July 15, 1958 R. N. FALGE 2,843,778

LIGHT BULB

Filed Dec. 22, 1952

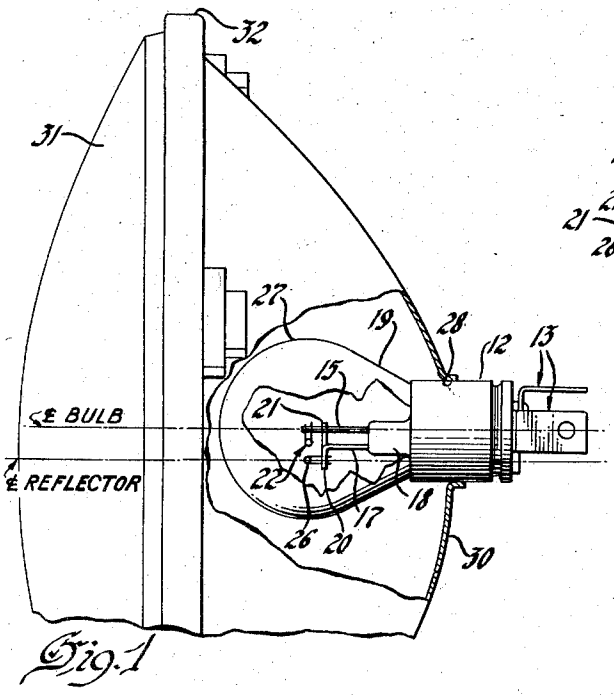


Fig. 1

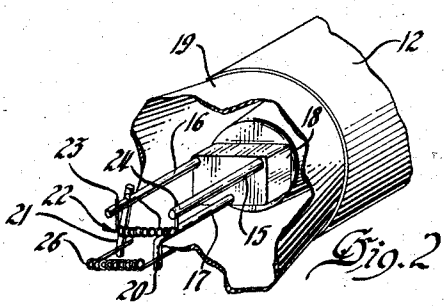


Fig. 2

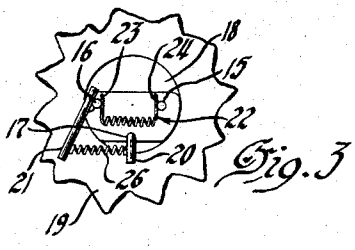


Fig. 3

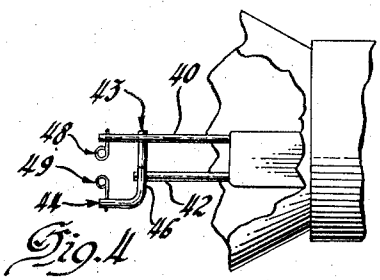


Fig. 4

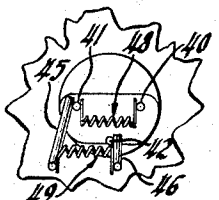


Fig. 5

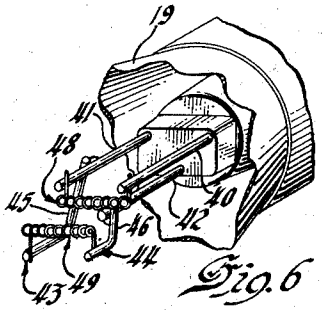


Fig. 6

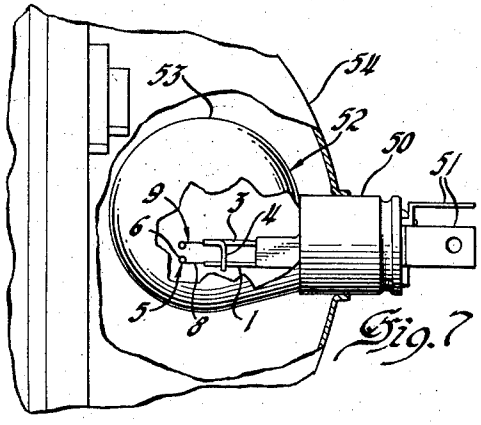


Fig. 7

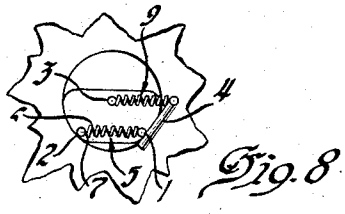


Fig. 8

Inventor

Robert N. Falge

By Willits, Helwig & Baillio

Attorneys

United States Patent Office 2,843,778 Patented July 15, 1958

2,843,778

LIGHT BULB

Robert N. Falge, Anderson, Ind., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application December 22, 1952, Serial No. 327,310

6 Claims. (Cl. 313—113)

This invention relates to light bulbs and more particularly to a new and improved filament arrangement for automobile headlamp light bulbs of the type having two filaments, one for an upper beam and the other for a lower beam.

One of the chief objects of this invention is to provide a light bulb having a shorter light center length for use with reflectors having a shorter focal length. Another of the objects of this invention is the provision of a light bulb filament arrangement which retards blackening of the bulb envelope for longer periods and therefore improves the lighting characteristics and life of the bulb. Still another object of the invention is to provide a filament arrangement for light bulbs which allows for easier and therefore more economical assembly. Still another object is to provide an automobile headlamp light bulb filament arrangement which increases the overall efficiency of the light bulb and which improves the quality of the lighting obtained therefrom.

These and other objects of the invention are carried out in accordance with the provisions of this invention by shortening the light center length of the bulb without, at the same time, shortening the length of the filament leads and also by positioning both filaments below the bulb centerline thereby reducing bulb blackening and improving the lighting characteristics and efficiency of the bulb.

These and other objects and advantages of the invention will be seen more clearly from the following description of preferred embodiments and from the accompanying drawings in which:

Figure 1 shows a side view with parts broken away of a light bulb embodying the invention and mounted in its proper position in a headlamp structure;

Figure 2 is a perspective view of the filament arrangement of the light bulb shown in Figure 1;

Figure 3 is a front view of the filament arrangement shown by Figures 1 and 2;

Figure 4 is a side view with parts broken away of another embodiment of the invention;

Figure 5 is a front view of the filament arrangement shown by Figure 4;

Figure 6 is a perspective view of the filament arrangement shown by Figures 4 and 5;

Figure 7 is a side view with parts broken away of a headlamp having mounted therein a light bulb with an unsymmetrical glass envelope and with a conventional filament arrangement of the type commonly used; and

Figure 8 is a front view of the filament arrangement shown by Figure 7.

The conventional filament arrangement which is in common use on multiple beam automobile headlamp light bulbs, can best be seen with reference to Figures 7 and 8. Three leads 1, 2 and 3 are used, leads 1 and 2 lying in the same horizontal plane and lead 3 being positioned slightly above and between leads 1 and 2. An elbow lead joint 4 is welded to lead 1 and extends upwardly and then outwardly therefrom. A generally U-shaped major filament 5 having a wire spiral portion 6 and angularly disposed

legs 7 and 8 is positioned across leads 1 and 2 by securing the ends of the respective legs to the ends of the leads. A minor filament 9 having the same general structure as the major filament 6 is, in the same manner, positioned between the end of the elbow extension 4 and the end of lead 3. Any suitable means may be used for securing the filament legs to the ends of the leads. The most common means for securing the filaments to the leads is by the use of joints resulting from heating the filament legs to soften the metal of the leads thereby causing the filament legs to embed into the lead metal to secure the filament permanently in place.

It will be noted that with this standard filament arrangement the filaments extend outwardly from, or lie in the same plane as, the leads. Thus, the light center length of the bulb includes not only the length of the leads but also, the length of the filament legs. It will also be noted that the distance between the filament leg-to-lead joints is the same as the distance between the spiral or lighting portions of the filaments. Thus, in attaining close spacing between the filament lighting portions, the joints are brought close together thereby complicating assembly.

In our new and improved bulbs, the light center length is shortened and bulb blackening reduced by disposing the generally U-shaped filaments at an angle to the ends of their respective leads. With such srtucture, the distance between filament-to-lead joints is increased without increasing the distance between the lighting portions of the filaments and, at the same time, the harmful effects of the glow from the leads and filament legs on the lighting characteristics of the bulb are greatly reduced.

In the embodiment shown in Figures 1, 2 and 3, the light bulb consists of a metal base 12 of conventional structure having contacts 13 from which extend through the socket three electrical conductors to make contact with the leads 15, 16, and 17 for the lighting filaments. A glass stem 18 is molded around the conductors and the base portion of the various leads. Sealed to the stem 18 and joined to the bulb base 12 in the conventional manner is a glass bulb 19 which envelops the leads and filaments. The bulb 19 may either be evacuated or else filled with an inert gas as is the usual practice. Leads 15 and 16 lie in the same horizontal plane and lead 17 is positioned between and below leads 15 and 16. The end portion 20 of lead 17 is bent downwardly at approximately a right angle to form a lead extension and a straight lead joint 21 is welded to lead 16 adjacent its end portion. If desired, a separate lead joint may be welded to the lead 17 in place of the bent end portion 20.

A generally U-shaped minor filament 22 having a spiral lighting portion and legs 23 and 24 is positioned between and extends downwardly from the ends of leads 15 and 16, the legs 23 and 24 being secured to the respective ends of the leads by any suitable means. It is to be particularly noted that the minor filament 22 rather than extend outwardly from, or in the same plane as that defined by leads 15 and 16, extends downwardly therefrom at approximately a right angle.

A major filament 26 having substantially the same shape as the minor filament 22 is positioned between the end of the lead joint 21 and the angularly disposed end 20 of lead 17. Just as was the case with the minor filament, the major filament legs are secured at approximately a right angle to the end portions of their respective leads 20 and 21, these end portions lying in substantially the same vertical plane.

As can best be seen in Figure 1, the centerline of the bulb passes through the plane defined by leads 15 and 16 and thus both the major and minor filament are positioned below the centerline of the bulb. This structure results in a greater distance from the filaments to the upper portion 27 of the glass bulb envelope. We

have found that this increased distance between the filaments and the upper portion of the bulb envelope substantially decreases bulb blackening which normally occurs at the upper portion of the glass envelope. Generally, it has been found that bulb blackening occurs to the greatest extent where the glass envelope is the hottest, this being the upper portion of the bulb envelope. It is believed that by increasing the distance from the filaments to the upper portion of the bulb envelope more uniform heat dissipation results and thus, the filament material condenses more evenly over the entire surface of the bulb rather than only at the top portion and thus tends to preclude the occurrence of very dark spots in this area, which spots hinder the lighting efficiency of the bulb.

It will also be noted that with the filament arrangement shown in Figures 1, 2 and 3, the distances between the leg-to-lead joints of the major filament and the leg-to-lead joints of the minor filament are greatly increased while, at the same time, a very close spacing between the lighting portions of the filaments is maintained. Such a design affords greater ease of assembly with resulting reduced costs since it allows more working space without at the same time sacrificing those advantages which are obtained by a close spacing between the lighting portions of the filaments. Also, because the lighting portions of the filaments are located below the bulb axis, the uncontrolled filament images are disposed to a less harmful position in the beam which improves the lighting qualities and efficiency of the bulb. In this new design the filament legs and leads are out of direct line with the filament thereby directing this glow downward into the reflector with respect to the filament image thus eliminating glare around the hot spot by placing the glow in a less harmful position in the beam.

Because the filaments are positioned unsymmetrically within the bulb envelope, we mount the bulb unsymmetrically within the reflector so that the major filament is positioned on the focal point of the reflector. This arrangement can clearly be seen in Figure 1 which shows the bulb mounted and sealed within an opening **28** in the paraboloidal concave reflector **30**. The particular lamp shown by Figure 1 is of the sealed unit type wherein a lens **31** is permanently held in sealing engagement with a metal reflector **30** by means of a flange **32** on the reflector which is turned over the edge portion of the lens. The opening **28** is positioned so that when the bulb is mounted therein, the spiral or lighting portion of the major filament will be located on the focal point of the reflector. As is shown by Figure 1, the centerline of the reflector is, in this instance, therefore slightly below the centerline of the bulb.

It will be understood, of course, that while I have illustrated my invention with regard to its use in conventional light bulbs and lamp structures, it could also be used with great advantages in all glass type sealed beam lamp units wherein the lens-reflector assembly is hermetically sealed together and serves as the glass envelope for the lighting filaments.

In the embodiment shown by Figures 4, 5 and 6, the socket engaging bulb base, glass envelope and contacts are the same as those described in conjunction with the previous embodiment. Likewise, the three leads **40**, **41** and **42** are arranged in the same manner as was the case in the embodiment shown by Figures 1, 2, and 3. A generally L-shaped lead extension **43** is welded adjacent the end of lead **41** and extends downwardly and then outwardly therefrom. A similarly shaped lead extension **44** is welded adjacent the end of lead **42** and also extends downwardly and outwardly. The vertical portion **45** of the extension **43** is longer than the vertical portion **46** of extension **44** and thus the horizontal portions of the two lead extensions lie in substantially the same horizontal plane as shown. A minor filament **48** is positioned between and secured to the free ends of leads **40** and **41** in the same manner as was described in conjunction with the previous embodiment and a major filament **49** is, in the same manner, secured between the free ends of the lead extensions **43** and **44**. The minor filament extends downwardly from the leads **40** and **41** at about a right angle thereto while the major filament **49** extends upwardly toward the minor filament from the elbow lead extensions **43** and **44** at about a right angle to the horizontal portions of the extensions to which it is secured.

Here again, with the embodiment shown in Figures 4, 5 and 6, it will be noted that the filaments are positioned closer to the bulb base than is the case with the concentional filament arrangement, thus shortening the light-center-length without shortening the lead lengths. At the same time, the filament-to-lead joints are more widely separated to allow more working space for assembly operations. In this embodiment, again the filaments are both positioned below the centerline of the bulb, this reducing harmful bulb blackening as previously described. An unsymmetrical reflector mounting such as is shown by Figure 1 may be used if it is desired to locate the major filament on the reflector focal point. The filament arrangement shown by Figures 4, 5 and 6 not only shortens the light center length, reduces harmful bulb blackening and simplifies assembly, but also results in better lighting qualities for reasons set forth above.

Thus, both of the embodiments described shorten the light-center-length of the bulb, reduce harmful blackening, provide for easy assembly and provide improved lighting characteristics. The chief advantage of the embodiment shown in Figures 4, 5 and 6 is that the filament-to-lead joints are greatly separated thus making assembly operations particularly easy. On the other hand, the embodiment shown by Figures 1, 2 and 3 has the advantage of having a lesser dimension from top to bottom thus allowing its insertion during assembly into a bulb neck of smaller diameter. In other words, the filament arrangement shown by Figures 1, 2 and 3 may be used with a narrower necked bulb than is the case with the other embodiment.

In Figures 7 and 8 which have already been referred to in conjunction with the description of the presently used filament and lead arrangement there is illustrated a bulb structure which we have found to greatly reduce harmful blackening of the interior top portions of the glass envelope. The bulb which is shown mounted in a reflector **54** has a conventional base **50** and contacts **51** as well as a commonly used filament-to-lead arrangement as previously described. However, the glass bulb **52**, rather than having a symmetrical shape as is the common practice, is shaped unsymmetrically around the filaments so that the top portion **53** of the glass envelope is a greater distance from the bulb filaments **5** and **9**. In this manner, the accumulation of deposits of filament material at the top portion of the bulb may be reduced and thus the continued high efficiency of the bulb increased.

It is to be understood that, although the invention has been described with specific reference to particular embodiments thereof, it is not to be so limited since changes and alterations therein may be made which are within the full intended scope of this invention as defined by the appended claims.

I claim:

1. In an automotive vehicle lamp, a reflector member having an opening therein and a light bulb having a base mounted in said opening, said light bulb comprising a glass envelope extending from one end of said base and in sealed engagement therewith, a pair of generally parallel leads extending into said envelope from said base, a third lead extending into said envelope from said base, said third lead being displaced from the plane of said pair of leads, a generally U-shaped filament bridging said pair of leads and lying in a plane angularly disposed thereto, and a second filament electrically connected to said third lead and to one of said pair of leads, one of said filaments being positioned at the focal point of the reflector and both of

said filaments being positioned below the longitudinal axis of said bulb when said lamp is mounted in operative position in a vehicle.

2. In an automotive vehicle lamp, a reflector member having an opening therein and a light bulb having a base mounted in said opening, said light bulb comprising a glass envelope extending from one end of said base and in sealed engagement therewith, three generally parallel leads extending into said envelope from said base, a pair of said leads establishing a plane lying substantially on the longitudinal axis of said bulb, and one of said three leads projecting into said bulb below the longitudinal axis thereof, a generally U-shaped filament bridging said pair of leads and lying in a plane disposed at an angle of about 90° to the plane of said leads and a second filament electrically connected to said one lead and to one of said pair of leads, one of said filaments being positioned on the focal point of said reflector and both of said filaments being positioned to one side of the longitudinal axis of said bulb.

3. In an automotive vehicle lamp, a reflector member having an opening therein and a light bulb having a base mounted in said opening, said light bulb comprising a glass envelope extending from said base and in sealed engagement therewith, three leads extending into said envelope from said base, a pair of said leads lying substantially in the same plane and the other of said leads being disposed to one side of the plane of said pair of leads, and a pair of generally U-shaped filaments, each of said filaments, having a light emitting portion and a pair of legs disposed at an angle thereto, one of said filaments being electrically connected and lying in a plane angularly disposed to said pair of leads and the other of said filaments being electrically connected to the other of said leads and to one of said pair of leads, the light emitting portions of said filaments being positioned parallel to each other and positioned closer to each other than the ends of the respective legs of said filaments.

4. In an automotive vehicle lamp, a reflector member having an opening therein and a light bulb having a base mounted in said opening, said light bulb comprising a glass envelope extending from said base and in sealed engagement therewith, three leads extending into said envelope from said base, a pair of said leads lying substantially in the same plane and the other of said leads being disposed to one side of the plane of said pair of leads, and a pair of generally U-shaped filaments, each of said filaments having a light emitting portion and a pair of legs disposed at an angle thereto, one of said filaments being electrically connected to said pair of leads and the other of said filaments being electrically connected to the other of said leads and to one of said pair of leads, the light emitting portions of said filaments being positioned parallel to each other, positioned to one side of the longitudinal axis of said bulb and positioned closer to each other than the ends of the respective legs of said filaments.

5. In an automotive vehicle lamp, a reflector member having an opening therein and a light bulb having a base mounted in said opening, said light bulb comprising a glass envelope extending from one end of said base and in

sealed engagement therewith, a pair of generally parallel leads extending into said envelope from said base, a third lead extending into said envelope, said third lead being parallel with said pair of leads and displaced to one side of the plane thereof, an end portion on said third lead angularly disposed thereto and extending away from the plane of said pair of leads, a lead extension secured to one of said pair of leads, said lead extension being generally parallel with the end portion of said third lead, a generally U-shaped filament bridging said pair of leads and angularly disposed thereto in generally parallel relationship with said end portion and said lead extension and a second generally U-shaped filament electrically connected and angularly disposed to the end portion of said third lead and said lead extension, one of said filaments being positioned at the focal point of said reflector and both of said filaments being positioned to one side of the longitudinal axis of said light bulb.

6. In an automotive vehicle lamp, a reflector member having an opening therein and a light bulb having a base mounted in said opening, said light bulb comprising a glass envelope extending from one end of said base and in sealed engagement therewith, a pair of generally parallel leads extending into said envelope from said base and a third lead extending into said envelope from said base, said third lead being parallel with said pair of leads and displaced to one side of the plane thereof, a pair of elbow extensions having end portions lying in a plane substantially parallel with said pair of leads, one of said extensions being connected to said third lead and the other of said extensions being connected to one of said pair of leads, a generally U-shaped filament bridging said pair of leads and extending toward the ends of said extensions and a second generally U-shaped filament bridging the ends of said extensions and extending toward said first mentioned filament, one of said filaments bing positioned at the focal point of said reflector and both of said filaments being positioned to one side of the longitudinal axis of said light bulb.

References Cited in the file of this patent

UNITED STATES PATENTS

1,156,967	Appleyard	Oct. 19, 1915
1,239,371	Evans	Sept. 4, 1917
1,269,510	Richardson	June 11, 1918
1,274,217	Trenner	July 30, 1918
1,693,672	Schroeder	Dec. 4, 1928
1,913,196	Falge et al.	June 6, 1933
1,929,111	Falge et al.	Oct. 3, 1933
1,998,187	Conti	Apr. 16, 1935
2,158,561	Biggs	May 16, 1939
2,214,472	Lund	Sept. 10, 1940
2,245,793	Kurlander	Sept. 30, 1941
2,441,823	Kurlander	May 18, 1948
2,441,824	Kurlander	May 18, 1948
2,488,751	Verbeek et al.	Nov. 22, 1949
2,490,776	Braunsdorff	Dec. 13, 1949
2,644,100	Braunsdorff	June 30, 1953
2,716,714	Adams	Aug. 30, 1955