Jan. 5, 1965 W. G. KEMP 3,163,961

ACOUSTICAL STRUCTURE

Filed June 11, 1962 2 Sheets-Sheet 1

FIG. 1

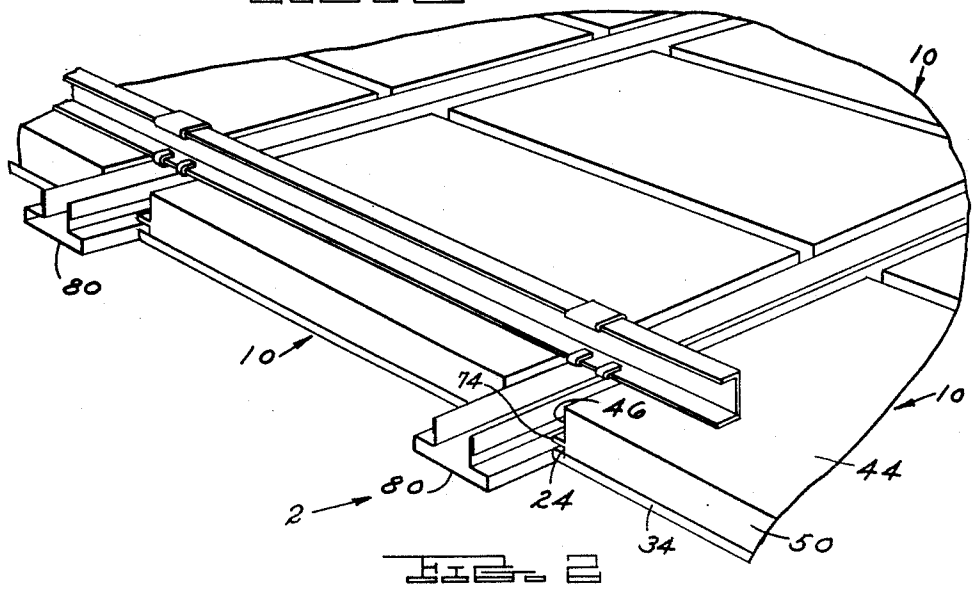


FIG. 2

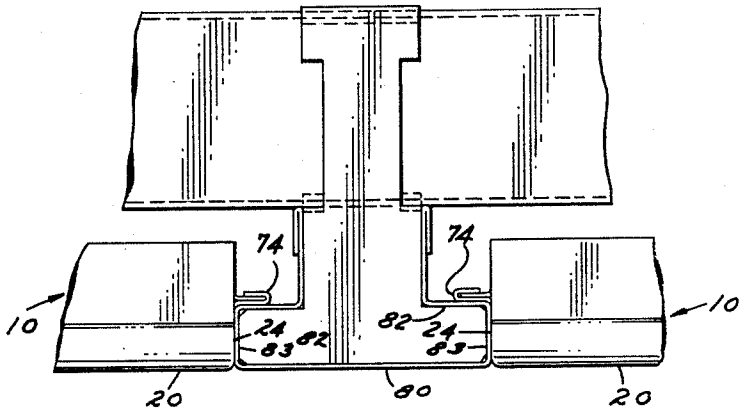
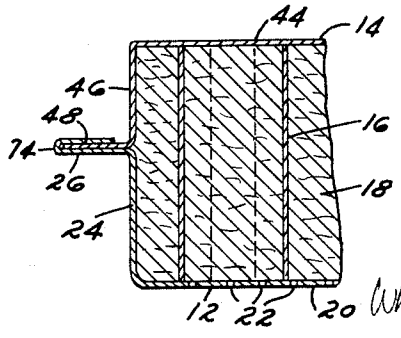


FIG. 3



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ACOUSTICAL STRUCTURE

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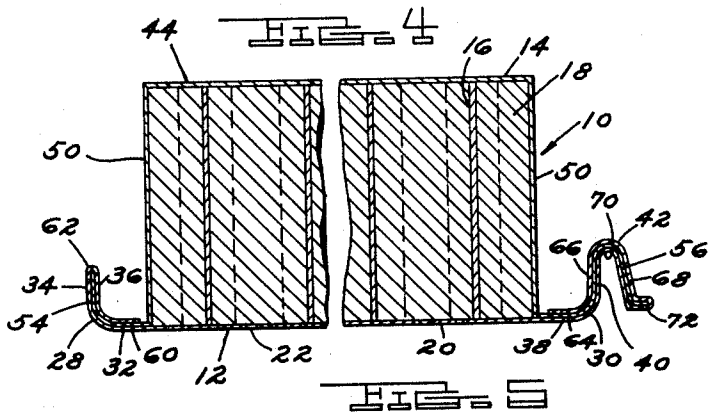

FIG. 4

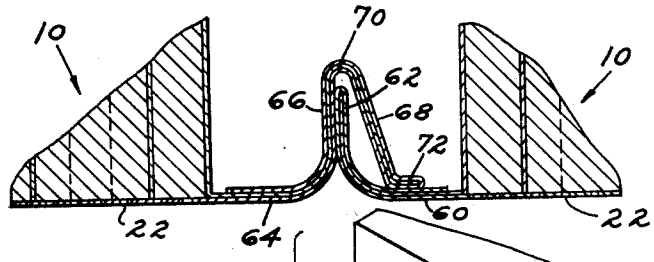

FIG. 5

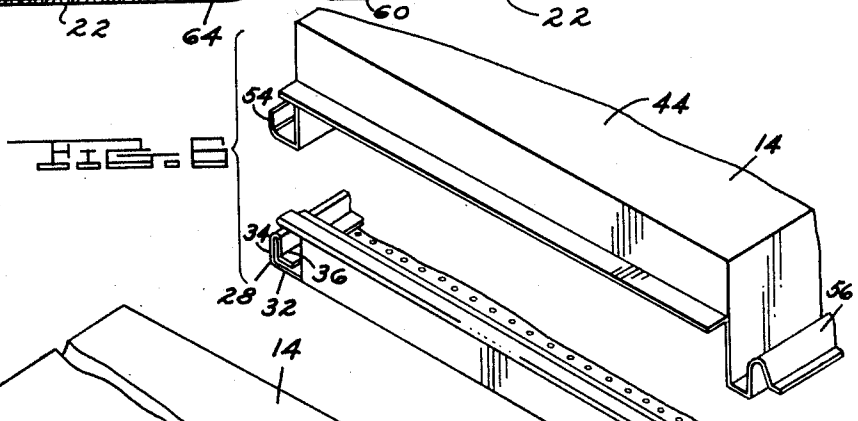

FIG. 6

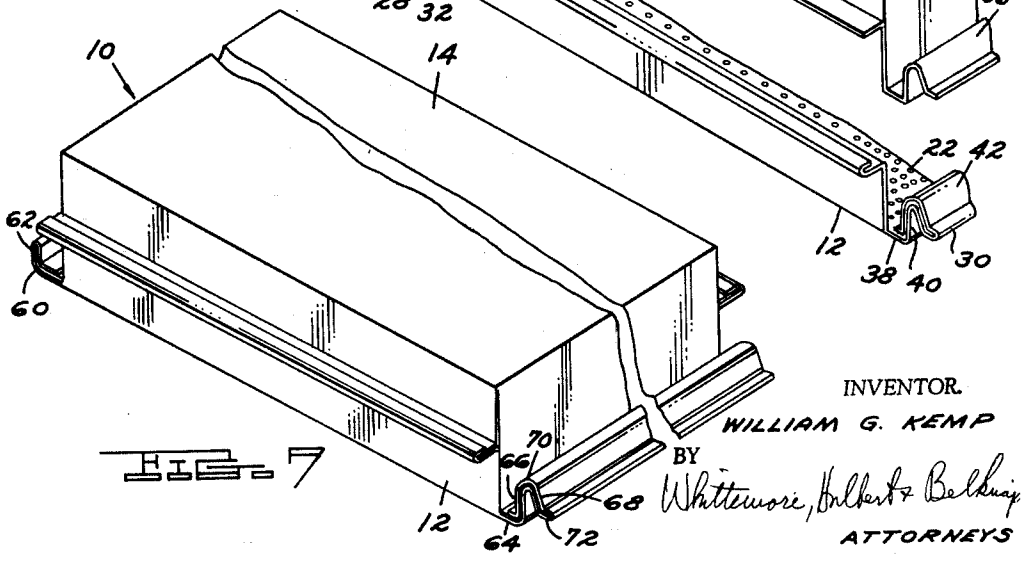

FIG. 7

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ACOUSTICAL STRUCTURE

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This invention relates generally to acoustical structure and refers more particularly to a strong, lightweight acoustical panel designed to present a pleasing appearance when assembled with other like panels in a suitable installation.

One object of the invention is to provide a lightweight acoustical panel which is exceptionally strong and rigid, and therefore capable of maintaining a flat uniform appearance without waves or irregularities.

Another object is to provide an acoustical panel constructed to facilitate the installation thereof or removal from an installation.

Another object is to provide an acoustical panel which has means to provide for its own support in an installation, and wherein the panel is designed to interlock with other like panels in an installation to provide a smooth continuous appearance and to provide an effective marginal seal.

Other objects and features of the invention will become apparent as the description proceeds, especially when taken in conjunction with the accompanying drawings, wherein:

FIGURE 1 is a fragmentary perspective view of an installation of acoustical panels constructed according to my invention.

FIGURE 2 is a view looking in the direction of the arrow 2 in FIGURE 1.

FIGURE 3 is an enlarged fragmentary sectional view of an end of the acoustical panel.

FIGURE 4 is an enlarged fragmentary sectional view illustrating opposite sides of the panel.

FIGURE 5 is a fragmentary view illustrating the interlock between the sides of adjacent panels.

FIGURE 6 is an exploded fragmentary perspective view illustrating parts of the composite panel prior to assembly.

FIGURE 7 is a fragmentary perspective view of the panel.

Referring now more particularly to the drawings, the acoustical panels therein illustrated are of the same construction and generally designated by the reference character **10**. Each panel **10** includes a perforated pan **12**, a reflecting pan **14** and a core structure confined between the pans comprising a relatively rigid honeycomb layer **16** having sound deadening material **18** within the cells of the honeycomb.

The perforated pan **12** has a substantially flat rectangular layer or member **20** provided with a plurality of orifices **22**. The orifices may be in either a regular or irregular pattern and are provided to allow sound to pass to the interior of the panel to be deadened by the sound deadening material in the cells of the honeycomb.

The pan **12** has end walls **24** which connect integrally with the opposite end margins of the flat bottom layer **20** and project upwardly at right angles to the bottom layer, terminating in the outwardly extending and return-bent flanges **26**. The flanges including the return-bent portions thereof are substantially parallel to the plane of the bottom layer **20** of the pan **12**.

The opposite sides of the perforated pan **12** are formed with the extensions **28** and **30** which join integrally with the side margins of the bottom layer **20** of the pan. The extension **28** extends laterally outward, then upward and is return-bent and folded back upon itself, all as illustrated in FIGURES 4 and 6. The outwardly extending portion of the extension **28** is designated **32**, the upwardly extending portion **34** and the return-bent portion **36**.

The other extension **30** has the portion **38** extending outwardly in the plane of the bottom layer **20**, the downwardly opening hook portion **40** and the return-bent portion **42** which follows the shape of the hook and terminates above the portion **38**.

The pan **12** may be molded, stamped or otherwise produced from metal, plastic or any other suitable material. The material should present a smooth relatively rigid hard outer surface capable of being cleaned with ease since it is the outer surface which will be exposed to view in a finished acoustical installation such as that shown in FIGURE 1.

The reflecting pan **14** has a substantially flat rectangular upper layer or member **44** which is of the same size and dimension as the layer **20** and which extends in spaced parallel relation thereto. The pan **14** has the end walls **46** joined integrally with the upper layer **44** along the opposite end margins thereof which extend downwardly at right angles to the plane of layer **44** and terminate in the outwardly extending flanges **48**. In the assembled condition of the panel, the flanges **48** are tightly clamped within the channel defined by the return-bent flanges **26** along the opposite ends of the reflecting pan. The flanges **48** together with flanges **26** and the return-bent portions thereof lie in a plane approximately midway between the planes of the upper and lower layers **44** and **20** and parallel thereto.

Referring to FIGURES 4 and 6, the pan **14** has side walls **50** integrally joined to the opposite side margins of the layer **44** and projecting at right angles thereto toward the perforated pan **12** and actually contacting the perforated pan **12** in a continuous line contact along the side margins of the bottom layer **20** thereof. The sides **50** of the reflecting pan have at their lower edges the integral lateral extensions **54** and **56**. These extensions have the outline illustrated in FIGURES 4 and 6 and, as shown, extension **54** extends laterally outward and upward to fit within the channel defined by the extension **28** of the perforated pan **12** to be tightly clamped therein. The extension **56** extends within the channel defined by the extension **30** of the perforated pan **12** and is tightly clamped therein.

The extended portions **28** and **54** of the two pans together provide a laterally outward extension **60** terminating in an upturned flange **62**. The extended portions **30** and **56** of the two pans along the opposite side of the panel together define an outward extension **64**, and a hook having a leg **66** integral with the outward extension and extending upward at substantially a right angle to the plane of the bottom layer **20** which is return-bent to provide a free leg **68** inclined from the base **70** of the hook away from the leg **66** and terminating in a foot **72** parallel to the plane of layer **20**. The flanges **26** and **48** along the ends of the panel provide a supporting flange extension **74**.

The top and bottom surfaces of the honeycomb **16** are adhered directly in surface-to-surface relation to the inner surfaces of layers **20** and **44** to prevent separation of the layers from the honeycomb. Since the sides and ends of the pan are mechanically crimped together, delamination cannot occur at the edges and hence a rigid permanently flat light weight acoustical panel structure is provided.

A plurality of the panels **10** are shown in a ceiling assembly in FIGURE 1. The rows of panels are separated by rolled metal T-bars **80** which are supported in spaced parallel relation to each other. The spacing between the T-bars corresponds with the length of the

panels so that the opposite ends of the panels are supported by the flanges 74 thereon which rest upon the flanges 82 of the inverted T-bars. The ends of the panels beneath the flanges 74 contact the sides 83 of the T-bar to prevent endwise shifting of the panels.

The sides of adjacent panels are interlocked by the extended portions of the panels along the sides thereof. This is shown in FIGURE 5. It will be noted that the side of the panel having the hook is supported on the side of an adjacent panel by engagement of the foot 72 of the hook with the outward extension 60 of the other panel. The arrangement is such that the panels, or the bottom surfaces thereof, are in a common plane. The base 70 of the hook is supported above and clear of the upper edge of the upturned portion 62. Hence it is the foot of the hook which supports the panel. This is preferred to supporting the panel by engagement of the upper edge of flange 62 with the base of the hook, because any slight variation in the dimension of the hooks and flanges, which might result in an irregular surface when several panels are installed side by side as in FIGURE 1 can be readily cured in the present construction by merely forming a longer foot 72 on the hook if that is considered necessary.

What I claim as my invention is:

1. An acoustical panel, comprising a substantially flat perforated member, a substantially flat sound-reflecting member extending over said perforated member in spaced parallel relation thereto, sound-deadening means between said members including a relatively rigid honeycomb core the opposite surfaces of which are adhered directly to the opposed surfaces of said members to prevent the material of said members from sagging or separating from the honeycomb core, sound deadening material in the cells of the honeycomb core, said members along one edge of said panel having extended portions secured together in surface-to-surface relation providing an outward marginal extension of the panel terminating in an upturned flange, said members having extended portions along the opposite edge of the panel secured together in surface-to-surface relation and defining a downwardly opening generally U-shaped hook having a free leg and a leg joined to the said opposite edge of the panel, said hook being adapted to engage over the flange of a like adjacent panel, the free leg of said hook being of a length to engage the extension of the adjacent panel and support the first-mentioned panel so that the base of the hook thereof is above and clear of the flange of the adjacent panel.

2. An acoustical panel, comprising a substantially flat perforated member, a substantially flat sound-reflecting member extending over said perforated member in spaced parallel relation thereto, sound deadening means between said members including a relatively rigid honeycomb core the opposite surfaces of which are adhered directly to the opposed surfaces of said members to prevent the material of said members from sagging or separating from the honeycomb core, sound deadening material in the cells of the honeycomb core, said perforated member having walls at opposite edges of said panel extending from the margins of said perforated member toward said reflecting member, said reflecting member having walls at the said opposite edges of said panel extending from the margins of said reflecting member toward said perforated member, the walls of one of said members having laterally outwardly extending flanges and the walls of the other of said members having laterally outwardly extending flanges return-bent to form inwardly opening channels respectively receiving and tightly gripping the first-mentioned flanges to prevent separation of said members and delamination of said members and core, said flanges and channels extending from side to side of said panel and being located approximately midway between the planes of said members and serving to support said panel in a suitable installation, said panel having along one of its remaining edges an outward marginal extension terminating in an upturned flange, said panel having along the other of its remaining edges a downwardly opening, generally U-shaped hook having a free leg and a leg joined to the panel, said hook being adapted to engage over the upturned flange of a like adjacent panel, the free leg of said hook being of a length to engage the extension of the adjacent panel and support the first-mentioned panel so that the base of the hook is above and clear of the upturned flange of the adjacent panel.

3. The acoustical panel defined in claim 2, wherein said marginal extension and upturned flange and said hook are formed from overlapping extended portions of said member secured to each other in surface-to-surface relation.

4. An acoustical panel, comprising a substantially flat perforated member, a substantially flat second member extending over said perforated member in spaced parallel relation thereto, a relatively rigid honeycomb core between said members, means connecting said members and core together in a permanent assembly, said core resisting warping of the panel, said panel having along one edge thereof an outward marginal extension terminating in an upturned flange, said panel having along the opposite edge thereof a downwardly opening generally U-shaped hook having a free leg and a leg joined to the said opposite edge of the panel, said outward marginal extension and upturned flange and said hook constituting integral extensions of at least one of said members, said hook being adapted to engage over the flange of a like adjacent panel, the free leg of said hook being of a length to engage the extension of the adjacent panel and support the first-mentioned panel so that the base of the hook thereof is above and clear of the upturned flange of the adjacent panel.

5. An acoustical panel, comprising a substantially flat perforated member, a substantially flat second member extending over said perforated member in spaced parallel relation thereto, a relatively rigid honeycomb core between said members, means connecting said core and members together in a permanent assembly, said core resisting warping of the panel, said panel having along opposite edges thereof laterally outward extensions providing flanges to support said panel in a suitable installation, said panel having along one of its remaining edges an outward marginal extension terminating in an upturned flange, said panel having along the other of its remaining edges a downwardly opening, generally U-shaped hook having a free leg and a leg joined to the panel, said hook being adapted to engage over the upturned flange of a like adjacent panel, the free leg of said hook being of a length to engage the marginal extension of the adjacent panel and support the first-mentioned panel so that the base of the hook is above and clear of the upturned flange of the adjacent panel.

6. The acoustical panel defined in claim 5, wherein said outward extensions, said outward marginal extension and upturned flange and said hook are formed from integral extended portions of at least one of said members.

7. In a ceiling structure, a pair of adjacent panels arranged substantially in edge-to-edge relation in a common horizontal plane, each panel having a substantially flat perforated member, a substantially flat second member extending over said perforated member in spaced parallel relation thereto, a relatively rigid honeycomb core between said members of each panel, means connecting said core and members of each panel together in a permanent assembly, said core of each panel resisting warping thereof, and a connection between adjacent edges of said panels including an outward marginal extension along said adjacent edge of one panel terminating in an upturned flange, a downwardly opening generally U-shaped hook along said adjacent edge of the other panel having a free leg and a leg connected to said other panel, said hook engaging over said upturned flange, the lower end of said

free leg engaging the extension of said one panel to support said other panel so that the base of the hook is above and clear of said upturned flange, said outward marginal extension and upturned flange and said hook being formed from integral extended portions of at least one of said members of each panel.

References Cited in the file of this patent

UNITED STATES PATENTS

892,693	Stein	July 7, 1908
1,889,784	Harter	Dec. 6, 1932
1,966,041	Nelson	July 10, 1934
2,028,272	Burgess	Jan. 21, 1936
2,063,457	Nold et al.	Dec. 8, 1936
2,150,997	Venzie	Mar. 21, 1939
2,449,292	Gillett et al.	Sept. 14, 1948
2,710,175	Jorn	June 7, 1955
3,021,916	Kemp	Feb. 20, 1962
3,095,943	Kemp	July 2, 1963

FOREIGN PATENTS

313,328	Switzerland	May 31, 1956
663,897	Great Britain	Dec. 27, 1951
744,946	France	Jan. 31, 1933