Nov. 10, 1936. K. M. REID ET AL 2,060,637

SIGNAL LAMP

Filed May 11, 1933 2 Sheets-Sheet 1

Fig 1

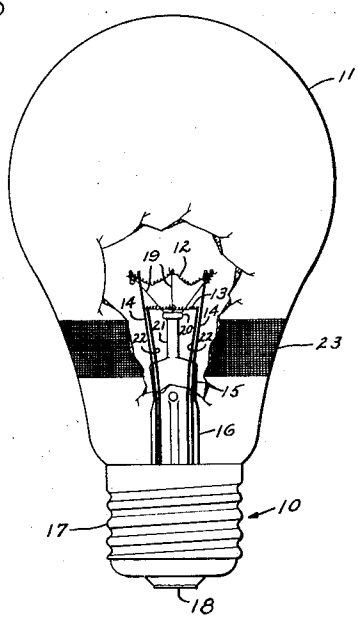


Fig 2

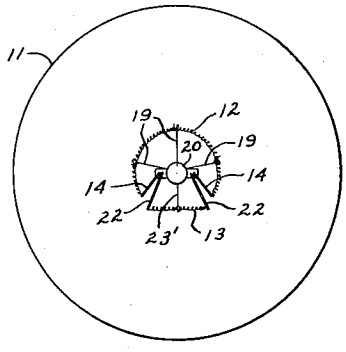


Fig 3

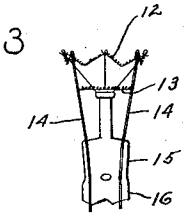


Fig 4

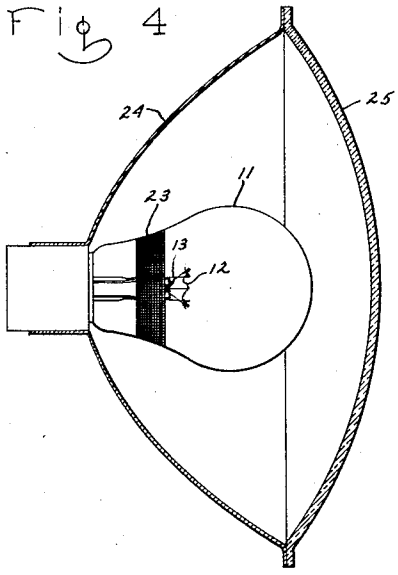
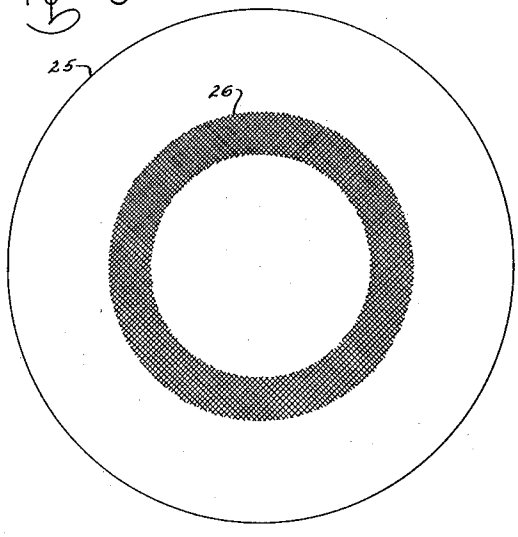


Fig 5



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Fig 6

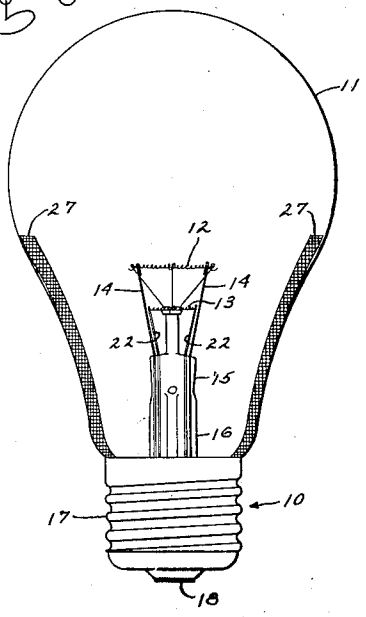


Fig 7

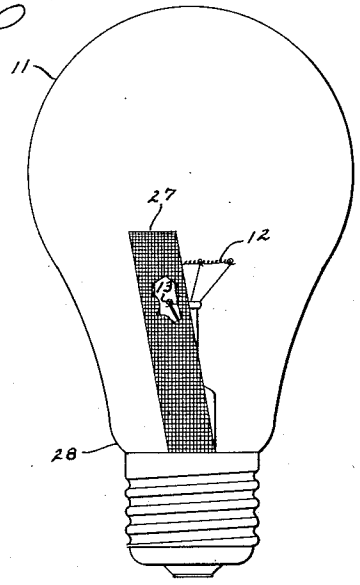
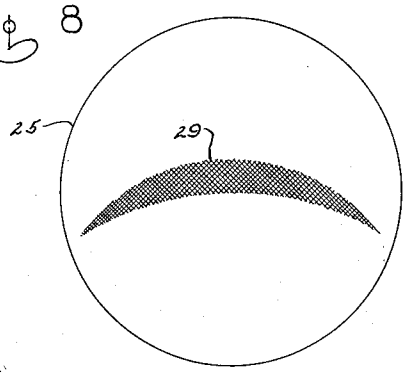


Fig 8



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UNITED STATES PATENT OFFICE

2,060,637

SIGNAL LAMP

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Application May 11, 1933, Serial No. 670,448

9 Claims. (Cl. 177—329)

Our invention relates to electric signal lamps and more particularly to such lamps used in traffic signal systems.

The object of our invention is to provide a practical, inexpensive electric signal lamp comprising a plurality of light sources and an indicator screen so disposed that upon failure of one of said light sources, another light source will cooperate with said indicator screen to produce a visible indication of the failure of the first light source and at the same time maintain the signal light in an operative condition until a new lamp is inserted. Such a lamp is highly desirable in traffic signal systems used at street intersections where the total failure of one of the lamps is likely to create an extremely dangerous situation, particularly when it is the red or "stop" signal that has become inoperative. The motorist who should be receiving the signal to stop is then receiving no signal at all and may consequently pass across the intersection and collide with a motorist who is traveling on the intersecting street and receiving the "go" signal.

According to our invention, the above-mentioned hazards are obviated by providing a lamp comprising a plurality of light sources such as filaments connected in parallel and sealed in a bulb, said bulb having a marking or screen thereon so disposed that upon failure of one of said filaments the other filament will cooperate therewith to produce contrasting light and dark areas upon the signal lens or cover glass to indicate the need of a lamp renewal and at the same time maintain the signal operative until a new lamp is inserted. Such a lamp provides a practical, inexpensive, effective and efficient means for producing the desired results. Further features and advantages of our invention will appear from the following detailed description thereof and from the drawing.

In the drawings, Fig. 1 is a vertical elevation of a lamp comprising our invention with a portion of the bulb broken away; Fig. 2 is a plan view thereof; Fig. 3 is an elevation of a modified filament mount; Fig. 4 is a section through a reflector and lens having the lamp of Fig. 1 mounted therein; Fig. 5 is a diagrammatic view of the front of the lens as it appears with one of the filaments inoperative; Fig. 6 is a side elevation of a modified form of lamp; Fig. 7 is another side elevation thereof at right angles to that in Fig. 6; and Fig. 8 is a diagrammatic view of the front of the lens as it appears with one of the filaments of the modified lamp of Fig. 6 inoperative.

Referring to Figs. 1 and 2, the lamp comprises a base 10 and bulb 11 having a major filament 12 and a minor filament 13 sealed therein. The filament 12 is in the shape of a horse-shoe disposed substantially symmetrically about the axis of the lamp and connected at each end to the ends of leading-in wires 14. Portions of said leading-in wires 14 are sealed in the press 15 of a stem tube 16, one of said wires extending to the shell 17 of the base 10 and the other extending to a metal end contact 18 in said base. The filament 12 is supported in loops in the ends of wires 19, the opposite ends of which are sealed in a button 20 on the end of a glass rod 21 extending from the stem press 15. As shown in Fig. 1, a serrated or zigzag configuration is preferably imparted to the filament 12.

The minor filament 13 comprises, preferably, a linear coiled coil disposed below the major filament 12 and mounted on the ends of leading-in wires 22. Portions of said leading-in wires 22 are sealed in the stem press 15 and one of said wires extends to the base shell 17 while the other extends to the end contact 18, thus connecting the filaments 12 and 13 fixedly in multiple. The filament 13 is preferably designed for a longer life than filament 12 so that when said filament 12 burns out, filament 13 will continue to burn. The said filament 13 may be additionally supported by a wire 23' which has a loop at one end which supports the filament while the other end is embedded in the button 20. Instead of mounting the filament 13 on separate leading-in wires 22, it may of course be mounted directly on the wires 14 as shown in Fig. 3.

An indicator screen 23 is disposed on the bulb 11 in cooperative relation with the minor filament 13 so that upon failure of the major filament 12 a positive indication of that failure will appear upon the signal as hereinafter explained. Said screen 23 is preferably a band of opaque paint encircling the bulb, the upper edge of said band being located just below the filament 13. In Fig. 4 the lamp is shown mounted in a signal light comprising the usual paraboloidal reflector 24 and lens 25. When both filaments are in operation a portion of the emitted light is intercepted by the opaque screen 23 and this tends to produce a narrow, darkened pattern on the reflector with a corresponding darkened pattern on the lens; however, there is sufficient "stray light" to obliterate the darkened pattern on the

lens and to produce a substantially uniformly lighted lens. Upon failure of the major filament 12 the opaque screen continues to intercept a portion of the emitted light, which produces a visibly darkened pattern 26 (Fig. 5) on the lens, since the stray light is not of such magnitude or direction as to obliterate it. Thus the appearance of the lens gives a positive indication that a lamp renewal is necessary and yet the signal light is maintained in operative condition until the lamp is replaced. It is apparent that this lamp may be used in the present traffic signals with no changes or auxiliary apparatus.

The structure of the modified lamp in Figs. 6 and 7 is substantially similar to that in Fig. 1 with the exception of the indicator screen. The filament 12 need not be of the serrated construction shown in Fig. 1. The indicator screen in Figs. 6 and 7 comprises a pair of stripes or bands 27 located on opposite sides of the bulb 11 and opposite the ends of the minor filament 13. As shown in Fig. 7, the stripes 27 preferably extend from the middle of the neck portion 28 of the bulb 11 upward in front of filament 13 and beyond the major filament 12, making a slight angle with the longitudinal axis of the bulb. When this lamp is inserted in the reflector and lens in Fig. 4 and both filaments lighted, the lens 25 assumes virtually a normal lighted appearance. But upon failure of filament 12, the lens appears as shown in Fig. 8 with a dark crescent 29 across the face thereof indicating the need for renewal of the lamp.

Although the form of lamp shown in Fig. 1 has given the best results, it is apparent that various changes could be made in the shape and design of the lamp. For instance, the screen 23 in Fig. 1 could be made to only partially encircle the bulb 11 thus producing a segment of the dark ring area 26. Also, the stripes 27 may be placed on diametrically opposite sides of the bulb 11 and the filament 13 may be located so as to extend through the axis of said bulb, thus producing a dark area on the lens comprising a pair of wedge shaped, oppositely disposed bands. One of said stripes 27 may also be omitted.

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

1. An electric incandescent lamp adapted to be used in a signal light comprising a reflector and a cover glass, said lamp comprising a transparent bulb having a pair of filaments therein electrically connected in multiple, and a substantially opaque screen extraneous of the space between said filaments, said screen being so disposed as to be in the path of some of the light rays directed toward the said reflector by the combined light source formed by said filaments when said lamp is used in said reflector, the overall dimensions of the said two filaments being sufficient to direct light behind said screen and substantially uniformly illuminate said cover glass to give a normal signal indication when both of said filaments are energized, but the dimensions of one of said filaments being too small to direct sufficient light behind said screen so that when the other filament fails a characteristic shadow of said screen of contrasting appearance from the normal signal indication appears on said cover glass.

2. An electric incandescent lamp adapted to be used in a signal light comprising a reflector and a cover glass, said lamp comprising a transparent bulb having a pair of filaments therein electrically connected in multiple, one of said filaments having a longer life than the other, and a substantially opaque screen extraneous of the space between said filaments, said screen being so disposed as to be in the path of some of the light rays directed toward the said reflector by the combined light source formed by said filaments when said lamp is used in said reflector, the shorter lived filament alone being of sufficient dimensions to direct light behind said screen and substantially uniformly illuminate said cover glass to give a normal signal indication but the dimensions of the longer lived filament alone being too small to direct sufficient light behind said screen so that when the shorter lived filament fails a characteristic shadow of said screen of contrasting appearance from the normal signal indication appears on said cover glass.

3. An electric incandescent lamp adapted to be used in a signal light comprising a reflector and a cover glass, said lamp comprising a transparent bulb having a pair of filaments therein electrically connected in multiple, and a substantially opaque area on said bulb so located as to be in the path of some of the light rays directed toward the said reflector by the combined light source formed by said filaments when said lamp is used in said reflector, the overall dimensions of the said two filaments being sufficient to direct light behind said opaque area and substantially uniformly illuminate said cover glass to give a normal signal indication when both of said filaments are energized, but the dimensions of one of said filaments being too small to direct sufficient light behind said opaque area so that when the other filament fails a characteristic shadow of said opaque area of contrasting appearance from the normal signal indication appears on said cover glass.

4. An electric incandescent lamp adapted to be used in a signal light comprising a reflector and a cover glass, said lamp comprising a transparent bulb having a pair of longitudinally spaced filaments therein electrically connected in multiple, the filament nearest the base end of said lamp having a longer life than the other filament, and an annular substantially opaque area around said bulb located between said long life filament and the base end of said lamp, the plane through the edge of said area farthest from the base end of said lamp being substantially adjacent to said long life filament so that when both of said filaments are energized the said cover glass is substantially uniformly illuminated to give a normal signal indication but when the shorter lived filament fails a characteristic shadow of said opaque area of contrasting appearance from the normal signal indication appears on said cover glass.

5. An electric incandescent lamp adapted to be used in a signal light comprising a reflector and a cover glass, said lamp comprising a transparent bulb having a pair of filaments therein electrically connected in multiple, one of said filaments having a longer life than the other, and a pair of substantially opaque bands extending substantially longitudinally along opposite sides of said bulb, the said long life filament being located substantially wholly between the longitudinal planes passing through the opposite edges of said opaque bands, and the other filament extending laterally a substantial distance beyond at least one of said planes so that when both of said filaments are energized the said cover glass is substantially uniformly illuminated to give a normal signal indication but when the shorter lived filament fails a characteristic shadow of said

opaque bands of contrasting appearance from the normal signal indication appears on said cover glass.

6. In an electric signal light, the combination of a reflector, a cover glass at the front of said reflector, and an electric lamp in said reflector comprising a bulb having a pair of filaments therein electrically connected in multiple, and a substantially opaque screen extraneous of the space between said filaments and in the path of some of the light rays directed toward the said reflector by the combined light source formed by said filaments, the said two filaments being so large and so located as to direct sufficient light behind said screen to substantially uniformly illuminate said cover glass to give a normal light indication when both of said filaments are energized, but one of said filaments being so small and so located as to direct insufficient light behind said screen so that when the other filament fails a characteristic shadow of said screen of contrasting appearance from the normal signal indication appears on said cover glass.

7. In an electric signal light, the combination of a reflector, a cover glass at the front of said reflector, and an electric lamp in said reflector comprising a bulb having a pair of filaments therein electrically connected in multiple, and a substantially opaque area on said bulb located in the path of some of the light rays directed toward the said reflector by the combined light source formed by said filaments, the said two filaments being so large and so located as to direct sufficient light behind said opaque area to substantially uniformly illuminate said cover glass to give a normal light indication when both of said filaments are energized, but one of said filaments being so small and so located as to direct insufficient light behind said opaque area so that when the other filament fails a characteristic shadow of said opaque area of contrasting appearance from the normal signal indication appears on said cover glass.

8. In an electric signal light, the combination of a reflector, a cover glass at the front of said reflector, and an electric lamp in said reflector comprising a bulb having a pair of filaments therein spaced axially of said reflector, said filaments being electrically connected in multiple, the filament nearest the base end of said lamp having a longer life than the other filament, and an annular substantially opaque area around said bulb located between said long life filament and the base end of the lamp, the plane through the edge of said area farthest from the base end of said lamp being substantially adjacent to said long life filament so that when both of said filaments are energized the said cover glass is substantially uniformly illuminated to give a normal signal indication but when the shorter-lived filament fails a characteristic shadow of said opaque area of contrasting appearance from the normal signal indication appears on said cover glass.

9. In an electric signal light, the combination of a reflector, a cover glass at the front of said reflector, and an electric lamp in said reflector comprising a bulb having a pair of filaments therein electrically connected in multiple, one of said filaments having a longer life than the other, and a pair of opaque bands extending substantially longitudinally along opposite sides of said bulb, the said long life filament being located substantially wholly between the longitudinal planes passing through the opposite edges of said opaque bands, and the other filament extending laterally a substantial distance beyond at least one of said planes so that when both of said filaments are energized the said cover glass is substantially uniformly illuminated to give a normal signal indication but when the shorter-lived filament fails a characteristic shadow of said opaque bands of contrasting appearance from the normal signal indication appears on said cover glass.

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