Dec. 11, 1951 P. J. ERNISSE 2,578,296

LAMP EJECTING SOCKET

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FIG. 1.

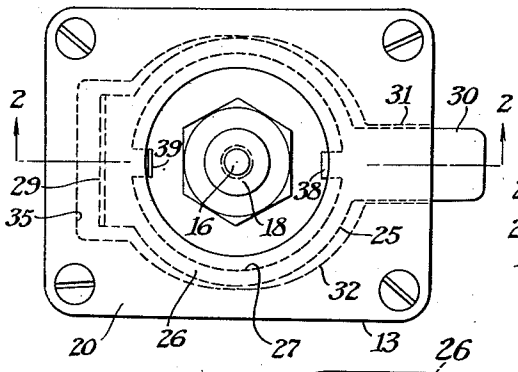


FIG. 2.

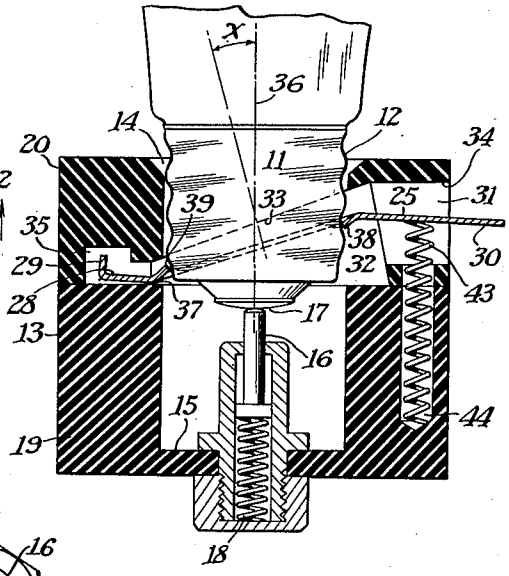


FIG. 5.

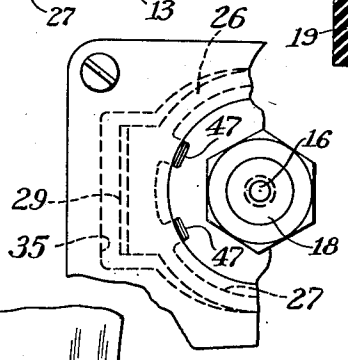
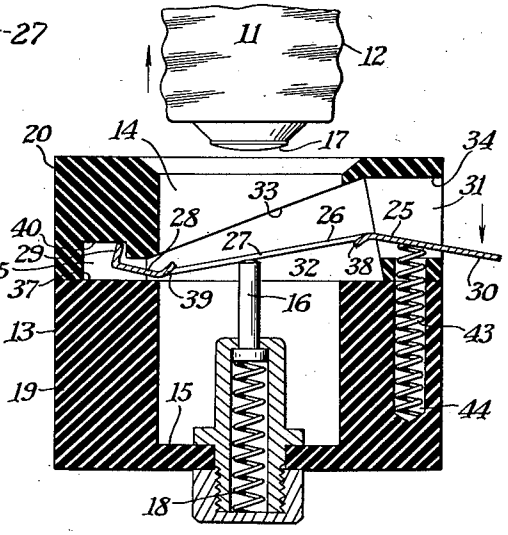


FIG. 4.



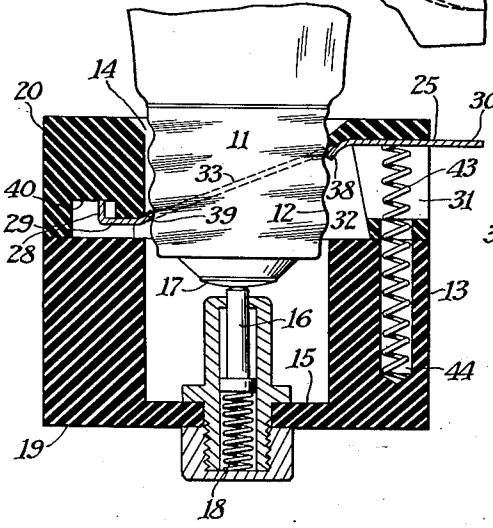


FIG. 3.

PAUL J. ERNISSE
INVENTOR
Daniel I. Mayne,
BY J. Griffin Little
ATTORNEYS

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LAMP EJECTING SOCKET

Paul J. Ernisse, Rochester, N. Y., assignor to Eastman Kodak Company, Rochester, N. Y., a corporation of New Jersey

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4 Claims. (Cl. 173—358)

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The present invention relates to lamp sockets, and more particularly to sockets designed to eject used flash-lamps from the socket without requiring the operator to touch the lamp bulb.

As is well known, in taking pictures with flash-lamps, it is often desirable to remove the expended lamp quickly before it is cooled. However, if the lamp is removed by hand, severe burns may result. Accordingly, it has become common practice to provide means to eject the used lamp automatically, thus eliminating the handling of the hot lamp. Such ejecting devices must, however, be designed so as to permit the ready and easy insertion of the new lamp into the socket and into engagement with electrical contacts positioned therein.

The present invention has as its principal object the provision of a lamp socket in which a lamp may be quickly and easily inserted in operative position therein and may be quickly and automatically ejected therefrom after use.

A still further object of the invention is the provision of a socket in which the lamp may be inserted and locked in position merely by pushing the lamp base into the socket. No turning or adjustment of the lamp in the socket is necessary.

Yet another object of the invention is the provision of a simple and effective means for locking the lamp releasably in operative position in the socket. When the lamp is to be ejected, the locking means is quickly and easily rendered inoperative to permit ejection.

A still further object of the invention is the provision of a locking means which is simple in construction, comprises few parts of rugged construction, is inexpensive to manufacture, easy to assemble and position in the socket and highly effective in use.

To these and other ends, the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a top view of a lamp socket, showing the relation thereto of a locking and ejecting device constructed in accordance with the preferred embodiment of the present invention;

Fig. 2 is a longitudinal sectional view through the lamp socket, illustrated in Fig. 1, showing the relation thereto of the lamp locking and ejecting device of the present invention with the parts in the position during lamp insertion;

Fig. 3 is a view similar to Fig. 2, showing the

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relation of the parts when the lamp base is locked in operative position in the socket; and

Fig. 4 is a view similar to Figs. 2 and 3, showing the positions of the parts during the lamp-ejecting operation.

Fig. 5 is a top view, partly broken away, of a lamp socket embodying a modification of the invention.

Similar reference numerals throughout the various views indicate the same parts.

The structure of the present invention is designed primarily, although not necessarily, for use with photoflash lamps having a base 11 provided with a thread 12 adapted to be inserted in a lamp socket so as to engage the electrical contacts positioned therein. The structure of the present invention permits a quick and easy insertion, holding, and ejection of a threaded base without necessitating any threading or rotating adjustment of the base in the socket, the advantages of which are apparent.

The socket 13, of any suitable insulated material, is formed with a central smooth axially extending opening 14 for the reception of the lamp base 11. The bottom 15 of the opening 14 is provided with a spring-pressed contact 16 adapted to be engaged by the end 17 of the base when the latter is in position in the socket, as clearly illustrated in Fig. 3. The particular construction of the contact 16 forms no part of the present invention, but it should be supported on a compressible spring 18 so that the latter may be effective to eject the lamp when the base 11 is released by the locking means to be later described. The socket 13 may be formed in one piece, but, to facilitate assembling of the locking means, the socket is preferably formed to provide a bottom housing 19, a top housing 20, which may be held in assembled relation in any suitable well known manner.

The upper housing 20 of the socket is provided with a laterally extending recess to be later described and adapted to receive a base locking member in the form of a locking lever broadly indicated by the numeral 25. The lever, in the preferred form, is provided with a central flat plate portion 26 formed with a central aperture 27 which is positioned in alignment with the opening 14 and has an "actual" diameter greater than that of the base 11, the purpose of which arrangement will be later more fully described.

One side of the lever is formed with a lateral part 28 bent out of the plane of the central portion 26 and terminating in an upturned end 29. A finger operating lever 30 is bent out of the

plane of the part 26 and extends through a slot 31 formed in the side of the upper part 20 of the socket. The lower side of part 20 is formed with a central recess 32, the upper surface 33 of which is inclined to the axis of the socket and is adapted to engage the central part 26 of the lever 25, as illustrated in Fig. 3. When the locking lever is in this position, the finger portion 30 engages a laterally extending wall 34 formed at the bottom of the slot 31, and elements 28 and 29 are positioned in an L-shaped recess 35 formed in the bottom of the left wall of the upper portion 20, as shown in Figs. 2 to 4, while the central portion 26 is arranged in an inclined relation across the recess 32 and engaging the inclined surface 33 formed at the top of the recess 32, all as shown in Fig. 3. The slots 31 and recess 35 are open-ended, but are closed by the lower socket portion 19.

Prior to the insertion of the lamp, the locking lever is in the position shown in Fig. 3. In this position, the central portion 26 of the central locking lever is arranged in inclined relation. As the aperture 27 is formed in portion 26, the latter is also arranged in an inclined relation so that the axis of the aperture is inclined at an angle "X" to the axis 36 of the sock opening, as illustrated in Fig. 2. As the aperture 27 is in inclined relation, it will appear as an ellipse when viewed from the top, as in Fig. 1. Furthermore, the vertical projected diameter of the aperture on line 2—2 will be smaller than the actual diameter. Where the term "projected diameter" is used, it means the diameter of the inclined aperture 27 projected onto a horizontal plane arranged normal to the axis 36. The actual diameter of the aperture is such that in its inclined relation the "projected diameter" is slightly less than that of the base 11, so that the latter will not pass freely through the aperture 27, as is deemed apparent.

However, when the lamp is to be inserted into the socket, the lamp base 11 is inserted therein to position the lower end of the base in the aperture 27. Now, as the lamp is pressed downwardly, it will carry the locking lever downwardly as a unit therewith until the bent end 28 strikes the upper surface 37 of the lower socket portion 19. The surface 37 then cooperates with the end 28 to afford a pivot or hinge about which the locking lever 25 may rock or turn in a clockwise direction. Now, as the lamp is pushed further into the socket, the locking lever will rock in a clockwise direction to decrease the inclination of the central portion 26 until a point is reached at which the "projected diameter" of the aperture 27 is sufficient to allow the passage of the lamp base therethrough. The parts are then in the position shown in Fig. 2. A further downward movement will cause the base to pass through the aperture 27 and engage the contact 16 and compress its supporting spring 18 to tension the latter, as shown in Fig. 3.

This further movement of the base will cause at least one thread 12 on the base 11 to pass through the aperture 27 to bring a lug 38, formed on an edge of the aperture 27, into camming relation with the thread 12. This camming action will impath a slight leftward movement to the locking lever to cause a second lug 39, formed on the edge of the aperture 27 diametrically opposite the lug 38, to snap upwardly, by means to be later described, over the first thread, as shown in Fig. 3. To secure this result, the inclination of the portion 26, and hence the lugs

38 and 39, must be equal to the pitched angle of the thread 12. When the lugs 38 and 39 have been moved over the respective thread portions, the entire locking lever with the base is moved upwardly to position the lugs 38 and 39 on the base of the next thread, as shown in Fig. 3. In this position, the tip of the end 28 will engage the bottom 40 of the recess 35, while the finger portion 30 will contact surface 34 of slot 31 and the central portion 26 will abut the inclined surface 33 of the recess 32 to limit upward movement of the locking lever to retain the lugs 38 and 39 in locking relation with the thread 12 to hold releasably the base of the lamp in position. As the aperture 27 is again in its inclined relation, the base cannot be withdrawn from the socket, but can be ejected by the tensioned spring 18 when the locking lever is again moved, by means to be later described, to the position shown in Fig. 2.

The locking lever 25 is moved upwardly and held in its initial or locking position, Fig. 3, by means of a coil spring 43, the lower portion of which is positioned in the well 44 formed in the lower socket portion 19, and the upper end engages the under surface of finger 30 to hold the latter yieldably and releasably in engagement with wall 34, as shown in Fig. 3. Thus, the base 11 serves to move the locking lever downwardly and to rock it about its left edge to permit the passage of the base 11 through the aperture 27. However, after the base has been positioned, a means independent of the base (spring 43) returns the locking lever to its initial inclined relation, as shown in Fig. 3, to lock or hold the base releasably in position. The lamp base is now locked in position. After the lamp has been flashed, it is desirable to remove the bulb, which is hot, without necessitating the handling thereof by the operator.

To secure this result, the present invention provides an arrangement by which the locking lever can be rocked again in a clockwise relation to reduce the inclination of the portion 26 to a point at which the "projected diameter" of the aperture 27 is such as to allow upward passage of the base 11 therethrough. When this position is reached, the tensioned spring 18 acts on the base 11 to eject the used lamp, as shown in Fig. 4.

To this end, the locking lever 25 is manually rocked in a clockwise direction independently of the base 11 by depressing the finger operating portion 30 against the action in spring 43. Such movement causes the upturned end 29 to pivot or rock on the bottom 40 of recess 35 to the position shown in Fig. 4, at which point the spring 18 will eject the lamp.

From the above description, it is apparent that during the loading operation the downward movement of the base 11 first causes the locking lever to move downwardly as a unit therewith until the end 28 of the locking lever abuts the surface 37 which forms a shoulder or abutment about which the entire lever may rock or pivot to a point at which the base may pass through the aperture 27. The coil spring 43 then causes the lugs 38 and 39 to snap over at least one thread of the base and to return the locking lever to its initial or locking position as shown in Fig. 3 in which the lugs 38 and 39 wedge the thread 12 to hold the base securely in position in the socket. When the lamp is to be ejected, the finger portion 30 is depressed to cause the entire locking lever to turn or pivot on the bottom 40 of the recess 35, which

forms an abutting shoulder for the end 29, to permit the lever to be rocked or tilted to the position shown in Fig. 4 to render the tensioned spring 18 effective to eject the lamp. After the lamp has been ejected, the finger portion is released and the spring 43 returns the locking lever to the position shown in Fig. 3 and ready for the insertion of another lamp.

The single lug 39 may be replaced by a pair of spaced lugs 47, as shown dotted in Fig. 1. These lugs 47 must, however, be in a plane which conforms to the helix angle of the thread 11 and the included angle between the lugs should be approximately 30 degrees. It has been found that if the angle of inclination "X" of the surface 33, and hence the portion 26 and aperture 27, is made equal to the helix angle of the thread 12, the locking lever will have enough movement so that the lugs 38 and 39 will include at least one and one-half threads of the base 11. Also the recess 32 is slightly larger than opening 14 to permit the locking lever to slide longitudinally or laterally in the socket. This sliding is necessary due to the slight camming action caused by the lug 38 as it passes over the peak of the threads of the lamp.

The present invention thus provides a lamp socket in which the lamp may be quickly and easily inserted in position; and, after use, may be ejected automatically. Such insertion is secured without necessitating any turning or rotation of the lamp in its socket. After the lamp is placed in the socket, it is securely, yet releasably, retained in operative position therein. The retaining or holding means is simple, inexpensive to manufacture, easy to assemble, and highly effective in use.

While one embodiment of the invention has been disclosed, it is to be understood that the inventive idea may be carried out in a number of ways. This application is, therefore, not to be limited to the precise details described, but is intended to cover all variations and modifications thereof falling within the scope of the appended claims.

Having thus described my invention, what I claim is:

1. In an ejecting socket for a lamp of the type having a threaded metal base adapted to be inserted slidably in a base-receiving opening in said socket, the combination with a spring-pressed contact positioned in the bottom of said opening and adapted to be engaged by the end of said base when inserted in position in said opening, of a locking lever arranged in an inclined relation in said socket and extending transversely of said opening, said lever having an apertured section therein positioned in said opening, said aperture having an actual diameter greater than said base and having the axis thereof inclined to the axis of said opening so that the projected diameter of said aperture is less than the diameter of said base to prevent the passage of the latter through said aperture when said lever is in an inclined relation, said base being insertable in said aperture and movable axially in one direction in said opening to move said lever as a unit therewith, means to limit said axial movement of said lever, means to pivot said lever upon said socket when the movement of said base is continued to tilt said lever to reduce the inclination thereof until said projected area is such as to allow said base to pass through said aperture and to engage said contact, lugs formed on said lever at the edge of said aperture and extending radially inwardly thereinto, said lugs camming over said thread as said base is moved through said aperture, and means independent of said base for returning said lever to its initial position and to increase the inclination thereof to cause said lugs to wedge against said thread to lock said base in said opening.

2. In an ejecting socket for a lamp of the type having a threaded metal base adapted to be inserted slidably in a base-receiving opening in said socket, the combination with a spring-pressed contact positioned in the bottom of said opening and adapted to be engaged by the end of said base when inserted in position in said opening, of a locking lever arranged in an inclined relation in said socket and extending transversely of said opening, said lever having an apertured section therein positioned in said opening, said aperture having an actual diameter greater than said base and having the axis thereof inclined to the axis of said opening so that the projected diameter of said aperture is less than the diameter of said base to prevent the passage of the latter through said aperture when said lever is in an inclined relation, said base being insertable in said aperture and movable axially in one direction in said opening to move said lever as a unit therewith, means to limit said axial movement of said lever, means to pivot said lever upon said socket when the movement of said base is continued to tilt said lever to reduce the inclination thereof until said projected diameter is such as to allow said base to pass through said aperture and to engage said contact, diametrically arranged lugs formed on said lever at the edge of said aperture and extending radially into the latter, said lugs camming over said thread as said base is moved through said aperture, means independent of said base for returning said lever to its initial position and to increase the inclination thereof to cause said lugs to wedge against said thread to lock said base in said opening, and means to limit the returning movement of said lever to retain said lugs in holding relation with said thread to hold said base in said opening.

3. In an ejecting socket for a lamp of the type having a threaded metal base adapted to be inserted slidably in a base-receiving opening in said socket, the combination with a spring-pressed contact positioned in the bottom of said opening and adapted to be engaged by the end of said base when inserted in position in said opening, of a locking lever arranged in an inclined relation in said socket and extending transversely of said opening, said lever having an apertured section therein positioned in said opening, said aperture having an actual diameter greater than said base and having the axis thereof inclined to the axis of said opening so that the projected diameter of said aperture is less than the diameter of said base to prevent the passage of the latter through said aperture when said lever is in an inclined relation, said base being insertable in said aperture and movable axially in one direction in said opening to move said lever as a unit therewith, means to limit said axial movement of said lever, means to pivot said lever upon said socket when the movement of said base is continued to tilt said lever to reduce the inclination thereof until said projected area is such as to allow said base to pass through said aperture and to engage said contact, diametrically arranged radial lugs

formed on said lever at the edge of said aperture and projecting into the latter, said lugs camming over said thread as said base is moved through said aperture, means independent of said base for returning said lever to its initial position and to increase the inclination thereof to cause said lugs to wedge against said thread to lock said base in said opening, said lugs being spaced axially of said base a distance equal to the pitch of said thread, and means for limiting the return movement of said lever to retain said lugs in said spaced relation to engage said thread to lock said base in position in said socket.

4. In an ejecting socket for a lamp of the type having a metal base adapted to be inserted slidably in a base-receiving opening in said socket, the combination with a spring-pressed contact positioned in the bottom of said opening and adapted to be engaged by the end of said base when inserted in said opening, of a locking lever arranged in an inclined relation in said socket and extending transversely of the opening therein, said lever being formed with a central aperture the actual diameter of which is greater than that of said base and is inclined to the axis of said opening so that the projected diameter of said aperture is less than that of said base, said base being insertable in said socket to engage said lever to move the latter axially in one direction as a unit with said base, means for rocking said lever on said socket to decrease the inclination thereof until said projected diameter is such as to allow said base to pass through said aperture and engage said contact, spring means for returning said lever to its initial inclined position, oppositely arranged means on said lever extending into said aperture for engaging said socket upon return of said lever for engaging said base frictionally to retain the base in position in said socket, a finger operating portion on said lever for moving the latter in said one direction independently of said base to release the latter so that said contact may eject said base from said socket, and means for pivoting said lever for rocking movement in said socket when said portion is moved.

PAUL J. ERNISSE.

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