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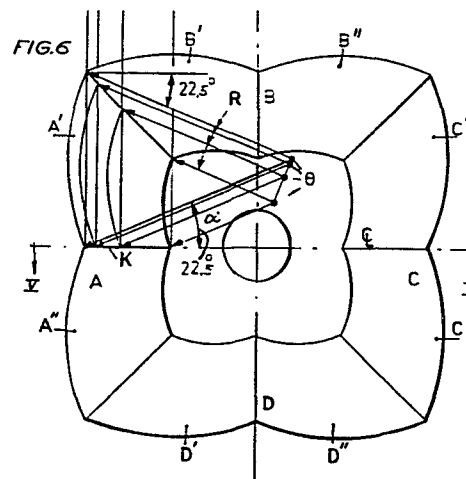
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54 Omnidirectional reflector.

57 In a reflector adapted to embrace as a continuous unit a light source situated in the centre of the reflector, the reflector is divided along the circumference into at least three parts (A, B, C ...) merging in each other, said reflector following a determined curve (K) in the vertical plane in the central portions of the various parts. Each of the parts (A, B, C ...) consists of two relatively reversed sectors (A', A''; B', B'' ...) which from said curve (K) are bent in the form of circular arcs in the horizontal plane (L, M, N, O) such that each part (A, B, C ...) reflects all the light beside the centre of the reflector and within a determined angular area.



OMNIDIRECTIONAL REFLECTOR

The present invention relates to an omnidirectional reflector especially designed for industrial light fittings, park light fittings and the like. The object of the invention is to avoid reflection back to the lamp and/or to
5 suspension means and/or coupling means necessary for the operation of the lamp, the latter being applicable especially to park light fittings. A reflection back to the lamp or other light fitting details strongly reduces the efficiency of the reflector and can in certain cases also shorten the
10 life of the lamp. Thus the invention is directed to an omnidirectional reflector adapted to embrace as a continuous unit a light source situated in the centre of the reflector, said reflector being characterized in that it is divided along the circumference into at least three parts merging in
15 each other, said reflector following a determined curve in the vertical plane in the central portions of the various parts, that each of the parts consists of two relatively reversed sectors which from said curve are bent in the form of circular arcs in the horizontal plane such that light
20 beams impinging on the sectors adjacent the symmetry plane thereof are reflected outwards from this plane and consequently away from the centre, that light beams impinging on the sectors adjacent the intersection line between the various parts are reflected outwards generally in parallel
25 with the symmetry plane of the sectors, and that intermediate light beams are reflected continuously relative to the angle of incidence towards the sectors, whereby all light is reflected beside the centre of the reflector. Accordingly, the lamp and corresponding central parts will
30 not be exposed to any re-reflection.

The invention will be described in more detail below with reference to the accompanying drawings which show, on one hand, a prior art reflector and, on the other hand, a number of reflectors according to the invention.

In the drawings:

Figs. 1 and 2 illustrate the beam path in the prior art reflector, where Fig. 1 is a vertical section of the reflector and Fig. 2 shows the reflector seen from below;

5 Figs. 3 and 4 show a reflector with three identical parts, Fig. 3 being a vertical section of the reflector on line III-III in Fig. 4 which shows the reflector seen from below;

10 Figs. 5 and 6 show a reflector with four identical parts, Fig. 5 being a vertical section of the reflector on line V-V in Fig. 6 which shows the reflector seen from below;

15 Figs. 7 and 8 show a reflector with five identical parts, Fig. 7 being a vertical section of the reflector on line VII-VII in Fig. 8 which shows the reflector seen from below;

20 Figs. 9 and 10 illustrate the beam path in the reflector shown in Figs. 5 and 6, Fig. 9 being a vertical section of the reflector on line IX-IX in Fig. 10 which shows the reflector seen from below;

Fig. 11 shows the isolux curve in a reflector provided with four parts, in which only the opposite parts are alike;

25 Figs. 12 and 13 show said reflector, Fig. 12 being a vertical section of the reflector on line XII-XII in Fig. 13 which shows the reflector seen from below;

30 Figs. 14 and 15 illustrate the beam path in the reflector shown in Figs 12 and 13, Fig. 14 being a vertical section of the reflector while Fig. 15 shows the reflector seen from below.

35 As is apparent from Figs. 1 and 2 some beams are reflected from the reflector back to the lamp. This is the disadvantage that is eliminated by the present invention which will be described primarily with reference to Figs. 5, 6, 9 and 10 according to which the reflector has been divided into four identical parts A, B, C and D since this number appears to give the best solution from a technical as

well as an economical point of view. Each part consists of two relatively reversed sectors A', A''; B', B'' etc.

Each part A, B, C and D is to reflect the light at 90° so that it will be 360° in total. Thus, each sector A', A'', B', B'' etc. is to reflect the light within 45° , as appears from Figs. 9 and 10.

The desired light distribution of the reflector in the vertical plane determines the shape of the curve K. When speaking of vertical plane and horizontal plane the normal position of the reflector is intended but of course the position of the reflector in space can be changed within the scope of the invention.

The curve K is calculated out or constructed in a conventional manner. Then the reflector is divided into an arbitrary number of horizontal planes L, M, N, O. Lines R with an angle of 22.5° from the symmetry plane C_L of the reflector are drawn from the intersection point between each plane and the curve K. In the same manner lines are drawn with the same angle relative to planes being parallel with the symmetry plane C_L from the intersection point of each plane with the intersection line between the parts. The common intersection point θ of the lines in each plane will then constitute the centre for radii of circular arcs which in this way form the surface of the reflector.

The sectors are thereby bent in the form of circular arcs in conjunction with the predetermined curve K such that light beams impinging on the sectors adjacent the curve K therebetween are reflected 45° out from the symmetry plane C_L of the reflector between the two sectors and consequently away from the centre, while light beams impinging the sectors adjacent the intersection line between the various parts are reflected out in parallel with the symmetry planes C_L . Between these two limits the beams are reflected continuously relative to the angle of incidence towards the sectors. Practically all light is thus reflected beside the centre of the reflector.

From the above description it appears that the

actual angle relative to the symmetry planes C_L are equal to 90° divided by the number of parts in the reflector. If the reflector has four parts, as in accordance with Figs. 5 and 6, Δ will thus be equal to 22.5° . According to Figs. 3 and 5 4 the reflector has three parts, and here Δ will therefore be equal to 30° . According to Figs. 7 and 8 the reflector has five parts, and therefore Δ will in this case be equal to 18° . With three parts the total radiation angle will be $2 \times 60^\circ$ a part, and with 5 parts $2 \times 36^\circ$ so that it will 10 always be 360° in total.

If it is desired to have an oval light image according to Fig. 11 on the ground, e.g. from a park light fitting, to illuminate e.g. a foot path, then one may allow the angles ρ and γ relative to the symmetry plane C_L and thus 15 the radii R to vary in the various parts, as appears from Figs. 12 and 13 which show a reflector with four parts. As is apparent from Figs. 14 and 15 the parts A and C are identical and give each a 60° radiation. The parts B and C are also identical and give each a 120° radiation. This 20 result has been obtained by setting the angle $\rho = 15^\circ$ and the angle $\gamma = 30^\circ$. The radiation angles will thus be equal to $4 \times \rho = 60^\circ$ and $4 \times \gamma = 120^\circ$. The sum $\rho + \gamma$ must always be 45° in a reflector consisting of four parts since the angles ρ and γ relative to the symmetry plane C_L for all the 25 parts in total should be 90° .

The invention is not restricted to that described above and shown in the drawings but can be modified within the scope of the appended claims.

CLAIMS

1. Omnidirectional reflector adapted to embrace as a continuous unit a light source situated in the centre of the reflector, w h e r e i n the reflector is divided along its circumference into a least three parts (A, B, C ...)
- 5 merging in each other, said reflector following a determined curve (K) in the vertical plane in the central portions of the various parts, w h e r e i n each of the parts (A, B, C ...) consists of two relatively reversed sectors (A', A''; B', B'' ...) which from said curve (K) are bent in the
- 10 form of circular arcs in the horizontal plane (L, M, N, O) such that light beams impinging on the sectors (A', A'' ...) adjacent the symmetry plane (C_L) thereof are reflected outwards from this plane and consequently away from the centre, w h e r e i n light beams impinging on the sectors (A',
- 15 A''...) adjacent the intersection line between the various parts (A, B ...) are reflected outwards generally in parallel with the symmetry plane C_L of the sectors (A', A''...), and w h e r e i n intermediate light beams are reflected continuously relative to the angle of incidence towards the
- 20 sectors (A', A'' ...), whereby all the light is reflected beside the centre of the reflector.
2. Omnidirectional reflector as claimed in claim 1, w h e r e i n the sectors (A', A'' ...) bent in the form of circular arcs have their curvature centres (θ) situated
- 25 in different horizontal planes (L, M, N, O) through the reflector and are positioned in the crossing point between a line drawn from the intersection point between each horizontal plane (L, M, N, O) and the determined curve (K) with a determined angle (α, ρ, γ) relative to the symmetry plane
- 30 (C_L) of the sector and a line drawn with a determined angle relative to planes parallel with the symmetry planes (C_L) from the intersection point of each horizontal plane (L, M, N, O) with the intersection line between the parts (A, B, C ...), said angles (α, ρ, γ) relative to the symmetry

plane (C_L) for all the parts (A, B, C ...) are 90° in total.

3. Omnidirectional reflector as claimed in claim 2,
w h e r e i n all the parts (A, B, C ...) of the re-
flector are identical and the angle (α) relative to the
5 symmetry plane (C_L) for the lines extending from the inter-
section points between each horizontal plane (L, M, N, O)
and the determined curve (K), on which lines the curvature
centres (θ) for the sectors (A', A'' ...) curved in the form
of circular arcs are situated, is equal to 90° divided by
10 the number of parts (A, B, C ...) in the reflector.

4. Omnidirectional reflector as claimed in claim 3,
w h e r e i n the reflector includes four identical parts
(A, B, C, D), the angle (α) relative to the symmetry plane
(C_L) for the lines extending from the intersection points
15 between each horizontal plane (L, M, N, O) and the deter-
mined curve (K), on which lines the curvature centres (θ)
for the sectors (A', A''; B', B'' ...) curved in the form of
circular arcs are situated, is equal to 22.5° .

5. Omnidirectional reflector as claimed in claim 2,
20 w h e r e i n opposite parts (A, C and B, D, respective-
ly) are identical, the angles (φ, γ) relative to the symmetry
plane (C_L) for the lines extending from the intersection
points between each horizontal plane (L, M, N, O) and the
determined curve (K), on which lines the curvature centres
25 (θ) for the sectors (A', A''; B', B'' ...) curved in the
form of circular arcs are situated, are equally large by
pairs.

6. Omnidirectional reflector as claimed in claim 5,
w h e r e i n the reflector includes four parts (A, B, C,
30 D), the angles (φ) relative to the symmetry plane (C_L) for
the lines extending from the intersection points between
each horizontal plane (L, M, N, O) and the determined curve
(K), on which lines the curvature centres (θ) for the sec-
tors curved in the form of circular arcs are situated, are
35 15° at the parts (A, C) opposite to one pair, while the
corresponding angles (γ) are 30° at the parts (B, D) oppo-
site to the other pair.

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FIG. 1

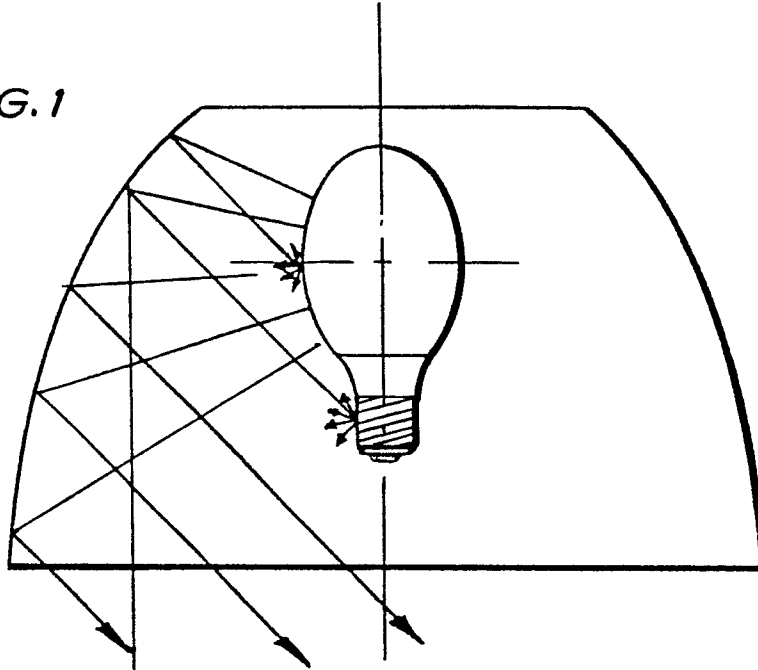


FIG. 2

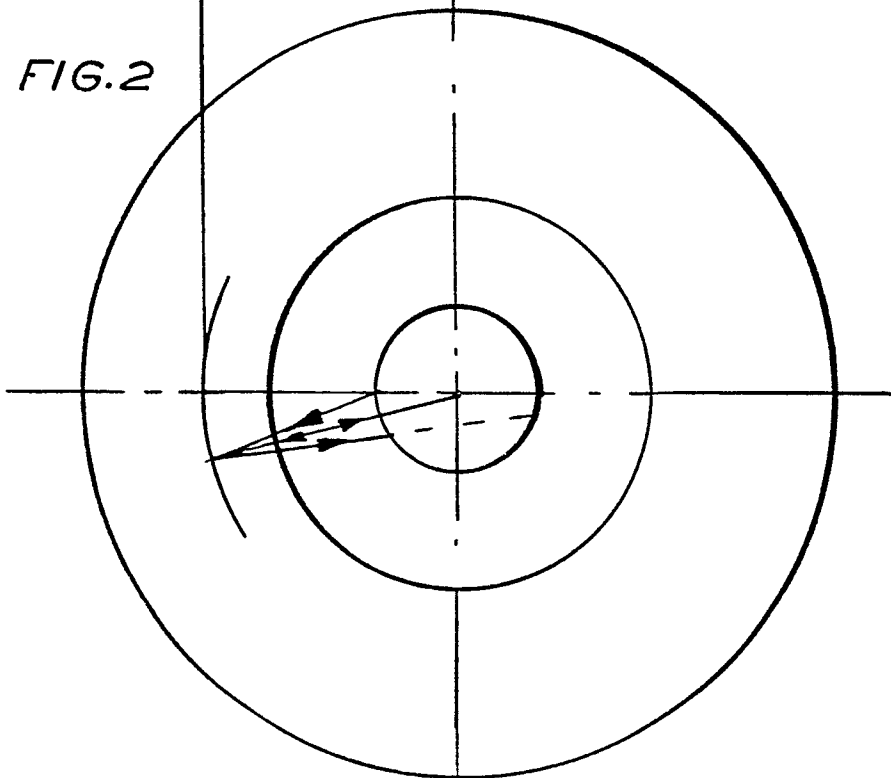


FIG. 3

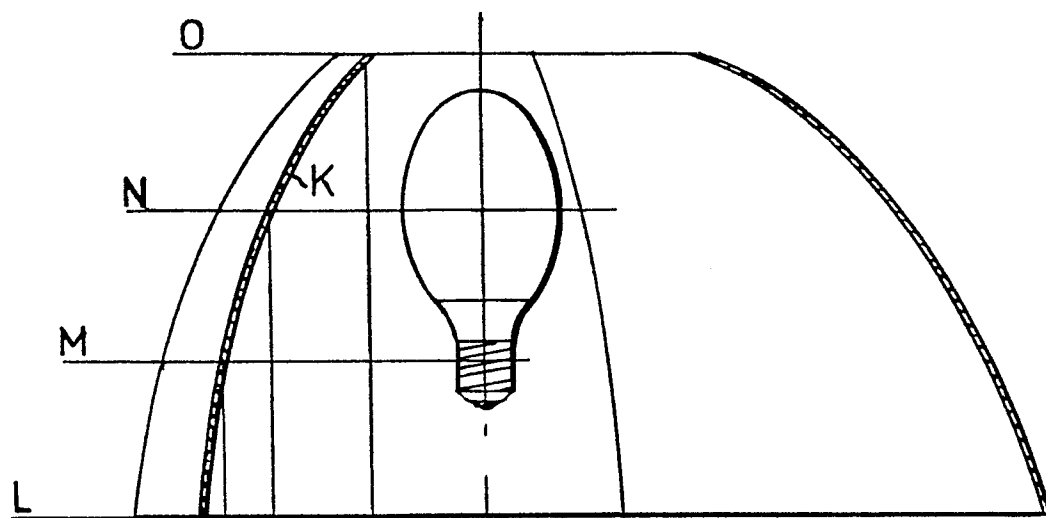
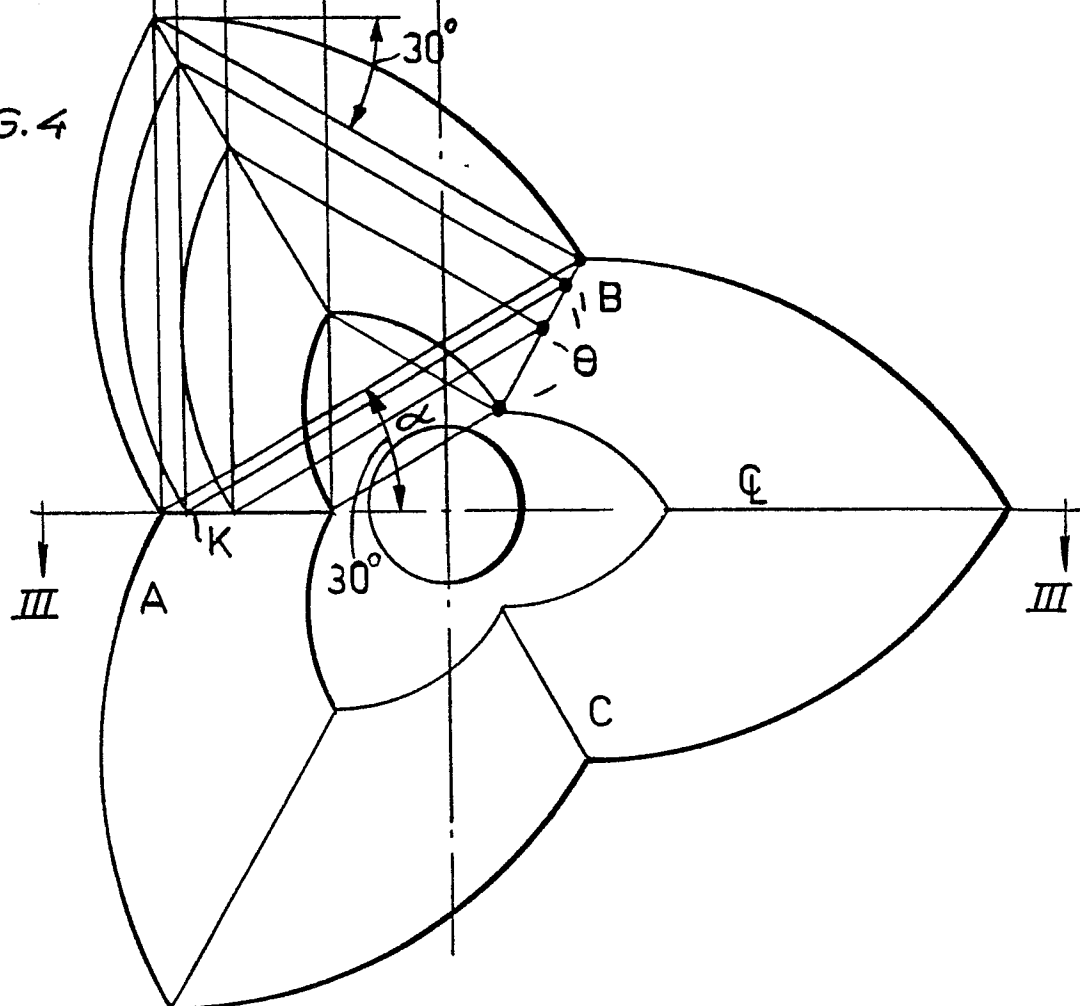
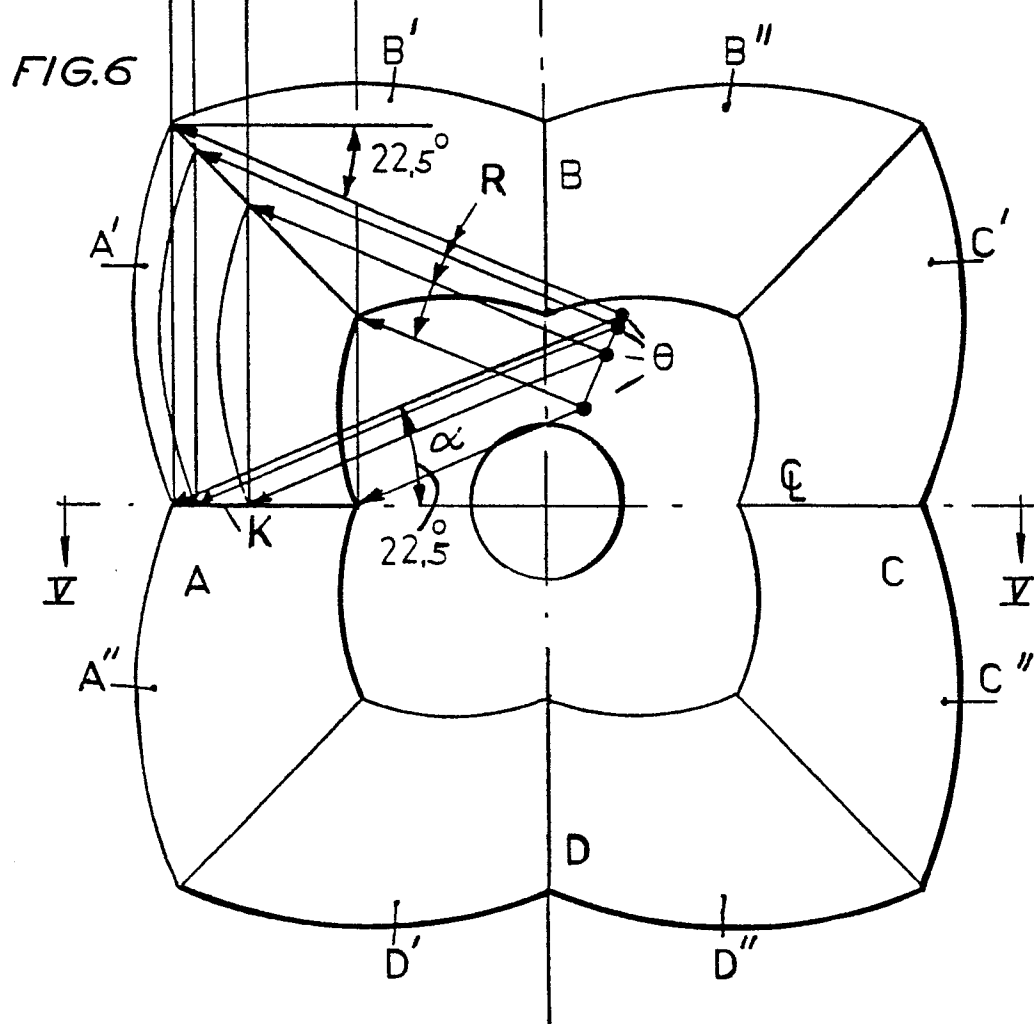
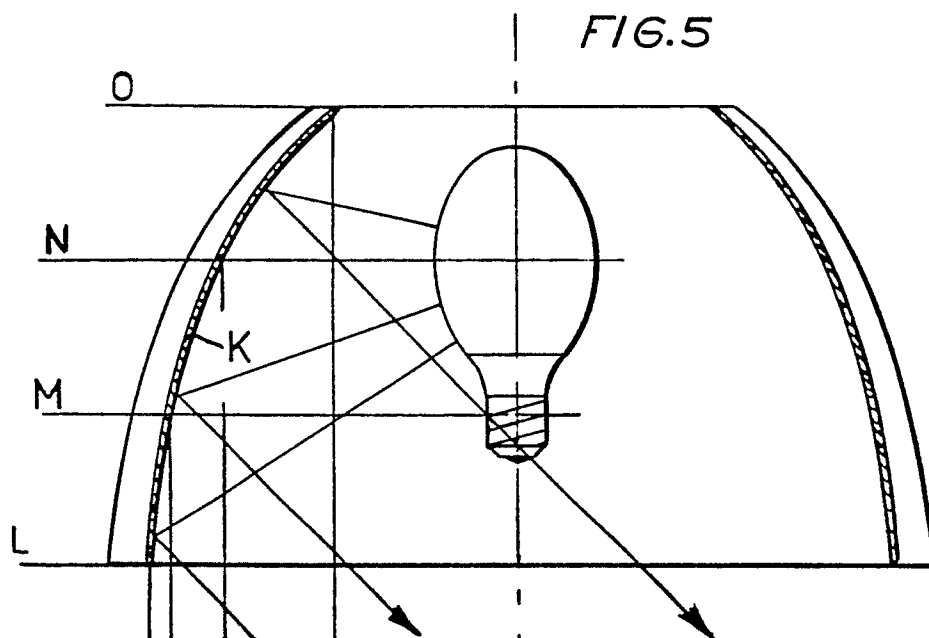


FIG. 4





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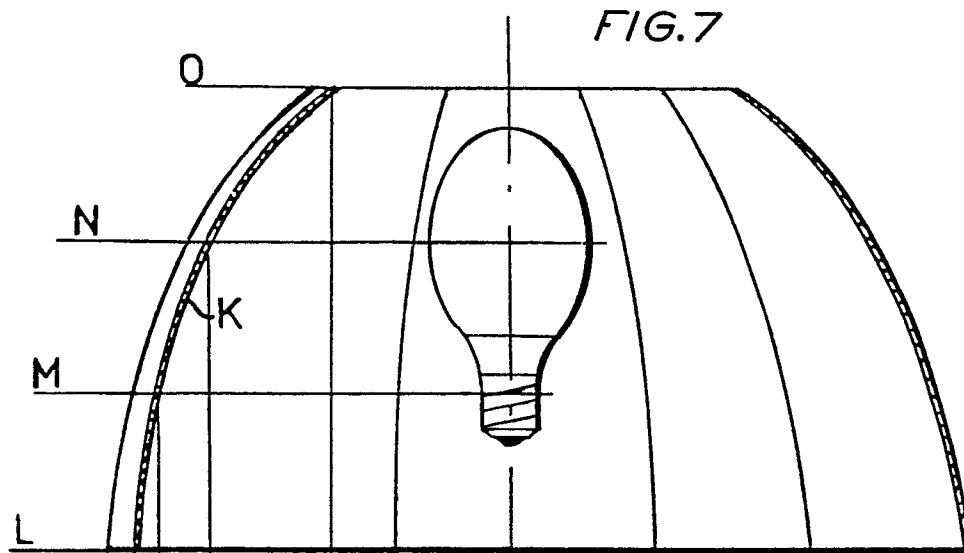
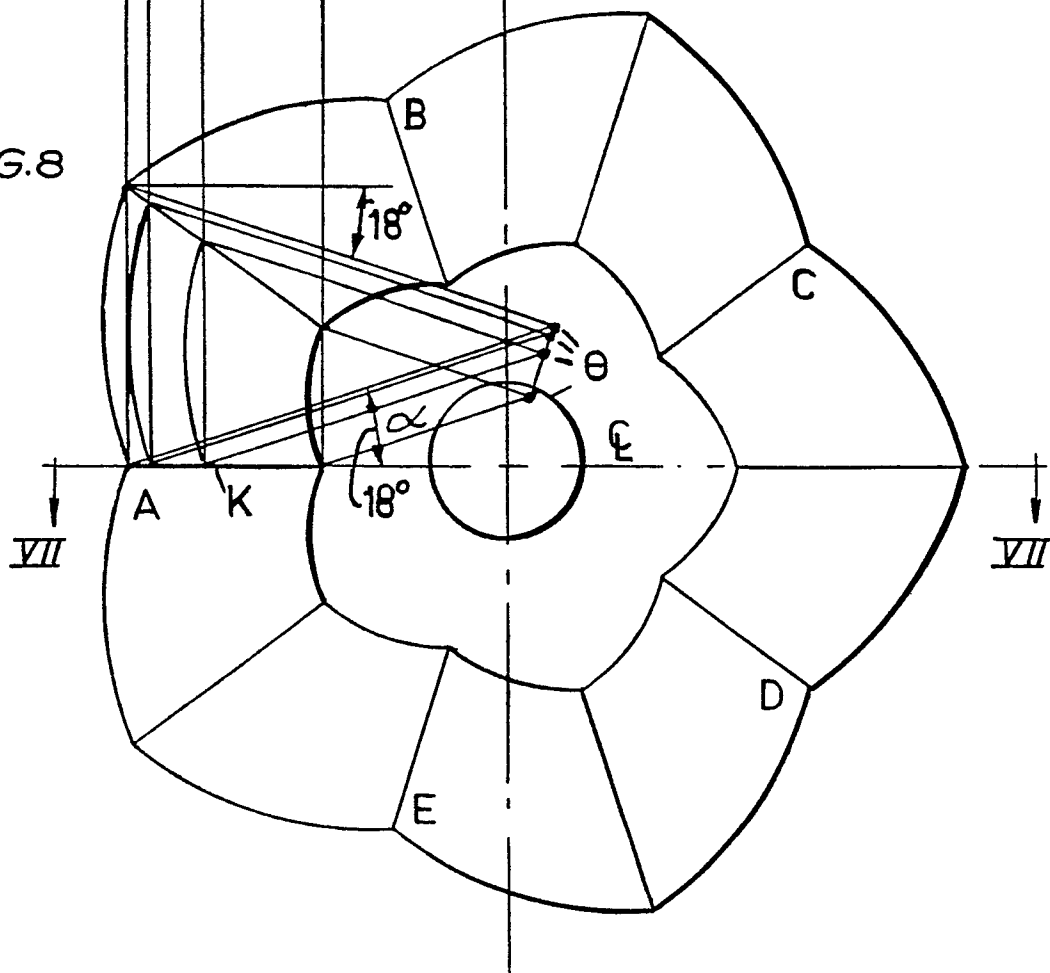
*FIG. 8*

FIG. 9

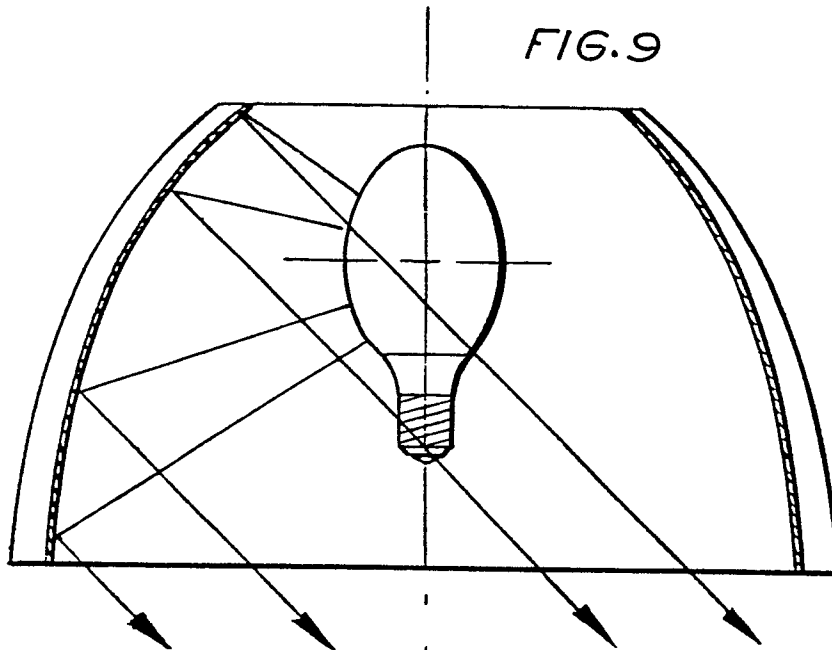


FIG. 10

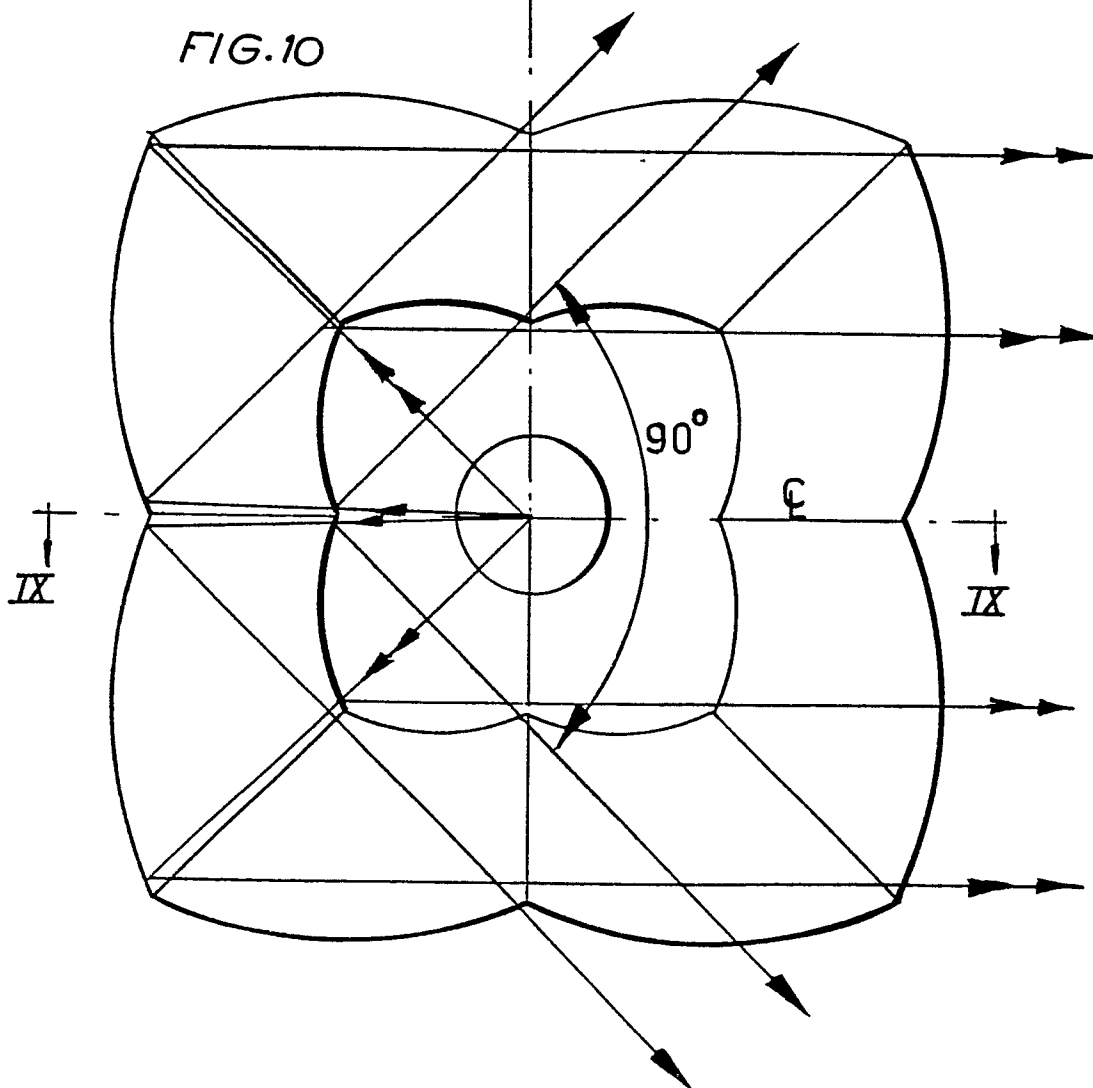
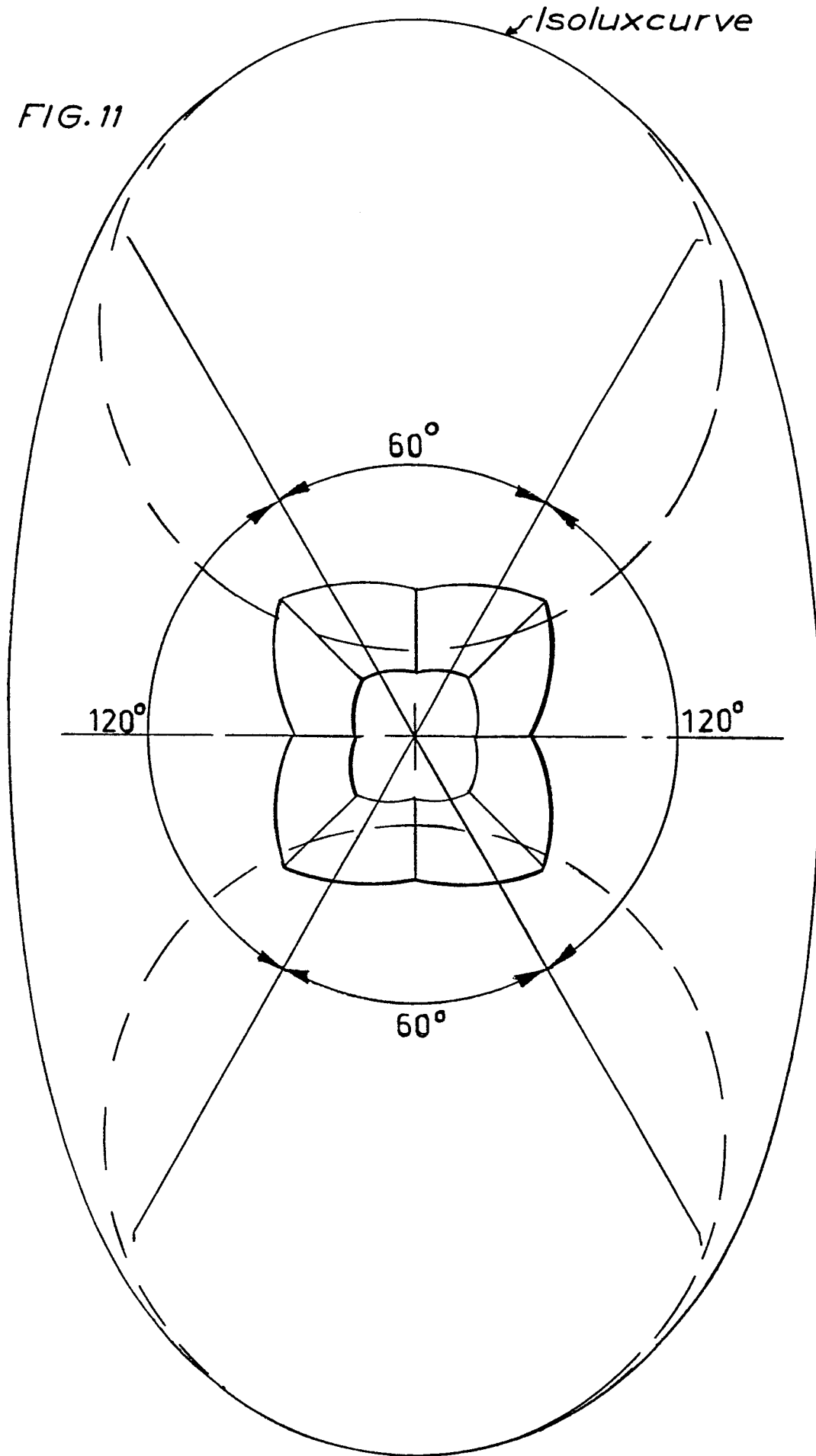


FIG. 11



A diagram showing a light bulb inside a dome. A vertical line passes through the center of the bulb and the dome. Four horizontal lines are drawn across the dome, labeled from top to bottom as O, N, M, and L. A curved line on the left side of the dome is labeled K. The bulb is positioned between the N and M lines.

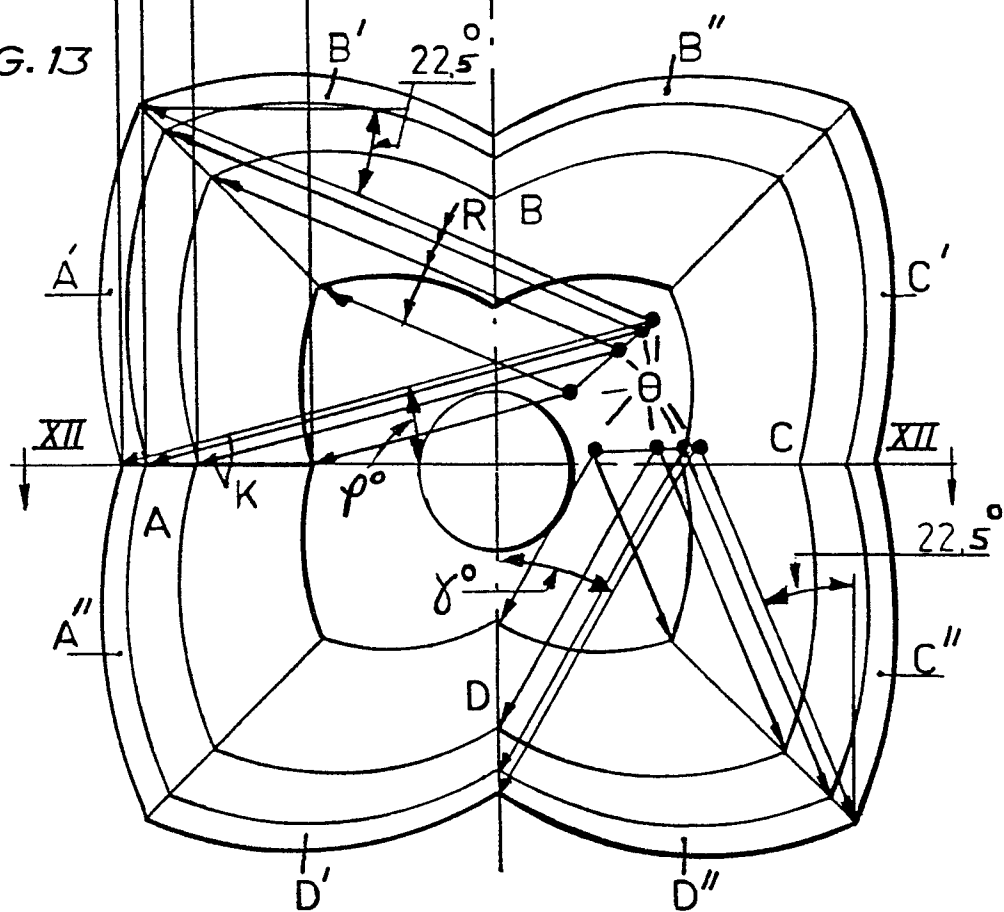


FIG. 14

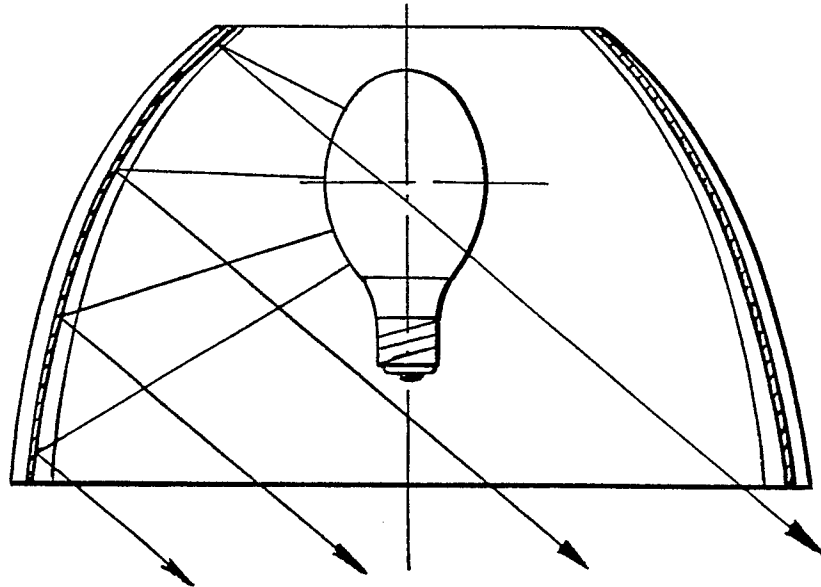
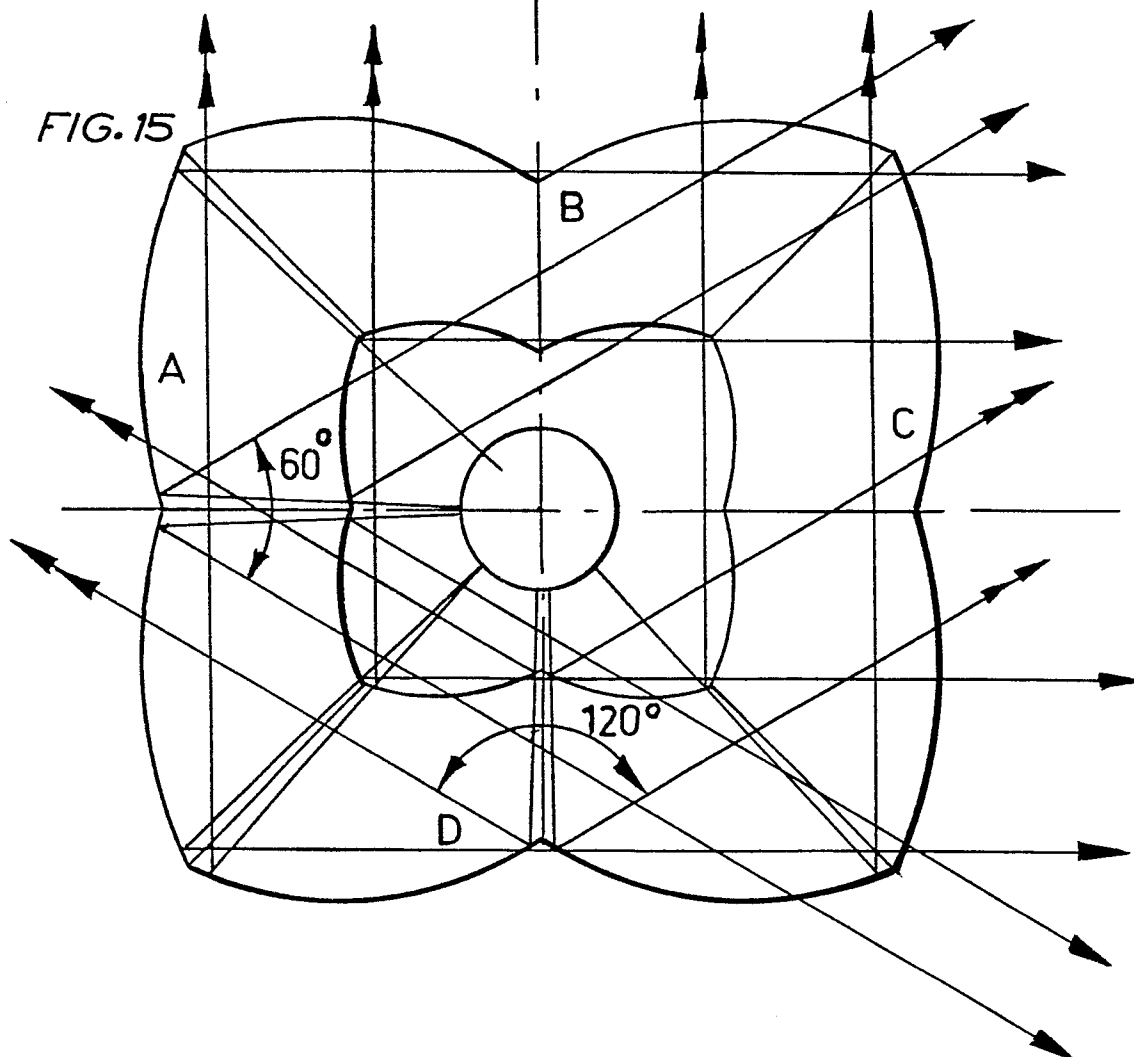


FIG. 15





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X	FR-A-1 222 687 (ANCIENS ETABLISSEMENTS BARBIER) *The whole document*	1	F 21 V 7/09
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
			F 21 V F 21 S
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 04-01-1983	Examiner FOUCRAY R.B.F.
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 & : member of the same patent family, corresponding document	