Feb. 25, 1930. S. F. ARBUCKLE 1,748,057

BEAM ADJUSTING MEANS

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Fig. 1.

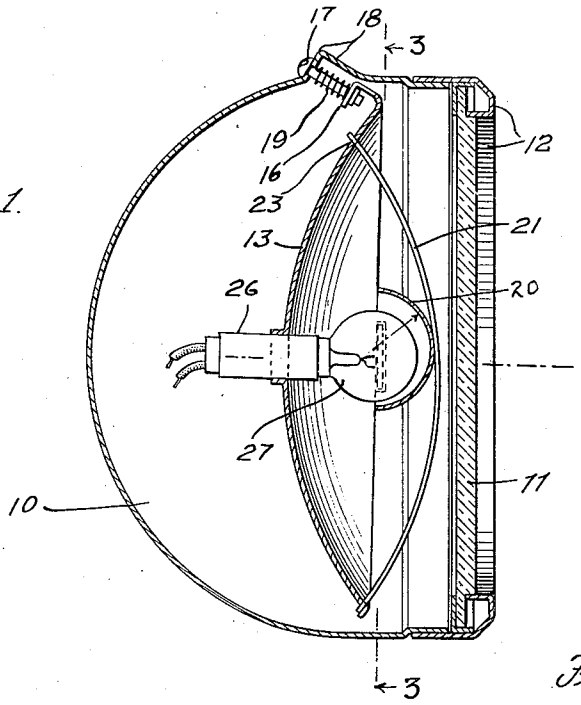


Fig. 2.

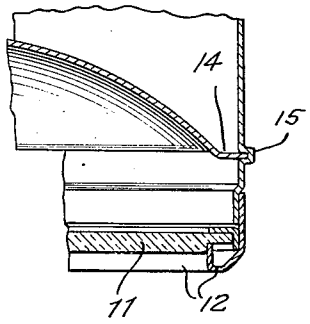


Fig. 5.

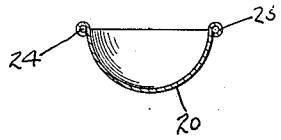


Fig. 3.

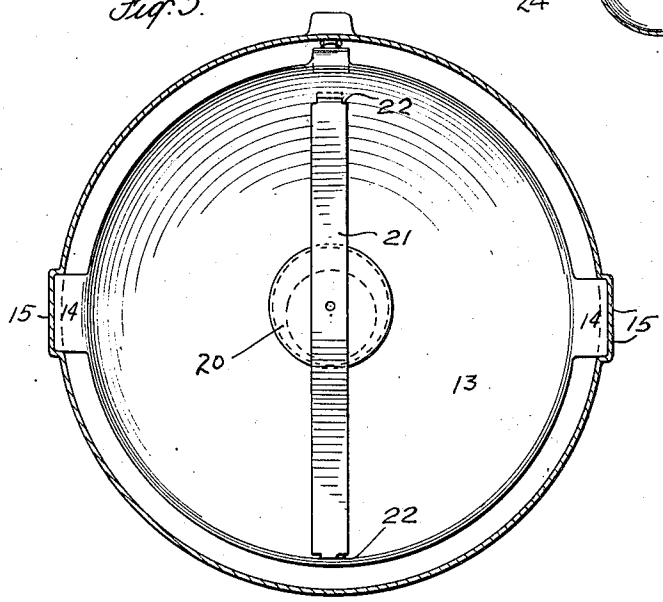
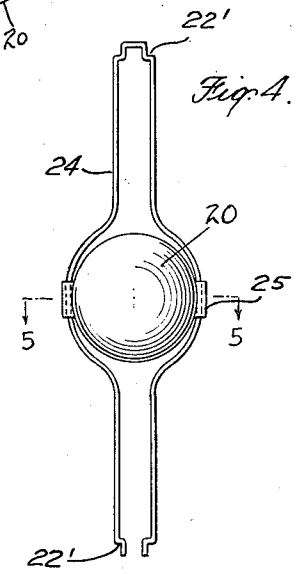


Fig. 4.



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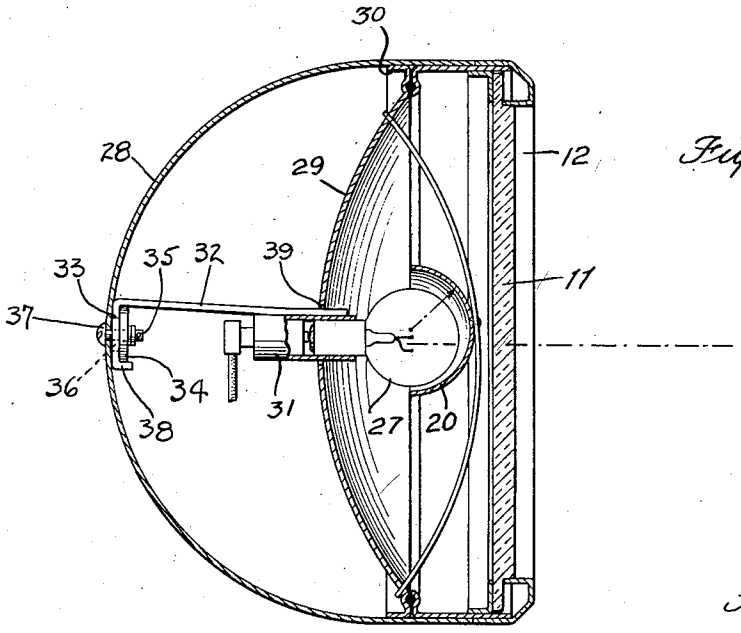


Fig. 6.

Fig. 9.

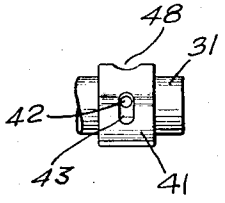


Fig. 7.

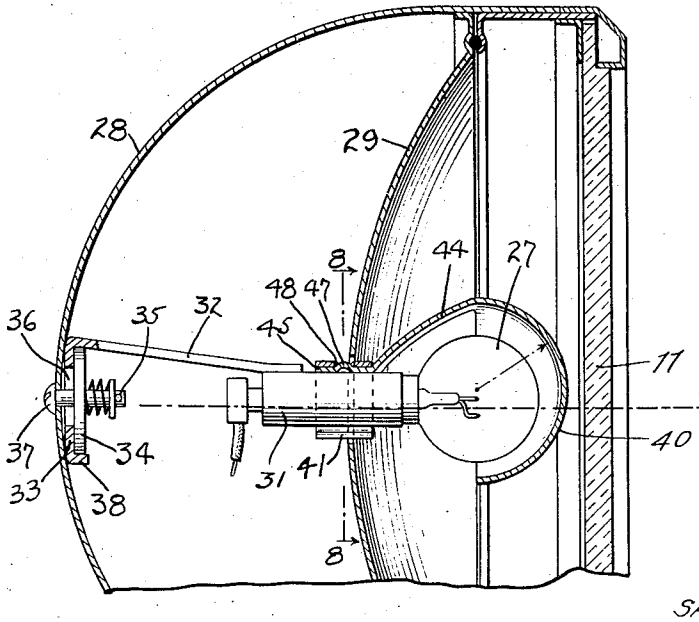
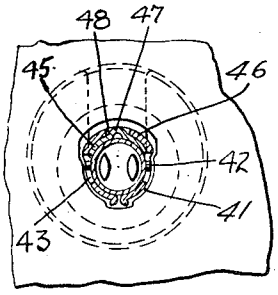


Fig. 8.



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Fig. 10.

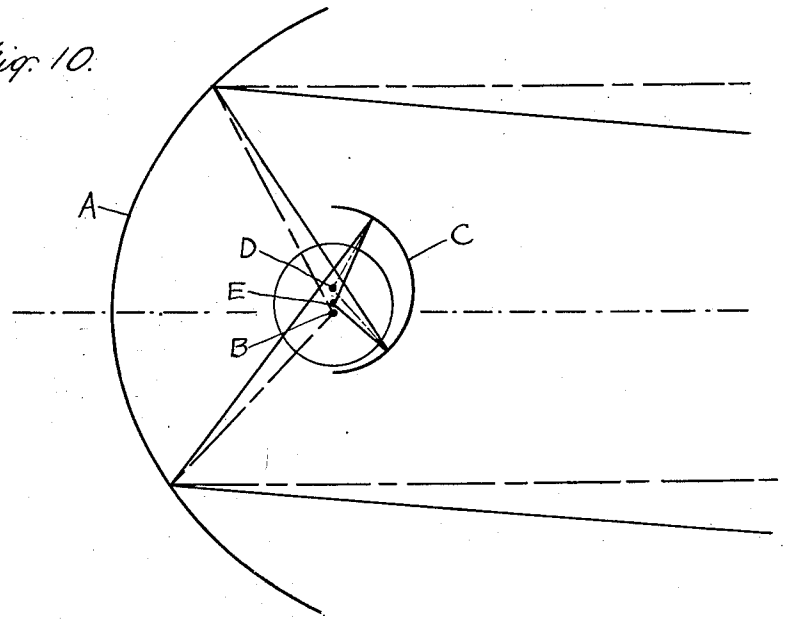
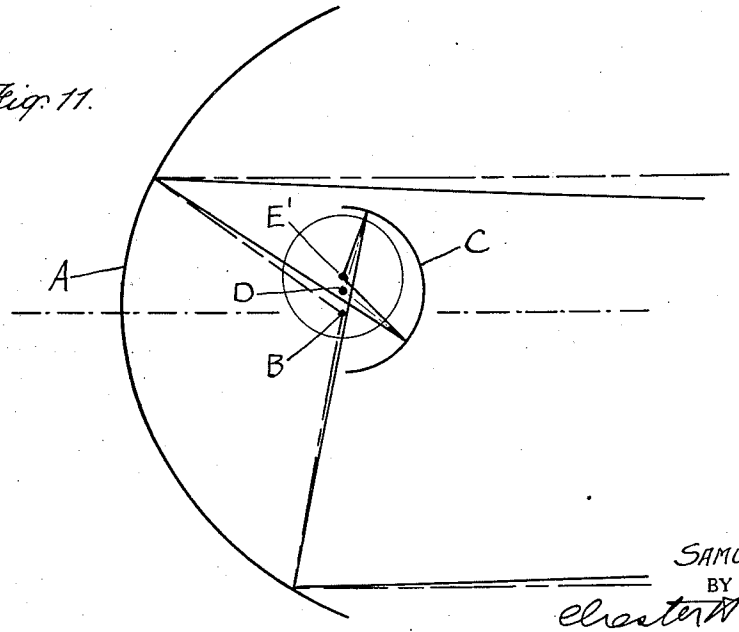


Fig. 11.



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UNITED STATES PATENT OFFICE

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BEAM-ADJUSTING MEANS

Application filed May 7, 1927. Serial No. 189,483.

This invention relates to a means for adjusting the angle of the beams of headlights for automobiles and more particularly to that type of headlight which comprises a main reflector and a supplementary reflector which is placed adjacent the light source in order to prevent certain light rays from being projected upwardly.

In replacing an electric light bulb in a headlight, it is often found that due to the tolerance in the manufacture of the light bulbs the filament of the new bulb will not fall at exactly the same place which was occupied by the filament of the old bulb with the result that the beam produced by the new bulb has a slightly different inclination from the horizontal than that produced by the old. This will often cause the two beams projected by a pair of automobile headlights to be directed at an angle vertically with respect to each other, and this not only produces a poor appearance but may also cause considerable annoyance and even danger to pedestrians and drivers of other cars.

It is one of the objects of this invention to provide a means by which the angle of the beam may be changed so that the two headlights will project beams at the same angle without disturbing the other adjustments of the headlight.

Another object of the invention is to provide a means to support the main reflector in a headlight so that the reflector may be tilted in order to change the direction of the beam projected thereby.

Another object of the invention is to provide means to removably support the supplementary reflector upon the main reflector so that the relation between the two reflectors is fixed.

Another object of the invention is to support a supplementary reflector in such a position with respect to a two filament bulb that the light rays from one filament projected by the reflector will not be intercepted by the other filament regardless of variations in the position of the filaments due to adjustment of the bulb and manufacturing tolerances thereof.

Other objects of the invention and objects relating to methods of construction and economies of manufacture will be apparent as the description proceeds.

Several embodiments of the invention have been illustrated in the accompanying drawings, in which

Fig. 1 is a sectional side elevational view of a headlight embodying my invention;

Fig. 2 is a sectional plan view of a detail of the headlight shown in Fig. 1;

Fig. 3 is a sectional front view taken on the line 3—3 of Fig. 1;

Fig. 4 is another embodiment of the supporting means for the supplementary reflector shown in Figs. 1 and 3;

Fig. 5 is a detail view showing the manner of attaching the support to the supplementary reflector shown in Fig. 4;

Fig. 6 is a sectional side elevational view of another embodiment of my invention;

Fig. 7 is a fragmentary sectional side elevational view of another embodiment of my invention;

Fig. 8 is a sectional elevation taken on the line 8—8 of Fig. 7;

Fig. 9 is an elevational view showing a detail of the construction shown in Fig. 7; and

Figs. 10 and 11 are diagrammatic views showing the light rays projected from the headlight.

My invention may best be understood by a contemplation of Figs. 10 and 11 in which the full lines represent rays from a light source displaced from the focal point and the dot and dash lines represent the projection from a light source if it were located at the focal point. In Fig. 10, a main reflector A having a focal point B is shown with a supplementary reflector C having its center of curvature D lying approximately in the focal plane of the main reflector A. A light source E is shown in the focal plane, but below the center of curvature D of the supplementary reflector C. In this position, rays of light directed from the light source to the supplementary reflector are reflected toward the main reflector and from the main reflector outward and downward. This will be the case as long as the light source is below the center of curvature of the supple-

mentary reflector and in the focal plane. In Fig. 11, the reflectors are positioned similarly but the light source E′ is positioned above the center of curvature of the supplementary reflector. In this position the light rays reflected from the supplementary reflector to the lower portion of the main reflector are reflected by the main reflector in an upwardly direction, as indicated in full lines.

If two filaments are used and the center of the supplementary reflector is positioned midway between them, one of the filaments will intercept rays projected by the other filament because of the angle at which they strike the supplementary reflector, with the result that the effect of the supplementary reflector is almost if not entirely destroyed.

From the above, it will be seen that with the center of curvature of the supplementary reflector approximately in the focal plane of the main reflector, light reflected from the supplementary reflector will be reflected downwardly by the main reflector if the light source is in the focal plane and below the center of curvature of the supplementary reflector, while, on the other hand, if the light source is above the center of curvature of the supplementary reflector, certain light rays will be reflected upwardly from the main reflector. In the latter case, a glare will be produced and it is one of the features of this invention to provide a means to adjust the beam produced by the headlight so that it will be impossible to place the light filament above the center of curvature of the supplementary reflector, and hence eliminate the possibility of producing a glare or, where two filaments are used, the light projected by either filament being intercepted by the other.

The desired result may be accomplished in several ways; first, by mounting the main reflector, the supplementary reflector, and the light bulb in fixed relation with each other, and provide means to tilt all three, in order to change the angle of the beam; second, to mount the two reflectors in fixed relation with each other and provide means to move the light source so that the beam may be tilted, the tilting means being provided with a positive stop which will prevent the light source from moving higher than the center of curvature of the supplementary reflector; third, the supplementary reflector and light bulb may be fixed with respect to each other and a means provided to tilt the bulb together with the supplementary reflector with respect to the main reflector, and it might also be accomplished by fixing the supplementary reflector with respect to the casing and tilting the bulb and main reflector.

The first construction is illustrated in Fig. 1 in which a headlight is shown comprising a casing 10, the open end of which is closed by a lens 11 which is retained in position by a suitable rim 12. A parabolic reflector 13 is supported at opposite sides thereof in the casing 10. This is accomplished by providing two thin strips or arms of metal 14, one at each side of the reflector 13 and adapted to seat in recesses 15 formed in the sides of the casing 10. The arms 14 may be formed integral with the edge of the reflector as shown, or they may be attached to the reflector in any desired manner, such as by welding. The depressions 15 may be formed, as shown in Fig. 2, or they may be slots cut through the wall of the casing. The reflector 13 with the arms 14 attached thereto may be forced into the casing, the arms bending slightly until they coincide with the depressions 15, whereupon the arms 14 will assume their normal position, and the reflector will be firmly held in place in the casing. Due to the resiliency of the arms 14, a slight tilting of the reflector may be effected about the arms 14 as an axis. In order to accomplish this tilting an arm 16 may be provided at the top edge of the reflector, either integral with the reflector, or attached thereto in any desired manner, and the end of this arm may be drilled and threaded to receive the screw 17 which passes through a hole in the casing and the head of which remains outside of the casing. A portion of the casing may be raised, as at 18, to provide a flat bearing surface for the head of the screw 17. A spring 19 may be provided around the screw between the arm 16 and the casing to urge the top of the reflector forward and keep the head of the screw against the surface of the casing.

A supplementary reflector 20 is rigidly positioned with respect to the main reflector 13 in the following manner:—

A thin narrow strip 21 of metal is attached to the supplementary reflector 20 in any desired manner, as by soldering. The ends of this strip are made slightly narrower than the strip itself to form shoulders 22 and the reflector 13 is provided with a plurality of slots 23 which are adapted to engage the ends of the strip 21. The slots 23 are just long enough to permit the extreme ends of the strip 21 to pass therethrough, but not long enough to permit the shoulders 22 to pass through, and therefore the strip 21 and attached reflector 20 will be held rigidly in position when the ends of the strip 21 are inserted in the slots 23 in the reflector 13. The distance between the ends of the strip is normally slightly greater than the distance between the slots in the main reflector so that in order to place the ends of the strip 21 in the slots 23, it will be necessary to slightly bow the strip 21 which maintains the same slightly deformed when placed in position. The reflector 20 may be easily removed in order to re-

place the bulb 27 by grasping the strip 21 at the top, for instance, and pressing down to cause the strip to bend slightly, whereupon the strip together with the reflector may be easily removed and when replaced again the reflector will necessarily assume the proper position. It will be noted that the strip 21 is not symmetrical with respect to the reflector 20, and that the slots 23 are not equi-distant from the center of the main reflector. By this means, it is impossible to place the supplementary reflector in the main reflector in any but the right position. If desired, however, this result may be obtained by providing one end of the strip narrower than the other as indicated in Fig. 3.

In Figs. 4 and 5, in place of the strip 21 to support the supplementary reflector 20, I have shown a wire 24. This wire may be any strong springy wire, such as piano wire, and may be bent in such a way as to form shoulders 22′ at the ends thereof, similar to the shoulders 22 shown on the strip 21. The reflector 20 may have tongues 25 integral with the sides thereof which may be bent around the wire to attach the reflector to the wire.

A socket 26 is rigidly mounted in the reflector 13, and is adapted to receive a light bulb 27 in the usual manner.

In this embodiment of the invention, if it is desired to change the angle of the beam projected from the headlight, it is only necessary to turn the screw 17 with a screw-driver or coin, whereupon the main reflector, light bulb, and the supplementary reflector will all tilt together and the beam will be tilted without changing the relation between the reflectors and the bulb.

In Fig. 6, I have shown a modification of the invention wherein the headlight comprises a casing 28 having a lens 11 and a rim 12 similar to those shown in Fig. 1. A main reflector 29 is rigidly supported in the casing 28 by a flange 30, which may be soldered or riveted to the casing wall, or by securing the reflector in any other desired manner. A socket 31 is movably mounted at the axis of the reflector and supports a bulb 27. A bracket 32 is attached to the socket 31 in any desirable manner as by soldering and extends rearwardly, the end thereof being bent over to form a foot 33 adapted to contact with and conform to the rear wall of the casing 28. A cam 34 disposed on the inner side of the foot 33 is rotatably mounted with respect to the casing 28 by a pin 35 which extends through a hole in the casing and a slot 36 in the foot 33, the head 37 of the pin 35 bearing against the rear surface of the headlight and providing a means by which the pin 35 and cam 34 may be rotated. The cam 34 comprises a disc which is eccentrically and rigidly mounted on the pin 35 and bears against the rearwardly extending portion of the bracket 32 on one side and against a flange 38 bent up from the foot 33 on the other so that the cam is confined between two bearing surfaces and when rotated necessarily moves the foot 33 up or down and tilts the socket 31. The forward end of the bracket 32 is adapted to fit into a notch 39 in the reflector 29 opening into the central aperture therein. The engagement of the bracket 32 with the notch 39 prevents rotation of the socket and bracket 32 when the pin 35 is rotated. A supplementary reflector 20 is mounted in the main reflector 29 in a similar manner to the construction shown in Fig. 1, and normally the center of curvature of the supplementary reflector is above the upper filament of the bulb 27. In order to prevent the possibility of the upper filament of the bulb 27 being raised above the center of curvature of the supplementary reflector 20, I locate the pin 35 in the rear casing so that the foot 33 of the bracket 32 cannot be lowered further than will bring the upper filament of the bulb 27, allowing for the usual tolerance in manufacture of these filaments, up to the center of curvature of the supplmentary reflector.

In Fig. 7, a headlight similar to that shown in Fig. 6 is illustrated. The reflector 29 is rigidly attached to the casing 28, and the socket 31 may be tilted by turning the head 37, as shown in Fig. 6. However, in this figure, the supplementary reflector 40 is attached directly to the socket 31. This is accomplished in the following manner:

A split ring 41 is mounted upon the socket 31 and held against movement thereon by the pins 42 engaging the slots 43 in the sides of the ring. The reflector 40 has an arm 44 attached thereto, and this arm 44 terminates in a foot 45 which is slightly curved to fit the curvature of the socket 31. The upper part of the split ring 41 is offset or raised slightly at 46 forming an opening or socket to receive the foot 45 attached to the arm 44. The foot 45 may have a slightly raised portion or hump 47 on the top thereof, which is adapted to engage a hole 48 in the top of the split ring 41. It will be evident from the above that the reflector 40 may be removed from the split ring 41 by merely pulling it forwardly, and it may be as easily replaced as the split ring is free to raise slightly to permit the hump 47 to pass under the edge of the split ring. However, when the reflector is in place, it will always be held in the proper position with respect to the bulb as the hump 47 will always center itself with respect to the split ring 41.

The bulb 27 is shown in the drawings as having the envelope centered about the upper filament. This is for the purpose of preventing internal reflection from the inner surface of the envelope when that filament is energized. This internal reflection from the upper filament would otherwise cause some of the projected rays to be directed up-

wardly, thus causing glare. The internal reflection from the lower filament is directed downwardly from the sensitive part of the reflector and hence is not objectionable.

It is possible by positioning the supplementary reflector with its center either slightly behind or in front of the focal plane to diminish or increase the spread of the beam produced thereby so that the light of the main reflector may be supplemented as desired.

It will be noted that no means for axially adjusting the bulb with respect to the reflector is shown, and it is intended to render this axial adjustment unnecessary by using a main reflector so constructed that it will not be sensitive to slight variations of the filaments in an axial direction due to the manufacturing tolerances.

While I have shown in the drawings a two filament bulb, and while the invention is particularly adapted for use with a headlight adapted to project either of two beams for different conditions of driving, I desire to have it understood that the invention is applicable also to a headlight which uses a single filament bulb.

It will be evident from the above description that I have illustrated and described several methods by which a headlight may be constructed so that the angle of the beam may be adjusted without producing any bad effects from changing the relation between the various parts, and although I have shown several modifications of the invention, many changes in construction may be resorted to without departing from the spirit of the invention. I desire it to be understood, therefore, that my invention is not limited to any specific form or arrangement of parts except in so far as such limitations are specified in the claims.

Having thus described my invention, what I claim is:

1. In a headlight, a casing; a main reflector within said casing; a light source within said reflector; a supplementary reflector positioned adjacent said light source; a plurality of resilient arms attached to said supplementary reflector, said main reflector having depressions adapted to receive the ends of said arms, whereby said arms are held in flexed position and said supplementary reflector is positioned with respect to said main reflector.

2. In a headlight, a casing; a main reflector within said casing, said reflector having a focal plane; a light source within said reflector; a supplementary reflector positioned adjacent said light source; resilient arms attached to said supplementary reflector; shoulders adjacent the outer ends of said arms, said main reflector having depressions adjacent the intersection of the focal plane with said reflector adapted to receive the ends of said arms, the edges of said depressions being adapted to abut against said shoulders, thereby holding said arms in convexly flexed position and firmly locating said supplementary reflector with respect to said main reflector.

3. In a headlight, a casing; a reflector within said casing; a light source within said reflector; a supplementary reflector adjacent said light source; and means to support said supplementary reflector from said main reflector, said means assuming an abnormal position when placed and maintaining said supplementary reflector positioned by its inherent resiliency.

In testimony whereof, I affix my signature.

SAMUEL F. ARBUCKLE.