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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 :		(11) International Publication Number:
F21V 13/10, 11/06, B29C 47/02	A1	WO 92/16790
		(43) International Publication Date: 1 October 1992 (01.10.92)

(21) International Application Number: PCT/AU92/00112

(22) International Filing Date: 16 March 1992 (16.03.92)

(30) Priority data:
PK 5080 14 March 1991 (14.03.91) AU

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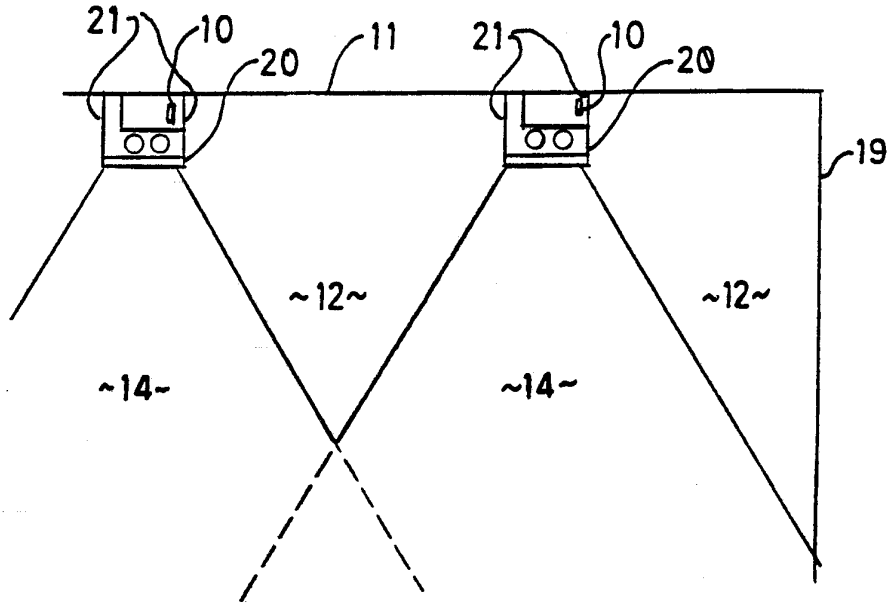
(81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BF (OAPI patent), BG, BJ (OAPI patent), BR, CA, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CI (OAPI patent), CM (OAPI patent), DE, DE (European patent), DK, DK (European patent), ES, ES (European patent), FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), GN (OAPI patent), GR (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC (European patent), MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, PL, RO, RU, SD, SE, SE (European patent), SN (OAPI patent), TD (OAPI patent), TG (OAPI patent), US.

Published
With international search report.

(54) Title: PARABOLIC DEFLECTOR



(57) Abstract

Light intensifying apparatus (20) is provided for selectively dispersing light emitted from a dispersed light source such as a fluorescent tube (10). The intensifying apparatus provides a reflector assembly which concentrates light from the dispersed light source (20) and associated deflecting means, longitudinal and lateral walls (22, 23 and 24), which extend outwardly beyond the dispersed light source (20) and towards a selected zone to be illuminated whereby light is concentrated at the selected zone. The reflector assembly may be formed by extruding a section of plastics material, laminating its surface with a coating having desired reflective properties, and forming the section into a desired cross-sectional profile while it remains plastic.

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"PARABOLIC DEFLECTOR"

This invention relates to intensifying apparatus. In particular this invention relates to light apparatus for fluorescent tube lighting.

This invention may be used advantageously for artificial lighting where video display terminals are in use, however it is to be understood that this invention may be used in other applications such as in offices or in homes or where an artificial light source may cause a distraction, such as in art galleries, cinemas, manufacturing and product inspection, and such like. This invention may further be utilised where intensified lighting and/or lighting effects are required such as in retail display, office, factory or workshop environments, domestic applications and such like.

Many buildings and outdoor areas require artificial lighting for occupants to see without at least some eye strain. In many instances, and with video display terminals (VDT's) in particular, eye strain and vision impairment may be caused by inefficient and/or inappropriate lighting. "Non-glare" VDT screens ameliorate the reflected glare from concentrated incident light sources, however, overhead lighting still represents a major source of irritation and vision impairment amongst VDT users.

Present light diffusers aim to disperse the light emitted from a primary light source such as an incandescent light globe or a fluorescent tube, however, whilst the light emerging from the diffuser is less concentrated and therefore

less harsh on the eyes, by their very nature, the light issuing from the diffusers is visible from any angle, making a distant light source a potential source of annoying or even harmful glare. Furthermore such light sources often form undesirable reflections on video screens.

At present different reflectors are required for different designs of light fitting, especially where fluorescent tube lights are sought to be converted to "down" lights, which may be defined as a light which has its light predominantly directed in a downwards direction in the form of a light beam, resulting in such reflectors being expensive and inefficient.

This invention aims to alleviate at least one of the abovementioned disadvantages and to provide intensifying apparatus which will be reliable and efficient in use. Other objects and advantages of this invention will hereinafter become apparent.

With the foregoing and other objects in view, this invention in one aspect resides broadly in intensifying apparatus for selectively dispersing light emitted from a dispersed light source, said intensifying apparatus including:-

a reflector assembly for concentrating light from the dispersed light source, and

deflecting means extending outwardly beyond the dispersed light source and towards a selected zone to be illuminated. Preferably, the deflecting means includes a

plurality of rigid or flexible deflecting panels each having an opaque surface substantially coincident with emitted light rays extending towards the selected zone.

The deflecting panels may constitute a decorative pattern such a regular array of polygonal shapes. In one embodiment of the invention, the deflecting panels include a plurality of longitudinal panels substantially parallel to and spaced from one another and a plurality of lateral panels substantially parallel to and spaced from one another. In a preferred embodiment, the reflector assembly partly encompasses the dispersed light source and includes a reflective back portion and opposite side portions extending from the back portion. The opaque deflecting means preferably includes the opposite side portions and a plurality of deflecting panels attachable to said reflector assembly.

The dispersed light source may be of any form such as a light globe or series of incandescent lamps. Preferably, the dispersed light source is an elongate light generating source such as a fluorescent lighting tube or such like.

Preferably, the deflecting panels include spaced longitudinal panels and a spaced lateral panels, and the spaced lateral panels extend substantially parallel to one another. In a further preferred embodiment, the spaced lateral panels are detachably attachable to said reflector assembly and slidable therealong whereby their angle and/or spacing may be readily varied.

The reflector assembly may be divided evenly or unevenly into a number of portions. In a preferred form, the reflector assembly is evenly divided into a plurality of portions by a plurality of deflecting means spanning between the side portions and the reflector assembly further includes a reflective back portion and opposite side portions and wherein the spaced longitudinal panels are formed by the opposite side portions. The dispersed light source is preferably an elongate light generating source located within said reflector assembly and inwardly of said plurality of deflecting means such as a fluorescent tube or a line of point light sources such as incandescent light globes.

The intensifying apparatus preferably includes adjustable deflecting means whereby the zone illuminated may be selectively varied. The deflecting means may be adjusted to maintain the dispersed light within a selected sector subtended from the light source. The sector preferably has an included angle of between 30^{o} and 60^{o}, being further preferred having an included angle of approximately 45^{o}.

The plurality of deflecting means may be selectively spaced along the reflector assembly to adjust the subtended sector in a plane containing the longitudinal axis of the light source and independent of the sector subtended in the plane at right angles thereto.

The reflecting assembly may be included or incorporated in a plenum for retaining the visible light generated by the dispersed light source. The plenum may include a side wall

assembly and a base wall assembly, the base wall assembly including light directing means adapted to direct the generated light to desired locations.

The intensifying apparatus of this invention may be incorporated in an existing luminaire, for example, in retro-fitting the intensifying apparatus into an existing building. Accordingly, in a preferred embodiment, the reflector assembly directs the light independently of the luminaire. In an alternative embodiment, the opaque deflector means include a plurality of panels directly attachable to a dispersed light source, such as a fluorescent tube.

In a preferred form, the intensifying apparatus includes a specular reflector assembly manufactured from a plastics material. Preferably, the reflector assembly is manufactured by extrusion of a substantially flat sheet which is formed to a profile having the back portion and opposite side portions as hereinbefore described. The reflecting surface may be fused to the reflector assembly during manufacture and preferably prior to forming the desired section.

Preferably the reflector assembly is extruded in a continuous length and cut into standard lengths. The reflector assembly is preferably provided with an axial division means whereby the selected edge portions of the side portions of the reflector assembly may be divided from the remainder of the reflector assembly axially whereby the reflector assembly may be reduced in width and/or so that, in

use, the edges of the reflector assembly are substantially flush with the lower edges of a luminaire or light fitting.

Accordingly, this invention in another aspect resides in a method of forming a reflector assembly for a light intensifying apparatus, the method including:-

extruding a section of plastics material having at least one substantially planar surface;

laminating said planar surface with a coating having desired reflective properties, and

forming said section into a desired cross-sectional profile. Preferably the laminating is performed whilst the section or its surface remains substantially molten and the forming is performed whilst said section remains substantially plastic.

Suitably, the extruded section has sufficient melt strength to perform the laminating and profile forming operations. The extruded section may include axial and/or transverse division means as hereinbefore defined. The reflective properties include reflective, partially reflective, dispersing, or black body surfaces, but preferably the laminate is has a specular surface and/or results in a specular surface on the reflector assembly.

The axial division means may also be formed such that the reflector assembly may be folded along a selected one or ones of the division means by a partial division of the selected division means.

Transverse division means may be provided at regular

intervals whereby the reflector assembly may be parted into desired integral lengths. Preferably, however, the reflector assembly is cut into standard lengths corresponding to the lengths of standard fluorescent light tubes.

The reflector assembly may be suspended from the light fixture holding the fluorescent tube. In a preferred embodiment, the reflector assembly is mounted on a deflector mount adapted for attachment onto a fluorescent tube. Accordingly, this invention in another aspect resides broadly in a deflector mounting means attachable to a reflector assembly as hereinbefore defined and mountable on a fluorescent tube. Preferably, fluorescent tube is of a standard diameter such as the current standard diameter of 25 mm, but preferably the mounting means is adapted for mounting on both the current standard diameter tube and the former standard diameter tube of 36 mm diameter.

In another aspect, this invention in one aspect resides broadly in a intensifying apparatus including:-

a plenum for retaining the visible light generated by dispersed light source, said plenum having a side wall assembly and a base wall assembly, and

said base wall assembly including light directing means adapted to direct the generated light to desired locations.

Further light directing means may be provided in the side wall assembly.

The dispersed light source may be disposed within a the plenum, or it may be disposed adjacent the plenum such that

light emitting from the dispersed light source passes into the plenum. In one embodiment, the plenum is the shape of a trapezoidal prism or truncated rectangular pyramid where the side wall assembly includes inclined side walls and the base and top walls are parallel and rectangular. The light directing means may be a grid of substantially vertical lateral and longitudinal walls the height of which is comparable to their separation such that the emergent light is not dispersed but intensified within a limited included angle. Preferably the included angle is between 30° and 60°.

Where the light source is disposed within the plenum, it is preferred that the plenum have a top wall and the internal surfaces of the top wall and the side wall assembly are highly reflective and specular thereby efficiently directing the light towards the light directing means. Where the light source is disposed above the plenum, the plenum may be provided with a transparent top wall, however it is preferred that the top wall is omitted and the side walls are reflective thereby efficiently directing the light towards the light directing means. Of course, in this latter aspect, the light source may be adapted to direct substantially all light emitted from the source through the top of the plenum by providing reflectors or such like above the light source. Preferably, the reflectors are of substantially parabolic cross-section.

The grid walls of the light directing means may have selected absorption, transmission or reflective properties,

but are preferably non-reflective.

The intensifying apparatus may be manufactured by any known process such as moulded from plastics material, or fabricated from metals, plastics, ceramics and the like. However, it is preferred that the intensifying apparatus is fabricated from plastics strip of suitable width by cutting the strip to appropriate lengths and joining the pieces so formed to form the base wall assembly and side walls and, if desired, the top wall. The lateral and longitudinal walls are preferably fabricated into a grid by providing slots substantially half-way transversely through each strip at regular intervals and inserting the lateral strips into the slots in the longitudinal strips where the slots occur in the lateral strips.

The apparatus of this invention may be installed in new lighting installations, or may be retro-fitted to existing installations. In the latter case, the top wall of the plenum may be formed from the existing lens of a light fitting, and the top edge portions of the side walls of the plenum may be adapted for suspension of the apparatus from the existing light fitting or from the rib members of a suspended ceiling.

The side walls, lateral walls and longitudinal walls may by bonded together by any process, such as adhesive, solvent, thermal or ultrasonic welding and such like, however, preferably the various components are manufactured such that the fabricated apparatus is held together by

interference fit of respective parts with one another.

Preferably the plastics strip is specular and highly reflective, and may be manufactured from plastics strip laminated with polished metal foil suitably coated for durability. In addition, half reflective strip and/or tinted strip may be employed. The opaque deflecting means may have a specular and/or reflecting surface, but preferably have a diffusing surface such as a substantially lambertian surface. Of course, the opaque deflecting means may be coloured, tinted, and include a patterned, prismatically reflecting or shaped surface as desired or to produce an illumination effect as desired.

In order that this invention may be more readily understood and put into practical effect, reference will now be made to the accompanying drawings which illustrate typical embodiments of the invention and wherein:-

FIGS. 1 to 6 are a schematic representations of respective alternative embodiments of a intensifying apparatus according to this invention shown in cross-section;

FIG. 7 is a perspective view of an embodiment of a intensifying apparatus according to this invention shown in cross-section;

FIG. 8 is a schematic end view of a intensifying apparatus according to a preferred embodiment of this invention;

FIG. 9 is a schematic representation of a prior art

light fitting;

FIG. 10 is a schematic representation of a reflector according to a preferred embodiment of this invention;

FIG. 11 is a diagrammatic representation of the reflector of figure 10 including a light deflecting panel;

FIG. 12 is a diagrammatic representation of a light deflecting panel according to an alternative preferred embodiment;

FIG. 13 is a diagrammatic representation of a light deflecting panel according to an alternative preferred embodiment;

FIG. 14 is a diagrammatic representation of a cross-sectional profile of a reflector according to a preferred embodiment of the invention, and

FIG. 15 is a light intensity diagram showing the preferred light distribution from a preferred embodiment of the reflector of this invention.

In reference to FIGS. 1 to 6, a plurality of artificial light sources 10 is disposed about a ceiling 11 in a room. The or each light source 10 is provided with a intensifying apparatus 20 which limits the direction of the light emerging from the light source 10 to 45°.

The light sources 10 in FIG. 1 are suspended from the ceiling 11 and depend downwards therefrom. The intensifying apparatus 20 fits around the light source 10 and has vertical sidewalls 21. The light sources 10 in FIG. 4 are similarly

suspended, and have oblique sidewalls 22. The light sources 10 closest to a dividing wall 19 have the side wall closest that dividing wall 19 omitted to allow light from the light source 10 to shine onto the dividing wall 19.

The light sources 10 in FIG. 2 have their lower face flush with the ceiling 11, and have an intensifying apparatus 20 installed in replacement of light normal dispersing lenses. The light sources 10 in FIG. 3 are similarly placed in the ceiling 11 with their lower faces flush with the ceiling 11, however, the intensifying apparatus 20 is displaced downwards by oblique side walls 22. In similar fashion to the embodiment illustrated in FIG. 4, the light sources 10 closest to a dividing wall have the nearest sidewall omitted.

Referring to FIGS. 1 to 4, reflectors 16 may be used above the lamps within the light sources 10 to direct light produced downwards. FIGS. 5 and 6 illustrate alternative forms of reflector 16.

The light sources 10 fitted with intensifying apparatus 20 cast light downwards into a lit region 14, and the limited angle of irradiation creates an umbra region 12. In FIGS. 3 and 4 in particular, the omitted sidewall panels allow the light region 14 to extend to a dividing wall.

Referring to FIG. 4, a video display terminal 18 placed against the dividing wall 19 is located in a penumbra region 15 under the nearest light source 10 thereto. The light emitted by the nearest light source 10 will not reflect into

the eyes of a user of the video display terminal 18 because the angle of incidence is too small. The penumbra region 15 is adjacent intermediate umbra region 17 and lit region 14. Intermediate umbra region 17 is also adjacent a lit region 14 in the corner portion of dividing wall 19 and ceiling 11.

The ceiling 11 is unlit directly from the light sources 10 except for the edge portions where sidewall panels have been omitted from the downward projecting intensifying apparatus. The light sources 10 remote from an observer to not direct light towards the observer, but direct the light downwards within the limited angle of deflection.

Referring to FIG. 7, a intensifying apparatus 20 has oblique sidewalls 22 depending downward from the peripheral portions a light source. The base wall assembly of the intensifying apparatus 20 is comprised of lateral walls 24 and longitudinal walls 23 extending in a grid across and along the base wall assembly respectively, at regular intervals. The respective lateral walls 24 and longitudinal walls 23 are spaced from each other in parallel relation. In the embodiment shown, the lateral walls 24 are at right angles to the longitudinal walls 23, however, alternative patterns may be employed, such as polygonal or curvilinear patterns, or combinations of these.

Referring to FIG. 8, a curved light deflector 30 is formed from a substrate 31 and has a reflective surface 32 laminated onto one side. (Only one portion of the deflector 30 is shown as laminated for clarity.) A notch 33 is formed

into both sides of the deflector 30 so as to enable the deflector 30 to be fractured axially into portions of one quarter, half or three quarters as required. When the reflective surface 32 is scored along a notch 33, the fracture of the deflector 30 separates the panel into two or more separate pieces. Alternatively, the deflector 30 may be fractured along a notch 33 without scoring the reflective surface 32 along a notch 33 then the deflector 30 may be folded along the axis of the notch 33 where the fracture is effected.

Referring to FIG. 9, a prior art light fitting 13 includes two (2) light sources 10 disposed within a box assembly 26 which has a diffuser 27 disposed at its lower edge. A custom made reflector 25 is frequently inserted into prior art light fittings 13 so as to improve the amount of light transmitted through the diffuser 27.

The diffuser 27 produces some images 28 of the light sources 10 with the aid of the reflector 25. The purpose of such an arrangement is to ameliorate the effect of a concentrated light source such as the light sources 10, the concentration of the light emitted from the light sources 10.

Referring to FIGS. 10 and 11, an extruded reflector 29 includes an engagement ledge 35 on the outside of the extruded reflector 29, a pair of adjustment notches 36 on each side of the extruded reflector 29 and a bisecting notch 37 running longitudinally along the upper portion of the extruded reflector 29.

The extruded reflector 29 may also include a plurality of deflecting panels 38 as shown in FIG. 11.

A plurality of deflecting panels 38 may be disposed at regular intervals along the length of the extruded reflector 29 and a light source may be disposed within a light space 39 whereby the light emitted therefrom may be reflected from the reflective surface 34 on the inner surface of the extruded reflector 29.

Such regularly spaced deflecting panels 38 may be disposed substantially at right angles to the longitudinal axis of the extruded reflector 29. Alternatively, the deflecting panels may be disposed at an oblique angle to the longitudinal axis of the extruded reflector 29 whereby reflected light may be directed towards a desired location.

The extruded reflector 29 may be incorporated into existing light fittings without the need to provide custom made reflectors. Furthermore, a diffuser is not required or even desirable to disperse the light from a concentrated light source since the extruded reflector 29 with a plurality of suitably spaced deflecting panels 38 directs the light substantially downwards and substantially within an included angle of 45° from a longitudinal light source such as a florescent tube.

If desired, an extruded deflector 29 may be bisected by fracturing the extruded reflector 29 along the bisecting notch 37 whereby light emitted from the light source may be directed towards a wall, in a similar manner as shown in FIG.

3, including, if desired, the illumination of a display panel, artwork, notice board or such like.

Preferably, the lower edges of the extruded reflector 29 are flushed with the sealing or lower edge of a light fitting. Accordingly, the lower edge of the extruded reflector 29 may be shortened as desired or appropriate by fracturing one or each of the side portions of the extruded reflector 29 along the desired or appropriate adjustment notch 36.

Referring now to FIG. 12, an alternative deflecting panel 40 includes an engagement slit 42 depending from an emplacement slit 41 which engaged with the engagement ledge 35 and the side portions respectively of the extruded reflector 29. Frequently, multiple florescent light sources are provided in a single light fitting with varying spaces between each florescent light source. Where extruded reflectors 29 are provided for adjacent light sources, deflecting panels 38 or 40 shown in FIGS. 11 and 12 respectively may be provided with their edge portions 44 overlapping.

Alternatively, the edge portions may be fractured from the alternative deflecting panel 40 by fracturing the deflecting panel 40 along adjustment notch 43 as desired. Of course, a plurality of adjustment notches 43 may be provided to accommodate a variety of different adjacent light source spacings.

Referring to FIG. 13, an alternative reflecting panel is

provided by a focusing deflection panel 45 as shown. The focusing deflection panel 45 includes a focusing surface 46 which is preferably curved to enhance the focusing of light reflected therefrom. The focusing deflection panel 45 includes the emplacement slit 41 and engagement slit 42 on each side thereof in a similar fashion to the alternative deflecting panel 40 shown in FIG. 12.

The lower portion 49 of the focusing deflection panel 45 includes fold-back reflectors 47 disposed in an upward and outward direction so that light from the light source may be directed towards the ceiling on each side of a light fitting incorporating the extruded reflector 29 having a plurality of focusing deflection panels 45 which may be in the form of reflecting surfaces, internally refracting segments or such like. Of course, the lower edge 48 of the focusing deflection panel 45 may include a decorative configuration, pattern or ornamentation or such like.

Referring to FIG. 14, the extruded reflector 29 preferably has an inner surface having a profile 50 as shown in figure 14. The profile 50 is disposed about a light source 10 and may be represented along the abscissa 51 and ordinate 52 according to the co-ordinates listed in Table 1.

TABLE 1

Abscissa	Ordinate
39.46	-57.27
38.62	-37.12
36.60	-21.55
33.88	-9.22
30.76	0.71
27.41	8.85
23.91	15.59
20.32	21.23
16.68	25.98
13.00	30.00

Of course, the numbers representing the abscissa satisfy the numbers represented in the ordinate in both the negative and the positive to produce a substantially symmetrical profile 50 as shown.

Referring to FIG. 15, a light source disposed in an extruded reflector of the form shown in figure 14, has been found to produce light of an intensity profile as shown in FIG. 15.

In use, a intensifying apparatus illustrated above may be installed in an installation where there is potential for eye strain due to reflected light from VDT's coming from standard fluorescent tube lighting in a suspended ceiling. The lens covers or diffusers are removed from the existing fittings and the intensifying apparatus are suspended from the rib members of the suspended ceiling, the spacing between the lateral and longitudinal walls of the light dispersing means having been set to allow the light emerging from the light sources to be emitted within an included angle of 45°. Since the light so emitted is limited in its angle of emission the emitted light cannot reflect from the screens

of the VDT's.

A fluorescent tube may be replaced in the preferred embodiment of the intensifying apparatus of this invention by sliding the deflecting panels to one or each end of the extruded reflector and removing the tube from the light space. A replacement tube may then be placed in the light space and the deflecting panels slid back to their respective positions. A spacer may be used to guide panels back into the desired spacing along the extruded reflector.

It will of course be realised that the above has been given only by way of illustrative example of the invention and that all such modifications and variations thereto as would be apparent to persons skilled in the art are deemed to fall within the broad scope and ambit of the invention as is defined in the appended claims.

The claims defining this invention are as follows:-

1. Intensifying apparatus for selectively dispersing light emitted from a dispersed light source, said intensifying apparatus including:-

a reflector assembly for concentrating light from the dispersed light source, and

deflecting means extending outwardly beyond the dispersed light source and towards a selected zone to be illuminated.

2. Intensifying apparatus as claimed in claim 1, wherein said deflecting means includes a plurality of deflecting panels each having an opaque surface substantially coincident with emitted light rays extending towards said selected zone.

3. Intensifying apparatus as claimed in claim 1 or claim 2, wherein said reflector assembly partly encompasses the dispersed light source.

4. Intensifying apparatus as claimed in any one of the preceding claims, wherein said deflecting panels include spaced longitudinal panels and a spaced lateral panels.

5. Intensifying apparatus as claimed in claim 5, wherein said spaced lateral panels extend substantially parallel to one another.

6. Intensifying apparatus as claimed in claim 4 or claim 5, wherein said spaced lateral panels are attachable to said reflector assembly.

7. Intensifying apparatus as claimed in any one of claim 4 to claim 6, wherein said reflector assembly is divided into a plurality of portions by a plurality of deflecting means spanning between said side portions.

8. Intensifying apparatus as claimed in claim 4, wherein said reflector assembly includes a reflective back portion and opposite side portions and wherein said spaced longitudinal panels are formed by said opposite side portions.

9. Intensifying apparatus as claimed in claim 7, wherein the dispersed light source is an elongate light generating source located within said reflector assembly and inwardly of said plurality of deflecting means.

10. Intensifying apparatus as claimed any one of the preceding claims, wherein said deflecting means are adjustable whereby the zone illuminated may be selectively varied.

11. Intensifying apparatus as claimed in any one of the

preceding claims, wherein said deflecting means may be adjusted to maintain the dispersed light within a selected sector subtended from the light source.

12. Intensifying apparatus as claimed in claim 11, wherein said sector has an included angle of between 30° and 60°.

13. Intensifying apparatus as claimed in claim 11, wherein said sector has an included angle of approximately 45°.

14. Intensifying apparatus as claimed in any one of claims 9 to 11 when appended to claim 7, wherein said plurality of deflecting means may be selectively spaced along said reflector assembly to adjust the subtended sector in a plane containing the longitudinal axis of the light source.

15. Intensifying apparatus as claim in any one of claims 1 to 13, wherein the dispersed light source is a fluorescent tube.

16. Intensifying apparatus as claimed in any on of claims 1 to 14, wherein said reflector assembly is a plastics material having a substantially specular reflecting surface.

17. A method of forming a reflecting assembly for a light intensifying apparatus, said method including:-

extruding a section of plastics material having at least

one substantially planar surface;

whilst said section remains substantially molten, laminating said planar surface with a coating having desired reflective properties, and

whilst said section remains substantially plastic, forming said section into a desired cross-sectional profile.

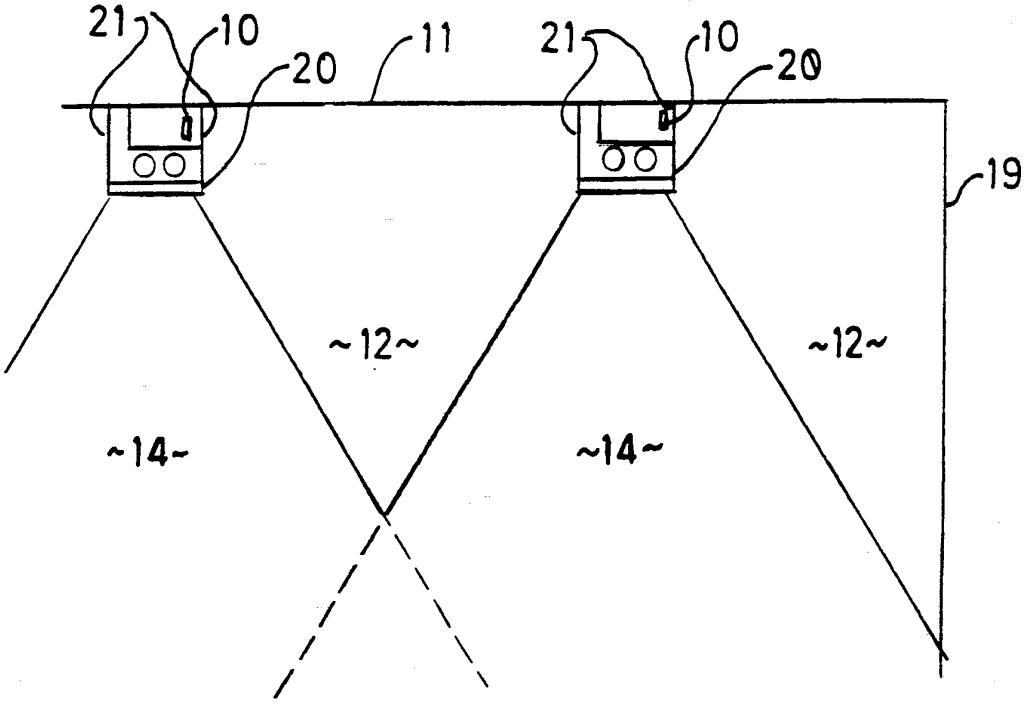

FIG. 1

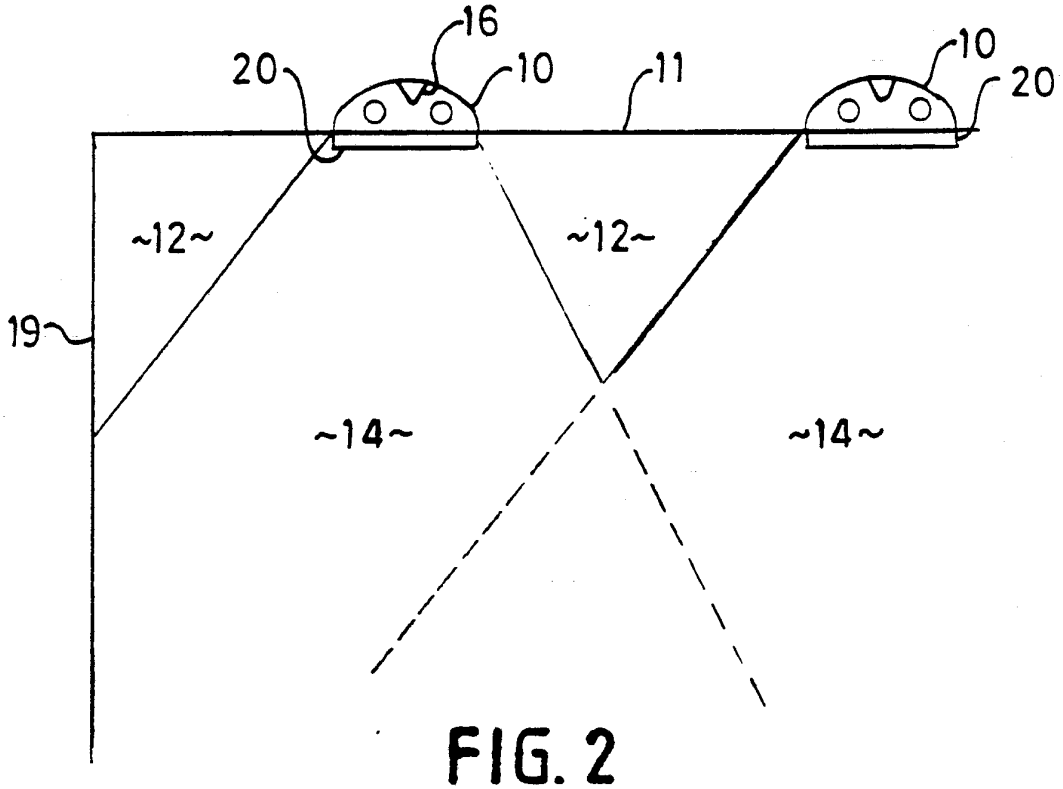

FIG. 2

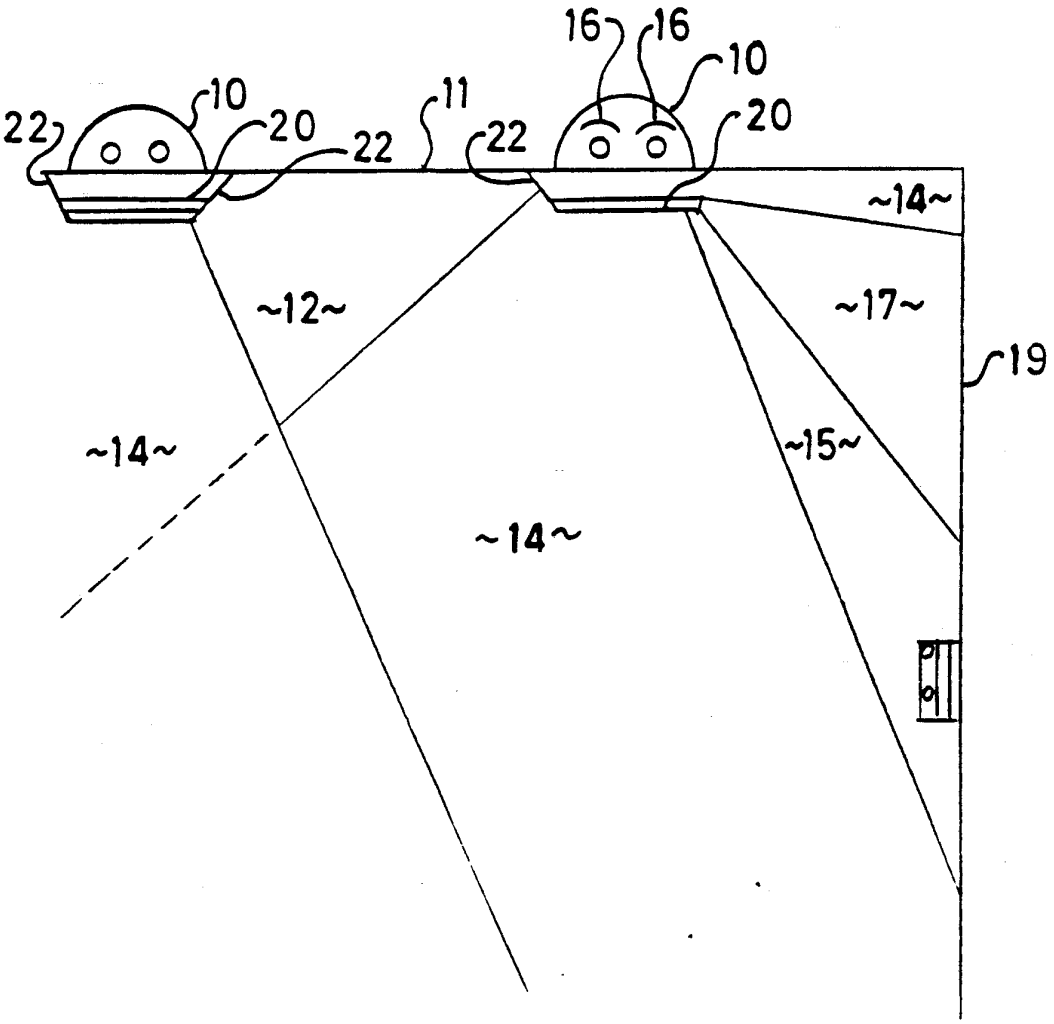

FIG. 3

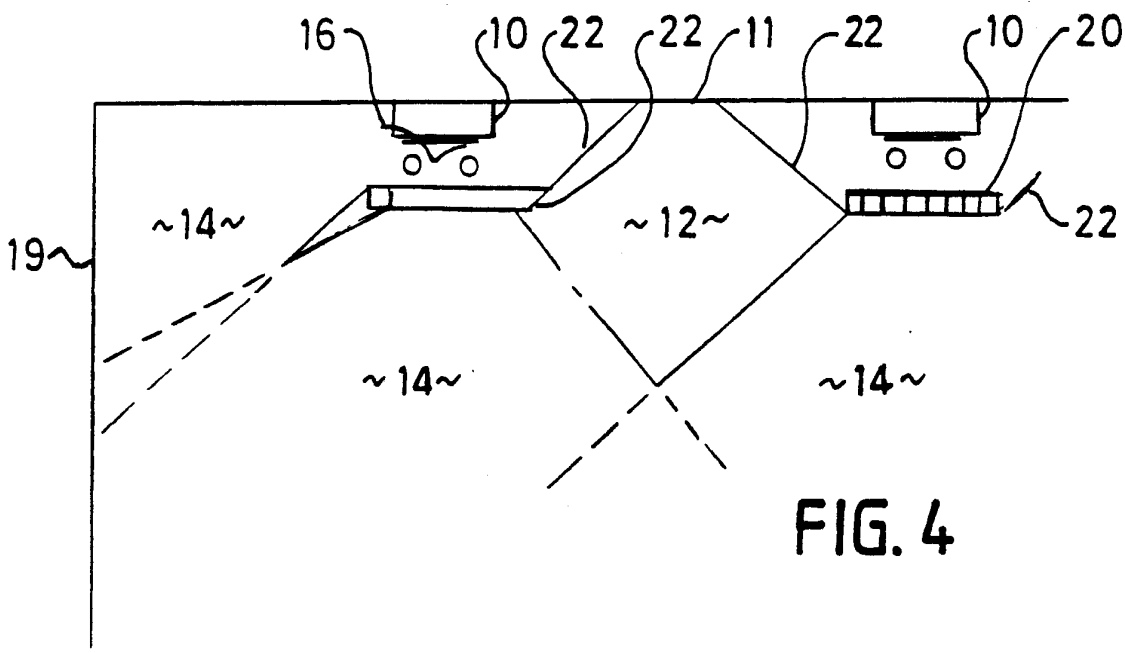

FIG. 4

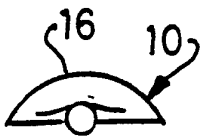

FIG. 5

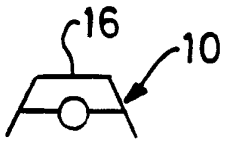

FIG. 6

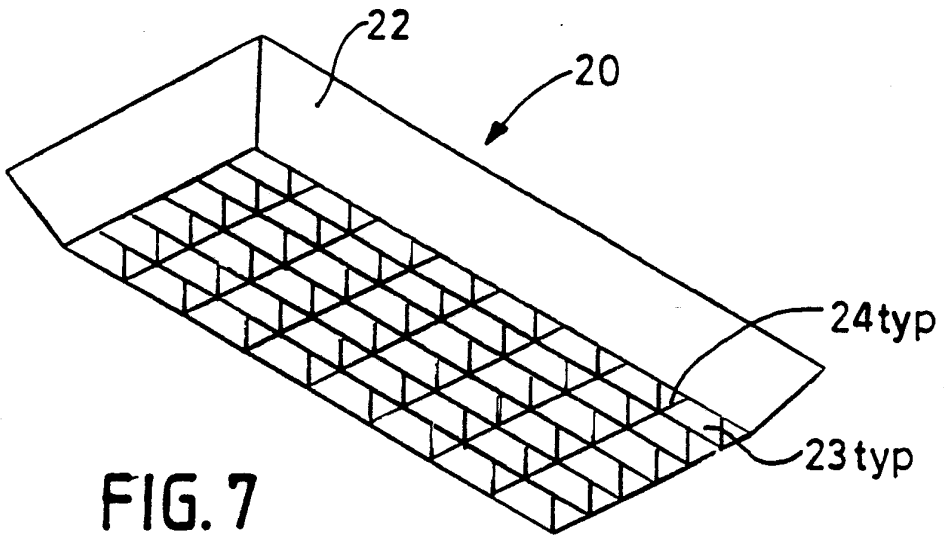

FIG. 7

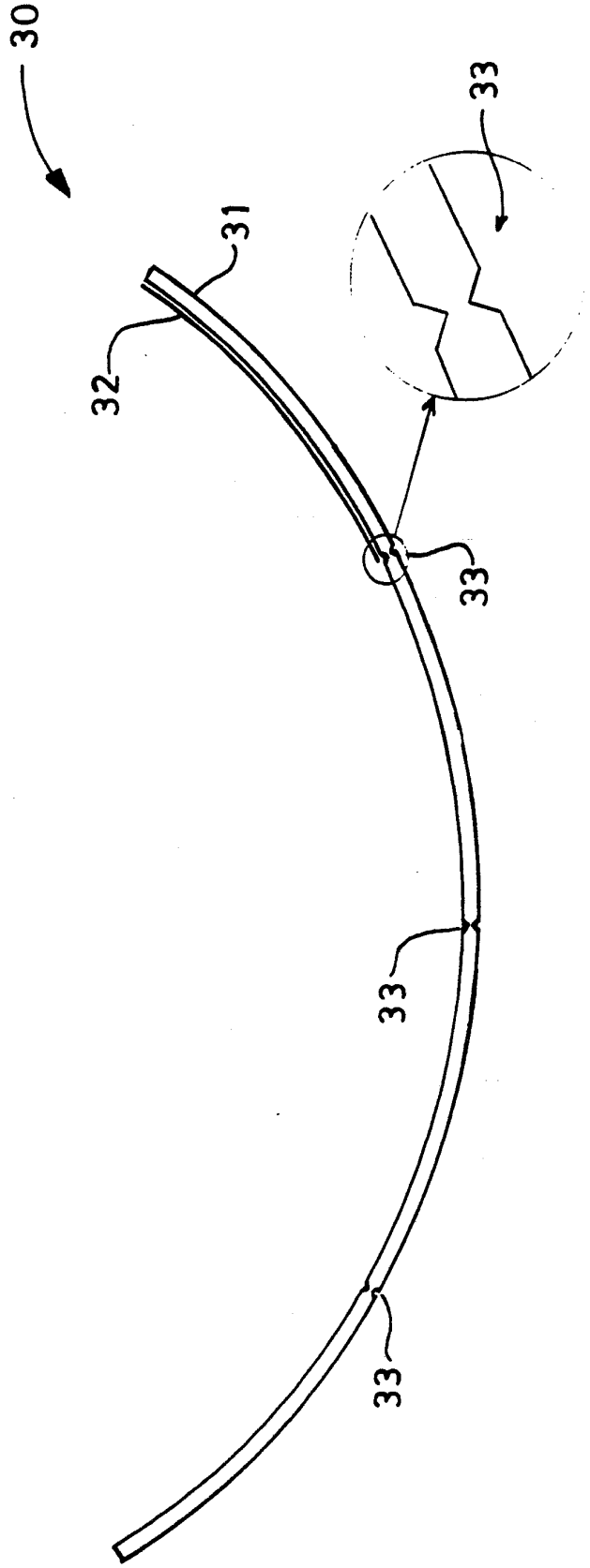

FIG. 5

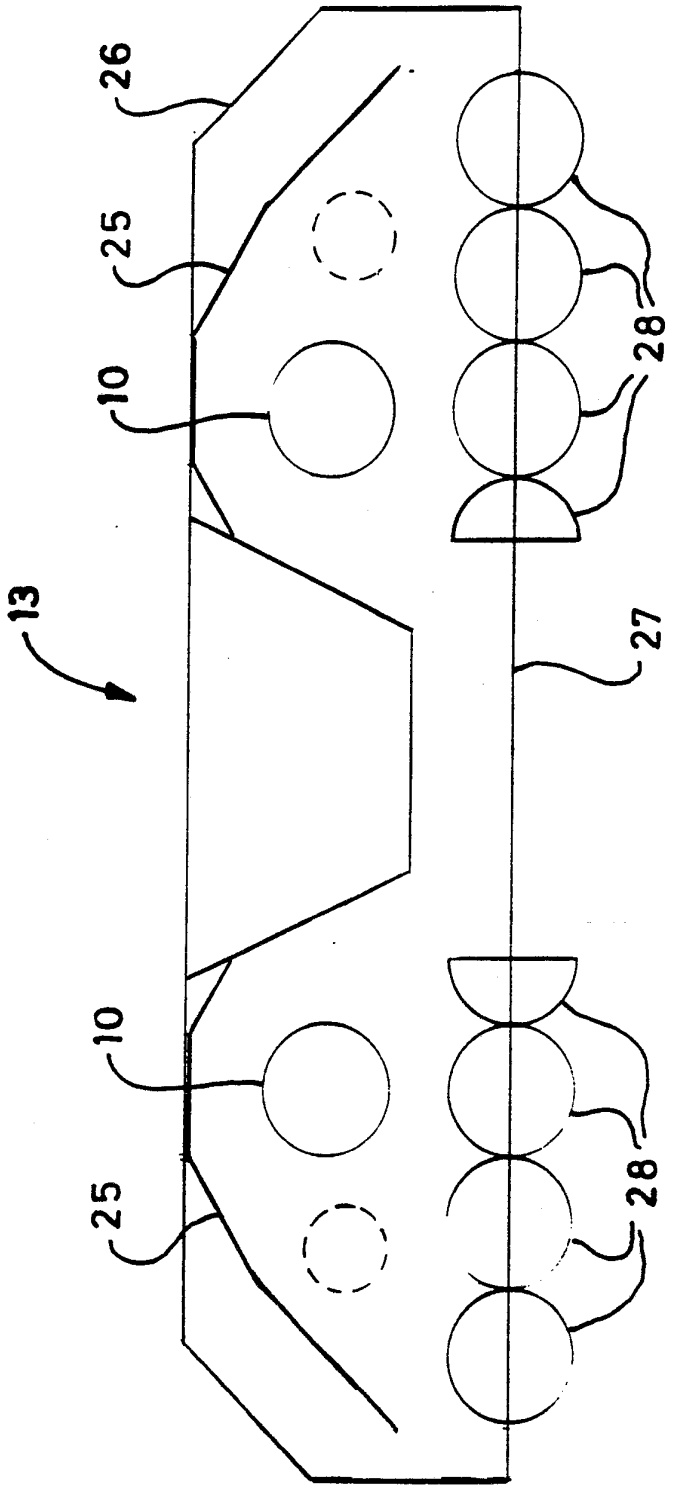

FIG. 9

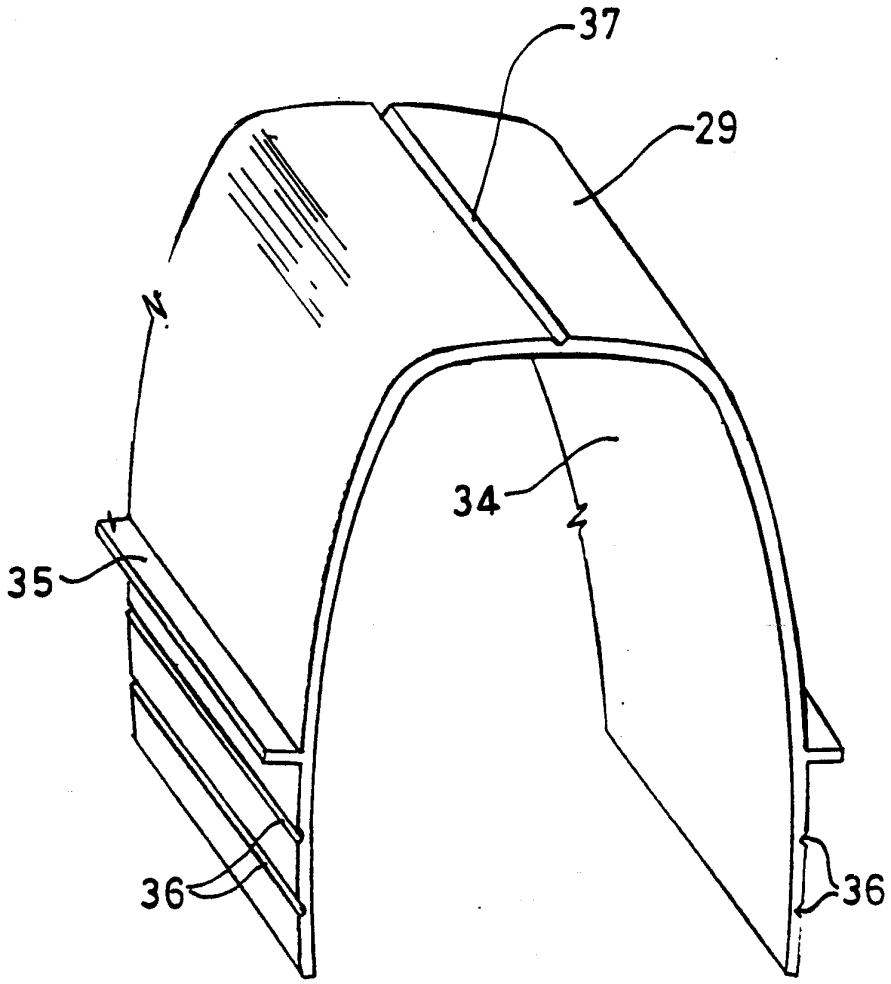

FIG. 10

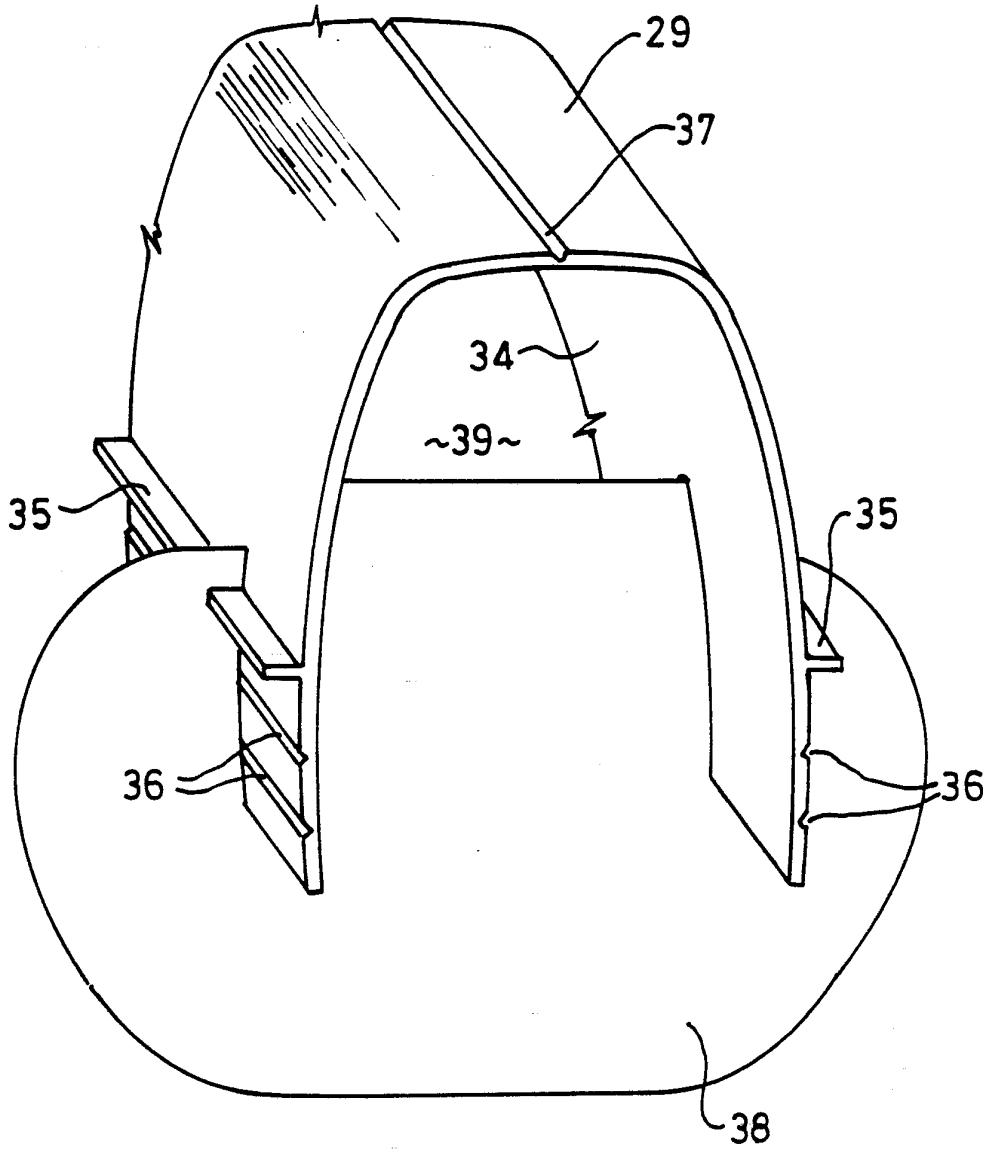

FIG. 11

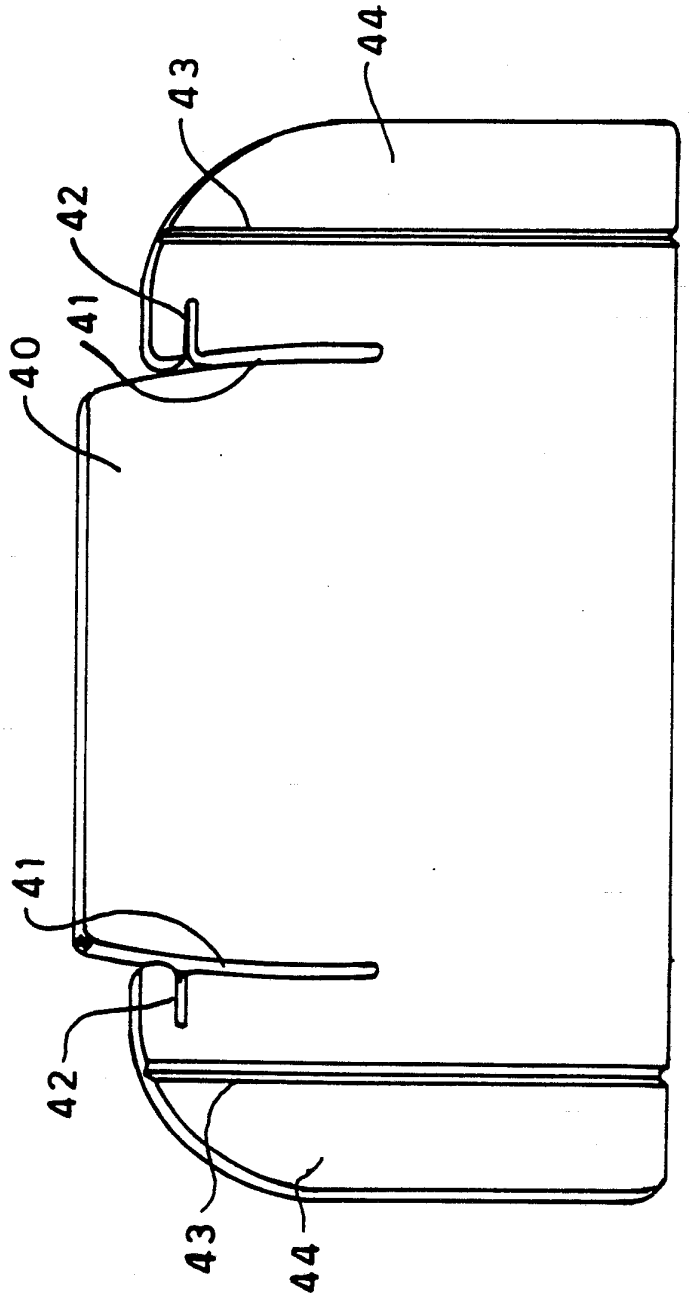

FIG. 12

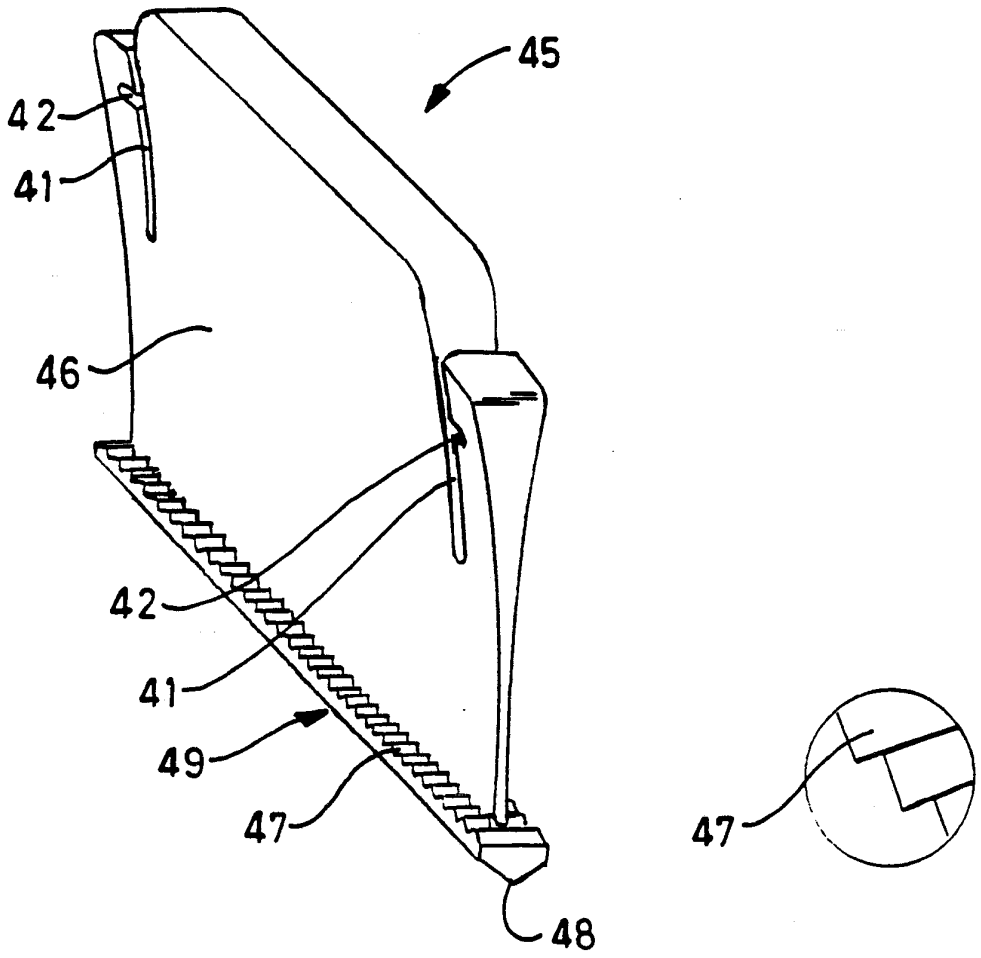

FIG. 13

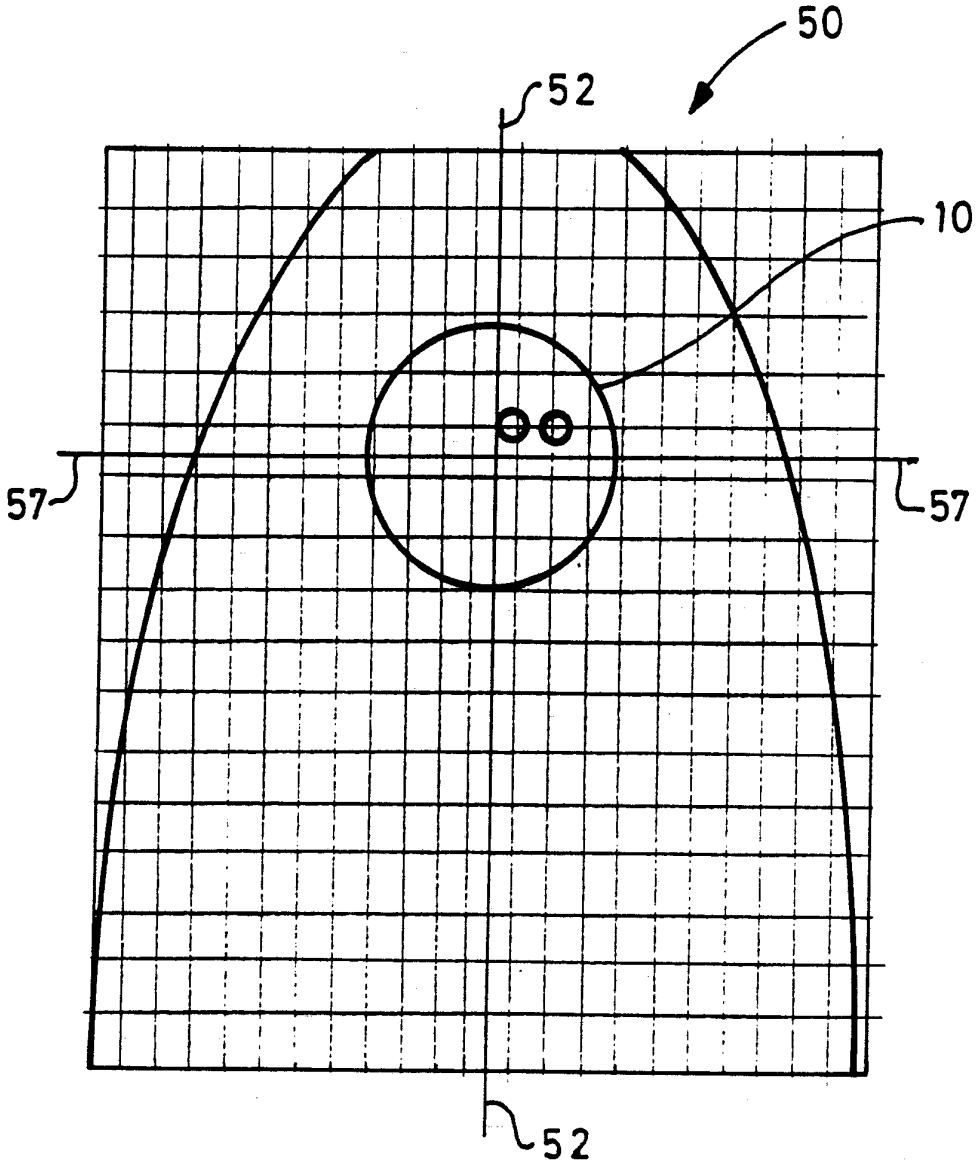

FIG. 14

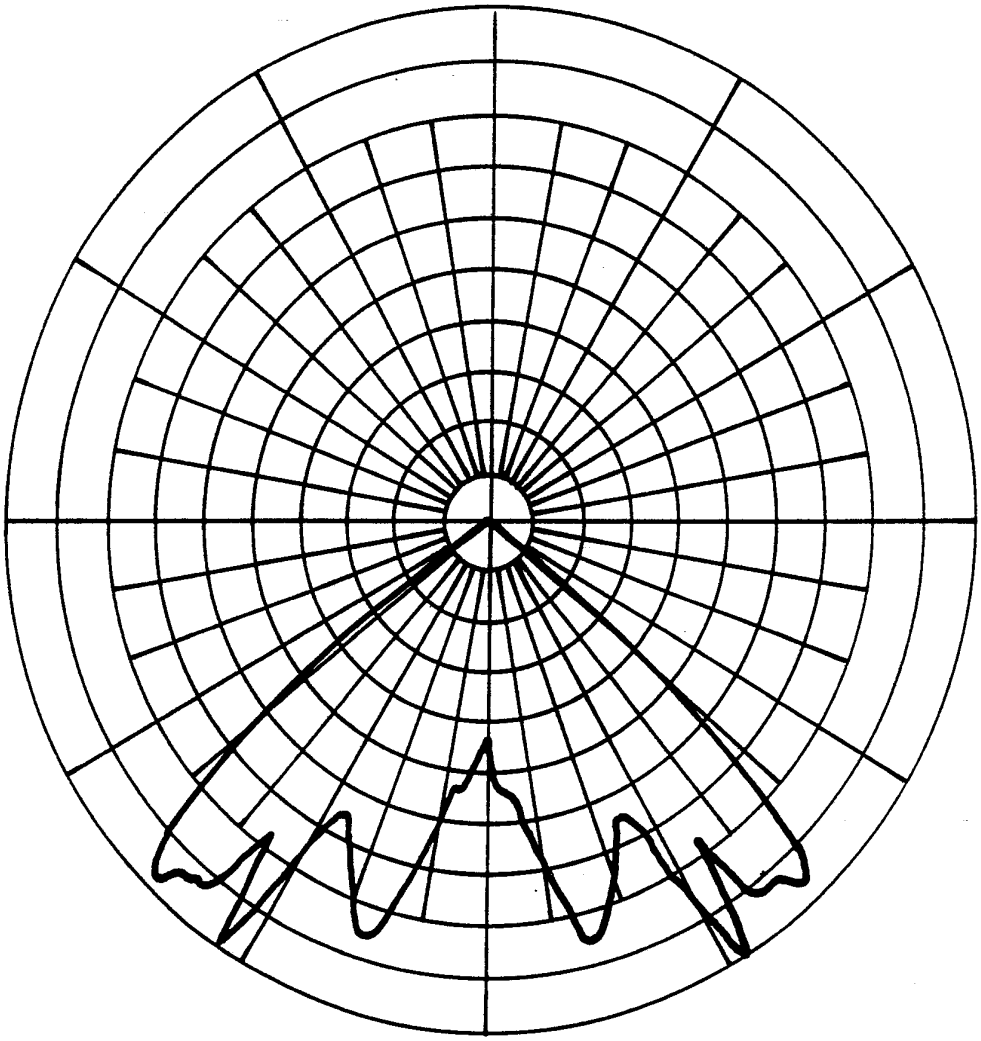

FIG. 15

INTERNATIONAL SEARCH REPORT

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent classification (IPC) or to both National Classification and IPC

Int. Cl.[5] F21V 13/10, 11/06, B29C 47/02

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC	F21V 13/10, 11/06, 11/02

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

AU : IPC as above, & Australian Class 22.51

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category*	Citation of Document, [11] with indication, where appropriate of the relevant passages [12]	Relevant to Claim No [13]
X	GB,A, 1518775 (PETERSEN) 26 July 1978 (26.07.78) (see page 1 lines 10-33)	(1-16)
X	GB,A, 1187913 (ELEKTRISKA AB EXAKTOR) 15 April 1970 (15.04.70) (see page 1 lines 6-19)	(1-9,15,16)
X	GB,A, 670766 (GENERAL ELECTRIC COMPANY LIMITED) 23 April 1952 (23.04.52) (see page 1 lines 1-82)	(1-9,15,16)
X,P	Patents Abstracts of Japan, M-1196, page 121, JP,A, 3-226905 (TOSHIBA LIGHTING & TECHNOL CORP) 7 October 1991 (07.10.91)	(1)
X	C. ZWIKKER, "Fluorescent Lighting", Published 1952, by Cleaver Hume Press Ltd (London) (see pages 144-168)	(1-9,15-16)

* Special categories of cited documents : [10]

"A" Document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior t the international filing date but later than the priority date claimed

"T" Later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
19 June 1992 (19.06.92)	26 June 1992 (26.06.92)
International Searching Authority	**Signature of Authorized Officer**
AUSTRALIAN PATENT OFFICE	I. BARRETT

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE [1]

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim numbers ..., because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim numbers ..., because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim numbers ..., because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4a

VI. ☒ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING [2]

This International Searching Authority found multiple inventions in this international application as follows:

Claim 17 to a method of forming a reflecting assembly has no features in common with the other claims to an intensifying apparatus.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.
2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

   Claims 1-16

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

☐ The additional search fees were accompanied by applicant's protest.

☐ No protest accompanied the payment of additional search fees.

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL APPLICATION NO. PCT/AU 92/00112

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report	Patent Family Member		
GB 1518775	CH 615491 US 4122511	DE 2707037	DK 703/76
GB 1187913	DE 1622846 DK 1352/68	FR 1557548	US 3582642