

[54] **ILLUMINATOR GRID**

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[52] U.S. Cl. .... **240/78 LD, 52/484, 52/645, 240/9 R, 240/108 R, 248/343**

[51] Int. Cl. .... **F21v 11/00**

[58] Field of Search ..... **240/9, 52 R, 78 R, 240/78 LD, 108 R; 248/323, 324, 343; 52/484, 486, 489, 645, 663, 666**

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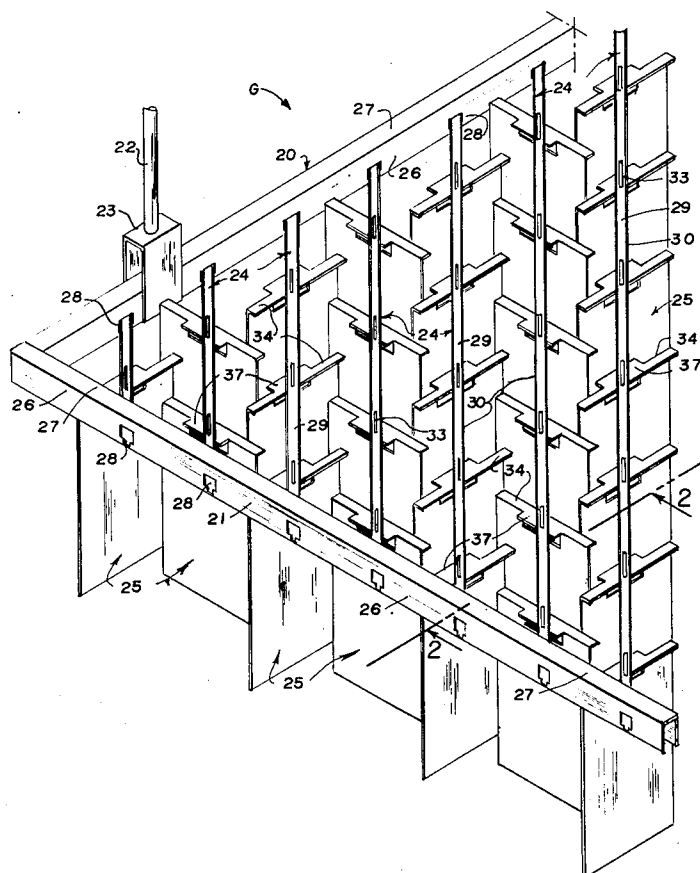
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[57] **ABSTRACT**

A series of parallel, equally spaced channels support a series of depending baffles below a light or series of lights. The baffles are spaced equally along the respective channels and have a width less than their own spacing but greater than the distance between supports to provide an overlap of the edges of adjacent light intersecting baffles, when turned angularly, such as 45°, to the channels and in alternating angular positions on adjacent channels. The baffles are held in the angular positions by clips cooperating with spaced slots in the channels and centrally disposed holes in a right angled portion of the respective baffles. These holes are slanted, rectangular or octagonally pointed. When turned in alignment with the channels to form rows, the baffles are readily cleaned.

**14 Claims, 15 Drawing Figures**



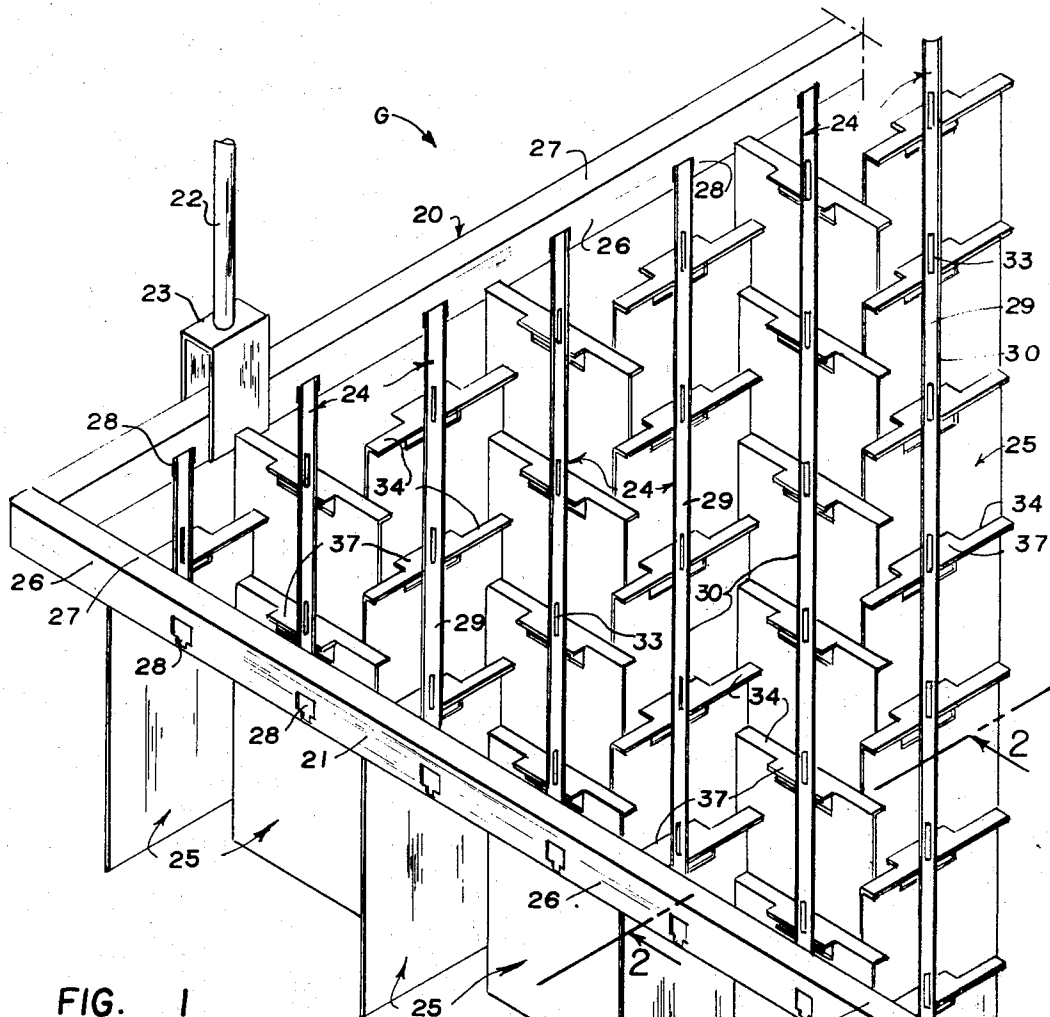


FIG. 1

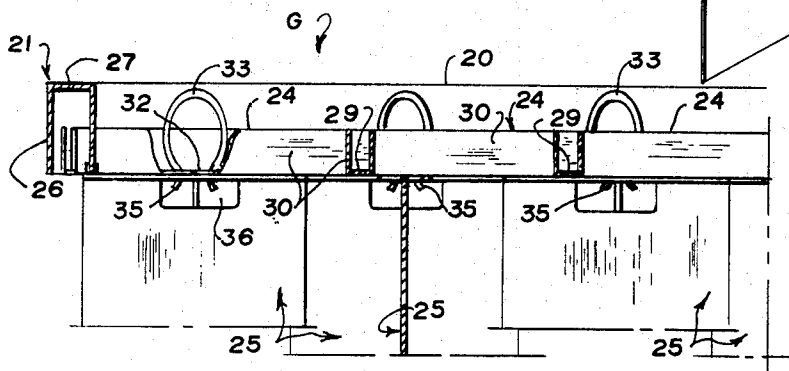


FIG. 2

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FIG. 3

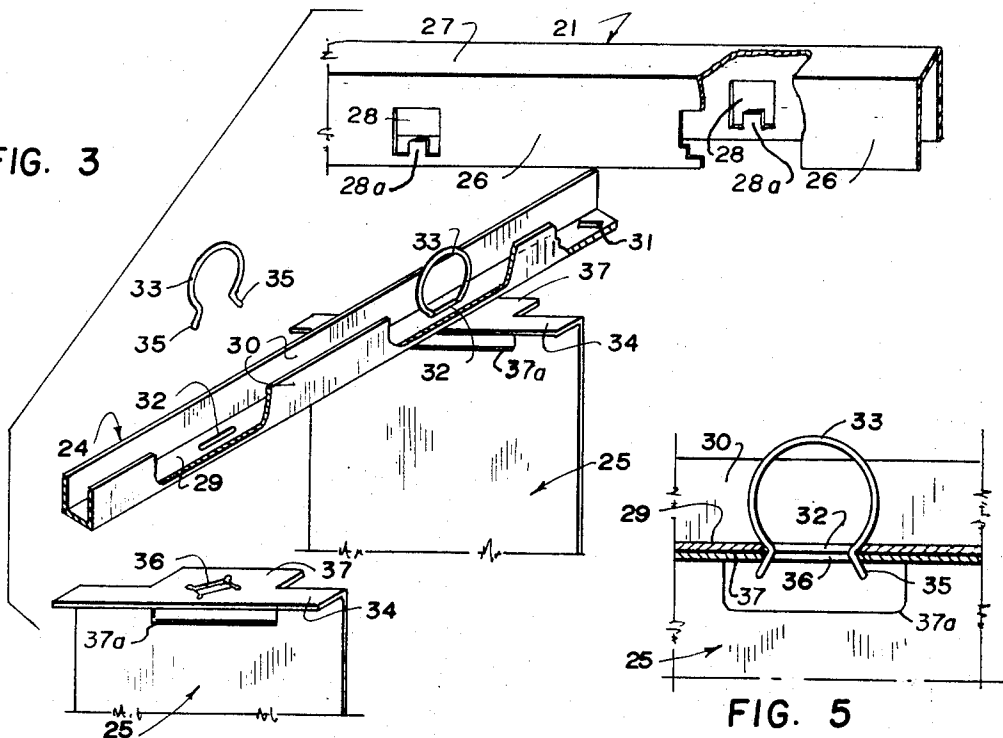


FIG. 5

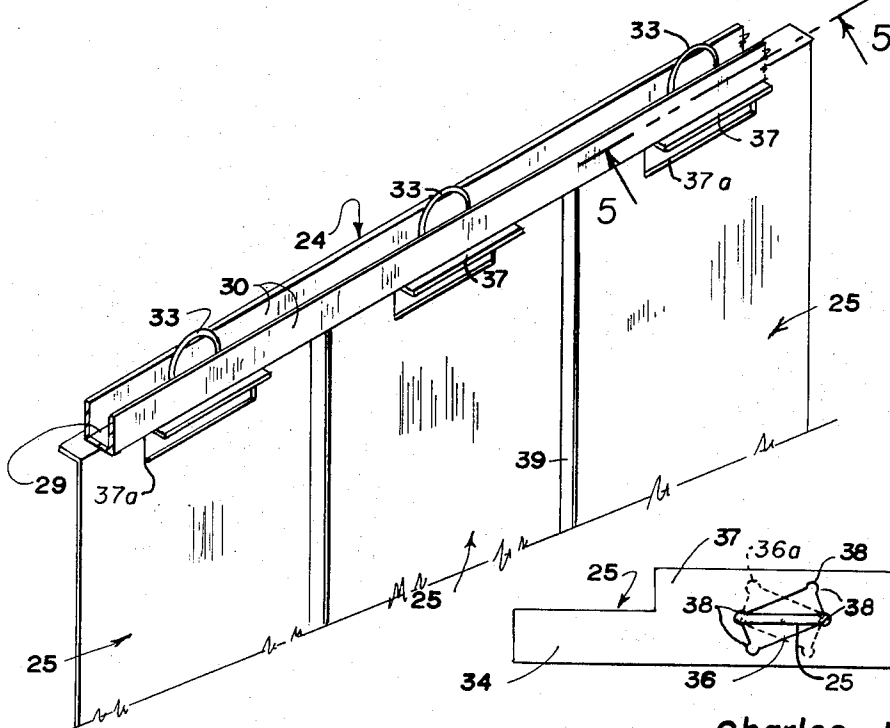


FIG. 4

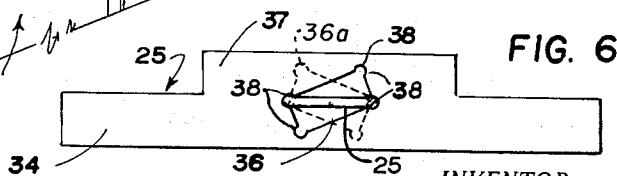
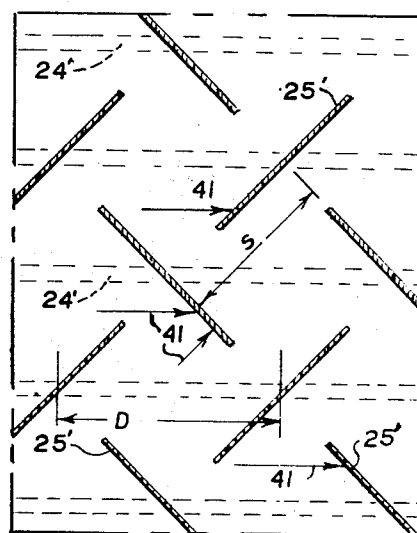
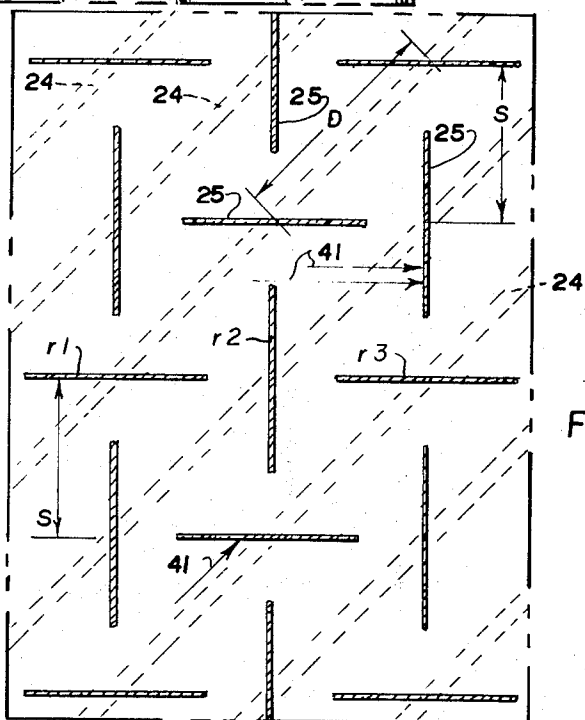
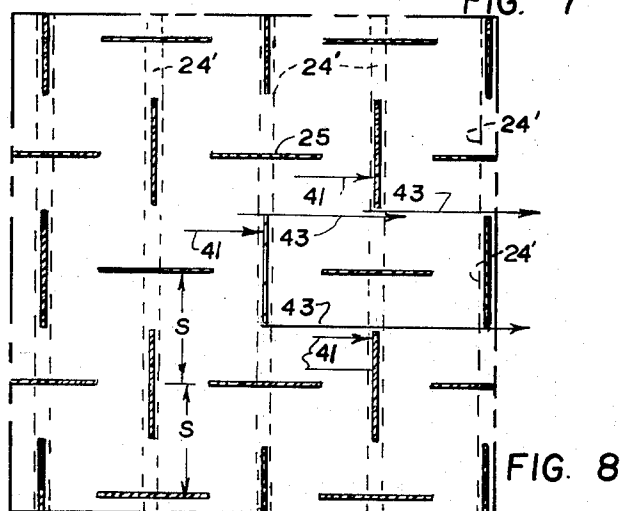
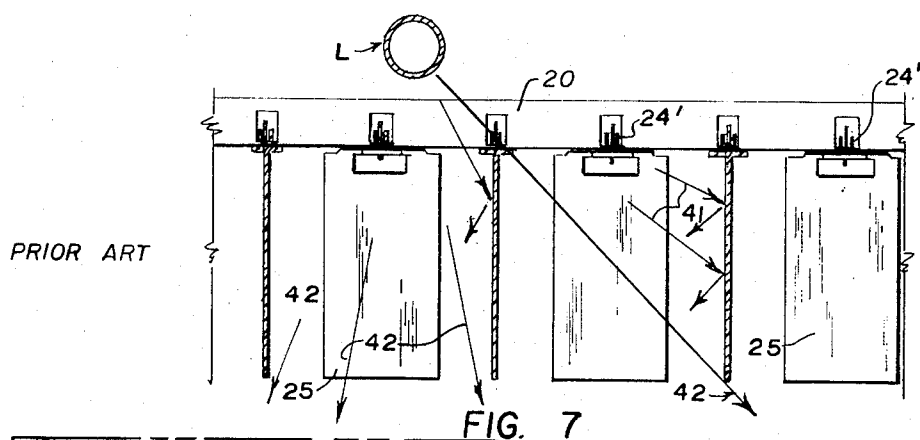


FIG. 6

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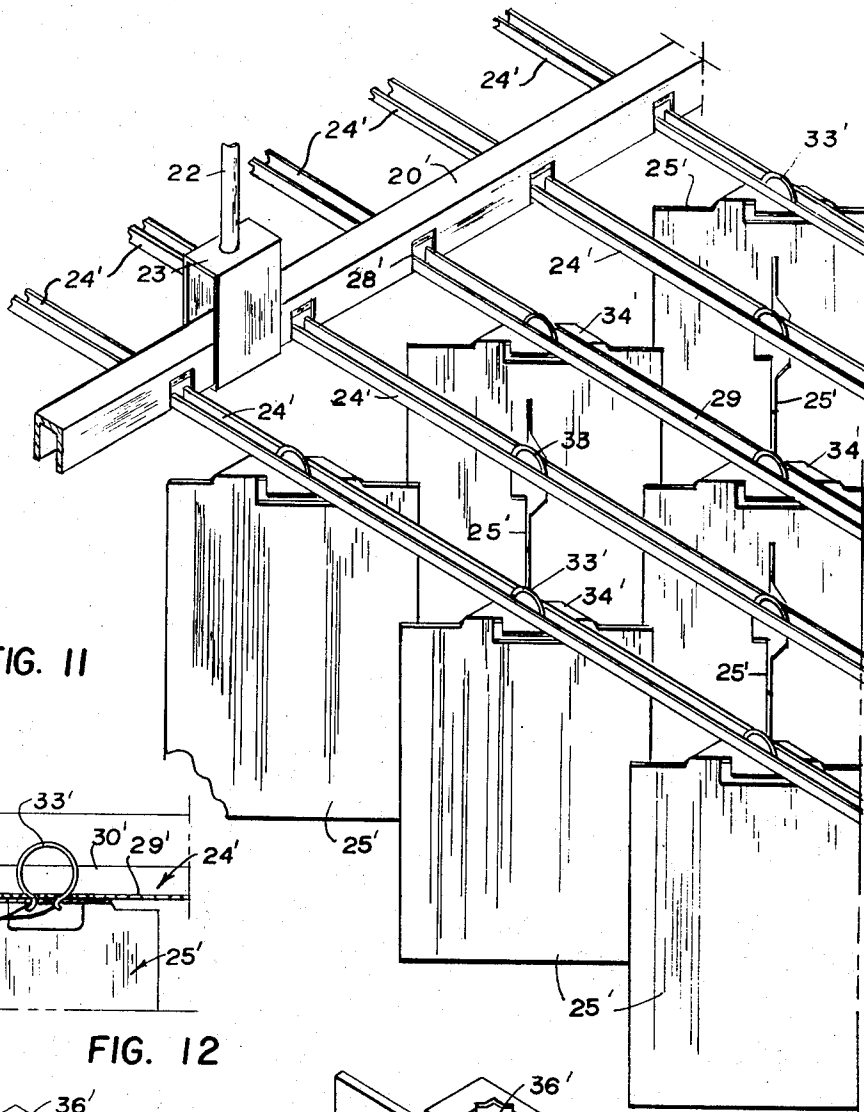


FIG. 11

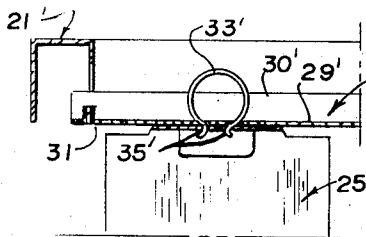


FIG. 12

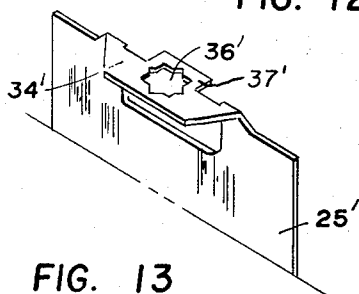


FIG. 13

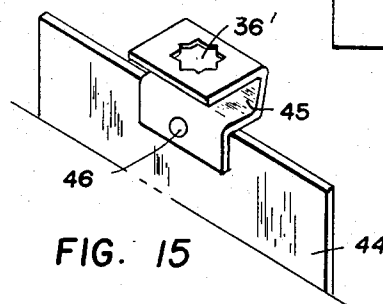


FIG. 15

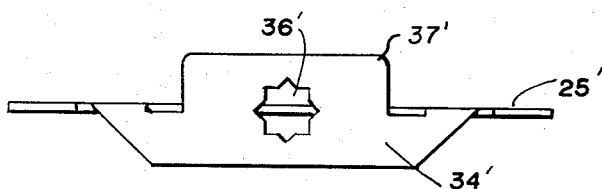


FIG. 14

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## ILLUMINATOR GRID

The present invention relates to overhead illumination grids for masking the glare of an illuminator from direct view, and more particularly overhead illumination grids having hanging light intercepting baffles of the type which are arranged in longitudinal and transverse rows with the individual baffles being at right angles with respect to adjacent baffles in an alternating pattern of pleasing appearance.

The present invention is an improvement over the constructions disclosed in my U.S. Pat. Nos. D-182,991 issued June 10, 1958; 2,870,883 issued Jan. 27, 1959; 3,006,019 issued Oct. 31, 1961; and 3,088,025 issued Apr. 30, 1963. In these illumination grids, rows of light ray baffles are carried upon a sequence of transverse, channel-shaped members in an orthogonal pattern. The baffles are flat, rectangular plates depending from their support channels. They are spaced evenly on the channels to also form rows at right angles to the channels, and each baffle is turned at right angles with respect to the adjacent baffles in alternating orthogonal patterns. The depth of each baffle is such that the grid intercepts the light rays of a ceiling illuminator at angles flatter than approximately 45°. This effectively protects the individuals within a room from the glare of the illuminator at an ordinary viewing angle, for an individual must look upwardly at an angle steeper than 45° to see an illuminator directly.

Illumination grids with hanging baffles, as disclosed in my prior patents, are preferred over the more economical egg-crate type grids of a better appearance, and more especially from the maintenance viewpoint, because they may be easily cleaned. Each baffle in a row of baffles carried upon a common support channel may be turned to a flat alignment with the channel, to present a flat, continuous surface which can be quickly and easily washed, as in the manner disclosed in my U.S. Pat. No. 3,006,019.

The one disadvantage discovered in using an illumination grid of such an arrangement resides in the fact that the width of the baffles in an array carried upon a channel support must be the same as, or less than, the spacing of the baffles on the channel to permit the baffles to be tuned to a flat alignment for washing. The resultant effect is that slits of light will leak past the edges of a row of the baffles and strike the eye of an individual when he is directly in alignment with the edge of a row. Although this light slit may be quite narrow, it is objectionable.

The present invention was conceived and developed with this factor in view, and this invention comprises, in essence, an arrangement in a grid wherein the baffles are rotated to a position at 45° with respect to their supporting channels. An orthogonal pattern of baffles still exists, although the baffles are angled with respect to their supporting channels. This is obtained whether the supporting channels are diagonal with respect to the room with the baffles in longitudinal and transverse rows, or with the supporting channels being transverse, or longitudinal, with respect to the room and the baffles aligned in diagonal rows. In either arrangement, in the improved construction, the edges of one row of baffles overlaps the edges of its adjacent row of baffles, and such lapping completely eliminates any possible light leak. Moreover, no change is necessary in the basic structural features of the illumination grid which per-

mits a row of the baffles to be turned upon their channel to a common alignment for cleaning.

Accordingly, an object of the invention is to provide a novel and improved illumination grid which completely shields light rays from a viewer at angles flatter than a selected critical angle, such as 45°.

Another object of the invention is to provide a simple arrangement of baffles in an illumination grid, wherein the edges of adjacent rows of baffles overlap each other sufficiently to positively prevent any light leaks, and at the same time, provide a neat appearing structure.

Another object of the invention is to provide an improved illumination grid having an arrangement of baffles wherein the edges of adjacent rows overlap to prevent light leaks and which does not require expensive or difficult modifications over the existing types of illumination grids now in use.

With the foregoing and other objects in view, the present invention comprises certain constructions, combinations and arrangements of parts and elements as hereinafter described, defined in the appended claims, and illustrated in preferred embodiment by the accompanying drawings, in which:

FIG. 1 is an isometric view of the corner of a grid constructed according to the principles of the invention, wherein the baffle supporting channels are diagonal to the room walls.

FIG. 2 is a fragmentary sectional elevational view as taken from the line 2—2 of FIG. 1, showing the support channels and the upper portions of baffles suspended from these channels, and depicting the manner in which the baffles of successive rows overlap each other.

FIG. 3 is an isometric exploded view of a portion of a frame member of the grid, a portion of a support channel, the upper portions of the baffles and the connections for holding the baffles to the channel.

FIG. 4 is an isometric view of a portion of a channel carrying baffles, with the baffles being turned to alignment with the channel for cleaning the same.

FIG. 5 is a fragmentary sectional detail, taken from the indicated line 5—5 of FIG. 4, but on an enlarged scale.

FIG. 6 is a top plan view of one of the baffles of FIG. 3, but on an enlarged scale and with broken lines indicating an alternate opening in a flange thereof.

FIG. 7 is a diagrammatic sectional view of a fragment of a prior illumination grid and of a light above this grid, the section being shown to exemplify how rays are deflected and diffused downwardly by the baffle.

FIG. 8 is a diagram depicting a horizontal sectional arrangement of a prior group of suspended baffles in a portion of a grid with the baffles being arranged in a conventional manner, with dotted lines indicating the portions of support channels above the baffles and with arrows indicating the manner in which light rays strike the baffles and also pass between adjacent rows of baffles to produce light leaks which appear as slits of light when viewed from below the baffles.

FIG. 9 is a comparative diagram similar to FIG. 8, but showing the baffles arranged in a modified orthogonal pattern according to the principles of the present invention, as illustrated in FIG. 1, with dotted lines indicating the positions of support channels above the baffles and with arrows indicating the manner in which light rays are intercepted by the lapping edges of adjacent rows of baffles to prevent light leaks.

FIG. 10 is a diagram similar to FIG. 9 showing the baffles arranged diagonally with respect to the supporting channels, but as illustrated in FIG. 11, with the supporting channels above the baffles being shown in dotted lines and with arrows indicating the manner in which light rays are intercepted by the baffles.

FIG. 11 is an isometric view of a corner of a grid similar to FIG. 1, but showing a modified arrangement wherein the baffle supporting channels are parallel to the room walls.

FIG. 12 is a fragmentary sectional detail taken along line 12-12 of FIG. 11, but on an enlarged scale.

FIG. 13 is an isometric view of the upper portion of a baffle also constructed according to the invention.

FIG. 14 is a top plan view of a baffle of FIG. 13, but on an enlarged scale.

FIG. 15 is an isometric view similar to FIG. 13, but depicting the baffle as being made of different materials.

Referring first to FIGS. 1-6 of the drawings, the grid G, a corner of which is shown in FIG. 1, is supported in unsuitable manner, as by longitudinal bars 20 and transverse bars 21. These bars are suspended from a ceiling or the like by rods 22 which connect with the bars at suitable locations about the same. Each rod is connected to a bar by a U-shaped clip 23, with the rod extending through a hole in the crotch of the clip and with the bar being embraced by legs of the clip and secured thereto by inturned hooks at the bottom of the legs.

These bars carry a spaced array of smaller, baffle supporting channels or supports 24, and each channel, in turn, carries a row of flat, rectangular baffles 25, as hereinafter further described. In the embodiment of the invention disclosed in FIGS. 1-6, these channels are positioned at 45° with respect to the room walls. The structural form of the bars 20 and 21 may vary, but preferably they are lightweight metal members, U-shaped in section, and in the arrangement illustrated, they are oriented downwardly with flange sidewalls 26 between the central web portion 27 which forms a top surface. The corners of these bars are interconnected in any suitable manner. Openings 28 are provided in the sidewalls 26 to receive the baffle supporting channels 24, with an upstanding tongue 28a in the base of each opening, for a purpose described later.

Each channel 24 is also a lightweight metal member, U-shaped in section, and oriented upwardly as illustrated, with the central web 29 forming the bottom or floor of the channel between upstanding sidewall flanges 30. The end of each channel 24 is adapted to fit into an opening 28, and an angularly disposed notch 31 is provided in each channel web to interlock the assembly through engagement with the tongue 28a of the corresponding opening 28, as will be evident from FIG. 3. To complete each channel 24, spaced slots 32 are provided in the floor webs to receive holding rings 33 for connecting the baffles to the channels, as will be described.

Each baffle 25 is a flat, rectangular member having a width corresponding to, or slightly less than, the center spacing between the slots 32 in the channels 24, and a height which is selected to effectively baffle a light mounted above an illumination grid, as hereinafter described. In the construction illustrated in FIGS. 1-6, each baffle 25 is of sheet metal or like material. The top edge is folded to provide a flange 34 normal to the sur-

face of the baffle 25, and the face of the flange 34 abuts against the underside of its channel 24 when it is connected thereto. The connection is effected by the holding ring 33, with each holding ring, of spring material, being formed with diverging, outwardly biased fingers 35 which extend through a slot 32 in the floor of a channel 24, and into a rectangular or otherwise suitably shaped indexing opening 36 in flange 34 which has a diagonal dimension the same as the width of slot 32. This indexing opening 36 is preferably located directly above the plane of the baffle 25 and to provide space therefor, a lug 37 is cut from a slot 37a in the central portion of the baffle adjacent to the fold of flange 34, the lug being folded outwardly from the baffle 25 as an extension of the flange 34, but at the opposite side of the baffle.

The indexing opening 36 is proportioned such that the ring fingers 35 will normally bear against diametrically opposite corners of the opening when holding the baffle in place, as shown in FIG. 6. Also, these corners may be indented, as at 38, to better seat the fingers 35. Thus, with a rectangular opening 36, each baffle may be secured at one of two positions with respect to the channel 24 which supports the baffle. The indexing opening 36 is proportioned and inclined so that, at one position, the baffle is positioned at 45° with respect to the channel 24, as shown in FIGS. 1 and 3, while at the other position, the baffle is parallel to the channel, as shown in FIG. 5. Thus, whenever the baffles on a channel are all at this latter position, they will form a flat surface which is easily cleaned. When in this position, it is to be noted from FIG. 4 that a small gap 39 occurs between the baffles, so they will not overlap when aligned with respect to the channel 24. Since the baffles on one channel are to be oriented in an alternating pattern, some of the baffles may have openings in the flange inclined in a direction opposite to the opening 36, as shown, and such opening may be as indicated by the broken lines 36a of FIG. 6. Further, an indexing opening which is a composite of the openings 36 and 36a, as will be described later, may be used. As is apparent from the above description, the fingers 35 coact with the opening 36 in the baffle flange 34 to index the baffle at the inclined or the aligned position with respect to the corresponding channel.

The manner in which these baffles function may be described with reference to FIGS. 7, 8 and 9. FIG. 7 illustrates a series of prior baffles 25 in a row arranged in an alternating longitudinal and transverse sequence on a series of channels 24' supported by a bar 20, with a light L above the grid. The depth of each baffle, compared with its spacing, is such that the rays 41 from light L which are flatter than a selected angle, such as 45°, will be diffused by striking the baffles. The steeper rays 42 extend downwardly through limited portions of the grid, but such rays are not objectionable from a glare viewpoint.

FIG. 8 illustrates a prior or conventional array of baffles 25 in longitudinal and transverse rows, with the baffles in each row being oriented alternatively, longitudinally and transversely. The channels 24', and the light L which is above the baffles, are shown as broken lines and in a conventional transverse array. Because it is necessary to turn the baffles in each row to a common alignment with their channel for cleaning, the width of each baffle must be less than the spacing S between them to prevent lapping. This results in the gap

39, as appears in FIG. 5. Moreover, this limited baffle width, less than spacing S, results in a spaced slit between the edges of adjacent rows of baffles, which is visible as an undesirable light leak by rays 43 from the light L heretofore mentioned.

FIG. 9 illustrates the baffle arrangement of this invention, as shown in FIGS. 1-6, but on a slightly larger scale than the comparative arrangement shown in FIG. 8. In FIG. 9, the baffles 25 are orthogonal, that is, in longitudinal and transverse rows and columns. The sequence of baffles in each row and column are oriented alternatively at right angles to each other. The channels 24, shown in broken lines, are diagonal with respect to the room, as heretofore described. To align the baffles with a channel, they are turned 45° from their normal arrangement when they are to be cleaned. Hence, the diagonal spacing D of FIG. 9, between the baffles along a channel, is greater than the orthogonal spacing S between the channels along a row or column by the ratio of  $\sqrt{2}/1$ . Since the maximum width of a baffle can approach the diagonal spacing D and be more than the orthogonal spacing S, the comparative width of the baffles, as in FIG. 9, may be substantially greater than that illustrated in FIG. 8. Accordingly, the baffles can be easily proportioned so that, in light intercepting position, their edges lap sufficiently to prevent light leaks not only from light rays 41 normal to the baffles, but also from light rays in other directions, and light rays 43 of FIG. 8, which would not be intercepted by the baffles of FIG. 8.

In the alternative construction shown in FIG. 11, the channels 20' are perpendicular to the sides of the room, so that the baffles 25', in the light intercepting position shown, will be disposed angularly to the room walls, such as at 45°. Similarly to the construction previously described, baffles 25' are mounted on channels 24', which are parallel to the sides of the room and are supported by bars 20' which, in turn, are supported by suspension rods 22 connecting with the bars by clips 23, the same as heretofore described. The channels 24' are carried by the bars 20' in spaced parallelism and at a regular spacing, being constructed in the manner heretofore described, except that the channels 24' may extend through an intermediate bar 20', as shown, and terminate at a bar 20' at either end of the room or either end of the grid, if not coterminous with the room.

The baffles 25' are spaced along the channels 24' and secured thereto by holding rings 33', as in FIG. 12. Each baffle 25', as in FIGS. 13 and 14, is constructed essentially the same as heretofore described, with the exception that indexing hole 36' may be octagonally pointed, as shown, to correspond to a composite of openings 36 and 36a of FIG. 6, heretofore described. This enables the baffles to be turned in either direction to a selected diagonal which will be 45° from the alignment of the transversely disposed channels, but to a position in alignment with the corresponding channel 24', for cleaning purposes. Thus, a baffle 25' as shown in FIG. 13, is formed as a flat sheet having a folded flange 34' at one side and a lug 37' at the other side, wherein the opening 36' is located, as in FIG. 14.

FIG. 10 illustrates the baffle arrangement shown in FIG. 11. In this arrangement, the baffles 25' are in diagonal rows, while the channels 24' are transverse to the room, as shown in broken lines. Otherwise, the arrangement is similar to that shown in FIG. 9. Thus, it will be noted that the spacing D of the baffles along the channels is greater than the spacing S between baffles

in the diagonal rows, by the ratio of about  $\sqrt{2}/1$  when the baffles are at 45° to the channels.

An alternative baffle, shown in FIG. 15 and adapted to be substituted for the baffles 25' of FIG. 11 or the baffles 25 of FIG. 1, is a composite baffle, having a flat, sheetlike body 44 formed from a colored sheet of plastic or the like. This body carries a hook 45, as of metal, secured to the top of the sheet by a rivet 46. This hook has a depending leg for attachment at rivet 46 and an offset structure with a flat top in which is a centrally located, octagonally pointed hole 36', for cooperation with a clip 33 of FIG. 1 or a clip 33' of FIG. 11, so that the top of the baffle may be affixed to and optionally rotated below a channel 24 or 24', the same as heretofore described.

In connection with the baffles 44 which, as indicated above, may be formed of a colored sheet of plastic or the like, it will be noted that, when a series of baffles 44 are mounted in an arrangement, such as the baffles 25 of FIG. 1 or the baffles 25' of FIG. 11, various baffles may be formed of different colors, so that the overlapping portions of the baffles will generally show a different color, particularly when the colored baffles are translucent rather than opaque. Thus, with alternating baffles or rows of baffles formed of red and blue, the light will illuminate the overlapping areas to form a purple color. Other color combinations can, of course, be utilized. Also, different colored baffles may be utilized, either translucent or opaque, in a design or pattern, such as similar to a mosaic.

A further advantage of the octagonal, pointed indexing holes 36' is that the baffles may not only be turned to or from the diagonal positions of FIGS. 10 and 11, but also to the 0° and 90° positions of FIGS. 7 and 8. Thus, a baffle provided with the indexing hole 36' may be utilized in the prior art structure of FIGS. 7 and 8, with the advantage that such baffles may be used in either the prior art structure or in the structure of the present invention.

In connection with the baffle arrangement shown in FIGS. 9 and 10, the angular and diagonal relationship of the baffles to their supports, such as channels 24 or 24', has been described above. However, it will be noted that the baffles are also arranged in parallel rows, with the rows of FIG. 9 being lengthwise of the room and the rows of FIG. 10 being diagonal to the room. Considering the rows of baffles which appear vertically in FIG. 9, with one of the baffles in each row being identified as  $r_1$ ,  $r_2$  and  $r_3$ , respectively, it will be noted that the baffles in each row are alternately perpendicular to each other in the same row and also that each baffle in one row is perpendicular to an opposite baffle in an adjacent row. The baffles of the diagonal rows of FIG. 10 have a similar relationship. In order to provide an overlapping relationship of one baffle with the adjacent but parallel baffle in the next row, the width of the baffles 25 should be greater than the center to center distance of adjacent baffles in the same row, and also greater than the center to center distance between rows. For a similar overlapping relationship, the same relationship exists for the width of the baffles of FIG. 10. It will be noted that, in the prior art illustrated in FIG. 8, the width of the baffles is slightly less than the center to center distance between adjacent baffles in the same row, but approximately the same or slightly less than the center to center distance between rows. As will be recognized, the ability to provide baffles having

a width greater than the center to center distance between baffles in the same row and also between the above rows, with the baffles in the operative positions illustrated in FIGS. 9 and 10, is provided by the angular relationship of the baffles to their supports. It will be understood that, instead of being supported by the channels 24 or 24', the baffles could be supported by a flat, highly translucent or transparent plate which permits the light to shine through with the baffles mounted at their centers in the same relative position as they are mounted on the channels 24 or 24'.

I have now described my invention in considerable detail. However, it will be evident that others skilled in the art can build and devise alternate and equivalent constructions which are nevertheless within the spirit and scope of my invention.

What is claimed is:

1. An illuminator grid adapted to be disposed beneath a source of light to intercept direct light rays disposed at less than a predetermined angle to the horizontal, comprising:
  - a substantially horizontal array of substantially parallel and substantially equally spaced supports;
  - a series of baffles depending from said supports at substantially equally spaced positions along each support and in interspaced positions on adjacent supports;
  - means connecting each baffle with the corresponding support to permit each baffle to be turned on the corresponding support to an aligned position and to a position angular to the support, with baffles on alternating supports being oppositely inclined to the baffles on the supports therebetween;
  - the width of said baffles being less than the center to center spacing of said baffles on the corresponding support; and
  - the width of said baffles being greater than the center to center distance between said supports.
2. An illuminator grid as defined in claim 1, wherein: said means connecting each baffle with the corresponding support is constructed and arranged to hold said baffles in a shifted position of alignment with said support and a shifted position of 45° with respect to said support.
3. An illuminator grid as defined in claim 2, including:
  - a resilient device for attaching each said baffle to its support; and
  - generally registering openings in said support and a portion of said baffle for receiving said resilient device.
4. An illuminator grid as defined in claim 3, wherein said generally registering openings include:
  - a slot in said support; and
  - an opening in a portion of said baffle generally perpendicular to the remainder of said baffle.
5. An illuminator grid as defined in claim 4, wherein said portion of said baffle comprises:
  - an integral, normally upper first portion of said baffle but perpendicular to the remainder of said baffle; and
  - a second integral portion coplanar with said first portion but severed from said baffle adjacent said first portion.
6. An illuminator grid as defined in claim 1, including:

a resilient device for attaching each said baffle to its support;

generally registering openings for receiving said resilient device including a slot in said support and an opening in a portion of said baffle generally perpendicular to the remainder of said baffle; and said baffle opening is generally rectangular but is inclined in opposite directions for baffles attached to alternate supports.

7. An illuminator grid as defined in claim 1, including:

a resilient device for attaching each said baffle to its support;

generally registering openings for receiving said resilient device including a slot in said support and an opening in a portion of said baffle generally perpendicular to the remainder of said baffle; and said baffle opening is generally octagonally pointed, to engage opposite sides of said resilient device to hold said baffle in alignment with and at a plurality of selected angular positions with respect to said support.

8. An illuminator grid adapted to be disposed beneath a source of light to intercept direct light rays disposed at less than a predetermined angle to the horizontal, comprising:

a series of baffles extending in the same direction away from said light source;

means for turnably supporting said baffles for movement to two positions in the first of which said baffles are disposed in generally perpendicular relation in each row and in adjacent rows, and in the second of which said baffles are in alignment in parallel rows angular to the rows of said first position; in said first position, the width of said baffles being greater than the center to center distance between adjacent baffles of the same row and also greater than the center to center distance between said rows; and

in said second position, the width of said baffles is less than the center to center spacing of said baffles in the same row.

9. An illuminator grid as defined in claim 8, wherein: said supporting means permits said baffles to be shifted to positions in alignment in a second series of rows disposed at an acute angle to said first mentioned rows.

10. An illuminator grid as defined in claim 9, wherein said second series of rows are disposed at about 45° to said first mentioned rows.

11. An illuminator grid as defined in claim 1, wherein said baffle comprises:

a flat, sheet-like first member having a predetermined width and height;

means connected to said first member providing a second member generally perpendicular to said first member and disposed at one end thereof; and an opening in said second member having a generally octagonally pointed configuration.

12. An illuminator grid as defined in claim 11, wherein:

said second member is integral with said first member and comprises a bent over portion of said end of said first member carrying in coplanar relation therewith a lug severed from said first member immediately adjacent said second member.

13. An illuminator grid as defined in claim 11,  
wherein:  
said first member and said second member are  
formed of different material; and  
said second member is attached to said first member 5  
by an extension of said second member.

14. An illuminator grid as defined in claim 13,  
wherein:  
said first member is formed of plastic; and  
said second member is formed of metal.  
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