Jan. 12, 1943. H. J. HOOD ET AL 2,308,009

REFLECTOR UNIT

Filed Aug. 6, 1940 2 Sheets-Sheet 1

FIG. 1

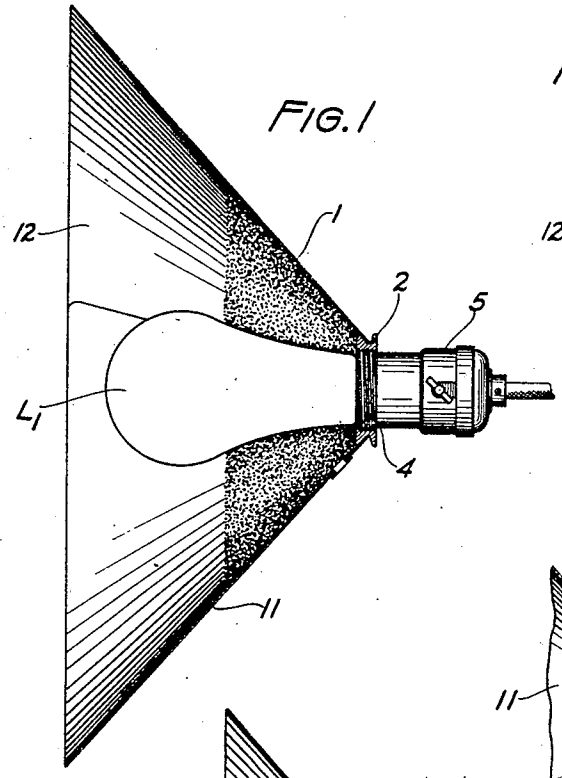


FIG. 2

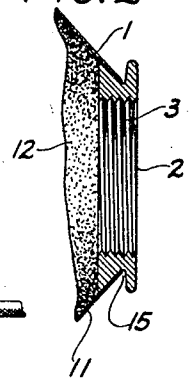


FIG. 2A

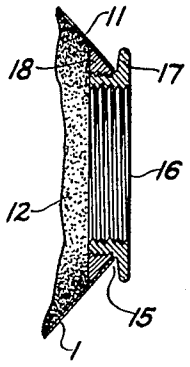


FIG. 4

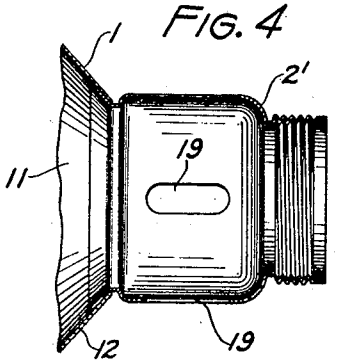


FIG. 3

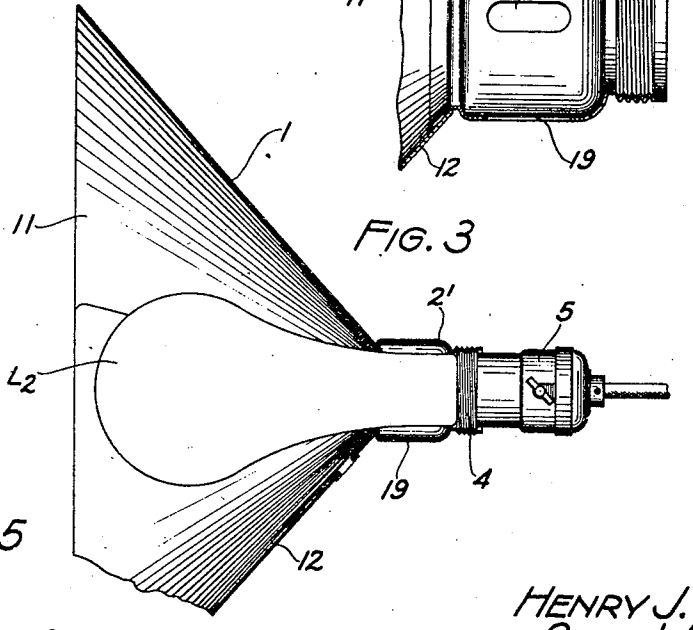
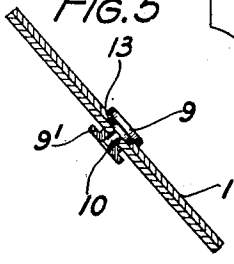


FIG. 5



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REFLECTOR UNIT

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FIG. 6

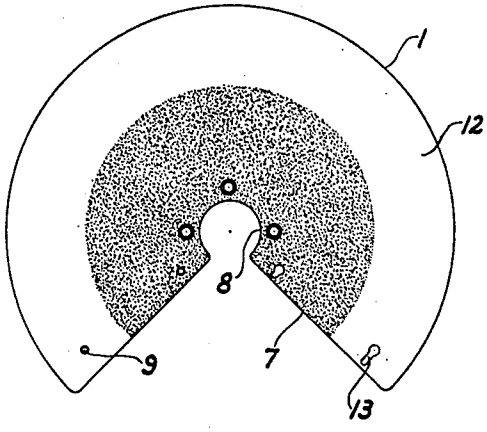


FIG. 7

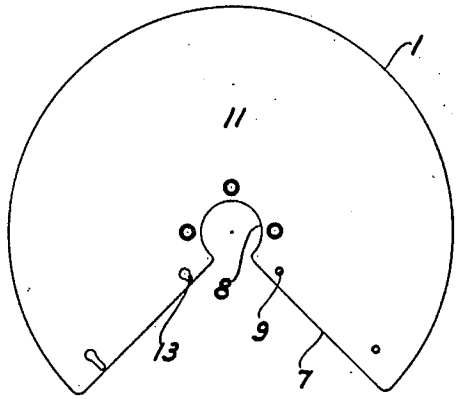


FIG. 8

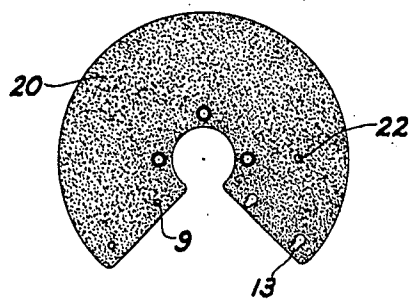


FIG. 9

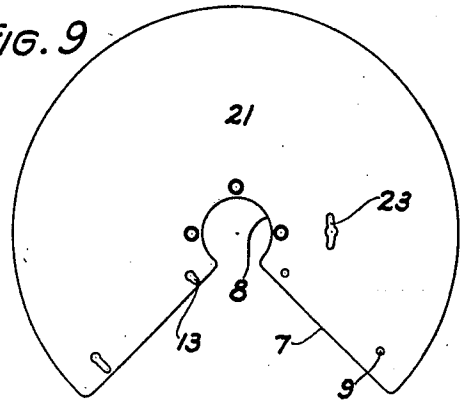


FIG. 10

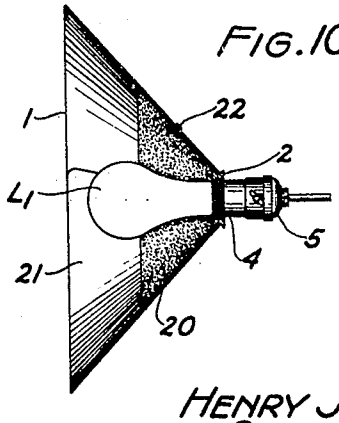
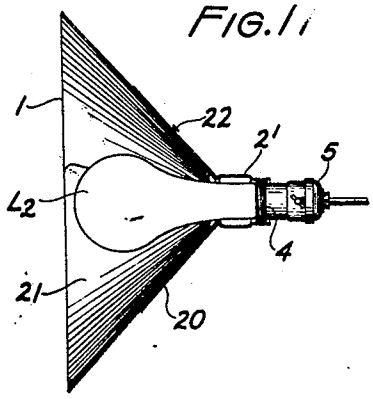


FIG. 11



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UNITED STATES PATENT OFFICE

2,308,009

REFLECTOR UNIT

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Application August 6, 1940, Serial No. 351,628

1 Claim. (Cl. 240—103)

The present invention relates to reflectors primarily for photographic illumination, and particularly to a reflector unit adapted to be detachably mounted on a lamp support in proper relation to a lamp supported thereby, and capable of presenting different reflecting surfaces toward the lamp at different times depending upon the lighting conditions required.

Picture taking with the aid of artificial illumination necessitates the control of light distribution in order to obtain the desired effects, and to meet the requirements of different types of photography. Light distribution can be readily controlled by the use of different types of lights, their number, and spacing relative to the subject, but such control is rather elaborate and expensive and not within the means of an amateur or small scale photographer. Light distribution can be readily controlled by using different reflecting surfaces on the lights at hand, and is the system best fitted to the photographer who is in no position to spend a lot of time and money on his photography.

By way of example as to the different light distribution required in photography, it might be pointed out that motion pictures require a brilliant light source over a small area, while still pictures require a less intense light over a comparatively large area. It is also desirable that this light distribution can be effected with the least amount of equipment for the purpose of cheapness and portability, and at the same time be adapted for use for lamps of various sizes.

Therefore, one object of the present invention is to provide a reflector unit the reflecting surface of which can be changed with ease to give different light distribution.

Another object is to provide a reflector unit of the type described which is collapsible for the purpose of portability.

And still another object is to provide a reflector unit of the type described which can be readily detachably mounted on a lamp support.

And yet another object of the invention is to provide a reflector unit which can be readily detachably mounted to a lamp support in proper spaced relation to different sizes of lamps held by the support.

And still another object is to provide a reversible reflector having a complete specular surface on one side, and a composite specular and matte surface on the other.

And another object is to provide a reflector having a central matte reflecting area surrounded by a specular ring.

The novel features that we consider characteristic of our invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its methods of operation, together with additional objects and advantages thereof, will best be understood from the following description of specific embodiments when read in connection with the accompanying drawings in which,

Fig. 1 is a sectional view of a reflector unit constructed in accordance with the preferred embodiment of the invention, and showing the same attached to a lamp socket in proper relation to a lamp contained therein,

Fig. 2 is an enlarged sectional view of a preferred embodiment of an adapter ring forming a part of the reflector unit, and showing the small end of the reflector associated therewith,

Fig. 2A is an enlarged sectional view of another embodiment of an adapter ring for use with the reflector unit, and particularly adapted for preformed, or non-collapsible, reflectors,

Fig. 3 is a view similar to Fig. 1 and showing the reflector reversed to present a second reflecting surface to the lamp, and attached to an adapter ring of the type shown in Fig. 4,

Fig. 4 is an enlarged sectional view of an adapter ring for use with a different size of lamp having a longer throat,

Fig. 5 is an enlarged sectional detail of the attaching stud by means of which a collapsible reflector may be held in assembled relation, or one reflector can be attached to either side of a second reflector,

Fig. 6 is a plan view of one side of a collapsible reflector in a collapsed condition,

Fig. 7 is a plan view of the other side of the reflector shown in Fig. 6,

Fig. 8 is a plan view of a collapsible reflector having an entirely matte surface and of the diameter of the matte area of the reflector shown in Fig. 6,

Fig. 9 is a plan view of a specular reflector of greater diameter than the reflector shown in Fig. 8, and adapted to be attached to the inside or outside of the reflector of Fig. 8 to give the ultimate results obtained by reversing the reflector shown in Figs. 6 and 7,

Fig. 10 is a sectional view of a modified form of reflector unit formed by assembling the reflector of Fig. 9 on the outside of the reflector of Fig 8, and

Fig. 11 is a view similar to Fig. 10, but showing the reflector of Fig. 9 attached to the inside of the reflector of Fig. 8.

Like reference characters refer to corresponding parts throughout the drawings.

The present invention is directed to the provision of a reflector unit which can be readily detachably mounted to a lamp support, and in which a single reflector can be arranged to give two different reflecting surfaces having different reflecting characteristics for obtaining the desired light distribution incident to photography with the use of artificial lighting. In the preferred embodiment, the reflector unit is made collapsible for the sake of portability and comprises a circular sheet cut so that it can be formed into a conical reflector open at both ends. The opposite sides of the sheet are provided with different reflecting surfaces and an attaching means for the overlapping ends of the reflector is provided whereby said reflector may be assembled with either reflecting surface in a reflecting position. So that the reflector can be readily and detachably mounted to a lamp support, e. g., a lamp socket, an adapter ring, adapted to be screwed onto the exterior of the support, is provided. This adapter ring is provided with a V-shaped groove into which the small end of the reflector is adapted to extend at the time the reflector is formed, the outer diameter of said ring being greater than the diameter of the small opening in the reflector so that the reflector cannot slip out of said groove.

As a modification of this reflector unit we show how a reflector unit having the reflecting characteristics and the desirable novel features of the preferred embodiment may be obtained with two reflectors capable of being attached together. This modified reflector unit is capable of the same ready attachment to a lamp support as that constructed in accordance with the preferred embodiment of the invention.

Referring now to the drawings, and particularly to Figs. 1, 2, 3, 6, and 7, a reflector unit constructed in accordance with the preferred embodiment of the present invention may comprise a reflector 1 and an adapter ring 2, to which it is attached as will be hereinafter described, said adapter ring 2 being internally threaded at 3 to screw onto an externally threaded portion 4 found on all standard lamp sockets 5 into which a lamp L1 or L2 is adapted to be screwed.

While the reflector may be of any suitable shape, we have found that a reflector having the shape of the frustum of a cone is suitable for most lighting purposes, and is particularly adapted for making a collapsible reflector unit of the type hereinafter set forth. Referring to Figs. 6 and 7, the reflector may comprise a circular sheet of material having an arcuate cut-out portion 7 emanating from a small opening 8 at the center of the sheet. The reflector may be made of any suitable material adapted to the formation of the reflector and which can provide the reflecting surfaces desired. We have found that a highly specular aluminum sheet is particularly well adapted to the reflector constituting a part of the herein disclosed reflector unit.

A reflector blank of the shape shown in Figs. 6 and 7 when rolled up will form a conical reflector of the shape shown in Fig. 1, as is well known. The reflector is adapted to be held in a conical shape by a bayonet lock comprising a pair of headed studs 9 fastened to the reflector in spaced relation adjacent one radial edge of the reflector and adapted to be engaged by bayonet slot 13 located in the other radial edge when the two edges are brought into overlapping relation. It will be readily understood that the heads of the studs 9 are spaced from the surface from which they extend to provide the necessary bayonet lock connection, as is clearly illustrated in Fig. 5 wherein the two radial edges of the reflector are shown locked in overlapping relation.

Collapsible reflectors of the type set out above are well known, but they have been so constructed as to have but one reflecting surface, and to be capable of formation with only the one reflecting surface directed inwardly. Therefore, in order to provide a simple and cheap reflector capable of giving the reflecting characteristics of two different reflectors we have modified the above-described reflector as hereinafter set forth.

In accordance with the preferred embodiment of the present invention we propose to make both sides of the reflector 1 a reflecting surface, each having different reflection characteristics, and to provide a fastening means whereby the reflector may be formed into a conical shape with either reflecting surface directed inwardly. So that the reflector may be formed with either surface directed inwardly, the headed studs 9 are made double, as shown in Fig. 5 or in other words, a headed stud 9 extends from either side of the reflector. This double-headed stud 9 may be formed by a shank 10 extending through the reflector from both sides thereof, and including a head 9 at one end and having a head 9' riveted to the other end thereof as shown. It will be noticed that the heads 9 and 9' proper are spaced from the surface which they are adjacent by a distance substantially equal to the thickness of the material from which the reflector is made, whereby the overlapping end engaging said stud will lie between the heads 9 or 9' and the surface which it overlaps. By virtue of this fastening means for the overlapping ends of the reflector it will be appreciated that the same may be formed with either surface directed inwardly, a procedure heretofore impossible and not deemed necessary. One surface of the reflector may be made so as to have the reflecting characteristics necessary to the distribution of light for one photographic effect, while the other surface may have different reflecting characteristics to satisfy the requirements of another effect.

While the two reflecting surfaces of the reflector could be of any number of different forms, for the purpose of illustration we have chosen to show said reflector having reflecting surfaces adapted particularly for motion picture and still photography. To obtain the best results in motion picture photography a brilliant light over a small area is required. To give this result one surface 11 of the reflector, that shown in Figs. 7 and 3, is made entirely specular, or non-diffusing.

On the other hand, still photography demands a less intense light over a larger area for the best results. To obtain this light distribution we have found that a conical reflector should have its central portion matte, or light diffusing, and this matte area should be surrounded by a specular, or non-diffusing, ring area, as shown in Fig. 6. To obtain this result, both sides of the reflector may be completely specular or non-diffusing, and the central area in the form of a circle of one surface 12 sprayed with a suitable material, such as aluminum, bronze, white paint, etc., to make it matte and light diffusing. So far as we are aware no reflecting surface of this character has ever been produced before, and it unquestionably gives a light distribution desired for still photography which is superior to any known reflector surface.

When the reflector is formed with the complete specular surface directed inwardly, a brilliant and limited light distribution is obtained, and by forming the reflector with the composite specular and matte surface directed inwardly, a less intense and larger light distribution is obtained, each light distribution being adapted for a particular kind of photography, as set forth. The result of this arrangement is that the photographer can obtain the results of two separate and distinct reflectors with the expense and portability of only one.

In order that the reflector may be readily and detachably mounted to a lamp support in proper relation to a lamp, and in a rapid and easy manner, the following attaching means is provided. Referring to Fig. 2, we provide an internally threaded adapter ring **2** which is adapted to screw onto, or be otherwise fastened, to the exterior of a lamp socket, or other suitable lamp support. This adapter ring is provided with a V-shaped groove **15** into which the small end of the reflector, when formed into a cone, is adapted to extend, see Figs. 1 and 2. The outside diameter of the adapter ring is larger than the small opening in the reflector so that the same cannot be slipped onto or off of the adapter ring. In order to assemble the reflector and adapter ring into a reflector unit, the reflector must be formed around the ring with the small end thereof located in the V-shaped groove.

The one face of the groove which is adapted to be engaged by the inwardly directed face of the reflector is inclined substantially the same as the elements of the conical reflector so that the bearing surface provided thereby will support the reflector against tilting relative to the lamp. In order to obtain a more rigid support of the reflector on the socket the V-shaped groove **15** could be so formed relative to the small opening in the reflector that the ends of the reflector seat in the bottom of said groove and abut the other face thereof. In addition to aiding in the prevention of a tilting of the reflector relative to the adapter ring such an arrangement prevents the reflector from moving axially of the socket after the unit is placed thereon. After the reflector is formed in assembled relation on the adapter ring the two constitute a reflector unit which can be readily attached to the lamp socket by screwing the adapter ring thereon; said ring preferably being rotatable relative to the reflector to eliminate the necessity of rotating both parts in screwing the ring onto the socket.

Referring to Fig. 2A we have shown a modified form of adapter ring which does not necessitate the reflector being formed in assembled relation thereto, and one which is adapted for use with conical reflectors which are not collapsible. This adapter ring comprises an internally and externally threaded ring **16** having a rear flange **17**. The diameter of the threaded portion of the ring is such that the small end of a conical reflector **1** can be slipped thereover after which said reflector will be held in position on the ring by an internally threaded collar **18** one face of which is inclined to engage the inner surface of the reflector. It will be noticed that the combined ring **16** and collar **18** form a complete adapter ring having the appearance and advantages of the adapter ring shown in Fig. 2, but provides for the connection thereof to a reflector which is not collapsible, or without necessitating the collapse of a reflector which is collapsible.

The reflectors are correctly proportioned for the largest lamp with which they will be used. When a lamp is used of a different size than the one for which the reflector was designed, some means must be provided for locating this latter lamp in the same relation to the reflector as the lamp for which it was designed assumes relative thereto. For instance, in Figs. 1 and 10 the reflector is shown in relation to a lamp L**1** for which it was designed, e. g., a No. 1 photoflood lamp. A No. 2 photoflood lamp has a much longer throat than a No. 1 lamp so that in order to bring the centers of the two lamp filaments in the same relation to the reflector an extension adapter ring **2'** must be used. This extension adapter will have a length equal to the difference in the center distances of the two lamps so that the reflector will be moved out on the throat of the lamp by this amount, see Figs. 3 and 4. This extension adapter may have the same features as the adapter ring shown in Fig. 2, but due to its size it is desirable to form this adapter out of thin metal stock with the proper V-shaped groove and threads formed therein as provided in the other adapter ring. This adapter may be provided with a plurality of spaced openings **19** for the purpose of dissipating heat from the throat of the lamp.

Referring now to Figs. 8–11 we have shown another embodiment of our reflector unit which permits, in addition to the formation of a reflector having the two reflecting surfaces set forth above, a third reflecting surface with the addition of one reflector element to the two elements comprising the preferred form of reflector unit. In addition, it does away with the necessity of having a reflector surface on the side of a reflector directed toward the photographer.

This reflector unit comprises a collapsible reflector **20** of the type set forth above and which may be formed into a conical reflector. This reflector is provided with a bayonet lock for holding the same in a conical shape, but instead of the headed studs **9** extending to both sides thereof, as in the previous case, they extend from only one side since it is not necessary that the reflector be reversible. In Fig. 10 this reflector **20** is shown assembled on an adapter ring **2** of the type set forth in Fig. 2 for ready attachment to a lamp socket, but it could be assembled on an adapter ring of the type shown in Figs. 2A or 4 just as well. In fact, in Fig. 11 it is shown attached to one of the type shown in Fig. 4 to accommodate a lamp of different size than that for which it is designed.

It will be noticed that this reflector **20** is entirely matte, or light diffusing, and is of substantially the same diameter as the matte area of the reflector surface shown in Fig. 6. If this matte reflector be used alone a comparatively dim and general illumination will result.

In Fig. 9 is shown a completely specular reflector **21** of the type heretofore described, and adapted to be used in combination with the reflector **20** to give the two reflecting surfaces possible with the reflector shown in Figs. 6 and 7. The specular reflector **21** is of the same diameter as the outside diameter of the reflector shown in Figs. 6 and 7 and is adapted to be positioned in front of the reflector **20**, see Fig. 1, to give an entirely specular reflector, such as shown in Fig. 11, or is adapted to be positioned at the rear of the reflector **20**, see Fig. 10, to give a composite reflecting surface identical with that shown in Fig. 6.

The conical reflector formed by the reflector 21 is adapted to be detachably connected to the front or rear face of the conical reflector formed by the reflector 20 by a bayonet lock arrangement. To this end the reflector 20 may be provided with a double-headed stud 22, the stud and one head thereof extending from each surface of the reflector in the manner shown in Fig. 5. The reflector 21 is provided with a bayonet slot 23 adapted to engage one of the heads of stud 22, depending upon which side of the reflector 20 it is to be situated on, and by a partial rotation relative to the reflector 20 the reflector 21 is adapted to be locked thereto.

While we have shown the V-shaped groove in the adapter rings of Figs. 10 and 11 wide enough to receive the small ends of each of the reflectors 20 and 21 when attached together, it will be readily understood that this groove need receive and support only the small end of one reflector since the other reflector is attached to and supported by the one reflector supported by the adapter ring. Referring to Figs. 10 and 11 it will be readily appreciated that the two reflecting surfaces formed by placing the reflector 21 on opposite sides of the reflector 20 are identical with the reflecting surfaces provided by reversing the reflector constructed in connection with the preferred embodiment of the invention, as shown in Figs. 1, 3, 6, and 7.

From the above description it will be readily appreciated that the present invention provides a reflector unit in which two or more different reflecting surfaces are available for use without the addition of any part, or no more than one part, to the ordinary reflector unit of this type. Such an arrangement is advantageous to the photographer inasmuch as it makes possible the acquisition of two or more different reflectors for substantially the price of one, and with the portability of a single reflector. The present reflector unit is particularly adapted for ready attachment to lamp supports in proper relation to lamps of different sizes, and is easily collapsed to a form making it very portable.

Although we have shown and described certain specific embodiments of our invention, we are fully aware that many modifications thereof are possible. Our invention, therefore, is not to be restricted except insofar as is necessitated by the scope of the appended claim.

Having thus described our invention, what we claim is new and desire to secure by Letters Patent of the United States is:

A photographic reflector unit comprising in combination an annular adapter capable of being detachably mounted on the exterior of an electric socket, said adapter provided with a V-shaped groove extending circumferentially of its exterior, an arcuate reflecting surface adapted to be formed into a frustrated conical reflector the small opening of which has a radius equal to the radius from the center of the adapter to the base of the groove therein, opposite faces of said reflecting surface possessing different reflecting characteristics suitable to different types of photography, means on said reflecting surface for releasably holding the ends thereof in overlapping relation to form a reflector with either of said faces directed inwardly, said reflecting surface assembled into a reflector with the small end thereof encircling said adapter and extending to the base of said groove therein, the divergence and spread of the conical surface formed by one face of the groove being substantially the same as the divergence and spread of the small end of the reflector, whereby the small end of said reflector is in surface contact with said conical surface and is rigidly supported relative to the axis of the adapter by such surface contact.

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