

[54] PHOTOGRAPHIC LIGHTING UNIT

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2,689,909 9/1954 Dazley 240/52 R

[75] Inventor: Donald M. Wagner, Pepper Pike, Ohio

[73] Assignee: General Electric Company, Schenectady, N.Y.

Primary Examiner—Richard L. Moses
Attorney, Agent, or Firm—Emil F. Sos, Jr. et al.

[22] Filed: Jan. 26, 1973

[57] ABSTRACT

[21] Appl. No.: 326,585

A lighting unit comprising a reflector lamp, a holder having a socket and faceplate connected by a base member and having a means for accurately aligning and firmly holding the reflector lamp. The means for aligning and holding is a set of aligning stops at the bottom inner side of the faceplate and a spring wire positioned so that the wire exerts a downward and forward force on the reflector to hold it in place against the faceplate and alignment stops. In one variation of the lighting assembly, a lever-type ejector is attached to the holder for easy removal of the reflector lamp.

[52] U.S. Cl. 240/52 R, 240/41 R, 240/52.1

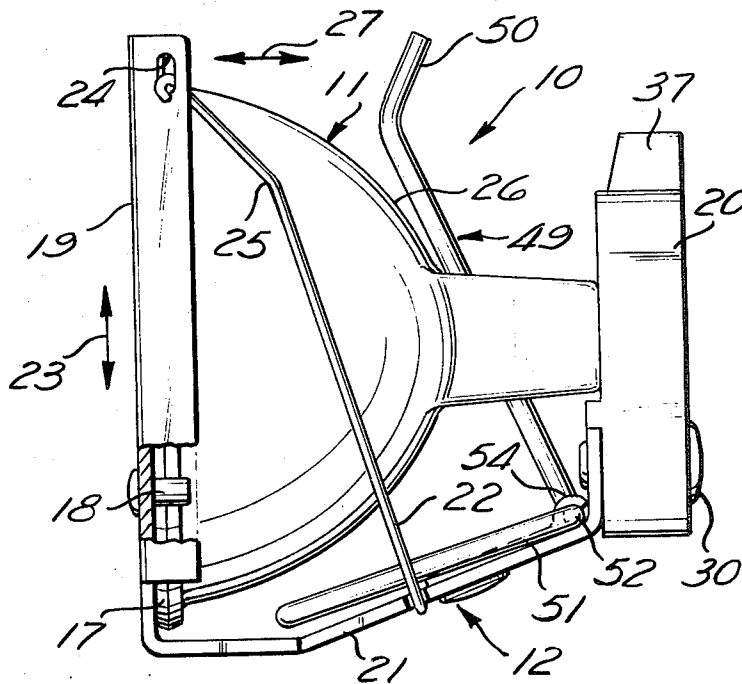
[51] Int. Cl. F21v 21/00

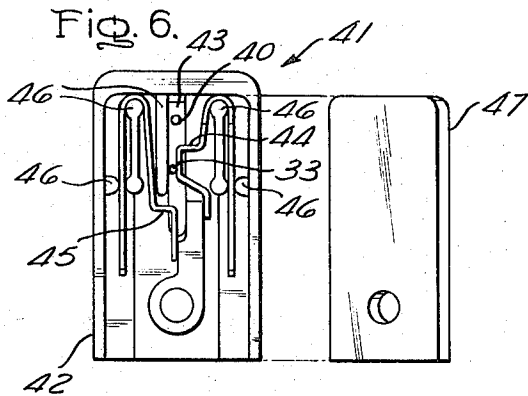
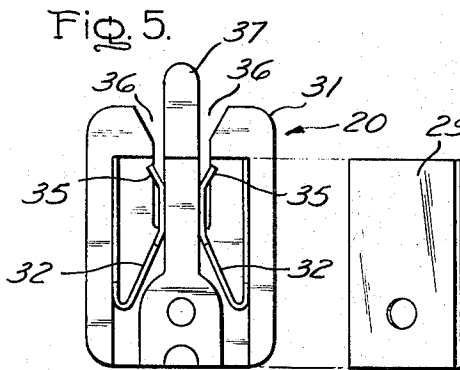
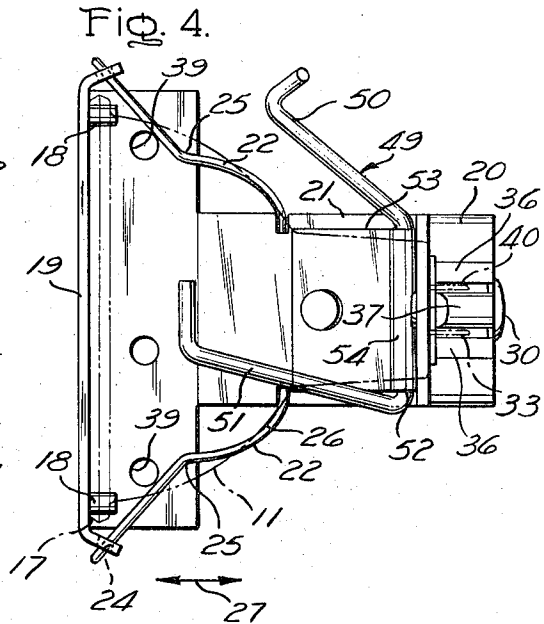
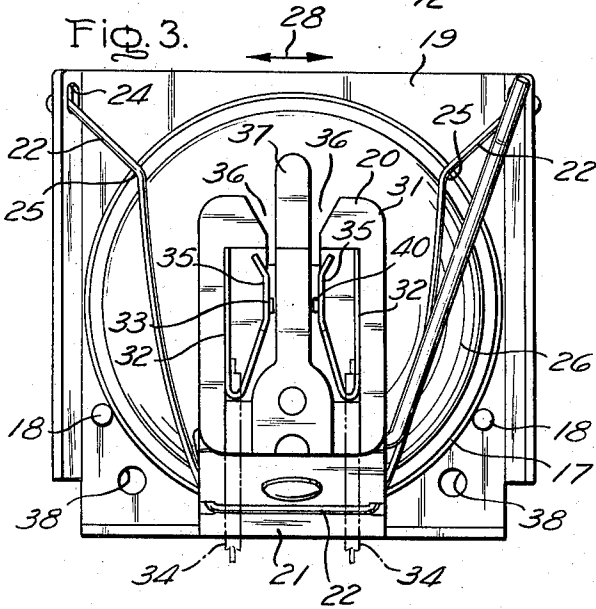
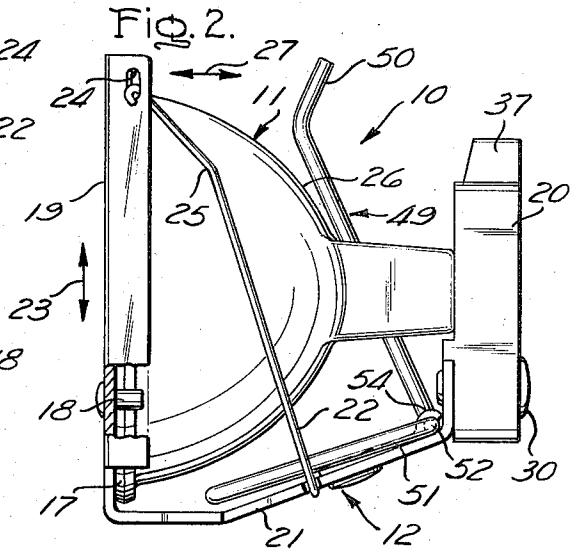
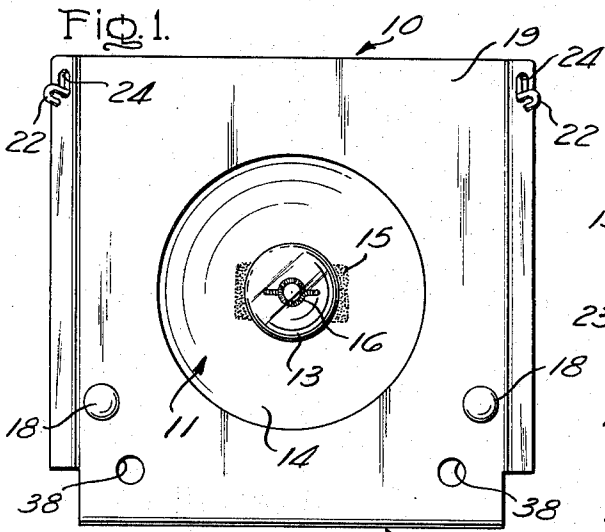
[58] Field of Search.. 240/52 R, 52.1, 73 R, 73 QD, 240/1.3, 41 R; 352/198; 313/318

[56] References Cited
UNITED STATES PATENTS

3,502,864	3/1970	Wagner.....	240/52 R
3,314,331	4/1967	Wiley.....	240/41.3
3,309,512	3/1967	Conley et al.....	240/52 R

10 Claims, 6 Drawing Figures





PHOTOGRAPHIC LIGHTING UNIT

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates generally to illumination units. More particularly, the invention relates to a reflector lamp and holder combination.

2. Description of the Prior Art

Reflector lamp and holder combinations are used in projection systems for focusing light onto a film aperture. One such system is more fully described in Wiley U.S. Pat. No. 3,314,331 assigned to the assignee of the present invention. With increased use of the reflector lamp illustrated in the Wiley patent, it became desirable to have a lighting unit in which a burned-out lamp could be easily and quickly removed and a new lamp easily inserted and accurately positioned. One type of device to accomplish this purpose is described in Wagner U.S. Pat. No. 3,502,864 also assigned to the assignee of the present invention.

In that patent, an annular recess in a faceplate positions the reflector lamp, and pressure between the socket and faceplate holds the lamp in the annular recess. A lever-type ejector moves the reflector lamp up out of the recess when a lamp change is desired. The lighting unit of the present invention is another type of reflector lamp holder which facilitates rapid reflector lamp removal and easy insertion of a new lamp with accurate positioning.

SUMMARY OF THE INVENTION

It is therefore an object of the invention to devise a lighting unit in which the reflector lamp is easily inserted and removed from a holder. Still another object of the invention is to position the reflector lamp in a holder such that, when a part of the holder is aligned with or attached to a preselected surface, such as in a projector for instance, the reflector lamp will accurately focus light to a predetermined location. Yet another object of the invention is to design a simple lighting unit which will be easy to manufacture and accordingly inexpensive.

These and other objects of the invention are accomplished by providing a compact lighting unit comprising a reflector lamp accurately and firmly positioned within a holder. In the reflector lamp, the lamp is generally aligned at the focus of the reflector which is at a predetermined distance from the rim of the reflector. The lamp is then secured to the base of the reflector at its apex with the lamp leads extending out from the reflector base through an opening.

The lamp reflector unit is positioned in a holder having a faceplate and socket rigidly connected by a base member. Embedded in the bottom inner end of the faceplate are two alignment stops which serve to align the reflector rim with the various components of the holder. A spring steel wire, each end of which is secured to the sides of the faceplate, extends under the base member to provide the proper amount of tension in the wire. The wire is bent near the top of the faceplate to match the contour of the reflector so that a downward and inward force is exerted upon the rear reflector surface, when it has been inserted in the holder, thereby securely holding the reflector against the two alignment stops and the faceplate.

As the reflector portion is held in position by the wire and stops, the lead-in conductors of the lamp are positioned in the socket to make electrical contact. There are two preferred types of sockets of the invention, one type has two separated side-by-side contacts and the other locates the two contacts one on top of the other. In each embodiment, the socket contacts are positioned in either a ceramic or high temperature plastic case.

Since the lighting unit is frequently used in projection systems, it is important to have the light source accurately aligned with respect to an aperture. Consequently, the holder is made such that it may be mounted at a specific location by attaching either the faceplate or the base member to predetermined points. The attaching points of the faceplate or base member are located at a predetermined distance from the alignment stops so that the light source is accurately focused once the base member or faceplate is attached.

Another feature of the invention is an ejector mechanism which has two arms which lie in approximately perpendicular planes and are connected by another section attached to and pivoted from the base member. One of the perpendicular arms is located under the reflector in an approximately horizontal plane while the other arm is in a vertical plane off to one side of the reflector lamp. In order to eject or move the reflector lamp, the lever arm, in the vertical plane, is moved until it comes to rest in a horizontal plane, and the other lever arm, through the action of the pivot section, simultaneously moves from the horizontal plane to a vertical plane. As the arm moves from underneath the reflector, it pushes the reflector upward away from the base member.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevation of the lighting unit of the invention;

FIG. 2 is a side view showing the lamp holder and ejector;

FIG. 3 is a rear elevation of the lighting unit of the invention with the socket cover removed to show electrical contact between the lamp and socket;

FIG. 4 is a top view of the lighting unit illustrated in FIGS. 1, 2 and 3;

FIG. 5 is an elevation view of one of the sockets of the invention with the back cover removed; and

FIG. 6 is an elevation view of another socket of the invention with the back plate removed.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. 1 and 2 of the drawing, lighting unit 10 is comprised of reflector lamp 11 and holder 12. Lamp 13 is secured in the base of reflector 14 by a small quantity of cement 15, as illustrated in FIG. 1. Lamp filament 16 is generally positioned at the focus of reflector 14 so that the reflector lamp assembly projects an optimum amount of light. FIGS. 2 and 3 show reflector rim 17 seated against alignment stops 18 to prevent movement of the reflector lamp in an up-and-down direction as indicated by arrow 23.

The alignment stops are attached to faceplate 19 which is rigidly connected to socket 20 by base member 21. Spring steel wire 22 is attached to the faceplate, at each end, in slots 24 and is wound around base member 21. There is a bend in wire 22 at location 25 which

permits the wire to contact the rear surface 26 of reflector 14. The illustrated bend is at an angle of 125°, although other angles may be used so long as the wire forms an interference fit with the reflector. The wire 22 forms an interference fit with the reflector lamp 11 thereby exerting a downward and inward force in the directions toward stops 18 and faceplate 19.

The force of the interference fit prevents movement of the reflector lamp in the directions indicated by arrows 23 and 27 (FIGS. 2 and 4 respectively). The sides of the wire 22 in conjunction with socket 20 prevent movement of the reflector lamp in the direction indicated by arrow 28 in FIG. 3.

Socket 20 is attached to base member 21 by rivet 30. Case 31 of the socket is preferably made of an insulating material such as a ceramic or high temperature plastic. As can be seen from FIGS. 3 and 5, wherein insulated backing material 29 has been removed, contact members 32 are positioned within case 31 to make electrical contact with reflector lamp leads 33, 40 after the lamp has been inserted. Power leads 34, which are connected to contact members 32, make an electrical connection with a projector power supply, not shown. Fingers 35 of contact member 32 are shown in FIG. 5 without lamp leads 33 inserted into contact position.

In inserting reflector lamp 11 into holder 12, rim 17 is placed against the faceplate 19 and pushed down against the pressure of spring steel wire 22. Upon further downward pushing, reflector lamp leads 33 and 40 enter the socket passageways 36 which are separated by insulating finger 37. Leads 33 force fingers 35 away from insulating portion 37 to give an interference fit between the socket contacts and the lead-in wires of the reflector lamp. The reflector lamp is eventually forced down against the pressure exerted by the steel wire until rim 17 comes into contact with alignment stops 18. Since lamp 11 is aligned with reflector 14 and since alignment stops 18 accurately position the reflector with respect to the base member and faceplate (21 and 19 respectively), the lighting unit may be mounted on a projector surface, not shown, by attachment through holes 38, in the faceplate, FIGS. 1 and 3, or through holes 39 in base member 21, FIG. 4.

Another socket used in the lighting unit of the invention is illustrated in FIG. 6. Socket 41 comprises a casing 42 containing a passageway 43, upper socket contact 44 and lower socket contact 45. The contacts are held in place and separated from each other by a plurality of fingers 46 formed to fit the contours of socket contacts 44 and 45. Backing plate 47 is shown removed from the casing and is attached to the socket casing and base member 21 by a rivet in a manner similar to that shown in FIGS. 2 and 4 by rivet 30.

In the process of inserting reflector lamp 11 into socket 41, lamp lead 33 is inserted in the passageway 43 and moved downwardly touching and passing upper socket contact 44. As lamp lead 33 passes contact 44, lamp lead 40 moves into passageway 43. Eventually, lamp lead 33 makes contact with lower socket contact 45. The lamp leads and socket contacts are designed such that when lamp contact 33 touches lower contact 45, lamp lead 40 touches upper contact 44.

An ejector device 49 for the efficient and convenient removal of reflector lamp 11 is illustrated in FIGS. 2, 3 and 4. The ejector device 49 comprises a handle 50, a pusher 51 and a pivot section 52. As can be seen from FIG. 4, the ejector device is attached to base member

21 by riveted sheet metal portion 53. However, other types of material other than sheet metal may be used. Curved or bent portion 54 serves the function of attaching the ejector device to the holder and as the pivot line for handle 50 and pusher 51.

Referring now to FIG. 2, pusher 51 is in a down position beneath the bottom of the reflector. In order to eject the reflector lamp, handle 50 is moved back toward socket 20. This movement causes pusher 51 to move from the down position, approximately a horizontal plane, to a near vertical position parallel to socket 20, thereby pushing the reflector lamp 11 upwards along faceplate 19.

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

1. A lighting unit comprising:

a reflector and lamp, the reflector having a light-reflecting surface, an opening at its apex and a base portion at its apex, the lamp having an oriented filament and two lead-in conductors, said lamp being secured in the base of the reflector and the lead-in conductors projecting outwardly from the apex and base;

a lamp holder comprising a faceplate, a socket for receiving the lead-in conductors of said lamp, a means rigidly connecting the faceplate and socket and a pair of alignment stops secured to the bottom of the inner side of the faceplate on either side thereof and a spring wire connected at either end to the faceplate and extending underneath the rigid connecting means, said spring wire located so that it forms an interference fit with the reflector thereby creating a force upon the reflector surface in a direction toward said faceplate and said alignment stops to accurately position and firmly hold the reflector lamp in the holder.

2. The lighting unit as described in claim 1 wherein the socket comprises an insulating block having two parallel slots containing two contact members, said slots adapted to receive said lead-in conductors for making electrical contact and for firmly holding in position the lead-in conductors when the reflector is positioned against the faceplate and alignment stops.

3. A lighting unit as described in claim 1 wherein the socket comprises an insulating block having a slot, said slot containing two contacts spaced apart so that, as the first of said two lead-in conductors transversely moves into said slot, it makes contact with the first electrical contact, then passes out of contact with the first electrical contact, and then said first lead-in conductor contacts the second resilient electrical contact and the second lead-in conductor contacts said first electrical contact, said first lead-in conductor being held firmly in electrical contact with said second electrical contact and said second lead-in conductor being held firmly in electrical contact with said first electrical contact when said lamp is positioned against said faceplate and alignment stops.

4. A lighting unit as described in claim 1 wherein said spring wire has a 125° bend in the length of wire on each side of the reflector.

5. A lighting unit comprising:

a reflector and lamp, the reflector having a light-reflecting surface, an opening at its apex and a base portion at its apex, the lamp having an oriented filament and two lead-in conductors, said lamp being secured in the base of said reflector and said lead-

in conductors projecting outwardly from said apex and base;

a lamp holder comprising a faceplate, a socket for receiving said lamp lead-in conductors, a means rigidly connecting said faceplate and socket and a pair of alignment stops secured to the bottom of the inner side of said faceplate on either side thereof and a spring wire connected at either end to the faceplate and extending underneath the rigid connecting means, said spring wire located so that it forms an interference fit with said reflector thereby creating a force upon the reflector surface in a direction toward said faceplate and said alignment stops to accurately position and firmly hold said reflector lamp in said holder;

an ejector means for removing said lamp from said lamp holder, said ejector means comprising a pusher arm and a lever arm connected by a pivot arm, the pivot arm is attached to the connecting means so that the pivot arm may rotate, said ejector means adapted to operate by engaging said reflector surface and moving said reflector from said alignment stops and spring wire simultaneously with the removal of said lead-in conductors from said socket.

6. A lamp holder, adapted to accurately and firmly hold a reflector lamp, comprising:

a faceplate, a socket for receiving the lead-in conductors of a reflector lamp, means rigidly connecting the faceplate and socket, and a means for accurately positioning said reflector comprising a pair of alignment stops secured to the bottom of the inner side of said faceplate on either side thereof and a spring wire connected at either end to the faceplate and extending underneath the rigid connecting means, said spring wire located so that it forms an interference fit with said reflector thereby creating a force upon the reflector surface in a direction toward said faceplate and said alignment

stops to accurately position and firmly hold said reflector lamp in the holder.

7. A lamp holder as claimed in claim 6 wherein the socket comprises an insulating block having two parallel slots containing two contact members, said slots adapted to receive lead-in conductors for making electrical contact and for firmly holding in position said lead-in conductors when a reflector lamp is positioned against said faceplate and alignment stops.

8. A lamp holder as described in claim 6 wherein said socket comprises an insulating block having a slot, said slot containing two contacts spaced apart so that, as the first of said two lead-in conductors transversely moves into the slot, it makes contact with the first resilient electrical contact, then passes out of contact with said first resilient electrical contact, and then said first lead-in conductor contacts the second resilient electrical contact and the second lead-in conductor contacts said first resilient electrical contact, said first lead-in conductor being held firmly in electrical contact with said second resilient electrical contact and said second lead-in conductor being held firmly in electrical contact with said first resilient electrical contact when said reflector lamp is positioned against said faceplate and alignment stops.

9. A lamp holder as described in claim 6 having, in addition, an ejector means for removing a lamp from the lamp holder, said ejector means comprising a pusher arm and a lever arm connected by a pivot arm, the pivot arm is attached to the connecting means so that the pivot arm may rotate, said ejector means adapted to operate by engaging the reflector surface thereby pushing both the reflector and base out of contact with said positioning and socket.

10. A lamp holder as described in claim 6 wherein said spring wire has a 125° bend in the length of wire on each side of the reflector.

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