Sept. 16, 1958 W. H. BEAUBIEN ET AL 2,852,758

LIGHTING UNIT

Filed Dec. 22, 1955

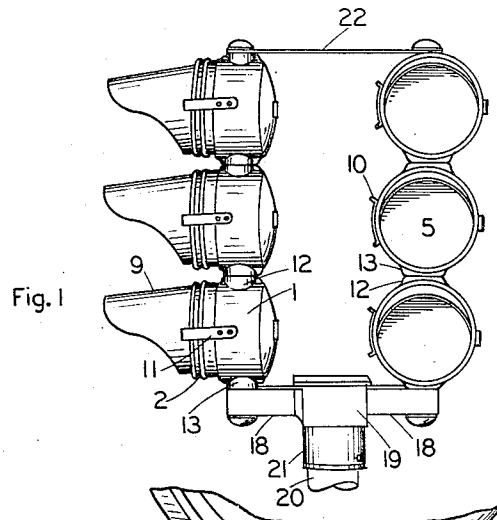


Fig. 1

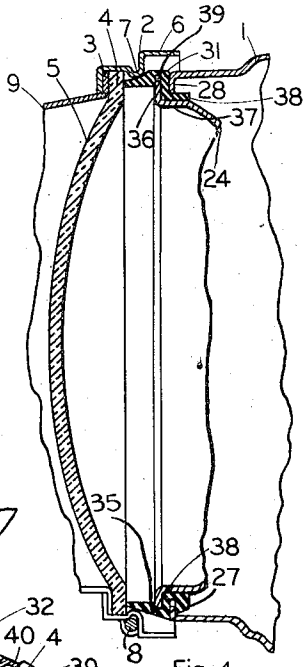


Fig. 4

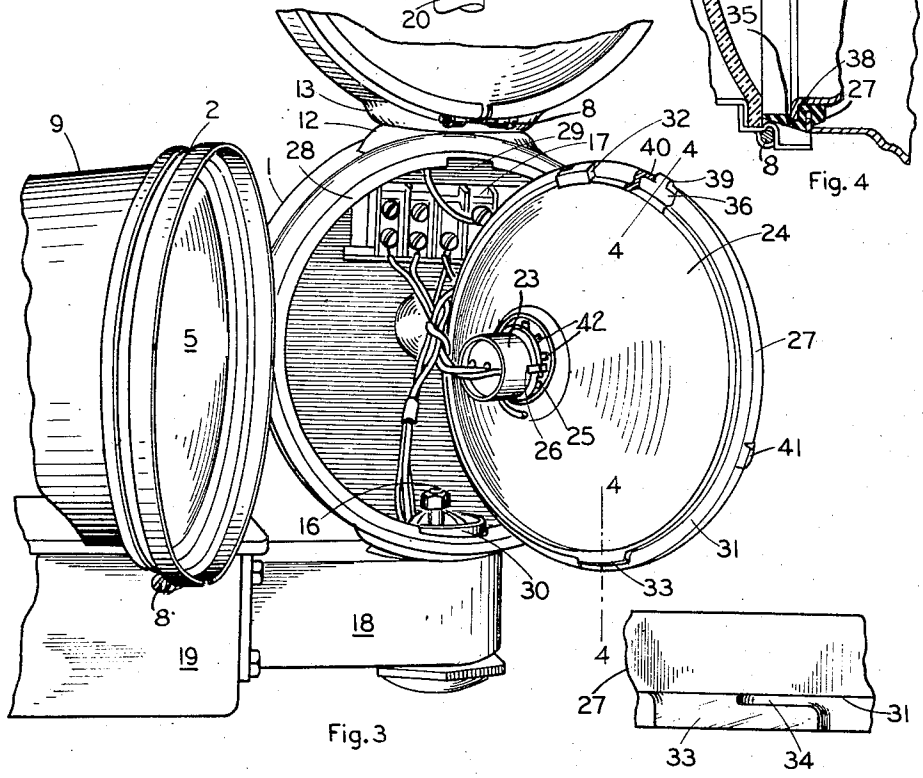


Fig. 3

Fig. 5

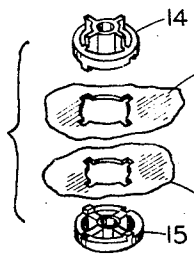


Fig. 2

Inventors:
William H. Beaubien
John P. Foulds

by, Richard E. Hosley

Their Attorney

United States Patent Office 2,852,758 Patented Sept. 16, 1958

2,852,758

LIGHTING UNIT

William H. Beaubien and John P. Foulds, Hendersonville, N. C., assignors to General Electric Company, a corporation of New York

Application December 22, 1955, Serial No. 554,742

4 Claims. (Cl. 340—74)

Our invention relates to lighting units and, more specifically, to lighting units particularly suited for use in traffic signal systems and the like.

It is a general object of our invention to provide a new and improved lighting unit which is inexpensive, simple in structure, and easily assembled and disassembled for replacement of parts and for servicing.

It is also an object of our invention to provide a lighting unit comprising a housing, a reflector and a flexible gasket detachably mounted on said housing and said reflector for positioning said reflector in said housing.

It is a further object of our invention to provide a lighting unit assembly in which the reflector is supported in the lighting unit housing by a gasket which also engages the lens in the door closure for the housing to provide, when the door is closed, a tight seal which effectively keeps dirt, dust, bugs and moisture out of the resulting optical assembly.

It is also an object of our invention to provide a construction in which the above-mentioned gasket indexes the reflector in one or more desired positions in the housing and from which the gasket and reflector may be removed readily to provide access to an adjustable lamp socket mounted in the reflector and to the wiring enclosed within the housing and in back of the reflector.

Further objects of our invention will appear from the following description thereof.

In one embodiment of our invention, the housing of a lighting unit is provided with an opening in its face and a gasket, which engages the edge of the housing about this opening and likewise engages the edge of the open mouth of a reflector, providing a detachable support for the reflector in the housing. Indexing means associated with the gasket, housing and reflector ensure the proper location of the reflector in the housing in one or more desired positions. The opening in the housing is closed by a door having an opening therein for a lens which has an exposed inner peripheral area adapted to engage the reflector supporting gasket and means are provided for holding this door closed over the opening in said housing with said peripheral area of the lens in engagement with said gasket. Thus, by opening the door, access is readily gained to the interior of the lighting unit for cleaning the reflector and for replacing the lamp therein. This lamp is mounted in a socket adjustably supported at the inner end of the reflector. Furthermore, by releasing the gasket from the housing structure, the reflector mounted therein may be removed therefrom in order to expose the interior of the housing for adjusting the lamp socket position in the reflector and for making any wiring operations which may be required. The indexing means associated with the reflector, housing and gasket not only ensures a proper assembly of these parts for the desired positioning of the reflector relative to an observer and the lens covering the reflector but also serves to seal the optical system including reflector, lamp and lens when the door holding the lens is closed. The gasket thus forms a seal between the lens and reflector and at the same time forms a seal between the reflector and the housing in which the reflector is mounted.

Our invention will be better understood and its various objects and advantages further appreciated by referring to the following detailed description taken in connection with the accompanying drawing in which Fig. 1 shows an assembly of our lighting units to form two signal faces at ninety degrees to one another for the display of the usual stop, caution and go signals in each face; Fig. 2 is an exploded view showing the manner in which the lighting units are assembled and locked in position relative to one another and their mounting means; Fig. 3 is a perspective view in which the reflector and gasket mounted thereon are shown removed from the housing to illustrate the indexing means employed for securing a desired assembly of those parts; Fig. 4 is a sectional view taken along the lines 4—4 of Fig. 3 to show the relationship of the parts when assembled and with the lens door covering the opening in the housing; and Fig. 5 is a detail view showing the construction of one of the indexing tabs by means of which the gasket is positioned and held in the housing.

Our lighting unit may be used alone as a one color, one-way signal or two or more of our units may be grouped into complete signal faces for orientation in one or more directions. As shown in Fig. 1 of the drawing, two groupings of three of such units mounted one on top of the other are provided for a two-way signal providing the usual stop, caution and go signals of red, yellow, and green for each way.

As shown in the drawing, each unit may comprise a hollow casing or housing **1** having a cylindrical body portion which is closed at one end and has a circular opening in its other end defined by a body section of reduced diameter. The door structure comprises a split-ring **2** having a configuration forming an inwardly directed channel-shaped slot **3** for holding the rim **4** of a lens **5** and a rim **6** which partly overlays the section of reduced diameter of housing **1** when the door is closed. The channel-shaped slot **3** and rim **6**, which is of larger diameter, are connected with one another through a grooved section **7** of the door which at the split portion of the ring structure is provided with lugs through which a bolt **8** passes to secure the assembly comprising the door structure. The body portion of this bolt rests within groove **7** which in the assembly serves to hold the nut on the bolt against turning when the head of the bolt is turned to secure the desired clamping engagement. The flanged edge of a visor **9** is also seated within the channel-shaped groove **3** and thus held in position in the door assembly.

The door structure is attached to the casing of the lighting unit by a hinge **10** formed by a pair of brackets one of which is attached to the housing and the other of which is attached to the split-ring forming the body portion of the door. One of these brackets is provided at its extremities with hinge pins and the other with lugs having holes therein for these hinge pins. By deforming the bracket having the lugs for these hinge pins, it is possible to disassemble the hinge and thus remove the door from the housing. The door is held in its closed position by a spring latch **11** which, in the arrangement illustrated, is mounted on the lighting unit housing and has at its free end a configuration which seats within groove **7** of the door structure.

Projecting bosses **12** and **13** of circular section are formed in the top and bottom portions of the cylindrical part of the housing in order to provide mounting surfaces therefor. The central areas of these bosses are formed to provide mating surfaces, one of which is recessed within one of the bosses and the other of which

projects from the other boss so that when a unit is assembled with another unit or with a support member by fitting these bosses together a connection is formed which will prevent the entrance of dirt, dust or moisture at the joint between them. The central areas of each of these bosses are provided with wiring holes or openings which, as shown in Fig. 2, are notched at ninety degree positions. The parts are held together by clamping washers **14** and **15** having interfitting projections and slots which match in location with the notches in the wiring openings above referred to. These clamping washers are held in assembled relation by a bolt **16** which passes through centrally located openings therein. Thus, each unit or a group of units may be rotated around a vertical axis and firmly locked at ninety degree positions in perfect alignment with one another and their support. The central part of each washer is formed with radial arms which provide spaces between the arms for wires to pass into and out of the units. Other than ninety degree positions may be provided by suitably notching the wiring openings in the lighting unit housing. Where a terminal board **17** is provided in one of the housings of a grouping as shown in Fig. 3, the supporting bracket therefor may also be held by the bolt which secures adjacent housings together through clamping washers **14** and **15** as previously described.

Various supporting arrangements may be provided for the lighting units or their various groupings, and as shown in Fig. 1, the two groupings of three are supported on arms **18** of a terminal box **19** which is mounted on the top of a hollow post **20** through the agency of a slip fitter **21**. The top portion of each unit assembly is held by a strap **22** shown in Fig. 1.

Wiring for the lighting units is introduced through hollow post **20** into terminal box **19** and through its arms and through the wiring openings in the units and their clamping washers to the terminal board in one of the units and to the lamp sockets in each of the units. As shown in Fig. 3, the lamp socket **23** for each unit extends through the inner closed portion of its reflector **24**. This reflector is provided with a cupped flange against which a rim of the socket rests under the biasing influence of a spring **25**. Ribs **26** on the body portion of the lamp socket engage corresponding slots **42** in the cupped flange of the reflector, and by pressing the socket against the bias of its spring, these ribs and slots may be disengaged to rotate the socket to positions which will bring the filament of a lamp in the socket to a position in which it coacts with the configuration of the specular surface of the reflector to give the desired light distribution. The filaments in traffic signal lamps such as this are customarily in the shape of a C located in a plane transverse to the lamp axis, and the desired light distribution is generally obtained with the open end of the C-shaped filament in the uppermost position. When the filament is properly positioned, the socket may be released to the bias of spring **25** so that its ribs will again engage the slots in the reflector and hold the socket in adjusted position. The fixture may be prefocused so that a lamp in its socket has its filament in the focal plane of the reflector whose specular surface may be divided into parabolic areas giving a desired light distribution.

The reflector **24** of a lighting unit is mounted in its housing through the agency of a ring-shaped gasket **27** which provides a seal between them and also provides a seal between the reflector and lens **5** of the door structure when the door is closed. This gasket is detachably mounted on the reflector and the housing and is preferably formed of a flexible material such as neoprene but obviously may be formed of other materials. In the arrangement illustrated, the gasket is an integral ring and requires flexibility for mounting on the reflector as described below. However, by using a split-ring construction, nonflexible materials or materials having slight flexibility may be used. Gasket **27**, reflector **24**, and housing **1**, which comprise the assembly, are each provided with cooperating indexing means which ensure that the reflector is properly positioned in the housing. This arrangement is required because of the light distribution produced by the specular surface of the reflector. The detachable gasket mounting of the reflector in the housing makes it easy to disassemble the parts as shown in Fig. 3 in order to gain access to the interior of the housing for installing or changing the wiring and for adjusting the lamp socket in the reflector. When the door of a unit is in its closed position gasket **27** forms a seal between the reflector **24** and the lens **5** by engaging it about a peripheral area thereof adjacent the rim portion of the lens. This lens may have varying configurations and may have bands of prisms on its inner surface which depress and spread horizontally the light directed therethrough by reflector **24**.

As shown in Figs. 3 and 4, the housing of the lighting unit has a circular projection **28** angularly disposed to the opening in its face, and this projection is provided with circumferentially spaced rectangular notches **29** and **30** which are of unequal width. The inturned lip or projection **28** of the housing provides a ring-shaped seating surface for the corresponding ring-shaped mounting surface **31** of gasket **27**, and in the arrangement illustrated notches **29** and **30** do not extend for the full depth of the projection **28** so that the mounting surface **31** of gasket **27** may form a tight seal at these notches. Gasket **27** is provided with rectangular tabs **32** and **33** which are circumferentially spaced about gasket **27** in accordance with the spacing of notches **29** and **30** in the inturned projection **28** of housing **1**. These tabs **32** and **33** are also of different widths corresponding respectively to the widths of notches **29** and **30** in projection **28** of housing **1** so as to index the gasket relative to the housing. Each tab is separated at corresponding ends from mounting surface **31** of the gasket to form slots **34** with closed inner ends and of a width corresponding to the thickness of the angular projection **28** of the housing. Thus, by inserting gasket **27** into housing **1** with its mounting surface **31** against the outer surface of projection **28** and with tabs **32** and **33** in register with notches **29** and **30** in projection **28**, the gasket may be latched in position by rotating it in a clockwise direction in order to bring the tabs in locking engagement with projection **28** which is engaged at the notches by slots **34** in the tabs.

Gasket **27** is also provided circumferentially of its inner surface with a reflector holding groove **35** which engages a circular flange **36** which extends outwardly from the outer portion of a cylindrical strip **37** formed about the open mouth of the reflector. Gasket **27** also has on the inner side of groove **35** a surface **38** which engages and seats against cylindrical side wall portion **37** of the reflector. Mating configurations are provided on the reflector and gasket in order to index the position of the reflector relative to tabs **32** and **33** of the gasket. In the arrangement illustrated, a projecting tongue **39** is formed on rim **36** of the reflector and engages a socket formed at **40** in the gasket at the bottom of its groove **35**. Since in some assemblies the lighting unit may form part of a group having a horizontal position instead of the vertical position shown in Fig. 1, another socket is formed therein for the projecting tongue **39** of the reflector at a position **41** which is displaced ninety degrees about the optical axis of the reflector from the socket at **40**. The positions of these sockets **40** and **41** are clearly indicated, as shown in Fig. 3, by projections which extend beyond the beveled outer surface of the gasket. The projecting front surface portion of the gasket engages the rim of lens **5** as shown in Fig. 4 when the door holding this lens is in its closed position covering the opening in the face of the lighting unit housing.

It thus becomes apparent that the gasket employed for mounting and orienting reflector **24** in casing **1** not only

forms a seal between these members through its seating surfaces engaging corresponding seating surfaces on these members, but also provides an engagement with the lens in the door of the unit when this door is closed. Thus the optical system of the lighting unit is completely sealed against the entrance of dust, dirt, bugs, moisture and the like and a high optical performance of this system is guaranteed. On the other hand, the reflector may be readily disassembled from the housing by a simple twist and pull operation for necessary wiring operations and for adjusting the socket for a lamp in order to position the lamp bulb therein relative to the reflector surface. Furthermore, when the door of a unit is opened, ready access is afforded for replacing this lamp when it becomes necessary to do this.

The principal parts of our lighting unit, such as housing **1**, door ring **2**, visor **9** and reflector **24**, may be formed of sheet metal which may be readily formed by suitable press operations. Preferably, we form these parts of a light metal such as aluminum or an aluminum alloy. The lens **5** may be readily replaced by unbolting the split-ring forming the body portion of the door. It is to be noted that no gasket is provided between this lens and this ring, since none is required in view of the sealing arrangement provided by our gasket construction which in itself seals the total optical assembly.

Various modifications of our invention are possible without in any way departing from the spirit and scope thereof. The gasket may take forms other than that illustrated in order to accommodate variations in the construction employed for the lighting unit. The gasket may be formed of materials other than the neoprene or the equivalent rubber-like materials above referred to. Other constructions of the gasket may be employed for securing the desired indexed location of the reflector in its housing and for providing a tight seal between the housing, reflector and lens parts of the lighting unit. Obviously our invention is of general application and may be employed in lighting units other than those used for traffic signaling.

Thus, while we have shown and described by way of illustration only a preferred embodiment of our invention, many modifications thereof will occur to those skilled in the art, and we therefore wish to have it understood that we intend in the appended claims to cover all such modifications as fall within the true spirit and scope of our invention.

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

1. In a lighting unit a housing having an opening in its face formed by an inwardly extending flange having notches of unequal width spaced from one another about said opening; a reflector having a specular surface producing a desired light distribution about its optical axis and having an outwardly extending flange about its open mouth and an indexing configuration on said flange; and a flexible gasket having a mounting surface which engages the face of said housing and having on said surface positioning tabs corresponding in width respectively with the different widths of said notches in the flange of said housing, said tabs being slotted at said mounting surface to engage said housing flange and hold said gasket with its mounting surface against the face of said housing when tabs and notches of corresponding widths are in register with one another and said gasket is moved relative to said housing to latch said gasket to said flange of said housing and said gasket also having a groove extending lengthwise of its inner surface and engaging and holding the outward extending flange of said reflector with said indexing configuration on said flange engaging a mating configuration in said groove.

2. In a lighting unit a housing having an opening in its face formed by an inwardly extending flange having notches of unequal width spaced from one another about said opening; a reflector having a specular surface producing a desired light distribution about its optical axis and having an outwardly extending flange about its open mouth and an indexing configuration on said flange; a flexible gasket having a mounting surface which engages the face of said housing and having on said surface positioning tabs corresponding in width respectively with the different widths of said notches in the flange of said housing, said tabs being slotted at said mounting surface to engage said housing flange and hold said gasket with its mounting surface against the face of said housing when tabs and notches of corresponding widths are in register with one another and said gasket is moved relative to said housing to latch said gasket to said flange of said housing and said gasket also having a groove extending lengthwise of its inner surface and engaging and holding the outward extending flange of said reflector with said indexing configuration on said flange engaging a mating configuration in said groove; a door having a lens opening therein; a lens in said door opening and having an exposed inner peripheral area adapted to engage said gasket; and means for holding said door closed over the opening in said housing with said peripheral area of said lens in engagement with said gasket.

3. A lighting unit comprising a housing having a circular opening therein formed by a projection angularly disposed to the face thereof; said projection being provided with notches of unequal width spaced from one another circumferentially of said projection and of a depth less than the width of said projection; a reflector within said housing having a specular surface producing a desired light distribution about its optical axis and having an open mouth defined by a cylindrical side wall strip having an outwardly directed circular flange provided with an indexing tongue which projects beyond the edge of said flange; a door having a circular lens opening therein; a circular lens mounted in said door opening, means for hinging said door to swing from a position uncovered the opening in said housing to a closed position covering said opening and for latching said door to said housing in its closed position; and a flexible ring-shaped gasket having a projecting front surface portion which engages an inner peripheral area of said lens when said door in which it is mounted is closed and latched to said housing; said gasket having at its inner end a mounting surface provided with positioning tabs corresponding in width respectively to the widths of said notches in said angular projection of said housing against which said mounting surface is seated when said tabs and said notches of equal width are in register with one another, said tabs being separated at corresponding ends from said mounting surface to form slots with closed inner ends and of a width corresponding to the thickness of said angular projection of said housing for latching said mounting surface seated against said angular projection when said gasket is rotated relative thereto; and said gasket also having in its inner surface a reflector-holding groove which engages the flange of said reflector; a socket which extends beyond the inner surface of said groove and accommodates said tongue which projects from said reflector flange to index said reflector relative to said gasket and its said tabs; and a seating surface to one side of said groove which engages said cylindrical side wall strip of said reflector.

4. A lighting unit comprising a housing having a circular opening therein formed by a projection angularly disposed to the face thereof; said projection being provided with notches of unequal width spaced from one another circumferentially of said projection and of a depth less than the width of said projection; a reflector within said housing and having an open mouth defined by a cylindrical side wall strip having an outwardly directed circular flange provided with an indexing tongue which projects beyond the edge of said flange; said reflector having a reflecting surface providing a desired light distribution relative to said indexing tongue; a door having a circular lens opening therein; a circular lens mounted in said door opening; means for hinging said door to

swing from a position uncovering the opening in said housing to a closed position covering said opening and for latching said door to said housing in its closed position; and a flexible ring-shaped gasket having a projecting front surface portion which engages an inner peripheral area of said lens when said door in which it is mounted is closed and latched to said housing; said gasket having at its inner end a mounting surface provided with positioning tabs corresponding in width respectively to the widths of said notches in said angular projection of said housing against which said mounting surface is seated when said tabs and said notches of equal width are in register with one another, said tabs being separated at corresponding ends from said mounting surface to form slots with closed inner ends and of a width corresponding to the thickness of said angular projection of said housing for latching said mounting surface seated against said angular projection when said gasket is rotated relative thereto; and said gasket also having in its inner surface a reflector-holding groove which engages said circular flange of said reflector; a plurality of sockets positioned at ninety degrees from one another along said groove and

extending beyond the inner surface of said groove, each of said sockets being of a size to accommodate said tongue of said reflector which projects from said reflector flange and indexes said reflector in either one of two definite positions in said gasket relative to its said mounting tabs, and a seating surface to one side of said groove which engages said cylindrical side wall strip of said reflector.

References Cited in the file of this patent

UNITED STATES PATENTS

1,336,407	Ahman	Apr. 13, 1920
1,761,528	Fryberg	June 3, 1930
2,615,084	Diebold	Oct. 21, 1952
2,725,546	Moore et al.	Nov. 29, 1955

FOREIGN PATENTS

10,968	Great Britain	Feb. 29, 1912
225,651	Great Britain	Dec. 11, 1924
391,212	Germany	Feb. 29, 1924
478,579	Great Britain	Jan. 30, 1938
505,768	Great Britain	May 16, 1939