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H. D. WAGNER

2,187,335

COMPOSITE BOARD

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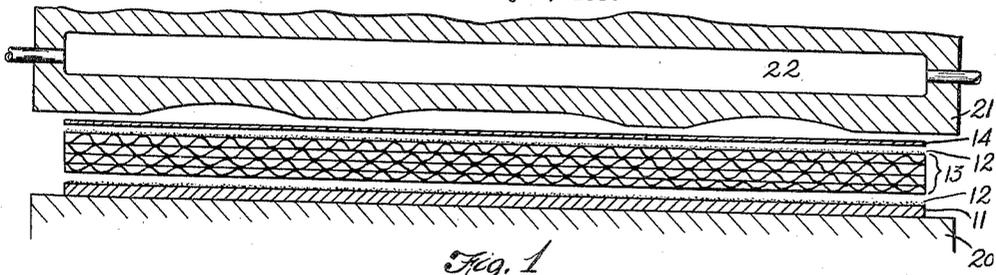


Fig. 1

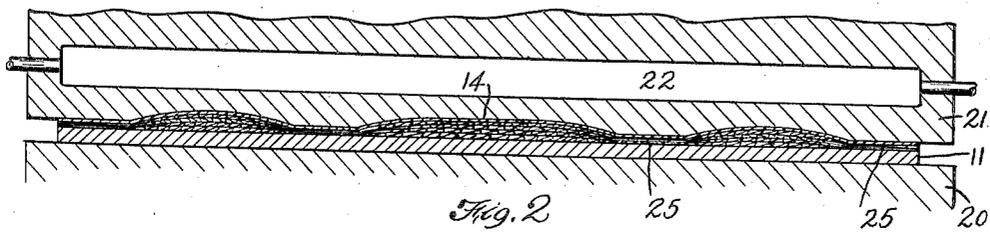


Fig. 2

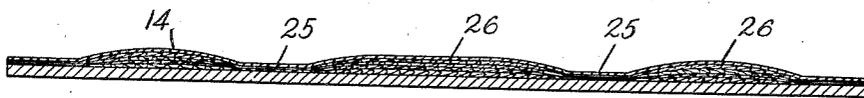


Fig. 3

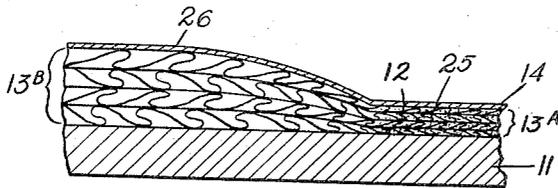


Fig. 4

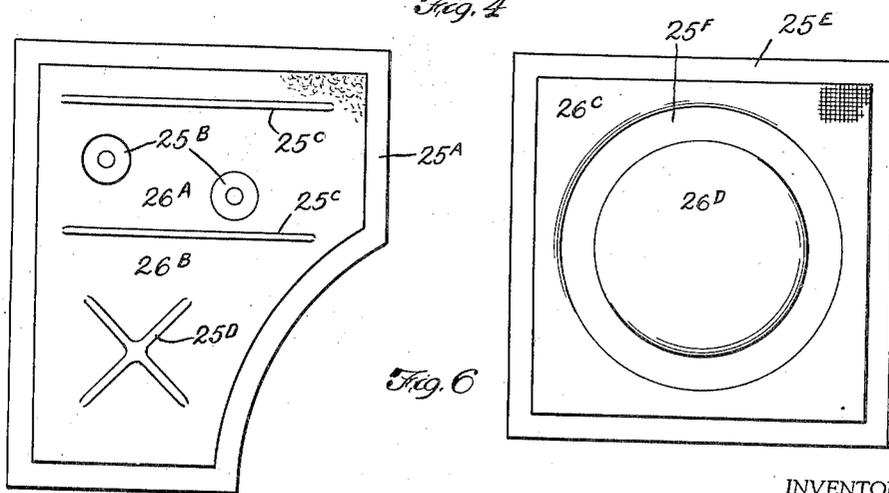


Fig. 5

Fig. 6

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2,187,335

COMPOSITE BOARD

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2 Claims. (Cl. 154—45)

This invention relates to a composite panel having insulating properties against both sound and heat and also having a cushioning effect, and further providing an interior finish. In the illustrations it is shown in relation to automobile interior panelling, but it will be apparent that such is only one of many possible applications. Among other uses of my improved material are house walls and ceilings.

It is the present practice in automobile interior construction to make door interior panels on a base of stiff fiber board which forms the concealed back of the panel, and to which an ornamental face, usually of cloth, is stitched. Between the concealed back and the exposed face a layer of padding is inserted and held in place by stitching. The stitching serves the various purposes of connecting the back and the face, of holding the padding in place so that it will not settle, and of ornamenting the visible cloth face.

Among the objections which arise from stitching are that panels made as described are expensive, the stitching through the heavy back is difficult even with special machinery, the stitching is not satisfactory for holding padding in place since the padding in any event tends to work away from below each line of stitching and gather above the next lower line, thus in time forming awkward bunches in the panel and greatly reducing the insulating effect both as to heat and as to sound.

The stitching is also troublesome around small round openings left for door and window handles. Either these must be stitched around by a small circle, which is not easy to do, or they may be left entirely unfastened, which again is not satisfactory.

A still further trouble to which stitching gives rise is due to the fact that the backing is ordinarily an asphalt-impregnated board, and in hot weather the asphalt melts, and it, or oils therefrom, creep along the threads and presently show as greasy spots where the stitches are visible through the facing fabric. Besides this, the thread is susceptible to a wearing and cutting action at the edges of the holes through the stiff backing sheet.

To avoid such difficulties as those outlined above, I employ a multi-ply pad of corrugated paper between backing and facing sheets, of which the facing sheets also are preferably a tough ornamental paper product. For backing I use a suitable stiff board, of which the conventional asphalt-impregnated board is one. The intermediate pad, which is adhered to the back-

ing board, and to which in turn the facing covering is adhered, is initially such a material as that which constitutes the successive plies shown in my co-pending application Serial No. 131,845, filed March 19, 1937, of which this present application is in part a continuation. However, it is within the scope of this invention to use the padding material in a manner somewhat different from what is therein disclosed, this different manner of use including, among other features, different degrees of compression upon different portions of the padding beneath the facing sheet, with corresponding indentation of the facing sheet above the most highly compressed parts of the pad.

My invention is shown as to construction, as to certain preferred embodiments, and as to a method of making in the accompanying drawing.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail one method and one article exemplifying my invention, such disclosed procedure and article constituting, however, but one of various applications of the principles of my invention.

In the accompanying drawing:

Fig. 1 is a vertical section illustrating in somewhat diagrammatic style my improved material and a method of making the same.

Fig. 2 is a view corresponding to Fig. 1 illustrating the final stage of making and also showing the material in its finished form.

Fig. 3 is a section on the plane 3—3 of Fig. 5.

Fig. 4 is an enlarged detail of part of Fig. 3.

Fig. 5 is a face view of a panel made for an automobile door.

Fig. 6 is a face view of an ornamental panel of general application.

The construction of the material will be understood from a description of one method of making it. Referring to Fig. 1, where the elements of my composite board are shown separated for diagrammatic effect, a sheet 11 of stiff fiber board is coated with a layer 12 of adhesive, on this a pre-formed pad 13 of several plies of corrugated and non-corrugated paper is applied, above the pad goes another layer of adhesive 12, then a facing sheet 14. This assembly is placed between pressing elements such as a bed plate 20 and head 21, the head being preferably heated as by a steam chamber 22, and therein compressed as

indicated by Fig. 2. The face of the press head will of course be figured as desired to apply a pattern to the finished panel, such as 25A to 25F, Figs. 5 and 6. Various forms of such panels, with patterns thereon, are illustrated in Figs. 5 and 6. The pattern applied by the press is not the same as the initial finish ornamentation which the facing sheet 14 may carry, such as the pebbling indicated in the upper right corner of Fig. 5 or the textile effect similarly indicated on Fig. 6.

In the embodiment illustrated, the base 11 is a sheet of stiff fiber board, preferably waterproofed as by asphalt or other suitable impregnating material. The adhesive 12 will best serve for the present use by being of such a character as will be spread by the heat of the press head through the several layers of the pad 13 and into the backing and facing sheet 11 and 14, all as indicated by stippling in the closely compressed portion 25 of Fig. 4, thereby adhering the entire product through from bottom to top in its thinner portions. The facing sheet 14 will be of character suited to the purpose of the panel. For automobile interiors a tough and heavy, but pliable, paper or cloth, such as a latex-impregnated or other specially treated sheet would be selected, and this would ordinarily be supplied for this use, prior to its application in Fig. 1, with a pebbled, grained, or other decorative surface, either embossed or printed on its exposed side. Obviously, such finish will be smoothed out to a considerable extent in the portions 25, depending upon the degree of pressure and heat applied, but will be left unimpaired in the thicker portions 26.

It will be observed by comparison of Figs. 1 and 2 that the thickness of the pad 13 is reduced about one-half in the less-compressed portions 26, and to substantially the aggregate thickness of the component sheets of the pad 13, as shown by 13A, in the closely-compressed portions 25. Thus, the voids or air spaces between the individual sheets of the corrugated pad are about half their original height in the portions 26, and are flattened out very thin in the portions 25.

Due to the penetration of the adhesive the portions 25 act as binding portions in the panel, corresponding to the stitching previously used in automobile door panels, and the less-compressed portions 26 give a resilient cushioning effect. Although it would be possible, as is within the scope of this invention, to leave entirely uncompressed portions corresponding to 26, it has been found in practice that where the pad 13 is of a fairly light-non-brittle paper, such, by way of example, as a machine glazed kraft on the order of from .0025" to .004", a compression to about half the initial thickness of the pad 13 gives a more satisfactory firmness and elasticity to the cushion portions 26. The corrugated components of the pad, when the pad is so compressed, are bent upon themselves with some lateral displacement of the non-corrugated sheets, all as indicated in somewhat diagrammatic manner at 13B, Fig. 4. Thus the facing sheet 26 is subjected to the outward springing tendency of the pad 13, and quickly returns to fullness after any temporary pressure, maintaining the desired upholstered effect.

The acoustical and heat insulating effects of the corrugated paper pad 13 are maintained by virtue of the air spaces left by the incomplete compression in the portions 26. These air spaces being of irregular shape and length do not reso-

nate to any dominant sound but largely absorb it and break it up into irregular and unrelated vibratory components which tend to neutralize one another, and many of which are not in the range of audibility.

Even the closely-compressed portions 13A of the pad as shown in cut samples are not reduced to the condition of a solid board but the successive sheets are here and there slightly separated leaving irregularly distributed thin air spaces. It will be appreciated that the difference in compression between 13A and 13B and consequent difference in thickness of the composite board at 25 and 26 may be varied as desired, but, as discussed above, the proportions shown are regarded as best for most purposes.

Fig. 5 illustrates the exposed face of a panel for the rear door of an automobile, made according to my improved construction. Herein the outer margin 25A and the borders 25B around the handle openings, are in the condition of 25 in Fig. 4. Other designs, such as the bars 25C and cross 25D, are likewise intended both for ornamental effect and as additional binding between the facing sheet 14 and bottom sheet 11. It will be appreciated that the intermediate binding may be lines, shapes, spots, and so on, in any design which may be ornamentally pleasing.

Fig. 6 is a face view of a panel of general application in which the margin 25E and a central ring 25F are compressed, and the portions 26C and 26D are compressed to a less degree, or may be considered as not compressed at all.

From the foregoing it will be seen that I have invented a panel useful for a variety of situations, although having specific advantages for the automobile field, wherein a composite article, stiff on one side, soft and padded on the other, and having a pleasing durable character and finish on its exposed surface, is provided, which panel combines thermal and acoustical insulating effects by reason of the various intermediate air spaces therein, which panel is also readily assembled since it can be made from stock material and formed by simple means into a unitary object. No stitching is required, and by using a suitable water-proof adhesive, conditions of atmospheric dampness or exposure are not injurious inasmuch as both the back 11 and front 14 are of water-resistant and wear-resistant material. When used in an automobile the finish is similar to that of leather or of cloth, according to the detail of finish of the facing sheet 14, but there is no stitching, the padding is adhered throughout its entire area to the backing, and furthermore is one piece, and thus in no danger of coming loose, shifting, bunching, or giving rise to other difficulties.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the means and steps herein disclosed, provided those stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. An insulating panel comprising in combination a stiff fiber board back, an intermediate pad of successive interadhered flat and corrugated layers of paper on the order of .0025" to .004" in approximate thickness, and a face of prefinished tough flexible paper, said panel being compressed throughout major areas to about half its uncompressed thickness, and compressed on minor areas to about the thickness of the component solids, 75

and adhesive incorporated through the compressed areas of the panel for maintaining said compression.

5 2. A panel of the character described, comprising in combination a backing of relatively stiff fiber board, a plurality of sheets of alternately corrugated and plane paper adhered successively each to the next along corrugation ridges, a fac-

ing of flexible paper heavier than said corrugated paper, said facing being adhered through the plies of said corrugated and plane paper to said backing at predetermined areas, said corrugated and plane paper being crushed together at said predetermined areas and exhibiting resilient cushioning areas between said predetermined areas. 6

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