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54 Directional lamp shade.

57 A directional lamp shade having a hollow tubular body (10) to be fitted to light source (13) and having an open exit end. The length (14) of the body is chosen to prevent direct light passing through the open end outside a predetermined cone semi-angle (γ). The body has a plurality of baffles (15) in the form of annular disks which prevent an observer looking through the body open end from outside the light cone and seeing directly illuminated portions of the body inner surface. The inner edges of the disks are sharpened to minimise specular and diffuse reflections therefrom. The disks may be equally spaced.

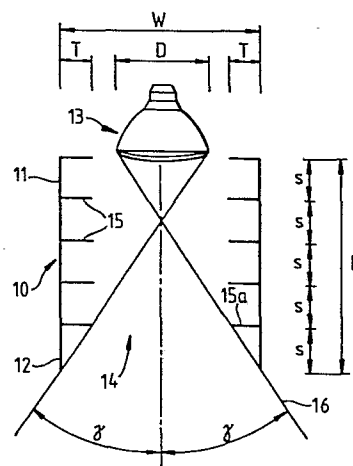


Fig. 2.

This invention relates to directional lamp shades for minimizing the light emitted from a source outside one general direction.

Overhead lighting (i.e. lighting from overhead luminaires) is used for the great majority of workplaces. Tasks such as reading and writing at a desk are often done with illumination provided solely by the overhead lighting system used for general room illumination. Sometimes it is advantageous to provide increased illumination in certain parts of the room; this may be done with local light sources such as desk or reading lamps or with a more directional type of luminaire (e.g. spotlamps) which for convenience may be mounted on a nearby wall or ceiling.

One environment where directional light sources are used is in air traffic control tower cabins. Light is required in such cabins for reading, writing, seeing instruments and operating controls and communication equipment. At night, the cabin operators need to be able to see the dim external scene without hindrance from the cabin lighting - either as disability glare or as reflections in the windows. Figure 1 of the accompanying drawings illustrates schematically the problem of luminaire reflection in a window. Windows in some flight control cabins and some other control centres slope outwards towards the top. This allows a better downwards view from close to the window, but objects in the upper part of the cabin interior can then cause unwanted images overlying the external field view around and above the horizontal direction. If those objects are moderately dark (as a result of dim illumination of poorly reflective surfaces), then the resulting images will be relatively faint. However, cabins with light coloured ceilings and unshielded luminaires (e.g. exposed fluorescent tubes) will tend to have relatively prominent images in their windows.

Other applications for directional light sources include aircraft carrier flying control cabins, ship's bridges, railway and crane control cabins and other situations where operators need panel or desk illumination with minimal degradation of their external view. Other applications for a spotlight with little off-axis illumination are for searchlights, landing lights, television and photographic studios, art galleries.

radar screen monitoring areas and intruder detection systems for example.

Projector-type spotlamps having an illuminated aperture which is imaged by an objective lens on a workplace are known. However, these devices are bulky and expensive and the objective lenses are visible from as much as 80 degrees from the axis. Stray light from multiple reflections and lens imperfections would render unshaded projectors unsuitable for flight control cabins for example. Addition of an effective shade would add substantially to their already excessive length.

More conventional methods for limiting off-axis illumination include the use of shades and louvre devices. Shades are usually cylindrical or conical in shape; and louvres can have linear, grid or cylindrical elements. The effectiveness of these is related to the light absorbing properties of the inner surfaces of the device. Even with materials having unusually small total reflectances (such as black flock paper and black velvet), as much as one per cent of the incident light may be reflected. A cylindrical shade with an inside lining of clean black flock paper has been found unacceptably bright for use in flight control cabins for example. Furthermore, black flock paper and black velvet are notoriously difficult to keep clean and deposits of airborne dust soon degrade the special light absorbing properties of that type of material.

It is an object of the present invention to provide a relatively simple lamp shade which is effective to provide illumination within a predetermined area whilst allowing very little light to reach outside that area.

According to the present invention there is provided a lamp shade for use with a light source and including a hollow tubular body arranged to be mounted over the light source, the body having an open exit and spaced from the light source for allowing a light cone to emerge from the body, the length of the body being predetermined so that no direct light ray paths from the light source through the open exit end lie outside a predetermined cone semi-angle, at least one baffle extending inwardly from the body and arranged so that no part of the inside surface of the body that is capable of direct illumination

by the light source can be seen through the exit end from a point located substantially outside the light cone.

The "length of the body" is the dimension in the general direction from the light source to the open exit end. Throughout this specification the word "cone" is to be interpreted broadly and includes generally right circular cones, elliptical cones, square and rectangular pyramidal illuminated areas and substantial sectors thereof. The "cone semi-angle" is defined as the maximum desired angle between an axis extending from the centre of the light source through the centre of the open exit end of the body and the direct light beam path emerging from the shade and diverging at the largest possible angle from that axis.

This geometry of the lamp shade is designed to prevent direct light from the source reaching outside the predetermined area and to prevent most light that has undergone only one specular or diffuse reflection within the shade from reaching outside the predetermined area.

In the preferred arrangement the body is generally cylindrical having an upper end for receiving the light source and a lower end defining the open exit end, the shade including a plurality of the baffles, each baffle being in the form of an annular disk having a central opening. In another arrangement the body is in the form of a truncated hemisphere with the light source arranged to be located in the largest diameter portion and the open exit end being provided in the smallest diameter portion, the shade including a plurality of baffles in the form of annular disks extending inwardly of the body, the spacing between the disks reducing towards the open exit end of the body.

The baffles may have sharp inner edges to minimise reflections therefrom. Accordingly the inner edges of the disks defining the central openings may be chamfered at both the upper and lower surfaces of the disks. Alternatively the inner edges of each disk defining the central opening may be turned upwardly towards the light source at an angle to the plane of the disk, the upper surface of the disk at the inner edges also being chamfered at an angle to the plane of the disk.

One possible embodiment of the present invention and some possible constructional variations will now be described



with reference to the accompanying drawings, in which:

Figure 1 is a schematic view of a work station adjacent a window illustrating the problem of luminaire reflection in the window,

Figure 2 is a schematic side sectional view of a lamp shade according to one embodiment of the present invention,

Figure 3 illustrates how the baffle spacings are determined,

Figure 4 illustrates a possible problem with reflections from the disk inner edges,

Figure 5 shows the limits of reflecting angles from the disk inner edges,

Figure 6 shows the umbral and penumbral regions of the light cone,

Figures 7 and 8 show two embodiments of sharpened disks,

Figure 9 shows a variation of the Figure 2 construction, and

Figure 10 shows a bottom plan view with a modified disk.

Referring to Figure 2, the lamp shade is for producing a right circular light cone and the body 10 is generally cylindrical having an upper end 11 for receiving the light source 13, the connection between the light source 13 and the upper end 11 preferably being light tight. If desired the upper end 11 may be provided with air vents (not shown) which allow cooling air flow over the source 13 but which provide a tortuous path for escape of light. The lower end 12 of the cylindrical body 10 defines the open exit end 14 and may be provided with a protective skirt of a resilient material such as neoprene to protect the shade and also to guard against a person being injured by the lower end 12 of the body 10.

The body 10 is preferably made of an opaque material such as metal or suitable plastics material.

The length H of the body 10, as mentioned above, is chosen to prevent direct light from the source 13 reaching areas outside the cone. A length of 180 mm and a diameter of 150 mm diameter used with a spotlight of 100 mm face diameter (yielding a cone semi-angle γ of about 35 degrees) was found to be an

acceptable compromise between several competing factors in a flight control cabin:- i.e., headroom required, extend, quantity and evenness or workspace illumination; and the cutoff angle between illuminated and shaded regions.

From an analysis of the work space requirements the length of the body 10 may be determined from the formula

$$H = \frac{W + D}{2 \tan \gamma} \quad (1)$$

where γ is the cone semi-angle, W is the body diameter, H is the body length and D is the lamp diameter.

A further characteristic of the shade pertains to stray light rays outside the cone semi-angle γ . These result from reflection and/or diffraction of source rays by the inner surface of the body 10. Because performance is inversely related to the amount of stray light, it is preferred for the inner surface of the body 10 to have a low total reflectance and it may be painted matt or gloss black. The total reflectance is preferably about 4 per cent or less.

The shade includes a plurality of baffles 15 which are provided to act as a light trap to minimise light having undergone a single specular or diffuse reflection from passing outside the desired light cone. The baffles 15 are in the form of annular disks having a constant radial width i.e., the difference between the outer disk diameter and the diameter of the circular opening in the disk. The disks 15 may be mounted to the cylindrical body 10 in any suitable manner. The disk 15a (Figure 2) nearest to the open end 14 is spaced from that end so that its inner edges just touch the light beam path 16 extending from the furthest part of the light source 13 and passing through the open end 14 at the cone semi-angle γ . Preferably the baffles 15 have a low total reflectance and may be painted like the inner surfaces of the body 10.

The disks 15 are equally spaced along the length of the body 10. For the cylindrical body 10 the spacing S between the inner edges of adjacent disks 15 is not more than that given by the formula:

$$S = \frac{TH}{W} \quad (2)$$

where T is the disk radial width, in order to prevent observation of rays which have undergone just one reflection (viz. reflection from the inner body surface only).

The minimum number of spacings, N, is found by evaluating W/T and rounding up to the next integer. Should that ratio be an integer, then

$$N = \frac{W}{T} \quad (3)$$

The number of disks 15 is then (N-1).

The formulae for the spacings and number of disks 15 are derived later.

The inner edges of the baffles(s) 15 are preferably arranged to reduce specular and diffuse reflections therefrom to areas outside the light cone which can arise as shown in Figure 4. For the cylindrical body 10, it may be convenient to form the annular baffles 15 from sheet material. In that case, the inner edge of each disk 15 comprises a cylindrical surface of short length so that reflections, both specular and diffuse, can emanate from those inner surfaces and as a result, light from the source 13 could be directed outside the cone semi-angle γ after just one reflection. Although only a small fraction of the total luminous flux could be so directed, the performance would nevertheless be degraded below that of ideal light traps (i.e., perfectly black baffles with optically sharp edges). The reflective effect may be reduced towards the limit set by diffraction if the internal edge of each disk 15 is machined or otherwise treated to reduce to or towards a sharp edge.

Accordingly, in one embodiment shown in Figure 7 the disk inner edges are sharpened, preferably by means of a chamfer or the like provided at both upper and lower surfaces 17, 18 of the disk 15. In the case of an annular disk 15 the angle α_1 of the chamfer face 19 at the upper surface 17 of the disk 15 (i.e. the surface closer to the light source 13) is smaller than the smallest angle β_1 of the path from disk inner edge through the open exit end 14 of the body 10 (Figure 5) and the angle α_2 of the chamfer face 20 at the disk lower surface 18 is smaller than the smallest angle β_2 of the path from the light source 13 to the edge of disk 15, all angles $\alpha_1, \alpha_2, \beta_1, \beta_2$

being measured relative to the plane of the disk 15. Using the geometrical analysis derived later, the following are upper limits for α_1 and α_2 for each disk 15;

$$\alpha_1 = \arctan \frac{n}{N} \left(\frac{H}{W-T} \right), \quad (4)$$

$$\text{and } \alpha_2 = \arctan \left(1 - \frac{n}{N} \right) \left(\frac{2H}{W-2T+D} \right), \quad (5)$$

where the disks are numbered

$n = 1, 2, \dots, (N-1)$ starting with the disk 15a nearest the open end 14 of the body 10.

In another embodiment (Figure 8) the inner part of each disk 15 is turned upwardly towards the light source 13 at an angle α_B (being less than or equal to the larger of α_1 and α_2) to the plane of the disk 15. The disk 15 is also chamfered by machining or otherwise treated to provide the angle α_S (being less than or equal to the smaller of α_1 and α_2). The angles α_B and α_S may be chosen in order to satisfy the requirements of more than one disk 15.

The light source 13 may be any suitable type such as a spotlight. The layout and orientation of the workplace, windows, observers, etc., will indicate the preferred values for the cone semi-angle, γ , and the total body length, H . The term $(2H \tan \gamma)$ can then be evaluated. For equation (1), this term should be equal to $(W+D)$, and therefore should be considered when seeking a suitable lamp.

Lamp characteristics - including directionality (illustrated by its intensity polar diagram), total output, suitability for dimming, availability and practicability - will further constrain the lamp choice. Of those eligible, the lamp with the smallest emitting face is preferably chosen as this will yield the most favourable ratio of umbral to penumbral regions exposed to direct illumination. Lamp diameter D , will then be known and so W may be calculated using equation (1). Should it not prove possible to find a suitable small lamp, a larger lamp and a longer shade (i.e., a larger value of H) may be considered.

The nature of the workspace and the liminaire position (e.g., the liminaire may be recessed) are further factors which

may determine the length H of the shade body 10.

After the iterative procedure above has identified the compromise which is most satisfactory to the designer, $\{H, W, D, Y\}$ will have been defined.

10 The number of spacings, N , or disks 15, $(N-1)$, will determine the disk width, T , and disk spacing, S , if equations (3) and (2) are used. Although more disks 15 would increase the umbral to penumbral ratio more manufacturing expense would be incurred. Moreover, because diffraction at each internal edge produces some stray light, the number of disks 15 also has to be a compromise between a large number for good geometrical efficacy as will be shown later and a small number for the smallest amount of stray light.

20 In the case of a flight control cabin the number of spacings, N , between four and ten was found suitable. In other cases, values near four or less may be a suitable compromise when minimising stray light is considered particularly important, or when a very low D/W ratio is used. Values near ten may be considered more suitable when a relatively large umbra is required.

Finally, equations (4) and (5) can be used to derive the upper limits for the angles on the inner edges of the disks 15. For ease of manufacture, some standardisation of disk edge angles may be preferred. This would result in the use of angles smaller than those calculated. Acute angled edges are preferably avoided because of their greater susceptibility to damage in manufacture and service, as well as the greater potential injury hazard if the edges are sharp.

30 To determine the maximum spacing, S , between adjacent disks 15 of the light trap, consider the geometry shown in Figure 3. Imagine a cylindrical body 10 initially with no disks 15. When to any given point on the inside surface of the cylinder, a ray is drawn from that point on the lamp face 2 which maximises the incident angle ϕ . A second line (to represent a ray diffusely reflected at a maximum value of the angle θ to an observer) is drawn just clear of the lower edge of the shade body 10 as shown. Opaque disks 15 of equal radial width T are then located so as to touch those lines. This will ensure that the region dimensioned S_1 cannot be illuminated directly by the source 13, and the region dimensioned S_2 is

40



always obscured from the observer's view.

From consideration of similar triangles containing the angle ϕ ,

$$\frac{S_1}{S_1 + Q} = \frac{T}{W/2 + D/2},$$

and therefore

$$S_1 = \frac{2TQ}{W + D - 2T} \quad (6)$$

From similar triangles containing the angle θ ,

$$\frac{S_2}{S_2 + P} = \frac{T}{W},$$

and because

$$S_2 + P = H - Q - S_1,$$

it follows that

$$S_2 = \frac{T}{W} (H - Q - S_1) \quad (7)$$

The maximum spacing between disks 15 which can still prevent observation of a single diffuse reflection is therefore S_1 plus S_2 . Using (6) and (7) this spacing, $S_{\max}$ is

$$S_{\max} = \frac{2TQ}{W + D - 2T} + \frac{T}{W} (H - Q - \frac{2TQ}{W + D - 2T})$$

which reduces to

$$S_{\max} = \frac{TH}{W} + \frac{TQ}{W} \frac{(W - D)}{(W + D - 2T)} \quad (8)$$

As the parameter Q varies through a series of values from zero for the uppermost disk 15, to $(H - S_1)$ for the disk 15 farthest from the lamp 13, the above formula indicates that $S_{\max}$ varies through a corresponding series of values from

$$\left(\frac{TH}{W}\right) \quad \text{to} \quad \left(\frac{2TH}{W+D}\right)$$

A constant spacing between disks may be desirable for

ease of manufacture and the spacing therefore should not exceed the smaller of these, viz.:

$$S = \frac{TH}{W} \quad (2)$$

The number of disks 15 is one fewer than the number of spacings, N, which is determined by the body length H, divided by the spacing between adjacent disks 15, and rounding up if necessary. Therefore if S is determined by equation (2),

$$\frac{W}{T} + 1 > N \geq \frac{W}{T} \quad (9)$$

When W/T is selected to be an integer,

$$N = \frac{W}{T} \quad (3)$$

Should the constant spacing be used, the disk farthest from the lamp will be closer to the shade rim than necessary. The cone semi-angle will then be determined by the location of the inner edge of that disk. The value for the cone semi-angle would then be

$$\gamma = \arctan \left\{ \frac{(W+D-2T)}{2(H-S)} \right\} \quad (10)$$

which would be only a little smaller than the value given in equation (1) above.

The angles α_1 and α_2 of the sharpened disk edges and the angles β_1 and β_2 are shown in Figures 5 and 7 and can be determined geometrically as follows:

$$\tan \beta_1 = \frac{P}{W-T}$$

and

$$\tan \beta_2 = \frac{2(H-P)}{W-2T+D}$$

Because $P = nS$ where n is the disk number from the open end $n = 1$ to $(N-1)$ as shown in Figure 5, and using S from equation (2), the first of these becomes

$$\tan \beta_1 = \left(\frac{n}{W-T} \right) \left(\frac{TH}{W} \right)$$

Using equation (3), this reduces to

$$\tan \beta_1 = \frac{n}{N} \left(\frac{H}{W-T} \right), \quad (11)$$

and similarly

$$\tan \beta_2 = \left(1 - \frac{n}{N} \right) \left(\frac{2H}{W+D-2T} \right). \quad (12)$$

Figure 6 shows the outer edge of the illuminated penumbral region as defined by the cone semi-angle, γ . Concentric within that region is the umbral region which can be illuminated by the entire lamp face 2. Its boundary is defined by the angle ψ as shown.

For a given $\{H, W, \gamma, D\}$ the value of ψ can be altered somewhat by the choice of number, size and spacing of disks 15, but ψ cannot exceed γ . As an indicator of the relative sizes of cones, it is convenient to define the Penumbral Factor, η , as

$$\eta = \frac{\tan \psi}{\tan \gamma} \quad (13)$$

A relatively large value of η (approaching unity) would imply a relatively large umbra and a narrow penumbra; i.e. a sharp cutoff.

A zero value for η would imply a zero value for ψ ; i.e. the umbral region would be a cylinder centred on the lamp axis and with a diameter equal to the diameter of the lamp face 2. A negative value of η would imply a negative value of ψ which could only occur in practice if the outermost disk 15a had an internal diameter smaller than the diameter of the emitting face 2 of the lamp 13 and if the remaining disks had internal diameters which increased with decreasing distance from the lamp 13 so as to avoid vignetting of the extreme umbral rays. In the case of negative η , the umbral region of illumination extends only for a finite distance from the lamp 13, viz. to the distance where the extreme umbral rays intersect on the lamp axis. Absorption of useful light by the shade is greater as η tends towards negative values. The Penumbral Factor will therefore be an indication of the geometrical efficacy of the shade for a given cone semi-angle, γ .

As seen in Figure 6, the umbral cone has a semi-angle ψ , which is determined by

$$\tan \psi = \frac{\left(\frac{W}{2} - \frac{D}{2} - T \right)}{(H - S)} \quad (14)$$

The Penumbral Factor can be expanded using equations (10) and (14) to

$$\eta = \frac{W - D - 2T}{W + D - 2T}$$

and by using equation (2) in order to express T in terms of N it follows that

$$\eta = \frac{1 - \frac{D}{W} - \frac{2}{N}}{1 + \frac{D}{W} - \frac{2}{N}} \quad (15)$$

It is clear that larger values of N and smaller values of D/W are conducive to larger values of η . However the improvement in η for increasing N is progressively less (i.e. a diminishing return situation).

Numerous modifications and variations of the lamp shade construction of Figures 2 to 8 are possible. For example as shown in Figure 9, the diameter of each central opening in each disk 15 may be slightly larger than the diameter of the central opening of each disk 15 nearer to the light source 13. The inner edges need not be in a line from the light source 12 and, in fact, to minimise diffraction effects arising at the disk inner edges, the inner edges may define a diverging bell shape so that one line can be drawn from that edge to the lamp face and touching at most one other disk inner edge. The angle δ in Figure 9 being formed by a tangent to the bell shape at the lowermost disk 15a may be about 5° .

As shown in Figure 10, each disk 15 may be provided with a diametrically extending band 22 so that the cone semi-angle at right angles to the direction of the band 22 is less than the cone semi-angle in the general direction of the band 22. This will result in a generally elliptical light cone with the major axis along the line of the bands 22 and minor axis transverse to the bands. This shape of light cone may be desirable for some applications such as landing lights for military aircraft where reduced visibility from points

displaced laterally from the flight path may be desirable.

In an alternative embodiment to a cylindrical body 10, the body is in the form of a truncated hemisphere, with the light source arranged to be located in the largest diameter portion and the open exit end being provided in the smallest diameter portion, the shade including a plurality of baffles in the form of annular disks extending inwardly of the body. the spacing between the disks reducing towards the open exit end of the body. This arrangement may be useful in helicopter landing lights to reduce reflections in to the cockpit and reduce visibility of the helicopter from points outside the light cone. The hemispherical body is designed for use with existing helicopter landing light assemblies.

The construction of the shade has been described with reference to embodiments where no direct light and minimal singly reflected light reaches outside the predetermined light cone. However it would be appreciated that this may be a feature that is found desirable at only one side of the light, for example where only one window might provide unwanted reflections. Hence the present invention covers shades which prevent direct light and reduce reflected light reaching outside the light cone at one side only of the shade.

CLAIMS:

1. A lamp shade for use with a light source and including a hollow tubular body arranged to be mounted over the light source, the body having an open exit and spaced from the light source for allowing a light cone to emerge from the body, the length of the body being predetermined so that no direct light ray paths from the light source through the open exit end lie outside a predetermined cone semi-angle, at least one baffle extending inwardly from the body and arranged so that
10 no part of the inside surface of the body that is capable of direct illumination by the light source can be seen through the exit end from a point located substantially outside the light cone.
2. A lamp shade according to Claim 1 wherein the body is generally cylindrical having an upper end for receiving the light source and a lower end defining the open exit end, the shade including a plurality of the baffles, each baffle being in the form of an annular disk having a central opening.
3. A lamp shade according to Claim 2 wherein the disk
20 nearest the open exit end is spaced from that end so that the inner edges of its central opening just touch the light beam path extending from the furthest part of the light source and passing through the open exit end at the cone semi-angle.
4. A lamp shade according to Claim 2 wherein the spacing S between adjacent disks is not more than TH/W , where T is the disk radial width, H is the length of the cylindrical body from the light source to the open exit end, and W is the diameter of the cylindrical body.
5. A lamp shade according to Claim 2, 3 or 4 wherein the
30 disks are spaced at constant intervals along the body and the number of disks equals $(N-1)$, where N is the minimum number of spacings and is an integer equal to W/T or is the next highest integer above W/T , where W is the diameter of the cylindrical body and T is the disk radial width.
6. A lamp shade according to Claim 1 wherein the or each baffle has a sharp inner edge to minimise reflections therefrom.
7. A lamp shade according to Claim 6 wherein the or
40 each baffle is in the form of an annular disk with a central opening, the inner edges of the disk defining the central opening

being chamfered at both the upper and lower surfaces of the disk.

8. A lamp shade according to Claim 7 wherein the angle α_1 of the chamfer face at the upper surface of the disk is smaller than the smallest angle β_1 of the path from disk inner edge through the open exit end of the body, and the angle α_2 of chamfer face at the disk lower surface is smaller than the smallest angle β_2 of the path from the light source to the edge, all angles $\alpha_1, \alpha_2, \beta_1, \beta_2$ being measured relative to the plane of the disk.

9. A lamp shade according to Claim 6 wherein the body is generally cylindrical and the or each baffle is in the form of an annular disk with a central opening, the inner edges of the disk defining the central opening being turned upwardly towards the light source at an angle α_β to the plane of the disk, α_β being less than or equal to the larger of α_1 and α_2 , where

$$\alpha_1 = \arctan \frac{n}{N} \left(\frac{H}{W-T} \right) \text{ and}$$

$$\alpha_2 = \arctan \left(1 - \frac{n}{N} \right) \left(\frac{2H}{W-2T+D} \right)$$

where n is the disk number starting with the disk nearest the open exit end,

N is the number of disks plus 1,

H is the body length,

W is the body diameter,

T is the disk radial width, and

D is the light source diameter,

the upper surface of the disk at the inner edges being chamfered at an angle α_s to the plane of the disk, α_s being less than or equal to the smaller of α_1 and α_2 .

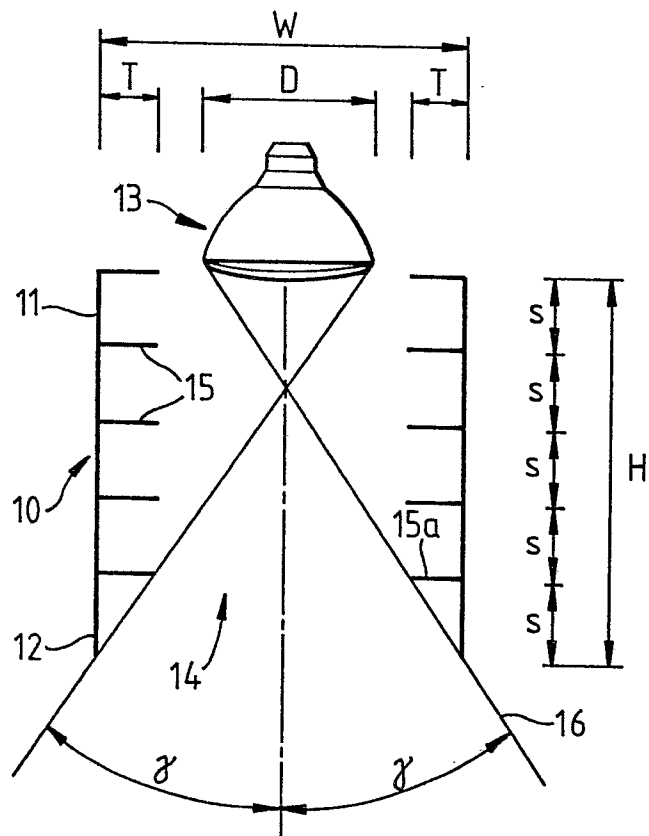
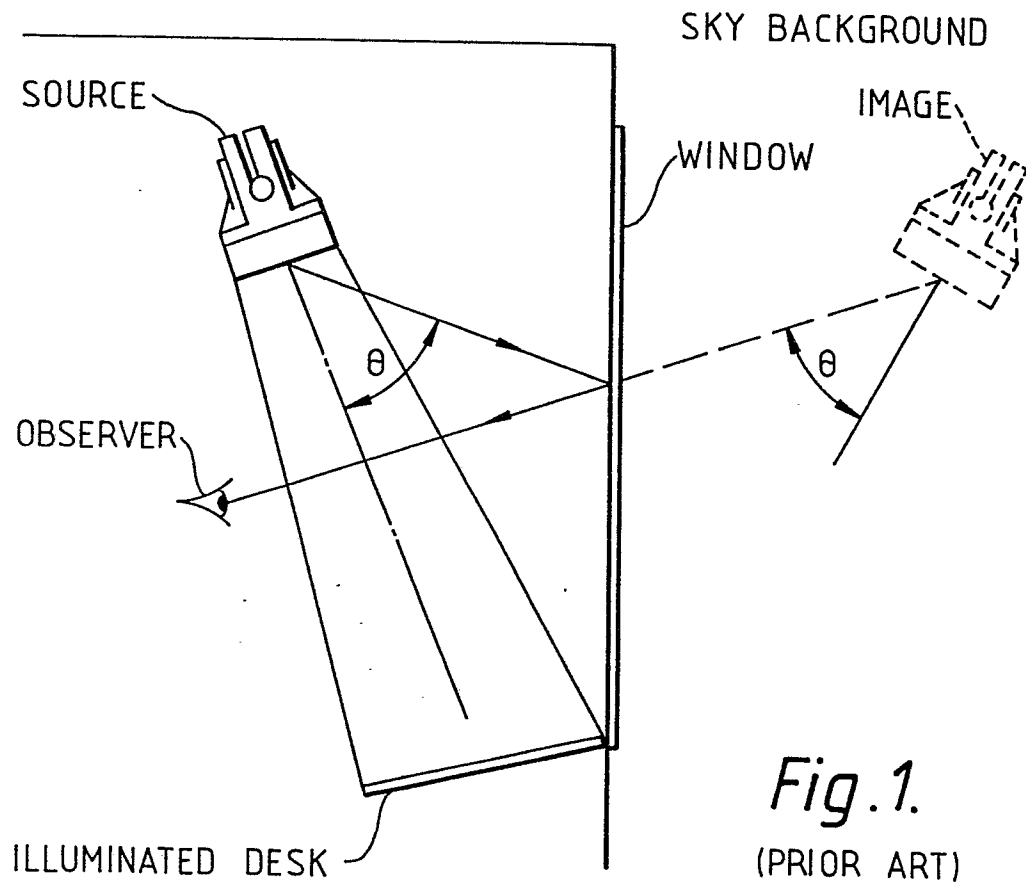
10. A lamp shade according to Claim 1 wherein the body is in the form of a truncated hemisphere with the light source arranged to be located in the largest diameter portion and the open exit end being provided in the smallest diameter portion, the shade including a plurality of baffles in the form of annular disks extending inwardly of the body, the spacing between the disks reducing towards the open exit end of the body.

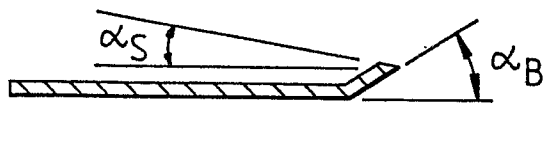
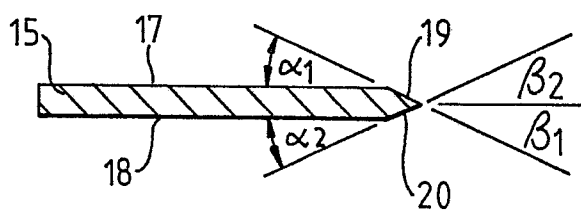
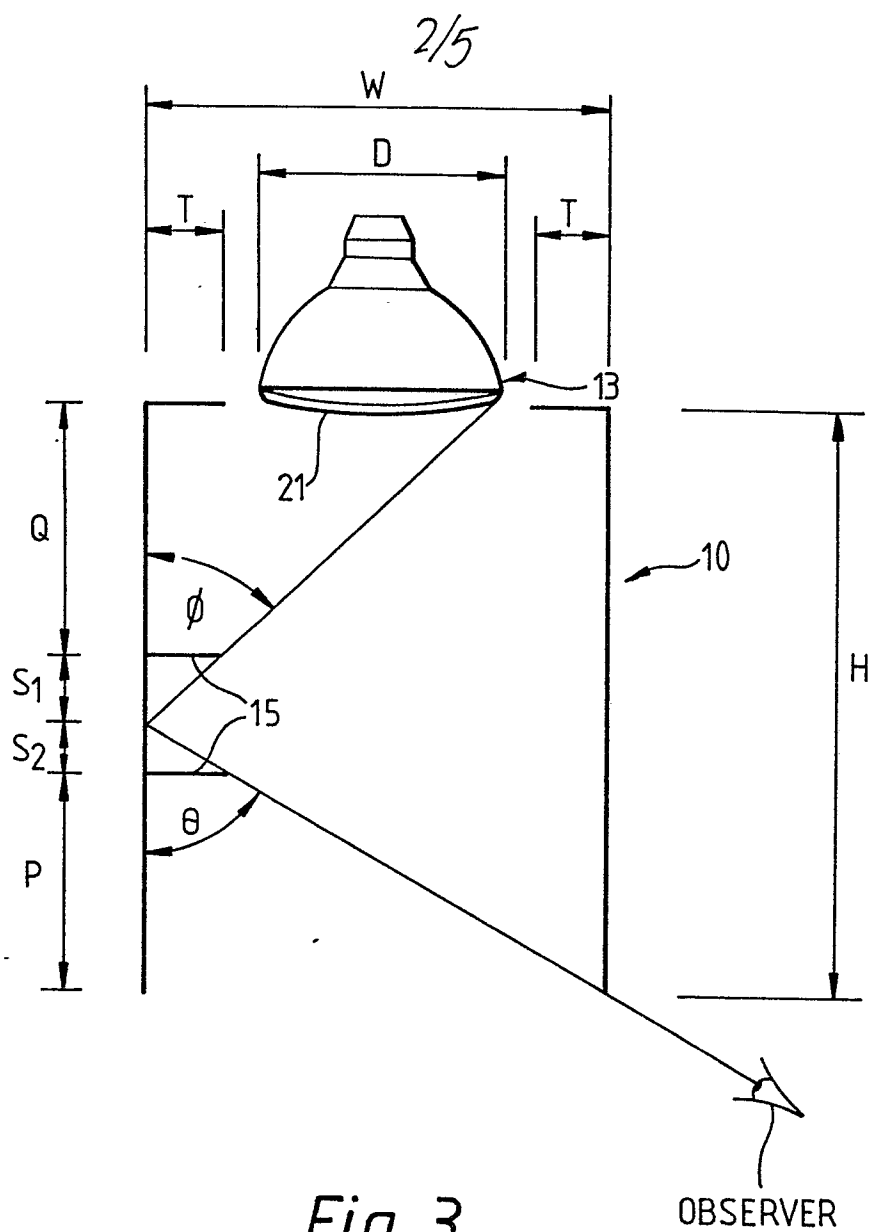
11. A lamp shade according to Claim 1 wherein the or each baffle is in the form of an annular disk having a central opening

and the or each disk is provided with a diametrically extending band so that the cone semi-angle at right angles to the direction of the band is less than the cone semi-angle in the general direction of the band.

12. A lamp shade according to Claim 1 wherein a plurality of baffles are provided, each baffle being in the form of an annular disk having a central opening, the diameter of each central opening being slightly larger than the diameter of the central opening of each disk nearer to the light source.

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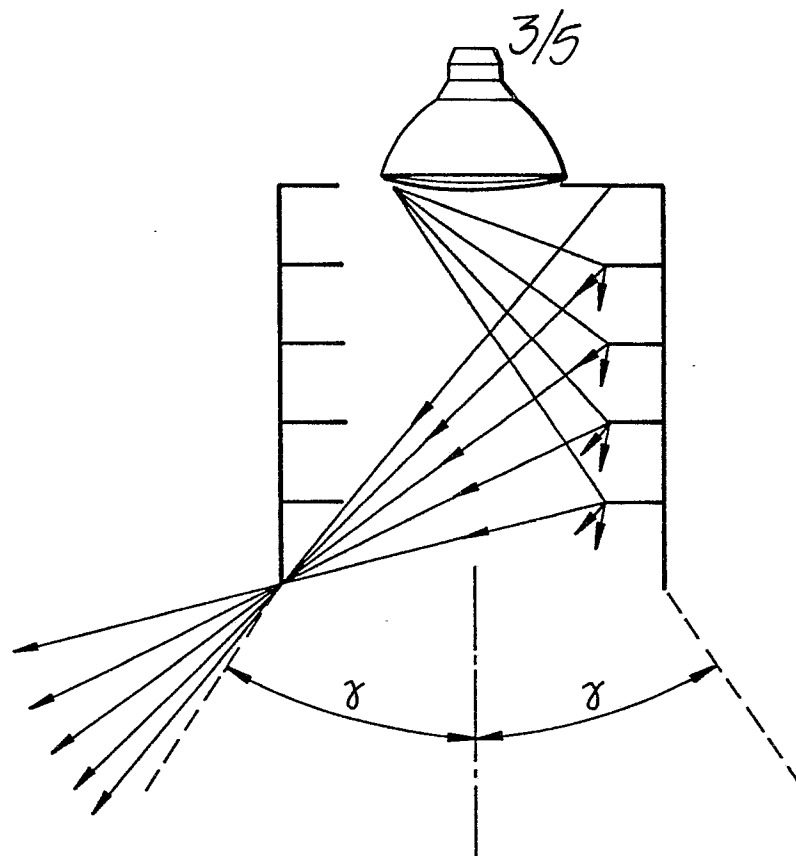


Fig. 4.

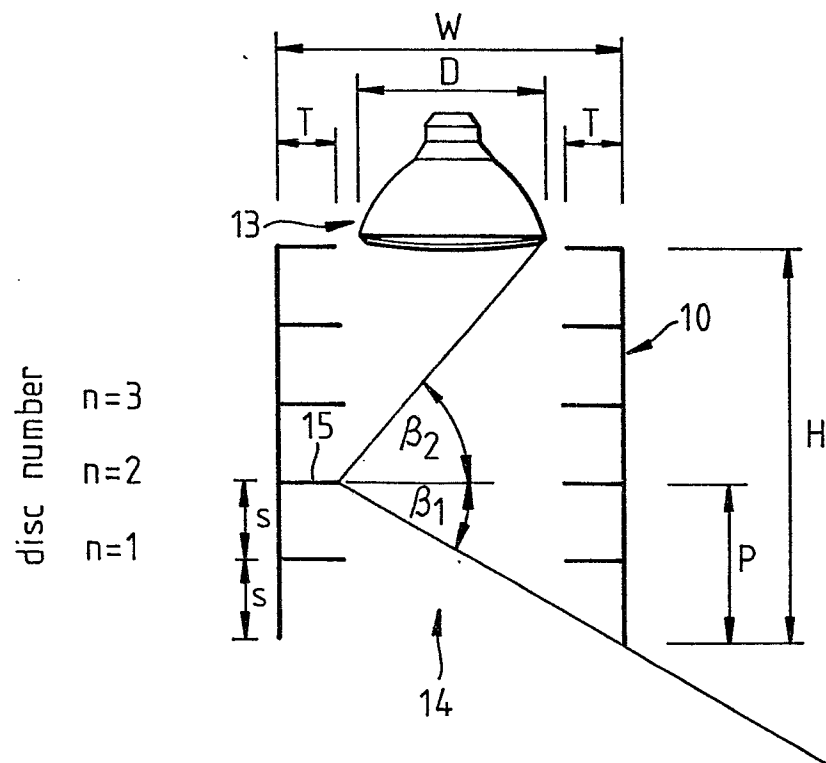


Fig. 5.

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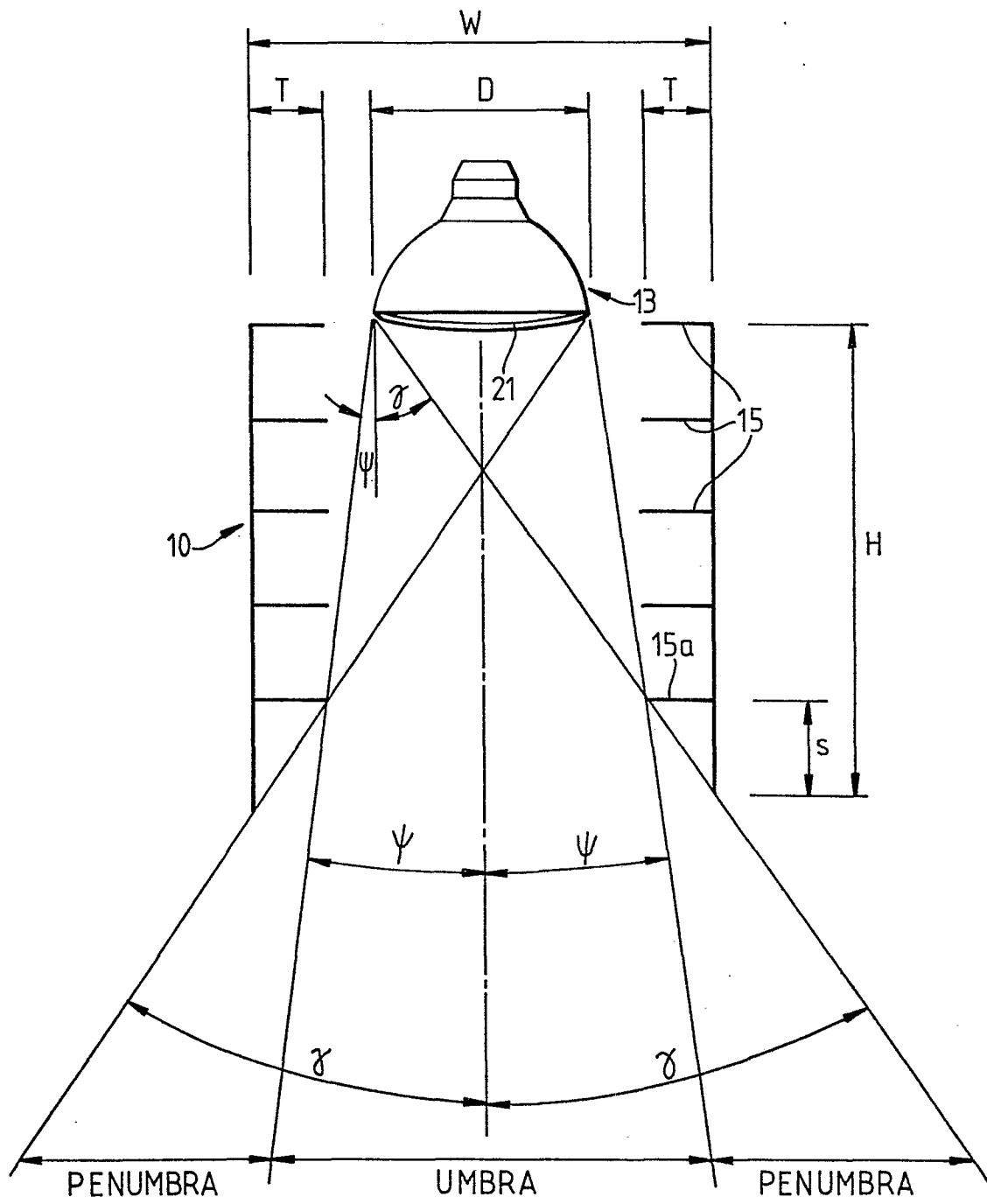
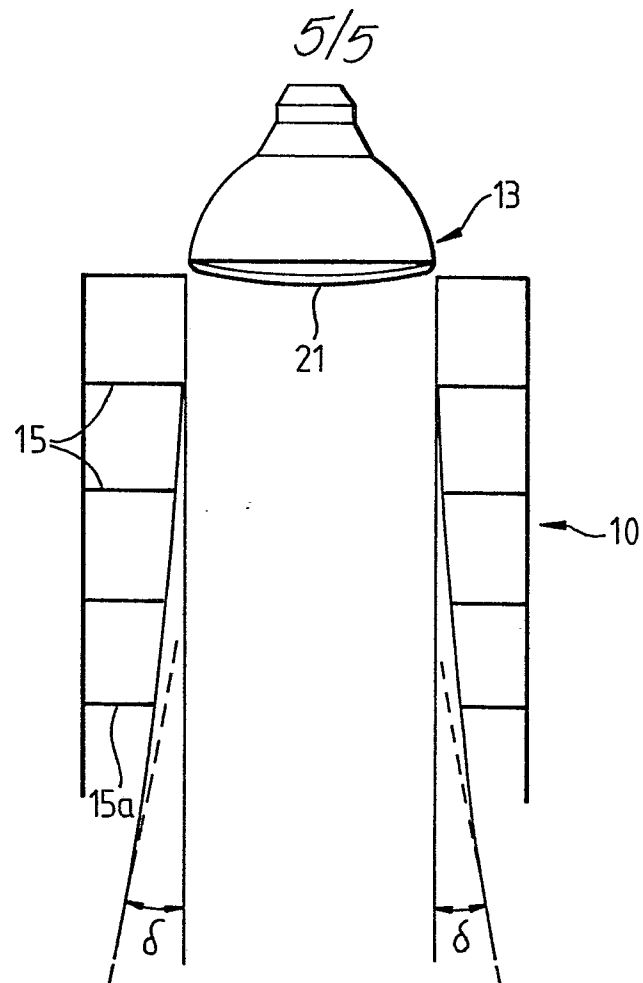
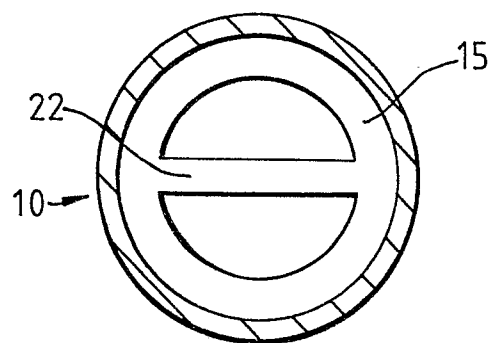


Fig .6.

*Fig. 9.**Fig. 10.*



European Patent
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EUROPEAN SEARCH REPORT

0052503

Application number

EP 81 30 5412

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<u>US - A - 2 183 048</u> (SCHNEIDER) * page 2, column 2, lines 5-14; figures 3-4 * --	1,3,6	F 21 V 11/00
A	<u>US - A - 1 361 018</u> (CONN) * page 1, lines 59-65; page 2, lines 39-55 * --	1,2	
A	<u>US - A - 2 179 161</u> (RAMBUSCH) * figure 1 * --	1	TECHNICAL FIELDS SEARCHED (Int.Cl. ³) F 21 V F 21 M
A	<u>FR - A - 1 018 291</u> (EZQUERRA) * figure 2 bis * --	1,2	
A	<u>GB - A - 541 185</u> (VICKERS-ARMSTRONGS) * page 3, lines 4,5; figures 3,4 * --	1,2	
A	<u>FR - A - 686 864</u> (DOURGNON) * figure 2 * ----	7	CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons
☒ The present search report has been drawn up for all claims			&: member of the same patent family, corresponding document
Place of search The Hague		Date of completion of the search 22-02-1982	Examiner FOUCRAY