United States Patent

[11] 3,581,453

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[73] Assignee **Owens-Corning Fiberglas Corporation**

[54] **FIBROUS CEILING SURFACING SYSTEM**
13 Claims, 20 Drawing Figs.

[52] **U.S. Cl.** **52/493,** 52/144, 52/484
[51] **Int. Cl.** **E04b 1/86,** E04b 5/60
[50] **Field of Search** 52/144, 145, 484, 489, 488, 493, 497

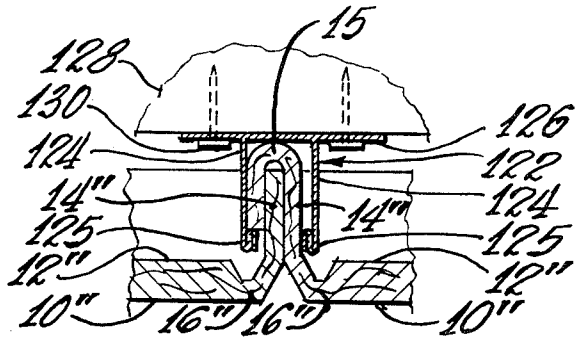
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Primary Examiner—John E. Murtagh
Attorneys—Staelin & Overman and Donald R. Fraser

ABSTRACT: A molded fibrous surfacing system including tiles or panels and supporting means, and a method of producing the same wherein a mass of fibrous material, such as glass fibers, impregnated with a binder is compressed and shaped during compression to produce edge configurations enabling the respective panels of being supported in alignment from a main support surface.



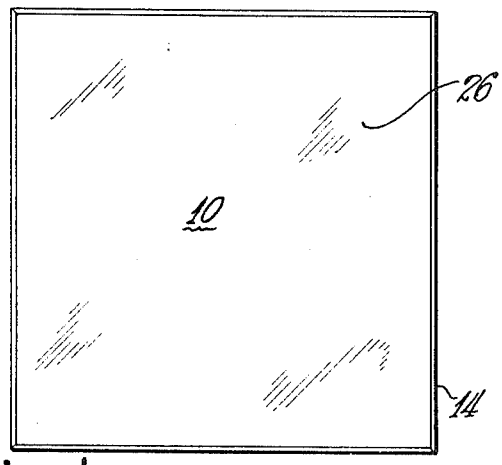


Fig. 1

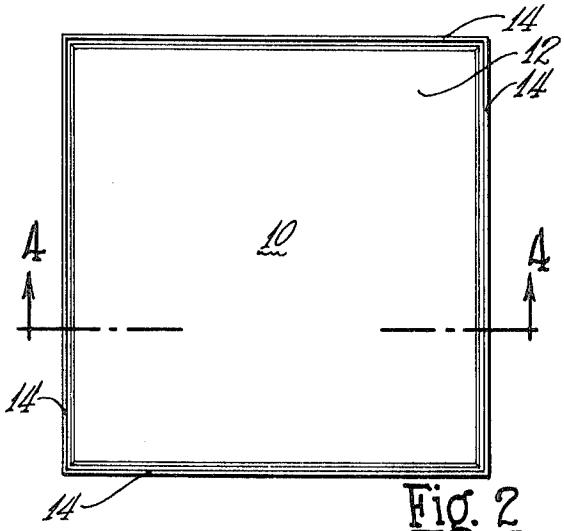


Fig. 2

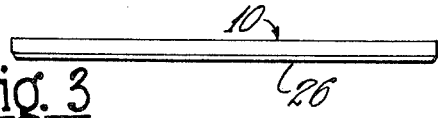


Fig. 3

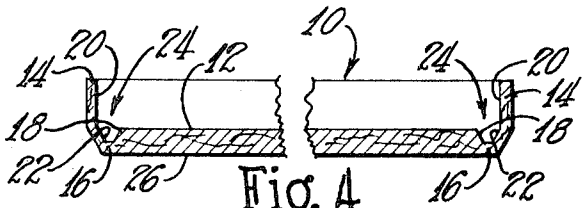


Fig. 4

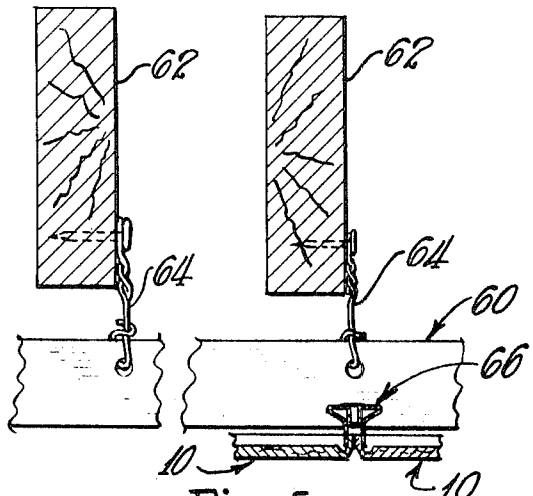


Fig. 5

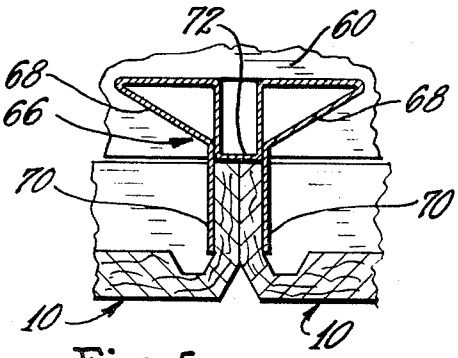


Fig. 5a

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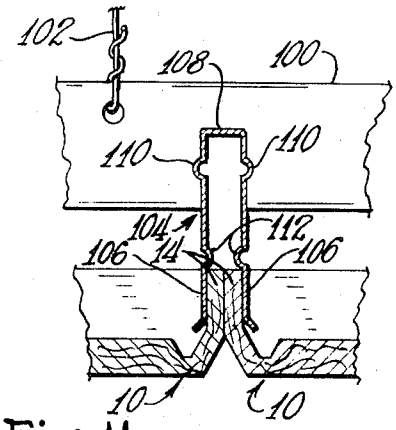


Fig. 11

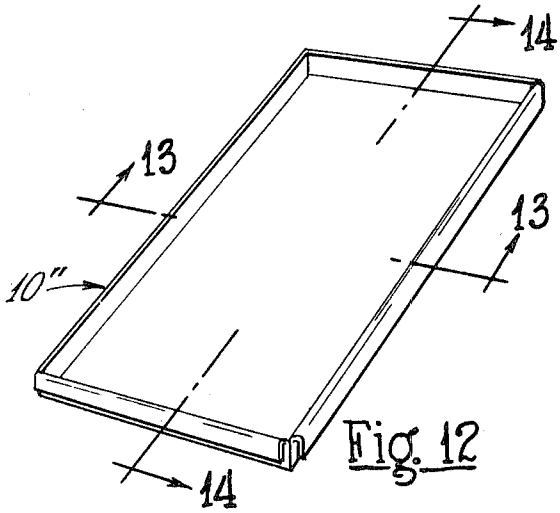


Fig. 12

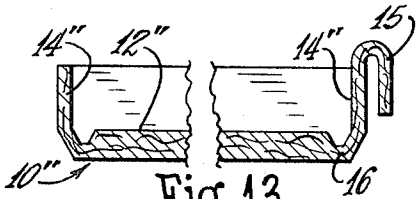


Fig. 13

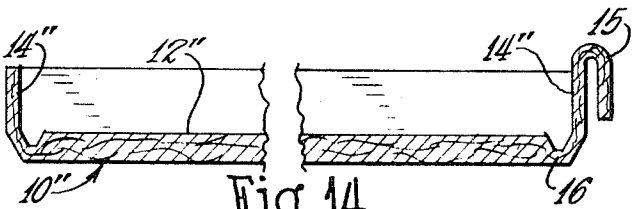


Fig. 14

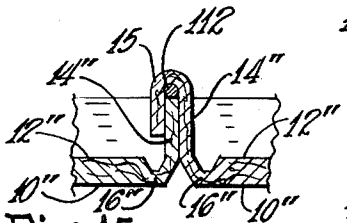


Fig. 15

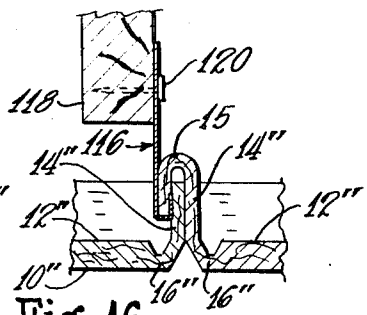


Fig. 16

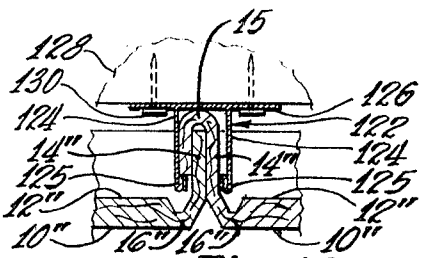


Fig. 17

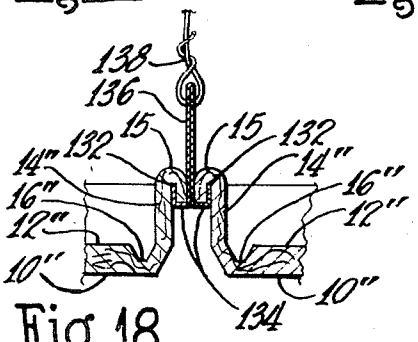


Fig. 18

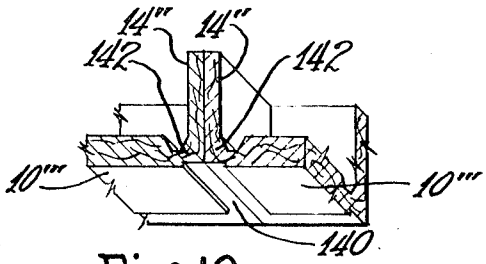


Fig. 19

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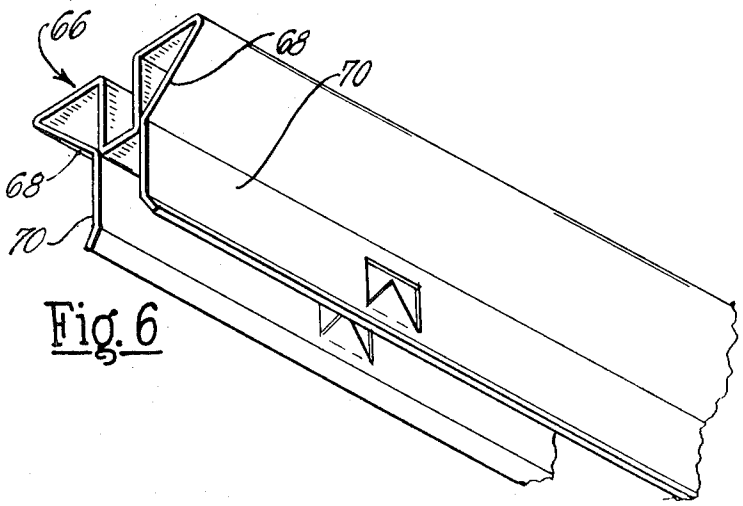


Fig. 6

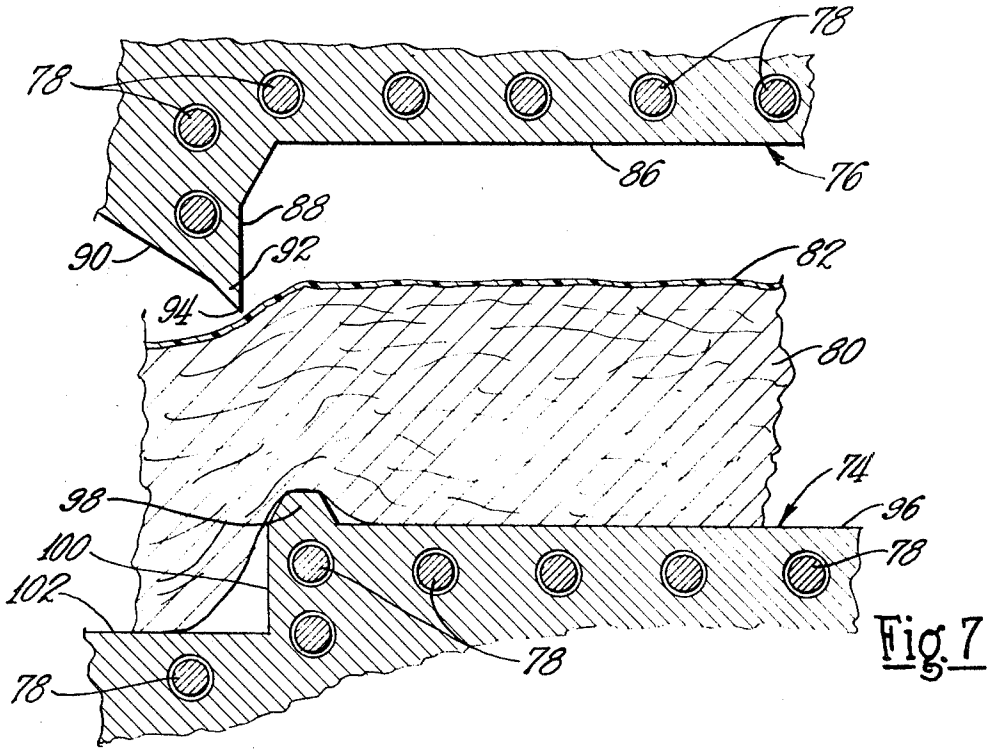


Fig. 7

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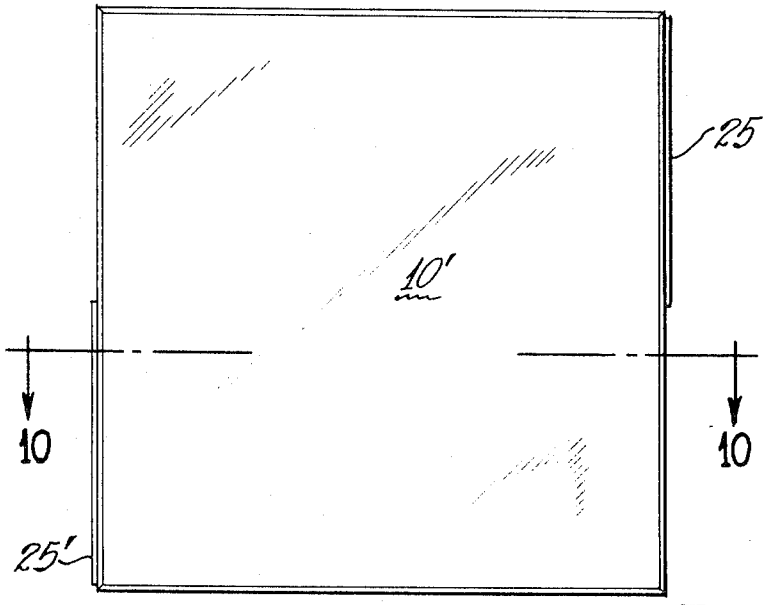


Fig. 8

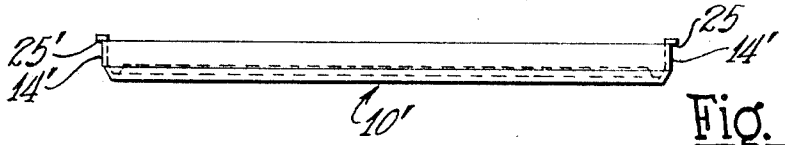


Fig. 9

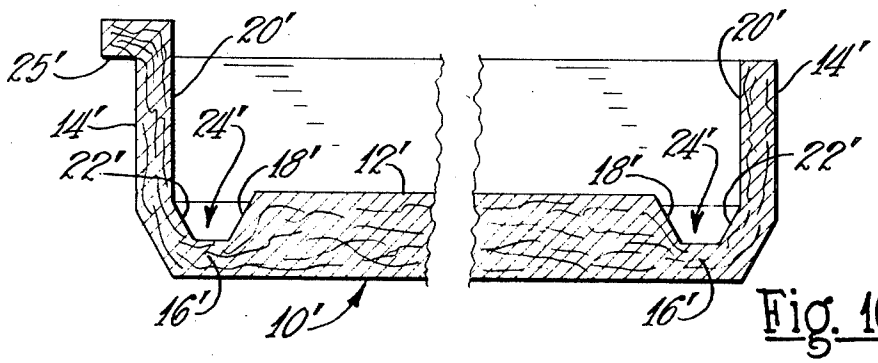


Fig. 10

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FIBROUS CEILING SURFACING SYSTEM

BACKGROUND OF THE INVENTION

Surfacing systems for use as suspended ceilings, for example, have heretofore been employed utilizing tiles or panels of glass fibers wherein a mat of fibrous glass material is compressed to a desired thickness and density to provide a substantially rigid boardlike product of uniform thickness and the boardlike body severed to provide tiles of square or rectangular configuration. Square or rectangular tiles or panels of this character are adhered to a support by an adhesive. In the application of tiles or panels of this character, there is no means or method of attaining exact or accurate alignment of the tiles or panels in assembly other than by visual observation. Hence, the installation of tiles or panels of this character require considerable skill on the part of the workmen. Furthermore, by reason of the operation of severing the fibrous board to square or rectangular configurations, variations occur which foster misalignment in installation. Glass fiber tiles or panels have been fashioned with tabs extending from the four edges arranged for overlapping relation with edge regions of adjacent tiles, but such tab arrangements do not provide a means for aligning the tiles and reliance is had upon the abutting engagement of adjacent edges of tiles in endeavoring to secure an aligned orientation.

An example of tiles of this character is disclosed in Johnston U.S. Pat. No. 3,077,426. Tiles or panels have been fashioned with edges of tongue and grooved character but such tiles do not provide for alignment in assembly in both directions. Rigid fibrous tiles of substantially uniform thickness do not have high-strength structural edge configurations resistant to damage in handling and shipping.

SUMMARY OF THE INVENTION

The present invention embraces a method of forming a fibrous surfacing system including panels or tiles formed by molding wherein the edge configuration is shaped and of high density to provide substantially rigid edges having high-strength characteristics resistant to warpage and damage in handling and means of supporting the same.

A feature of the invention resides in a method of fashioning a fibrous panel or tile by molding wherein a comparatively thick mat or body of fibrous material of substantially uniform thickness, such as glass fibers, is compressed to one density in a central region and compressed to a higher density at the edge regions in the molding operation, the mat of fibers containing a binder which is cured or set during molding to maintain a permanent configuration of the panel or tile.

Another feature of the invention is the provision of a fibrous panel or tile having a comparatively thin central region of compressed glass fibers maintained in the compressed condition by a cured binder and fashioned with edge regions of high density provided with projections to provide for overlapping engagement with edge regions on adjacent panels or tiles, whereby the units or panels, when being installed, are automatically aligned, enabling installation and assembly by unskilled labor.

Another feature of the invention is the provision of a fibrous panel or tile of comparatively high density having edge regions of increased density providing high-strength characteristics and which is shaped to facilitate rapid and efficient installation in coplanar relation with adjacent units or panels without the use of special tools.

Another feature of the invention embraces a method of fashioning a panel or tile of glass fibers and binder wherein the obverse surface area may be provided with a decorative or roughened surface, repetitive in each unit, panel, or tile presenting a symmetrical surface decor in installed assembly.

Another feature of the invention resides in the provision of a panel or tile of compressed glass fibers or other fibers bonded in compressed condition with a resinous film mechanically joined or adhered to the obverse surface of the panel or tile providing a durable surface that may be readily cleaned without impairing the acoustic properties or thermal insulating characteristics.

Another feature of the invention resides in a method of and means for molding a panel or tile of glass fibers and binder wherein the edge regions are fashioned of fibers compressed to a high density and wherein the central region defined by the high-density edge regions may be fashioned of different densities and thicknesses to vary or modify the sound attenuating or acoustic properties as well as the thermal insulating characteristics of the panel or tile without modifying the overall height or thickness thereof.

Another feature of the invention is the provision of a panel or tile fashioned of mineral fibers, such as glass fibers, rendering the product fire resistant and noise absorbing.

Another feature of the invention resides in a fibrous panel or tile fashioned of binder-impregnated compressed fibers wherein the edge regions may be of greater height than the thickness or height of the central section defined by the edge regions providing an air space between the central section and a support means enhancing the insulating characteristics of the wall or ceiling surfaced with the units or tiles.

Another feature of the invention resides in a fibrous panel or tile wherein the obverse surface may be of various shapes and painted or decorated to enhance the decor of a room.

Another feature of the invention is the provision of a panel or tile fashioned of compressed glass fibers and binder with high-density, high-strength edge regions of a shape wherein the panels or tiles are of comparatively lightweight and which may be readily nested to occupy a small space for shipping and handling with a minimum liability of damage.

Another feature of the invention is the provision of a molded fibrous panel or tile fashioned with edge regions having high-strength characteristics which are highly resistant to warping.

Another feature of the invention is the provision of a fibrous panel or tile of compressed glass fibers having certain edge regions of high density provided with sections for overlapping engagement with edge regions of adjacent tiles providing for automatic alignment of the tiles in assembly.

BRIEF DESCRIPTION OF THE DRAWINGS

Objects and advantages within the scope of this invention such as relate to the arrangement, operation and function of the related elements of the structure, to various detail of construction and to combinations of parts, elements per se, and to economies of manufacture and numerous other features as will be apparent to those skilled in the art from a consideration of the following description and the attached drawings illustrating a form of the invention which may be preferred, in which:

FIG. 1 is a plan view of the obverse side of a fibrous panel or tile of the invention;

FIG. 2 is a plan view of the reverse side of the fibrous panel or tile illustrated in FIG. 1;

FIG. 3 is an elevational view of the fibrous panel or tile illustrated in FIGS. 1 and 2;

FIG. 4 is an enlarged fragmentary sectional view of the fibrous panel or tile of the invention illustrated in FIG. 2 taken along line 4–4 thereof;

FIG. 5 is a fragmentary sectional view of the fibrous panel or tile illustrated in FIGS. 1 to 4 showing the panels in assembled relation on a support means;

FIG. 5*a* is an enlarged fragmentary view of the panel clip member illustrated in FIG. 5;

FIG. 6 is an enlarged perspective view of a panel-supporting clip member for holding the panels or tiles illustrated in FIGS. 1 to 4;

FIG. 7 is an enlarged fragmentary sectional view illustrating a method of forming the fibrous panels or tiles of the invention;

FIG. 8 is a fragmentary plan view of the obverse side of a modified form of the fibrous panel or tile illustrated in FIGS. 1 to 4;

FIG. 9 is a fragmentary end elevational view of the panel or tile illustrated in FIG. 8;

FIG. 10 is a fragmentary sectional view of the panel or tile illustrated in FIG. 8 taken along line 10–10 thereof;

FIG. 11 is an enlarged fragmentary sectional view of a modified form of a panel- or tile-supporting clip member;

FIG. 12 is a perspective view of the reverse side of a modified form of the fibrous panel or tile illustrated in FIGS. 8 to 10;

FIG. 13 is a sectional view of the panel illustrated in FIG. 12 taken along line 13–13 thereof;

FIG. 14 is a sectional view of the panel illustrated in FIG. 13 taken along line 14–14 thereof;

FIG. 15 is a fragmentary perspective view of an arrangement for supporting the panels or tiles illustrated in FIGS. 12, 13, and 14;

FIG. 16 is a fragmentary perspective view of a modified arrangement for supporting the panels or tiles illustrated in FIGS. 12, 13, and 14;

FIG. 17 is a fragmentary perspective view of another modified arrangement for supporting the panels or tiles illustrated in FIGS. 12, 13, and 14;

FIG. 18 is a fragmentary perspective view of still another modified arrangement for supporting the panels or tiles illustrated in FIGS. 12, 13, and 14 wherein at least the opposite edges are formed in a hooklike configuration; and

FIG. 19 is a fragmentary perspective view in section showing a modified form of the panel illustrated in FIGS. 1 to 4.

DESCRIPTION OF PREFERRED EMBODIMENTS

While the preferred form of the panel or tile of the invention is fashioned of glass fibers and a binder material, it is to be understood that other types of fibers may be used in fabricating the panels or tiles of the character shown and described herein.

As hereinafter more fully described, the method for producing the panel or tile involves a body or mass of glass fibers impregnated with a suitable binder and the body or mass compressed between molding dies to form a panel or tile of desired shape, contour and thickness and the binder cured or set while the body of fibers is in compressed condition to thereby maintain the desired configuration.

Referring to the drawings in detail and initially to FIGS. 1 through 4, FIG. 1 illustrates a plan view of the obverse face of a panel or tile 10 of the invention, and FIG. 2 is a plan view of the rear face or surface of the construction. The finished panel or tile 10, as shown in FIGS. 1 and 2, is of square configuration and preferably of standard tile dimensions, such as 12 inches square or 16 inches square, or the product may be rectangular. Where the tile is of rectangular shape, the length of the major surface should be twice the width of the major surface to obtain the advantages of the aligning characteristics in assembly hereinafter described.

The panel or tile 10 embraces a central portion or section 12 comprising a body of glass fibers or other fibers compressed to a desired density and thickness. The panel is fashioned with edge regions 14 of the fibers compressed to a greater density than the fibers at the central region 12 and hence of lesser thickness than the central region, as shown in FIG. 4. The edges or edge regions 14 are integrally joined with the central portion or section 12 by bridge portions 16.

In the panel 10 shown in FIGS. 1 to 4, the bridge portions 16 of fibers are typically of the same thicknesses and density as the edge regions 14. The central section or portion 12 is defined by angular surfaces 18 at the four edges of the central section or portion 12, and the inner surfaces 20 of the edge regions 14. The inner surfaces 22 of the edges 14 adjacent the bridge portions 16 are arranged at an angle in converging relation with the angularity of the surfaces 18, forming channels or grooves 24.

The pairs of surfaces defining the grooves 24 are arranged in converging relation to facilitate the molding operation in forming the panel and to assure a better flow or orientation of the fibers in the bridge portions 16 and the edge regions 14.

The obverse or decorative surface 26 of the central section 12 of each panel or tile 10 is substantially planar in shape and the overall thickness or height of each panel or tile to be assembled on a wall or ceiling are of identical overall height at the edge regions so that the finished or obverse surface 26, when of planar character in assembly, are disposed in a common plane.

FIG. 5 shows a method of supporting the panels or tiles 10, illustrated in FIGS. 1 to 4, from suspended overhead support rails 60. The support rails 60 are adapted to be supported in spaced relation below an overhead supporting structure such as joists 62 by hanger wires 64. The support rails 60, which may be fashioned of sheet metal, plastic or the like, are provided with spaced apart cutout sections for the reception of a clip member 66 having oppositely extending wing portions 68 and spaced apart downwardly depending spring leg portions 70. The leg portions 70 are adapted to functionally engage the inner surfaces 20 of the edge regions 14 of the adjacent panels 10. As is usually practiced in the installation of ceilings, the support rails 60 are initially suspended across the entire space in which the ceiling panels 10 are to be installed. Next, the centermost panels 10 are positioned, and the installation thereof continues toward the sidewalls of the room. Upon reaching the sidewalls, the outermost panels 10 may have to be trimmed. In installing the panels 10 in the clip member 66, the center web 72 between the wing portions 68 functions to effect registry of the upper marginal portion of the edges 14 and thereby properly aligns the obverse surfaces 26 of the panels 10 to create the desired asethetic appearance.

The clip members 66 may be provided, as illustrated in FIG. 6, with spaced apart inwardly and upwardly extending barbs 73 which are stuck out of the material of the leg portions 70. The barbs 73 function to positively retain the panels 10 and militate removal thereof from clip members 66.

It has been found that an overall height of a surfacing unit, panel or tile 10 being the dimension between the plane of the surface of the upper portion of the edge regions 14 and the plane of the peripheral edges of the obverse surface or face 26 of the panel or tile 10, should preferably be about three-eighths of an inch, but may be of a greater or lesser height, depending upon the thermal and acoustic characteristics desired for the product. In molding the panel or tile 10, the fibers of the central or major section or body portion 12 providing the obverse surface 26 may be compressed to different thicknesses and densities and thereby modify the thermal and acoustic characteristics of the product.

The method of molding the fibrous panel or tile 10 is adaptable for compressing the mass or body of glass fibers or other fibers to different densities in various portions or regions of the tile or panel to obtain certain physical and structural characteristics. FIG. 7 illustrates semischematically the method of forming or molding the panel or tile. The molding apparatus includes a bottom die or platen 74 and an upper die or platen 76, the dies being mounted in a conventional press for relative movement toward and away from each other. The dies or platens 74 and 76 are preferably heated by electrically energizable heating means 78, but they may be heated by fluids such as heated air circulated through passages in the dies or by other means.

With -settable dies in open position, as shown in FIG. 7, a loose mass or pelt 80 of glass fibers or other suitable fibers impregnated with a heat-curable or settable binder is disposed between the dies when they are in the illustrated position. In the molding of a panel or tile 10 of an overall height of about three-eighths of an inch, the fibrous mass or pelt 80 is initially of a thickness of about 2 inches of loose randomly oriented fibers as they are delivered from a conventional glass fiber-forming apparatus onto a conveyor.

The glass fibers may be formed by the method and apparatus disclosed in Slayter, et al. U.S. Pat. No. 3,026,563, or by other conventional fiber-forming process. Fibers of various diameters may be employed, providing the fibers are flexible. It has been found that glass fibers of an average diameter or size of about 0.00028 inches are preferred, but fibers of lesser

or greater diameters may be employed. Fibers of increased diameters tend to impair the fidelity of design. The fibers may be of varying lengths, for example in a length range of from one-half inch to 8 inches or more, or continuous fibers of filaments may also be used.

The fibrous mass **80** is impregnated or provided with a suitable uncured binder such as phenolformaldehyde or other binder suitable to retain the fibers permanently in molded configuration, the binder being usually applied as the fibers are formed. The mass or uncompressed body or pelt of fibers **80** is of very light density, being about 1 pound per cubic foot and is of substantially uniform thickness enabling the use of a conventional mat of fibers from a fiber-forming station to effect economical production of tiles or panels even though the fibers are compressed in the molding operation to different densities and thicknesses in various regions in forming the panels or tiles.

The obverse surface or face of the panel or tile may be provided with a layer or facing of resinous film such as a vinyl film (copolymer of vinyl chloride and vinyl acetate) or other plastic film.

Thus, where it is desired to face the panel or tile with a film, a vinyl film or other plastic film **82** is disposed on the loose fibrous mass **80** in the manner illustrated in FIG. **17**. The mass of fibers may be molded to tile or panel configuration without a resinous film or facing layer. The upper or female die or platen **76** is fashioned with a surface **86** bounded by four right-angularly arranged surfaces **88**, one of which is shown in FIG. **17**. Two of the opposed surfaces **88** are in converging relation with a surface **90**, and each of the surfaces **90** intersected by an angularly arranged surface **92** terminating in a sharp edge **94** which trims the tile to size when the dies are closed.

The lower or male die **74** is fashioned with an upper surface **96** bounded by an upwardly extending peripheral ridge **98** of square contour. The exterior surface **100** of the ridge intersects a surface **102** parallel with the surface **96**. When the dies or platens are in closed or fiber-compressing relation to form the panel or tile **10** of the shape shown in FIGS. **1** to **4**, the surface **86** of the upper die forms the obverse surface **26** of the panel or tile while the surface **96** forms the lower surface of the central compressed fiber section **12**.

The surfaces **88** of the upper dies form the exterior surfaces of the edge regions **14**, while the surfaces **100** of the lower die form the interior surfaces **20** of the edge regions **14**.

The panels or tiles may be formed by this method either with or without the resinous film layer **72**. The film may be in a range of from 1 to 8 mils in thickness and is preferably of a thickness of about 4 mils. In curing a panel with or without a vinyl facing **82**, the fibrous mass **80**, lying on the lower die, is heated substantially before the dies are brought to closed position. This action results in differential temperatures between the upper and lower regions of the tile causing warpage. In order to avoid uneven heating and warping the upper die is maintained at a higher temperature than the lower die so as to more nearly equalize the heating of upper and lower sections of the tile and thereby prevent warpage.

In carrying out the method in fashioning tiles without the film facing or layer **82**, the temperature differential is approximately 10°. For example, if the upper die is at a temperature of 440° F., the temperature of the lower die would be about 430° F. The average curing time, that is, the time that the dies are held in closed or tile-molding position, is approximately 1 minute and 30 seconds for curing tiles without a resinous film facing **82**. This curing time is sufficient to set the phenolformaldehyde binder.

In heat curing the binder in panels or tiles having a vinyl film facing, lower curing temperatures are employed. For example, in curing a film faced panel or tile, the upper die may be heated to approximately 375° F., and the lower die maintained at a temperature of approximately 360° F., providing about a 150° temperature differential between the upper and lower dies. By reason of the reduced temperatures in curing the binder in a film faced panel or tile, the dies are maintained in closed heat-curing relation for approximately 2 minutes in order to effect a proper curing or setting of the binder.

The amount of binder in the fibrous mass **80** is preferably in the ratio of between 3 percent and 25 percent by weight of the fibrous glass mass, the ratio of binder to the fibrous component being dependent upon the desired thickness and degree of rigidity of the central section **12** of the panel or tile.

The following is exemplary of dimensions and structural characteristics of one form of a molded fibrous panel, illustrated in FIGS. **1** to **4**, made in accordance with the method of the invention which is of comparatively lightweight having effective thermal insulating properties and sound-attenuating characteristics. Where the height of the panel **10** is of the order of three-eighths of an inch in thickness, the compressed fibers in the central section being of approximately a density of between 14 and 18 pounds per cubic foot.

The fibers in the edge regions **14** of the panel are compressed to a higher density of approximately 30 pounds per cubic foot and are of a thickness of approximately one-sixteenth of an inch. The fibers at the bridge sections **16** are compressed to a density of about 60 pounds per cubic foot and of a thickness of about one thirty-second of an inch.

The fibers of the central section of the panel **10** compressed to the aforementioned density provide a central section which is substantially rigid, and by reason of the highly compressed fibers in the edge regions **14** and the bridge regions **16**, the central section **12** is substantially reinforced by the rigid edge regions and warping of the panels substantially militated against.

The panel **10** of the type illustrated in FIGS. **1** to **4** has effective acoustic or sound-attenuating characteristics even though the central section **12** is of substantial density. The acoustic characteristic or noise-reducing property of a body is generally expressed as N.R.C. (noise reduction coefficient). It is found that the noise reduction coefficient of the fibrous section **12** is from 0.50 to 0.60, which is indicative of comparatively high acoustic or noise-reducing properties. Where the central section **12** is compressed to a lesser density, the acoustic properties may be improved but the rigidity factor of the section is reduced.

FIGS. **8**, **9**, and **10** illustrate a modified form of the panel or tile illustrated in FIGS. **1** to **4**, wherein the panel or tile **10'** embraces a central section **12'**, comprising a body of glass fibers or other fibers compressed to a desired density and thickness. The unit is fashioned with edge regions **14'** of the fibers compressed to a greater density than the fibers at the central section **12'**, and hence of lesser thickness than the central region, as clearly shown in FIG. **10**. The edges or edge regions **14'** are integrally joined with the central section **12'** by bridge portions **16'** of fibers which are typically of approximately the same thickness and density as the edge regions **14'**. The central section **12'** is defined by angular surfaces **18'** at the four edges of the central section **12'**, and the inner surfaces **20'** of the edge regions **14'**. The inner surfaces **22'** of the edges **14'** adjacent the bridge portions **16'** are arranged at an angle in converging relation with the angularity of the surfaces **18'** forming channels or grooves **24'**.

Two opposite edge portions **14'** of the panel or tile **10'** are provided with integral beadlike indexing projections or extensions **25** and **25'**, which typically extend over only one-half of the dimension of the associated respective edge **14'**. The surfaces of the projections **25** and **25'** adjacent the outer wall of the edges **14'** are adapted to extend over the free marginal edge of the edge regions **14'** of the adjacent panels **10'** when the same are installed in a ceiling system, to thereby effect the desired alignment of the panels. It will be appreciated that the width of each of the projections **25** and **25'** is substantially equal to twice the width of one of the edges **14'**. Therefore, when the panels **10'** are joined in abutting relation, a fastening means such as the clip member **66** illustrated in FIGS. **5** or **6**, may be readily fitted over the edges **14'** in securing relation thereon to support the panels in a ceiling system.

The panels or tiles **10** and **10'**, thus far described, may be fastened to an overhead support system by other fastening means such as that illustrated in FIG. **11**, for example, wherein the panels **10** are supported from a suspended overhead support rail **100**. The support rail **100** is adapted to be suspended in spaced relation below a main overhead supporting structure, such as joists, for example, by hanger wires **102**. The support rail **100** is provided with spaced apart cutout sections for the reception of a clip member **104** formed of a blank of sheet material folded or bent upon itself to form a pair of substantially parallel spaced apart leg portions **106** joined at their distal ends by a web portion **108**. Each of the leg portions **106** is provided with outwardly extending rib **110** suitable for engagement with a similar aperture in the support rail **100**. Further, an inwardly extending rib **112** is provided in the wall of each of the legs **106** and positioned intermediate the free and distal ends thereof. The ribs **106** cooperate to function as indexing stops for the edges **14** of the panels **10** when the edges are positioned therein.

FIGS. **12**, **13**, and **14** show another modified form of the panel or tile structure described hereinbefore wherein the panel or tile **10''** embraces a central portion or section **12''** comprising a body of glass fibers or other fibers compressed to a desired density and thickness. The panel is fashioned with edge regions **14''** of the fibers compressed to a greater density than the fibers at the central regions **12''**, and hence of lesser thickness than the central regions **12''**, as illustrated particularly in FIGS. **13** and **14**. The edges or edge regions **14''** are integrally joined with the central portion or section **12''** by bridge portions **16''**.

In the panel **10''** shown in FIGS. **12**, **13**, **14**, the bridge portions **16''** of fibers are typically of substantially the same thickness and density as the edge regions **14''**. The central section or portion **12''** is defined by angular surfaces **18''** at the four edges of the central section or portion **12''**, and the inner surfaces **20''** of the edge regions **14''**. The inner surfaces **22''** of the edges **14''** adjacent the bridge portion **16''** are arranged at an angle in converging relation with the angularity of the surfaces **18''**, forming channels or grooves **24''**.

The pairs of surfaces defining the grooves **24''** are arranged in converging relation to facilitate the molding operation in forming the panel and to assure a better flow or orientation of the fibers in the bridge portions **16''** and the edge regions **14''**.

The terminal ends of the edge regions **14''** of two adjacent edges of the panel **10''** are fashioned in the form of a hooklike configuration in cross section **15**. The thickness and density of the fibrous material constituting the edge regions **14''** and the hooklike sections **15** are substantially identical.

One method of suspending the panels or tile **10''**, illustrated in FIGS. **12**, **13**, and **14**, is illustrated in FIG. **15** wherein the hooklike section **15** of one panel is positioned over a wire **112**, after which the edge **14''** of another panel **10''** is forced into the space between the interior of the hooklike portion **15** and the outer surface of the edge **14''** of another adjacent panel **10''** and is maintained by frictional engagement.

Another method of supporting the panels or tile **10''** is illustrated in FIG. **16** wherein the hooklike section **15** of one panel is positioned over an upturned end **114** of strap member **116** formed of sheet material such as sheet metal, for example. The strap member **116** is typically secured to a main overhead supporting surface such as joists **118** by nails **120**, for example. The edge region **14''** of another panel **10''** is forced into the space between the outer surface of the upturned end **114** of the strap member **116** and outer surface of the edge **14''** of the panel **10''** having the hooklike section **15**. The frictional engagement of the straight edge **14''** of one panel with the hooklike section **15** of the other cooperating panel is sufficient to maintain the same in suspended supported relation.

FIG. **17** illustrates still another method and means for supporting the interlocked panels **10''** of the type illustrated generally in FIGS. **15** and **16**, wherein there is provided a sheet material supporting or suspending member **122** having spaced apart depending leg portions **124** having longitudinally extending beads **125**, wherein the leg portions are joined at one end by a laterally extending base section **126** which may be fastened to a main overhead supporting surface such as joists **128** by nails **130**, for example. The upstanding edge **14''** of one of the panels **10''** is inserted into the space defined by the hooklike section of another of the panels **10''** and then inserted between the spaced apart leg portions **124** above the beads **125**.

In FIG. **18** there is illustrated an arrangement for suspending the panels or tiles **10''** wherein the hooklike portions **15** are disposed adjacent one another and are caused to be fitted over respective upturned terminal ends **132** of transversely extending flanges **134** of a hanger member **136**. The hanger member **136** is suspended from an overhead support by spaced hanger wires **138**.

While the surfaces **86** and **96** of dies **76** and **74**, respectively, are illustrated as being smooth and uninterrupted, it will be understood that the surface **86** may be provided with a pattern to impart a textured appearance to the obverse surface of the finished panel. In such instance the central portion of the finished panel will be comprised of zones of different densities. If it is desired to obtain uniform density throughout the textured portion of the panel, each of the die surfaces **86** and **96** are provided with matched patterns. The density of the control portion of the panels generally falls within the range of from 15 to 25 pounds per cubic foot. In order to obtain the maximum design fidelity in the panels containing textured surfaces, it is found desirable to impart a greater density to the fibrous mass when employing a small design than when employing a relatively larger design on the die surfaces.

In FIG. **19** there is illustrated a modified form of a panel **10'''** wherein the peripheral marginal edges **140** of the obverse surface are provided with a continuous depressed zone **142**. The fibers of the depressed zone **142** are compressed to substantially the same degree of compression as the edge regions **14'''** to assure for maximum strength and to thereby militate against damage thereof during handling and installation. In an assembled ceiling system, the edge regions **14'''** of adjacent panels are disposed in abutting relation and may be suspended by means similar to those illustrated, for example, in FIGS. **5**, **5***a*, and **6**. Also, the marginal edges **140** of adjacent panels cooperate to form elongate continuous zones which extend the complete length and width of the associated room.

We claim:

1. A surfacing panel comprising a compressed body of fibers and a binder for maintaining said body in a compressed condition, said body having a substantially planar central section surrounded by edge regions depending substantially normally therefrom of a greater density than the central section, whereby the substantially planar central section is surrounded by edge regions embodying structural rigidity; and at least one pair of the edge regions is provided with terminal portions which are formed to extend outwardly of the central section and downwardly in substantially parallel relation to the outer portion of said edge regions whereby said one pair of the edge regions are of hooklike cross-sectional configuration, said hooklike portions being adapted to engage with adjacent panels when assembled.

2. A surfacing panel as defined in claim **1** including a film of flexible sheet material affixed to the obverse surface of the central section and the edge regions of said body.

3. A surfacing panel as defined in claim **2** wherein said film of flexible sheet material is resinous.

4. A supported panel system comprising in combination:

a plurality of panels arranged in planar array, each of said panels including a compressed body of fibers and a binder for maintaining said body in a compressed condition, said body having a substantially planar central section surrounded by depending edge regions compressed to a greater degree than the central section; and

a plurality of structural support elements arranged to cooperatively support said panels, said elements including suspension means for supporting the edge regions of

adjacent panels in parallel alignment, said support elements having spaced apart depending members engaging opposed surfaces of abutting edge regions of adjacent ones of said panels.

5. A supported panel system as defined in claim 4 wherein the fibers are mineral fibers.

6. A supported panel system as defined in claim 4 wherein the fibers are glass fibers.

7. A supported panel system as defined in claim 4 wherein the portions of said body joining the central section and the edge regions of said body are compressed to a higher density than the central section.

8. A supported panel system as defined in claim 4 including a film of flexible sheet material affixed to the obverse surface of the central section and the edge regions of said body.

9. A supported panel system as defined in claim 8 wherein said film of flexible sheet material is resinous.

10. The invention defined in claim 4 wherein at least one pair of the edge regions is provided with terminal portions which are formed to extend outwardly of the central section and downwardly in substantially parallel relation to the outer portion of said edge regions whereby said one pair of the edge regions are of hooklike cross-sectional configuration, said hooklike portions being adapted to engage with adjacent panels when assembled.

11. The invention defined in claim 10 wherein said support elements consist of laterally and upwardly extending flanges fitting in supporting relation with the hooklike terminal edges of the edge regions of said panels.

12. The invention defined in claim 4 wherein said support elements include a plurality of overhead supporting rails arranged in a gridlike manner having clip means depending therefrom, said clip means including extending spaced arms for frictionally receiving and supporting edge regions of adjacent ones of said panels.

13. The invention defined in claim 12 wherein the spaced arms of said clips have inwardly extending prongs to engage the edge regions of said panels and militate against the removal thereof subsequent to insertion therein.