

Sept. 30, 1952

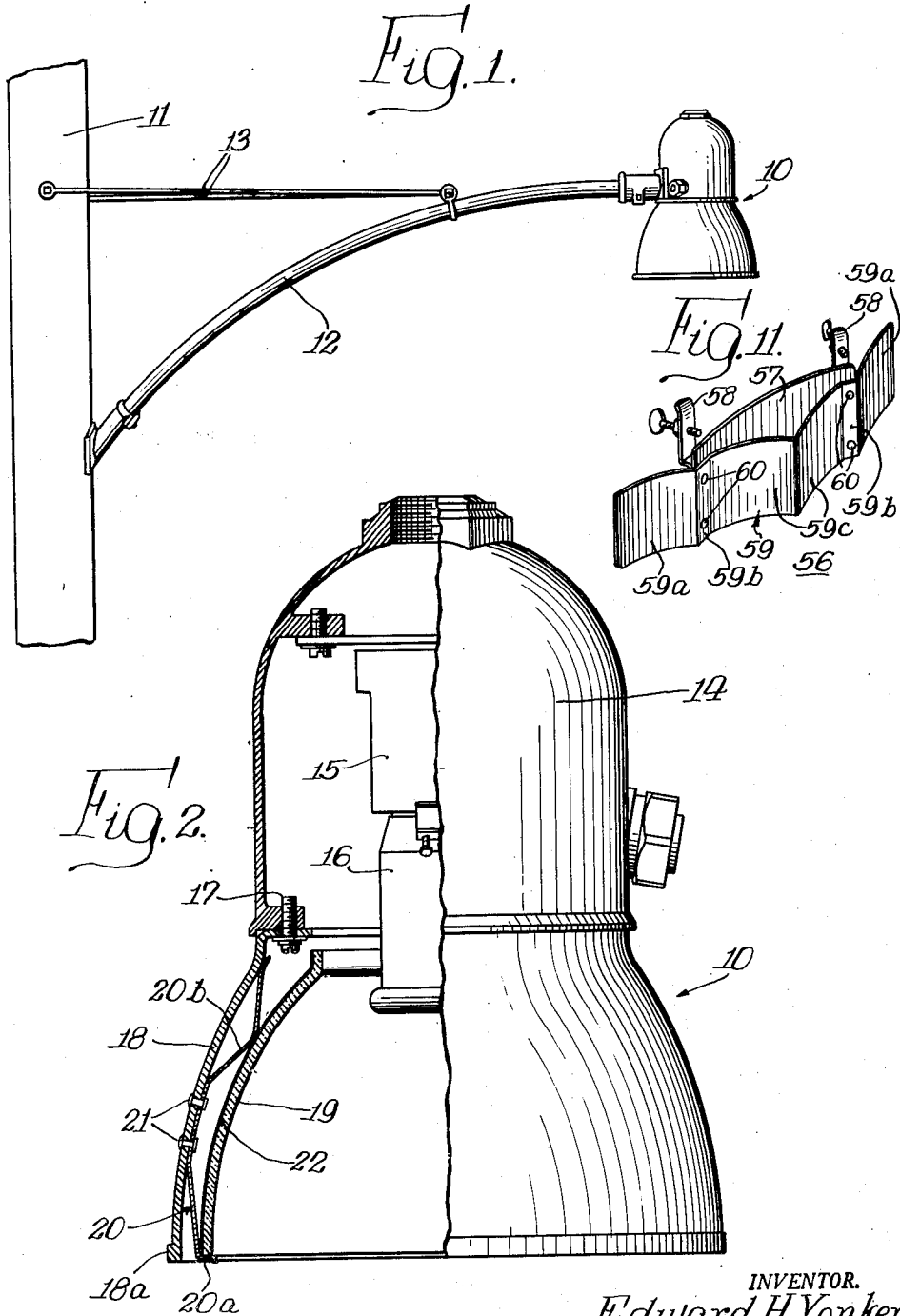
E. H. YONKERS

2,612,600

OPEN TYPE LUMINAIRE WITH EASILY REMOVABLE REFLECTOR

Filed Aug. 12, 1947

3 Sheets-Sheet 1



INVENTOR.
Edward H. Yonkers,
BY Mason & Nyss

Attys.

Sept. 30, 1952

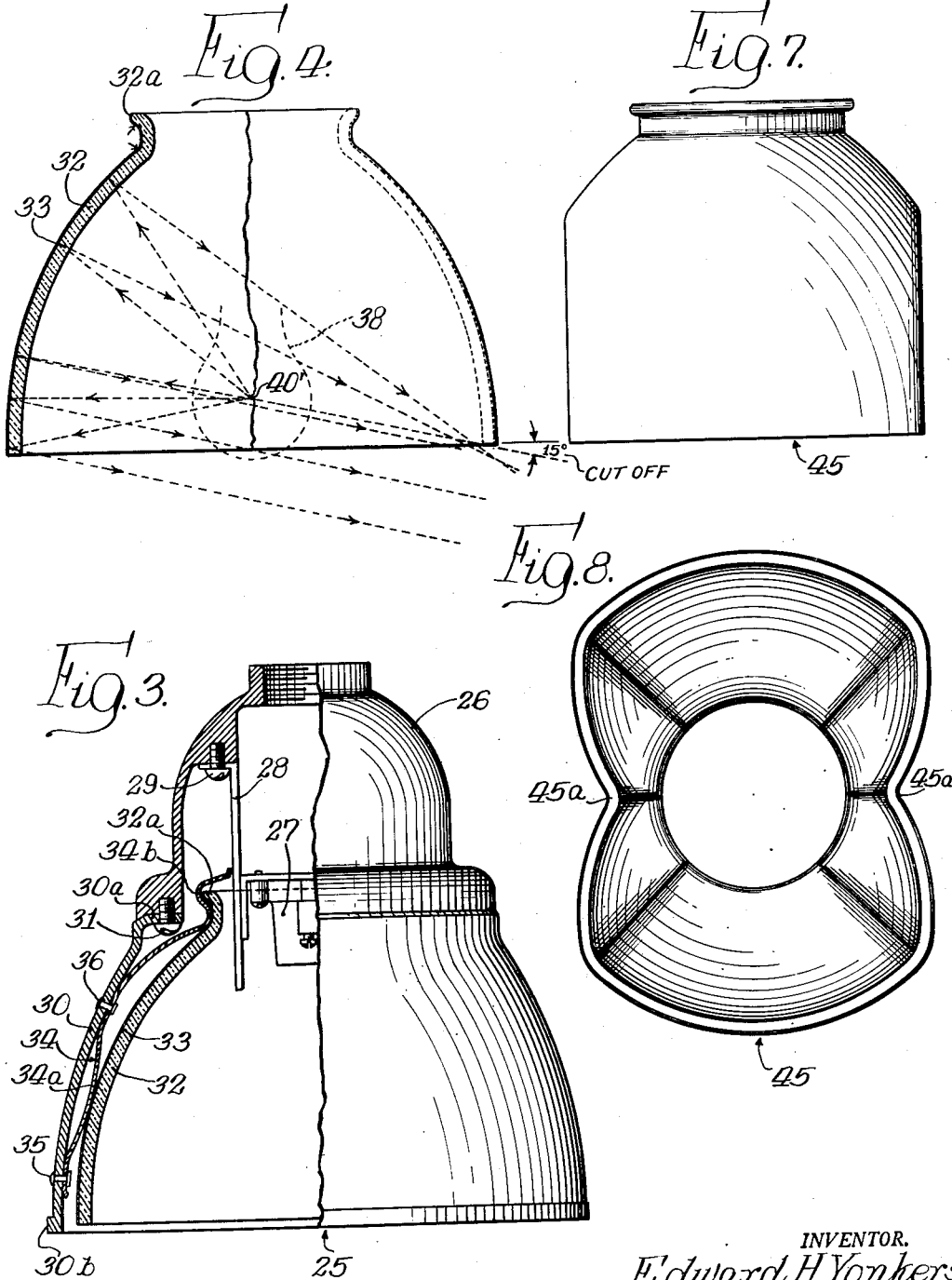
E. H. YONKERS

2,612,600

OPEN TYPE LUMINAIRE WITH EASILY REMOVABLE REFLECTOR

Filed Aug. 12, 1947

3 Sheets-Sheet 2



INVENTOR.
Edward H. Yonkers
BY *Mason & Hyss*

Attys.

UNITED STATES PATENT OFFICE

2,612,600

OPEN TYPE LUMINAIRE WITH EASILY REMOVABLE REFLECTOR

Edward H. Yonkers, Glencoe, Ill., assignor to
Joslyn Manufacturing and Supply Company,
Chicago, Ill., a corporation of Illinois

Application August 12, 1947, Serial No. 768,184

5 Claims. (Cl. 240-25)

1

The present invention relates to luminaires and more particularly to street lighting luminaires of the open type.

Street lighting originally employed open-type reflectors which were developed as a cheap means of controlling light on overhead systems. Such open type luminaires came into extensive use primarily because of (1) low first cost and (2) low maintenance cost due to their sturdy construction resulting in very little breakage and due also to the ease with which lamps could be replaced therein merely by employing replacer sticks. It is only within a period of little more than a decade that specular reflectors with definite light control have been employed for street lighting purposes. Such use followed the development of a particular type of aluminum reflector formed of a sheet of highly polished anodized aluminum. Heretofore, luminaires capable of producing a definite light control were relatively expensive and were generally of the fully enclosed type. Due to their high cost they were not employed for lighting suburban areas or the like, and the open type of reflector continued to be used for this purpose. Open type luminaires employing exposed specular metal reflecting surfaces have been used to a limited extent but were not acceptable due to the fact that the specular metal did not retain sufficient reflectivity under outdoor conditions. As a result by far the greatest portion of street luminaires in service today are of the overhead styles using open non specular radial wave reflectors. Incidentally, this type of luminaire concentrates most of the light directly under the luminaire so as to be relatively unsatisfactory as compared with the more expensive closed type of luminaire employing the specular reflector.

It would be desirable therefor to provide a reflector which would be particularly applicable for suburban use in that the initial cost thereof would be little, if any, higher than that of the radial wave reflector so extensively employed today while at the same time retaining the open style for easy lamp replacement. Such luminaires should also be capable of equaling or approaching the lighting characteristics of the expensive closed type of luminaire. Furthermore, the reflectors employed therewith should be unaffected by acids and alkalis normally found in the atmosphere of industrial localities. Such luminaires should furthermore be mechanically sturdy and interchangeable with open type reflectors now in use.

Accordingly, it is an object of the present in-

2

vention to provide an open type luminaire for street lighting purposes having the desirable characteristics enumerated above.

It is another object of the present invention to provide an improved open type luminaire including a specular reflector unaffected by exposure and the like.

Still another object of the present invention is to provide a new and improved supporting means for reflectors for use in open type luminaires.

It is a further object of the present invention to provide new and improved means of relatively inexpensive construction, capable of being employed in an open type luminaire for directing the light up and down the street without having any substantial loss of light in the vertical direction or toward the house sides of the street.

It is another object of the present invention to provide a new and improved reflector designed for open type street lighting luminaires.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the present invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of the present invention reference may be had to the accompanying drawings in which:

Fig. 1 is an elevational view of an open type overhead street lighting luminaire embodying the present invention with the mounting means thereof being shown;

Fig. 2 is an enlarged partially sectional view of the luminaire portion of Fig. 1 showing a portion of the reflector and supporting means thereof;

Fig. 3 is a sectional view similar to Fig. 2 of an open type luminaire embodying a modification of the present invention;

Fig. 4 is a partial sectional view of the reflector of Fig. 3 illustrating the configuration thereof whereby projection of most of the reflected light at approximately 15° below horizontal is produced;

Fig. 5 is a top view partly in section, with contours shown on the outer surface, of a reflector similar to Fig. 4 but constructed so as to cause the light to be directed into two street beams substantially 180° apart which would be directed up and down a particular street where a luminaire embodying the reflector would be mounted;

Fig. 6 is a construction diagram from which the contour lines of Fig. 5 may be determined;

3

Fig. 7 is a side elevational view of a reflector illustrating a modification of the reflector of Fig. 5;

Fig. 8 is a bottom view of the reflector of Fig. 7;

Fig. 9 is a partial view of a reflector somewhat similar to the reflector shown in Fig. 4 having means attached thereto for causing the light therefrom to be directed into two strong beams displaced by approximately 180° which may be directed up and down the street where the reflector is employed;

Fig. 10 is a perspective view of one of the means associated with Fig. 9; and

Fig. 11 is a view similar to Fig. 10 of a modification of the invention.

Street lighting units or luminaires of the open construction, like street lighting luminaires of the closed construction, are of many specific types, particularly with reference to the head assembly which may comprise a metal head, or a porcelain head of various forms depending upon the particular type of circuits with which such luminaires are employed. In order to illustrate the present invention, however, only two different types of luminaires of the open construction are illustrated, best shown in Figs. 2 and 3 of the drawings. It should be understood, however, that the present invention is equally applicable to all other styles of street lighting luminaires of the open type and the specific embodiments are merely representative of constructions to which the present invention is applicable.

Referring now to Fig. 1 of the drawings there is illustrated a street lighting luminaire of the open type generally indicated by the reference numeral 10. This luminaire is illustrated as being supported for overhead street lighting on a suitable support illustrated as a post 11. A suitable pipe mast arm 12 and braces or tie rods 13 are illustrated as supporting the luminaire 10 from the post 11. The particular arm construction illustrated forms no part of the invention.

Referring now to Fig. 2 of the drawings where there is shown an enlarged partially sectional view of the luminaire 10 of Fig. 1, it may be observed that this luminaire 10 comprises a head 14 preferably formed of any suitable material such as metal or the like within which is mounted a receptacle assembly 15 and a lamp socket 16. Fastened to the head 14 as by a suitable fastening means indicated at 17 is a housing 18 preferably formed of cast aluminum or any other suitable material. This housing 18 is of somewhat cylindrical construction with a bowl-shaped configuration and is provided at its lower end with an annular flange 18a.

For the purpose of supporting within the housing 18, which is open at the lower end, a suitable reflector generally designated at 19 there are provided in accordance with the present invention a plurality of resilient supporting means 20 preferably formed of resilient strip material and fastened at intermediate points thereof to the housing 18 by the fastening means 21. These strips are disposed in spaced relationship in housing 18, preferably a minimum of three strips being employed. The portion of each resilient supporting strip 20 below the fastening means 21 is arranged to be inherently biased toward the axis of the housing 18 and is furthermore provided with a horizontal shoulder portion 20a adapted to engage the lower periphery of the reflector 19.

4

As illustrated the reflector 19 is generally of inverted bowl-shaped configuration with an open top and bottom. The opening in the top of the reflector 19 is provided so that the lamp socket 16 and particularly the lamp associated therewith, not shown in the drawings, may extend into the reflector. Preferably the reflector 19 is highly resistant to both thermal and mechanical shock. A specular reflecting surface is applied to the outside of the glass as indicated at 22. This surface is applied at high temperature and under conditions which produce extreme cohesion between the metal and the glass. Preferably the reflecting surface 22 comprises an aluminum spray which forms a molecular bond with the glass so that it is impossible to separate the metal and glass by mechanical means. The reflector is further treated to give it resistance to shattering from impact. In fact it has been found that such a reflector may be shot through several times with rifle bullets and still remain in place within the housing where it will continue to distribute the light with efficiency in spite of such damage. The extreme cohesion between the specular surface and outer surface of glass assures maintenance of its original high reflectivity. The reflecting surface 22 is protected on the inside by the glass reflector 19 and when cleaning the reflector 19 only the glass surface is cleaned so that such cleaning in no way damages the specular surface which is protected by the glass.

It will be apparent that the reflector 19 with its reflecting coating 22 may readily be removed from the housing 18 by merely deflecting the ledges 20a of the resilient supporting means 20. Also in accordance with the present invention the resilient supporting strips 20 are each provided with an extension 20b which is bent in somewhat of a V-shape so that the apex of the V engages an intermediate position of the reflector 19 to steady the same in its position in housing 18. The free end of the extension 20b is in sliding engagement with the inside wall of the housing 18. Consequently, the reflector 19 is removably supported by the resilient members 20 and is firmly held in position against damage.

It will be observed by examining Fig. 2 of the drawings that removal and replacement of the lamps can readily be accomplished by a suitable tool without touching any part of the luminaire except the lamp. The arrangement is furthermore interchangeable with the present open type reflectors to give the improved lighting. The luminaire is furthermore not affected by acids and alkalis normally found in the atmosphere of industrial localities and cleaning of the reflector 19 merely involves the cleaning of the transparent glass surface without in any way touching or disturbing the reflecting surface 22 thereof.

A modification of the luminaire described above is shown in Fig. 3 of the drawings generally designated by the reference numeral 25. This luminaire 25 is provided with a somewhat different type head 26 adapted to be supported by suitable means. Disposed within the head 26 is a lamp receptacle 27 adjustably supported from suitable supporting members, one of which is shown at 28, which supporting members are in turn fastened to the head 26 as indicated at 29. A suitable skirt or housing 30 similar to the housing 18 is provided which is fastened to the head as by means of fastening means

31 extending through a peripheral flange 30a. The lower peripheral edge of the housing 30 is provided with the flange 30b substantially identical with the flange 18a of the housing 18 described above. Disposed within the housing 30 is a bowl-shaped reflector 32 having a reflecting surface 33 identical with that described in connection with Fig. 2 of the drawings. The upper end of the reflector 32 is provided with a curved portion terminating in an outwardly extending annular flange 32a.

For the purpose of supporting the reflector 32 in the housing 30 there are provided in accordance with the present invention resilient means 34 in the form of resilient strips which are fastened at spaced points to the inside of the housing 30. As illustrated one end of each resilient strip 34, namely the lower end, is fastened as by means of suitable rivets or the like indicated at 35 to the lower end of the housing 30. An intermediate portion of the resilient strip 34 is also fastened to the housing 30 as by means of the rivet 36. However, sufficient resilient material is permitted to exist between the rivets 35 and 36 so as to provide the bowed portion 34a adapted to press against the outer surface of the reflector 32. The upper end of each of the resilient strips 34 is provided with a free end biased toward the axes of the housing 30 and head 26 including a hooked shaped portion 34b for engaging the annular flange 32a of the reflector 32 in a manner apparent from Fig. 3 of the drawings. Preferably the hooked shaped portion 34b of each of the resilient strips 34 has a portion which extends closely adjacent the supports 28 so as to be engageable by a suitable reflector removing tool in the form of a ring adapted to be inserted in the space between the supports 28 and the annular surface of the upper end of the reflector 32. Such a bowl removing tool would, in addition to the ring for manipulating the extensions of the hooked shaped portions 32b, be provided with a stopper on the handle beneath the ring to catch the bowl when released from the hooked-shaped portions 34b. With this arrangement it is apparent that not only can the lamp be removed by a suitable tool, but in addition the reflector 32 may readily be removed by means of a suitable tool as described above, including a ring shaped member for actuating the ends of the resilient strips 34 and a stopper member for receiving the reflector when released from its resilient supports within the housing 30.

In Fig. 4 of the drawings there is illustrated a partially sectional view of the glass reflector 32 shown in Fig. 3 of the drawings. It will be understood that this reflector is designed to reflect the light from the lamp 38 indicated by dotted lines in a predetermined manner. The filament of the lamp 38 is effectively the light center, which light center is designated by the reference numeral 48', and all rays from the lamp 38 above this point will be controlled as indicated by the rays in Fig. 4. Most of the reflected light is projected at approximately 15 degrees below horizontal and all rays from the lamp filament above this angle are controlled. The 15 degree cut-off ray is so designated in Fig. 4 of the drawings. It should be noted that all reflected rays from points on the reflector below the light center are reflected at an angle of 15 degrees with the horizontal. From points on the reflector much above the light center the rays are directed to clear the reflector edge or rim. This control produces the natural symmetrical or circular light patterns which are

adapted to intersections, wide streets and the like. It will be understood that this is accomplished by properly shaping the contour of the reflector 32 or with reference to Fig. 2 the reflector 19.

It will be understood that for lighting narrow streets at places other than intersections the light supplied in a direction perpendicular to the street is generally wasted and undesirable. In accordance with the present invention there is illustrated in Fig. 5 a reflector generally similar to that shown in Fig. 4 but capable of transmitting most of the light in two beams 180° apart. The reflector 40 comprises a glass reflector with a specular reflecting surface 41 identical with that described in connection with Figs. 2, 3 and 4. As illustrated the reflector 40 comprises four symmetrical quadrants, each quadrant having its wall portions arranged in a somewhat steplike configuration. For one half of the reflector the portions A—B, C—D, and F—G cause the light to be directed in rays generally parallel to each other along the line designating the angle of 180° while for the portions E—F, H—I, and J—K the reflected light from the reflector surface 41 is directed in rays generally parallel to the line designating the angle zero degrees. Preferably the portions A—B, C—D, F—G, etc., are parabolic elements. The single reflection rays are indicated in Fig. 5 of the drawings. With the arrangement shown in Fig. 5 there is substantially 15° cut-off at zero degrees and 180° and 25 to 30° cut-off at 90° and 270°. The vertical contour of the reflector 40 is substantially identical with that of Fig. 4 of the drawings so as to provide the desired control of lighting with reference to 15° below horizontal. Fig. 6 is primarily provided to show the construction lines for obtaining the configuration shown in Fig. 5 of the drawings. It should be understood that in reflectors of the type shown in Figs. 5 and 6 of the drawings the best and most useful part of the reflector for producing two directed beams of light is from 0 to 3 as shown in Fig. 6 since light reflected from much above this leaves at too steep an angle.

It will be apparent that the reflector of Fig. 5 would have to be molded and a fairly complicated configuration of the mold would be required. In Figs. 7 and 8 of the drawings there is illustrated a reflector 45 which can be constructed in a much simpler manner than the reflector 40 in Fig. 5 but still produces satisfactory lighting up and down the street so as to produce two narrow fairly highly controlled beams 180° apart. In accordance with the present invention the reflector 45 of Figs. 7 and 8 is originally of substantially the same configuration as the reflector of Fig. 4. The reflector is then heated to a sufficient extent to soften the glass so that diametrically opposite points on the periphery of the reflector may be pushed in toward the axis of the reflector to provide the somewhat V-shaped side portions 45a clearly shown in the Fig. 8 of the drawings. With this arrangement the light is controlled in two beams 180° apart in substantially the manner of the reflector of Fig. 5 of the drawings while employing a reflector of very simple construction from a manufacturing standpoint.

It should be understood that the reflectors of Figs. 5, 7 and 8 are adapted to be supported within housings such as 18 or 30 in exactly the same manner as the reflectors 19 and 32 are supported therein as described above.

In order that a standard luminaire may be employed at all lighting sites while still provid-

ing the controlled beams along narrow streets, there is illustrated in Figs. 9 and 10 a simple arrangement for obtaining, when desired, two narrow highly controlled light beams 180° apart. This is accomplished by employing the so-called "standard" reflectors such as 19 or 32 described above. As illustrated in Figs. 9 and 10 of the drawings a pair of snap-on reflecting members generally designated at 50 are employed which are provided with suitable clips 51 for engaging the peripheral flange such as 18a of the housing 18. These snap-on reflecting members 50 are arranged to be disposed at diametrically opposed points on the housing 18, in a manner so that a line interconnecting these diametrically opposed points is perpendicular to the street adjacent which the luminaire is supported. As illustrated each reflector 50 comprises a pair of arcuate reflecting surfaces 52 and 53 which are joined at a common vertical line 54. Preferably the reflecting surfaces 52 and 53 are specular reflecting surfaces and since they extend for a short distance below the housing of the luminaire such as 18 they control practically all of the reflected light which as described above is projected at approximately 15 degrees below the horizontal. The reflectors 50 may readily be clipped into place wherever desired and replacement thereof for cleaning purposes is as simple as the replacement of a lamp in an open type reflector.

In Fig. 11 of the drawings there is illustrated a snap-on reflector 56 similar to the reflector 50 described above employing a stepped reflecting surface in order to produce the desired reflections while confining the unit 56 to a relatively small volume. This reflector 56 comprises an arcuate supporting plate 57 which extends upwardly a sufficient amount so as to engage the arcuate inside wall of a housing such as 18 or 30. Fastened to the arcuate plate 57 are a pair of extensions 58 for accommodating suitable clamping screws for clamping the reflector 56 to its associated luminaire. A stepped reflecting member 59 having a suitable specular reflecting surface is fastened to the plate 57 as by the rivets 60. As illustrated the stepped reflecting member 59 is provided with the surface portions 59a, 59b and 59c, the portions 59a and 59c producing the desired reflection of the light rays.

In view of the detailed description included above it is apparent that there has been provided an open type luminaire which has great advantages over the open type luminaires employed heretofore. It has the inherent characteristic of easy lamp removal which was a desirable feature of the open type reflector and yet it has the desirable light control feature of the expensive enclosed type of luminaire employed in installations where a large investment for lighting purposes is justified. Various means have been illustrated for providing control of the light in beams 180 degrees apart for residential street lighting between intersections. The present invention furthermore lends itself admirably for converting the present open type luminaires by merely supplying new housings and reflectors thereto in accordance with the present invention.

It should be understood that the present invention is not limited to the specific constructions and arrangements described above and that changes and modifications may occur to those skilled in the art without departing from the spirit and scope of the present invention. It is therefore aimed in the appended claims to cover all such changes and modifications.

What is desired to be secured by Letters Patent of the United States is:

1. In a street lighting luminaire, a supporting housing, a reflector adapted to be disposed in said housing and having an annular outwardly projecting flange adjacent the upper end thereof, means comprising a resilient member disposed in said housing and fastened to the lower end of said housing so that the upper end of said member is biased toward the axis of said reflector when said reflector is positioned in said housing, and a hook-shaped portion on said upper end of said resilient member for receiving said flange to removably support said reflector in said housing.

2. In a street lighting luminaire, a supporting housing, a reflector adapted to be disposed in said housing and having an annular outwardly projecting flange adjacent the upper end thereof, means comprising a resilient member disposed in said housing and having its lower end fastened to said housing so that the upper end of said member is biased toward the axis of said reflector when said reflector is positioned in said housing, and a hook-shaped portion on said upper end of said resilient member for receiving said flange to removably support said reflector in said housing, said hook-shaped portion having an extension engageable by a tool thereby to deflect the upper end of said member against the bias to release said flange from said hook-shaped portion for permitting ready removal of said reflector from said housing.

3. A lighting unit comprising, a rigid and generally bell-shaped housing, a reflector of frangible material mounted within said housing and having an annular flange at one end thereof, a plurality of resilient deflectable members disposed in spaced relation about said reflector between said reflector and said housing and attached to said housing for resiliently supporting said reflector in spaced relation to the inside of said housing, and hook-shaped portions on the ends of said resilient members for receiving said flange, said hook-shaped portions having extensions simultaneously engageable with a single tool for simultaneous deflection of said members to cause release of said hook-shaped portions from said flange, thereby permitting ready removal of said reflector from said housing.

4. A lighting unit comprising, a rigid and generally bell-shaped housing, a reflector of frangible material mounted within said housing and having an annular flange at the upper end thereof, a plurality of resilient deflectable members disposed in spaced relation about said reflector between said reflector and said housing and attached to said housing at the lower ends thereof for resiliently supporting said reflector in spaced relation to the inside of said housing, and hook-shaped portions on the upper ends of said resilient members for receiving said flange, said hook-shaped portions having extensions simultaneously engageable with a single tool for simultaneous deflection of said members to cause release of said hook-shaped portions by said tool thereby permitting ready removal of said reflector from said housing.

5. A lighting unit comprising, a rigid and generally bell-shaped housing, a reflector of frangible material mounted within said housing and having an annular flange at the upper end thereof, a plurality of resilient members disposed in spaced relation about the reflector between said reflector and said housing and attached to said

9

housing at the lower end thereof for resiliently supporting said reflector in spaced relation to the inside of said housing, and hook-shaped portions on the upper ends of said resilient members for receiving said flange.

EDWARD H. YONKERS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
38,492	Jukes	May 12, 1863
55,054	Brown et al.	May 29, 1866
1,043,256	Schepmoes	Nov. 5, 1912
1,789,976	Henningsen	Jan. 27, 1931

Number
1,884,665
2,053,923
2,110,018
2,145,732
2,196,548
2,259,307
2,376,806

5

10

Number
27,113
74,180
429,668
454,525
474,482

15

10

Name	Date
Greiner	Oct. 25, 1932
Stewart	Sept. 8, 1936
Halvorson	Mar. 1, 1938
Nickle	Jan. 31, 1939
Cohu et al.	Apr. 9, 1940
Herbold	Oct. 14, 1941
Pennow	May 22, 1945

FOREIGN PATENTS

Country	Date
England	of 1904
Sweden	May 3, 1932
France	July 24, 1911
Germany	Jan. 11, 1928
England	Nov. 2, 1937