Jan. 8, 1935. J. R. FITZPATRICK 1,987,506

FIRE RESISTANT VENEERED PANEL

Filed Jan. 23, 1933

Fig. 2.

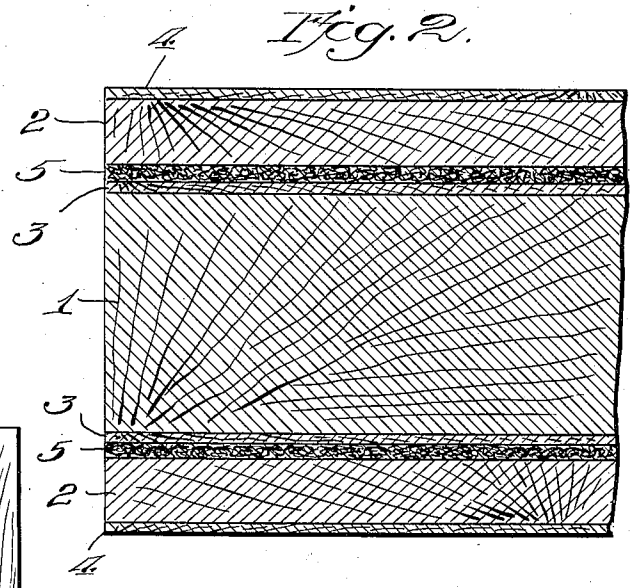


Fig. 1.

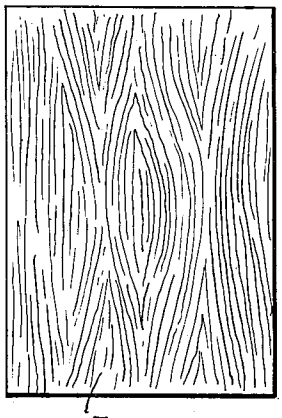
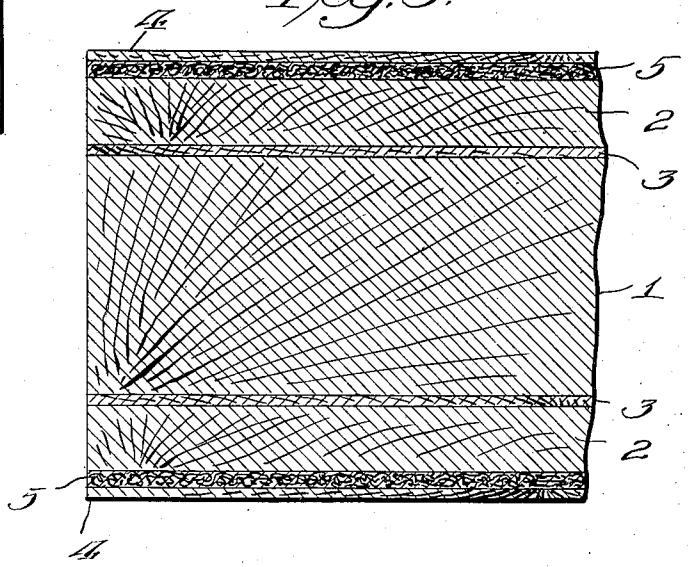


Fig. 3.



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FIRE RESISTANT VENEERED PANEL

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Application January 23, 1933, Serial No. 653,046

3 Claims. (Cl. 20—91)

The primary object of the present invention is to produce lumber in the form of strong, light panels faced with wood veneers, which shall be highly fire-resistant without resorting to expedients that may discolor the fine woods employed as facings.

Bulkheads and partitions employed in the superstructure of ships should be made as light as possible because, for every pound of weight placed above the water line of a ship there must be a number of pounds placed below the water line in order to make the ship stable. These extra pounds may be in the form of ballast or freight. Consequently, any reduction in the weight of the stateroom partitions in a ship means either that the ship can carry more freight, or that the whole weight of the vessel may be decreased very much more than the reduction in weight of the partitions and thus decrease the displacement and either increase the speed or decrease the power required to drive the vessel at a given speed. Furthermore, it is important that these partitions be highly fire-resistant. Plywood possesses properties that cause it at present to be largely used for partitions and bulkheads in the superstructure of ships, even though it does not offer the desired degree of resistance to fire. In order to make plywood more suitable for these purposes attempts have been made to increase its resistivity to fire by impregnating it with suitable chemicals. However, such impregnation results in discoloration of the facing veneers; and, since these facing veneers are usually of rare woods selected because of their decorative value, impregnation with chemicals is impracticable in such cases. Furthermore, the usual plywoods are reasonably good conductors of heat and sound and, therefore, do not serve as heat insulators or sound deadeners, both of which characteristics are desirable in the partitions and bulkheads forming part of a ship superstructure.

Viewed in one of its aspects, the present invention may be regarded as having for its object to produce a simple and novel panel possessing all of the characteristics desirable in the partitions and bulkheads of a ship's superstructure, as described above, and, consequently, a panel adapted for use wherever some or all of such characteristics are useful or desirable.

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 elevation of a panel or a piece of lumber in the form of a panel embodying my invention; Fig. 2 is a section, on an enlarged scale, through the panel; and Fig. 3 is a view similar to Fig. 2, showing a modification.

Referring to Figs. 1 and 2 of the drawing, 1 represents a thick core, preferably of light material. The core may be composed of balsa wood, of wood fiber or of wood composition. The core is made up in the form of a panel of any desired width, limited only by the size of the presses in which multiple-ply lumber must be glued up, and of any desired length. Balsa wood is very light, and so are some of the wood fiber or wood composition boards as at present manufactured. Not only is a core made from any of these materials light in weight but it has good sound-deadening and good heat-insulating properties.

Glued to the two faces of the core are thin multiple-ply panels which stiffen and strengthen the structure, provide the ornamental surface finish, and give to the composite panel its capacity to resist fire. In the arrangement shown, these facing panels for the core are just alike, each being composed of a relatively thick member 2 of one of the lighter and cheaper woods, such as poplar, two layers of thin wood veneer, and a layer of asbestos paper. One layer 3 of veneer is cemented or glued directly to the inner or under face of the core member 2 whereas the other layer constitutes the outer or facing layer. The asbestos paper layer 5 is shown as being located between the layers 2 and 3. These relatively thin facing panels are preferably built up separately, and are then glued or cemented to the relatively thicker core to form the complete panel.

The ordinary sheet asbestos or the mill board of commerce possesses very little shear strength and, if used to form the asbestos plies in my improved product, makes it easy for the thin facing veneers to tear loose. I have found that by impregnating commercial sheet asbestos or mill board with resin, of the synthetic type, the asbestos is sufficiently strengthened, particularly insofar as its capacity to resist shear stresses is concerned, to make it possible successfully to employ the asbestos layers even in very large panels.

The four plies of each facing panel are preferably assembled and united by glue or cement in any usual or suitable way, and these facing panels are then glued or cemented to the core, whereupon my improved material is ready for use.

The completed panel possesses great strength for its weight; it is self-supporting and requires very little bracing even in very large sizes; and it may be set in rabbets at the top and bottom and in pilasters where joints between adjacent panels occur, in assembling the panel in a ship or other structure. Regarding the weight of the material, it should be noted that the weight of the panel as a whole is not greatly increased by the presence of the thin layers of asbestos whereas, when it is attempted to render wood panels fire-resistant by treatment with chemicals, a considerable increase in weight results, such increase amounting sometimes to as much as twenty-five per cent. This increase in weight is, of course, a serious objection quite aside from the objection that the wood may be discolored by the chemicals. Furthermore, chemically treated panels quickly dull tools that are used in cutting into or through them; whereas my improved panels may be worked in the same way as any ordinary lumber and have no more effect on the tools than does such ordinary lumber.

With respect to its fire-resisting properties, it will be noted that, when a flame acts upon a face of one of my improved panels, it can burn away only the comparatively thin veneer layers 4 and 2 before striking the corresponding asbestos layer. The burning of this small amount of wood cannot produce a great fire and it can easily be put out. Consequently, the danger of a serious fire resulting before attention can be attracted thereto is minimized. By actual test, one of my improved panels has withstood a five-inch Bunsen flame which has a temperature of from 1500° F. to 1800° F. for ninety minutes. At the end of that time it was found that the flame had not penetrated the more remote layer of asbestos and that, although the panel was charred on the side in contact with the test flame, the remote or "cool" side was but slightly scorched and a good deal of the original strength of the panel remained. A similar panel, excepting that it did not contain the asbestos layers, was burned completely through in fifteen minutes. It was also found that with the Bunsen flame directed against one face of my improved panel, the opposite face remained comparatively cool. Wood scorching temperatures were attained only after twenty-five minutes. This is of considerable importance because of the protection against any objectionable rise in temperature afforded by the panel to anything behind it for a comparatively long time after a flame has reached the panel from the opposite side.

Although the multiple-ply face panels may be glued up separately yet, in the completed structure, the core 1 together with the inner layer of each facing panel may be regarded as the body member that is faced on both sides with asbestos overlaid with thin wood veneer. Furthermore, while the inner thin veneer layers of the facing panels add strength to the structure as a whole, their principal function is to hold the facing panels flat until they can be glued to the main core.

In some cases the asbestos layers may be placed directly under the outer thin facing layers 4, 4. Such a construction is shown in Fig. 3. In this form of my invention there is only a very thin skin of wood outwardly from the asbestos and therefore only an extremely small amount of material to support combustion, as long as the asbestos stands up, when the panel is attacked by fire.

It will thus be seen that I have produced a panel which, among other things, because of its thick, light core, weighs about one-half as much as an ordinary plywood panel of the same thickness, is rugged and self-supporting, is highly fire-resistant, acts as a heat insulator and to deaden sound, permits natural wood facings to be employed without danger of discoloration in the process of manufacturing the panel, and may be worked by ordinary wood working tools without dulling them.

The proportions or thicknesses of the several plies relatively to each other may, of course, be varied within wide limits. Ordinarily, in panels having a thickness of from seven-eighths of an inch to an inch and a half, the thin veneers 3 and 4 will have a thickness of anywhere from one forty-eighth of an inch to one twenty-eighth of an inch, while the heavier auxiliary core elements 2 will be from a tenth of an inch to an eighth of an inch thick. Variations in the thickness of the panel as a whole may be brought about by increasing the thickness of the main core and, also, if desired, of the auxiliary core elements 2. In any event, assuming that Figs. 2 and 3 of the drawing illustrate panels having a thickness of an inch or so, it will be seen that these figures are drawn on a greatly enlarged scale.

While I have illustrated and described with particularity only a single preferred form of my invention, with a slight modification, 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 piece of lumber composed of a thick, light core and a multiple-ply panel overlying and cemented to each broad face of the core; each such panel consisting of plies of wood and an interposed layer of asbestos impregnated with a fire-resistant material for strengthening the asbestos, all cemented together.

2. A piece of lumber composed of a thick, light core and a multiple-ply panel overlying and cemented to each broad face of the core; each such panel consisting of two layers of thin wood veneer, a layer of thick veneer, and a layer of asbestos impregnated with a synthetic fire-resistant resin; one of the thin veneer layers being cemented to the thick veneer and the asbestos being interposed between and cemented to the other thin veneer layer and the thick veneer.

3. A piece of lumber composed of a thick, light core and a multiple-ply panel overlying and cemented to each broad face of the core; each such panel consisting of a layer of thin wood veneer next to the core, a layer of asbestos and, overlying the asbestos, a thick layer of wood veneer and then another thin layer of wood veneer.

JAMES R. FITZPATRICK.