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RIM-REFERENCING LAMP-HOLDER AND PROJECTION  
LAMP WITH REFLECTOR  
Filed Jan. 11, 1968

3,502,864

Fig. 1.

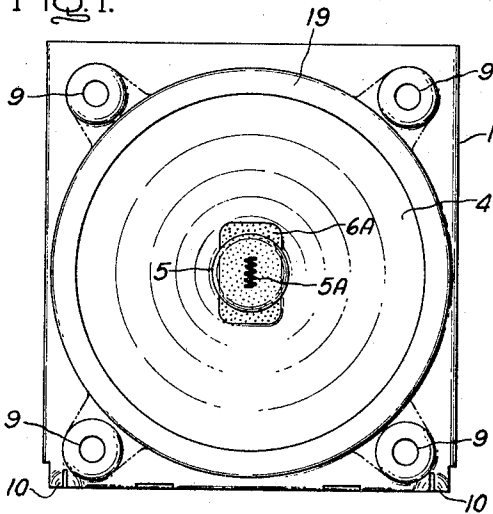


Fig. 2.

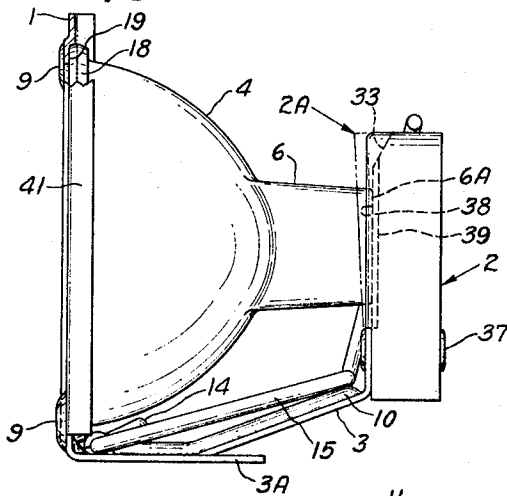


Fig. 3.

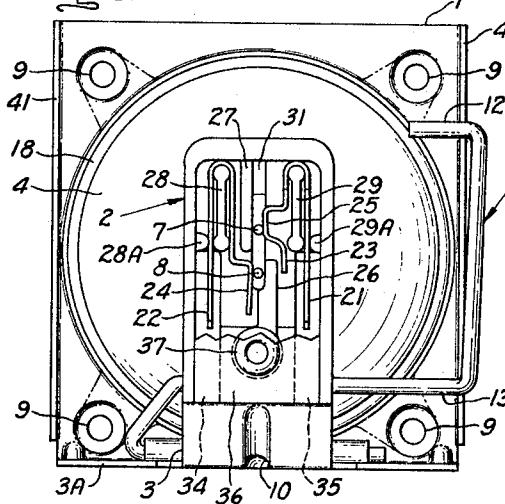
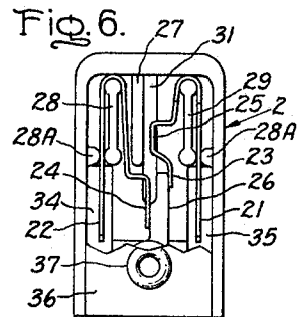
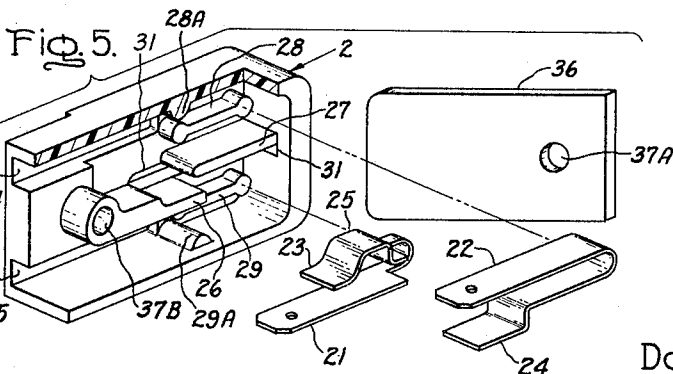
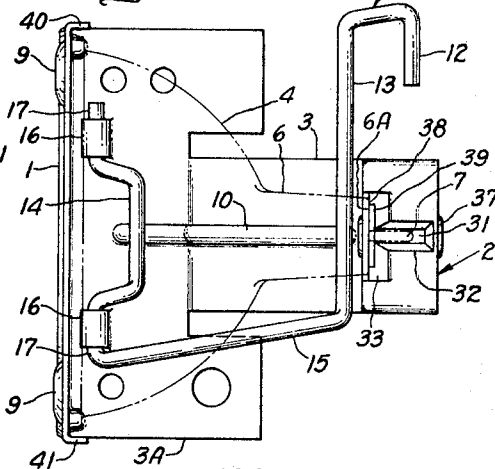


Fig. 4.



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## RIM-REFERENCING LAMP-HOLDER AND PROJECTION LAMP WITH REFLECTOR

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8 Claims

### ABSTRACT OF THE DISCLOSURE

A rim-referencing lamp-holder is provided in combination with a compact incandescent lamp which is rigidly mounted within a concave light-concentrating reflector. The lamp-holder has a faceplate, socket, and a resilient portion connecting the two so that the lamp in its reflector can be firmly positioned in relation to the faceplate by means of pressure applied to the base of the reflector. A flange on the rim of the reflector fits into an annular recess in the faceplate. The socket portion of the lamp-holder is designed to permit the two contact pins of the lamp to slide transversely into a slot, one after the other, to provide positive electrical contact between the socket and the lamp and control the orientation of the lamp within the lamp-holder so that accurate mounting of the lamp-holder will control the position of the lamp relative to the projection system in which it is to be used. The faceplate and slot lock onto the lamp to maintain a constant axial and angular alignment of the lamp and reflector in the lamp-holder.

Also provided for such lamp-holder and lamp system is a lamp ejector means such as a lever with two operating portions. As the lever is moved forward, its first operating portion disengages the reflector from the faceplate of the lamp-holder, and then the second operating portion of the lever contacts the base portion of the reflector and moves the lamp away from the electrical contacts in the socket so that it can be readily taken from there by hand.

The combination of the present invention is particularly suited for use as a light source for projecting images such as motion pictures.

### BACKGROUND OF THE INVENTION

The present invention relates to rim reference lamp-holders in combination with lamps firmly mounted within reflectors. More specifically, it relates to such lamp-holders for bipin lamps.

Previously available lamp-holder and lamp-reflector combinations have required more or less manual handling of the lamp and reflector to locate them within the lamp-holder and make satisfactory electrical contact. Such combinations are shown in Patent 3,314,331—Wiley, assigned to the assignee of the present invention. That patent provides for referencing a lamp and reflector in a lamp-holder by clamping a guide down onto the rim of the reflector once the lamp and reflector have been placed in position. Then, an electric socket is plugged onto the bipin contacts at the rear of the lamp.

Certain optical systems such as in some movie projectors make use of the orientation of the filament of the lamp, and require that the filament lie in a predetermined plane such as a horizontal plane or a vertical plane. Thus, the angular lamp orientation must be controlled. Of course, the direction of light output is critical, and the axial orientation of the reflector must be controlled. Also, if the lamp burns out during operation of a projector such as a motion picture projector, it should be convenient to replace the lamp rapidly for minimum disturbance in the

showing of the film. Compact source high intensity lamps and their reflectors remain too hot to touch by hand for a substantial length of time after the current flow has ceased. Thus, a system which requires several manual and mechanical motions to clamp the lamp into place and which requires firmly grasping a hot lamp or reflector by hand to separate the socket laterally from the lamp before removing the lamp from the lamp-holder, is not entirely satisfactory for all purposes.

Thus, it would be desirable to have a lamp-holder in combination with a lamp fixed in a reflector which would allow simple direct insertion of the lamp and reflector into the holder, and which would permit removal of the lamp and reflector from the holder and disengaging the electrical contacts with simple motions and only the application of moderate forces and without having to grasp the lamp firmly by hand.

### SUMMARY OF THE INVENTION

Thus, it is an object of the present invention to provide an improved lamp-holder in combination with a lamp fixed in a reflector in a form suitable for orienting the lamp in the lamp-holder by reference to the reflector's rim. The lamp can be considered as comprising both the lamp itself and the reflector. A further object is to provide such a combination in which the lamp and reflector can be readily inserted into the lamp-holder by a simple, direct motion, making the electrical contacts directly by such motion. A further object is to provide such a system in which the lamp and reflector can be removed from the lamp-holder while hot without having to grasp them firmly by hand.

Briefly stated, the present invention in certain of its embodiment provides the combination of a lamp comprising a compact electric incandescent projection lamp such as a single-ended quartz-halogen lamp mounted firmly in the apex of a concave light-concentrating reflector, with a lamp-holder. The lamp has a light source such as a filament which may be linear, with a desirable orientation. The reflector has an annular flange at its rim, and two pins projecting outwardly from the apex of the reflector form electrical contacts for the lamp. The lamp-holder comprises a faceplate, a socket, and means resiliently connecting them, urging them toward each other when the lamp is in position in the lamp-holder. The faceplate has an annular recess facing the socket and adapted to receive and hold firmly in position the annular flange of the reflector when the base portion of the reflector is positioned against the socket, and the socket has a slot adapted to receive and hold firmly in position the two pins of the lamp. This annular recess and the slot in the socket respectively fix the axial orientation of the reflector and the angular orientation of the filament relative to the lamp-holder.

More specifically, the socket preferably contains two resilient electrical contacts, one on either side of the slot, and spaced apart along the slot so that, as the first of the two pins moves transversely into the slot, it makes contact with the first resilient electrical contact. The first pin then passes out of contact with the first resilient electrical contact and then makes contact with the second resilient electrical contact while the second pin contacts the first resilient electrical contact. When the lamp is thus in position, the resilient electrical contacts respectively hold the pins in position.

Another aspect of the invention provides combinations of the invention with ejector means for removing the lamp from the lamp-holder. The ejector means, preferably in the form of a lever with two operative positions, are adapted to operate by first disengaging the annular flange of the reflector from the annular recess, and then

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disengaging the pins which provide the electrical contacts to the lamps from the resilient electrical contacts of the socket.

The lamp-holders, as subcombinations, are also embodiments of the invention.

#### BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a front elevation view of the lamp-holder of the invention showing the lamp and reflector in place.

FIG. 2 is a side elevation view of the same subject as FIG. 1.

FIG. 3 is a rear elevation view of the lamp-holder of the invention with the lamp and reflector in place showing the socket portion of the lamp-holder with its rear cover removed so as to facilitate an understanding of the inner working parts of the socket portion.

FIG. 4 is a plan view from the top of the lamp-holder of the invention, showing the reflector in phantom outline.

FIG. 5 is an exploded view partly in section of the socket portion of the lamp-holder of the invention.

FIG. 6 is a view of the socket portion of the lamp-holder of the invention, partly in section, as in FIG. 3 except that the lamp and its bipin electrical contacts are not in place in the socket portion.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to the drawings, the lamp-holder comprises a faceplate 1, a socket 2, and a resilient connecting means 3. Connecting means 3 is integrally connected to faceplate 1 through a base 3A. Faceplate 1 is provided with mounting holes 9, of which four are shown in the drawings. These mounting holes 9 are used to firmly position the lamp-holder in a projection apparatus, not shown. Other mounting arrangements built into the faceplate 1 or the base 3A would be suitable. The faceplate has an annular recess 19 around a large centered opening. This recess 19 is adapted to hold in place annular flange 18 provided on the rim of reflector 4.

Lamp 5 is rigidly mounted in a base portion 6 of reflector 4, such as by means of cement 6A. Since lamp 5 is rigidly mounted in reflector 4, and the two can only be inserted into or removed from the lamp-holder together, the lamp portion of the combination of the invention can be considered to include both lamp 5 and reflector 4. Lamp 5 has a linearly oriented filament 5A, shown in a vertical position in FIG. 1. In some photographic projection systems, it is important to control the orientation of filament 5A relative to the optical system of the projector, not shown here. The present invention allows the control of orientation of filament 5A relative to the faceplate 1, and faceplate 1 can be positioned in a definite and controlled manner in the projection system. The faceplate 1 and connecting member 3 are provided with stiffening indentations 10 to increase their rigidity. Faceplate 1 and connecting means 3 are typically provided in sheet steel.

Socket 2, preferably made of insulating plastic materials, is mounted onto connecting member 3 by means of a rivet 37 through hole 37A in the backplate 36 of socket 2 and hole 37B in the body of socket 2, connecting these together and to connecting member 3. The angle at which connecting member 3 is bent and connected to socket 2 is such that socket 2 is bent forward toward the faceplate, as shown in phantom outline in FIG. 2, at 2A, more when the lamp 5 and reflector 4 are not in place than when they are in place, so that socket 2 can operate as a pressure pad to hold the lamp in the lamp-holder.

Lamp 5 and reflector 4 are inserted into the lamp-holder by pushing them in vertically from above. Reflector rim guides 40 and 41 guide flange 18 of reflector 4 into position as the lamp is inserted into the lamp-holder. After flange 18 of reflector 4 is in contact with the back of faceplate 1, further motion of reflector 4 down into the lamp-holder pushes the base portion 6 of reflector 4 downwardly on the inclined plane lead-in 33 of socket 2,

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pushing socket 2 away from faceplate 1, and thereby setting up a pressure between socket 2 and faceplate 1 which tends to hold the lamp in place. As reflector 4 is pushed further down into the lamp-holder, electrical contact pins 8, and then 7, are guided into slot 31 by the inclined plane lead-in 32 and a similar inclined plane on the other side of slot 31. First pin 8 first contacts resilient electrical contact at 25 and passes between it and stop 27 in a cavity formed in socket 2. As first pin 8 passes further into slot 31, it passes beyond the contacting portion 25 of the first resilient electrical contact and comes adjacent to portion 23 which does not contact said pin 8. As the lamp is moved still further into slot 31 of socket 2, the second pin 7 comes into contact with the first resilient electrical contact 25, and the first pin 8 comes into contact with the second electrical contact 24. Stops 26 and 27, respectively, hold the pins in position while the resilient electrical contacts 24 and 25 press against the pins 8 and 7. Stop 26 is also configured so as to hold portion 23 of resilient electrical contact 25 and prevent contact 25 from blocking slot 31 or shorting out to resilient electrical contact 24. Resilient electrical contacts 24 and 25 are held in position in socket portion 2 by being wrapped around holders 28 and 29, and held against pivots 28A and 29A, respectively. Plug portions 22 and 21 of these contacts provide for attachment of the lamp-holder to conventional electrical leads of the projection system through holes 34 and 35 in the bottom of socket portion 2.

Thus, with lamp 5 and reflector 4 in place in the lamp-holder, the annular flange 18 at the rim of reflector 4 is firmly seated in annular recess 19 of faceplate 1, and back 6A of base portion 6 of reflector 4 is butted firmly up against ledge 38 of socket portion 2. Ledge 38 has a relief 39 to make the contact between back 6A and ledge 38 more precise.

Means are provided for ejecting the lamp comprising lamp 5 and its reflector 4 from the lamp-holder. The illustrated means include a lever 11 which has a handle portion 12 positioned near the top of the lamp-holder and adapted to be moved forward toward the faceplate 1 by hand in order to eject the lamp. Lever 12 is anchored on base 3A by two hinge portions 17 in hinge holders 16 provided at the base 3A. Between these hinge portions 17, a reflector ejector 14 is provided by appropriate bends in the lever, as illustrated in the drawing. When the reflector 4 with the lamp 5 is in place in the lamp-holder, a small movement of handle 12 of lever 11 forward toward the faceplate 1 moves reflector ejector 14 upwards enough to free annular flange 18 of reflector 4 from the recess 19 in faceplate 1. Further movement of ejector handle 12 forward brings base ejector 13 into contact with base portion 6 of reflector 4, and pushes the base portion 6 upwards and disengages pins 7 and 8 from the resilient electrical contacts 24 and 25 of socket 2. Even when ejector 11 is configured so as not to push reflector 4 with its lamp 5 entirely out of contact with the lamp-holder, still it does move reflector 4 far enough upward to substantially disengage it from the lamp-holder so that it can be removed the rest of the way easily by hand or by other satisfactory means, without the necessity of grasping it firmly. Other equivalent lever systems could be used.

The present invention has certain major aspects, including the socket and lamp-holder design and the ejection lever mechanism. While certain specific embodiments of each of these aspects have been disclosed hereinabove, obvious variations will be apparent to those skilled in the art.

The foregoing is a description of illustrative embodiments of the invention, and it is applicant's intention in the appended claims to cover all forms which fall within the scope of the invention.

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

1. The combination of:

a lamp comprising a compact electric incandescent pro-

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jection lamp having an oriented filament and being mounted firmly in the apex of a concave light-concentrating reflector which has an axis of light projection, said reflector having an annular flange at its rim and a base portion at its apex, and electrical contacts for said lamp projecting outwardly from said apex in the form of two pins which are spaced apart from one another, and

a lamp-holder comprising a faceplate, a socket, and means resiliently connecting said faceplate and said socket, urging them toward each other when said lamp is in position in said lamp-holder, said faceplate having an annular recess facing said socket and adapted to receive and hold firmly in position said annular flange of said reflector when said base portion is positioned against said socket, thereby fixing the axial orientation of said reflector relative to said lamp-holder, and

said socket comprising a slot adapted to receive and hold firmly in position said two pins when said annular flange of said reflector is positioned within said annular recess, thereby fixing the angular orientation of said filament.

2. The combination of claim 1 wherein:

said socket contains two resilient electrical contacts, one on either side of said slot, and spaced apart along said slot so that, as the first of said two pins transversely moves into said 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 pin contacts the second resilient electrical contact and the second pin contacts said first resilient electrical contact, said first pin being held firmly in electrical contact with said second resilient electrical contact and said second pin being held firmly in electrical contact with said first resilient electrical contact when said lamp is in position with said annular flange of said reflector within said annular recess and said base portion of said reflector against said socket.

3. A lamp-holder adapted to hold in a predetermined orientation, both axially and angularly, a lamp, which lamp comprises a compact electric incandescent projection lamp having an oriented filament and being mounted firmly in the apex of a concave light-concentrating reflector which has an axis of light projection, said reflector having an annular flange at its rim and a base portion at its apex, and electrical contacts for said lamp projecting outwardly from said apex in the form of two pins which are spaced apart from one another, said lamp-holder comprising:

a faceplate,  
a socket, and

means resiliently connecting said faceplate and said socket, urging them toward each other when said lamp is in position in said lamp-holder,

said faceplate having an annular recess facing said socket and adapted to receive and hold firmly in position said annular flange of said reflector when said base portion is positioned against said socket, thereby fixing the axial orientation of said reflector relative to said lamp-holder, and

said socket comprising one slot adapted to receive and hold firmly in position both of said two pins when said annular flange of said reflector is positioned within said annular recess, in a manner which prevents rotation of said lamp, thereby fixing the angular orientation of said filament.

4. The combination of claim 3 wherein:

said socket contains two resilient electrical contacts, one on either side of said slot, and spaced apart along said slot so that, as the first of said two pins transversely moves into said slot, it makes contact with the first resilient electrical contact, then passes out of contact with said first resilient electrical contact, and

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then said first pin contacts the second resilient electrical contact and the second pin contacts said first resilient electrical contact, said first pin being held firmly in electrical contact with said second resilient electrical contact and said second pin being held firmly in electrical contact with said first resilient electrical contact when said lamp is in position with said annular flange of said reflector within said annular recess and said base portion of said reflector against said socket.

5. The combination of:

a lamp comprising a compact electrical incandescent projection lamp mounted firmly in the apex of a concave light-concentrating reflector, said reflector having an annular flange at its rim and a base portion at its apex, and electrical contacts for said lamp projecting outwardly from said apex, and

a lamp-holder comprising a faceplate, a socket, and means resiliently connecting said faceplate and said socket, urging them toward each other, said faceplate having an annular recess facing said socket and adapted to receive and hold firmly in position said annular flange of said reflector when said base portion of said reflector is positioned against said socket, and

ejector means for removing said lamp from said lamp-holder, which ejector means are adapted to operate by first disengaging said annular flange of said reflector from said annular recess, and then disengaging said electrical contacts from said socket.

6. The combination of claim 5 wherein:

said ejector means is provided in the form of a lever with two operating portions, said lever being configured such that when said lever is moved, the first operating portion of said lever disengages the annular flange of said reflector from said annular recess of said lamp-holder by moving said reflector relative to said lamp-holder, and then the second operating portion of said lever disengages said base portion of said reflector from said socket.

7. A lamp-holder adapted for holding in a predetermined orientation, both axially and angularly, a lamp, said lamp comprising a compact electric incandescent projection lamp mounted firmly in the apex of a concave light-concentrating reflector, said reflector having an annular flange at its rim and a base portion at its apex, and electrical contacts for said lamp projecting outwardly from said apex, said lamp-holder comprising:

a faceplate,  
a socket, and

means resiliently connecting said faceplate and said socket, urging them toward each other,

said faceplate having an annular recess facing said socket and adapted to receive and hold firmly in position said annular flange of said reflector when said base portion of said reflector is positioned against said socket, and ejector means for removing said lamp from said lamp-holder, which ejector means are adapted to operate by first disengaging said annular flange of said reflector from said annular recess, and then disengaging said base portion of said reflector from said socket.

8. The combination of claim 7 wherein:

said ejector means is provided in the form of a lever with two operating portions, said lever being configured such that when said lever is moved, the first operating portion of said lever disengages the annular flange of said reflector from said annular recess of said lamp-holder by moving said reflector relative to said lamp-holder, and then the second operating portion of said lever disengages said base portion of said reflector from said socket.

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