

Jan. 20, 1942.

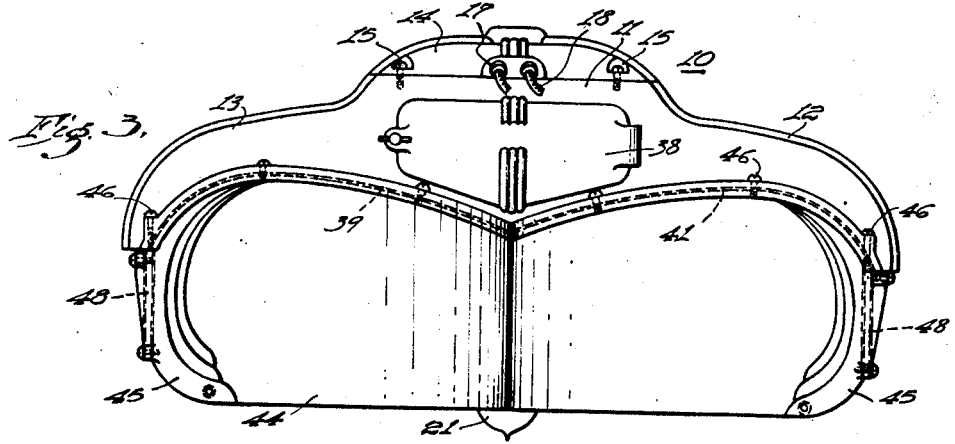
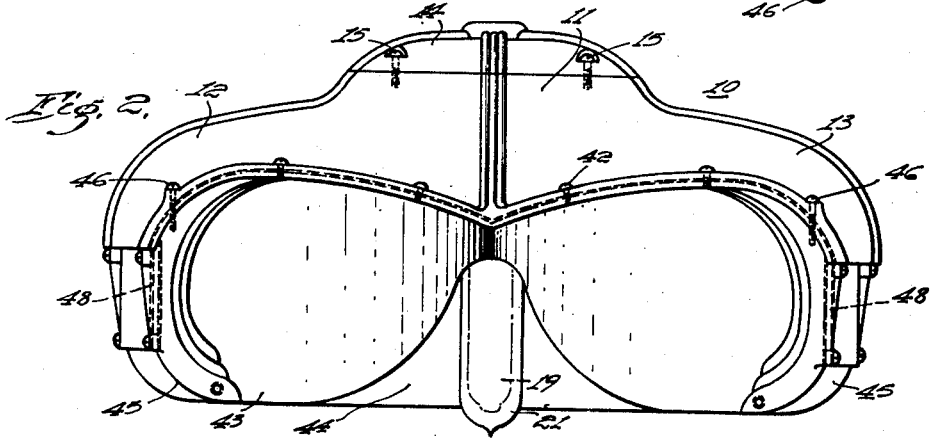
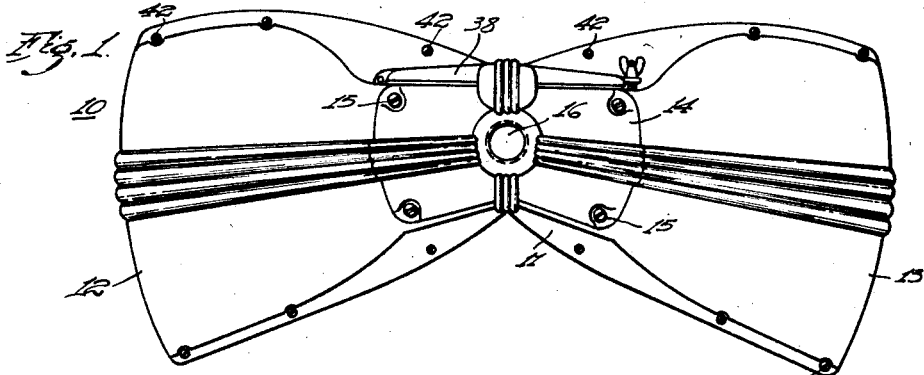
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2,270,801

LIGHTING UNIT

Filed Aug. 27, 1938

3 Sheets-Sheet 1



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3 Sheets-Sheet 3

Fig. 6.

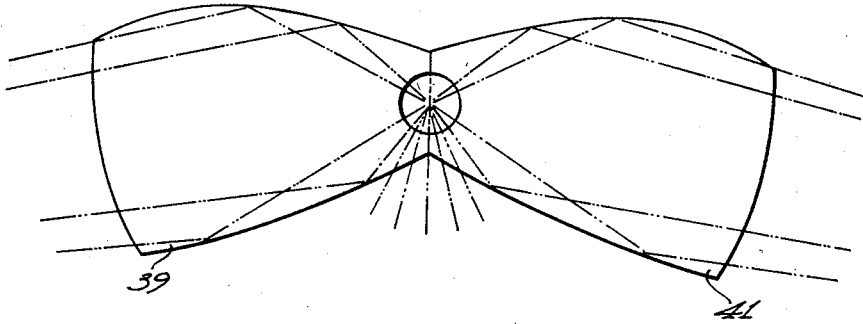


Fig. 7.

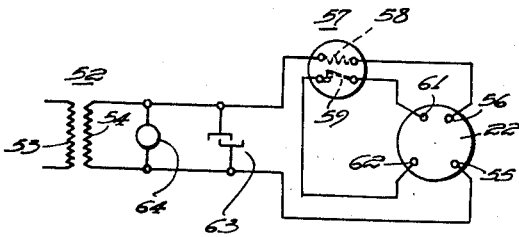
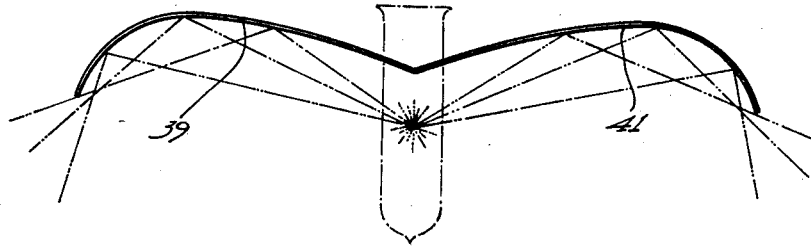


Fig. 8.

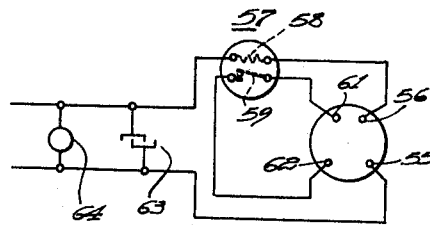


Fig. 9.

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2,270,801

LIGHTING UNIT

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Application August 27, 1938, Serial No. 227,047

6 Claims. (Cl. 240—25)

My invention relates, generally, to lighting units, and, more particularly, to lighting units for street and highway lighting utilizing a sodium or other suitable lamp.

The object of my invention, generally stated, is to provide a lighting unit for street and highway lighting which shall be of simple and lightweight construction, have a pleasing and ornamental appearance, which shall function to efficiently and effectively control the light, and which may be readily and economically manufactured and used.

A more specific object of my invention is to provide a lighting unit for street and highway lighting utilizing a sodium or other suitable lamp having an elongated light source mounted in a vertical position within a reflecting medium to produce a predetermined desired distribution of light.

Another object of my invention is to provide a lighting unit for street and highway lighting utilizing a vertically mounted lamp enclosed by horizontally and vertically mounted reflector elements to direct the maximum amount of light from the lamp upon the surface of the street or roadway.

A further object of my invention is to provide, in a lighting unit of the above-described character, for mounting the lamp socket and other associated auxiliary accessories and devices within the housing or body of the unit in such manner as to provide a high degree of protection and accessibility to these parts.

A still further object of the invention is to provide a lighting unit of this character embodying a main housing or body member which functions to support the reflector elements of the unit and house the lamp socket and other associated auxiliary accessories.

Another object of my invention is to provide a lighting unit of the character described wherein the main housing or body member is provided with a side opening and a door or cover member whereby ready access may be had to the parts mounted within the body member.

Still another object of the invention is to provide, in a lighting unit having a vertically mounted lamp enclosed by horizontally and vertically mounted reflector elements, for eliminating glare in the direction of the street or roadway without decreasing the efficiency of the unit or decreasing the intensity of the light on the street or roadway.

A further object of my invention is to provide for utilizing a simple thermal switch in the

electrical circuit of the sodium lamp to more effectively and economically control its operation.

These and other objects of the invention will become more apparent from the following detailed description considered in connection with the drawings, in which:

Figure 1 is a plan or top view of a lighting unit or fixture embodying the principal features of the invention;

Fig. 2 is a front or street side view in elevation of the unit of Fig. 1;

Fig. 3 is a back or curb side view of the unit;

Fig. 4 is a view partly in elevation and partly in cross-section of the top or dome portion of the housing showing the mounting of the lamp socket and auxiliary control devices;

Fig. 5 is an end elevational view partly in cross-section of the unit;

Fig. 6 is a diagrammatic view showing the general shape of the side or vertical reflector elements of the unit and the light distribution produced thereby;

Fig. 7 is a similar view of the top or horizontal reflector element showing the light distribution therefrom;

Fig. 8 is a diagrammatic view of a connection diagram for the unit for operation with a transformer on either series or multiple lighting circuits; and

Fig. 9 is a similar diagram showing circuit connections for operation on a straight series lighting circuit.

Referring now to the drawings, and to Figs. 1, 2 and 3, in particular, the unit representing a preferred embodiment of the invention may comprise an elongated main housing or body member 10 of shell construction having a dome-shaped central portion 11 with integral oppositely extending wing portions 12 and 13. The housing 10 may be constructed of any suitable material, such, for example, as cast aluminum, which reduces the weight of the unit to assure ease of installation and maintenance.

The exterior surfaces of the housing 10 are preferably provided with ribbed ornamentation as shown which adds to the attractiveness of the unit and increases the strength of the housing.

As will be observed, the housing 10 is provided with a large top opening, and in order to close this opening and support the housing and other parts attached thereto above the roadway surface, a canopy member 14, detachably secured to the housing by means of screw bolts 15, is provided. The canopy is preferably constructed of

cast iron to provide a strong support for the entire unit and is provided with a threaded or tapped opening 16 whereby it may be secured to a suitable mounting bracket or mast arm (not shown).

As shown in Fig. 3, and also in Fig. 5, the canopy 14 is provided on one side thereof with openings containing insulating bushings 17 and insulated leads 18 which may be used when outer wiring is desired. When inner wiring is used, the bushings may be omitted and the unit wired through the threaded opening 16 in the top of the canopy.

In this embodiment of the invention the light source of the unit is in the form of a sodium vapor lamp 19, provided with a suitable vacuum flask 21, and mounted in a vertical position beneath the housing. It is to be understood, however, that any other suitable light source may be used, such, for example, as a mercury or other gaseous discharge lamp with a long light source.

As will be readily understood, the operation of the sodium lamp requires the use of accessory devices, such, for example, as a socket for the lamp, a holder for the vacuum flask, a condenser, a receptacle and film holder and a thermal switch to control the proper heating of the heaters or cathodes of the lamp during the initial stage of its energization.

In order to provide for mounting these devices in such manner that they will be suitably housed and be readily accessible for maintenance and repair, they are all mounted as shown in Fig. 4 within the dome-shaped portion 11 of the housing by attaching them to the detachable canopy 14 by means of suitable brackets.

As shown, the lamp socket 22 and the flask holder 23 are mounted directly beneath the top opening in the canopy 14 by means of brackets 24 and 25 secured to lugs 26 on the under side of the canopy by screws 27. The thermal switch 28 is likewise secured to a lug 29 by a bracket 31. The condenser 32, receptacle 33 and film holder 34 are mounted on the bracket 35 attached to lugs 36 and 37.

It is apparent that this mounting arrangement provides a unit assembly for all of the auxiliary or accessory devices from which the housing and attached reflectors may be removed, leaving the unit assembly, including the canopy and auxiliary devices attached to the supporting bracket or mast arm with all of the auxiliary devices exposed and readily accessible for repairs or replacement.

In order to facilitate relamping and refilming operations, the housing is provided with a side opening and a hinged door 38 for closing the opening. As will be readily understood, this side door 38 gives access to the interior of the housing in which the lamp socket, film cut-out and other control parts are located, thereby making it possible to readily replace the film cutout or lamp without removing the canopy or removing the unit from its mounting support, and is an important feature of construction when considered from the maintenance standpoint.

In order to effectively and efficiently control the light distribution, the unit is provided with a reflector system comprising top and side reflector elements which may be also termed horizontal and vertical reflectors.

The top reflector is preferably constructed in two similarly shaped parts 39 and 41, as shown in Figs. 2 and 3, which are secured to the under

side of the housing in any suitable manner, as by means of the screws 42.

The shape of the two top reflectors is shown in Figs. 6 and 7. It will be observed that the outline of each of the parts conforms generally to the shape of the housing, and that they are each curved as shown in Fig. 7. The outer ends of the top reflectors are curved sharply downward in order to direct the light rays from the source downwardly upon the roadway surface and to increase the illumination directly below the unit.

The side reflectors 43 and 44 are preferably of one-piece construction. The shape or outline of the side reflector 43, which may be termed the street side reflector, is shown best in Fig. 2. It will be seen that this reflector is cut away opposite the lamp which provides for directing a portion of the light across the roadway.

The other side reflector 44, or curb side reflector, is also of one-piece construction and has a straight bottom edge in order to prevent any appreciable amount of light to be directed beyond the edge of the roadway surface on the curb side of the unit.

The top and side reflectors are preferably constructed of aluminum sheet material and are suitably processed and treated to provide a highly efficient reflecting surface.

The side reflectors 43 and 44 are of double curved construction, the curvature of which follows, generally, the curvature of the wing-shaped housing.

The side reflectors 43 and 44 may be attached to the housing in any suitable manner. In this instance, a plurality of reflector supports 45, one at each corner of the housing, are utilized. The supports are preferably constructed of cast aluminum and may be secured to the bottom edge of the housing by means of screws 46, as shown. These supports are ornamented and, in addition to providing rigid mounting for the side reflectors, add to the attractiveness of the units as a whole.

In view of the foregoing, it will be readily seen that the reflector system comprising the top and side reflector elements is such that the elongated light source is most effectively enclosed to produce the desired light distribution upon the roadway surface, and at the same time effectively screen the light from the curb side of the unit.

It will also be apparent that this reflector system produces an asymmetric light distribution comprising two main beams spaced approximately 165 degrees apart horizontally. The beam control produced by the reflector system is shown in Figs. 6 and 7. Fig. 6 shows the main beams directed in opposite directions along the roadway, while Fig. 7 shows the manner in which the top reflectors function in directing the light downwardly directly beneath the unit and also along the roadway. The top and side reflectors functioning together in conjunction with the vertically mounted lamp produce a highly satisfactory and effective light distribution and uniform surface brightness.

While the reflector system utilized effectively directs the main light beams along the roadway as to largely eliminate glare to the observer, the glare may be eliminated, if desired, by utilizing glass refractor plates 48 at the ends of the unit. These plates may be secured to the reflector supports 45 by means of suitable mounting members 49 and screws 51, as shown in Fig. 5.

It will be understood that the refractor plates

48 function to deviate the light rays in such manner as to increase the light intensity on the roadway and at the same time eliminate glare which is caused, primarily, by excessive light above the horizontal plane of the unit.

The circuit connections for the unit are shown schematically in Figs. 8 and 9. The circuit of Fig. 8 is for operation with a transformer on either a series or multiple distribution circuit, and the circuit of Fig. 9 is for straight series operation.

With reference to Fig. 8, 52 is the transformer having primary and secondary windings 53 and 54. The secondary winding 54 is connected to the two main terminals 55 and 56 of the socket 22, as shown, these terminals being associated with the contact elements of the socket which engage the prongs of the lamp to which the cathodes are connected.

In order to delay the establishment of the arc across the anodes of the lamp until the heaters or cathodes have reached the proper temperature, a thermal switch 57 is utilized. As shown, the heating element 58 thereof is connected in series with the socket 22, and the normally closed contact element 59 is connected to the other two terminals 61 and 62 of the socket, which are connected to the contact elements which engage the anode prongs of the lamp.

In response to the energization of the lamp circuit, the heater element 58 becomes energized and after a predetermined time effects the opening of the contact element 59 and the establishment of the arc across the anodes of the lamp.

Any suitable type of thermal switch may be used for this purpose although it is preferred to use a simple snap-acting disc thermostat, such, for example, as those used in electric appliances of various kinds.

In addition, the lamp circuit is provided with a condenser 63 and a film cutout 64, both of which are connected across the secondary winding 54, the condenser 63 functioning to eliminate any possible radio interference and the film cutout to insure continuity of the distribution circuit in the event of lamp failure.

The arrangement and operation of the circuit shown in Fig. 9 is substantially the same as described in connection with Fig. 8.

In view of the foregoing, it will be apparent that I have provided a lighting unit especially adapted for street and highway lighting which is of simple and economical construction and which is efficient and effective in operation. The unit provides for utilizing a sodium or other lamp having an elongated light source in the most effective manner, and the reflector system employed not only produces an efficient and effective utilization and distribution of the light from the sodium lamp, but is also constructed in such manner as to require a minimum amount of maintenance to keep it in efficient condition.

The reflector system and glass refractor plates utilized therewith function to effectively illuminate the roadway without producing objectionable glare to the observer which is a highly important feature in highway lighting.

It may be stated in conclusion that, while the illustrated embodiment constitutes a practical embodiment of my invention, I do not wish to limit myself strictly to the exact details illustrated, since modifications of the same may be made without departing from the spirit of the invention as defined by the appended claims.

I claim as my invention:

1. A lighting unit for street and highway lighting, comprising, an elongated wing-shaped housing having a relatively-deep dome-shaped central portion provided with a relatively large top opening, a detachable canopy member covering said top opening, said canopy member being adapted for attachment to the supporting means for the unit, horizontally and vertically disposed cooperating reflector plates secured to the bottom of the housing to provide an elongated inverted trough shaped reflector system, a transverse vertically disposed refractor plate mounted at each end of the reflector system, an elongated lamp, means including a lamp socket attached to the detachable canopy member for supporting the elongated lamp in a downward vertical position beneath the housing and within the reflector system, a plurality of auxiliary control devices for the lamp attached to the underside of the canopy member, said canopy, lamp socket, lamp and auxiliary control devices being removable as a unit from the housing, said dome-shaped portion of the housing being provided with a side opening to give access to the interior thereof, and a door for said opening.

2. A lighting unit for street and highway lighting, comprising, an elongated housing having a relatively deep dome-shaped central portion and oppositely extending relatively flat wing-shaped portions with downwardly curved ends, said housing having a top opening in the dome-shaped central portion, a detachable cover member for the top opening in the housing, reflector plate means having a central opening therein and secured to the bottom of the housing in a generally horizontal position forming a central compartment in the housing, said reflector plate means being curved at the ends to conform generally to the curvature of the said wing-shaped portions, vertically-disposed reflector plate means attached to the opposite sides of the wing-shaped portions of the housing, said reflector plate means being formed to generally follow the side edges of the housing and cooperating with the horizontally-mounted reflector plate means to form a generally trough-shaped reflecting system having its longitudinal axis generally parallel to the roadway, a lamp socket supported from the detachable cover member within the said central compartment for supporting a lamp in a downward vertical position within the reflecting surface, said lamp extending through said central opening in the reflector plate means, and a plurality of auxiliary devices for controlling the lamp supported from the cover member, said cover member and the attached lamp socket and auxiliary devices being removable as a unit from the fixture, and a glass refractor plate mounted in a transverse vertical position at each end of the reflector system to direct the light at a predetermined angle below the horizontal to eliminate glare and increase the light intensity on the roadway.

3. A lighting unit for street and highway illumination, comprising, a housing member having a dome-shaped central portion open at the top and bottom with oppositely extending integral wing-shaped portions, said central portion also having a side opening, said wing-shaped portions being curved downwardly at their outer ends, a detachable canopy member for covering the top opening in the housing, reflector plate means secured to the underside of the housing to provide a generally horizontal upper reflecting

surface, said upper reflecting plate means being curved to generally conform to the curvature of the wing-shaped portions of the housing, reflector plate means secured along the side edges of the housing in a vertical position to provide oppositely disposed reflecting surfaces, an elongated lamp, a socket for said lamp, means for supporting the lamp socket from the detachable canopy within the housing in such manner as to position the lamp in a downward vertical position beneath the upper reflecting surface and between the side reflecting surfaces, said canopy, lamp socket and lamp being removable as a unit from the housing, and a hinged cover for the side opening in the housing to provide access to the interior thereof.

4. A street and highway lighting unit, comprising, an elongated wing-shaped housing member having an enlarged dome-shaped central portion with top and side openings therein, a plurality of top and side reflector plate means secured to the underside thereof to provide a reflecting surface closed at the top and on two opposite sides, a canopy for the top opening in the housing, an elongated sodium lamp, a socket for said lamp, means for attaching the socket to the canopy for supporting said lamp in a downward vertical position beneath the top reflector plate means and between the side reflector plate means, said top reflector plate means having an opening through which the lamp extends, a cut-out device for said lamp, a temperature responsive device for controlling said lamp, means for also supporting said cut-out and temperature responsive control device from the canopy, said lamp socket, cut-out device and temperature control device all being located within the dome-shaped central portion of the housing and removable therefrom with the canopy as a unit, and a door for the side opening in the housing to permit ready access to the interior thereof.

5. A highway lighting unit, comprising, an elongated housing member adapted for horizontal mounting above the roadway surface and having a central dome-shaped portion including a

removable canopy which covers an opening in the top of the dome-shaped portion, a plurality of reflector plate means secured to the underside of the housing forming a generally inverted trough-shaped reflecting surface open at the bottom and the two ends, means including a lamp socket attached to the canopy for supporting an elongated lamp within the reflecting surface, said lamp extending through an opening in the top of the reflecting surface, a plurality of control devices for use in connection with the lamp supported from the canopy within the dome-shaped portion of the housing, said lamp socket and control devices being removable with said canopy as a unit, said dome-shaped portion of the housing being provided with a side opening giving access to the lamp socket and control devices supported therein, and a cover for said side opening.

6. A lighting unit for street and highway lighting, comprising, an elongated housing having a central dome-shaped portion provided with a removable canopy at the top and with a side opening having a hinged door, means including a lamp socket attached directly to the canopy for supporting an elongated lamp in a downward vertical position beneath the housing, a plurality of reflector plate means attached to the bottom of the housing to provide cooperating horizontally and vertically disposed reflecting surfaces above and on two opposite sides of the lamp, said lamp extending through an opening in the upper reflector plate means, said lamp socket being located above said upper reflector plate means within the dome-shaped portion of the housing, a temperature responsive switch supported from the canopy within the dome-shaped portion of the housing for controlling the establishment of the arc within the lamp, and a cut-out device supported from the canopy within the dome-shaped portion of the housing for short-circuiting the lamp in the event of failure thereof, said lamp socket, lamp, temperature responsive switch and cut-out device being removable from the housing with the canopy as a unit.

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