June 10, 1941. J. A. POTCHEN 2,245,497

FLOORING FOR AIRCRAFT

Filed Nov. 16, 1940

Fig. 1.

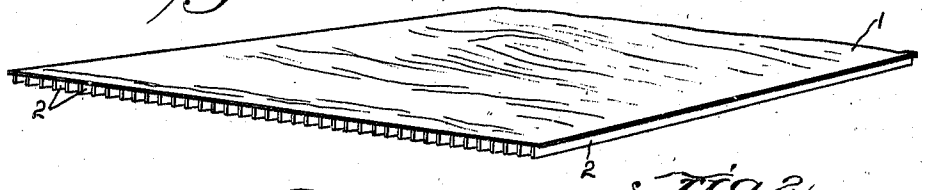


Fig. 2.

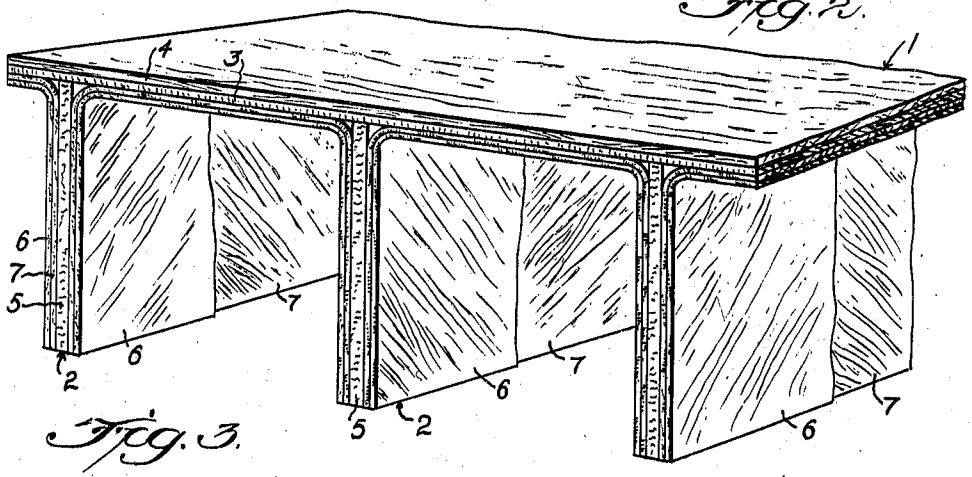


Fig. 3.

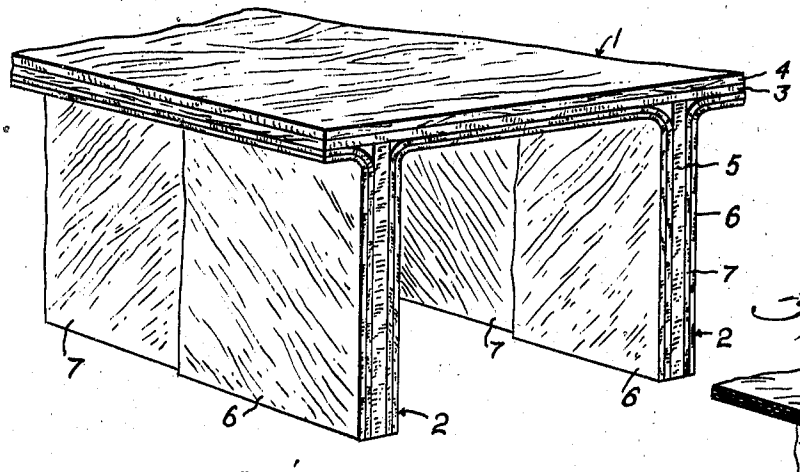


Fig. 4.

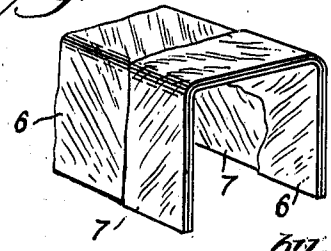
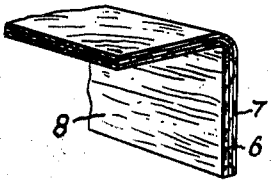


Fig. 5.



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SEARCH ROOM

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2,245,497

FLOORING FOR AIRCRAFT

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Application November 16, 1940, Serial No. 365,874

8 Claims. (Cl. 20—6)

It has been found highly desirable to employ wood floors in aircraft, particularly in compartments for passengers. However, solid wood floors composed of boards thick enough to provide the requisite strength are too heavy. Consequently, it has been common practice to employ hollow wood slabs all of which that are familiar to me are costly and are difficult to manufacture.

The object of the present invention is to produce a simple and novel floor slab which shall be strong, light, and which can easily be manufactured at a reasonable cost.

In carrying out my invention, I first produce a plywood panel of the desired dimensions and then apply to the under side thereof a series of parallel ribs that serve as supports for the flooring. These ribs are so constructed that the parts therefor can be manufactured in quantities and the desired number for a given slab be quickly and easily assembled into a cellular structure which may be bonded into a single unit and at the same time be united with the plywood panel in a single operation.

The various features of novelty wherein 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 a perspective view of a large fragment of a flooring slab embodying the present invention; Fig. 2 is a view similar to Fig. 1, showing, on a much larger scale, only the extreme lefthand corner of the slab as it appears in Fig. 1, some of the veneer plies on the ribs being partly broken away to disclose the plies lying behind the same; Fig. 3 is a view similar to Fig. 2, showing a smaller fragment of the panel, viewed from a different angle, so as to expose the sides of the ribs that are concealed from the observer in Fig. 2; Fig. 4 is a perspective view of a fragment of one of the plywood trough or channel members forming part of the rib structure, portions of each of the two plies being broken away; and Fig. 5 is a perspective view of a fragment of a three-ply trough or channel member containing the two plies of Fig. 4 and an additional ply on the concave or inner side.

Referring to Fig. 1 of the drawing, 1 represents a light plywood panel of any desired length, width and thickness. What may be termed a standard size for most purposes, is a panel measuring, for example, 48" x 76". The panel may have any desired thickness, a panel one-thirty-secondth of an inch thick being satisfactory for some purposes, whereas a thickness as great as one-quarter of an inch may sometimes be required. The panel may be composed of any desired number of plies. Secured to the under face of the panel are numerous light, thin, sturdy ribs 2 extending parallel with each other across one dimension of the panel. In the arrangement shown, the ribs run lengthwise of the panel.

Figs. 2 and 3 illustrate the details of construction of the slab. The particular panel there illustrated contains two plies, an under ply 3 whose grain extends lengthwise of the panel, and an upper ply 4 in which the grain runs crosswise of the panel. Each of the ribs is shown as comprising a core member 5 in the form of a fairly thin, flat strip of wood standing on edge and having its grain extending in the longitudinal direction or parallel to the panel, together with thin facing veneers bonded thereto. These facing veneers serve not only to increase the thickness and strength of the ribs but also as spacers for the core members and as means for holding or aiding in holding the ribs to the panel. The facing veneers are accordingly formed as the sides or flanges of U-shaped trough or channel members each of which may be set between two consecutive core elements, in an inverted position, so that the web portion rests against the under face of the panel and the flanges fit against the adjacent faces of the two core elements. Thus, by preforming the trough-like elements, as well as the panels and the core elements, all of the parts for a complete slab may readily be assembled with bonding material interposed between meeting faces of the various separate parts, and the entire assembly be bonded together by a single operation.

The trough-shaped plywood elements are shown as consisting of two plies, an inner ply 6 nested within an outer ply 7, with their grains crossing each other. In order to secure a maximum shearing strength of the ribs proper, namely, of each part composed of a core 5 and the two plywood facings therefor, the grains of the veneers are arranged diagonally of the long edges of the ribs. This also makes it easier to bend the flat panels into trough-like shapes without fracturing the wood at the bends. In the arrangement shown, the grains in each pair of plies cross each other in the usual way, the grain in one ply being inclined in one direction with respect to a long edge of a flange and the grain in the other ply being inclined in the opposite direction. Furthermore, in order to secure a balanced construction for each

rib, consecutive trough-shaped plywood members are so disposed that the grains in the outer layers of each rib are inclined in the same direction as are also the grains in the two layers engaged with opposite sides of the core. This is made clear in Figs. 2 and 3. In Fig. 2 the righthand side of the lefthand rib shows the exposed facing 6 on the inner side of the trough to have grain that runs upwardly and rearwardly while the grain in the layer 7 is inclined upwardly and forwardly. This arrangement of the grains corresponds to that on the opposite side of this particular rib. In the second rib from the left in Fig. 2, the grains of the wood are shown as being disposed oppositely with respect to the grains in the corresponding veneers in the first rib. This is to produce a balanced construction with the righthand flange of the trough-shaped element between the first and second ribs in which the grains of the two veneers are, of course, oppositely disposed relatively to the grains of the lefthand flange of this trough-shaped member, as shown in Fig. 3. This reversal of the grains in the two flanges of each trough-shaped member is illustrated in Fig. 4 which shows, on a smaller scale, the trough-shaped member interposed between the two ribs appearing in Fig. 3.

Any desired number of plies may be employed in the trough-shaped elements. However, because the panels from which these elements are made must be thin, it is ordinarily advisable to use a minimum number of plies in order to avoid the added expense due to the greater cost of extremely thin veneers and the difficulty in handling them and uniting them into plywood panels. For some purposes, it may be desirable to provide the original flat panel from which a trough-shaped member is made with an additional ply in which the grain extends lengthwise of the panel. Then, when the panel is bent into the trough-shape, one of the plies, preferably that on the inner side of the trough, as illustrated at 8 in Fig. 5, has grain extending lengthwise of the trough so that, when the trough element is assembled in the flooring structure, the grain in this ply is parallel with the panel forming the top of the flooring and with the long edges of the ribs.

Although the dimensions of the various parts of a flooring slab, as well as of the slab itself, may vary within wide limits, a slab having the length and width of the example heretofore given may have ribs not much more than one-eighth of an inch thick, roughly one and one-half inches high, and spaced apart about one and one-quarter inches; the core members of the ribs being of wood about one-sixteenth of an inch thick, and each of the plies being commercial veneer one-forty-eighth of an inch thick. In the manufacture of the trough-shaped members, the desired number of plies are preferably first bonded together in the form of a thin, flat panel which is then bent or molded into the trough shape. For the purpose of bonding the preformed individual elements or members together to produce the completed slab, it is of advantage to employ bonding material in sheet or film form as, for example, tissue paper impregnated with artificial resin adhesive. Bonding material in this form can be readily inserted between the individual pieces of the assembly and, being dry, insure against any distortion of such pieces before the bonding pressures can be applied, as might follow from the use of wet adhesives. The actual bonding preferably is carried out with apparatus such as disclosed in my application Serial No. 321,175, filed February 28, 1940, for Apparatus for bonding laminated material. However, any other means or method of bonding the core strips, the trough elements, and the top panel to each other may be employed.

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 definitions of my invention constituting the appended claims.

I claim:

1. A flooring material comprising a thin wood panel, a series of parallel strips of wood arranged on edge underneath and in engagement with said panel, and long members of thin plywood U-shaped in cross section alternating with said strips and each having its web portion engaged with the under side of the panel and its flanges fitted against the sides of the strips between which it lies, said strips and said members being bonded to each other and to said panel.

2. A flooring material comprising a thin wood panel, a series of parallel strips of wood arranged on edge underneath and in engagement with said panel, and long members of thin plywood U-shaped in cross section alternating with said strips and each having its web portion engaged with the under side of the panel and its flanges fitted against the sides of the strips between which it lies, said strips and said members being bonded to each other and to said panel, the grains of the wood in said flanges lying at acute angles to the long edges of the strips.

3. A flooring material comprising a thin wood panel, a series of parallel strips of wood arranged on edge underneath and in engagement with said panel, and long members of thin plywood U-shaped in cross section alternating with said strips and each having its web portion engaged with the under side of the panel and its flanges fitted against the sides of the strips between which it lies, said strips and said members being bonded to each other and to said panel, the grains of the wood in the plies of each of said flanges lying at acute angles to the long edges of the strips, and crosswise of each other.

4. A flooring material comprising a thin plywood panel, a series of thin parallel strips of wood arranged on edge underneath and in engagement with said panel, the wood grain in said strips running lengthwise of the latter and parallel to the plane of the panel, and long members of thin plywood U-shaped in cross section alternating with said strips and each having its web portion engaged with the under side of the panel and its flanges fitted against the sides of the strips between which it lies, the grain in at least one of the plies in each of said flanges extending crosswise of the grain in the adjacent strip, said strips and said members being bonded to each other and to said panel.

5. A flooring material comprising a thin plywood panel, a series of thin parallel strips of wood arranged on edge underneath and in engagement with said panel and having their grains extending lengthwise thereof and parallel to the panel, and long members of two-ply plywood U-shaped in cross section alternating with said strips and each having its web portion engaged with the under side of the panel and its flanges fitted against the sides of the strips between which it lies, said strips and said members be-

WOODEN BUILDINGS.

SEARCH ROOM

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ing bonded to each other and to said panel, the grains of the plies in each of said flanges lying at acute angles to the long edges of the strips and crosswise of each other.

6. A flooring material comprising a thin plywood panel, a series of long, thin parallel strips of wood having their grains extending lengthwise thereof arranged on edge underneath and in engagement with said panel, and long members of thin plywood U-shaped in cross section alternating with said strips and each having its web portion engaged with the under side of the panel and its flanges fitted against the sides of the strips between which it lies, said strips and said members being bonded to each other and to said panel, the grains of the wood in at least two plies of each of said flanges lying at acute angles to the long edges of the strips, and crosswise of each other, and the grain in the bottom ply of the panel being parallel to the grain in the strips.

7. A flooring material comprising a thin plywood panel, a series of parallel, long, thin strips of wood having their grains running lengthwise thereof and parallel to the grain in one of the plies of the panel arranged on edge underneath and in engagement with said penal, and long members of thin plywood U-shaped in cross section alternating with said strips and each having its web portion engaged with the under side of the panel and its flanges fitted against the sides of the strips between which it lies, said strips and said members being bonded to each other and to said panel, the grain in at least one ply of each of said flanges extending crosswise of and that in another of such plies extending parallel to the grain in the adjacent strip.

8. A flooring material comprising a thin wood panel, a series of parallel, long, thin strips of wood having their grains running lengthwise thereof arranged on edge underneath and in engagement with said panel, and long members of thin plywood U-shaped in cross section alternating with said strips and each having its web portion engaged with the under side of the panel and its flanges fitted against the sides of the strips between which it lies, said strips and said members being bonded to each other and to said panel, the grains of the wood in at least one ply in each of said flanges lying at an acute angle to the long edges of the adjacent strips while the grain in another of the plies extends parallel to the grain in the latter strip.

JOSEPH A. POTCHEN.