

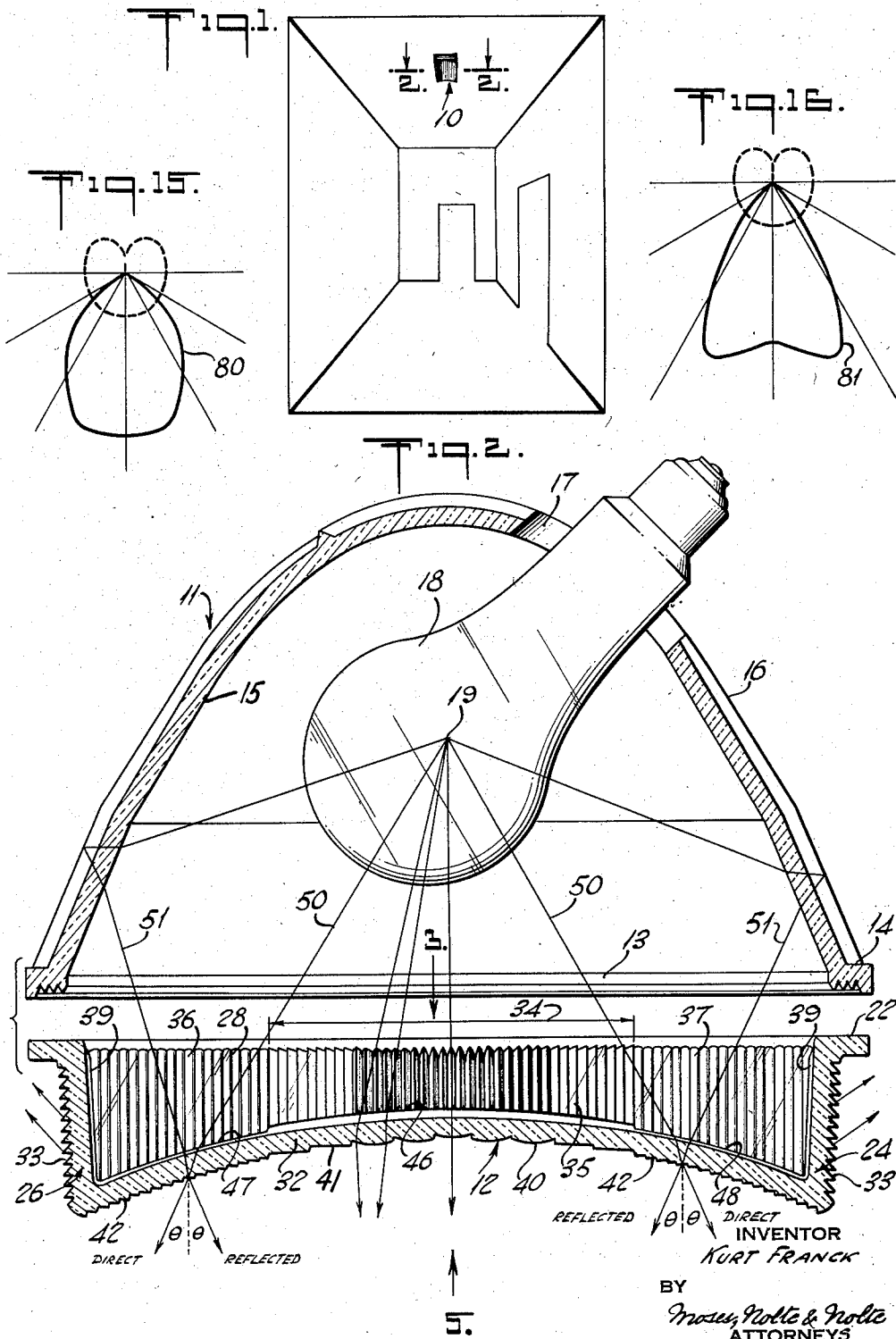
May 19, 1959

K. FRANCK
CEILING LAMINAIRE

2,887,568

Filed Feb. 26, 1957

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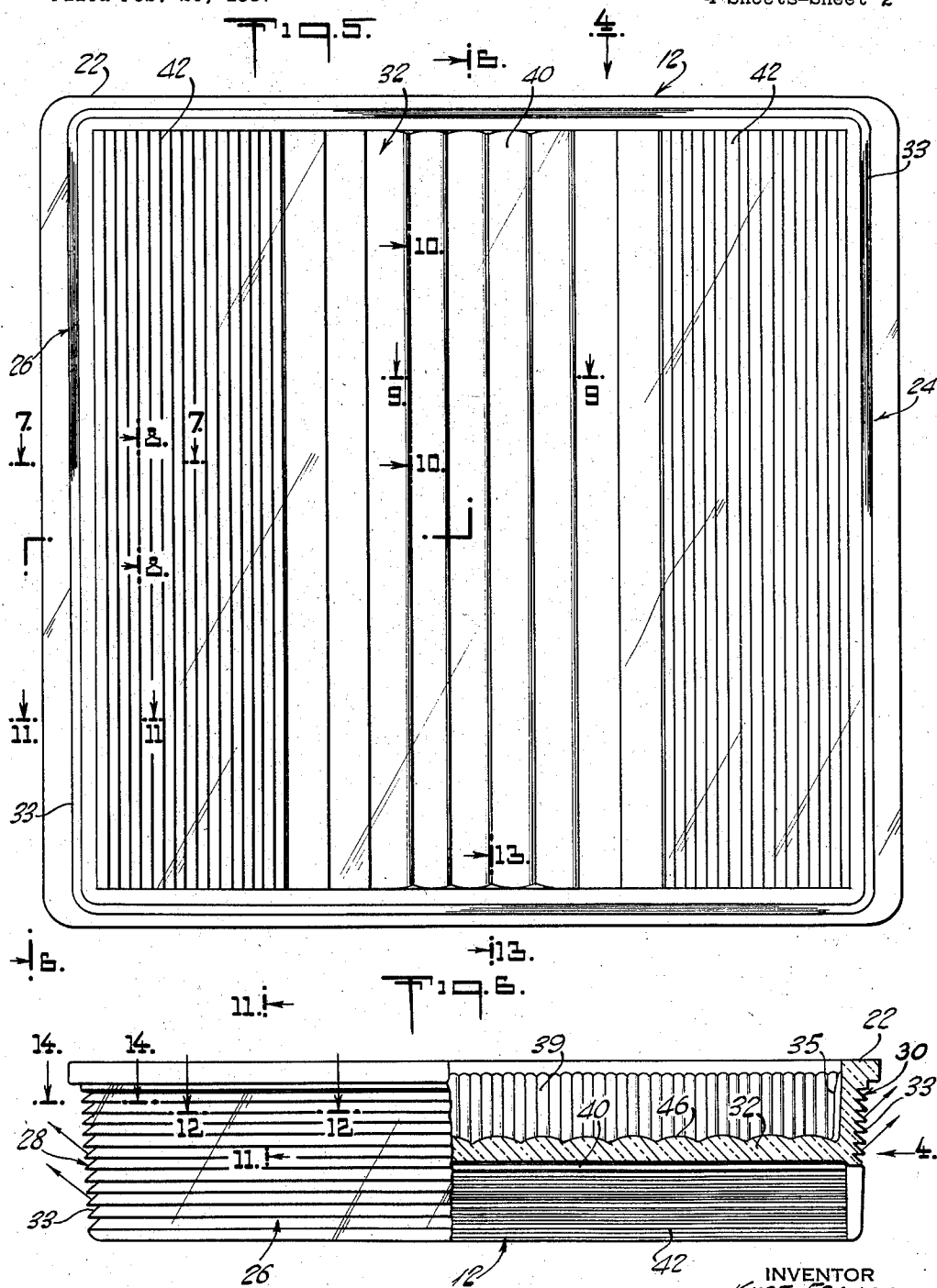
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4 Sheets-Sheet 2



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May 19, 1959.

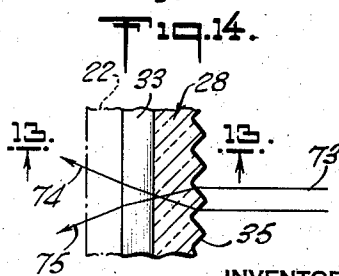
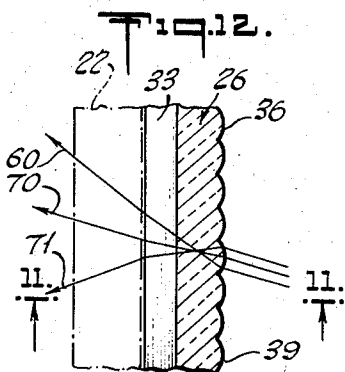
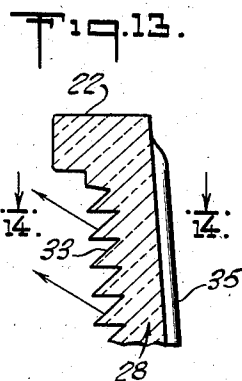
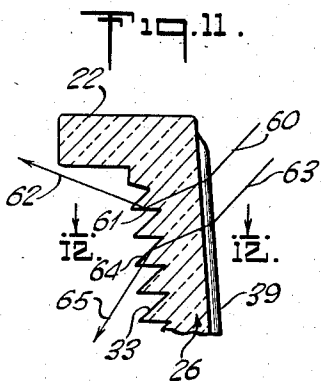
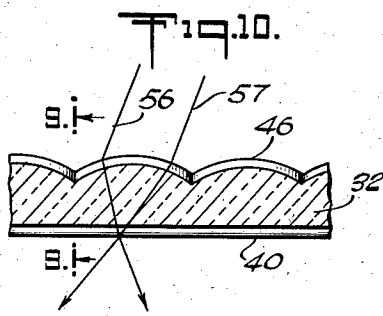
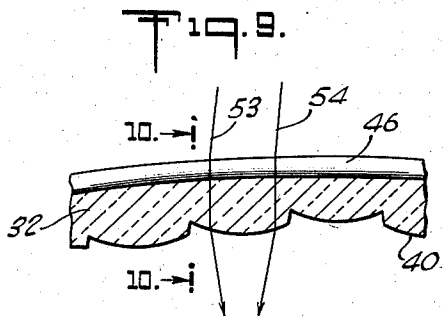
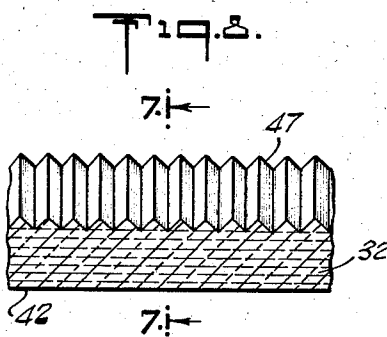
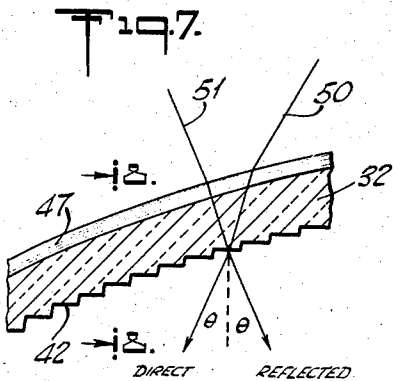
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CEILING LAMINAIRE

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4 Sheets-Sheet 4



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2,887,568

CEILING LUMINAIRE

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Application February 26, 1957, Serial No. 642,410

20 Claims. (Cl. 240—93)

This invention relates to luminaires and more specifically to a ceiling luminaire that is useful among other things for lighting hallways, corridors and the like.

In the design and construction of luminaires, particularly for corridor applications, it has been found desirable to produce in addition to normal floor illumination, substantially uniform illumination throughout the corridor, increased illumination of the junction of the floor and wall and the elimination of objectionable glare zones. These ends have been attained with this invention through a novel and improved design and arrangement of elements that provides for selective light distribution to uniformly light the corridor. At the same time the floor illumination is controlled so that proper spacing of the luminaires will produce substantially uniform floor illumination through the length of the corridor.

Another object of the invention resides in the provision of a new and improved reflector and lens combination wherein the lens functions to handle reflected and direct light rays to produce the desired light distribution.

Another object of the invention is to cause some of the light to be directed upwardly toward the ceiling and some of the light to be directed downwardly toward the walls and floor by subjecting a portion of the light to horizontal light splitting prisms.

Still another object of the invention is a novel and improved lens or refractor for luminaires that is particularly useful for corridor lighting to produce an elongated light distribution pattern on both the floor and ceiling and without objectionable glare spots.

A further object of the invention is a novel and improved luminaire.

The above and other objects and advantages of the invention will become more apparent from the following description and accompanying drawings forming part of this application.

In the drawings:

Fig. 1 is a perspective view of a corridor with a luminaire in accordance with the invention disposed in the ceiling thereof.

Fig. 2 is a cross sectional view of the luminaires in accordance with the invention and taken along the line 2—2 of Fig. 1;

Fig. 3 is a top plan view of the lens of Fig. 2 taken in the direction of the arrow 3;

Fig. 4 is an end view of the lens taken in the direction of arrow 4 of Fig. 3;

Fig. 5 is a bottom view of the lens of Figs. 2, 3 and 4 taken in the direction of arrow 5 of Fig. 2;

Fig. 6 is a cross sectional view of the lens in accordance with the invention taken along the line 6—6 of Figs. 3 and 5;

Fig. 7 is a cross sectional view of the lens taken along the line 7—7 of Figs. 3, 5 and 8;

Fig. 8 is a cross sectional view of the lens taken along the line 8—8 of Figs. 3, 5 and 7;

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Fig. 9 is a cross section view of the lens taken along the line 9—9 of Figs. 3, 5 and 10;

Fig. 10 is a cross sectional view of the lens taken along the line 10—10 of Figs. 3, 5 and 9;

Fig. 11 is a cross sectional view of Figs. 3, 5, 6 and 12 taken along the line 11—11 thereof;

Fig. 12 is a cross sectional view taken along the line 12—12 of Figs. 4, 6 and 11;

Fig. 13 is a cross sectional view of Figs. 3, 4, 5 and 14 taken along the line 13—13 thereof;

Fig. 14 is a cross sectional view of the lens taken along the line 14—14 of Figs. 3, 6 and 13; and

Figs. 15 and 16 are light distribution patterns of the lens and reflector of Figs. 1 and 2.

The luminaire is particularly suited for mounting in the ceiling of long rooms or corridors with the axis of the luminaire 10 extending lengthwise of the room or corridor as shown in Fig. 1. The luminaire consists of a reflector 11 and a lens 12. Reflector 11 has a suitable contour and a horizontal open mouth 13 of substantially square outline. The reflector is provided with an outwardly extending flange 14 forming the bottom rim thereof. The inner surface 15 of the reflector is smooth while the outer surface is provided with prisms 16 extending over the reflector in substantially vertical directions. An opening 17 is formed near the top of the reflector for receiving a suitable lamp 18, which may be an incandescent lamp having a light center 19 at a substantial distance above the mouth of the reflector.

The lens 13 fits over the mouth of the reflector and is adapted to be fastened thereto by suitable fastening means which are not shown. The lens has an upper outwardly extending flange 22 conforming to and adapted to be mounted adjacent flange 14 of the reflector. A pair of side panels 24 and 26 and a pair of end panels 28 and 30 extend vertically from an upwardly concave bottom plate 32. Plate 32 is generally cylindrical with the axis of the cylinder lengthwise of the corridor. The outer faces of the side panels and the end panels have horizontally extending prisms 33 over substantially the entire area thereof. The central portions 34 of the inner faces of the end panels have vertically extending light splitting prisms 35 as shown in Figs. 2, 13 and 14, for deflecting the light laterally out of the normal line of sight of an observer, as indicated by arrows 27 in Fig. 3. On either side of the central portion 34, the inner faces of end panels 28 and 30 are provided with vertical flutes 36 and 37 for spreading the light crosswise of the corridor. The inner surfaces of side panels 24 and 26 are provided with light diffusing means preferably in the form of vertical flutes 39, as shown in Figs. 11 and 12. The vertical prisms and flutes aid the horizontal prisms 33 in producing a smooth distribution of light on the ceiling.

The central portion 34 of the outer or lower face of bottom plate 32 has a plurality of prismatic surfaces including flutes 40 and prisms 41 extending lengthwise. The rather large prisms 40 serve to spread the light crosswise slightly, giving an even glow to the central section of the lens. On either side of the central section 34, the bottom of plate 32 is provided with lengthwise prisms 42 which direct the light downwardly toward the corners formed by the walls and the floor. The upper side of plate 32 is provided with crosswise flutes or double acting prisms 46 which spread the light along the corridor. The prisms 46 cover the entire central portion of the upper surface of plate 32. On either side of the flutes or prisms 46 the upper surface of plate 32 is provided with crosswise prisms 47 and 48, which are double acting prisms for spreading the light along the corridor. Prisms 47 and 48 are formed so as to spread the light more than the light is spread by the

central flutes 46, this being permissible because the prisms 47 and 48 are not in the normal field of vision.

The various elements of the lens are illustrated particularly in Figs. 7 to 14. Referring to Fig. 7, direct light 50 and reflected light 51 reach the prisms 42 on the lower side of bottom plate 32. Prisms 42 are arranged so that the direct and reflected rays emerge at equal angles with respect to the vertical, the angles being chosen so that the light will be directed toward the corners formed by the walls and the floor, in order to emphasize the junction of the floor and the walls. It will be seen from Figs. 2 and 7 that the reflected rays 51 will be directed across the median plane of the lens, toward the junction of the floor and the wall on the far side, while the direct rays 50 will travel toward the junction of the floor and the wall on the near side. In other words, the direct rays emerging from prisms 42 on one side of the lens and the reflected light emerging from prisms 42 on the other side of the lens are substantially parallel. The wide prisms 40 on the central portion 34 of the lower side of bottom plate 32 refract direct rays 53 and 54 slightly, so as to spread the light crosswise evenly over the floor. Rays 53 and 54 emerge from prisms 40 at slight angles to the vertical.

The centrally located flutes 46 on the upper central portion of bottom plate 32 serve as double acting light spreading prisms. Incident rays 56, 57, Fig. 10 emerge as rays 58, 59 forming a substantial angle with the vertical, so that the light is spread lengthwise down the corridor. The prisms 47 and 48 illustrated in Fig. 8 act similarly to prisms 46 previously mentioned. Prisms 47 and 48 produce a greater amount of refraction in order to effect a greater spreading of the light up and down the corridor than prisms 46.

The horizontally extending prisms 33 on the outside of the side panel 26 are shown in Fig. 11 and the same prisms on the end wall 28 are shown in Fig. 13. A light ray 60 reflected from surface 61 of prisms 33 will be directed upwardly toward the ceiling as indicated by the rays 62 in Fig. 11. A light ray 63 impinging on an inclined surface 64 of prisms 33 will be directed downwardly as indicated by the ray 65. The side panels 24 and 26 will therefore send a portion of the light upward above the horizontal to illuminate the ceiling and will deflect other rays downward along the wall. The end panels 28 and 30 likewise serve to elevate light for the illumination of the ceiling and to direct light downwardly along the corridor.

The insides of side panels 24 and 26 may have vertical flutes 39 over their entire surfaces. The flutes 39 serve to diverge incident rays 68, Fig. 12, in the directions 69, 70 and 71, thereby spreading the light laterally along the walls of the corridor. The double acting vertical prisms 35 in the central portion of the inner sides of end panels 28 and 30 are shown in detail in Fig. 14. Incident rays 73 will be deflected by prisms 35 in the direction 74 and 75 to produce a lateral spreading of the light crosswise of the corridor.

The light distribution obtained by the luminaire herein shown and described is illustrated in Figs. 15 and 16. Curve 80 shows the vertical light distribution along the corridor, while curve 81 shows the vertical light distribution across the corridor. The light distribution of the lamp itself is shown by the dashed curves. It can be seen from curve 80 that a considerable amount of light is transmitted lengthwise of the corridor at relatively high angles. Curve 81 shows a fairly even light distribution is obtained over angles of plus and minus 20° and that a substantial amount of light is transmitted at higher angles for the illumination of the walls.

I have described what I believe to be the best embodiment of my invention. I do not wish, however, to be confined to the embodiment shown, but what I desire to cover by Letters Patent is set forth in the appended claims:

I claim:

1. A lens for a ceiling luminaire for lighting a corridor consisting of a bottom plate and substantially vertical end panels and substantially vertical side panels, said bottom plate having an upwardly concave cylindrical cross section with the axis of the cylinder adapted to extend longitudinally of the corridor, horizontal light elevating prisms on one face of said panels, the bottom plate having lengthwise prisms on a central section of one face thereof for spreading the light crosswise of the corridor, the other face of said bottom plate having crosswise prisms to spread the light along the corridor.
2. A lens according to claim 1, including lengthwise prisms on either side of said central section of the bottom plate arranged to direct light towards the corners between the walls and the floor of the corridor.
3. A lens according to claim 1, wherein said lengthwise prisms on the central section of the bottom plate include lengthwise flutes for directing light downwardly.
4. A lens according to claim 1, including vertical prisms on the other face of the end panels for refracting light laterally out of the normal viewing angle of an observer.
5. A lens according to claim 1, wherein said end panels have diffusing means on the other faces thereof.
6. A lens according to claim 1, wherein said side panels include light spreading vertical flutes on the inner faces thereof.
7. A lens for a ceiling luminaire consisting of a bottom plate and two substantially vertical end panels and two substantially vertical side panels, said bottom plate having an upwardly concave cylindrical cross section, horizontal light elevating prisms on the outside of said end panels and side panels, the bottom plate having in its central section lengthwise prisms parallel to the axis thereof on one face thereof for spreading the light crosswise.
8. A rectangular lens for a ceiling luminaire for lighting a corridor consisting of a bottom plate and two substantially vertical end panels and two substantially vertical side panels, said bottom plate having an upwardly concave cylindrical cross section with the axis of the cylinder adapted to extend longitudinally of the corridor, horizontal light elevating prisms on the outside of the said end and side panels, said light elevating prisms having a reflecting surface for redirecting light upwardly, said bottom plate having crosswise prisms to spread the light along the corridor.
9. A rectangular lens for a ceiling luminaire for lighting a corridor consisting of a bottom plate and two substantially vertical end panels and two substantially vertical side panels, said bottom plate having an upwardly concave cylindrical cross section with the axis of the cylinder extending longitudinally of the corridor, the end panels having a central section having vertical light splitting prisms on the inside thereof for refracting light out of the normal viewing angle of an observer in the corridor, horizontal light elevating prisms on the outside of said end panels and side panels, said end panels having light diffusing vertical flutes on either side of said central section, the bottom plate having lengthwise prisms on a central section of the outside thereof for spreading the light crosswise of the corridor and lengthwise prisms on either side of said last mentioned central section arranged to direct light both across and away from the vertical median plane of the bottom plate towards the corners between the side walls and the floor of the corridor, the inside of said bottom plate having crosswise prisms to spread the light along the corridor.
10. A ceiling luminaire for lighting a long corridor or the like comprising a downwardly directed reflector having an open rectangular mouth in a horizontal plane, a substantially point light source above the plane of said mouth, a refracting lens of corresponding rectangular outline, and means for mounting said lens below the

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mouth of said reflector, said lens consisting of a bottom plate and two substantially vertical end panels and two substantially vertical side panels, said bottom plate having an upwardly concave cylindrical cross section with the axis of the cylinder extending longitudinally of the corridor, the end panels having a central section having vertical light splitting prisms on the inside thereof for refracting light out of the normal viewing angle of an observer in the corridor, horizontal light splitting prisms on the outside of said panels for redirecting a portion of the light above the horizontal and a portion of the light below the horizontal, said bottom plate having on one side prisms extending crosswise thereof to spread the light along the corridor.

11. A luminaire according to claim 10, wherein said end panels having diffusing means on their inner faces on either side of the central section.

12. A luminaire according to claim 10, wherein the bottom plate includes prisms on its other side extending lengthwise thereof for spreading the light crosswise of the corridor.

13. A luminaire according to claim 12, wherein said lengthwise prisms occupy a central longitudinal portion on said other side and the remainder of said other side includes lengthwise prisms formed so as to refract reflected light across the vertical median plane of the lens toward the corners of the floor and walls.

14. A luminaire according to claim 13, wherein said last mentioned prisms on one side of the central portion refract direct light at substantially the same angle as the reflected light is refracted by the prisms on the opposite side of the central portion.

15. A ceiling luminaire for lighting a long corridor or the like comprising a downwardly directed prismatic reflector having an open square horizontal mouth, a substantially point light source above the plane of said mouth, a refracting lens of square outline, and means for mounting said lens below the mouth of said reflector, said lens consisting of a bottom plate and two substantially vertical end panels and two substantially vertical side panels, said bottom plate having an upwardly concave cylindrical cross section with the axis of the cylinder extending longitudinally of the corridor, the end panels having a central section having vertical light splitting prisms on the inside thereof for refracting light out of the normal viewing angle of an observer in the corridor, horizontal light elevating prisms on the outside of said side and end panels for refracting a portion of the light above the horizontal, said end panels having on their inside light diffusing vertical flutes on either side of said central section, the bottom plate having lengthwise prisms on a central section of the outside thereof for spreading the light crosswise of the corridor and lengthwise prisms on either side of said last mentioned central section arranged to direct light towards the corners between the walls and the floor of the corridor, the inside of said bottom plate having crosswise prisms to spread the light along the corridor.

16. A lens for a ceiling luminaire for a corridor or the like consisting of a bottom plate and substantially vertical end panels and substantially vertical side panels, horizontal light splitting prisms on one face of said panels, the bottom plate having parallel light splitting prisms on a wide central section of one face thereof for spreading the light crosswise of the corridor and lengthwise prisms on narrower sections on either side of said central section

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of the bottom plate arranged to direct light towards the corners between the walls and the floor of the corridor, the other face of said bottom plate having crosswise prisms to spread the light along the corridor.

17. A lens for a ceiling luminaire for lighting a corridor consisting of a bottom plate and substantially vertical end panels and side panels, the end panels having vertical light splitting prisms on the inside thereof for refracting light out of the normal viewing angle of an observer in the corridor, horizontal light splitting prisms on the outside of said end panels and side panels, the bottom plate having lengthwise prisms on a central section of the outside thereof for spreading the light crosswise of the corridor and lengthwise prisms on either side of said last mentioned central section arranged to direct light towards the walls of the corridor, the inside of said bottom plate having crosswise prisms to spread the light along the corridor.

18. A ceiling luminaire for lighting a corridor or the like comprising a downwardly directed prismatic reflector having a horizontal mouth, means for locating a substantially point light source above the plane of said mouth, a refracting lens and means for mounting said lens below said reflector, said lens including a plate having an upwardly concave cylindrical cross section with the axis of the cylinder extending longitudinally of the corridor, the plate having lengthwise prisms on a central section of the outside thereof for spreading the light crosswise of the corridor and lengthwise prisms on either side of said central section arranged to direct light towards the corners between the walls and the floor of the corridor, the inside of said plate having crosswise prisms to spread the light along the corridor.

19. A refracting plate for a ceiling luminaire having an upwardly concave cylindrical cross section, the plate having prisms extending parallel to the axis of the cylindrical cross section on a central section of the outside of the plate for spreading the light crosswise of the axis and axially extending prisms on either side of said central section arranged to direct light in downward substantially parallel directions, the inside of said plate having prisms extending crosswise of the axis to spread the light in the directions of the axis.

20. A refracting plate of rectangular outline for horizontal mounting in a point light source ceiling luminaire, the plate having light splitting prisms extending parallel to an axis of the plate on a central section of the outside of the plate for spreading the light crosswise of the axis and prisms extending parallel to said axis on either side of said central section arranged to direct light in downward substantially parallel directions which are oblique to a vertical median plane through the axis, the inside of said plate having prisms extending crosswise of the axis to spread the light in the directions of the axis.

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