Jan. 30, 1962 W. L. LIPSCOMB 3,019,334

CELLULAR LIGHT CONTROL PANEL

Filed Dec. 26, 1956 2 Sheets-Sheet 1

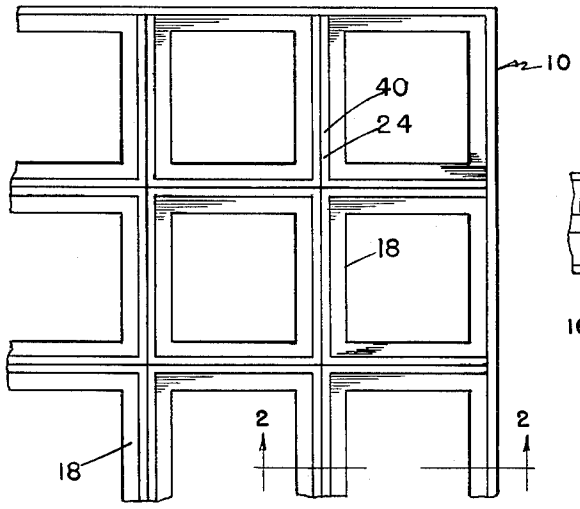


FIG. 1

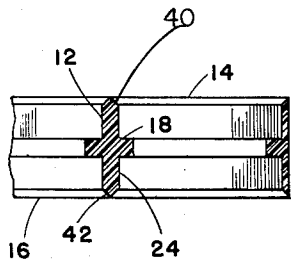


FIG. 2

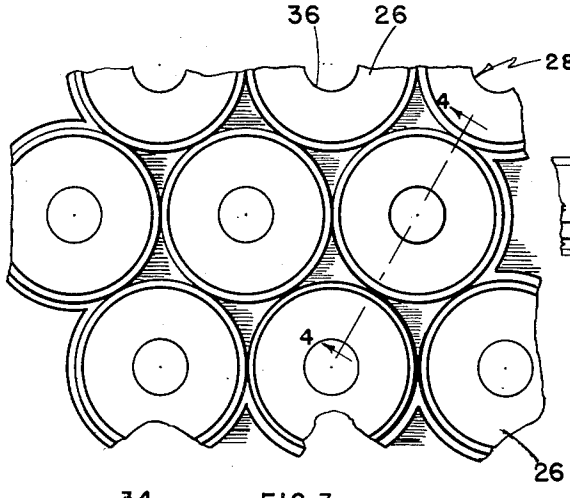


FIG. 3

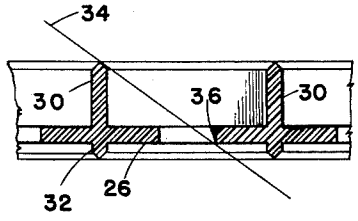


FIG. 4

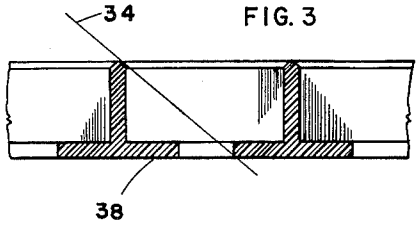


FIG. 5

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CELLULAR LIGHT CONTROL PANEL

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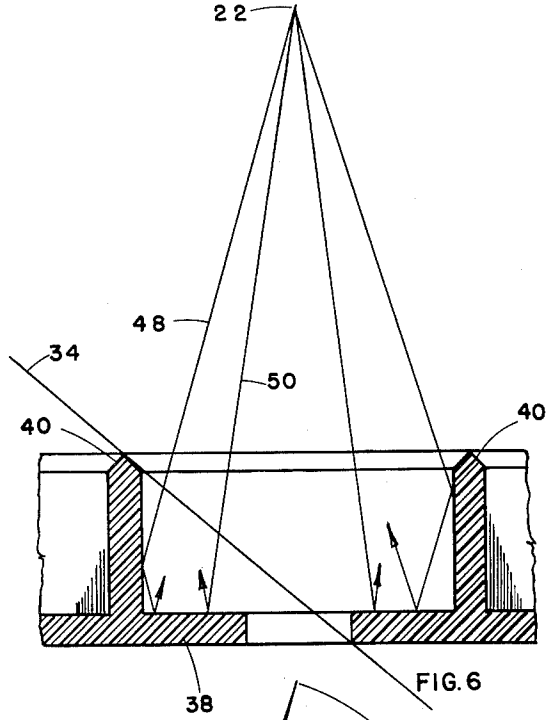


FIG. 6

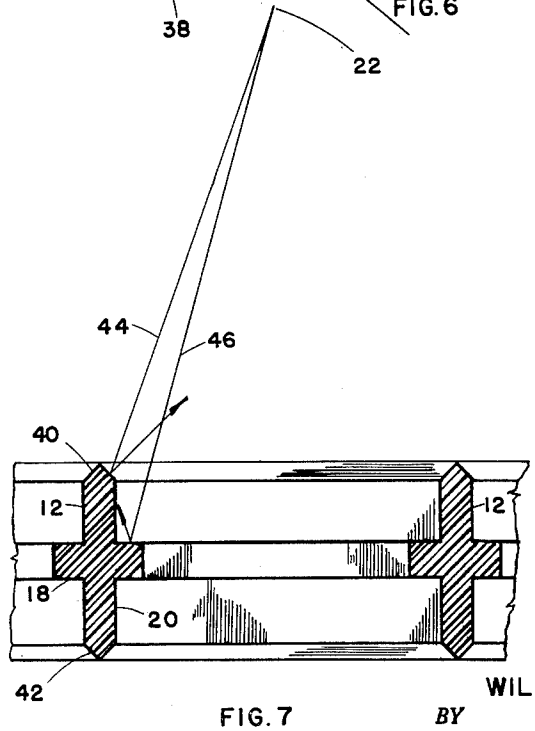


FIG. 7

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CELLULAR LIGHT CONTROL PANEL

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This invention relates generally to structural panels of cellular character and more particularly to a cellular structural panel for lighting control.

The primary object of this invention is to provide a cellular structural panel wherein means are incorporated for limiting brightness at one face of the panel. In many ceiling and other installations and in many types of luminaires it is desirable that the lower or outer face of the cellular panel used in such installation or luminaire should have some means to limit the brightness thereof so that the contrast between the panel and surrounding structure will not be so great as to cause undue eyestrain. In any type of plastic, eggcrate style structural panel, the light is directed in the direction of the axes of the cells and a limited degree of diffusion is usually present in any such plastic panel. However, the lower face of the panel is usually much more brightly illuminated than is desirable and it is an object of this invention to permit proper levels of illumination to be maintained without the creation of an excessively bright area at the outer or downward face of the panel.

Another object of this invention, equally important, is to provide in such a panel adequate light source shielding means, this last mentioned means being incorporated and combined with the aforementioned means for brightness control.

Still another object of this invention is to provide light source shielding means in a cellular panel, while maintaining the visual impression of cellular structure in the panel, when this is desirable.

Yet another object of this invention is to provide a cellular light control panel wherein means for brightness control and light source shielding are provided with these said means employed as strengthening means for the panel.

A last object which will be mentioned specifically is to provide a panel such as that mentioned with special structure at the upper edge portions of the cell walls to compensate for any added upward reflectance due to the incorporation of the brightness control and the shielding means, while still maintaining proper breathing or airflow characteristics in the panel.

With these objects definitely in view, along with other objects which will appear to those skilled in the art to which this invention appertains as this description proceeds, this invention resides in the novel combination and arrangement of elements and portions as will be hereinafter described in the specification, particularly pointed out in the claims and illustrated in the drawings, in which:

FIGURE 1 is a plan view of a cellular panel with this invention incorporated therein;

FIGURE 2 is a fragmentary vertical sectional view taken substantially on the line 2—2 in FIGURE 1;

FIGURE 3 is a fragmentary, plan view of a cellular panel, similar to FIGURE 1 but having circular instead of square cells, and having the brightness control means incorporated therein enlarged so as to function also as shielding means;

FIGURE 4 is a vertical sectional view, taken substantially on the line 4—4 in FIGURE 3;

FIGURE 5 is a vertical sectional view, similar to FIGURE 4 but showing a slightly modified form of panel wherein the brightness control and shielding means is incorporated with the cell walls at one face of the panel

rather than at an intermediate point as shown in the other embodiments;

FIGURE 6 is a diagrammatic view showing a portion of a panel, constructed according to this invention, and including representation of the manner in which the panel functions as a brightness control means and as a shielding means; and

FIGURE 7 is a view, similar to FIGURE 6 and showing how the tapered edge portions of the cell walls in the panel function to reduce the tendency for the production of a bright spot above the panel.

Similar characters of reference indicate similar or identical elements or portions throughout the different views in the drawings.

Referring now to the drawings in detail, the panel 10 is represented as being comprised of a plurality of square cells defined by cell walls 12, and the upper face 14 of the panel may be considered as being in the plane of the extremities of the cell walls at the top of the panel when the same is in horizontal position, the position in which it is ordinarily used. The lower face 16 of the panel may be considered as being in the plane of the lower extremities of the cell walls.

A feature of this invention is the incorporation in the panel of brightness control means in the form of integral flange like portions 18 of the cell walls, these portions extending transversely of the cell walls 12, into the cells or the space between the walls. As illustrated in FIGURE 2, the flange-like portions 18 may be disposed at the central plane of the panel, and when so disposed the panel is completely reversible. Such panels will nearly always be constructed of plastic which causes a considerable diffusion of the light falling thereon, and the flange-like portions 18 will have a considerable thickness, probably always substantially equal to the thickness of the cell wall itself, with the result that portions of lowered brightness 24 will be found to exist in the cell walls on that side of the flange-like portions 18 remote from the light source used with the panel, such as the light source diagrammatically indicated at 22 in FIGURES 6 and 7.

In carrying out this invention, the portions 18 may be extended into the cells a greater distance than shown in FIGURES 1 and 2. Such wider flange-like portions 26, in the panel generally indicated at 28, retain the function of lowering the brightness of the panel on its underside or on that side remote from the light source, and the flange-like portions 32 of the cell walls 30 in the panel 28 are of lowered brightness. In this form of the invention, however, another secondary function is important, since such wider portions 26 result in a very desirable shielding of the light source, the shield angle being indicated by the line 34. The light source is visible from beneath the panel only through the space 36 preserved between the confronting edge portions of the integral portions 26. A similar dual function is achieved by the integral flange-like portions 38 which, as illustrated in FIGURE 5, are disposed at the lower face of the panel, rather than at an intermediate portion thereof as indicated in FIGURES 2 and 4. The usually desirable appearance of cellular structure is preserved more definitely in the form of the invention indicated in FIGURE 4 than in that form indicated in FIGURE 5, since the portions 32 aid materially in visually outlining the cellular structure. However, all the functions in the other forms of this invention are preserved in the embodiment illustrated in FIGURE 5 and, in addition, the embodiment in FIGURE 5 has an increased shielding of the light source, which will be evident when the shield angle line indicated at 34 in that figure is compared to the analogous line in FIGURE 4. It is noteworthy that in all the embodiments in this invention, as illustrated, free flow of air is permitted through the panel.

It will be realized that it is very important to lessen the tendency for the production of an excessively bright spot above a luminaire or above a ceiling installation wherein the light sources are above such panels as described in this specification. Even when a reflector is employed, it is still desirable that the amount of light reflected directly upwardly from the upper edges of the panel should be as small as possible. With this in mind, the upper edge portions of the cell walls are tapered as indicated at 40, and since the panel 10 is reversible, the lower edge portions of the cell walls are also tapered as at 42. A similar tapering of both upper and lower edges is indicated in the form of the invention indicated in FIGURES 3 and 4, while the upper edges of all such panels will ordinarily be tapered, according to this invention as indicated in FIGURE 5. Tapering of the edge portions of the cell walls results in a reduction of the reflectance of light directly upwardly, as will be clear from a consideration of the diagrammatic showing in FIGURE 6, wherein the light ray 44 is reflected away from the space immediately above the panel and it will be evident that very little light is reflected directly upward from any light source disposed above the panel. This results of the lowering of the brightness on any structure disposed above the panel and in compensating for any slight increase in upward reflectance of light resulting from the introduction of the flange-like portions 18, 26 and 38. In connection with the reflectance from the last mentioned portions, it should be noted that there is a distinct tendency for light falling on these portions to undergo multiple reflection and to escape from the panel ultimately in directions other than vertically upward. The net result is that the brightness of structures above a panel formed according to this invention is considerably lower, and this result is in addition to the aforementioned lowering of the brightness of the under portions of the panel and the shielding of the light source from view.

While the flange-like portions 18, 26 and 38 have been illustrated as rectangular in cross-section, other configurations can be employed to attain the same function. Specifically, it is conceived that the cross-sectional shape of the cell wall may be double convex, rhomboid, or various combinations of shapes, the critical feature, in this regard, being that the cell walls have thickened portions shading the portions of the cell walls remote from the light source and thus reducing the brightness of these last mentioned portions.

It is conceived also that the flange-like portions 18, 26 and 38 have a still further function, when desired, in providing for easy securement of various types of clips and holding devices for securement of the panel in place. In this regard, it may be stated generally that such clips and fastening devices will ordinarily have portions thereof extending through the cells concerned, with other flange-like portions secured to the portions 18, 26 or 38.

Although I have illustrated three embodiments of this invention, it is proposed that still other minor variations from the form of this invention may be resorted to without departure from the spirit and scope of this invention and what I claim as new and desire to secure by Letters Patent is pointed out in the following claims.

I claim:

1. In a cellular panel for lighting control, translucent cell walls defining the cells extending entirely through the panel and opening at both faces of the panel, said cell walls being substantially uniform in thickness throughout the major portions thereof and having plate-like flanges extending inwardly of the cells and extending throughout substantially the entire inner peripheries of the corresponding cells and shading the portions of said cell walls adjacent one face of the panel, said flanges being brightness control means to reduce the brightness at one face of the panel when a light source is positioned adjacent the opposite face of the panel and said flanges being of a dimension, measured in the plane of said one face, greatly in excess of any variation in wall thickness required merely for draft in molding.

2. In a cellular panel for lighting control, translucent cell walls defining the cells extending entirely through the panel and opening at both faces of the panel, said cell walls being substantially uniform in thickness throughout the major portions thereof and having plate-like flanges extending inwardly of the cells and extending throughout substantially the entire inner peripheries of the corresponding cells and extending substantially transversely into the cells, and said flanges being brightness control means to reduce the brightness at one face of the panel when a light source is positioned adjacent the opposite face of the panel and said flanges being of a dimension, measured in the plane of said one face, greatly in excess of any variation in wall thickness required merely for draft in molding.

3. In a cellular panel for light control, translucent cell walls defining the cells extending entirely through the panel and opening at both faces of the panel, said cell walls being substantially uniform in thickness throughout the major portions thereof and having plate-like flanges extending inwardly of the cells and extending throughout substantially the entire inner peripheries of the corresponding cells and extending substantially transversely into the cells, and said flanges being brightness control means to reduce the brightness at one face of the panel when a light source is positioned adjacent the opposite face of the panel, said flanges being closer to said one face of the panel than to the opposite face of the panel, whereby said flanges are light source shielding means for said panel and said flanges being of a dimension, measured in the plane of said one face, greatly in excess of any variation in wall thickness required merely for draft in molding.

4. In a cellular panel for lighting control, translucent cell walls defining the cells extending entirely through the panel and opening at both faces of the panel, said cell walls being substantially uniform in thickness throughout the major portions thereof and having integral, plate-like flanges extending substantially transversely into the cells, and said flanges constituting brightness control means to reduce the brightness at one face of the panel when a light source is positioned adjacent the opposite face of the panel; said flanges being closer to said one face of the panel than to the opposite face of the panel, said flanges also constituting light source shielding means for said panel; said flanges having a thickness dimension measured axially of the cells substantially equivalent to the thickness dimension of said cell walls and said flanges being of a dimension, measured in the plane of said one face, greatly in excess of any variation in wall thickness required merely for draft in molding.

5. In a cellular panel for lighting control, translucent cell walls defining the cells extending entirely through the panel and opening at both faces of the panel and having wall faces extending in a direction substantially normal to the plane of a face of the panel, said walls being substantially uniform in thickness throughout the major portions thereof and having the edge portions at at least one face of the panel tapered to present surfaces inclined at an acute angle to said plane, whereby a minimum of light originating from a light source adjacent to said one face is reflected in said direction from said portions, thus providing a degree of brightness control for any ceiling and wall surfaces adjacent to said face, said cell walls having integral plate-like flanges thereof extending substantially transversely into the cells and constituting brightness control means to limit the brightness at the face of the panel remote from said light source; said brightness control compensating at least in part for any increased reflectance from said flanges.

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