

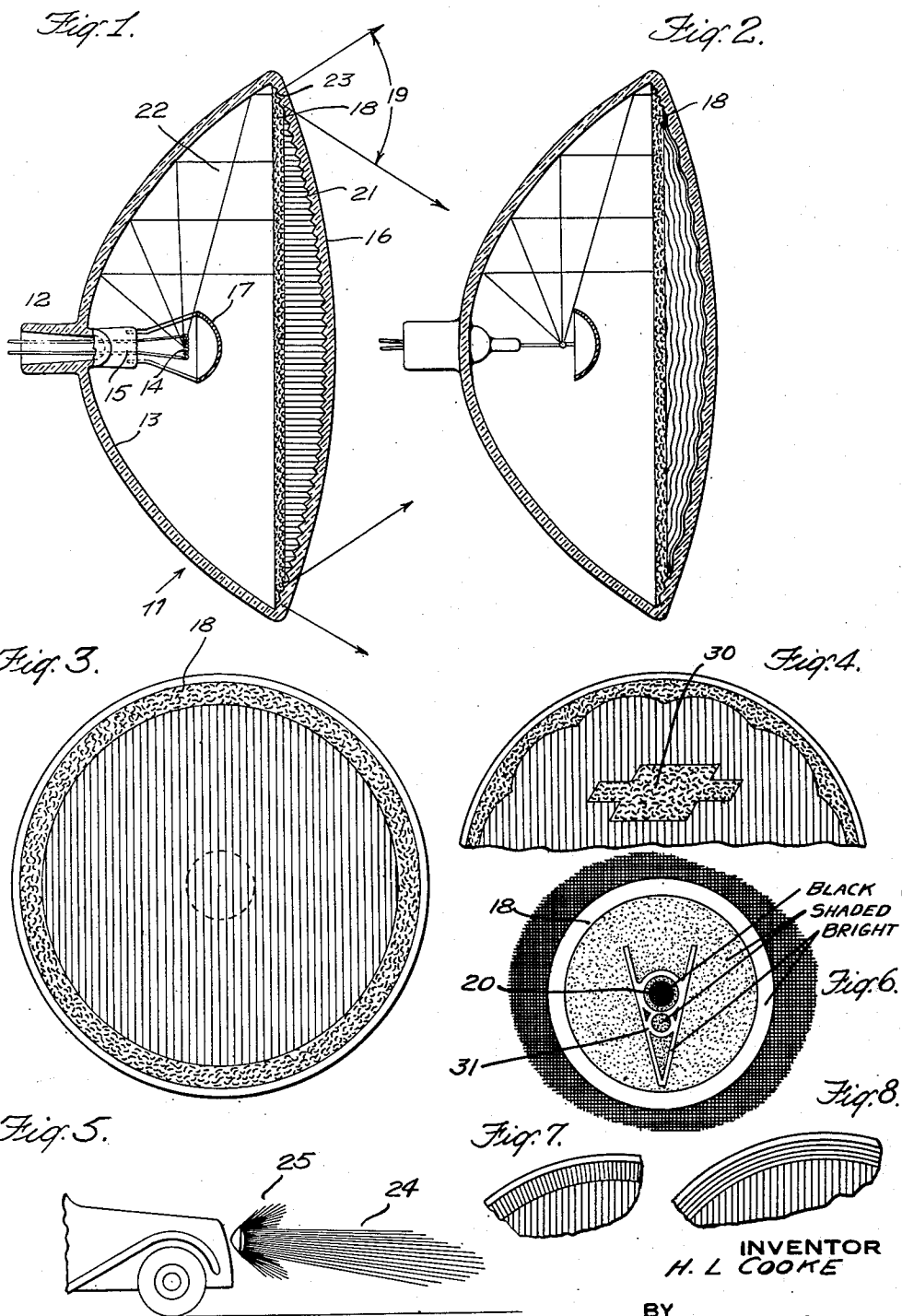
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2,220,145

HEADLIGHT

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2,220,145

HEADLIGHT

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5 Claims. (Cl. 176—34)

This invention relates to light projecting devices and has special reference to headlights for use on automobiles wherein provision is made for a single beam of light of predetermined brilliance and direction and a non-glare annular band of diffused light surrounding said beam. It relates more particularly to the type of lamp wherein the source of light and the reflector are combined in a single unit so that the conventional reflector combined with a separate bulb may be dispensed with.

In my prior Patent No. 1,712,027 of May 7, 1929, I have disclosed headlights having paraboloid reflecting surfaces with concentrated filaments or other convenient sources of light at the foci of said paraboloids and front surfaces of ordinary form. I also disclosed in said patent the incorporation in such a lamp of an internal shield in front of the filament whereby only those rays reflected by the paraboloid can emerge from the lamp, direct rays from the filament being intercepted by said internal shield. While this arrangement, by cutting out the direct illumination, shields the eyes of oncoming drivers from glare, it has the disadvantage that, particularly with good designing, the wide angle of illumination as opposed to the beam or columnar illumination is apt to be so faint as to endanger the car from obstructions close to the car but out of the direct beam of the reflected light, such as overhanging branches and the like, and thus perception of objects outside the region of calculated intense illumination is rendered difficult.

My invention is not necessarily to be limited to the use of a light comprising an integral light source and reflector. It is also applicable to the customary automobile headlight or other lights comprising a conventional electric bulb and a reflecting surface. However, certain distinct advantages result from applying my invention to integral light source and reflector systems in that the absence of surfaces of glass between the light source and the reflector, such as the outer and inner surfaces of a bulb, avoids diffraction and multiple reflection and increases the sharpness of the collimation. In lights employing bulbs, wide angle illumination depends on stray rays resulting from diffractions and multiple reflections and from direct rays from the unshielded filament, but since no control over the amount or direction of light so diffracted or directly emitted is obtained, glare is very likely to result. According to my invention in integral light source and reflector sys-

tems, especially where direct rays are intercepted by a shield, all rays are first brought under control and collimated by the reflector. A specified portion of these controlled rays is then diffused or spread. Thus the rays directed laterally for wide angle illumination may be controlled exactly both in intensity and direction. Owing to this definite control and to the fact that the main beam itself is sharply defined and composed of completely collimated rays, it is possible to greatly increase the candle power of headlights which may be used with safety on the highways. This permits faster and safer night driving.

It is an object of this invention to provide a light projection device or headlight which shall have combined with a collimated beam of predetermined direction and intensity an additional zone of diffused or spread rays which also may be of predetermined intensity whereby light may be directed over any required solid angle ahead of an automobile. It is a further object of this invention to provide an integral bulb, reflector and lens capable of producing a collimated beam of desired intensity and direction, in which the direct rays of the light source are shielded to prevent glare, having a pebbled or otherwise striated zone upon the lens portion of the bulb adapted to change the direction of the rays passing through that portion in a random or calculated manner, thereby producing in that portion of the lens a zone of substantially glareless diffused illumination. Further objects and advantages will appear from the description and drawing in which—

Fig. 1 is a horizontal section of an embodiment of a lamp having my improvement applied thereto;

Fig. 2 is a vertical section of the same embodiment;

Fig. 3 is a front view of the lens shown in Figs. 1 and 2;

Fig. 4 is a front view of a part of an optional form of lens;

Fig. 5 is a side view of the front part of an automobile illustrating diagrammatically an example of light distribution obtainable by use of the lamps of this invention.

Fig. 6 is a front view showing how the lamp will appear to the occupant of an oncoming car when illuminated at night, the lens of the lamp having a conventional design applied thereto; and

Figs. 7 and 8 are fragmentary front views illustrating modified forms of lens construction.

Referring to Fig. 1, 11 denotes a bulb having a base 12 which may be arranged to cooperate with a bayonet socket of the type well known in the art, or to be mounted in a proper socket in any convenient manner. The rear wall 13 of the lamp is preferably in the shape of a paraboloid or parabola of revolution, and the light source 14, which may be in any convenient form, here shown as a filament, is mounted upon the support 15 which has such length and position that the center of the filament is as nearly as possible at the focal point of the paraboloid. Where a filament is used, it is preferably as compact as possible and may be of any known kind which approaches the ideal condition of a point source of light. As shown in Figs. 1 and 2, the filament 14 may preferably have its longer axis horizontal, but any suitable approximate point source of light may be used.

The exterior or preferably the interior surface of the rear wall 13 is silvered or otherwise made a reflecting surface and serves thereby to reflect the rays of light from the source 14 and to form them into a substantially parallel or collimated beam of light which passes through the non-silvered front portion 16 of the bulb. In order to cut off the direct rays emanating forwardly from the source of light, which would not be collimated, I preferably provide a shield 17 of opaque or darkened transparent material which may be located as shown in Fig. 1 between the source of light 14 and the non-silvered part of the bulb 16 through which the reflected rays are directed. This shield may be of any suitable form, such as the spherical form shown, and may be mounted in any convenient fashion, it being the purpose of the shield to cut off all rays from the source of light which would otherwise pass directly out of the bulb without striking the reflector.

The front of the bulb may suitably be formed into a lens by striations or prisms or in any other convenient manner. By modifying the form of the lens the collimated rays may be directed in a variety of configurations and directions according to the use to which the bulb is to be put. When used in automobile headlights I have found it preferable to design the lens portion of the bulb so that the collimated rays may be slightly depressed in order to avoid glare in the eyes of the oncoming driver and laterally spread to a small extent in order to light the desired width of the road.

With the described arrangement of shield and reflector the direct illumination from the source of light is eliminated and a light is achieved having a true collimated beam and lacking entirely the stray rays which cause the objectionable glare which in automobile lights tends to blind the oncoming driver. However, under these circumstances, the only diffused or wide angle illumination obtained will be from the light subjected to multiple reflection by the lens 16. When this lens is properly designed the diffused illumination is so faint as to make perception of objects outside the region of calculated illumination difficult.

In order to avoid this disadvantage, while obtaining all of the benefits of the light heretofore described, I propose to add to the lens 16 a portion 18 of pebbled or striated irregularities or definitely formed prismatic characteristics designed to diffuse the light passing through it from the reflector in such a manner that this light leaves the collimated beam and is spread laterally from said beam in random or predeter-

mined directions. The pebbles or striations of the lens portion 18 may be so formed as to confine the laterally spread light within suitable angular limits such as the angle 19 shown in Fig. 1. I have found it preferable to locate this striated or pebbled configuration of the lens 16 partly or wholly about the circumference thereof either in the form of an annulus, Fig. 3, or in various suitable designs, such as shown in Fig. 4, according to the requirements of the designer. If desired, the lens may also be provided with a pebbled or striated area in the form of a design, a trademark such as shown at 20, in Fig. 4 or 31 in Fig. 6. As will be evident the pebbled or striated surfaces are composed of a plurality of smooth or polished elements so as to be transparent and permit transmission and diffusion of the rays passing through such areas. In this way sufficient light for the purpose desired is permitted to pass through the diffusion zone of the lens but is so effectively diffused that glare is prevented.

Figs. 7 and 8 illustrate possible arrangements of striations which may be substituted for the pebbling in the area 18 and adapted to diffuse or spread the light at the margin of the lens. Fig. 7 shows such striations arranged radially and Fig. 8 shows them arranged circumferentially. Any other suitable arrangement may also be used.

From the foregoing description it will be apparent that numerous advantages arise from this type of light. The combination of reflector and light source in one integral system insures that there will be a fixed relation between the light source and the reflecting surface so that the reflected beam of light will not be subject to variations which ordinarily are caused by slight movements of a light source such as a bulb in relation to the reflecting surface. This is a particularly salient advantage when these lights are applied to automobiles as the jolting of the car during travel will not disturb the accurate adjustment between the light source and the reflecting surface. The use of an annulus of pebbling or striations which changes the direction of the outside portion of the collimated beam does not detract sufficiently from the strength of the beam to seriously affect its lighting qualities as, in fact, the rays which are diffused in this manner are the weakest reflected rays from the reflecting surface 13. This arises from the fact that where a given quantity of light is to be diffused through an annular area such as 18, the apparent intrinsic brilliance of this annulus will vary inversely as the square of the radius vector 22 from the light source 14 to the center 23 of the annulus and the area 18 is that part of the lens furthest from the light source. In addition to the control of the portion of light used in the beam, absolute control of the portion of light used for diffused illumination may also be obtained as the area of the annulus and the configuration of the pebbling or striations may be conveniently adjusted to suit the needs of the individual light. Furthermore, the angle of diffuse illumination may also be very closely and carefully controlled by adjustment of the striations or pebbling.

As viewed from ahead, the light, when illuminated and in the surrounding darkness, will have a distinctive and noticeable appearance as illustrated in Fig. 6, the annular region 18 being bright but not dazzling, the intermediate region being faintly illuminated when viewed from a position above or at one side of the direct collimated beam, and the central portion 20 which is over the

shield 17 being black, the pattern of the intermediate and central portions being, of course, modified more or less by the prisms or striations 21 of the lens. The annular region 18, however, will be sharply defined and very striking in appearance. If the lens is provided with a pebbled or striated design such as 30 or 31, this design will appear bright like the annulus 18.

The resulting light distribution obtained from my new light is illustrated diagrammatically in Fig. 5 wherein is shown the beam 24 which comprises the collimated rays which are reflected through the main part of the lens 16 and the cone or fringe of diffused rays 25 which are those rays broken up and spread by the striations or pebbling 18 at the margin of the lens.

Where my invention is applied to an integral bulb and reflector, the lamp may be manufactured by blowing in a mould or by constructing the reflector 13 and lens 16 as two separate portions and fusing them together at their outer peripheries, or by any other suitable means. Parts 14 and 17 may suitably be placed in the reflector part of the bulb prior to the fusing process.

While the invention is directed mainly to use in automobile headlights it is, of course, to be understood that it covers all lamp systems of this type, whether intended for automobile or other use. It is further contemplated by the invention that the reflecting surface need not necessarily be paraboloid but may be of other shapes according to the needs to which the lamp is applied and the position of the filament or other source of light need not necessarily be concentrated in the focus of the paraboloid although this arrangement is preferable. As before stated, other sources of light than filaments may be used such as the ball of incandescent tungsten of the type used in certain lamps known in the art.

I claim:

1. In a headlight, a glass bulb having an integral portion for reflecting rays in a substantially non-diverging beam, a concentrated source of light therein at the focus of said reflector, a shield interior of the bulb disposed in the path of the rays tending to pass directly from said source to the interior of the bulb, said bulb hav-

ing an integral lens portion comprising a zone for modifying the distribution of the beam and a diffusing zone.

2. An electric light comprising an integral bulb and reflector, a source of light located at the focus of said reflector, a shield to intercept unreflected rays, and a front lens portion, said lens portion comprising a circumferential annular zone for diffusing light within predetermined limits and a central portion for passage of reflected light in a collimated beam.

3. An integral electric light comprising a paraboloid reflector, a light source at the focus of said reflector, a shield preventing the emergence of direct rays from the light source and a lens through which the reflected rays pass, said lens comprising an annular zone for diffusing reflected rays in a random manner, and a zone for directing reflected rays in a collimated beam of high brilliance.

4. An electric headlight unit comprising a paraboloidal reflector and a front lens united to form a sealed bulb, a filament located at the focus of said reflector, said lens having a central portion formed to emit a collimated beam of high intrinsic brilliance and a surrounding portion formed of a large number of irregular, smooth, transparent, refracting surfaces acting to diffuse a part of the light coming from said unit in a random manner.

5. An electric headlight unit comprising a reflector for reflecting rays in a collimated beam, and a filament therein at the focus of said reflector, said unit having a lens united to the reflector to form a sealed bulb, said lens comprising a prisms zone for modifying the distribution of the collimated beam so as to limit the upper boundary of the beam to a given level, said lens also having a zone in the form of a definite pattern, said zone being formed of irregular, smooth, transparent, refracting surfaces to thoroughly diffuse rays of light passing through the same, whereby when the said headlight is viewed from a point in front of the same, and above the upper boundary of said collimated beam, the pattern of said diffusing zone will be clearly defined and plainly visible.

HEREWARD LESTER COOKE.

CERTIFICATE OF CORRECTION.

Patent No. 2,220,145.

November 5, 1940.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, first column, line 48, claim 1, for the word "interior" read --exterior--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 31st day of December, A. D. 1940.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.