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# United States Patent [19]

**Schwartz**

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[54] **LIGHT DIFFUSER SYSTEM**


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[52] **U.S. Cl.**..... **350/319;** 240/106 R; 350/259

[51] **Int. Cl.²**..... **G02B 5/00;** F21V 5/00

[58] **Field of Search**..... 350/319, 259, 168; 240/186 R, 108 R, 51.11, 110



[56] **References Cited**

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[57] **ABSTRACT**

A light diffuser system suspended from a ceiling below a light source includes a framework of T-bar members depending from the ceiling and defining rectangular openings. Secured in each opening is a one-piece, translucent plastic light diffuser panel, formed in a coffer configuration with the cavity opening downward and the walls of the coffer inclined slightly from vertical toward the center of the opening. The walls are tapered from the bottom to the transverse portion, and are painted with an opaque color coating on the ceiling-facing surface. Light diffusing through the translucent, transverse portion stikes the walls, illuminating the color coating more strongly as the taper of the walls increases, and causing a color gradient effect which enhances the apparent depth of the coffer and increases the esthetic appeal of the diffuser system.


**13 Claims, 5 Drawing Figures**

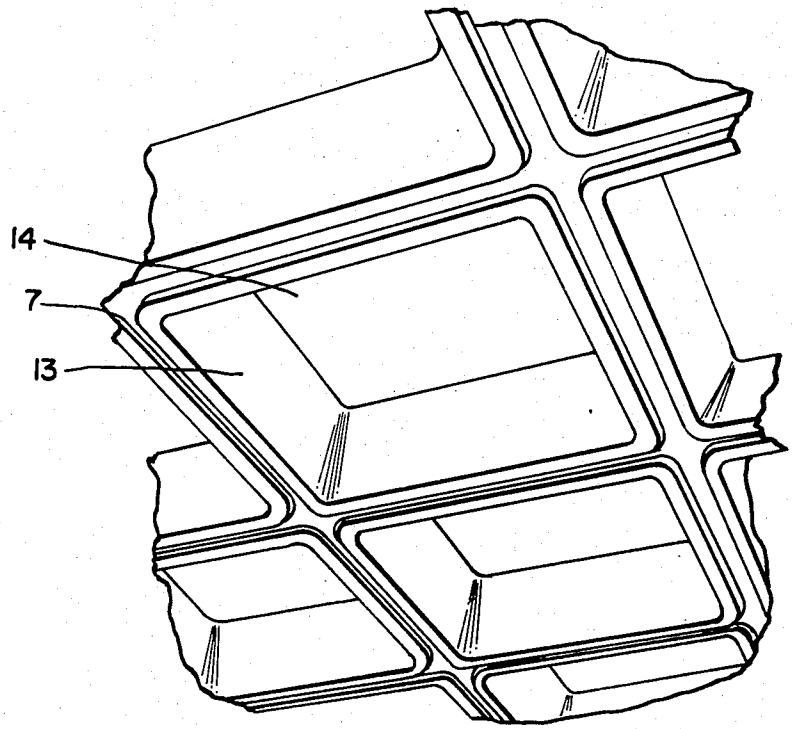


FIG_2

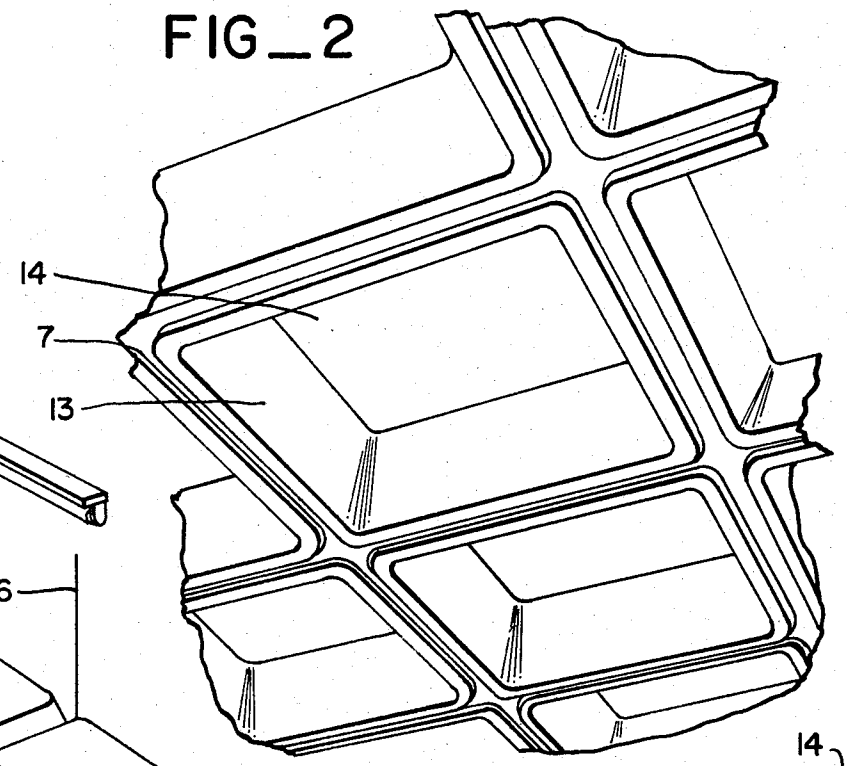
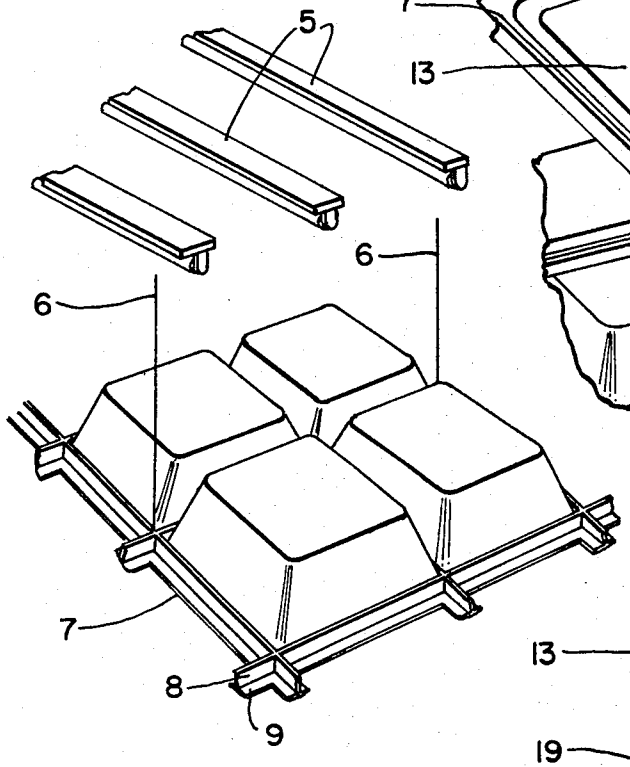



FIG_1



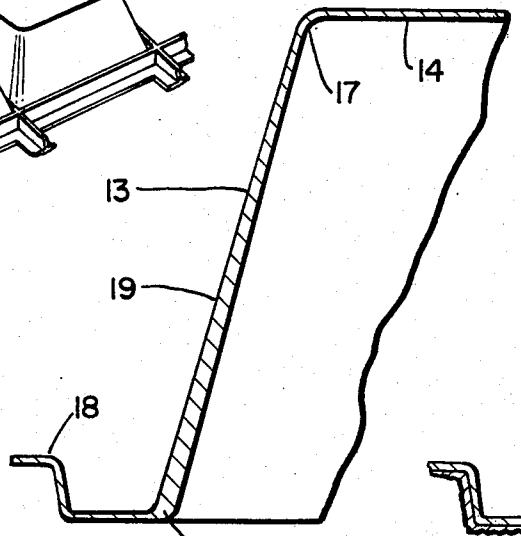




FIG_4

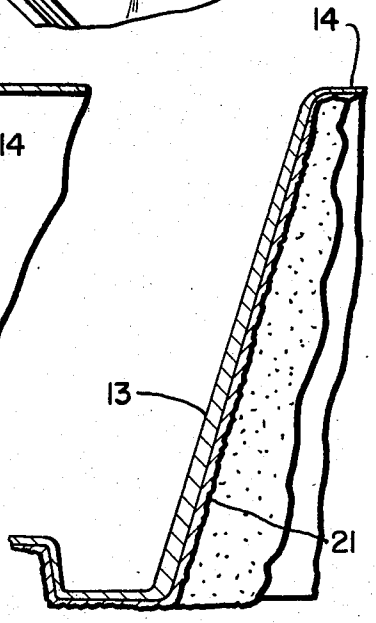



FIG_5

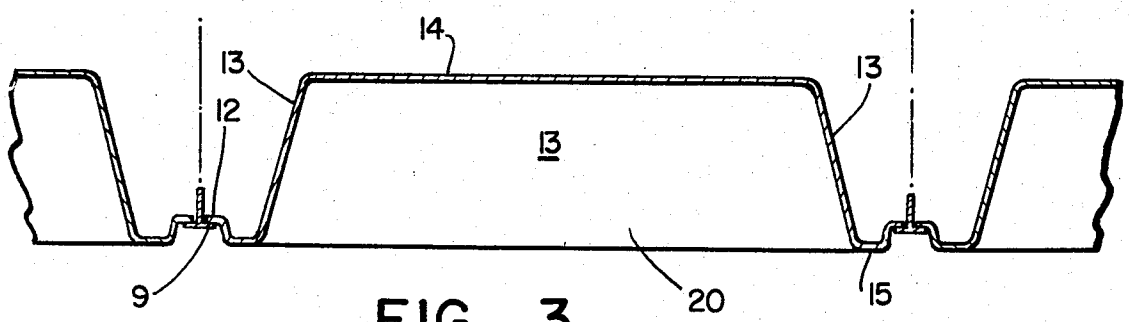



FIG_3

# LIGHT DIFFUSER SYSTEM

## BACKGROUND OF THE INVENTION

Light diffusing systems suspended from a ceiling have been used to distribute illumination from ceiling mounted fluorescent or similar lamps. Often these systems have employed translucent planar panels to form a continuous, flat diffusing surface extending over large portions of a ceiling. These monotonous expanses of illuminated panel have often contributed to an oppressive, non-productive room environment which is further exacerbated by the glare produced by such a system. The lamp fixtures and suspending structure have often cast shadows on the diffusing panels, which serve not to alleviate the monotony of the diffuser surface but to cause non-uniform illumination of the room, and confusing multiple shadows on work areas. Attempts to overcome these problems by introducing new systems which recess the diffusing panels or employ secondary diffusers have resulted in a proliferation of parts to be assembled during installation of each new system. The corresponding increase in man-hours required for complete assembly has resulted in higher costs without overcoming all of the defects of the prior art.

## SUMMARY OF THE INVENTION

The present invention is directed toward a light diffusing system which overcomes the problems of the prior art and provides a textured ceiling which is a source of non-glaring illumination and is pleasing to the eye. It comprises a multiplicity of rectangular or square panels, each formed in a coffer configuration defined by a lateral translucent portion supported by upwardly extending walls which terminate at their lower extremities in horizontally extending flanges. A framework of T-bar members defining square openings which is suspended from the ceiling supports the panels with the flanges resting on the T-bars and the coffer cavities opening downward. The upwardly extending walls are tapered in thickness from the flange to the lateral portion, and are painted on their ceiling-facing side with an opaque color coating. Light from ceiling-mounted lamp fixtures diffuses through the lateral translucent portion of each panel, providing illumination to the area below and also illuminating the walls of the coffer. The taper of the walls causes them to reflect more lights from the upper portions than from the lower, so that the color reflected from the walls of each panel has an intensity gradient which enhances the depth effect of the coffer. The coffer configuration removes most of the lateral diffusing surfaces from direct view, greatly relieving the glare and brightness of the ceiling. Furthermore, the enhanced depth effect of the coffer panels and the color of the walls of the coffers provides a pleasant visual interest which is lacking in prior light-diffuser systems. Because each panel is a molded single unit, installation is simple and economical, and maintenance of the lamp fixtures is easily facilitated. The panels may be used in luminous bays interspersed with acoustical tile or other suspended ceiling material, or they may be employed as a complete suspended ceiling.

## THE DRAWING

FIG. 1 is a perspective view of the present invention as seen from above.

FIG. 2 is a perspective view of the present invention as seen from below.



FIG. 3 is a sectioned side view of the present invention.

FIG. 4 is an exploded sectioned side view of a portion of a light diffusing panel.

FIG. 5 is a view similar to FIG. 4 illustrating a modified form of the invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

The light diffuser system of the present invention is illuminated from above by lighting fixtures **5** secured to a ceiling, as shown in FIG. **1.** Suspended from the ceiling by the hanger rods or wires **6** is a framework **7** of T-bar members. Each T-bar member includes a vertical portion **8** and horizontally extending portions **9,** with the members defining square openings. Into each of the openings a square light diffusing panel **11** is placed, resting on the horizontal portions **9** of the framework on all sides, and diffusing the light from fixture **5** to the area below. It should be noted that the framework may be formed with openings of various standard sizes with the panels dimensioned to match, thus providing a selection of panel sizes to suit a wide variety of situations.

Each light diffusing panel is formed by molding translucent white acrylic plastic, plexiglass or the like into a single unit with a square coffer configuration, as shown in cross-section in FIG. **3.** The panel **11** includes a horizontal flange **12** formed about the perimeter of the panel and resting on the horizontal portion **9** of the framework on all sides of the panel. Upwardly directed walls **13,** which are inclined inwardly from vertical toward the center of the panel, support a laterally extending planar portion or top wall **14,** and define a coffer cavity **20** therebetween which opens downward. Walls **13** are joined to the flanges **12** by a shoulder **15.** All of the vertices are rounded to prevent stress concentrations.

Because each light diffusing panel is of unitary construction, it may be appreciated that installation is quick and economical. Each panel is lifted through its opening diagonally, turned and properly oriented, and set in place. No screws or bolts or other fasteners are required.

As shown in FIG. **4,** each of the walls **13** is tapered in thickness from the base **16** to the top **17.** The ceiling facing surface of the walls is painted or otherwise coated with an opaque pigmented coating **19.** The coating blocks all light from the lamps above, so that the only illumination of the walls **13** comes from the light diffusing through the white, translucent portion **14.** Because each wall is tapered in thickness, the incident light from **14** is reflected more strongly by the pigmented coating **19** at the top **17** of the wall, and is more dispersed and less intense at the thicker bottom **16** of the wall. Thus the color reflected from the wall has a gradient of decreasing intensity from the top to the bottom of the wall. This gradient serves to enhance the perceived depth of the cavity **20** and make the panels **11** more visually interesting and esthetically pleasing.

The panels of the present invention may be arrayed in luminous bays interspersed with acoustical ceiling tile or the like, or may be extended over an entire ceiling, as shown in FIG. **2.** It may be appreciated that due to the coffer configuration of the panels **11,** the lateral, light-diffusing portions **14** are only partially visible at most from below, thus reducing glare and brightness while delivering optimum illumination. The luminous portions **14** set off in the coffer cavity by the colored

walls **13** and the dark frame of the framework **7** provide a striking and effective, yet economical light diffusing system.

It should be noted that the taper of the walls **13** may be inverted; i.e., thicker at the top portion **17** and thinner at the lower extremity **16,** thereby inverting the intensity gradient and creating another striking yet pleasing visual effect. Also, it will be appreciated that instead of painting or otherwise laminating an opaque coating or layer on the outer surfaces of walls **13,** the same general effect could be obtained by placing an opaque collar or sleeve over the walls.

A modified form of invention is disclosed in FIG. **5** in which the walls **13** are not provided with their outer opaque layer or coating. Instead, an acoustical ceiling is readily provided by coating or spraying a conventional acoustical material on the inner surface of walls **13** to form a layer **21.** Such layer may be formed of any suitable open cell sound absorbing material, such as polyurethane foam, sprayed flocking and the like.

With this latter arrangement, light will only pass through the horizontal translucent wall portion **14,** with the remainder of the coffer bearing the sound absorbing material.

As a further feature of the invention, it has been found that the color provided in the coating **19,** described in the first described embodiment, has a substantial effect in providing novel harmonized lighting in a room. In other words, by selecting various colors for the coating, the color temperature of the room can be readily modified. For example, by providing a coating possessing an amber color, blue light will be absorbed.

It should also be understood that in order to optimize this color effect, the walls **13,** which define an included obtuse angle with top wall **14,** should be offset from the vertical by from about 10° to about 35°, and preferably about 15° as shown in the drawing. This gives an included angle of about 105°. Too great an angle will result in most light passing through the top wall and completely missing the side walls and entering the room directly.

I claim:

**1.** Light diffusing means for a ceiling with a light source above comprising: a unitary member having side walls joined to a laterally extending top planar wall and defining a downwardly directed cavity, said top planar wall being translucent for the passage of light from the light source therethrough, and said side walls being translucent; and opaque means substantially completely covering at least one of the inside and outside surfaces of all said side walls for preventing passage of light through said side walls and reflecting incident light passing through said top wall.

**2.** The light diffusing means of claim **1** in which said opaque means is affixed to the inner surface of said side walls and constitutes a sound absorbing material.

**3.** The light diffusing means of claim **1** in which said side walls and top wall define a coffer, and in which said side walls converge towards said top wall.

**4.** The light diffusing system of claim **1,** in which the outer surfaces of said side walls are provided with said opaque means as a film to reflect incident light passing through said top wall.

**5.** The system of claim **4** in which said film comprises a pigmented paint applied to said surfaces.

**6.** The system of claim **1** in which said side walls are tapered in thickness from said top wall to the distal ends of said side walls.

**7.** The system of claim **6** in which said side walls have a minimum thickness adjacent said top wall.

**8.** The system of claim **1** wherein said member includes horizontally extending flanges extending outwardly from the distal end portions of said side walls.

**9.** The system of claim **1** wherein said opaque means is provided with a color.

**10.** The system of claim **4** wherein said opaque means is provided with a color.

**11.** The system of claim **1** wherein said side walls define included obtuse angles with said top wall.

**12.** The system of claim **11** in which said obtuse angles are in the range of about 100° to 125 °.

**13.** The system of claim **11** wherein said angles are about 105 °.

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