ACOUSTICAL CEILING STRUCTURE AND PANEL THEREOF

Walter W. Thompson, Box 67, Hazlehurst, Ga. 31539
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6 Claims

ABSTRACT OF THE DISCLOSURE

This disclosure relates to an acoustical ceiling panel and to a ceiling structure composed of a plurality of the panels.

The panel is preferably rectangular, having a bottom perforated sheet providing a flat bottom surface adapted to be exposed to sound, a top sheet, and sound deadening material between the sheets. The panels are arranged in a ceiling structure in parallel rows and are similarly oriented.

Each panel has supporting flanges along an end and a side edge which are flush with the bottom surface of the panel. Each panel also has supported flanges along the other end and side edges. The supported flanges of each panel are supported on the supporting flanges of adjacent panels. The supported flanges of each panel are spaced above the bottom surface thereof a distance such that the bottom surfaces of all panels are flush.

Means are provided for suspending each panel adjacent one of the edges having the supporting flanges from an overhead support structure.

Background of the invention

The invention refers to acoustical panel construction and is an improvement on the construction shown in U.S. Patent No. 5,241,282.

Summary of the invention

An essential object of the invention is to provide an improved acoustical panel which when installed with other panels of like construction in a ceiling structure will provide a unitary or monolithic appearance.

Another object is to provide a ceiling structure composed of panels so constructed that any one of them is individually removable without disturbing the other panels.

Another object is to provide a panel with supporting flanges along two adjacent edges and supported flanges along the remaining two edges, such that the supported flanges of each panel in a ceiling structure rest upon and are supported by the supporting flanges of the adjacent panels.

Another object is to provide a panel in which the supporting flanges of each panel are flush with the bottom surfaces thereof and the supported flanges are spaced upwardly from the bottom surface a distance such that the bottom surfaces of all of the panels in a ceiling structure are flush with one another.

Another object is to provide means for suspending the panels adjacent one of the edges having the supporting flanges from an overhead support structure.

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 bottom plan view of a panel constructed according to my invention.

FIGURE 2 is a fragmentary perspective view of one of the corners of the panel.

FIGURE 3 is a fragmentary perspective view of another corner.

FIGURE 4 is a fragmentary perspective view of the corner shown in FIGURE 3, taken from a different angle.

FIGURE 5 is a fragmentary perspective view of another corner.

FIGURE 6 is a fragmentary perspective view of another corner.

FIGURE 7 is a semi-diagrammatic bottom plan view of a ceiling structure composed of the panels shown in FIGURES 1-6.

FIGURE 8 is an enlarged sectional view taken on the line 8—8 in FIGURE 7.

FIGURE 9 is a fragmentary perspective view of the ceiling structure as seen from above.

FIGURE 10 is an enlarged fragmentary view of a portion of FIGURE 7.

Referring now more particularly to the drawings, the panels 10 are rectangular and of identical construction. Each has a rectangular bottom facing or sheet 14, and a rectangular top facing or sheet 16 which is parallel to and spaced from the bottom sheet 14. These sheets 14 and 16 may be of any suitable material but preferably are formed of sheet metal. The bottom facing of sheet 14 is formed with a multiplicity of perforations 18.

A honeycomb structure 20 is sandwiched between the facings or sheets 14 and 16. The honeycomb structure 20 may be formed of a cardboard material and, together with the sheets 14 and 16, provides a strong composite panel structure which is resistant to bending and twisting.

The honeycomb structure 20 is preferably secured by a suitable adhesive to the sheets 14 and 16, and a sound absorbing material 22, which may be glass, wool or wood fibers, fill the cells of the honeycomb structure 20.

The panel 10 has a flange 24 along one end edge, and has a flange 26 along one side edge. Flanges 24 and 26 are sometimes referred to as supporting flanges because in an acoustical ceiling structure composed of a plurality of identical panels 10, the flanges 24 and 26 support adjacent panels. Panel 10 also has a flange 28 along the opposite end edge and a flange 30 along the opposite side edge. Flanges 28 and 30 are sometimes called supported flanges because in a ceiling structure composed of a plurality of identical panels 10, the flanges 28 and 30 rest upon and are supported by the flanges 24 and 26 of adjacent panels.

The corners of the panel in FIGURE 1 are, for convenience and for the purpose of later reference, designated 1, 2, 3 and 4.

The end of the panel between corners 1 and 3 is closed by an end wall 32 which is integral with the top sheet 16. Wall 32 extends at right angles to the bottom and top sheets 14 and 16. Wall 32 terminates short of the bottom sheet 14 and has a right angle flange 34 extending outwardly at right angles to wall 32 and parallel to the bottom and top sheets 14 and 16. The bottom sheet 14 has an integral end continuation which is bent upwardly at right angles to the sheet where indicated at 36, and then outwardly to provide a flange 38 parallel to the bottom sheet 14 and in surface-to-surface contact with the bottom of flange 34. Flange 38 is then return-bent over the top of flange 34, the return-bent portion being designated 40, so as to lie in surface-to-surface relation with the top of flange 34 and provide three layers of material. The flanges 34 and 38 and the return-bent portion 40 together form the supported flange 28 along one end of the panel.

The side of the panel between corners 1 and 4 is of the same construction as the end of the panel between corners 1 and 3 just described, except that the side of the panel may be longer than the end thereof depending upon the particular dimensions employed.
Similar parts have the same reference numerals primed. Thus, the side of the panel between corners 1 and 4 is closed by a side wall 32' which is integral with the top sheet 16. Wall 32' extends at right angles to the bottom and top sheets 14 and 16. Wall 32' terminates short of the bottom sheet 14 and has a right angle flange 34' extending outwardly at right angles to wall 32' and parallel to the bottom and top sheets 14 and 16. The bottom sheet 14 extends at right angles to sheet 16, and side extension 64' which is bent upwardly at right angles to the sheet where indicated at 36', and then outwardly to provide a flange 38' parallel to the bottom sheet 14 in the surface-to-surface contact with the bottom of flange 34'. Flange 38' is then return-bent over the top of flange 34', the return-bent portion being designated 40', so as to provide a surface-to-surface relationship of material. The flanges 34' and 38' and the return-bent portion 40' together form the supported flange 30 along one side of the panel.

The end of the panel between corners 2 and 4 is closed by a generally L-shaped member 50 which is preferably of metal and is shown as being of a somewhat heavier and stronger section than the bottom and top sheets 14 and 16. Member 50 has an upright portion 52 which extends between and at right angles to sheets 14 and 10 to close the end of the panel. Member 50 has a flange 54 which extends outwardly of the panel at right angles to the upright portion 52 at the bottom end thereof. The bottom sheet 14 has an integral extension 56 which extends outwardly along in surface-to-surface contact with the bottom of flange 54, being return-bent at 58 over the top of flange 54 to provide three laminations of material. The flange 54, extension 56 and the return-bent portion 58 together form the supporting flange 24, and it will be noted that the bottom face of flange 24 as provided by the bottom face of extension 56 is flush with or in the plane of the flat bottom surface of sheet 14.

The upper end of the upright portion 52 of member 50 has a flange 60' extending outwardly at right angles thereto and then bent downwardly as indicated as 62 parallel to the upright portion 52 so as to provide a hook formation by means of which the panel may be suspended from an overhead ceiling structure. The top sheet 16 has a side extension 64' which extends over the portions 60' and 62 and is return-bent along the inner surface of portion 62'. The supported flanges 28 and 30 are spaced from the bottom sheet 14 a distance equal to the thickness of flanges 24 and 26. The bottom surfaces of flanges 24 and 26 are, as previously stated, flush with or in the plane as the flat front surface of bottom sheet 14.

The panel 10 is intended to be installed in an acoustical ceiling structure with other panels of identical construction as shown in FIGURE 7. As there shown, the panels are similarly oriented and are arranged in a horizontal plane in parallel rows. An overhead support structure is provided made up of spaced parallel, transverse channels 70. The elongated, generally L-shaped support strips 74 have horizontal portions 75 engaging the underside-surfaces of the channels 70, vertical depending portions 76 extending downward, and hooked portions 78 removing engaging under the hooked portions 60', 62' along the side between corners 2 and 3 of the panels. These strips 74 are removably secured to the channels 70 by wires 80 and extend at right angles to the channels continuously along all of the panels in the row.

In the installed ceiling structure, the supported flanges 28 and 30 of each panel rest atop and are supported by the supporting flanges 24 and 26 of adjacent panels. Since the bottom faces of supporting flanges 24 and 26 of each panel are flush with the bottom face thereof and since the supported flanges 28 and 30 are spaced upwardly on the bottom face a distance equal to the thickness of the supporting flanges 24 and 26, it will be apparent that the front faces of all of the panels in the ceiling structure will be disposed in the same horizontal plane. In view of the fact that there are no support runners between panels or gridwork separating panels, the view of the ceiling structure as seen from below according to FIGURE 7, is one of a monolithic or continuous ceiling structure.

A firm support is provided for each panel because each panel is suspended along the side having the supporting flange 26 from an overhead support structure, and is supported along the opposite side and along one end upon the supporting flanges of adjacent panels.

The arrangement is such that any one panel may be removed from the assembly without disturbing the other panels. This is accomplished by raising the corner 1 of a particular panel and then twisting it slightly to disengage the panel from the suspending strips 74 along the side between corners 2 and 3, and then lowering the disengaged panel from the space it previously occupied.

The panels may be of varying dimensions and may be rectangular or square as desired. While the terms "side" and "end" have been used throughout the specification to refer to certain edges of the panel, it should not be inferred that the "sides" are necessarily longer than the "ends." With respect to the supporting and supported flanges, it will be noted that a three layer or lamination construction is provided for added strength. This edge construction is provided by the flanges also prevents delamination of the top and bottom sheets from the honeycomb core structure. Delamination, if it ever occurs, will ordinarily begin at the edges.

It will be noted that in the ceiling construction illustrated in FIGURE 7 the flange or hook portion 60, 62 along the end having the supporting flange 24 is not suspended from overhead. The purpose of flanges or hook portions 60, 62 is convenience of construction. It also allows the installer to begin installing the panels in a 90° change of direction, so that the panels instead of extending in rows from right to left as in FIGURE 7, extend at right angles thereto. In that event, the support strips 74 would engage the flanges or hook portions 60, 62 instead of those designated 60', 62'.

What I claim as my invention is:

1. A rectangular acoustical ceiling panel having a flat
bottom surface, supporting flanges extending laterally outwardly from said panel along two adjacent edges of said panel and extending flush with said bottom surface, supported flanges extending laterally outwardly from said panel along the remaining two edges of said panel, said panel being adapted to be installed in a ceiling structure with other panels of like construction and like orientation in parallel rows with said supported flanges of each panel in said ceiling structure supported upon the said supporting flanges of adjacent panels, said supported flanges of said panel being spaced upwardly from the bottom surface thereof a distance such that the bottom surfaces of all panels in said ceiling structure will be flush with one another, said panel having a bottom perforated sheet providing said bottom surface, a top sheet parallel to and spaced above said bottom sheet, sound deadening material between said sheets, said supporting flanges being formed by extensions of said bottom sheet, L-shaped members along the first-mentioned two edges having upright portions extending between said sheets and closing said first-mentioned two edges and also having horizontal flanges extending from the lower ends of said upright portions, said horizontal flanges being disposed above and in surface-to-surface relation with said supporting flanges to reinforce the latter, said L-shaped members having horizontal flanges extending from the upper ends of said upright portions by which said panel may be suspended from an overhead support structure, said horizontal flanges extending from the upper ends of said upright portions being disposed below and secured in surface-to-surface contact with said top sheet.

A rectangular acoustical ceiling panel having a flat bottom surface, supporting flanges extending laterally outwardly from said panel along two adjacent edges of said panel and extending flush with said bottom surface, supported flanges extending laterally outwardly from said panel along the remaining two edges of said panel, said panel being adapted to be installed in a ceiling structure with other panels of like construction in parallel rows with said supported flanges of each panel in said ceiling structure supported upon the said supporting flanges of adjacent panels, said supported flanges of said panel being spaced upwardly from the bottom surface thereof a distance such that the bottom surfaces of all panels in said ceiling structure will be flush with one another, said panel having a bottom perforated sheet providing said bottom surface, a top sheet parallel to and spaced above said bottom sheet, sound deadening material between said sheets, said supporting flanges being formed by extensions of said bottom sheet, L-shaped members along the first-mentioned two edges having upright portions extending between said sheets and closing said first-mentioned two edges and also having horizontal flanges extending from the lower ends of said upright portions, said horizontal flanges being disposed above and in surface-to-surface relation with said supporting flanges to reinforce the latter, said L-shaped members having horizontal flanges extending from the upper ends of said upright portions by which said panel may be suspended from an overhead support structure, said horizontal flanges extending from the upper ends of said upright portions being disposed below and secured in surface-to-surface contact with said top sheet.

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ALFRED C. PERHAM, Primary Examiner.