March 5, 1968 M. L. QUIN ETAL 3,372,270

CEILING MODULES

Filed Sept. 22, 1965 5 Sheets-Sheet 1

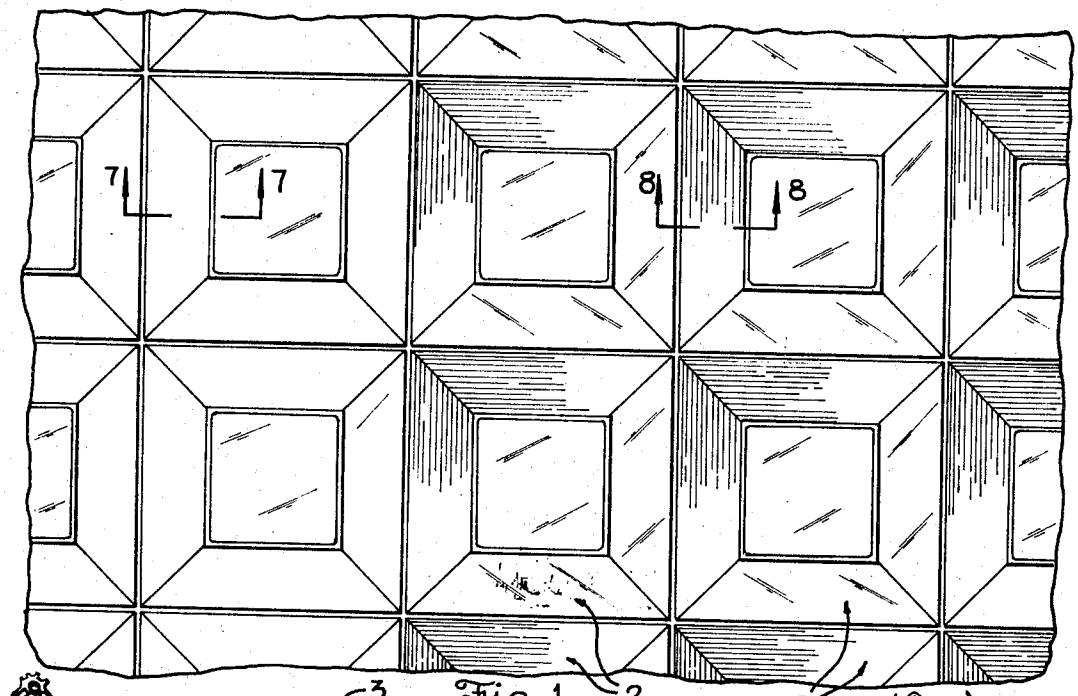

Fig 1

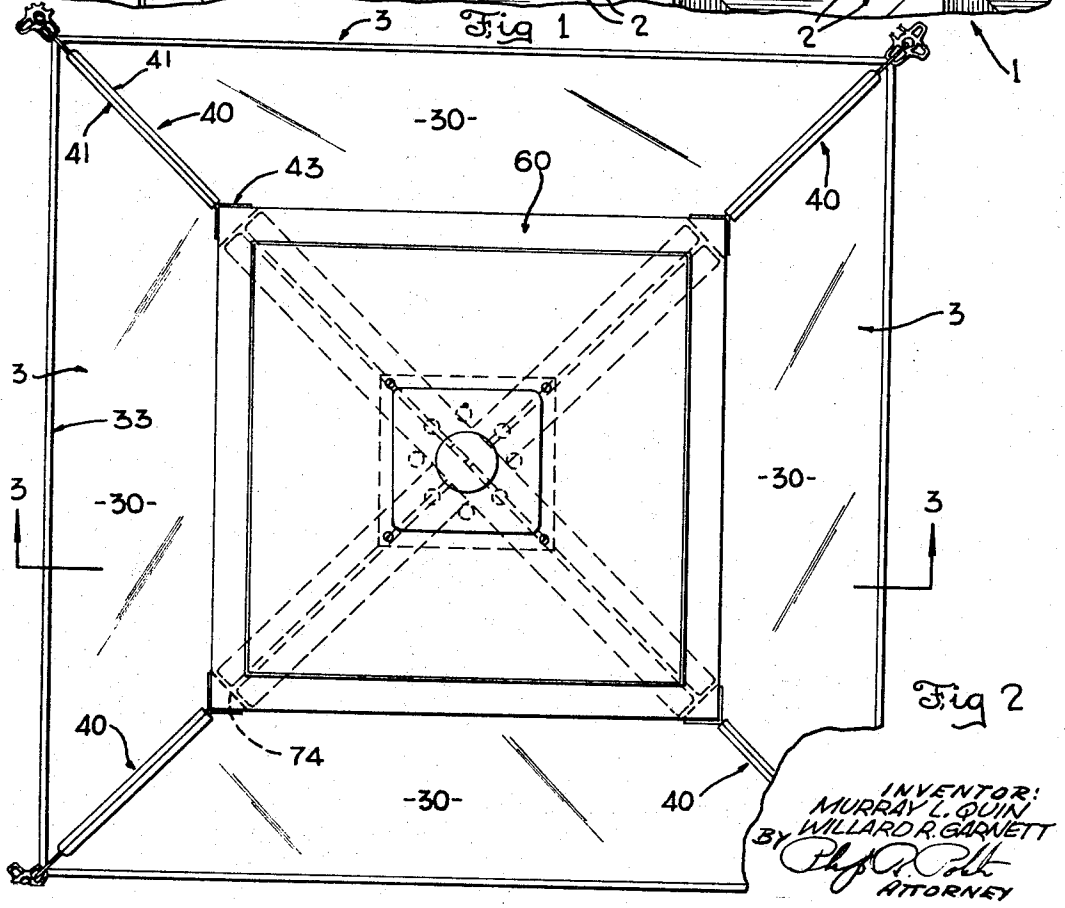

Fig 2

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CEILING MODULES

Filed Sept. 22, 1965 5 Sheets-Sheet 2

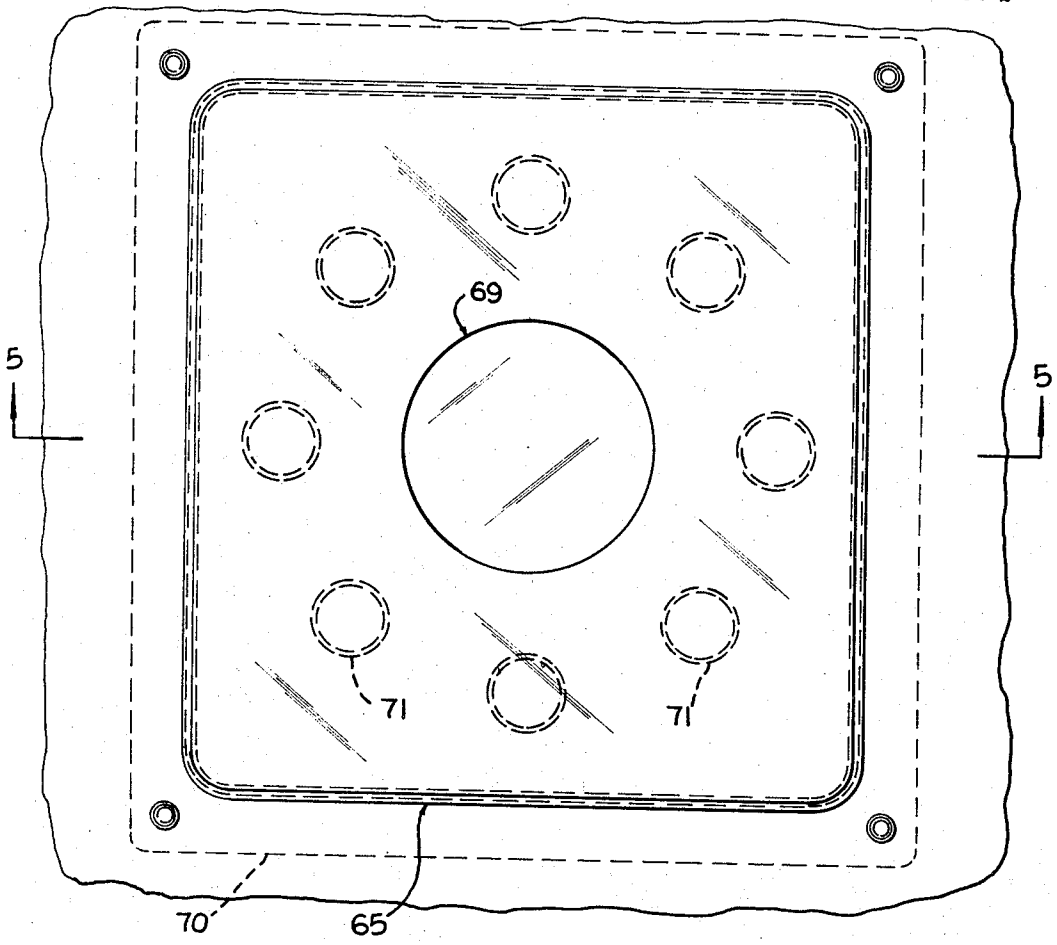

Fig 4

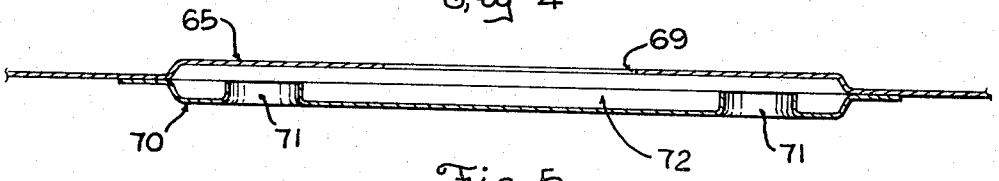

Fig 5

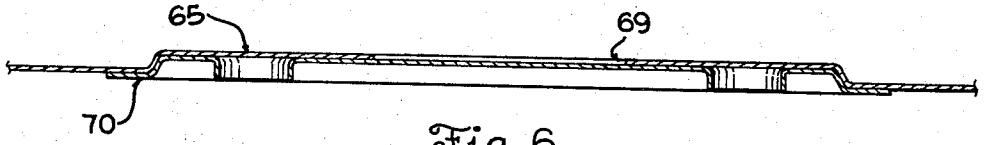

Fig 6

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CEILING MODULES

Filed Sept. 22, 1965 5 Sheets-Sheet 3

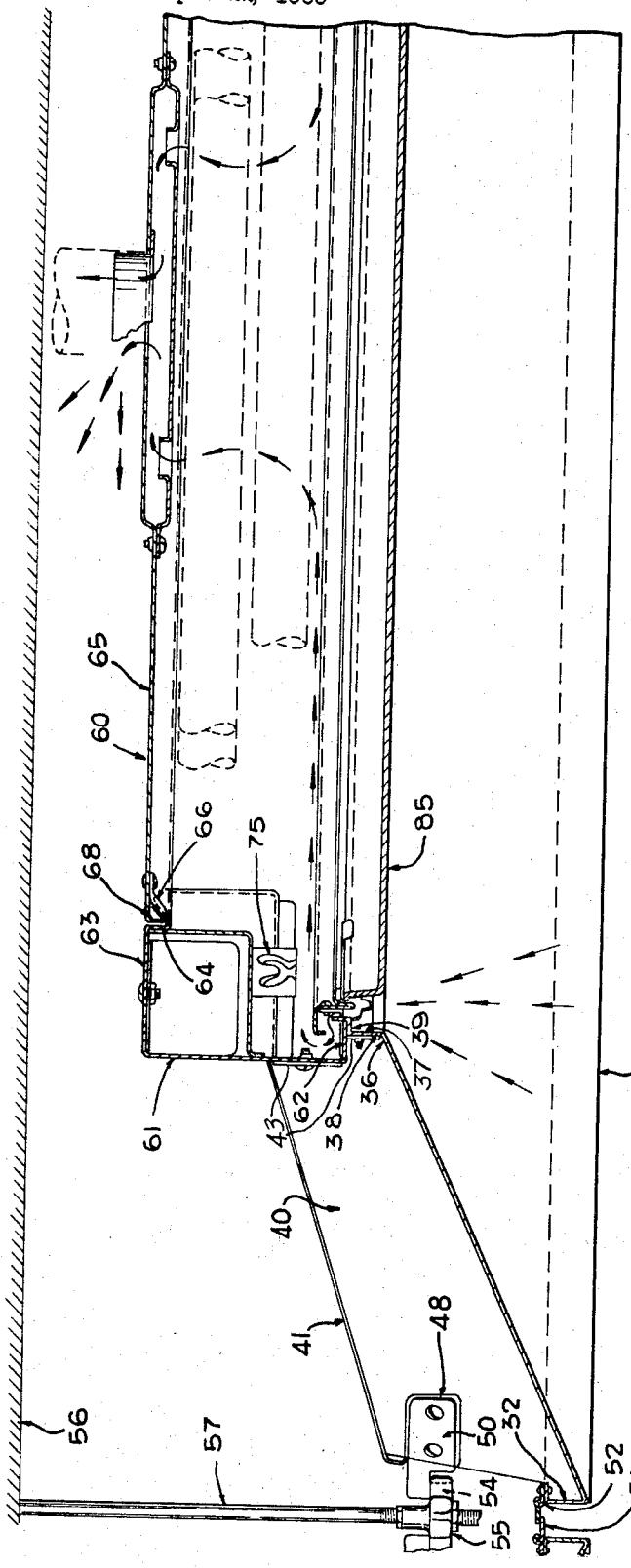

Fig 3

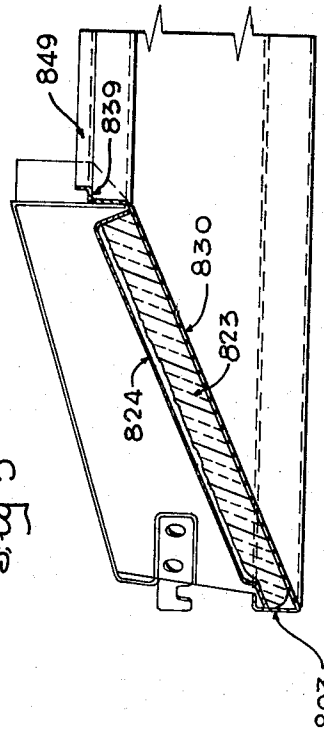

Fig 8

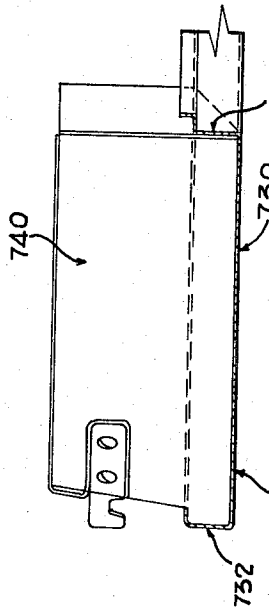

Fig 7

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CEILING MODULES

Filed Sept. 22, 1965

5 Sheets-Sheet 4

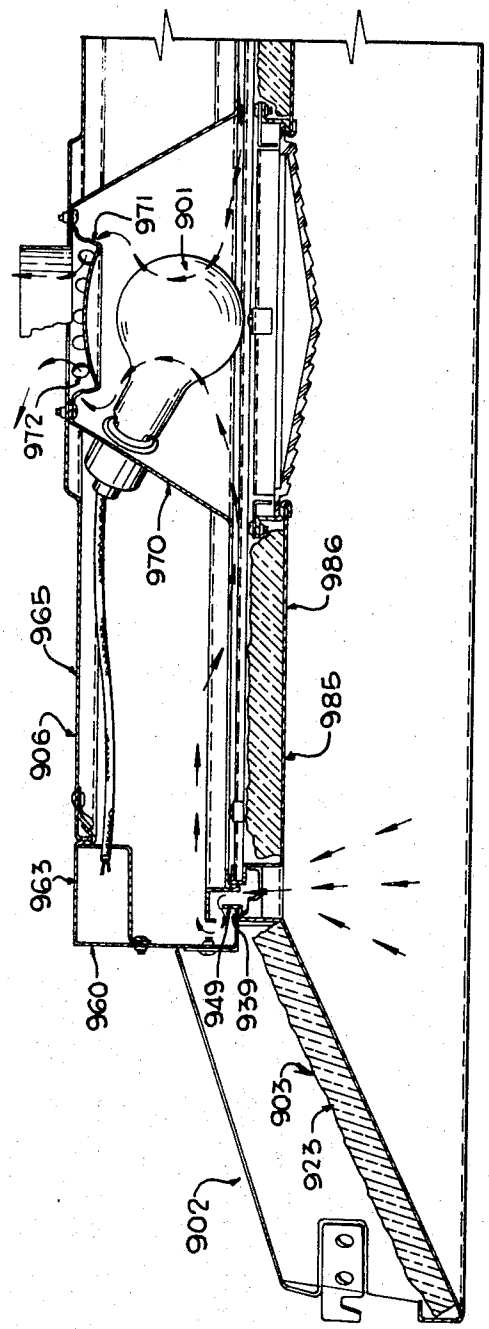

Fig 9

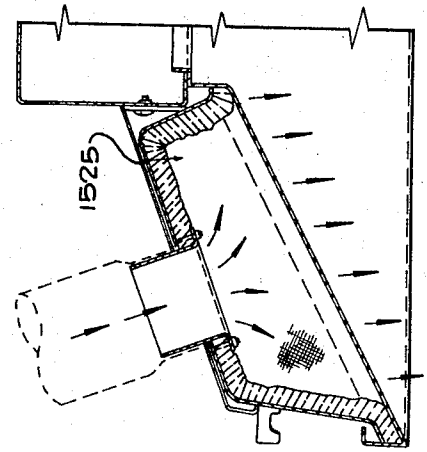

Fig 15

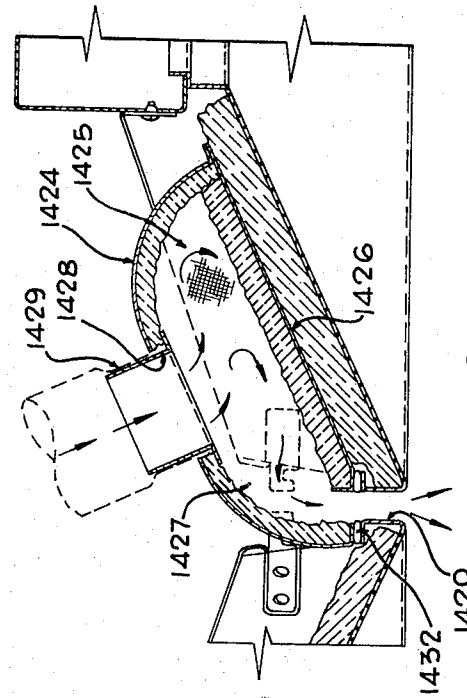

Fig 14

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March 5, 1968 M. L. QUIN ETAL 3,372,270

CEILING MODULES

Filed Sept. 22, 1965

5 Sheets-Sheet 5

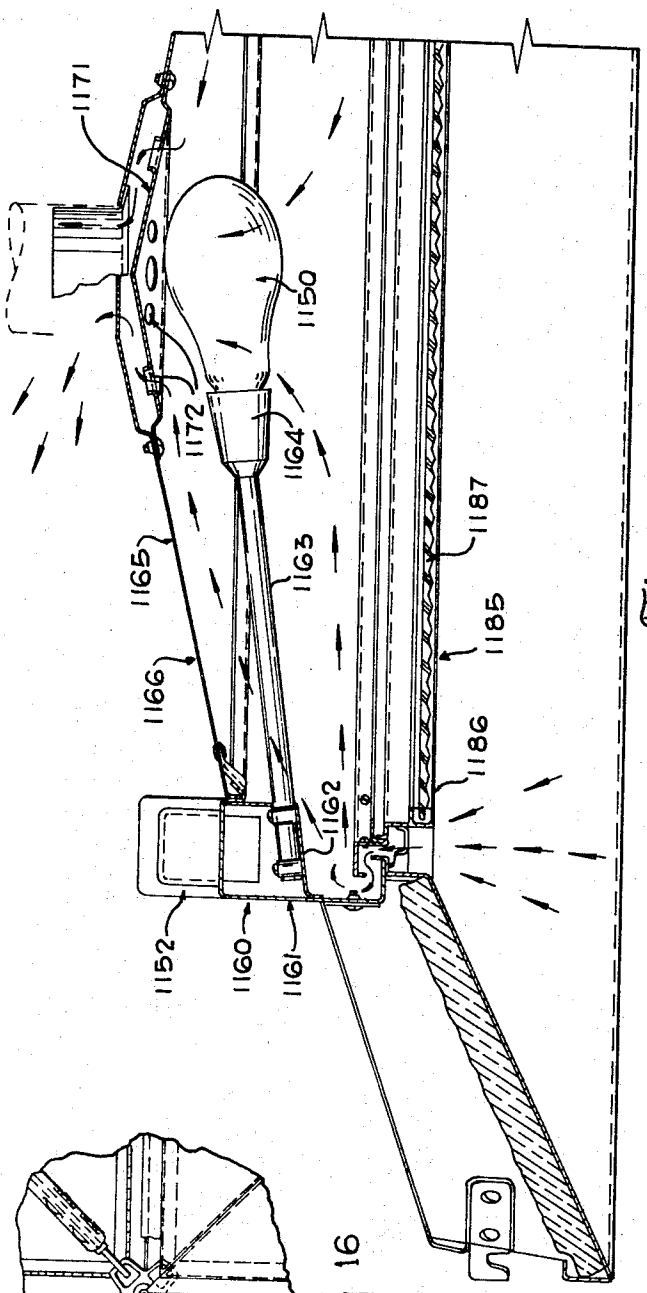

Fig 11

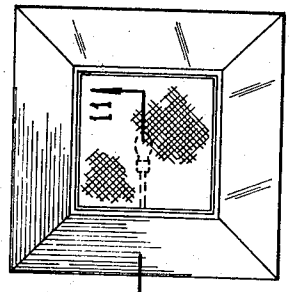

Fig 13

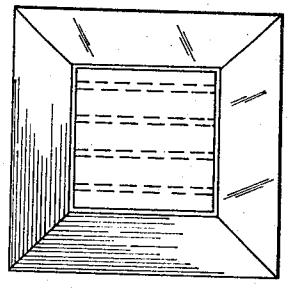

Fig 12

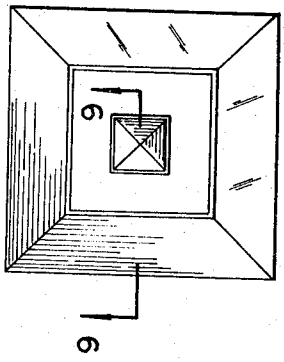

Fig 10

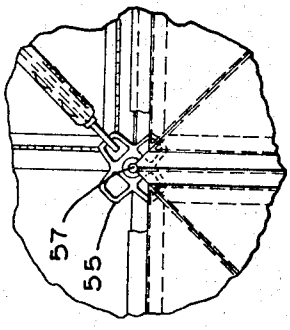

Fig 16

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United States Patent Office 3,372,270 Patented Mar. 5, 1968

3,372,270

CEILING MODULES

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Filed Sept. 22, 1965, Ser. No. 489,312
25 Claims. (Cl. 240—9)

ABSTRACT OF THE DISCLOSURE

A ceiling made up of ceiling modules each formed of four trapezoidal panels, each convergent edge of each of the panels being contiguous a convergent edge of another panel, the long bases of the panels lying in a common plane, and the short bases of the panels defining an open seat. A spine extends along and above each line of contiguity between adjacent panels and mounting means in the form of outwardly extending hooks are provided on the spines above the line of contiguity. A central closure member openably mounted in the seat defined by the short bases of the trapezoids. The central closure member made up of a lamp housing and a light transmitting panel. Lamps mounted in the housing are offset vertically and cross intermediate their ends. Four modules supported at one corner by a single hanger.

Background of the invention

At present it is common practice to provide building spaces with suspended ceilings, the function of which is to conceal overhead structure and mechanical equipment, protect the structure from fire, and absorb sound generated within those spaces. Such ceilings may also provide thermal insulation and function as an acoustical barrier to noise generated in adjacent rooms. Another common practice is to install lighting fixtures and ventilating outlets within suspended ceilings in a manner to conceal their housings, connecting conduits and ducts, and to present an overall decorative appearance when view from the room below.

Heretofore, the assembly of suspended ceilings has been dependent upon the procurement and fitting together of many individual parts and materials, the parts themselves being differentiated in terms of function. The construction of such ceilings has been one of piece-meal assembly requiring considerable prior planning and on-site coordination of workmen. Moreover, the actual functioning of a completed ceiling in terms of overall performance has been difficult to anticipate because the various parts are generally engineered to operate independently and are tested accordingly.

The problem has been recognized, and several novel proposals have been made heretofore, see, for example, U.S. Patents to Wulle, No. 2,775,927, Wakefield, No. 2,833,199, and Kruger, No. 2,854,565.

One of the objects of this invention is to provide a ceiling module which has substantial area yet is of a size convenient to handle, which can be installed as a single unit, which used repetitively, provides an attractive and effective ceiling through its entire extent, and which performs additional functions.

Another object is to provide ceiling modules which can perform the necessary illuminating, acoustical and ventilating functions to maintain environmental comfort within rooms.

Still another object of this invention is to provide a ceiling module which can, in any desired combination therefor, control the distribution of visible energy, control the distribution of acoustical energy, and control the

distribution of thermal energy with regard to spaces above and below the ceiling plane.

Still another object of this invention is to provide a ceiling module which is light in weight but which is rigid, durable and dimensionally stable for all intended uses.

Summary of the invention

In accordance with this invention, generally stated, a ceiling module is provided which includes a normal or ventilated lamp housing surrounded by a ceiling-defining area formed of panels symmetrically arranged about it, each of the panels being provided with reinforcing spines which, when assembled form at least a portion of a lamp housing-supporting seat.

The ceiling-defining panels are so arranged that one module can be placed adjacent another module at any or all of the four side edges, so that a multiplicity of the modules can be used to provide a continuous ceiling. It is to be understood, of course, that some panels of different sizes at the periphery of the ceiling may be necessary to accommodate rooms in which the dimensions are not uniformly multiples of the span of one of the ceiling modules of this invention. On the other hand, the modules of this invention lend themselves to the provision of divider channels and the like between successive modules so as to permit flexibility in the installation of room dividers. The ceiling modules of this invention also permit the installation between successive modules of heating and cooling ducts or channels, or to provide a different decorative effect from that which is produced by contiguous, abutting modules. The ceiling defining panels themselves can be, and preferably are, perforated to permit greater sound absorption or to admit air or both. Illustrative embodiments of these various constructions are described and illustrated.

In the embodiments shown and described, the lamp housing itself is square, although it may be elongatedly rectangular. In the preferred embodiment, provision is made for positioning fluorescent lamps diagonally from corner to corner of the housing in two sets, one above the other, so that the lamps cross in the area of the center of the lamp housing. The lamp housing is provided with a ventilating opening immediately above the area of crossing of the fluorescent tubes so as to insure against overheating of the lamps at their intersecting areas. While, as is illustrated hereinafter, arrangements of fluorescent lamps are contemplated in which the lamps extend from side to side of a housing in a conventional way, the arrangement of the diagonal, crossed lamps of the preferred embodiment has several advantages. Longer lamps, e.g. four foot lamps as contrasted with three foot lamps, have longer life and are more efficient in light output per foot of length. Since fewer lamps are required to produce equal light, the total module weight can be reduced since fewer ballasts are required. Another advantage, less obvious until witnessed, is the overall symmetry of appearance of the crossed lamp module as compared with luminaires with parallel rows of lamps, in spite of the elevational differences between the upper and lower of the crossed lamps.

Brief description of the drawing

In the drawing,

FIGURE 1 is a fragmentary reflected plan view, of a ceiling composed of a multiplicity of ceiling modules illustrating two embodiments of this invention;

FIGURE 2 is a top plan view, partly broken away, of one embodiment of ceiling module of this invention, with crossed fluorescent lamps;

FIGURE 3 is an enlarged fragmentary sectional view taken along the line 3—3 of FIGURE 2;

FIGURE 4 is a fragmentary, enlarged, top plan view of a part of a lamp housing forming a part of the ceiling module of FIGURES 2 and 3, partly broken away;

FIGURE 5 is a sectional view taken along the line 5—5 of FIGURE 4;

FIGURE 6 is a view corresponding to FIGURE 5, showing one of the parts reversed to render a ventilating opening inoperative;

FIGURE 7 is an enlarged, fragmentary, sectional view taken along the line 7—7 of FIGURE 1;

FIGURE 8 is an enlarged, fragmentary, sectional view taken along the line 8—8 of FIGURE 1;

FIGURE 9 is an enlarged, fragmentary, sectional view taken along the line 9—9 of FIGURE 10;

FIGURE 10 is a top plan view of another embodiment of ceiling module of this invention;

FIGURE 11 is an enlarged, fragmentary, sectional view taken along the line 11—11 of FIGURE 13;

FIGURE 12 is a top plan view of still another embodiment of ceiling module of this invention;

FIGURE 13 is a top plan view of still another embodiment of ceiling module of this invention;

FIGURE 14 is a fragmentary, sectional view of yet another embodiment of ceiling module of this invention wherein air is directed through a channel between adjacent modules from a plenum chamber mounted on and extending between the adjacent modules;

FIGURE 15 is a fragmentary, sectional view of yet another embodiment of ceiling module of this invention wherein air is directed through perforations in a panel of the module from a plenum chamber mounted on and above the panel; and

FIGURE 16 is a fragmentary top plan view of a meeting corner of four ceiling modules of this invention, showing the corner supporting bracket shown in side elevation in FIGURE 3.

Description of the preferred embodiments

Referring now to FIGURE 1 of the drawing, reference number **1** indicates a ceiling made up of a multiplicity of modules **2**. Each of the modules **2** includes four panels **3** and a lamp housing **60** as further illustrated in FIGURE 2.

In the embodiment of module shown in FIGURES 2–6, each of the panels **3** includes a central web section **30**, which, in this embodiment, tends upwardly from a lower edge **31** to an upper edge **36** at the foot of a step **37** defined by a vertical riser **38** and an inwardly directed tread **39**. A marginal flange **32** is integral with the web **30** along the lower edge **31**. The flange **32** is provided with an inturned lip **33** at its upper edge.

Each of the panels **3** of the embodiment shown in FIGURES 2–6 is in the form of an isosceles trapezoid, with the marginal flange **32** along its base, the step **37** along its parallel upper, short edge, and with a spine **40** along and integral with each end. The angle which the ends make with the base and upper edge of the trapezoidal panel is such as to cause the panels to meet at 45°, in plan, as shown in FIGURE 2, when the panels are assembled, to form a module which is square in outline.

The spines **40** are high, relative to the marginal flange **32**, for example, and extend through substantially the whole length of the ends of the panel. Each of the spines **40** has a flange **41**, integral with it, along its upper edge, projecting over the web of the panel of which it is a part. At the upper, inner end of the spine **40**, the spine has a vertical wing **43**, integral with the spine, and bent to be parallel with the upper and lower edges of the panel. The wings **43** as shown in FIGURE 3 are in two parts, a lower of which extends a short distance along the outside face of the riser **38** and the upper of which is offset vertically and outboardly of the lower part and extends above the treads substantially to the height of the spines.

In the embodiment shown in FIGURES 2–6, a hanging bracket plate **50** is mounted on the outer part of the spine **40**. A hook **54** on the plate **50** engages a hanger bracket **55**, suspended by a threaded rod **57** from some fixed structure **56**. The hanger bracket can be screwed up and down the rod **57** for vertical adjustment.

The panels **3** are joined by welding, riveting, or otherwise securing the flat outer faces of the spines **40** in tight abutment, as shown in FIGURE 2.

The treads **39**, when the panels are assembled, form a continuous ledge around the upper edge of the panels. The lower parts of the wings **43** provide reinforcement for the steps **37** and the upper parts form positioning and lateral restraining elements of a seat made up of the wings **43** and treads **39**. As can be seen in FIGURE 2, the seat as demarked by the upper part of the wings **43** is square in plan, and is adapted to receive lamp housing **60**.

The lamp housing **60** includes side walls **61**, a bottom flange **62** which rests on the ledge provided by the treads **39**, a frame defining top wall **63** and a removable cover **65**. Around its inner periphery the top wall **63**, has, integral with it, a trough **64**, which is adapted to receive a downwardly bent rim **68** of the cover **65**. Four latches **66**, one on each edge of the cover, hold the cover but permit it to be easily removed and installed. The cover **65** has in it a central ventilating opening **69**, which may be used to permit the interior of the lamp housing to communicate with a plenum chamber defined between the ceiling and the supporting structure, through a baffle plate **70**, which is provided with openings **71** offset laterally from the opening **69**. A central area of the cover around the opening **69** is embossed upwardly, and the baffle plate **70** is dished, as shown in FIGURES 5 and 6, so that the two provide a passage **72** for the air moving through the holes **69** and **71** when their offset portions are oppositely disposed as shown in FIGURE 5 and sealed against passage of air when the baffle plate is reversed and nested, as shown in FIGURE 6.

As shown particularly in FIGURES 2 and 3, the side walls **61**, near each corner of the housing, are bridged with compartment-defining webs **74** to accommodate sets of fluorescent lamp-holders **75**. The lamp-holder **75** shown in FIGURE 3 is low in the housing **60**, at the same level as a lamp-holder in the diagonally opposite corner. In the other two corners lamp-holders **75** are provided at a level sufficiently far above the level of the lower lamp-holders that the lamps cross, as indicated in FIGURE 2, without touching, as indicated in FIGURE 3.

The housing **60** is provided with light-baffled passages along its lower inside edge, which may be of conventional construction, and is provided with a light-diffusing panel or lens **85**, supported in a hinged frame, which may also be of conventional design.

Suitable ballast chambers and wiring conduit are provided within the housing **60** to one side of cover **65**, in such a way that the cover **65** can be removed easily and that external wiring connections can be made easily through the opening provided when the cover **65** is removed.

It can be seen that since the marginal flanges **32** are flat faced and vertical, and since the hanger plates **50** are offset inwardly from the marginal flanges, the marginal flanges of contiguous modules could be made to abut tightly to form a continuous ceiling area. However, in this embodiment, the corner bracket **55** and bracket plates **50** are so proportioned as to space the flat face of adjacent panels from one another. The intervening gap is bridged by hinged leaves **51**, connected to the top edge of the flange **32** by means of piano hinges **52**. The use of the hinged leaves **51** not only provides a quick and easy means of closing the gap between modules, but permits expansion of the modules with intense heat without buckling. The hinged leaves also can be used as dampers, with respect to plenum chambers above the module gaps or channels for the control of air.

Merely by way of illustration, the module may be 59

inches square and the lamp housing 37 inches square. The distance across the seat for the housing, from riser to opposite riser, can be 35½ inches, and from inner edge of one tread to the opposite one, about 34½ inches. The inclination of the web **30** from the plane of the bottom edge of the panels can be 25°. The spine **40** can be 5½ inches high, measured along its inwardly sloping edge from the outer corner of the panel, as shown in FIGURE 3, and 3½ inches high at its upper end. The marginal flanges **32** can be 1¼ inches high.

As has been pointed out, one standard fluorescent lamp tube comes in four foot lengths. Accordingly, a standard four foot fluorescent lamp would not fit across the housing, which is only 37 inches from side to side. However, the housing is approximately 52¼ inches from corner to corner, which provides ample room to mount the sets of lamp-holders **75** and still to accommodate a four foot lamp. In this way, the module can be kept to a size which can be manufactured easily, made rigid and sturdy without undue weight, and handled and installed easily. For example, one type of commercial ceiling module of this invention with crossed lamps weighs, complete, about sixty pounds and can support in excess of 500 pounds with a deflection of less than ⅛ inch.

Referring now to FIGURE 7 for another embodiment of ceiling modules of this invention, the module of this embodiment is defined by four marginal metal panels **703**, each of which is provided with a stiffening flange **732** along its outer edge and a flange **738** along its inner edge. In this embodiment, the panels **703** have a flat center web **730**, and the flanges **732** and **738** are perpendicular to the center web **730**. Each of the panels **703** is in the form of an isosceles trapezoid, with the marginal flange **732** along its base, the flange **738** along its inner edge parallel with the base, and with a spine **740** along and integral with each end. The ends, hence the spines, extend at an angle of 45° from the outer edge of the panel. Four panels are assembled by bolting, riveting, or welding the spines together, to make a square ceiling-defining area and a lamp housing-receiving seat. The lamp housing can be of the type described in connection with the embodiment of module shown in FIGURES 2–6, or of some different construction, as illustrated in other of the embodiments to be described. The module shown in FIGURE 7 is shown without hinged leaves. It is to be understood that the module of FIGURE 7 can be provided with hinged leaves of the type shown in FIGURE 3, if desired. No central closure panel is shown in this figure or in FIGURE 8, but any suitable lamp housing or the like may be utilized, examples of which are described hereinafter.

In FIGURE 8 an embodiment of ceiling modules is shown which resembles the one shown in FIGURES 2–6, and the feature of which can be utilized in the embodiment of FIGURES 2–6. Four marginal metal panels **803** have center webs **830** which, in this embodiment, are perforated so that all of them are foraminous. Each of the webs **830** is backed by a layer of acoustic and thermal insulation **823** and, covering the insulation **823**, by a sound-attenuating metal sheet **824**. No hinged leaves are provided around the outer edge of the module shown in FIGURE 8.

Referring now to FIGURES 9 and 10 for still another embodiment of this invention, a ceiling module **902** is provided with an incandescent lamp **901**. The panel members of the module **902** are essentially the same as those shown in FIGURES 2–6 and 8. The central web of the panels is perforated, and is backed by a sound-absorbent insulating material **923**. A housing **960** rests on a tread **939**. A flange **949** on the inner edge of the tread **939** forms a part of a light baffle, with suitable baffling in the housing **960**, as shown particularly in FIGURE 9. The housing **960** also includes a frame-defining top wall **963**, with a trough along its inner edge, in which a flange of a removable cover **965** rests. The cover **965** is substantially the same as the cover **65** shown in FIGURE 3, except, that, in lieu of a baffle plate **70**, a reflector **970** is attached to the underside of the cover at points radially outboard of the central ventilating opening. In the embodiment shown in FIGURE 9, the reflector **970** is attached by sheet metal screws. The reflector **970** has a central cup **971**, with a convex bottom, as viewed from above the reflector, which provides a concave reflecting surface. The walls of the cup are provided with air passages **972**, which communicate with the central ventilating opening, as shown in FIGURE 9.

As is indicated schematically in both FIGURE 3 and FIGURE 9, the air moving through the central ventilating opening in the cover can either be directed through a conduit of some sort, or into the plenum chamber formed between the ceiling defined by the modules and supporting structure above them.

A conical wall of the reflector **970** has an incandescent lamp holder mounted in it, as shown clearly in FIGURE 9.

In this embodiment, an enclosure **985** is hinged by means of wings projecting at opposite ends in a manner commonly used in commercial lighting fixtures, to permit the enclosure being swung down when desired. The enclosure **985** has a perforated metal flat bottom panel **986**, backed by sound-absorbent insulation. The bottom **986** has a central aperture, in which a transparent, light controlling lens is seated. The lens is mounted, in the embodiment shown, by means of four clips, underlying and overlying the flange about the periphery of the light controlling lens.

It will be observed that the reflector **970** is spaced above the upper surface of the insulation on the bottom **986**, to permit the passage of cooling air from the light-baffled passage along the edge of the enclosure, shown in FIGURE 9, under the lower edge of the reflector **970**, past the incandescent lamp, and out through the holes **972** and the ventilating opening in the cover **965**.

In FIGURES 11 and 13, still another embodiment of ceiling module of this invention, equipped with a bulbar electric discharge lamp such as mercury vapor or the like, is illustrated. In this embodiment, the panel members are identical with the panel members of the embodiment shown in FIGURE 9. The lower portion of a housing **1160** is also identical with a lower part of the housing **960** illustrated in FIGURE 9. An enclosure **1185** includes a frame **1186** hinged to the housing **1160** and mounting a prismatic lighting panel **1187**. These can be conventional elements, conventionally mounted. However, because of the more intense heat given off by bulbar electric discharge lamps, the upper surface of the lens can have a thin metallic coating to reflect infrared energy and transmit visible light. The infrared energy reflected from the coating is absorbed by the metal housing surface and transferred to the ventilating flow of air passing through the module. In this embodiment, the housing **1160** has side walls **1161**, one of which has a socket arm supporting bracket **1162** welded or otherwise secured to its inside surface. The bracket **1162** carries a tubular lamp-holder support **1163**, at the end of which is a lamp-holder **1164** for the reception of a bulbar electric discharge lamp **1150**. Electrical conductors, not here shown, are connected to the lamp-holder **1164**, run down the arm **1163**, and are connected to a ballast located in a suitable compartment **1152** mounted to project partly above the housing **1160**. The cover **1165**, in this embodiment, is domed to serve as a reflector. A ventilating opening in the center of the cover **1165** is in an upwardly offset area of the cover, and is covered on its underside by a reflector baffle plate **1171**, with vent holes **1172** around its radially outer area.

In FIGURE 12, an embodiment of ceiling module of this invention is shown in which fluorescent lamps are mounted, in a single layer, parallel with one another and perpendicular to sides of the housing between which they

extend, as distinguished from being mounted to extend diagonally of the housing and at two levels.

Referring now to FIGURE 14, an embodiment of ceiling module of this invention is shown in which two modules, which, in the illustrative embodiment shown, can be identical with the modules shown in FIGURE 9 or FIGURE 11, are spaced apart to define between them a channel **1420**, which is bridged by an arched top wall **1424** of a plenum chamber **1425**. The plenum chamber **1425** also has a bottom wall **1426**, and end walls **1427**. The plenum chamber **1425** has near its longitudinal center, a duct opening **1428**, which receives a duct fitting **1429**, which, in the embodiment shown in FIGURE 14, carries air under pressure. The bottom wall **1426** rests upon the insulation on the sloping panel of one of the modules, and terminates coincidently with the vertical face of the marginal flange of that panel. One side edge of the arched wall **1424** of the plenum is provided with a flange which rests, with an intervening gasket **1432**, on an in-turned ledge of the marginal flange of the facing panel of the other module. Plenum chamber **1425** is lined with insulating material which, on the inner side of the edge of the arched wall **1424** which rests on the ledge, is substantially coincident vertically with the vertical part of the marginal flange. Accordingly, a gap is defined between the end of the bottom **1426** and the inside face of the insulation on the arched wall **1424**, which gap forms a continuation of the passage **1420**, all as shown in FIGURE 14.

Referring now to FIGURE 15, an embodiment of ceiling module of this invention is shown in which the panels are foraminous, and at least one of them is not backed with insulation, but is provided with a plenum chamber **1525**, open at its bottom, and so constructed as to deliver air under pressure through the foraminous panel itself. Insulation on the inner side of the plenum chamber **1525** serves to deaden sound created and carried by moving air and also sound from the room area below and inhibit the transfer of heat through the plenum chamber walls. The arched wall of the plenum chamber also serves as a sound attenuator.

Numerous variations in the construction of the module of the invention within the scope of the appended claims, will occur to those skilled in the art in the light of the foregoing disclosure. The proportions of the various elements of the combination may be varied, so long as the spines are made of sufficient height through the length of each panel to provide rigidity and serve as an element of the housing seat. The slope of the web of the panels can be varied even to a negative angle as compared with the angles shown, though the embodiments illustrated are preferred for strength and appearance. The panels can be arched in section, the marginal flanges being planar vertically. The panels can be coated or decorated in any desired way and, while it is contemplated in the embodiments shown that the panels and housing be made of sheet metal, enameled or otherwise suitably protected and decorated, one or both could be made of other materials. One reason why the preferred embodiments of this invention are made of steel is that, when constructed of steel, all the load bearing areas of the modules described resist deflection and all surfaces expand evenly to prevent warping and distortion when the modules are exposed to extreme temperatures, as in the case of fire. It can be seen that the insulating material shown in several of the embodiments can be also a good thermal insulating material, such as mineral wool, and may be applied liberally, to provide a ceiling which will retard the passage of heat from the space below the ceiling to the supporting structure. The various panels can be made imperforate or foraminous, as the case may be, and backed or not backed. The arrangement of lamps and lamp holders can be varied widely. For example, different numbers of fluorescent and incandescent lamps may be employed. In the fluorescent lamp housings in which the lamps run diagonally, different numbers of lamps, both in total and in different levels can be used. When odd numbers of lamps are used, it is preferable to locate the greater number in the upper tier of lamps. For example, if three are used, it is preferable to locate two lamps above and a single lamp below. These are merely illustrative variations.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. A ceiling module comprising a ceiling-defining area defined by a plurality of trapezoidal panels arranged in such a manner that each convergent edge of each said trapezoidal panel is contiguous a convergent edge of another of said trapezoidal panels, the long bases of the trapezoids defining a plane polygon and the short bases of the trapezoids defining an open seat, a spine along each line of contiguity between adjacent panels and extending above said panels, and mounting means on said spines above said line of contiguity.

2. The ceiling module of claim **1** wherein the trapezoidal panel members are foraminous and are covered with thermal and accoustical insulating material.

3. The ceiling module of claim **1** wherein at least one of the trapezoidal panel members is foraminous and communicates directly with a plenum chamber above said panel whereby an air-pressure differential through foramina in said panels is maintained.

4. The ceiling module of claim **1** wherein at least one of the trapezoidal panel members is foraminous and a plenum chamber of a size to fit the panel is mounted on the upper surface of the panel.

5. The ceiling module of claim **1** wherein a plenum chamber is mounted on the upper surface of at least one trapezoidal panel, said plenum chamber having a wall extending beyond the outer margin of said panel and adapted to engage an adjacent module spaced from the module on which the plenum chamber is mounted, said plenum chamber being provided with a gap coincidental with the space between said modules.

6. A ceiling comprising a plurality of ceiling modules each having a ceiling defining area formed of trapezoidal panels arranged about a central opening, each of said panels having on each of two inwardly converging edges a substantially vertical, upwardly extending spine extending along said edge, said panels being joined to form an open seat for a central closure member, said central closure member being openably mounted in said seat; hook means mounted on said spines and projecting outwardly thereof laterally of the ceiling area; suspending and spacing means engaging one of said hook means on a plurality of adjacent modules, by which adjacent of said ceiling modules are spaced from one another to define channels between them, and bridging means, carried by said panels, for bridging the space between adjacent ceiling modules.

7. The ceiling of claim **6** wherein the ceiling module bridging means are hinge leaves, each hingedly connected to one panel along an outer edge of the panel.

8. A ceiling comprising

(1) a plurality of ceiling modules, each of said modules comprising

(a) a ceiling-defining area comprising a plurality of trapezoidal panels arranged in such a manner that

(i) each convergent edge of each said trapezoidal panel is contiguous a convergent edge of another of said trapezoidal panels

(ii) the long bases of the trapezoids define a plane polygon

(iii) the short bases of the trapezoids define an open seat

(b) a central closure member openably mounted in said seat

(c) a spine along each line of contiguity between adjacent panels and extending above said panels

(d) mounting means on said spines above said lines of contiguity;

(2) a supporting structure; and

(3) hanging means depending from said supporting structure, adapted to engage said mounting means.

9. The ceiling of claim **8** wherein said modules are arranged so that each side of at least one of said polygons is contiguous a side of an adjacent polygon.

10. The ceiling of claim **9** wherein one of said hanging means engages mounting means carried by a plurality of modules.

11. The ceiling of claim **9** wherein contiguous edges of said adjacent polygons are spaced from each other to define channels between them.

12. The ceiling of claim **10** wherein one of said hanging means engages mounting means carried by four modules.

13. The ceiling of claim **11** wherein bridging means are provided above said contiguous edges of said adjacent polygons for bridging the space between adjacent ceiling modules.

14. A ceiling module comprising a ceiling-defining area comprising a plurality of trapezoidal panels arranged in such a manner that each convergent edge of each said trapezoidal panel is contiguous a convergent edge of another of said trapezoidal panels, the long bases of the trapezoids defining a plane polygon and the short bases of the trapezoids defining an open seat, a central closure member openably mounted in said seat, a spine along each line of contiguity between adjacent panels and extending above said panels and mounting means on said spines above said line of contiguity.

15. The ceiling module of claim **14** wherein the central closure member comprises a lamp housing and light transmitting panel.

16. A ceiling module comprising a ceiling-defining area comprising a plurality of trapezoidal panels arranged in such a manner that each convergent edge of each said trapezoidal panel is contiguous a convergent edge of another of said trapezoidal panels, the long bases of the trapezoids defining a plane polygon and the short bases of the trapezoids defining an open seat, and a light transmitting panel mounted in said seat.

17. The ceiling module of claim **16** wherein the area of the polygon defined by said long bases is at least twice the area of said lighting panel.

18. The ceiling module of claim **16** including a ventilated housing above said light transmitting panel, fluorescent lamp-holders arranged in pairs within said housing, each lamp-holder of a pair being opposite to the other and at least two of said pairs being oriented at an intersecting angle to and offset vertically from one another whereby lamps extending between lamp-holders of said pairs cross one another intermediate their ends, said housing having a ventilating opening immediately above the crossing area of said lamps.

19. The ceiling module of claim **18** wherein the housing is essentially square in plan and the lamp-holders are located at corners of said housing, with the lamps extending at right angles to one another.

20. A ceiling module comprising a ceiling-defining area formed of trapezoidal panels arranged about a central opening, each of said panels having on each of

two inwardly converging edges, a substantially vertical upwardly extending spine extending along said edge, said panels being joined to form an open seat for a central closure member, said central closure member comprising a light transmitting panel, a lamp housing supporting said light transmitting panel, and a removable cover on said housing.

21. The ceiling module of claim **20** wherein a lamp-holder is mounted within the housing above said lighting panel.

22. The ceiling module of claim **21** wherein the lamp-holder is mounted on an arm supported at one end on a side wall of the housing.

23. The ceiling module of claim **21** wherein the lamp-holder is mounted on a reflector connected to the removable cover of the housing.

24. The ceiling module of claim **21** wherein a ventilating opening, communicating with a plenum chamber, is provided in the center of the cover and a lamp mounted in the lamp holder is positioned directly below said ventilating opening.

25. A ceiling module comprising a ceiling-defining area formed of four inwardly-upwardly inclined isosceles trapezoidal panels the bases of which lie in a common plane, secured to one another and symmetrically arranged about a central square opening defined by edges of ledges integral with said panels and parallel to said bases, each of said panels having integral with each of two inwardly converging edges a substantially vertical spine of substantial height, extending the length of said edge and having, at its upper inner end, a wing extending above a contiguous one of said ledges, contiguous spines being secured in face to face abutment and said wings forming with said ledges, a seat for a square lamp housing, fluorescent lamp-holders arranged in pairs, each of said lamp-holders being mounted at a corner of said housing and the lamp-holders of a pair being diagonally opposed to one another, at least two of said pairs being oriented at right angles to one another and being offset vertically from one another whereby lamps extending between opposed lamp-holders of said pairs cross one another at right angles in the central area of said housing, said housing having a ventilating opening immediately above the crossing area of said lamps, said housing being seated on the ledges of the panels with the wings of said spines extending along the sidewalls of the housing at each corner.

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