Feb. 6, 1968 R. A. D. SCHWARTZ ETAL 3,368,070

MODULAR CLOSED LOUVER PANEL SYSTEM

Filed June 15, 1965 2 Sheets-Sheet 1

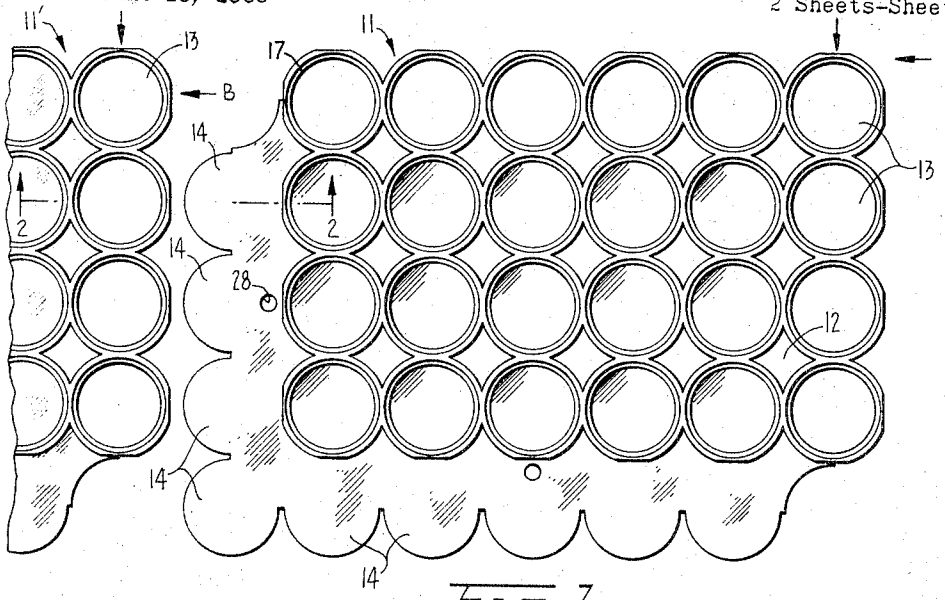


Fig. 1

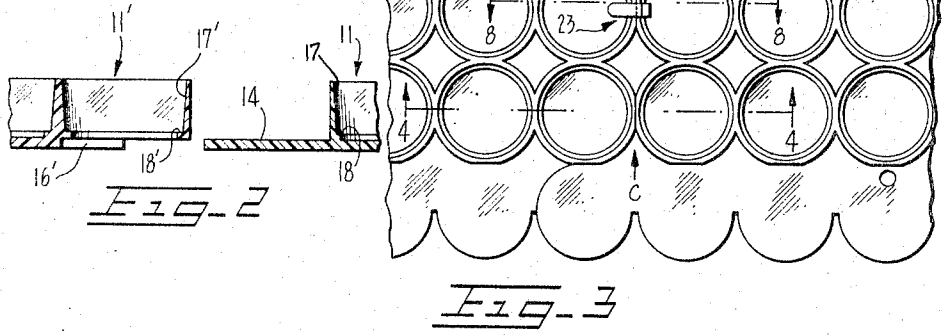


Fig. 2

Fig. 3

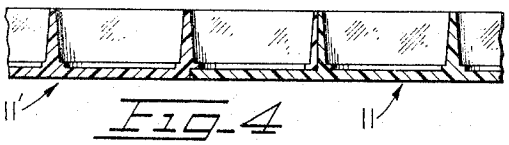


Fig. 4

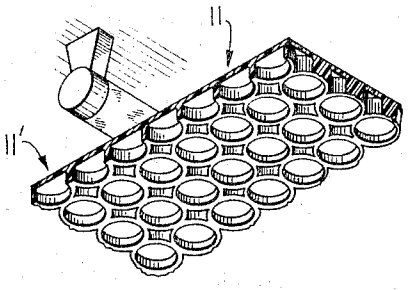
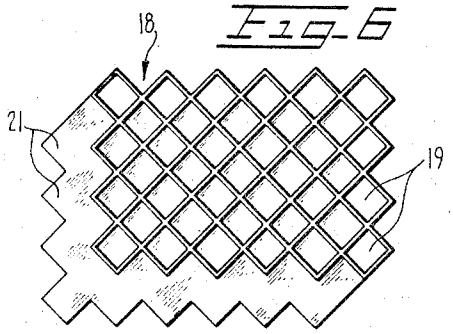


Fig. 5

Fig. 6



INVENTOR.
ROBERT A. SCHWARTZ
BY PHILIP W. PFEIFFER
Gardner & Zimmerman
ATTORNEYS

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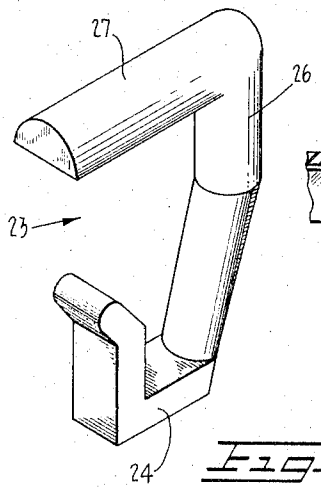


Fig. 7

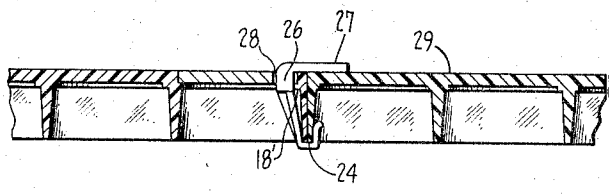


Fig. 8

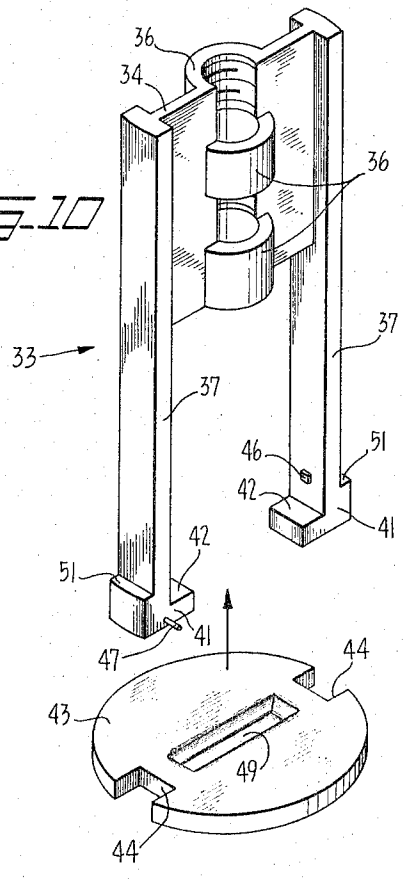


Fig. 10

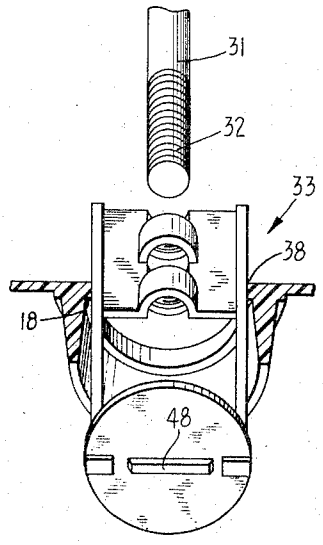


Fig. 9

INVENTOR.
ROBERT A. SCHWARTZ
PHILIP W. PFEIFFER
Gardner & Zimmerman
ATTORNEYS

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MODULAR CLOSED LOUVER PANEL SYSTEM

Robert A. D. Schwartz, Oakland, and Philip W. Pfeiffer, San Mateo, Calif., assignors to United Lighting and Ceiling Co., Oakland, Calif., a corporation of California

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5 Claims. (Cl. 240—9)

ABSTRACT OF THE DISCLOSURE

A translucent or transparent lighting panel incorporating adjacent cell members and a planar backing sheet enclosing one end of the cells. The backing extends laterally beyond the cells on two adjacent edges of the panel and is omitted from the end cells on the other two adjacent edges of the panel so that a plurality of panels may be connected together to form a continuous ceiling or the like of uniform design.

This invention relates to louvered panel systems of the type used as light transmitting media such as in the ceiling or walls of a room and, more particularly, to an improved modular panel of this type, and a hanger and attachment clip therefor.

In the lighting of rooms, particularly larger rooms such as are found in office and industrial buildings, it is now common to provide a "false" ceiling below light fixtures to provide, in effect, a luminous ceiling. These false ceilings are often in the form of open grillework or louver panels which, when the ceiling is viewed at an angle, act to reduce the brightness of the light and shield or hide the light fixtures from view while permitting direct passage of light to the room below. For many installations, though, it is more desirable to utilize a closed louver panel system for the ceiling wherein a transparent or translucent backing sheet or membrane is provided on the upper side of the louver panels in order to diffuse or refract the light reaching the room to be illuminated. Such closed louver panels provide a ceiling in which the light fixtures are completely hidden from view to provide a true luminous ceiling effect, and by which, by proper design of the sheet backing, the intensity and quality of the light can be closely controlled.

In general, however, closed louver panel ceilings have not been accepted by the art since, with present designs, the joints between adjoining panels have not been sufficiently good to prevent the leakage of direct light to the area being illuminated. This leakage of light makes the joints highly noticeable and visible. In order to reduce this undesirable leakage of direct light, closed louver panels have in the past been made in unusually large sizes to thereby reduce the number of joints. However, besides not completely eliminating the existence of points and the resulting leakage of light, the large panels are not as versatile as smaller ones in the provision of ceilings of different dimensions and shapes. In another presently employed method of eliminating the leakage or passage of direct light through joints, a metal lattice or grid structure is provided upon which the panels are laid with the grid structure covering the joints. Besides being expensive, though, these grid structures are themselves unsightly and give the ceiling a sectional appearance.

The instant invention provides a modular closed louver panel capable of being assembled with a plurality of like modular panels to provide a larger continuous panel having no visible joints and through which no direct light is permitted to pass. Further, the modular panel interlocks with adjacent panels to assure proper and stable assembly of a plurality of the panels. Clip means are also provided for securing adjoining modular panels together, and hanger means are provided to facilitate hanging the resulting closed louver ceiling below light fixtures. Both the clip means and the hanger means are especially adapted to prevent the direct passage of light thereabout through the ceiling.

Accordingly, an object of the invention is to provide a modular closed louver panel which is especially designed to be easily assembled with a plurality of like modular panels into a large continuous panel having no visible joints.

A further object of the invention is to provide a modular closed louver panel which can be assembled with a plurality of like panels into larger panels of various dimension and peripheral shapes.

Another object of the invention is to provide such a modular closed louver panel which is adapted to transmit light and which can be assembled with similar panels to provide a larger continuous light transmitting panel having no visible joints between the panels and no other apertures through which direct light can pass.

A still further object of the invention is to provide an improved clip for securing adjoining closed louver panels together in an efficacious and simple manner and which is designed to not permit direct passage of light through the panels at their point of securance.

And still another object of the invention is to provide a hanger system capable of hanging a closed louver panel beneath a light fixture without causing an undesirable aperture to result in the panel through which light from the light fixture can directly pass.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawings accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawings and description may be adopted within the scope of the invention as set forth in the claims.

Referring to the drawings:

FIGURE 1 is a plan view of a modular closed louver panel of the invention positioned for engagement with a similar modular panel which is only fragmentarily shown;

FIGURE 2 is an enlarged sectional view of the panels depicted in FIGURE 1, taken on a plane indicated by the line 2—2;

FIGURE 3 is a fragmentary plan view of the panels of FIGURE 1 after having been joined to form a larger, continuous panel;

FIGURE 4 is a sectional view of the panels of FIGURE 3 taken along a plane indicated by the line 4—4 of FIGURE 3 and depicting the joint between the panels;

FIGURE 5 is a reduced perspective view of panels of the invention secured together and supported beneath a light fixture;

FIGURE 6 is a reduced plan view of another embodiment of a modular panel of the invention having a different louver or grill work configuration.

FIGURE 7 is an enlarged perspective view of a clip especially designed to facilitate securing adjoining modular panels together to form a continuous larger panel;

FIGURE 8 is an enlarged sectional view of the adjoining panels of FIGURE 3 taken on a plane indicated by the line 8—8 of FIGURE 3 and depicting a clip of the invention securing two modular panels together;

FIGURE 9 is an enlarged perspective view of a hanger system for supporting a closed louver panel beneath a lighting fixture, and depicting its relationship to a panel;

FIGURE 10 is an enlarged perspective view of the hanger of FIGURE 9.

A modular closed louver panel of the invention is gen-

erally indicated in FIGURE 1 by the reference numeral **11**. Such panel comprises a membrane or sheet backing **12** having a decorative grill work or louver structure on the side thereof to be exposed to the room being lighted. In the embodiment depicted in FIGURE 1, the louver comprises a plurality of adjacent and adjoining cylindrical cells **13**. Backing **12** and cells **13** are desirably molded integrally as one piece and can be of any of the materials commonly utilized as louver or light panel structures. For example, they can be of transparent or translucent plastic. While backing **12** is depicted as being a flat planar sheet, it is to be appreciated that it can be of other forms, such as a prismatic sheet.

As mentioned before, closed louver panels of the general type to which the invention relates are known. However, in the past, it has not been possible to join adjacent panels together with assurance that the joints will not leak light or otherwise be visible. The instant modular panel, however, is especially adapted to have similar panels joined to every edge thereof to form a larger continuous panel without the joints being visible. Because of this, the modular panel can be made of a size much smaller than the size that most panels are, and thus, the modular panel of the invention affords great versatility in providing continuous panels of desired shapes and sizes. To provide the desired joining of panel **11** to similar panels, such panel has extensions **14** protruding from two adjacent edges of the panel which generally conform to the pattern of the louvers of the panels to which it is to be joined. In the embodiment described, these extensions are actually continuations of the backing **12** and their configurations generally conform to the cylindrical cell pattern **13**. That is, the extensions **14** have convex semi-circular configurations which are adapted to mate with concave semi-circular recesses **16'** in another identical panel **11'**. As best seen from FIGURE 2, the edge portions of the recesses **16'** will be directly above the mid point of the inside cylindrical walls **17'** of the exterior cells **13'** of panel **11'** when the cell is arranged beneath a light fixture. Thus, when the panel **11** is adjoined to panel **11'** with extensions **14** mating with recesses **16'**, the joints between the extensions **14** and the recesses **16'** are shielded by the cylindrical cell walls **17'**. If the joint itself is not completely opaque, therefore, the cell walls **17'** prevent light from passing directly to the area to be illuminated. Because of this shielding, the existence of minor imperfections in the joint due to practical limitations imposed by manufacturing or expansion or contraction of the panels is immaterial. A shoulder **18'** is provided about the inner periphery of each of the exterior edge cells to mate with the undersurface of the extensions **14** to assure that the joint is not visible without the necessity of making cell walls **17'** unduly thick. Shoulder **18'** also provides a relatively large surface in contact with the undersurfaces of the extensions to facilitate securing of the panels together thereat, if desired, by any of the conventional means. For the sake of uniformity in appearance, each of the cells of the panels **11** and **11'** has a shoulder **18** and **18'**, respectively, about its inner periphery.

Besides preventing the leakage of light at the joints between the panels, the mating of extensions **14** with recesses **16'** interlocks the panels and assures proper and stable alignment therebetween. That is, the panels only fit together with the cells of one aligned with the cells of the other, and when the cells are so aligned the panels are prevented from lateral movement relative to one another.

The outside edge of the cylindrical walls **17'** of panel **11'**, and the similar outside cylindrical walls **17** of panel **11** are flattened so that when the panels are moved together with these cylindrical walls, the meeting points of the walls define a wall of a thickness equal to thickness of the walls of the other cylinders **13** of the panels. This further assures that the joint between adjoining panels is not visible.

The modular panels **11** and **11'** are shown in adjoining relationship in FIGURES 3 and 4. Since the joint therebetween is not readily discernible, it has been indicated by the arrow marked C. It is apparent from these figures that when the panels are so joined, they appear to be one continuous panel.

The other two adjacent edges of panel **11** have recesses **16** therein identical to the recesses **16'** of panel **11**. These recesses are adapted to mate wth extensions on other panels (not depicted) identical to the extensions **14**. It is thus apparent that a plurality of panels can be adjoined together to provide a large panel of a desired size and shape. In this regard, it is to be noted that panels can be secured to panel **11** on every side thereof.

While the panel **11'** is identical to the panel **11**, it is to be appreciated that this is not necessary. In some instances it might be desirable to provide a "checkerboard" pattern for the composite closed louver panel. To do so the panel **11** can be joined with panels of dissimilar louver design. Then, the extensions **14** of panel **11** will generally conform to the design of the louver of the dissimilar panels so that the joints between the extensions and recesses conforming to the louvers will be shielded by the louver cell walls. Likewise, the dissimilar panels will have extensions thereon conforming to the recesses **16** of panel **11**.

Another panel **18** of the invention having a different louver design or pattern is depicted in FIGURE 6. In this panel, the louver is comprised of adjoining diamond-shaped cells **19**. Extensions **21** protruding from this panel have a configuration designed to mate with recesses on a panel having similar diamond shaped cells. This panel itself has such recesses **22** generally conforming to the louver pattern along the two edges thereof not having extensions **21**. It is, of course, to be appreciated that louver patterns other than the diamond-shaped and cylindrical cells patterns described are also within the scope of the invention.

While, if desired, modular panels of the invention can be secured together in any conventional manner such as by means of an adhesive or high frequency welding of shoulders **18** to extensions **14**, the invention includes a clip **23** which facilitates assembly of a plurality of these panels in a rapid and simple manner. This clip is shown in perspective in FIGURE 7 and comprises a U portion **24** for gripping together adjacent louver cells of two adjoining panels. Further, means are provided on the clip for securing it to the panels. More particularly, one of the legs of the U portion extends upward to form a cylindrical shank **26**, and has a horizontally extending bar **27** integrally secured to its free end. The material of clip **23** is desirable similar to, and of the same color, as, the material from which the modular panels are made. When it is of such a material, the clip is unobtrusive and does not form light shadows.

Clip **23** is also desirably flexible in order to facilitate its securance to the panels. As shown in FIGURE 8, when the clip is assembled to the panels, U portion **24** grips between its legs the adjacent cylindrical walls of adjoining modular panels, and shank **26** extends through an aperture **28** within an extension **14** of panel **11**. The aperture **28** is circular and of a size to just receive shank **28** so that light cannot directly pass thereabout to the area being illuminated. The bar **27** has a flat under surface portion which abuts against the upper surface **29** of backing **12** of panel **11**. In this manner, bar **27** and shank **26** act to hold the U portion of the clip in engagement with the aforesaid adjacent cell walls.

Desirably, the clip **23** is inserted into the aperture **28** of each of the panels at the place of manufacture. Then, when the panels are assembled at the installation, they can be easily and simply secured together. Because of the resiliency of the clip, the U portion can be snapped

over the adjacent cell walls of adjoining panels by rotating the clip to secure them together. When the clip is in such securing position, it should be noted that shank **26** engages shoulder **18'** of panel **11'** and thereby urges the upper portion of cell wall **17** against the adjacent cell wall to assure tight relationship between the panels. The bar **27** acts to prevent vertical movement of the panel **11'** with respect to panel **11**.

In providing a conventional closed louver light transmitting panel beneath a lighting fixture, it is now common to utilize a lattice frame work since the use of a conventional hanger results in an undesirable aperture in the panel. The instant invention includes as an important part thereof a hanger which obviates the necessity of these lattice structures and does not result in an aperture in the panel. A preferred embodiment of the hanger system of the invention is depicted in FIGURES 9 and 10. Such hanger system includes a hanger rod **31** adapted at one end to be secured to a structure such as an upper ceiling (not shown) above the position at which the light diffusing panel is desired to be supported. The depending free end **32** of such rod is threaded as depicted.

A hanger member **33** is provided for securing the panels to hanger rod **31**. This hanger member includes a web **34** having alternating threaded half cylinders **36** for threadably receiving end **32** of hanger rod **31**. Two flexible legs **37** depend from web **34** and are adapted to extend through a cylindrical aperture **38** within panel **11**. Aperture **38** is through backing **12** coaxially with one of the cylindrical cells **13**. The periphery of this aperture corresponds to the periphery of the shoulder **18** within the cell.

Each of the legs **37** has an enlarged foot portion **41** which provides an inwardly extending flange **42** for engagement with a discoidal retaining member **43**. Such retaining members **43** is of a size to fit within the cylindrical cell below aperture **38** and abut against the shoulder **18**. It has notches **44** in its edge adapted to receive the legs **37**. When the legs are so received within notches **44**, the retaining member acts to spread the legs apart, and the shoulders **42** abut against the retaining member to hold it in position. A nub **46** is provided on the inner surface of each leg to assure that the retaining member cannot move upward with respect to the legs and, in this manner, come out of position. It should be noted that the exterior side configurations of the feet portion **41** will coincide with the periphery of the retaining member when it is so supported.

The manner in which the hanger system is assembled to support panel **11** should be apparent from the above. The flexible legs of hanger member **33** are brought together and are inserted through aperture **38** from above the panel. To facilitate holding of the legs together as they are so inserted, a pin **47** is provided on one of the legs over which the other leg can be hooked. After the legs are inserted, they are released from one another and retaining member **43** is attached thereto as shown in FIGURE 9. Then the panel and hanger can be raised to a hanger rod **31**, and the hanger rotated, such as by means of a tab **48** on retaining member **43** to threadably receive the rod **31**. It should be noted that tab **48** is provided by forming the retaining member with an indentation **49** on one side thereof. In this manner the retaining member can be made of uniform thickness so that no undesirable shadows are caused thereby.

It is to be noted that shoulder **18** of the panel will rest upon the periphery of retaining member **43** and thus the retaining member acts to close off the aperture **38**. In this regard it should be noted that both the retaining member **43** and shoulders **51** on the leg feet **41** provide support for the panel. Furthermore, it is possible to level the height of a plurality of panels supported by hangers of the invention, by simply rotating the individual hangers by means of the retaining member and thereby vertically moving its associated panel. In this regard it is to be noted that the retaining member can be turned over so that the indentation is on the undersurface thereof, and provides a notch for a screw driver to facilitate such adjustment. Hanger **33**, and disc **43** should be of a light transmitting material corresponding to that of the panels in order that they will be unobtrusive and not cause undesirable shadows.

While the invention has been described in conjunction with the forming of large continuous panels for ceilings, it is to be appreciated that panels formed with modular panels of the invention can be used in other lighting structures such as in a light fixture. Further, while the concept of the invention has been described with respect to light transmitting panels, it is to be realized that it is especially applicable to opaque panels utilized for various purposes such as in a decorative wall structure. The invention provides the advantage of permitting various size and shapes of decorative composite panels in such a structure without the joints between adjoining modular panels being visible.

What is claimed is:

1. A modular panel comprising a louver structure formed of a plurality of adjacent open cells of uniform size and having a generally rectangular periphery, a continuous planar backing sheet formed integrally with said cells on one side thereof, two adjacent edges of said sheet having recesses conforming to the pattern of said cells disposed along said edges to thereby provide for a row of open cells along said edges, and the other two adjacent edges of said sheet having planar extensions protruding therefrom conforming to the pattern of said cells for mating with corresponding recesses on a similar panel with the joints therebetween shielded by walls of the cells of such other similar panels, whereby said panel is joinable with said similar panels to provide a larger continuous panel without said joints being visible.

2. A closed modular louver panel comprising a louver structure formed of a plurality of abutting open cells having a planar sheet backing on one side thereof, said backing having recesses along one edge conforming to the pattern of said louver cells with a row of cells being open along said edge, and said backing having extensions protruding from another edge of said panel having edge configurations conforming to the pattern of said louver cells for mating with corresponding recesses on a similar panel with the joint therebetween shielded by cell walls of the louver structure of such other similar panel, whereby said panel is joinable with said similar panel to provide a larger continuous panel without said joints being visible and with the backings defining a substantially continuous coplanar sheeting.

3. A modular closed louver panel comprising a louver structure having a planar light transmitting sheet backing on one side thereof and having a generally rectangular periphery, two adjacent edges of said backing having recesses conforming to the pattern of said louver with the louvers positioned along said edges being open, and the other two adjacent edges of said backing having protruding coplanar extensions having edge configurations conforming to said louver pattern and extending beyond the louvers positioned along said other two edges, said extensions mating with corresponding recesses on other similar panels in coplanar relationship with the joints between the backings of mating panels intersecting and being shielded by walls of the louver structures of such other similar panels, whereby said panel is joinable with said similar panels to provide a larger continuous panel without said joints being visible or permitting the direct passage of light therethrough.

4. A closed louver panel assembly comprising a first modular panel having a louver structure with a continuous planar translucent sheet backing on one side of said louvers and recesses within said backing along one edge thereof conforming to the pattern of said louver structure, a second modular panel having a louver structure with a continuous planar translucent sheet backing on one

side thereof and coplanar extensions protruding from one edge of said backing conforming in plan configuration to the recesses in the first panel, and a clip passing through an aperture in one of the extensions of the second panel and securing an edge portion of the louver structure of said second panel to an edge portion of the louver structure of said first panel with said extensions mating with said recesses to thereby form a larger continuous panel with the respective backings defining a coplanar sheet with the joint therebetween being hidden by the thickness of the louvers.

5. The panel assembly of claim 4 further defined by means for hanging said panel assembly in a position below a lighting fixture, said means comprising a web threadably receiving a hanger rod depending from a structure above said panel, legs depending from said web for

passing through an aperture in one of said panels, and a retaining member supported by the free ends of the legs in engagement with the edges of said aperture and having an edge configuration generally conforming to the edge configuration of said aperture for closing said aperture.

References Cited

UNITED STATES PATENTS

2,860,237	11/1958	Baker et al.	240—78
2,937,265	5/1960	Blitzer	240—9

JOHN M. HORAN, *Primary Examiner.*

NORTON ANSHER, *Examiner.*

M. H. HAYES, *Assistant Examiner.*