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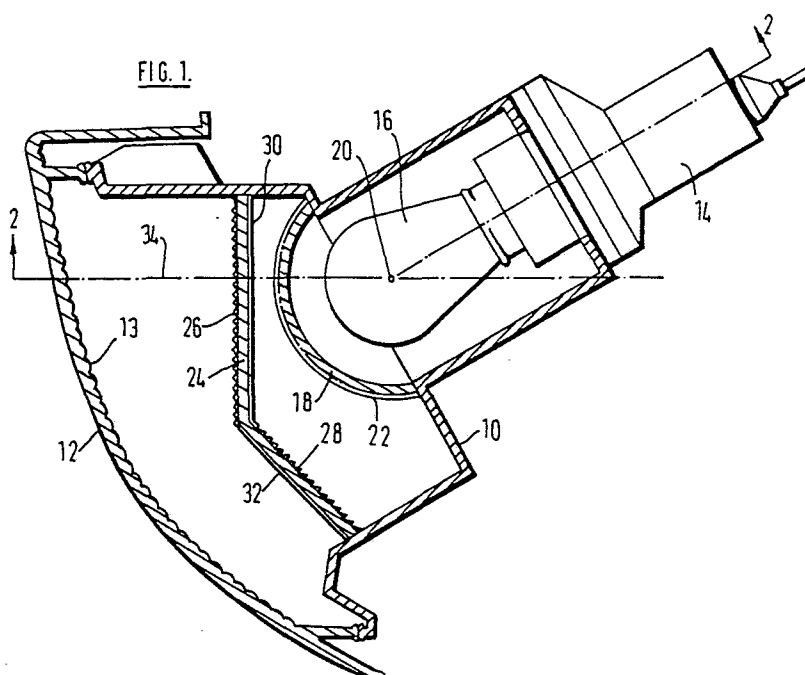
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 **Vehicle lamp assembly.**

 A vehicle lamp assembly comprises a light source (16), a light transmitting outer element (24) and a cylindrical light transmitting intermediate element (18) disposed between the light source (16) and the outer element (24) with the light source (16) on its cylinder axis. The intermediate element (18) has elongate Fresnel prism formations (22) of uniform cross section on its outer surface which extend in respective planes perpendicular to the cylinder axis so as to collimate light from the light source (16) into said planes. A second set of elongate Fresnel prism formations (26, 28), formed on the outer element (24), is oriented parallel to the cylinder axis of the intermediate element (18).



## VEHICLE LAMP ASSEMBLY

This invention relates to a vehicle lamp assembly of the type comprising a light source, a light transmitting outer element and a cylindrical light transmitting intermediate element disposed between the light source and the outer element with the light source on its cylinder axis and having elongate Fresnel prism formations of uniform cross section on one surface extending in respective planes perpendicular to the cylinder axis and arranged to collimate light from the light source into said planes.

A lamp assembly of this type is disclosed in patent specification EP-A-0098062. The intermediate element also has elongate Fresnel prism formations of uniform cross section on its other surface extending in respective planes parallel to the cylinder axis, i.e. perpendicular to the first mentioned prism formations. The combined effect of the two sets of prism formations is to collimate the light from the light source parallel to an optical axis through the light source and perpendicular to the cylinder axis. However, if the intermediate element is to be moulded from plastics material, the shapes of the prism formations must be such that the two halves of the mould can separate from the moulded intermediate element. In other words, none of the prism formations can have undercut draw surfaces. (The draw surfaces are the surfaces of the prism formations interconnecting adjacent surfaces at which light is intended to be refracted). The effect of this is that some of the light from the light source will fall on to these draw surfaces and therefore not contribute to the effective output from the lamp assembly. It is an object of the invention to provide a vehicle lamp assembly which is not subject to this disadvantage.

According to the invention, in a vehicle lamp assembly of the foregoing type, said elongate Fresnel prism formations are disposed on the outer surface of the intermediate element and a second set of elongate Fresnel prism formations is formed on the outer element, said second set of prism formations being oriented parallel to the cylinder axis of the intermediate element.

The outer element must be at a uniform distance from the cylinder axis of the intermediate element in directions perpendicular to such cylinder axis, but otherwise it may be of any convenient shape.

The outer element may itself serve as the cover element of the lamp assembly in which case the prism formations are preferably disposed on its inner surface. However, it will usually be preferable to provide a separate cover element outside the outer element. This permits some of the prism formations to be on the outer surface and others on the inner surface thus further avoiding any risk of light from the light source being wasted by falling on a draw surface.

If the lamp assembly is to be of the type in which the perceived colour when the light source is illuminated is different from that when the light source is not illuminated, the intermediate element may be moulded from material having the colour required to be perceived when the lamp is on. Since there are no prism formations on the inside of the intermediate element, any light from outside the lamp assembly which penetrates through the intermediate element will emerge radially into the enclosure housing the light source and can be trapped by arranging for the inner surface of such enclosure to be coloured black. Perception of the colour of the intermediate element when the light source is not illuminated can be further reduced by providing fluting on the inner surface of the cover element and whichever surface of the outer element not provided with the aforesaid Fresnel prism formations.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

5 Figure 1 is a cross sectional view of a lamp assembly in accordance with the invention taken on a horizontal plane;

Figure 2 is a cross sectional view taken on the line 2-2 in Figure 1 and showing the line 1-1 on which the cross section of Figure 1 is taken;

15 Figure 3 is a scrap cross-sectional view of an element having Fresnel prism formations on the side nearer to a light source; and

20 Figure 4 is a scrap cross-sectional view of an element having Fresnel prism formations on the side further from a light source.

Referring to the Figures 1 and 2, the front direction indicator lamp of a motor car consists of a housing 10 enclosed by a transparent cover element 12 having elongate flutings 13 on its inner surface. The housing 10 includes a bulb holder 14 which supports a bulb 16.

25 Located between the bulb 16 and the cover element 12 is a cylindrical intermediate element 18 of amber plastics material, the axis 20 of the cylinder passing through the filament of the bulb 16. The outer surface of the intermediate element 18, i.e. the surface further from the lamp 16, carries elongate Fresnel prism formations 22 extending in respective planes perpendicular to the cylinder axis.

30 Between the intermediate element 18 and the cover element 12, there is an outer element 24 consisting of two flat portions arranged at an angle to each other. One portion extends perpendicular to the emergent beam of light and has elongate Fresnel prism formations 26 on its outer surfaces extending parallel to the cylinder axis of the intermediate element 18. The other portion is oriented so as to approximately bisect the angle between the light incident thereon from the intermediate element 18 and the light emergent therefrom. This portion has elongate Fresnel prism formations 28 on its inner surface extending parallel to the prism formation 26. The choice of surface on which to locate the prism formations 26 and 28 is made so as to minimise the amount of light falling on draw surfaces, as will be explained hereinafter. Flutings 30 and 32 are disposed on the outer element 24 on the opposite surfaces to the prism formations 26 and 28 so as to extend perpendicular to the flutings 13 on the cover element 12.

35 When the bulb is illuminated, rays of light therefrom are deflected into horizontal planes parallel to the optical axis 34 of the lamp by the intermediate element 22. They are then deflected parallel to the optical axis 34 within such planes, i.e. in the vertical direction, by the Fresnel prisms 26 and 28 on the outer element 24. Thus a parallel beam is directed through the entire area of the cover element 12.

40 When the bulb 16 is not illuminated, most of the light which penetrates the cover element 12 is reflected from the various formations on the outer surfaces of the outer element 24 and the inner element 18, the colour of such reflected light being unchanged. Any light which penetrates the intermediate element 18 and thus becomes amber con-

tinues inwardly to the walls of the part of the housing 10 surrounding the bulb 16, which walls are coloured black. Consequently, scarcely any amber light emerges from the lamp when the bulb is not illuminated.

As mentioned above, light falling on the draw surfaces of a Fresnel prism element is effectively unusable. This is illustrated in Figure 3 which shows a fragment of such an element 40 with a beam of light, including rays 42, 44, 46 and 48 incident on the side carrying the prism formations. The emergent beam is required to be perpendicular to the plane surface of the element 40. The part of the beam between the rays 42 and 44 and incident on a prism surface 50 and are deflected horizontally as illustrated. The part of the beam between the rays 44 and 48, such as the ray 46, are incident on a draw surface 52. They are then internally reflected on the prism surface 50 and thence directed upwardly (as drawn) away from the main horizontal output beam. On the other hand, if the Fresnel prism element 40 is turned round so that the prism formations are on the side further from the light source (not shown), all the light in a beam bounded by rays 56 and 58 either passes through the prism surface 50 or the adjacent prism surface 54 in a direction parallel to the draw surface 52. Thus the arrangement of the element 40 illustrated in Figure 4 is suitable for use as the part of the outer element 24 carrying the prisms 26.

Because of the different orientation of the other part of the outer element 24, none of the light incident on the prism formations 28 reaches their draw surfaces. If the prism formations 28 were on the outside of the outer element 24, i.e. as illustrated in Figure 4, the incidence beam would be at a greater angle to the normal to the plane surface than are the raised 56 and 58, with the result that some of the emergent beam would fall on the draw surfaces 52.

Similarly, if the prism formations 22 on the intermediate element 18 were disposed on the inner surface thereof, some of the light from the bulb 16 would fall on draw surfaces, as illustrated in Figure 3. Since the prism formations 22 are, in fact, disposed on the outside of the intermediate element 18, the path of the light from the bulb 16 is as illustrated in Figure 4 and none of the emitted light falls on draw surfaces.

#### Claims

1. A vehicle lamp assembly comprising a light source (16),

a light transmitting outer element (24) and a cylindrical light transmitting intermediate element (18) disposed between the light source (16) and the outer element (24) with the light source (16) on its cylinder axis and having elongate Fresnel prism formations (22) of uniform cross section on one surface extending in respective planes perpendicular to the cylinder axis and arranged to collimate light from the light source (16) into said planes, characterised in that said elongate Fresnel prism formations (22) are disposed on the outer surface of the intermediate element (18) and a second set of elongate Fresnel prism formations (26, 28) is formed on the outer element (24), said second set of prism formations (26, 28) being oriented parallel to the cylinder axis of the intermediate element (18).

2. A vehicle lamp assembly according to claim 1, wherein the outer element (24) is integral with the cover element of the lamp assembly and the second set of prism formations - (26, 28) are disposed on its inner surface.

3. A vehicle lamp assembly according to claim 1, having a cover element (12) outside the outer element (24) and some of the prism formations (26) of the second set are on the outer surface and others (28) are on the inner surface thereof.

4. A vehicle lamp assembly according to claim 3, wherein the outer element (24) comprises first and second plane portions, the first portion being perpendicular to the direction of the emergent light beam therefrom and having some of the the prism formations (26) of the second set on its outer surface, and the second portion being inclined to the first portion and having others of the prism formations (28) of the second set on its inner surface.

5. A vehicle lamp assembly according to any preceding claim, wherein the lamp assembly is of the type in which the perceived colour when the light source (16) is illuminated is different from that when the light source (16) is not illuminated, the intermediate element (18) is moulded from material having the colour required to be perceived when the lamp is on.

FIG. 1.

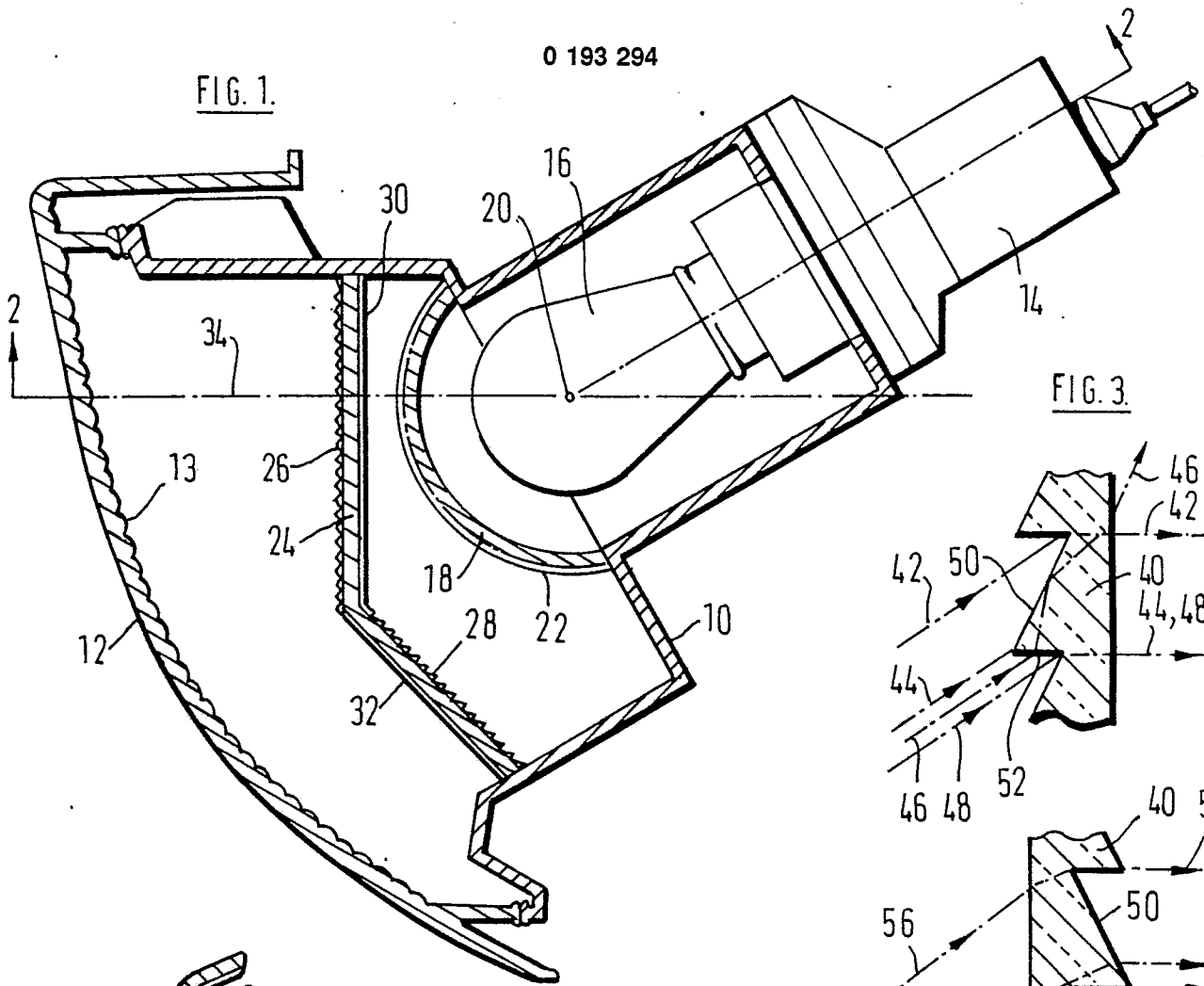


FIG. 3.

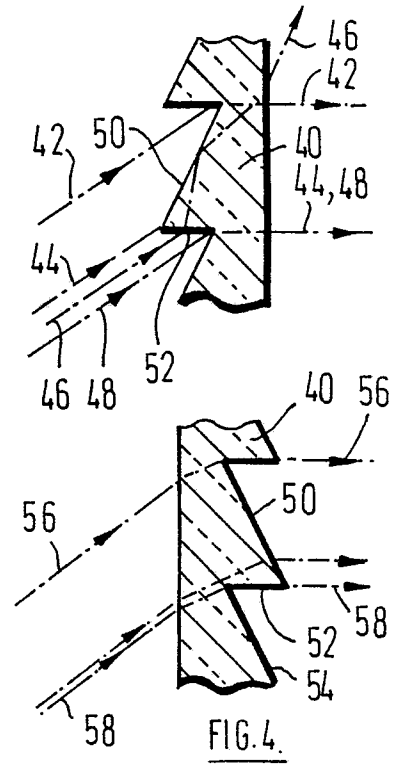


FIG. 2.

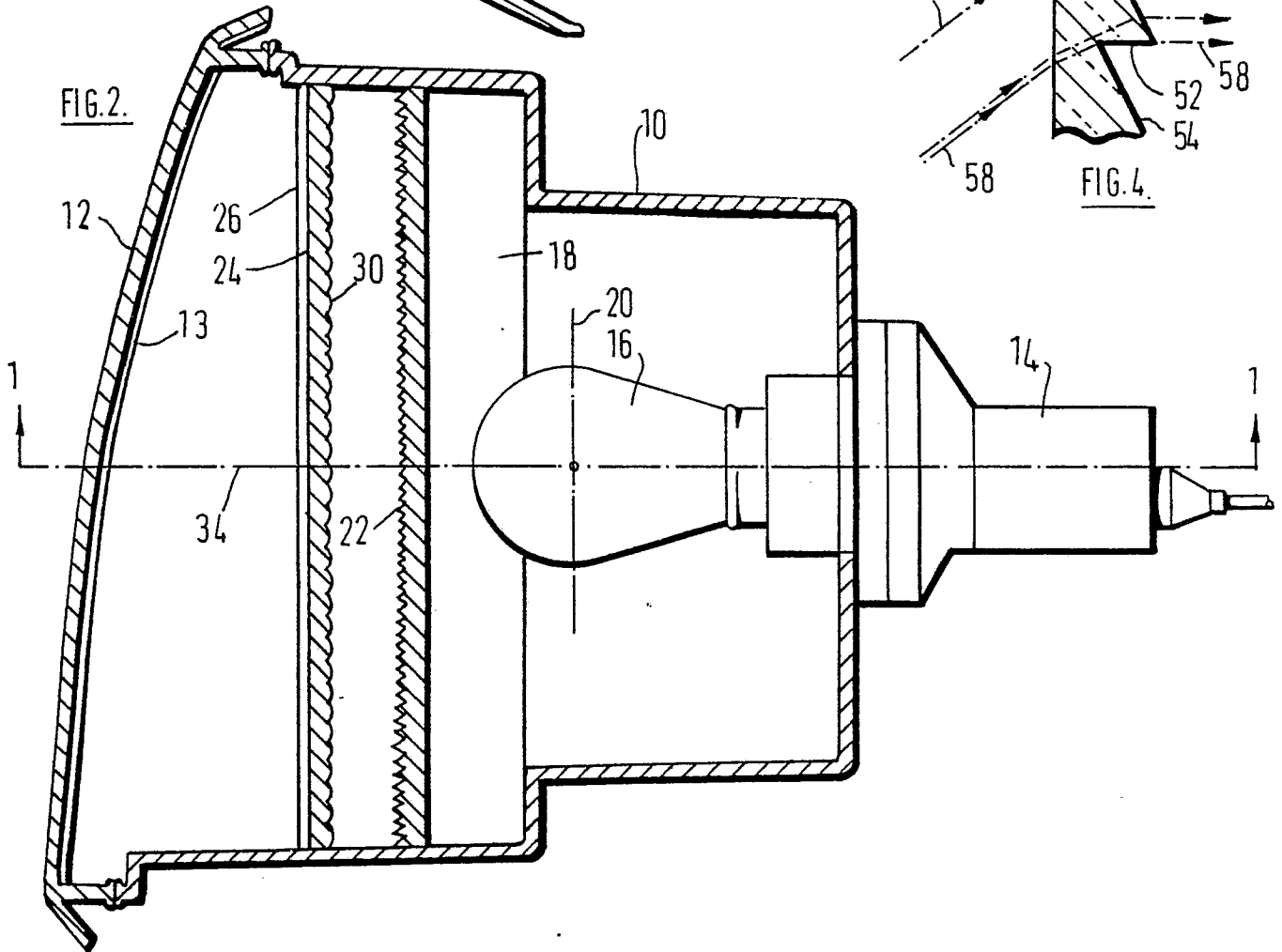


FIG. 4.

