April 28, 1964 R. F. SMITH 3,130,922

ILLUMINATED CEILING

Filed April 19, 1961 2 Sheets-Sheet 1

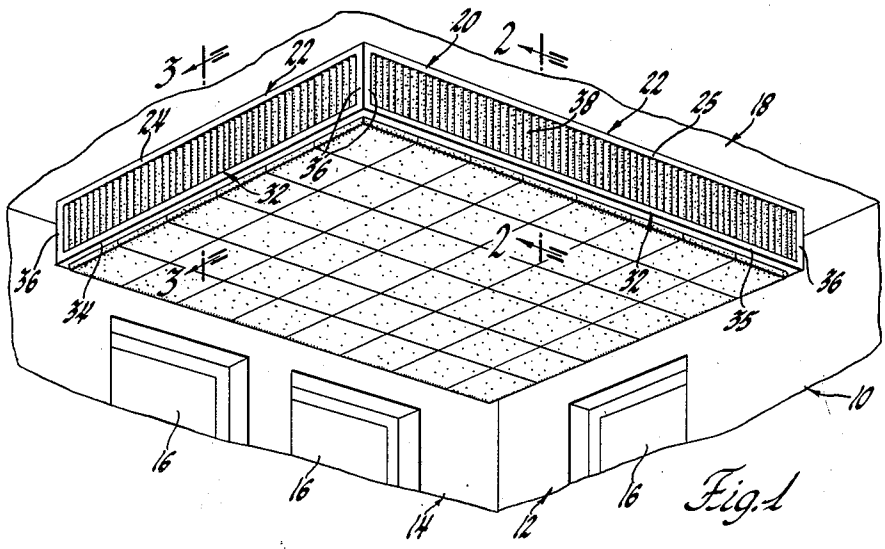


Fig. 1

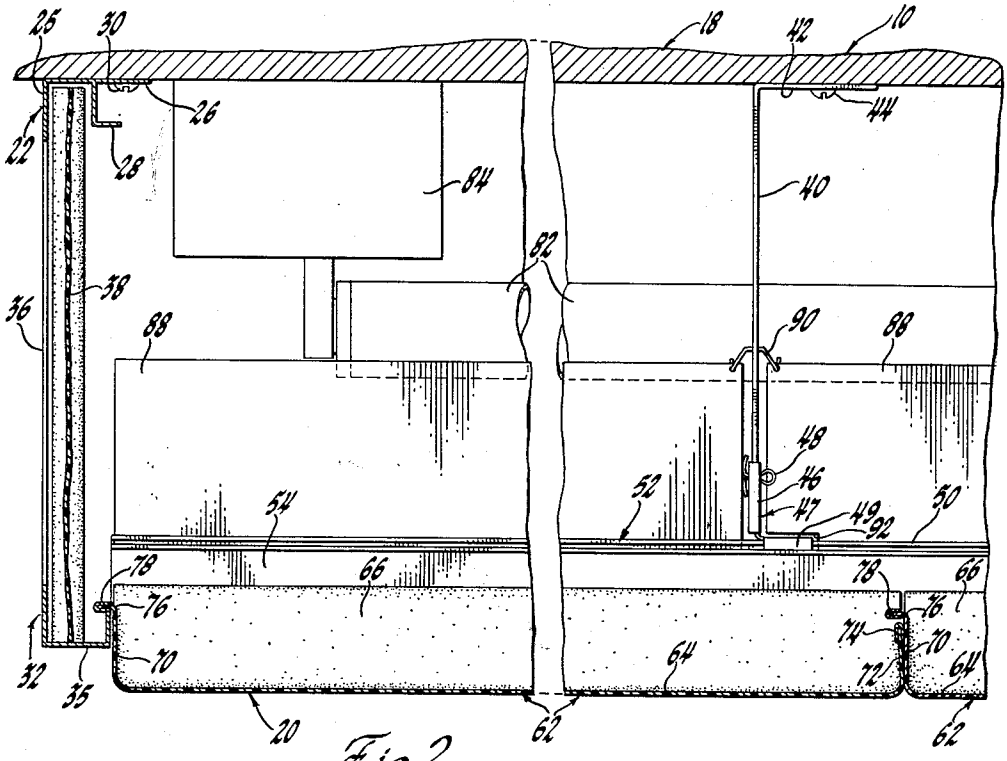


Fig. 2

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ILLUMINATED CEILING

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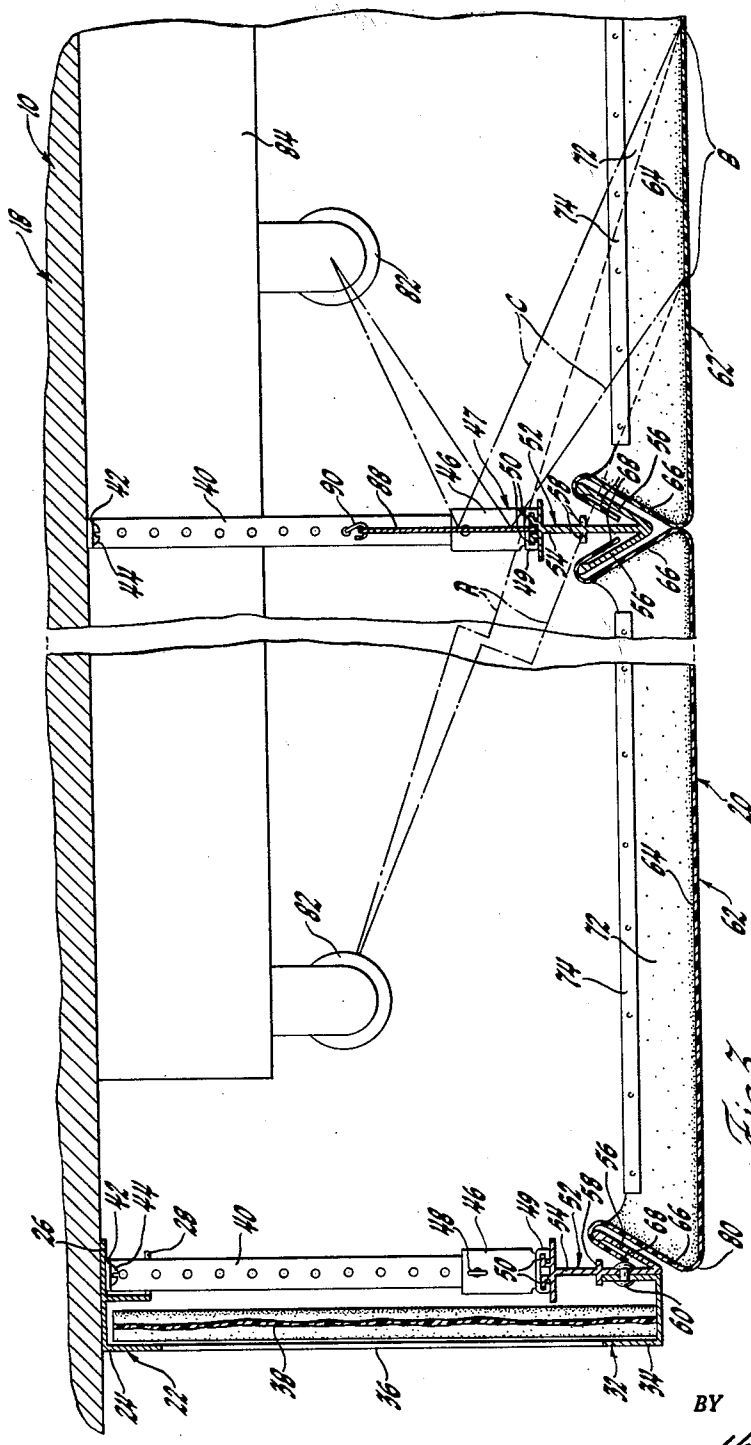


Fig. 1

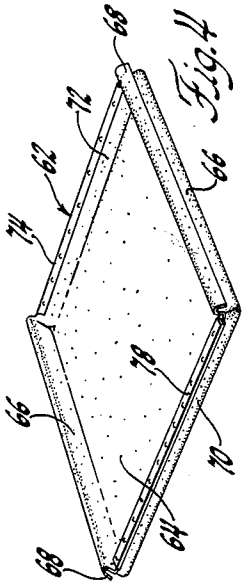


Fig. 4

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ILLUMINATED CEILING

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This invention relates generally to illuminated ceilings and more particularly to illuminated ceilings for building structures.

At the present time, there are many known illuminated ceiling constructions. In many of these constructions the support members for the pans which make up the ceiling are visible to the viewer. Further, many of these ceilings do not provide for even distribution of diffused light since the light is of varying gradation so as to cause undesirable reflections on smooth surfaced articles. Additionally, many of these ceilings have undesirable shadow areas which detract from the appearance of the ceiling.

The ceiling of this invention provides for even distribution of diffused light over the entire surface thereof so that there are no undesirable reflections on any smooth surfaced articles below the ceiling and there are no gradations of light and dark areas. The ceiling of this invention is further arranged so that there are no exposed hangers or other support members between the pans which make up the ceiling.

The ceiling of this invention is very economical in construction and may be applied to either new building construction or to existing building construction in a very simple manner. In the preferred embodiment of the invention, a plurality of longitudinal hangers are suspended from the ceiling of the building, with each pair of adjacent hangers having an angularly directed flange which extends toward the other and toward the ceiling. The pans are preferably made of semitransparent plastic material, with one pair of side walls of the pans being angularly directed and provided with return bent flanges adapted to be hooked over a respective pair of hanger flanges so as to locate said walls and hanger flanges in an adjacent generally parallel spaced relationship. The other two side walls of the pan extend generally normal to the base wall thereof, with one of these walls including a laterally directed flange which overlies the adjacent other side wall of the longitudinally successive pan to provide a light seal. The base walls of laterally successive pans abut each other so as to conceal the hangers whereby there are no visible hangers or other support members. In order to avoid any shadows caused by the hangers, light reflecting shields are provided between the pans in directions parallel to the source of light. Thus, the entire ceiling presents a smooth unbroken surface of even diffused light.

The primary object of this invention is to provide a new and improved illuminated ceiling. Another object of this invention is to provide a new and improved illuminated ceiling which will cast even diffused light throughout the entire surface thereof. A further object of this invention is to provide a new and improved illuminated ceiling wherein no hangers or other support members are visible.

These and other objects of the invention will be readily apparent from the following specification and drawings wherein:

FIGURE 1 is a perspective view of a portion of building structure having an illuminated ceiling according to this invention mounted thereon;

FIGURE 2 is an enlarged sectional view taken generally along the plane indicated by line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged sectional view taken generally along the plane indicated by line 3—3 of FIGURE 1; and

FIGURE 4 is a perspective view of one of the pans.

Referring now particularly to FIGURE 1 of the drawings, a building structure 10 includes walls 12 and 14 located generally normal to each other and provided with one or more windows 16. A ceiling 18 extends generally normal to the walls 12 and 14, and an illuminated ceiling 20 according to this invention is suspended or supported by the ceiling 18. In the embodiment shown, the illuminated ceiling 20 is spaced from the walls 12 and 14 although it will be understood that the ceiling 20 may extend to these walls if so desired.

As shown in FIGURES 2 and 3 of the drawings, the upper frame 22 of the ceiling 20 is comprised of generally channel shaped like longitudinal and lateral extruded members 24 and 25, each of which opens downwardly and is provided with a pair of flanges 26 and 28 extending laterally from the inboard wall or leg thereof. Flanges 26 are bolted or otherwise suitably secured at 30 to the ceiling 18 in order to mount the frame 22 thereon.

The lower frame 32 of the ceiling 20 is also comprised of generally channel shaped like longitudinal and lateral extruded members 34 and 35 which open to the members 24 and 25 and are of greater width. Frames 22 and 32 are joined at each corner thereof by corner posts or members 36 which are preferably in the form of plates extending between the outboard walls or legs of the members 24, 25 and 34, 35 and located generally normal to each other. Corrugated strips 38 of somewhat opaque plastic material have their edge portions fitting within the channels of members 24, 25 and 34, 35 and provide the outer depending walls of the ceiling 20, which walls are spaced from the walls 12 and 14 as previously described.

A plurality of perforated metal straps 40 include upper flanged ends 42 which are bolted or otherwise secured at 44 to the ceiling 18. Straps 40 are spaced apart and located in longitudinal rows across the ceiling 18. As shown in FIGURE 3, the lower flange 28 of members 24 is slotted at certain places in order to allow passage of the outermost straps 40 therethrough. The lower ends of the straps 40 are received within generally channel shaped legs 46 of angle members 47, with legs 46 being secured to the straps 40 by cotter keys 48 extending through openings in the bases of legs 46 and through a selected one of the openings in straps 40. The lower legs 49 of the angle members fit over spaced track portions 50 of elongated hanger members 52 so as to support these hanger members in generally parallel equally spaced relationship longitudinally of the ceiling 20 and parallel to members 24 and 34. The hanger members 52 are of extruded construction and generally comprise a wall 54 depending from the track portions 50 and terminating in a pair of angularly extending flanges 56. Laterally extending flanges 58 are located intermediate the flanges 56 and the track portions 50 of the hanger members. The outermost hanger members include only one flange 56, as shown in FIGURE 3, with the walls 54 of these hanger members being riveted at 60 to the inner legs or walls of members 34.

As best shown in FIGURE 4, a pan member 62 of plastic material includes a base wall 64, a pair of opposite side walls 66 which extend angularly to the base wall 64 and terminate in return bent flanges 68, and another pair of opposite side walls 70 and 72 which extend generally normal to the base wall 64, with the upper edge of the wall 72 being reinforced by a metal channel member 74 crimped thereto and the wall 70 terminating in a laterally extending flange 76 which is reinforced by a metal channel member 78 crimped thereto. The pan member 62 may be very easily and economically manufactured by vacuum forming and it is intended that the walls which comprise the pan member be integral with each other.

In order to mount the pan members in longitudinal

rows between each pair of hanger members **52**, the flanges **68** of walls **66** are hooked over the respective pairs of opposing flanges **56** of members **52**, as shown in FIGURE 3, to thereby locate the walls **66** in generally parallel juxtaposed relationship to the flanges **56**. The edge portions **80** of the adjacent longitudinal rows of pan members will thereupon abut each other laterally of the ceiling **20** as shown in FIGURE 3, so as to conceal the members **52** from view below the ceiling. As shown in FIGURE 2, the flange **76** of the outermost pan member of each longitudinal row overlies the inboard wall or leg of one of the frame members **35** so as to provide a light seal between these outermost pan members and the one frame member **35**. Likewise, the flanges **76** of the succeeding pan members of each longitudinal row overlie the walls **72** of the preceding pan members to provide a continuous light seal down each longitudinal row of pan members. The end pan member of each row will not have a flange **76** to overlie the other member **35**, but a generally L-shaped member is crimped to the wall **72** of this pan member to bridge the space between the wall **72** thereof and the adjacent member **35**.

A longitudinally extending row of fluorescent tubes **82** is supported from laterally extending ballast carrier cases **84** and is located generally midway between the members **52**. The light from the fluorescent tubes **82** is diffused through the pan members and the tubes are located a sufficient distance from the pan members so that the opaqueness of the pan members will prevent a bright band of light from being visible through the pan members. Depending on the amount of light required, more than one row of tubes **82** may be necessary between the members **52**.

The walls **54** of the hanger members interrupt the light from the tubes **82** which are located above the adjacent pans, as indicated by dot-dash lines A, and accordingly will provide shadow areas B on the adjacent laterally located pan members so that there will be a gradation of light and dark areas across these laterally located pan members. In order to avoid any such gradation of light and dark areas and to provide for even diffusion of light through the pan members, a plurality of reflector members **88** extend longitudinally of the ceiling generally coplanar with each of the walls **54**. The reflector members **88** have their lower edges received within channels provided between the track portions **50** of members **52** and are vertically located by wire hooks **90** which extend through the apertures of the straps **40** and through suitable apertures provided in adjacent corners of longitudinally aligned reflector members as shown in FIGURE 2. The corners of the reflector members are cut out at **92** wherever necessary so as to clear the legs **49** of members **47**. The reflector members are painted white on each side thereof and reflect the light into the shadow areas as indicated by dot-dash lines C in FIGURE 3 to thus prevent any gradation of light and dark areas.

From the foregoing description it can be seen that the ceiling of this invention is very economical in construction and can be easily applied to both existing ceilings or to new building construction. In certain installations, it may be desirable to have the ceiling extend to the walls of the building structure and in such instances the frame members **24**, **25**, **34**, **35** are dispensed with so that the walls **54** of the laterally outermost hanger members and the edge portion **80** and the walls **70** and **72** of the pan members will abut the wall of the building structure.

In order to both assemble and disassemble the pan members **62** from the hanger members, the pan members are flexed on the diagonal so as to allow the flanges **68** to be either hooked over the flanges **56** or removed therefrom.

Thus, this invention provides a new and improved illuminated ceiling.

What is claimed is:

1. In a building structure, an illuminated ceiling comprising, in combination, a pair of longitudinal support members, each including an angularly directed flange, means mounting said support members on said building structure in generally parallel spaced relationship with said flanges thereof being directed toward each other, a light source, a pair of pan members of light transmitting material spaced from said light source, each having first opposite side walls extending angularly to the base walls thereof, and second opposite side walls extending generally normal to the base wall thereof, means removably securing said first walls to said flanges of said support member to locate said pan members in successive relationship and locate said first walls thereof in generally parallel adjacent relationship to the flanges of said support member and said second walls thereof in adjacent juxtaposed relationship, and cooperating means on said second walls providing a light seal therebetween.

2. In a building structure, an illuminated ceiling comprising, in combination, a pair of longitudinal support members, each including an angularly directed flange, means mounting said support members on said building structure in generally parallel spaced relationship with said flanges thereof being directed toward each other, a light source, a pair of pan members of light-transmitting material spaced from said light source, each having first opposite side walls extending angularly to the base walls thereof, and second opposite side walls extending generally normal to the base wall thereof, means removably securing said first walls to said flanges of said support member to locate said pan members in successive relationship and locate said first walls thereof in generally parallel adjacent relationship to the flanges of said support member and said second walls thereof in adjacent juxtaposed relationship, and a flange on one of said second walls overlying the other of said second walls to provide a light seal.

3. In a building structure, an illuminated ceiling comprising, in combination, at least three longitudinal support members, means mounting said support members on said building structure in generally parallel spaced relationship, a pair of angularly directed flanges on the intermediate one of said members each extending to one side thereof, an angularly directed flange on each member to one side of said intermediate member extending toward a respective flange on said intermediate member to arrange said flanges in respective pairs, a light source, a plurality of pan members of light transmitting material, each having first opposite side walls extending angularly to the base wall thereof and second opposite side walls extending generally normal to said base walls, said pan members arranged in successive relationship to locate said second walls thereof in adjacent juxtaposed relationship and said first walls thereof in side-by-side relationship, cooperating means on said related second walls providing a light seal therebetween, and means removably securing said first walls of each pan member to a respective pair of said flanges to locate the base walls of said pan members in abutting relationship below said flanges to conceal said flanges from view and locate said first walls of each pan member in generally parallel adjacent spaced relationship to a respective flange.

4. In a building structure, an illuminated ceiling comprising, in combination, at least three longitudinal support members, means mounting said support members on said building structure in generally parallel spaced relationship, a pair of angularly directed flanges on the intermediate one of said members, each extending to one side thereof, an angularly directed flange on each member to one side of said intermediate member extending toward a respective flange on said intermediate member to arrange said flanges in respective pairs, a light source, a plurality of pan members of light-transmitting material, each having first opposite side walls extending angularly to the base wall thereof and including a return bent flange and second opposite side walls extending generally nor-

mal to said base wall thereof, said pan members arranged in successive relationship to locate said second walls thereof in adjacent juxtaposed relationship and said first walls thereof in side-by-side relationship, cooperating means on said related second walls providing a light seal therebetween, said return bent flanges being hooked over a respective pair of said support member flanges to support said pan members on said support members adjacent said light source and locate said first walls of each pan member in generally parallel adjacent spaced relationship to said respective pairs of support member flanges and locate the base walls of said pan members in abutting relationship below said flanges to conceal said flanges from view.

5. In a building structure, an illuminated ceiling comprising, in combination, a longitudinal support member mounted on said building structure and including a pair of angularly directed flanges, each extending to one side thereof, a pair of pan members of light-transmitting material, each including a side wall extending angularly from an edge portion of the base wall thereof, means removably securing said walls of each pan member to a respective flange to locate said walls of said pan members in generally parallel adjacent relationship to a respective flange and locate said edge portions of said pan members in abutting relationship to conceal said support member, means supporting said pan members adjacent an opposite edge portion thereof to locate the base walls of said members in generally coplanar relationship, a source of light above each of said pan members and extending generally parallel to said support member, and a light reflecting member supported by said support member and disposed to reflect light impinging on said support member onto said pan members.

6. In a building structure, an illuminated ceiling comprising, in combination, a longitudinal support member mounted on said building structure and including a pair of angularly directed flanges, each extending to one side thereof, a pair of pan members of light-transmitting material, each including a side wall extending angularly from an edge portion of the base wall thereof, means removably securing said walls of each pan member to a respective flange to locate said walls of said pan members in generally parallel adjacent relationship to a respective flange and locate said edge portions of said pan members in abutting relationship to conceal said support member, means supporting said pan members adjacent an opposite edge portion thereof to locate said base walls of said members in generally coplanar relationship, a source of light above and extending longitudinally of and intermediate said side walls of each pan member, and a member having opposite light reflecting sides supported by said support member above said pan members intermediate said light sources and disposed to reflect light impinging on said support member from each of said light sources onto the respective pan member located therebelow.

7. In an illuminated ceiling, a pan member comprising, a base wall, a pair of side walls extending inwardly at an acute angle from opposite edge portions of said base wall and each including a return bent flange, a second pair of side walls extending generally normal to opposite side edge portions of said base wall, one of said second side walls being provided with a laterally directed flange, said pan member being formed of semitransparent light diffusing material and said base wall and said side walls being formed as an integral unit.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

April 28, 1964

Patent No. 3,130,922

Robert F. Smith

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 59, after "62 of" insert -- semitransparent --.

Signed and sealed this 8th day of September 1964.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents