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RAPID-CHANGE FLASH LAMP SOCKET

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Fig. 1

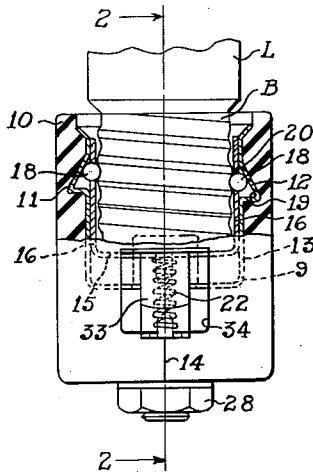


Fig. 2

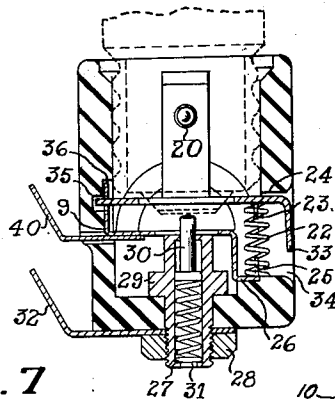


Fig. 8

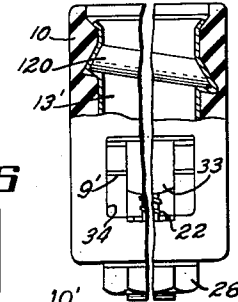


Fig. 7

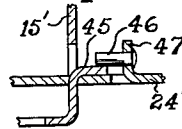


Fig. 5

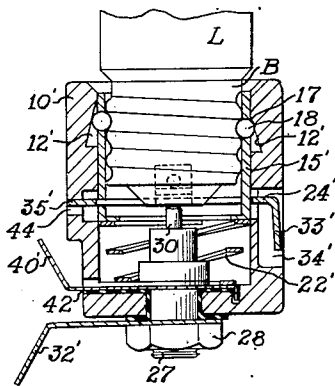


Fig. 6

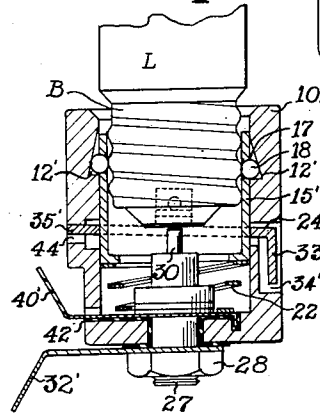


Fig. 4

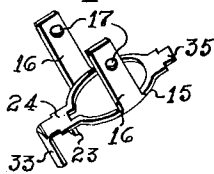
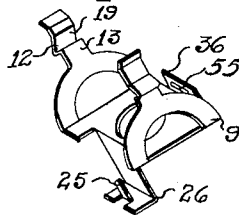


Fig. 3



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RAPID-CHANGE FLASH LAMP SOCKET

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7 Claims. (Cl. 173—358)

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The present invention relates to lamp sockets, and particularly to a lamp socket for use in conjunction with flashlight synchronizers wherein it is desirable to be able to replace a burned lamp with a new one in a rapid manner and requiring the handling of the burned lamp for a minimum length of time.

Photographers who take action pictures by the use of flashlights are aware of the necessity and desirability of being able to remove a burned flash lamp from its socket and replace it with a new one in the fastest possible time. The ability to so change flash lamps in a socket is not dependent alone upon the fact that an action shot may be lost, but also upon the fact that it is very often necessary to remove a lamp from its socket before it has cooled sufficiently so that it will not burn the person handling it. While it is desirable to be able to change the lamps in a socket in a rapid manner, it is imperative that the lamp, when inserted into the socket, be properly situated to engage the electrical contacts of the socket and to be positively locked in the socket against accidental removal.

One object of the present invention is to provide a flash lamp socket which permits a lamp to be inserted thereinto and removed therefrom in a rapid manner.

Another object is to provide a flash lamp socket which permits a lamp with a threaded base to be inserted into, or removed from, the same by a straight axial thrust rather than requiring the usual rotative movement of the lamp relative to the socket.

Still another object is to provide a socket of the type set forth which includes means for releasably locking a lamp in place in the socket.

And yet another object is to provide a socket of the type set forth which includes a center contact for the base of the lamp which takes the form of a spring plunger having sufficient force to eject the lamp from the socket when the lamp latching means is manually released.

The novel features that I consider characteristic of my 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 side elevational view, partially in section, of a flash lamp socket constructed in accordance with one embodiment of the present invention;

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Fig. 2 is a sectional view taken substantially on line 2—2 of Fig. 1;

Fig. 3 is a perspective detail showing the construction of a liner member forming a part of the socket shown in Figs. 1 and 2;

Fig. 4 is a perspective detail of one form of ball retainer forming a part of said socket;

Fig. 5 is a longitudinal section showing another embodiment of a lamp socket constructed in accordance with the present invention, and showing the flash lamp locked in operative position within the socket;

Fig. 6 is a sectional view corresponding to Fig. 5 but showing the lamp released from a latched position in the socket and partially expelled from the socket by the spring plunger contact;

Fig. 7 is an enlarged sectional detail showing how the release lever is operatively connected to the ball retainer in the embodiment of the invention shown in Figs. 5 and 6; and

Fig. 8 is a view similar to Fig. 1 but with the lamp removed from the socket to show an embodiment wherein the undercut recesses 11 of Fig. 1 are replaced by a continuous undercut spiral groove and metal liner having a pitch corresponding to that of the thread on the base of the lamp.

Referring now to the embodiment of the invention shown in Figs. 1—4, the lamp socket may comprise an open-ended casing 10 made of any suitable insulating material, such as one of the many plastics on the market today. While the opening in the casing 10 need be of no particular configuration, it is necessary that the smallest inside dimension thereof be greater than the maximum outside diameter of the threaded base B of the lamp L to be inserted into the socket. The inside wall of the casing 10 is provided with recessed portions 11 into which the deformed portions 12 on the upstanding arms 13 of a liner member 9, of the form best shown in Fig. 3, are adapted to extend. This liner member 9 is preferably made of metal and is necessitated to provide metal bearing surfaces within the plastic casing because the plastic material would not normally have a hardness sufficient to withstand the friction which would be imposed by the latching mechanism as will be evidenced by the following description. This liner member is preferably fixed relative to the casing and, in the particular construction disclosed, this relation exists because of the fact that the deformed portions 12 of the liner member fit rather closely into recesses 11 in the inside walls of the casing. In cases where such a close fit between the deformed

portions 12 and the recesses 11 are relied upon to fix the liner member within the casing, the casing can be split along the line 14 so as to permit assembly of the liner member into the casing.

Telescopically mounted within the liner member is a ball retainer cup 15, of the form best shown in Fig. 4. The upstanding arms 16 of the retainer each include a ball seat 17 in which a metal ball 18 is loosely mounted. The ball seats 17 are so disposed relative to the liner member that each of the balls is adapted to align with one of the deformed portions 12 in the liner member. It will be noted that the deformed portion 12 of the liner member provides undercut recesses having inclined bottom walls 19 which taper away from the interior of the casing in a direction downwardly thereof. The ball seats 17 are swedged on the inside of the arms 16, as indicated at 20, to permit the balls to extend a sufficient distance beyond the inside faces of the arms 16 to positively engage the threads on the base of the lamp, but to prevent the balls from passing through the seats and falling out of place when no lamp is in the socket.

The balls are free to move into and out of the other side of the seats and are confined by the inclined wall 19 of the deformed portion 12 of the liner member. When the ball retainer is moved upwardly to the position shown in Fig. 1, the balls 18 are moved upwardly along the inclined surfaces 19 and are cammed into a gripping position where they positively engage the thread on the base of the lamp to prevent the lamp from pulling out of the socket. The retainer cup is normally moved to this upward position by a compression spring 22, see Fig. 2, which is seated at opposite ends on a lug 23 turned down from a horizontal extension 24 on the retainer cup and a lug 25 turned up from the offset extension 26 on the liner member.

When a lamp is inserted into the socket by a straight thrust, the threads engage the balls 18 and force the retainer cup downwardly against its spring 22 and, as the balls reach the bottom of the deformed portions 12 of the liner member, they are free to move axially of their seats and out of the path of movement of the lamp so that the lamp may be completely inserted into the socket. The instant the downward pressure on the lamp is relieved, the retainer cup is moved upwardly by its spring 22, whereupon the balls 18 are cammed into gripping relation with a thread on the base of the lamp by the action of inclined surfaces 19. Accordingly, the lamp is locked in the socket, and it will be appreciated that any force tending to move the lamp axially from the socket will increase the gripping action of the balls 18 with the engaged thread of the lamp by virtue of the camming action afforded by the inclined surfaces 19.

Fixed in the bottom wall of the casing 10 is a hollow stud 27 having its exterior threaded to receive a nut 28 which serves to draw a flange 29 down into engagement with the inside wall of the bottom of the casing. Slidably mounted within the bore of the stud 27 is a plunger contact 30 which is backed up by a compression spring 31 which normally tends to force the plunger upwardly. This plunger is electrically connected to one terminal 32 through the stud 27 and spring 31 and constitutes the center contact for the socket. At the same time, it serves as an ejector for the lamp when the latching mechanism is manually released, as will now be described.

As clearly shown in Fig. 2, the ball retainer 15 includes an annular horizontal portion extending transversely of the casing and terminating in a fingerpiece 33 disposed within a cutout 34 in the side of the casing. The annular portion of the ball retainer contains an extending lug 35, diametrically opposed to the fingerpiece 33 which loosely engages a slot 55 in the turned-up end 36 on the liner member 9 to pivotally support the ball retainer. The annular portion of the ball retainer cup is normally held in a substantially horizontal position by the action of spring 22 tending to swing the cup counterclockwise about its pivot point, see Fig. 2, and in which position the balls 18 are moved to their lamp-gripping position. Now, in order to release the lamp from its socket, all that is necessary is to pivot the ball retainer cup clockwise about its pivot point by depressing the fingerpiece 33. This serves to move the upstanding arms 16 of the ball retainer downwardly relative to the liner member so that the balls 18 come opposite the deeper portions of the deformed portions 12 in the liner member and can thus move axially out of the path of the thread of the lamp base. With the ball retainer held in its lower, or lamp-releasing, position, the spring plunger 30 is free to eject the lamp axially from the socket, the thread on the lamp being free to force the balls 18 into the deeper part of the deformed portion of the liner member at this time. The second terminal 40 of the socket extends through an aperture in the side wall of the casing and is soldered or otherwise fastened to the horizontal portion of the liner member, see Fig. 2. Thus, electrical connection is made to the threaded shell of the lamp base through the liner member, through spring 22 to the ball retainer cup and, thence, to the lamp base through balls 18 and/or direct engagement between the threaded shell of the lamp base and the upstanding arms 16 of the ball retainer cup.

Referring now to Figs. 5, 6 and 7, another embodiment of my novel lamp socket will be described which allows a simplified construction for the reason that the socket casing is made of metal as the result of which the metal liner member 9 is not required to provide bearing surfaces for the balls 18. Since, in this second embodiment, certain parts are exactly the same as those shown in the first embodiment, corresponding parts in the second embodiment will be referred to by the same reference numerals, while other parts which are not the exact equivalent of those in the first embodiment will be referred to by the same reference numerals primed ('). In this embodiment, the socket comprises an open-ended casing 10' which, in this instance, is made of metal and is preferably circular in shape. The inside wall of casing 10' is provided with a pair of diametrically opposed undercut recesses 12' which include inclined bottom walls tapering away from the interior of the casing in a direction downwardly of the casing. Telescopically mounted within the interior of the casing is a ball retainer cup 15' having diametrically opposed ball seats 17 which are swedged to prevent balls 18 from falling out of the seats and into the casing when a lamp is not in the socket. In this instance, the ball-retaining member is shown as circular and is a member separate from the release lever as will be described below. As before, the ball-retaining cup is normally spring-pressed to an upper position relative to said casing, see Fig. 5, wherein the balls 18 are cammed to a lamp-gripping position by virtue of their engage-

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ment with inclined surfaces in the undercut recesses 12'. However, in this instance, the ball-retaining cup is seated on the top of a large compression spring 22' which is confined between the bottom of the cup and the base of the casing and which encircles the spring-ejector plunger 30 and its associated hollow stud 27 engaged by nut 28 to hold this plunger assembly in position in the casing. One terminal 32' is electrically connected to the plunger 30 by being grounded to the hollow stud 27, and insulating bushing 42 is provided to insulate this terminal from the metal casing 10'.

For selectively moving the ball retainer cup 15' to a lowered position in the casing wherein the balls 18 are free to move into the deeper portion of the undercut recesses 12' and thereby release the lamp, a separate release lever 24' is provided, this lever being annular in shape and surrounding the ball retainer cup and including a projection 35' extending into a slot 44 in the casing to provide a fulcrum or pivot point for the lever. Diametrically opposite the projection 35', the lever includes a finger piece 33' disposed within a recess 34'. In order to operatively connect the release lever 24' with the ball retainer cup 15' so that pivoting the release lever downwardly in a clockwise direction will move the ball retainer cup to its lower or lamp-releasing position, see Fig. 6, the connection shown in detail in Fig. 7 is recommended. This connection comprises diametrically-opposed lugs 45 turned outwardly from the vertical wall of the ball retainer cup 15' and which lugs have their upper surfaces engaged by a pin 46 extending from a lug 47 turned upwardly from the annular portion of the release lever 24'. Thus, as the ball-retaining cup 15' is normally moved to its upper position by spring 22', the connection between the cup and release lever causes the lever to be moved to the substantially horizontal position shown in Fig. 5. Now, if the release lever is pivoted downwardly in a counterclockwise direction by pressing fingerpiece 33', then pins 46, acting on lugs 45, cause the ball retainer cup to be moved to its lowered position, see Fig. 6, and in which position the balls 18 are free to move into the deeper portions of the undercut recesses 12' and free the lamp from the socket. Electric terminal 40' extends through an opening in the casing wall and into grounded relation with spring 22' so that the ball retainer cup 15', and the balls 18 held thereby, constitute the second contact of the socket to be engaged by the shell of the lamp base as before.

In order to insure the lamp being held in the socket in a perfectly upright direction, rather than at some angle, the undercut recesses 12 in the first embodiment or recesses 12' in the second embodiment are offset from one another axially of the casing in accordance with the pitch of the thread on the lamp base to be accommodated by this socket. Likewise, the diametrically-opposed ball seats 17 are relatively offset in this same manner to cooperate with said recesses. This arrangement of parts provides that the two balls engage the same concaved thread on the lamp and, hence, place a substantially opposed transverse pressure on the lamp base which acts to hold the same upright in the socket. As shown in Fig. 8 instead of having two diametrically-opposed undercut recesses 11 or 12' in the casing wall, a continuous undercut spiral groove 110 can be cut in the casing wall, said groove having a pitch corre-

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sponding to that of the thread on the base of the lamp. In this embodiment, the socket engaging portion 13' of the member 9' should be circular as shown, rather than U-shaped as in the Fig. 1 embodiment, and the deformed portions 12 of the Fig. 1 embodiment will be replaced by a continuous deformation 120 extending into groove 110 and have a spiral pitch corresponding thereto.

While I have shown and described certain specific embodiments of my invention, I am fully aware that many modifications thereof are possible. Therefore, this invention is not to be limited to the specific details of construction shown and described, but is intended to cover all modifications coming within the scope of the appended claims.

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

1. A flash lamp socket for a lamp having a threaded base comprising an open-ended casing larger in diameter than the threaded base of the lamp to be inserted therein, the inner side walls of said casing provided with recesses having inclined bottoms tapering away from the casing interior in a direction toward the bottom thereof, a ball retainer cup telescopically mounted within said casing to move between an upper position and a lower position and having the inside faces of its side walls spaced apart a slightly greater distance than the maximum diameter of the threaded base of said lamp, the side walls of said retainer cup provided with sweged ball seats extending therethrough in alignment with said recesses and each permitting a ball seated therein to move axially of its seat to and from an operative lamp-gripping position, wherein a portion of its circumference extends beyond the inner face of said retainer cup to engage the threads on the base of a lamp inserted therein, a metal ball loosely mounted in each ball seat and of such diameter as to extend into engagement with the inclined bottoms of said recesses, whereby when the retainer cup is telescoped to its lower position said balls are free to move axially of their seats and into the deeper portions of said recesses and from said operative lamp-gripping position, and when the retainer cup is moved to its upper position, the balls are cammed to said operative lamp-gripping position by the inclined bottoms of said recesses, a spring normally urging said retainer cup to its upper position, and means extending to the outside of said casing for manually moving said retainer cup to its lower position to permit said balls to move away from their operative lamp-gripping position and thereby release said lamp from the socket.

2. A flash lamp socket according to claim 1 and including a spring plunger extending up into the bottom of said casing to be engaged and compressed by the bottom of the lamp when inserted into said socket, said spring plunger acting to forcefully eject the lamp from the socket when said retainer cup is manually moved to its lower position.

3. A flash lamp socket according to claim 1 in which said casing is fabricated from a plastic material not having sufficient hardness to constitute a suitable bearing surface for said balls, and including a sheet metal liner member having vertical arms connected at their lower ends by a cross arm, the vertical arms of said liner extending longitudinally along the inside walls of

said casing and deformed to conform to said recesses and provide a metal lining for the inclined bottom thereof engaged by said balls.

4. A flash lamp socket for a lamp having a threaded base comprising an open-ended casing having an inside diameter larger than the threaded base of the lamp to be inserted into the same, the inner side walls of said casing provided with diametrically opposed undercut portions, a U-shaped metal liner member whose arms each include a deformed portion including an inclined cam surface seated in said casing with the deformed portion on each arm extending into one of the undercut portions of said casing so that the cam surfaces are inclined downwardly and away from the center of said casing, a U-shaped ball retainer member disposed within said liner member with the arms of the two in parallel juxtaposition, the arms of said retainer member spaced apart a slightly greater distance than the maximum diameter of the threaded base of said lamp and each provided with a swedged ball seat in alignment with the cam surface in the adjacent arm of said liner member and permitting a ball seated therein to move axially of the seat but in a direction toward the interior of the casing by only a limited amount to a lamp-gripping position, wherein a portion of its periphery extends beyond the inner face of said retainer arm to engage a thread on the base of the lamp inserted between said arms, a metal ball seated in each of said seats adapted to engage the cam surface in the liner member adjacent thereto to be cammed to a lamp-gripping position and allowed to drop into the deep portion of said deformed portion of the liner member when the balls are moved up and down said cam surfaces, respectively, said ball retainer member pivoted at a point below, and to one side of, said balls to move between a raised position, wherein it moves said balls upward along said cam surface to cam them to a lamp-gripping position, and a lowered position, wherein it moves said balls downward along said cam surfaces to a point where they can be retracted from a lamp-gripping position, a spring normally urging said ball retainer to said raised position, and a fingerpiece on said ball retainer diametrically opposite said pivot point and extending to the exterior of said casing to permit said retainer member to be normally moved to its lower position to release the lamp.

5. A flash lamp socket for a lamp having a threaded base comprising an open-ended casing larger in diameter than the threaded base of the lamp to be inserted therein, the inner side walls of said casing provided with diametrically opposite recesses having inclined bottoms tapering away from the casing interior in a direction toward the bottom thereof, a ball retainer telescopically mounted within said casing to move between an upper and a lower position relative thereto and having upstanding side walls whose inside surfaces are spaced a slightly greater distance apart than the maximum diameter of the threaded base of the lamp to be inserted therebetween, the side walls of said retainer provided with ball seats extending therethrough in align-

ment with said recesses and the inner end of said ball seats swedged to allow the ball to move inwardly of the casing only to an operative lamp-gripping position, wherein a portion of its circumference extends beyond the inner surface of the side wall of said retainer to engage the threads on the base of a lamp inserted into the socket, a metal ball loosely mounted in each ball seat and of such diameter as to extend into engagement with said inclined bottoms of said recesses, whereby when the retainer is telescoped to its raised position, the balls are moved relative to, and cammed by, the inclined bottoms of said recesses into a lamp-gripping position, and when the retainer is moved to its lower position the balls are moved opposite the deeper portion of said recesses and are free to move thereinto from a lamp-gripping position, a spring normally urging said retainer to its raised position, means for selectively manually moving said ball retainer to its lower position to release a lamp from said socket, and including a lever, having a fingerpiece extending to the exterior of said casing, pivotally mounted in said casing to move between a latching position and a release position, and an operative connection between said lever and ball retainer causing movement of said retainer to its lower position when the lever is moved to its release position and causing said lever to be moved to its latching position by the spring urging said retainer to its raised position.

6. A flash lamp socket according to claim 5 in which the recesses in said casing and the ball seats in said retainer are offset from their counterpart axially of said casing in accordance with the pitch of the thread on the lamp to be inserted into said socket, whereby diametrically opposed balls are adapted to engage the same thread on the lamp base and thereby hold the lamp in axial relation to said socket.

7. A flash lamp socket according to claim 5 in which said casing is circular and said recesses constitute diametrically opposed portions of an undercut circumferential groove provided on the inside surface of said casing and including an inclined wall tapering away from the inside wall of the casing in a direction downwardly of said casing, said groove being spiral in form and having a pitch corresponding to the pitch of the thread on the base of the lamp to be inserted into said socket, and said ball seats in said retainer being offset from each other axially of said casing in accordance with the pitch of said spiral groove so as to align therewith.

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