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COMBINATION LUMINOUS AND ACOUSTICAL CEILING

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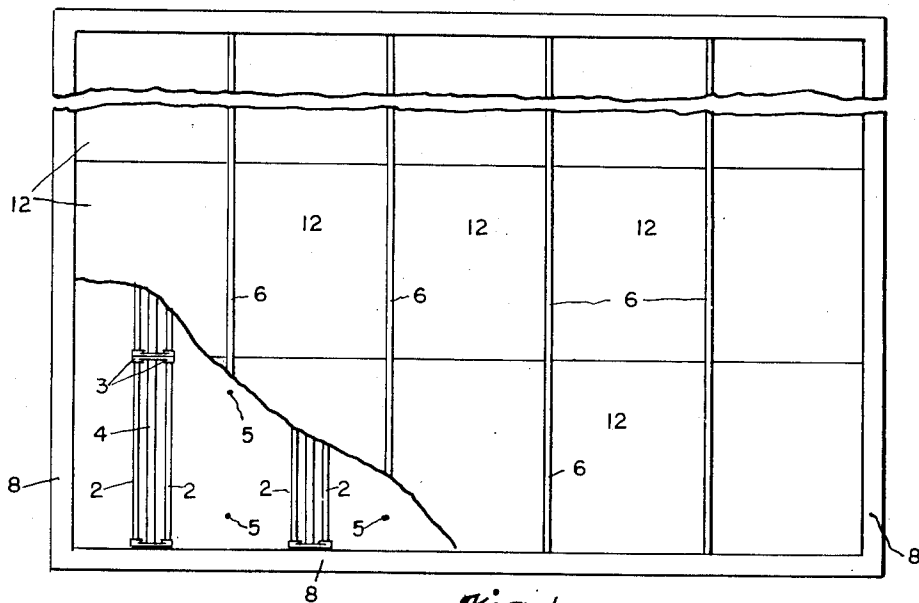


Fig. 1

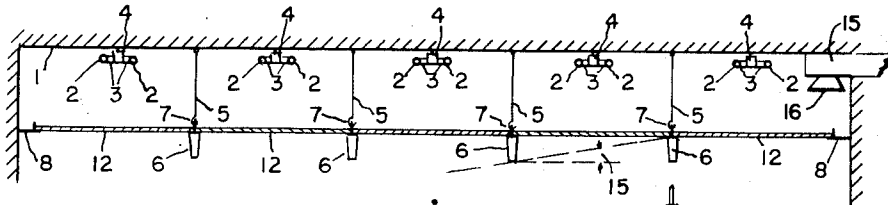


Fig. 2

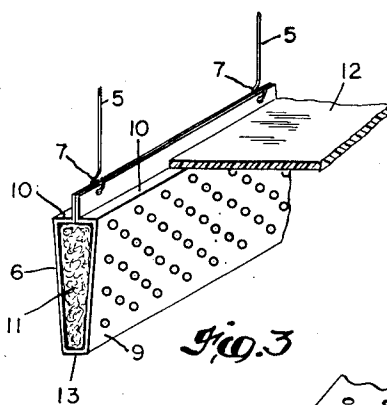


Fig. 3

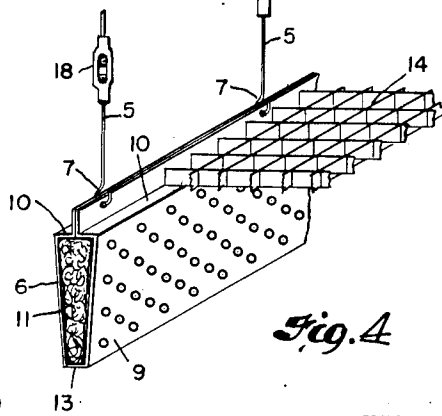


Fig. 4

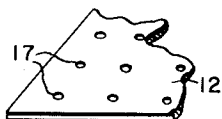


Fig. 5

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COMBINATION LUMINOUS AND ACOUSTICAL
CEILING

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6 Claims. (Cl. 240—9)

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The present improvements relate to combina-
tion luminous and acoustical ceiling construc-
tions in which illuminating and sound-absorb-
ing means are incorporated for illuminating the
room or other space beneath such ceiling and for
deadening sounds in such room.

An object of the present invention is to render
luminous the entire ceiling, or such portion there-
of as may be desired, by the use of a suitable
source of illumination located above the ceiling,
which may be disposed so as to serve either as a
direct or an indirect source of light and at the
same time the ceiling is of such construction as
to act as a sound deadening medium without af-
fecting its function as a light transmitting medi-
um or means of illumination.

Other objects and advantages will become ap-
parent as the following description proceeds.

To the accomplishment of the foregoing and
related ends, said invention, then, comprises the
features hereinafter fully described and particu-
larly pointed out in the claims, the following de-
scription and the annexed drawing setting forth
in detail certain illustrative embodiments of the
invention, these being indicative, however, of
but a few of the various ways in which the
principle of the invention may be employed.

In said annexed drawing:

Fig. 1 is a bottom plan view, more or less
diagrammatic in character, of a luminous and
acoustical ceiling embodying my present im-
provements with a portion of the ceiling broken
away to illustrate the light source thereabove;

Fig. 2 is a vertical sectional view of such ceil-
ing showing the manner in which it is suspended
from the ceiling proper and attached to the ad-
jacent side walls bounding the ceiling proper;

Fig. 3 is a fragmentary and enlarged perspec-
tive view of a portion of the luminous and
acoustical ceiling construction of Figs. 1 and 2;

Fig. 4 is a similar fragmentary perspective
view of a modification; and

Fig. 5 is a fragmentary perspective view of a
light-diffusing panel having small perforations
therethrough whereby when the entire luminous
ceiling is composed of such panels, ventilating
air may flow uniformly into or from the room
space beneath such ceiling.

As indicated, my improved ceiling construc-
tion as shown in bottom plan view in Fig. 1 is
designed to be suspended a suitable distance be-
low the main or permanent ceiling 1 (Fig. 2).
As a matter of convenience, the novel features
which are comprised in the ceiling proper will be

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described in connection with the type of lighting
fixture designed to provide a direct light source
as illustrated in Fig. 2. Where direct illumina-
tion is desired, the fluorescent tubes 2 or equiva-
lent light elements will be supported preferably
in pairs closely adjacent the permanent ceiling 1,
the opposite ends of said tubes being mounted in
suitable sockets carried by the arms 3 which ex-
tend in opposite directions from each fixture 4.
As shown, said fixtures 4 are arranged in parallel
rows extending lengthwise of the permanent
ceiling 1, the fixtures comprising each row being
disposed in longitudinally aligned, end-to-end
relation.

Also attached to the permanent ceiling 1 so as
to depend downwardly therefrom intermediate
the rows of fixtures 4 are parallel series or rows
of aligned hanger rods or equivalent support
members 5. As best shown in Fig. 3, longitudi-
nally extending rows of acoustical baffles 6 are
supported by said hanger rods 5 in parallel re-
lation as for example by the hooks 7 at the lower
ends of the rods hooked through apertures ad-
jacent the upper edges of the baffles.

Secured to the side walls bounding the perma-
nent ceiling 1 are longitudinally extending mem-
bers or filler strips 8 of which one pair is pre-
ferably parallel to the baffles 6.

The acoustical baffles 6 are disposed vertically
and each preferably comprises a perforated cas-
ing or shell 9 of metal, plastic, or other relatively
stiff material, providing horizontally extending
ledges or rails 10 upon which the hereinafter
described light diffusing panels 12 are adapted to
laterally rest. The opposite side faces of said
casing 9 are inclined from vertical and are con-
nected together at their lower edges by a relatively
narrow web portion 13. Within said casing 9 and
spaced from the walls thereof is a body 11 of
sound absorbent material. Said baffles are made
in convenient lengths and are of trapezoidal
transverse cross-section with the opposite non-
parallel side faces inclined slightly from vertical
as shown both for superior light reflective and
sound absorbent properties. In other words, said
baffles 6 are tapered in transverse cross-section
form, their upper edges contiguous with the panel
margins to the lower edges thereof, as a result of
which the sides of the baffles lie at oblique
angles to the panels. The light-reflecting sur-
faces provided by the sides of the baffles accord-
ingly serve the more effectively to conceal the
rails 10 whereon the margins of the light-dif-
fusing panels are supported.

An acoustical baffle 6 of the character described when fabricated from sheet metal for example will not affect the sound deadening properties thereof when the casing 9 is repainted as is the case with known acoustical panels which are formed simply by compressing fibrous material into panel form.

As previously indicated, the light diffusing panels 12 laterally rest upon the ledges 10 of the baffles 6, and the panels 12 which are adjacent to the side walls of the room space are supported by the filler strips 8 which are secured to and project laterally from such side walls.

The light diffusing panels 12 illustrated in Figs. 1-3 are fabricated as from translucent plastic or like material and may be relatively thin and formed with corrugations or ribs for imparting thereto the necessary strength characteristics. Said panels 12 are preferably made in convenient lengths to facilitate installation and removal thereof.

In the form of the invention illustrated in Fig. 4 the luminous or secondary ceiling comprises egg-crate type louver panels 14 laterally resting upon the baffles 6 and spanning or closing the spaces therebetween. Otherwise, the construction illustrated in Fig. 4 is the same as that illustrated in Figs. 1-3.

From the foregoing description it will be seen that by providing a secondary ceiling composed of light diffusing panels, a very simple and yet effective form of luminous ceiling for a room or like space is provided. The construction furthermore is such that access to the lighting fixtures which are normally completely enclosed and hidden by such luminous ceiling may be readily had since the latter is made up of displaceable panels 12 or 14 which may be raised clear of the supporting means at any point in the ceiling and then returned to proper place.

Also it will be seen that by supporting such component light diffusing panels on vertically disposed acoustical baffles 6 which extend downwardly from such panels, the opposite side faces of said baffles will be illuminated through the light diffusing panels 12 or 14 and when the ceiling is viewed at any angle from horizontal between zero and angle 15 said baffles will conceal the panels from direct view and therefore only the low brightness of the reflected light from the side faces of the baffles will be visible. Moreover, because the bottom web portions 13 of the baffles are relatively narrow, the fact that such portions are unilluminated does not noticeably detract from the desired effect of continuous, over-all illumination.

With luminous and acoustical ceilings as just described sound waves reflected by the secondary ceiling when composed of light diffusing panels 12 as illustrated in Fig. 3 or 5 will be effectively deadened or absorbed by the series of baffles, said baffles further functioning as aforesaid to reflect light passing through the panels. On the other hand, when the secondary ceiling is composed of louver panels 14, sound waves which pass through such ceiling will be reflected from the permanent ceiling 1 against the acoustical baffles 6. In the latter case it may be desirable though not necessary to include sound-absorbing means in the space between the permanent and louvered ceilings such as acoustical tile secured to the permanent ceiling 1.

The forms of the invention herein disclosed are, of course, to be regarded merely as typical, it being understood that the lighting fixtures 4

might be arranged in other than parallel rows and longitudinally aligned end-to-end relation as shown. In view of the space provided between the light source and the light diffusing panels, a rather complete diffusion of light results below the luminous ceiling, thus making it possible to organize the fixture layout to best satisfy uniform distribution and the particular shape of the room space. Furthermore, the acoustical baffles 6 may be of rectangular or other cross-section if desired.

As a further modification, the light diffusing panels 12 may be perforated as illustrated in Fig. 5 to provide a perforate luminous ceiling for the discharge of ventilating air into the room space below the luminous ceiling, the space between the permanent and luminous ceilings thus functioning as a plenum chamber. If desired, suitable ductwork 15 for the ventilating system may be supported as from the permanent ceiling 1 with its outlet 16 spaced above the panels 12 so as not to obstruct the overall, diffused illumination afforded by the luminous ceiling and arranged to supply air into such plenum chamber whereby the ventilating air is uniformly diffused into the room space through the small and judiciously located perforations 17 in the light-diffusing panels 12. Obviously, the duct 15 may be arranged to exhaust air from the space above the luminous ceiling, in which event, air will flow upwardly from the room space through said perforations 17.

A still further modification for facilitating leveling of the luminous ceiling is to make the hanger rods 5 adjustable in length, as for example, by means of turnbuckles 18. (See Fig. 4.)

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

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

1. In an overhead sound absorbing and light shielding structure designed to be disposed beneath the ceiling proper and overhead lighting means of a room space, the combination of a series of light-diffusing panels substantially coextensive with the ceiling area, means for suspending said panels from the ceiling in spaced, approximately parallel relation thereto, said means including horizontally extending rails aligned with juxtaposed margins of said panels, and elongated acoustical baffles also carried by said panel suspending means, said baffles lying in close underlying relation to adjacent margins of said panels, said baffles comprising bodies of sound absorbing material providing light reflecting surfaces whereby said rails are concealed.

2. In an overhead sound absorbing and light shielding structure designed to be disposed beneath the ceiling proper and overhead lighting means of a room space, the combination of a series of light-diffusing panels substantially coextensive with the ceiling area, means for suspending said panels from the ceiling in spaced, approximately parallel relation thereto, said means including horizontally extending rails aligned with juxtaposed margins of said panels, and elongated acoustical baffles also carried by said panel suspending means, said baffles lying in close underlying relation to adjacent margins of said panels, said baffles comprising bodies of sound absorbing material providing light reflecting surfaces whereby said rails are concealed,

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said baffles being tapered in transverse cross-section from their upper edges contiguous with said panel margins to the lower edges thereof, whereby the sides thereof lie at oblique angles to said panels.

3. In an overhead sound absorbing and light shielding structure designed to be disposed beneath the ceiling proper and overhead lighting means of a room space, the combination of a series of light-diffusing panels substantially co-extensive with the ceiling area, means for suspending said panels from the ceiling in spaced, approximately parallel relation thereto, said means including hanger rods and horizontally extending rails carried by said rods in alignment with juxtaposed margins of said panels, and elongated acoustical baffles also carried by said panel suspending means, said baffles lying in close underlying relation to adjacent margins of said panels, said baffles comprising bodies of sound absorbing material providing light reflecting surfaces whereby said rails are concealed, said baffles being tapered in transverse cross-section from their upper edges contiguous with said panel margins to the lower edges thereof, whereby the sides thereof lie at oblique angles to said panels.

4. In an overhead light shielding structure designed to be disposed beneath the ceiling proper and overhead lighting means of a room space, the combination of a series of light-diffusing panels substantially co-extensive with the ceiling area, means for supporting said panels beneath the ceiling in spaced, approximately parallel relation thereto, said means including horizontally extending rails aligned with juxtaposed margins of said panels, said structure being formed with a relatively large number of small openings distributed over the entire structure for air flow between the space above and the room space below said structure, and an air duct opening into the space above said structure effective to establish pressure in such space different from that in the room space whereby air flows uniformly through such openings of said structure, said air duct being clear of the panels therebeneath whereby to avoid obstruction of the overall, diffused illumination of the room space below said structure as afforded by said light-diffusing panels.

5. In an overhead light shielding structure designed to be disposed beneath the ceiling proper and overhead lighting means of a room space, the combination of a series of light-diffusing panels substantially co-extensive with the ceiling area, means for supporting said panels beneath the ceiling in spaced, approximately parallel relation thereto, said means including horizontally extending rails aligned with juxtaposed margins of said panels, said structure being formed with a relatively large number of small openings distributed over the entire structure for air flow between the space above and the room space below said structure, and an air supply duct opening into the space above said struc-

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ture effective to discharge air into such space whereby such space constitutes a plenum from which the air is uniformly discharged through such openings of said structure into the room space below said structure, said air duct being clear of the panels therebeneath whereby to avoid obstruction of the overall, diffused illumination of the room space below said structure as afforded by said light-diffusing panels.

6. In an overhead ventilating and light shielding structure designed to be disposed beneath the ceiling proper and overhead lighting means of a room space, the combination of a light-diffusing sub-ceiling substantially co-extensive with the area of the ceiling proper and means for supporting said sub-ceiling in spaced, approximately parallel relation to the ceiling proper, said sub-ceiling being composed of light transmitting sheets and being provided with openings therethrough which are uniformly distributed over the entire sub-ceiling area and which in the aggregate occupy but a minor fractional portion of the sub-ceiling area as a whole, and an air duct opening into the space above said sub-ceiling effective to establish an air pressure in such space different from that in the room space whereby air flows uniformly through the openings in said sub-ceiling, said air duct being clear of said sub-ceiling and out of the path of downward light rays from said lighting means to insure such overall, diffused ventilation and to avoid obstruction of such overall, diffused illumination.

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