March 31, 1959 J. FLAWS, JR., ET AL 2,880,347

SEALED BEAM HEADLIGHT WITH INTERNAL SHIELD

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Fig. 1.

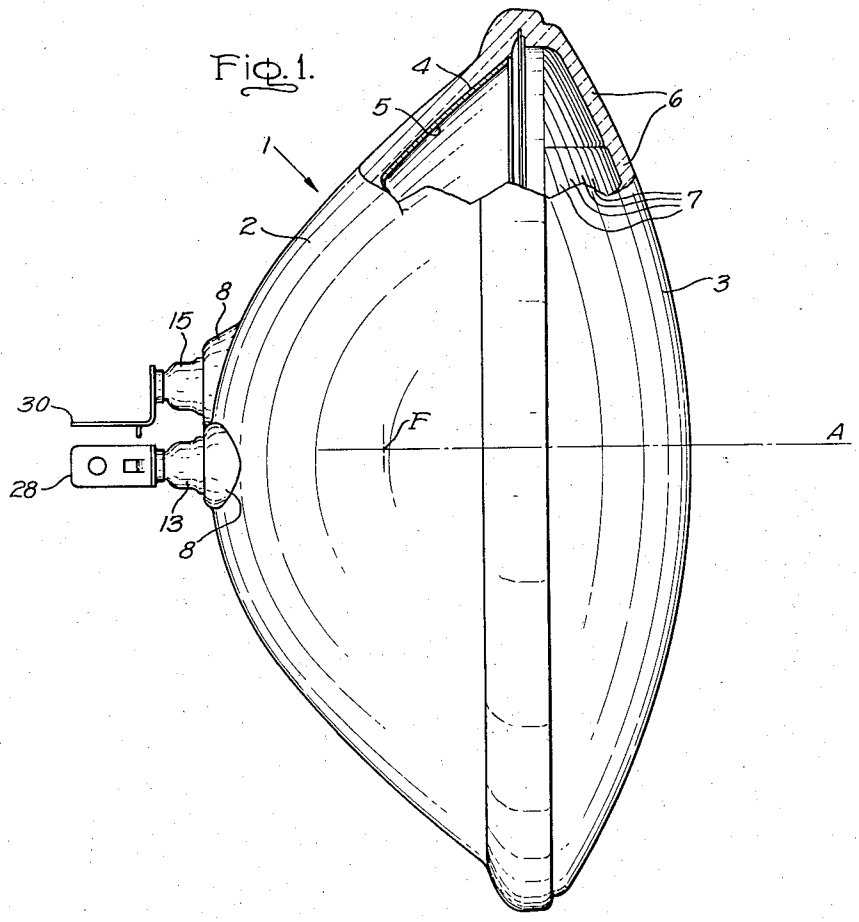
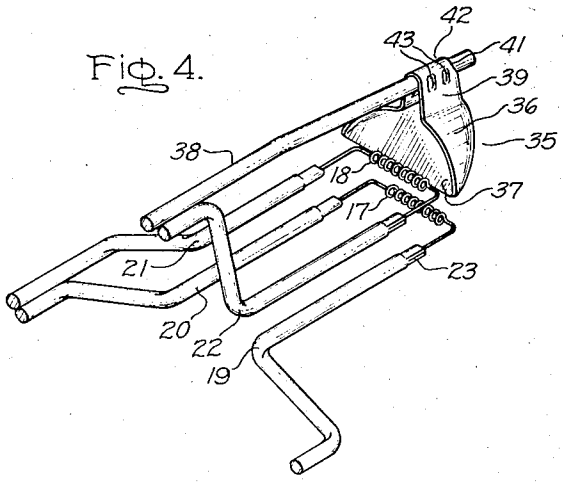


Fig. 4.



Inventors:
John Flaws Jr.,
Lee E. Dilts,
by Vernet C. Kauffman
Their Attorney

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Fig. 2.

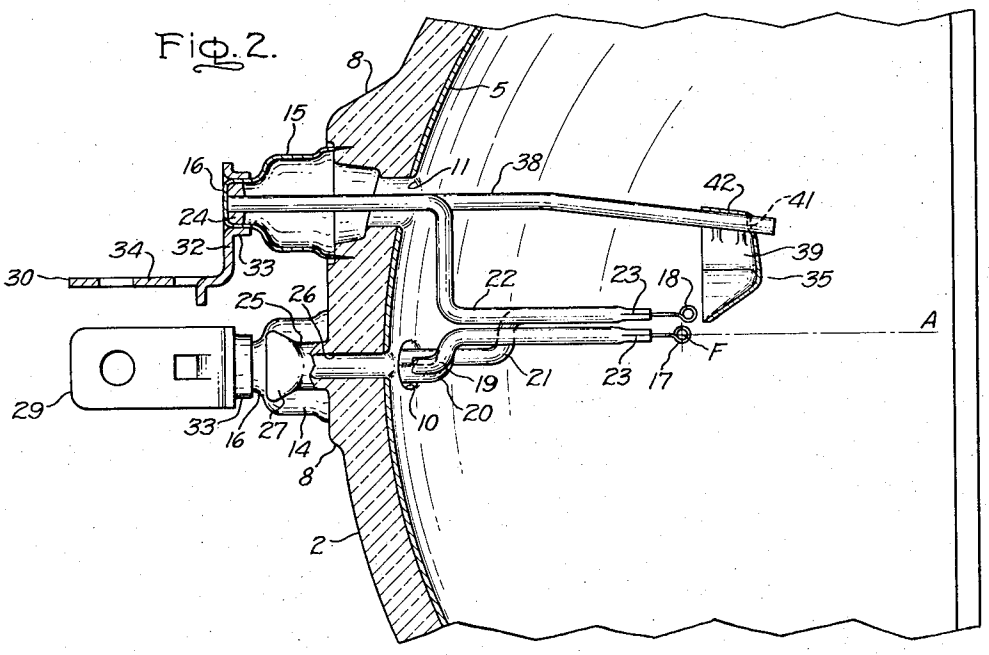
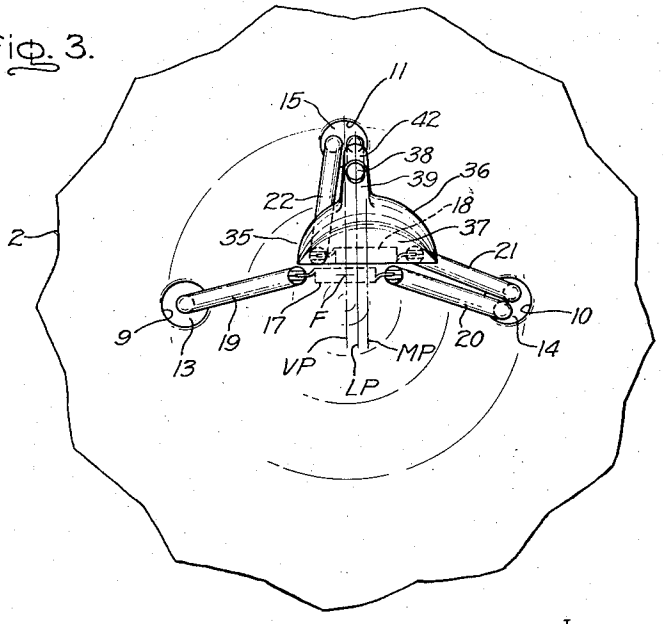


Fig. 3.



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John Flaws Jr.,
Lee E. Dilts,
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SEALED BEAM HEADLIGHT WITH INTERNAL SHIELD

John Flaws, Jr., East Cleveland, and Lee E. Dilts, South Euclid, Ohio, assignors to General Electric Company, a corporation of New York

Application December 8, 1954, Serial No. 473,796

3 Claims. (Cl. 313—115)

This invention relates in general to vehicle headlights for illuminating the roadway. More particularly, the invention relates to sealed beam headlamps such as are now in common use on automobiles and comprising a major filament directing a driving beam and a minor filament directing a passing beam downwardly and to the right. Our invention is specifically concerned with a sealed beam headlamp of this type which includes a shield placed over the minor filament in order to cut out glare from upwardly directed components of light.

Sealed beam lamps comprise in general a sealed glass envelope consisting of a preformed glass reflector section of definite optical shape and a preformed lens or cover glass section. The two sections are sealed together at their peripheries by fusion, so as to form a hermetically sealed envelope. The filaments are mounted within the glass envelope in definite optical relation to the reflecting surface thereof and are supported on the inner offset ends of rigid leads whose outer ends are fastened into metal ferrules or thimbles hermetically sealed to the outside of the reflector. The ferrules consist of small metal cups with a feathered edge which is embedded and fused in the glass of the reflector about small openings therein through which the leads project. The contact terminals for such lamps have now become standardized in the form of three L-shaped prongs whose shorter legs are fastened, generally by brazing, to the ferrules, and whose longer legs extend rearwardly and parallel to the optical axis of the lamp in a triangular disposition.

In the co-pending application of George E. Meese et al., Serial No. 473,797, of even date herewith, entitled "Vehicle Headlamp," and assigned to the same assignee as the present invention, there is disclosed a new sealed beam headlamp for automobiles having an improved beam distribution, particularly as regards the lower or passing beam. In order to reduce the curtain of glare which forms about the headlamp, particularly in rainy or foggy weather, there is provided a small shield which is located in front of and slightly above the minor filament providing the lower beam. One of the problems which has arisen in connection with that shield is the provision of a structure and mounting arrangement therefor which is sufficiently rugged to withstand the vibration and general abuse of automotive use, and which is amenable to machine manufacture without necessitating any departure from standardized or accepted practice as regards the physical structure and dimensions of the lamp and its terminal arrangement.

Accordingly, the object of the invention is to provide a new and improved shield structure and mounting arrangement for a sealed beam headlamp which provides a solution to the above-outlined problem.

A more specific object of the invention is to provide a shield structure and mounting for a sealed beam headlamp which is very rugged, low in cost, and which may be manufactured by machine operations which do not require any substantially greater accuracy than has been used heretofore in the commercial manufacture of sealed beam headlamps.

In accordance with the invention, the shield is supported on an additional lead which is fastened into the upper ferrule of the triangularly disposed group of three. In the preferred embodiment of the invention, this additional lead is maintained in a vertical plane parallel to the vertical plane containing the optical axis of the lamp. The shield is in the form of a sheet metal member dished toward the minor filament and located generally above and forwardly of the minor filament. In order to fasten the shield to the lead, the shield is provided with an upstanding fold projecting upwardly in its upper wall and pierced through on its front side. The additional lead has its inner end projecting through the fold which is crimped laterally onto the lead to lock the shield securely in place. In order to position the shield centrally over the minor filament which has its center offset to one side of the vertical plane through the optical axis, the upstanding fold in the shield of the preferred embodiment is correspondingly offset to one side of the medial plane of the shield, and the need for bending or laterally offsetting the additional lead is thereby avoided.

For further objects and advantages and for a better understanding of the invention, attention is now directed to the following description and accompanying drawings. The features of the invention believed to be novel will be more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a side elevation of a sealed beam headlamp embodying the invention and showing the general physical structure and external configuration thereof;

Fig. 2 is a fragmentary vertical section through the reflector of the lamp of Fig. 1 showing the shield and the mounting arrangement thereof in a preferred embodiment of the invention;

Fig. 3 is a front elevation of the reflector fragment of Fig. 2 showing the filaments and shield and the mounting arrangement; and

Fig. 4 is a pictorial view of the lead, filament and shield assembly, and showing the spatial relationship.

Referring to the drawings and more particularly to Fig. 1, the lamp there shown is of the well-known all glass sealed beam type widely used on automobiles for headlamps. The lamp comprises a sealed glass bulb or envelope 1 made of heat-resisting glass and consisting of a preformed pressed glass concave reflector section 2, and a cover glass or lens section 3 sealed together at their peripheries by fusion. The interior surface 4 of the reflector section 2 is of any suitable optical shape, preferably that of a paraboloid, and is coated with a reflecting metallic layer 5, preferably aluminum, so as to form a reflecting surface. Reflector section 2 has a focal point F and an optical axis FA, and light rays originating at the focus are normally reflected by the reflector parallel to the optical axis. Lens section 3 is provided with suitable horizontally extending prism sections 6 adapted to bend or refract the light rays vertically. The prism sections in turn are subdivided into vertically extending segments or flutes 7 adapted to spread the light rays horizontally. The combination of the risms and flutes effects the desired modification of the substantially parallel beam reflected by the reflector, and defines the vertical and horizontal beam distribution of the headlamp.

As best seen in Fig. 2, the exterior of the reflector section 2, adjacent the vertex of the paraboloid, is formed with three glass bosses 8 arranged in triangular formation, each of the bosses being provided with a concentric opening extending through the wall of the reflector section and communicating with the interior of the lamp envelope. As shown in Fig. 3, two of the openings 9, 10 are diametrically opposed on either side of the opti-

cal axis and lie in a horizontal plane slightly below the axis. The third opening 11 is located above the optical axis in a vertical plane therethrough. Mounted on the exterior of the bosses 8 are three closed metal cups or ferrules 13—15 covering the openings 9—11. The ferrules are mounted with their axes parallel to the optical axis and have thin feathered edges or rims fused to and sunk and embedded in the glass of the bosses 8, so as to form a hermetic seal therebetween. The ferrules are made of a metal to which the glass of the lamp envelope will "wet" or adhere, and having a coefficient of expansion as near as possible to that of the glass. For heat-resistant glass of the type known as "Pyrex," the ferrules 13—15 are preferably made of an iron-nickel-cobalt alloy known as "Fernico." Each of the ferrules is formed with a small tubular projection or nipple 16 extending outwardly from its outer end.

Mounted within the envelope, in definite optical relation to the reflecting surface of parabolic section 2, are the major and minor filaments 17, 18. The filaments are in the form of concentrated linear coils of a suitable metallic refractory material, such as tungsten. The filaments are arranged parallel to each other in more or less side-by-side relation and in the focal plane of the parabolic section 2. Major filament 17 is disposed with its center at the focal point F of the parabolic section, whereas minor filament 18 is disposed with its center a slight distance above and to one side of the focal point. When viewed from the rear of the reflector looking forward along a line of sight corresponding to that of the driver of the vehicle, the minor filament is offset above and to the left of the focal point. This causes the lower or passing beam to be deflected downward and to the right, as is well known. Both filaments are supported with their longitudinal axes transverse to the optical axis FA and lying in horizontal planes.

The filaments 17, 18 are supported within the bulb by pairs of relatively heavy rigid lead wires 19, 20 and 21, 22, respectively. Leads 19, 20, for the major filament, are fastened into ferrules 13, 14 respectively, whereas leads 21, 22 for the minor filament, are fastened into ferrules 14, 15 respectively. Ferrule 14 thus is common to both major and minor filaments, and selection of filament in operation is made by energizing one or the other of ferrules 13 and 15, together with ferrule 14. The ends of the filaments are fastened to the ends of the leads by disposing them axially in longitudinal notches which are then crushed flat to clamp the filament ends securely in place, leaving longitudinally extending seams 23. The inner ends of the leads are offset toward the optical axis relative to the outer ends, both the inner and outer ends being substantially parallel to the axis. The outer ends extend outwardly into the nipples 16 in the ferrules 13—15 and are rigidly attached therein in such manner as to provide firm support and electrical connection. A suitable attachment may be effected by metallic fusible material 24, such as hard solder or brazing alloy.

The lamp envelope is exhausted and filled with a suitable gas, such as argon or nitrogen or mixtures thereof, to reduce the rate of evaporation of tungsten from the filament. The filling gas is introduced through an exhaust tube 25 attached to the reflector section near its vertex and communicating with the interior of the lamp envelope through an opening 26. After the envelope is exhausted and gas filled, the exhaust tube is tipped off to provide a flattened tip 27 as shown in Fig. 2.

The ferrules 13—15 are provided with exterior terminal elements in the form of L-shaped metal members or prongs 28—30. The prongs have mounting leg portions 32 provided with integral eyelets 33 punched therefrom, these eyelets being of such size as to just fit over the projecting nipples 16 on the ferrules. The prongs are securely fastened to the ferrules by soldering the eyelets about the nipples. The connector leg portions 34 of the prongs extend at right angles to the mounting leg portions and rearwardly from the envelope in a direction parallel to the optical axis. The triangular disposition of the prongs, as illustrated, has now become standardized in the automobile industry. In order to be interchangeable with prior sealed beam headlamps, any new lamp must maintain the same physical configuration and disposition of the terminal prongs.

As thus far described, the instant lamp is essentially similar to the ordinary all glass sealed beam headlamps which have been commercially available. The invention is more particularly concerned with the shield 35 for the minor filament and with its mounting arrangement within the envelope. Such will now be described in detail.

Shield 35 is a sheet metal member dished toward the minor filament, that is, of generally concave form when viewed from the minor filament. In the preferred embodiment illustrated in the drawing, the shield has a generally semi-cylindrical upper wall 36 and a lower wall 37 which slants upwardly and forwardly into the upper wall. At the rear open side of the shield facing the filament, the edge of the upper wall describes in general the upper half of a circle and the edge of the lower wall describes a horizontal diameter bounding the half-circle. The axis of the imaginary cylinder from which the upper wall is formed is substantially parallel to the focal axis of the lamp, and the lower wall slants upward into the imaginary cylinder at an angle of approximately 35 degrees. The shield is located with a medial plane MP therethrough, that is, a vertical plane through the axis of the imaginary cylinder from which upper wall 36 is formed, intersecting the center point of the minor filament 18 (Fig. 3). The shield in general is located above and forwardly of the minor filament, the rear edge of the lower wall being in the horizontal plane of the lower side of the filament and just slightly to the front thereof.

The specific function of the shield is to intercept all direct rays from the minor filament which leave in the solid angle bounded by the upper edge of the lamp periphery and a plane depressed a few degrees below the horizontal. It is desirable to suppress this direct radiation because it serves no useful purpose as regards illuminating the roadway. In fact, this portion of the radiation is undesirable as it causes glare in the eyes of the drivers of passing cars. Under certain circumstances, it is directly disadvantageous to the driver himself, particularly in foggy or rainy weather. Under such circumstances, the rays which leave the headlamp at a high angle are refracted by the droplets of water in the atmosphere and bent back into the eyes of the driver. This phenomenon causes the appearance of a nimbus or halo of glare to the front of the vehicle which reduces drastically the visibility of the roadway and oncoming vehicles to the driver. The shape or physical configuration and the location of the shield are important as regards the effective elimination of the direct radiation in the upper half of the headlamp. Reference may be made to the aforementioned co-pending application of George E. Meese for a more complete explanation of the function of the shield.

In accordance with the invention, shield 35 is supported on an additional rigid lead 38, the fifth one in the instant lamp, which is attached in the third ferrule 15, that is, the ferrule at the apex of the triangular layout of ferrules. Both lead 22 which supports one side of the minor filament and additional lead 38 are entered into nipple 16 of ferrule 15, being attached thereinto by hard soldering or brazing in the usual fashion.

It has already been stated that the medial plane MP of the shield must intersect the center point of the minor filament, and that the minor filament 18 is offset to the left relative to a vertical plane VP through the focal axis FA of the lamp. Lead 22 and additional lead 38 are fastened side-by-side in ferrule 15, with additional lead 38 on the left, according to the system of directions pre-

viously stated. Thus, the additional lead is offset to the left into plane LP (Fig. 3) by an amount equal substantially to half its diameter. However, this offsetting of the additional lead is still not sufficient to bring it into line with the medial plane MP of the minor filament. It might be thought that a simple solution to the problem would reside in merely bending the additional lead, so as to bring its inner end in line with the medial plane of the shield; however, if this were done, the additional lead would be skewed in a horizontal plane relative to the focal axis of the lamp and the lateral adjustment of the shield would then vary with its axial, that is, its rearward or forward adjustment on the additional lead. Of course, putting an offset into the additional lead **38**, in the same manner as in leads **19** to **22**, might resolve the problem, but this would be an expensive solution as it would require additional complex forming operations and is therefore undesirable.

Another problem to which the invention provides a solution, as will be described shortly, is that of attaching the shield to the additional lead in a rigid and accurate manner which is adaptable to automatic machinery. It is hardly necessary to point out that the welding of thin sheet metal, such as the instant shield is made of, is a difficult operation and one subject to considerable spoilage or shrinkage, so that it is desirable to avoid it.

In accordance with the invention, a simple and effective solution to the above-outlined problems resides in providing an upstanding fold **39** in the curved upper wall **36** of the shield. The spacing between the vertical side walls of the fold or loop is sufficient to allow it to receive the end of additional lead **38**, the front end wall of the fold being pierced at **41** to allow the lead to project therethrough. This arrangement allows the shield to be adjusted axially on the lead, that is, to be slid rearward or forward to the desired location, and eliminates need for accurate cutting of the additional lead to the desired length.

In order to avoid the need for offsetting the additional lead, according to another feature of the invention, the upstanding fold **39** on the shield is offset laterally to the right, relative to the medial plane of the shield, a distance equal substantially to the difference between the offset of the minor filament and the offset of additional lead **38** from the vertical plane through the focal axis, that is, the distance between planes LP and MP (Fig. 3). Thus, with the construction illustrated, the additional lead is maintained throughout its length in the same vertical plane, and when the upstanding fold of the shield is slipped over the end of the lead, the shield is properly located transversely relative to, i.e., centered with respect to the medial plane MP of the minor filament.

In order to secure the proper elevation of the shield relative to the minor filament and to avoid making the upstanding fold **39** too high, the additional lead **38** is bent down at a shallow angle within the vertical plane previously referred to. To accommodate this slight inclination of the additional lead, the upper edge **42** of the fold **39** is inclined at a corresponding angle, so that the shield is properly aligned when it rests entirely on the lead **38**. The shield is locked to the lead by crimping the fold laterally to produce the indentations indicated at **43**. It may be noted that maintaining lead **38** in the same vertical plane throughout permits the tool which effects the crimping operation of the shield to move in a horizontal plane, such being a decided advantage from the point of view of automatic manufacture.

For the convenience of those desiring to practice the invention, essential illustrative particulars of a sealed beam headlamp, such as illustrated in the drawings, are here given. Lead **19**, **20** for the major filament may be .070 inch diameter; leads **21**, **22**, for the minor filament, and additional lead **38**, for the shield, may be .060 inch in diameter. The offset of additional lead **38** to the left of the vertical plane through the focal axis is .037 inch. The offset of the medial plane of the shield to the left of the vertical plane through the focal axis is .090 inch; accordingly, the offset of upstanding fold **39** from the center plane of the shield is .053 inch. The shield is .016 inch thick drawing steel. The diameter of the imaginary cylinder, from which the upper wall of the shield is formed, is approximately $1\frac{7}{32}$ inch. Additional lead **38** is bent down at an angle of 7° from a point removed $1\frac{9}{32}$ inch from a vertical transverse plane through the inner vertex of the parabola; the upper edge **42** of the upstanding fold is likewise inclined at an angle of 7° corresponding to the inclination of the end of the lead. The comparative dimensions of the other electrode elements may readily be seen in the drawing. In other respects, not specifically mentioned herein, the lamp may be similar to prior art sealed beam headlamps heretofore made and commercially available.

While a certain specific embodiment of the invention has been shown and described, it is to be understood that same has been provided by way of illustration and not in order to limit the invention thereto. Obviously, the invention admits of modifications in the dimensions and noncritical details of the described structure. The appended claims are therefore intended to cover any such modifications within the true spirit and scope of the invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. A sealed beam headlamp comprising a sealed glass envelope consisting of a concave reflector section and a lens cover glass section, said reflector having a focal point and defining an optical axis for said lamp and said lens cooperating therewith to define vertical and horizontal beam distribution, said reflector section having three openings therein at approximately equal distances from the optical axis, two of the openings being disposed in a horizontal plane on either side of the axis and the third opening being located above the axis in a vertical plane therethrough, metal ferrules mounted on the exterior of the reflector section and having their edge portions sealed into the glass around said openings, five rigid inner leads extending through said openings and having their outer ends attached within the ferrules, one pair of said leads supporting a major filament and being attached into the ferrules of the first two openings, another pair of said leads supporting a minor filament and being attached into the ferrule of one of said first two openings and the ferrule of said third opening, and the fifth one of said leads supporting a shield and being attached into the ferrule of said third opening, a major and a minor filament each consisting of a linear coil supported horizontally and transversely to said optical axis on the offset inner ends of said pairs of leads, said major filament being supported with its center at said focal point and said minor filament being supported with its center above and offset to one side of said focal point, said fifth lead having the attachment of its outer end within the ferrule of said third opening offset in the same direction as said minor filament, and a shield consisting of a sheet metal member dished toward the minor filament and located generally above and forwardly of said minor filament and with its vertical medial plane intersecting the center of said minor filament, said shield having a curved upper side with an upstanding fold projecting upwardly and offset to the side of said medial plane toward the vertical plane through the optical axis a distance equal substantially to the difference between the offset of the minor filament and the offset of the fifth lead from the vertical plane through the optical axis, said additional lead being located in a vertical plane parallel to said optical axis and having its inner end entered and fastened into the upstanding fold of said shield to support same in place.

2. A sealed beam headlamp comprising a sealed glass envelope consisting of a concave reflector section and

a lens cover glass section, said reflector having a focal point and defining an optical axis for said lamp and said lens cooperating therewith to define vertical and horizontal beam distribution, said reflector section having three openings therein at approximately equal distances from the optical axis, two of the openings being disposed in a horizontal plane on either side of the axis and the third opening being located above the axis in a vertical plane therethrough, metal ferrules mounted on the exterior of the reflector section and having their edge portions sealed into the glass around said openings, five rigid inner leads extending through said openings and having their outer ends attached within the ferrules, one pair of said leads supporting a major filament and being attached into the ferrules of the first two openings, another pair of said leads supporting a minor filament and being attached into the ferrule of one of said first two openings and the ferrule of said third opening, and the fifth one of said leads supporting a shield and being attached into the ferrule of said third opening, a major and minor filament each consisting of a linear coil supported horizontally and transversely to said optical axis on the offset inner ends of said pairs of leads, said major filament being supported with its center at said focal point and said minor filament being supported with its center above and offset to one side of said focal point, said fifth lead having the attachment of its outer end within the ferrule of said third opening offset in the same direction as said minor filament, and a shield consisting of a sheet metal member of generally concave form when viewed from the minor filament and located generally above and forwardly of said minor filament and with its vertical medial plane intersecting the center of said minor filament, said shield having a generally semi-cylindrical upper wall and a lower wall slanting upwardly and forwardly into said upper wall, said upper wall having an upstanding fold therein projecting upwardly and offset to the side of said medial plane toward the vertical plane through the optical axis a distance equal substantially to the difference between the offset of the minor filament and the offset of said fifth lead from said vertical plane through the optical axis, said fold having an upper edge sloping downwardly at a shallow angle and being pierced through at its front side, said fifth lead being located in a vertical plane parallel to said optical axis and sloping downward at said hollow angle and having its inner end projecting through said pierced upstanding fold, and said fold being crimped laterally onto the lead in order to fasten said shield securely in place.

3. A sealed beam headlamp comprising a sealed glass envelope consisting of a concave reflector section and a lens cover glass section, said reflector having a focal

point and defining an optical axis for said lamp and said lens cooperating therewith to define vertical and horizontal beam distribution, said reflector section having three openings therein at approximately equal distances from the optical axis, two of the openings being disposed in a horizontal plane on either side of the axis and the third opening being located above the axis in a vertical plane therethrough, metal ferrules mounted on the exterior of the reflector section and having their edge portions sealed into the glass around said openings, five rigid inner leads extending through said openings and having their outer ends attached within the ferrules, one pair of said leads supporting a lower filament and being attached into the ferrules of the first two openings, another pair of said leads supporting an upper filament and being attached into the ferrule of one of said first two openings and the ferrule of said third opening, and the fifth one of said leads supporting a shield and being attached into the ferrule of said third opening, a pair of filaments each consisting of a linear coil supported horizontally and transversely of said optical axis on the offset inner ends of said pairs of leads, said filaments being disposed in vertically spaced relation adjacent the said focal point with their centers offset from one another in a horizontal direction transversely of said optical axis, said fifth lead having the attachment of its outer end within the said ferrule of said third opening offset to one side of the vertical center plane therethrough, and a shield consisting of a sheet metal member dished toward the upper one of said filaments and located generally above and forwardly of said upper filament and with its vertical medial plane intersecting the center of said upper filament, said shield having a curved upper side with an upstanding fold projecting upwardly and offset the same distance and to the same side of the vertical center plane through the ferrule of said third opening as said additional lead so as to be aligned therewith in a common vertical plane, said additional lead being located throughout its length in a single vertical plane and having its inner end entered and fastened into the upstanding fold of said shield to support the shield in place.

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