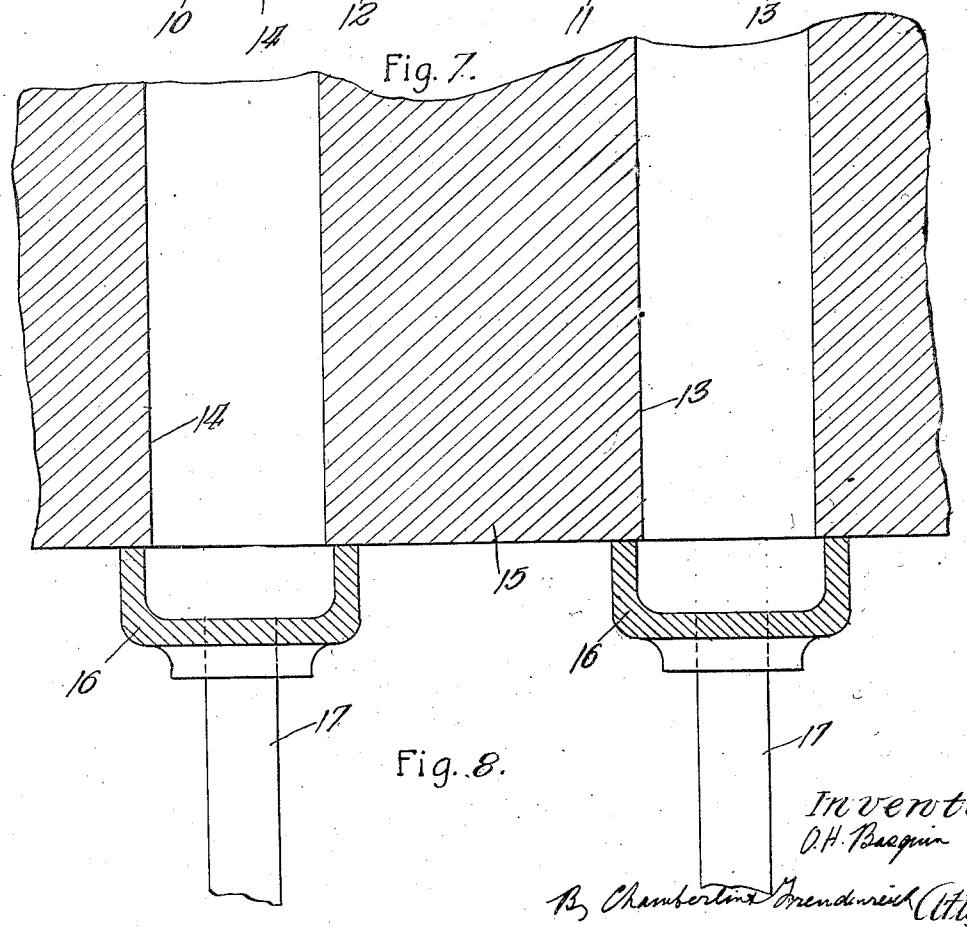


Fig. 8.

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UNITED STATES PATENT OFFICE.

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BENT PLY-WOOD AND METHOD OF BENDING SAME.

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Application filed November 14, 1919. Serial No. 337,960.

To all whom it may concern:

Be it known that I, OLIN H. BASQUIN, a citizen of the United States, residing at Evanston, county of Cook, State of Illinois, have invented a certain new and useful Improvement in Bent Ply-Wood and Methods of Bending Same, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

In making a sharp bend in three-ply wood veneer in which the grain of one ply is transverse to another, there is danger of either splitting the wood on the tension side or causing it to buckle on the compression side. The object of the present invention is to produce a multiple ply structure having therein a sharp bend, the structure being so arranged that when it is bent from a flat state the difficulties heretofore pointed out will be avoided.

Viewed in another of its aspects my invention may be said to have for its object a simple and novel method of forming a sharp bend in a multiple ply sheet of wood.

It is well known that wood cannot be stretched materially in any direction. It is also well known that wood cannot readily be compressed except transversely to the grain. If it be attempted to make a sharp bend in say a three-ply sheet in which the grain in the inner layer is at right angles to the grain in the outer layers it must follow that there is either on the tension or the compression side of the sheet a material which is not adapted to withstand the stresses coming upon it and consequently there is apt to be either a buckling on the compression side or a splitting of the material on the tension side.

In accordance with my invention I reduce the number of layers of wood in the zone where the bend is to occur so that the tension stresses are parallel with the grain in the outer layer and the compression stresses are transverse to the grain of the layer on the inner side of the bend. The ultimate extent of the reduction is of course to two layers; but if there are more than three layers in a sheet it will suffice if one or more layers are cut away so as to permit the compression stresses in the bending process to be across the grain of the layer on the inner side of the bend. Consequently, in bending such a multiple ply sheet there are only two layers to be considered, one being readily compressible and the other having sufficient tensile strength in the direction along which the stresses are imposed to avoid danger of injury thereto.

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 drawings, wherein:

Figure 1 is an edge view of a three-ply sheet ready to be bent;

Fig. 2 is a view similar to Fig. 1, showing the sheet after it has been bent to form a right-angled corner;

Fig. 3 is a perspective view of the bent sheet;

Fig. 4, Fig. 5 and Fig. 6 are views similar to Fig. 1 showing fragments of several modified forms of reduced bending zones or panels;

Fig. 7 is an edge view of a series of flat sheets arranged in a stack preparatory to being steamed to place them in condition for bending; and

Fig. 8 is a section of a fragment of the stack taken approximately on line A—A of Fig. 7, together with the steam-supplying means.

Referring to Figs. 1, 2 and 3 of the drawings, 1, 2 and 3 represent the plies of a three-ply sheet of wood. The grain in the inner ply or layer, 2, is arranged at right angles to the grain in the two outer plies or layers. Assuming that the sheet is to be bent sharply along a line parallel with the grain in the inner layer, that outer layer which it is intended shall lie on the inner side of the angle is cut away so as to leave a panel, 4, of considerable width of the inner ply or layer exposed; the grain in the exposed panel running lengthwise of the latter.

The sheet is then moistened, preferably by steaming the exposed panel and, upon thereafter bending the sheet to bring it to the condition illustrated in Fig. 2, the material of the panel, 4, is compressed so as to permit the outer layer, that is the layer 1, to adjust itself in substantially the same man-

ner as though it were being bent as an individual piece. Of course the several plies must be fastened together with a glue which will withstand the steaming or boiling, preferably the well known blood glue known as "haskelite glue."

My improved method is of value in all cases where there are three or more plies, the advantages increasing with the thickness of the sheet to be bent and the sharpness of the angle to be formed.

In Figs. 7 and 8 I have illustrated a simple method of steaming sheets to be bent in the manner heretofore explained. Thus in Fig. 7 there are shown four sheets, 5, 6, 7 and 8, having bending panels, 9 and 10, similarly disposed. On a suitable flat supporting surface, 11, is placed a heavy plate, 12, having channels, 13 and 14, spaced apart a distance corresponding to the spacing between the panels 9 and 10. The sheet 5 is laid upon the member 12 with its panels, 9 and 10, registering with the channels 13 and 14. A plate, 15, similar to the plate 12, is then laid upon the sheet 5; the sheet, 6, being laid upon the plate 15; and the stack being completed by alternating channeled plates with sheets to be treated. A vertical trough-shaped manifold, 16, extends over one end of each vertical series of channels, 13 and 14; and, when steam is admitted to the manifolds through pipes, 17, it is distributed through the several channels and acts on the ply-wood to soften it and place it in a condition for bending.

Instead of completely cutting away the layer 3, slits or saw-cuts, 20, may be cut at intervals in this layer in the direction of the length of the bending panel or zone, as illustrated in Fig. 4.

Furthermore, if there are more than three layers as, for example, five layers as illustrated at 21, 22, 23, 24 and 25 in Fig. 5, wherein the second layer, 24, from the inner side of the bent structure has the grain properly directed to take the compression, only the inner layer, 25, need be cut away to form a bending zone or panel, 4, because the layers 22 and 23 lying between the layers 21 and 25 will be supported by these latter layers. In the case of a thick sheet illustrated as a whole at 26 in Fig. 6, that is a sheet containing a comparatively large number of layers, it may be advisable to cut away material from approximately half of the layers in the region of the bending zone or panel, 27.

While I have illustrated and described with particularity only a single preferred form of my invention, I do not desire to be limited to the exact structural details thus illustrated and described; but intend to cover all forms and arrangements which come within the terms employed in the definitions of my invention constituting the appended claims.

I claim:

1. A sharply-bent sheet of plywood of more than two plies having the number of plies in the zone in which the bend occurs reduced to two the inner of which has its grain extending lengthwise of the angle or corner and the outer of which has its grain extending transversely.

2. The method of forming sharply-bent sheets of plywood having more than two plies which consists in reducing the number of plies in each sheet in the bending zone to two having the grain transverse to each other, placing the sheets in a stack made up of sheets alternating with spacing plates provided with channels registering with the reduced portions of the sheet, introducing steam into the channels, and then bending the sheets in a direction to bring the compression stresses transverse to the grain of that ply in the reduced zone which lies on the inner side of the angle in the completed structure.

3. The method of forming a sharply-bent sheet of plywood containing more than two plies, which consists in reducing the number of plies in the zone in which the bending is to occur to two having the grain transverse to each other, subjecting said zone of the sheet to heat and moisture to render it pliable, and then bending the sheet in a direction to bring the compression stresses transverse to that ply in the reduced zone which is to lie on the inner side of the angle in the completed structure.

4. A sharply bent sheet of ply-wood having a layer on the outer side of the bend in which the grain extends in the direction of the tension stresses and having material removed from one or more layers on the inner side of the bend so as to expose a layer in which the grain extends lengthwise of the angle or corner, that is transverse to the compression stresses.

5. The method of forming a sharply bent sheet of ply-wood which consists in reducing the number of layers in the sheet in the zone in which the bending is to occur so as to have an outer layer in which the grain runs in the direction of the tension stresses when the sheet is bent and an exposed inner layer in said zone in which the grain extends transverse to the compression stresses produced by the bending operation, subjecting said zone of the sheet to heat and moisture to render it pliable, and then bending the sheet.

In testimony whereof, I sign this specification.

OLIN H. BASQUIN.