Aug. 28, 1951 H. W. FRENCH, JR 2,565,492

FLASH LAMP EJECTOR SOCKET

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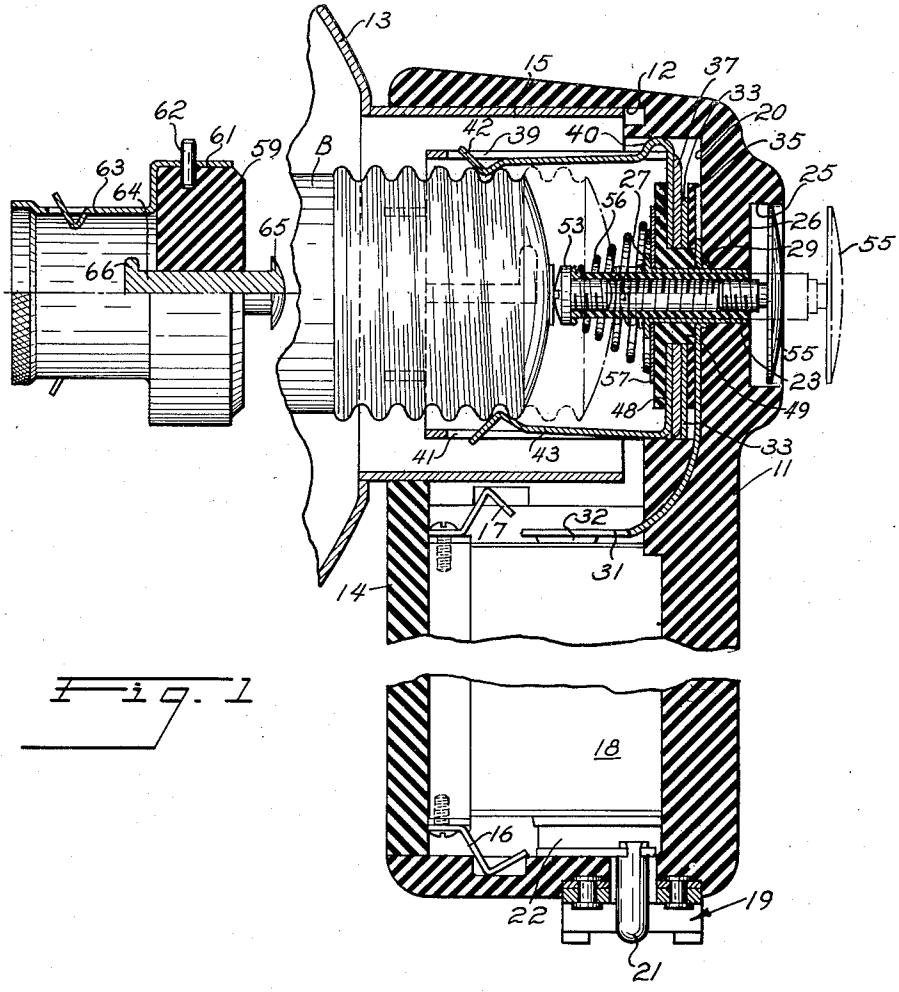


Fig. 1

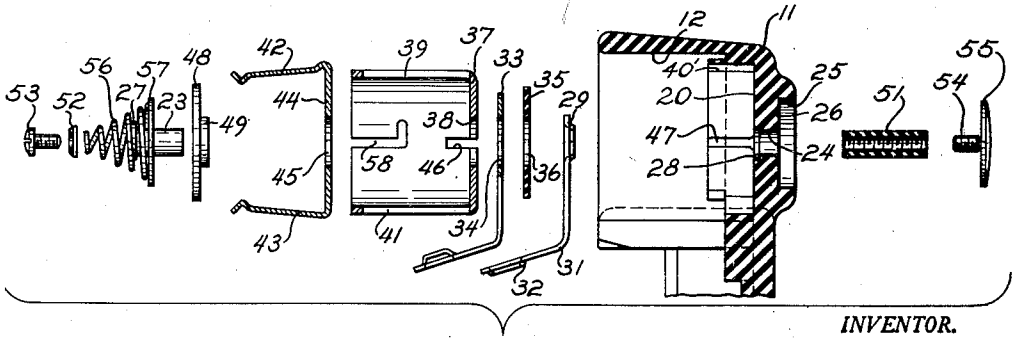


Fig. 2

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FLASH LAMP EJECTOR SOCKET

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6 Claims. (Cl. 67—31)

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This invention relates to flash bulb supporting and actuating apparatus for attachment to a camera and is particularly concerned with an ejector socket for the flash bulbs.

Flash-light photography has become common in newspaper and indoor work where it is necessary to provide artificial light on the subject, and is particularly useful for speed work where it is desired to take a number of pictures in quick succession. It is time-wasting to unscrew bulbs by hand and even though some sockets are spring thrust sockets, it is dangerous and often painful to handle the hot newly fired bulb. Hence ejector sockets have been proposed in a large number of designs. Many of these, however, employ a spring action for the purpose of propelling the bulb out of the socket, as this has been considered necessary. Some of these spring powered ejector sockets however have proven objectionable in that they are so powerful as to actually propel the bulb a substantial distance across the room so that there is danger of hitting persons in the room with the ejected bulb.

I have found that with a properly designed socket and with special arrangements of parts in combination, it is possible to provide a satisfactory ejector socket for flash bulbs wherein the bulb may be thrust into the socket and held there resiliently while the picture is being taken and the bulb exploded, and then ejected manually by a positive thrust without any recourse to auxiliary spring ejector action, for quickly removing the bulb entirely from the socket, so that the operator may be instantly ready for taking a new picture as fast as he can push a new bulb into the socket and set the camera for the succeeding exposure.

It is therefore a major object of my invention to provide a flash bulb ejector device which is positive in operation and does not depend on auxiliary spring or other means for expelling the bulb from the socket.

It is a further object of my invention to provide a novel flash bulb ejector socket having a non-conductive plunger slidably mounted therein for positively pushing the bulb out of the socket after it has been used.

It is a further object of my invention to provide a novel conductor and plunger arrangement in a flash lamp ejector socket.

A further object of my invention is to provide a novel adapter for a flash lamp ejector socket.

Further objects of my invention will presently appear as the description proceeds in connection with the annexed claims and the appended drawings, wherein,

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Figure 1 is a section in side elevation illustrating a flash lamp unit having an ejector socket according to a preferred embodiment of my invention wherein the full line position of the parts illustrates their relative arrangement just when the bulb is being axially thrust into the socket and just as its center contact touches the plunger, and the dotted lines represent the position of the parts when the lamp has been thrust fully into its operative position in the socket so that the ejection plunger becomes projected from the back of the unit so as to be available for operation by the operator after the flash bulb has been used; and

Figure 2 is an exploded view of the elements of the socket of Figure 1 illustrating the structure in detail.

In its preferred embodiment my invention comprises a self-contained attachment unit for a camera comprising a Bakelite, hard rubber or other insulated housing 11 having integral back, bottom, top and side walls and being formed with an opening in the upper part of the front wall for mounting a reflector 13 on the unit. Housing 11 has a removable lower front wall 14 which fits below the reflector. Reflector 13 is firmly but removably mounted on the housing 11 as by means of a split resilient collar 15 which is thrust into opening 12 and frictionally retains the reflector in position on the housing coaxially with the socket to be described.

Cover 14 is removably mounted on the housing by means of spring clips 16 and 17 cooperating with recesses in the interior of the housing, and the purpose of making wall 14 removable is to enable the batteries 18 to be replaced when desired.

The lower wall of housing 11 is provided with a depending metal slide clip assembly 19 which is adapted to fit with a corresponding part on the camera and which is rigidly secured to the exterior of housing 11 as by a rivet and vulcanized plate construction, the details of which are not concerned with this part of the invention. Clip assembly 19 is centrally apertured for the free passage of an electrical terminal member 21 which is secured at its upper end within housing 11 to a spring 22 on which rests the bottom metallic surface of the battery 18. Metal spring 22 is riveted or otherwise secured to housing 11 and provides a lead between the outer battery terminal and terminal 21. When the unit is mounted in position on the camera by clip 19, terminal 21 engages a suitable insulated terminal on the camera leading to one of the shutter operated contacts as in the usual flash bulb arrangement.

A tubular metal rivet or thimble 23 is fixedly

mounted in a small bore 24 at the bottom of opening 12 and in the rear wall of the housing 11 in axial alignment with reflector 13. Outwardly of bore 24, housing 11 is formed concentrically with an enlarged circular recess 25 providing a flat shoulder 26 at its bottom. Rivet 23 is flanged at its inner end at 27, and the purpose of rivet 23 is to rigidly mount the socket assembly on housing 11.

The inner surface 20 of the rear wall of housing 11 adjacent and surrounding bore 24 is flat and normal to the axis of bore 24 and formed with a small shouldered recess 28 at the inner end of bore 24 for receiving the apertured tip 29 of a flexible conductor strip 31. The lower end of strip 31 is attached to tip 32 to the central terminal of battery 18.

A second conductor strip 33 formed with an enlarged circular aperture 34 much larger than the diameter of rivet 23 is axially spaced and electrically isolated from strip 31 by a flat insulating washer disc 35 which has a central aperture 36 of the same size as aperture 34. The purpose of conductor strip 33 is to connect the outer terminal of battery 18 with the outer shell terminal of the socket to be described.

This outer socket shell terminal preferably comprises a generally cylindrical metal shell member 37 closed at its bottom except for a central circular aperture 38 of the same size as apertures 34 and 36 and open at its front end. Shell 37 is formed along its cylindrical side with diametrically opposed longitudinally extending slots 39 and 41 for receiving guiding and locating spring arms 42 and 43 of a generally U-shaped conductor strip having a flat base 44 apertured at 45 in alignment with aperture 38 of shell 37.

Adjacent its bottom wall and midway between slots 39 and 41, shell 37 is formed with a pair of diametrically opposite slots 46 adapted to interfit with corresponding projecting integral ribs or keys 47 formed on the interior of housing 11 as illustrated in Figure 2. The purpose of this key and slot arrangement is to orient the shell within the housing and to prevent its rotation when the bulb is thrust thereinto. If desired spring contact member 44 may have any number of spring arms, but in this embodiment only two are shown located above and below the lamp base as this number has been found to be usually enough for holding a lamp bulb for the purpose required.

Spring arms 42 and 43 diverge inwardly from flat base 44 which in the assembly is held flat against the rear wall of shell 37 as will appear, so that when a bulb is thrust axially into the socket, these spring arms 42 and 43 are sprung outwardly through the slot 39 and 41 as they give in response to axial pressure on the bulb. As illustrated in Figure 1, at least one spring contact arm may be formed with an integral projecting bend 40 for keying into a suitable recess 40' in the housing 11 for aiding assembly and orientation of the socket.

An insulated washer 48 which has a smaller cylindrical boss 49 projecting in turn through apertures 45, 38, 34 and 36 abuts against tip 29 to align and hold the socket members and associated contacts in position. In the assembly washer 48 is supported on rivet 23. The axial length of hub 49 is equal to the combined thickness of the two bottom walls of the shell members 37 and 44, the strip conductor 33 and the washer 35.

A plunger rod 51, which is preferably a hollow internally threaded rod of hard rubber, Bakelite or other insulating material, is supported within the interior of tubular rivet 23 for axial sliding movement. At its inner end, rod 51 has rigidly mounted thereon a cup-shaped metal washer 52 secured to rod 51 as by a set screw 53. At the other end of rod 51, a screw 54 having an enlarged button head 55 adapted to enter recess 25 is secured. A light compression spring 56, which is preferably in the shape of a spiral cone having its smaller end cupped within washer 52 and its larger end secured to a flat metal washer 57 slidably surrounding rivet 23, surrounds the inner end of rod 51 within the socket.

The function of rivet 23 is to hold all the parts of the socket in position, as well as to establish conductive relation between battery connected conductor 31 and spring 56. In assembly after insulating member 48 has socket members 37 and 44, conductor 33 and washer 35 threaded over boss 49 thereof, the rivet is thrust through washer 57, insulating washer 48 and conductor tip 29 in succession, and its outer end is peened over where it enters housing recess 25. Rivet 23 is thus rigidly secured to the housing and tightly clamps the socket parts and conductors between flange 27 and flat surface 20 at the bottom of recess 12. Since conducting washer 57 is tightly clamped against flange 27 and since metal rivet 23 has a tight fit with terminal 29 of conductor strip 31, the circuit comprising conductor strip 31, rivet 23, washer 57 and spring 56 provides a live socket center terminal at 53 for engaging the center contact of the lamp bulb. This center contact circuit is insulated from the circuit of conductor strip 33 by washers 35 and 48. The sole function of spring 56 is to carry current in all positions of plunger 51, and it exerts no bulb ejection action.

In the assembly, with no bulb in the socket, the parts tend to assume the positions illustrated in full lines in Figure 1, due to the fact that spring 56, which is very light and the purpose of which is only to conduct current from washer 57 to washer 52 and screw head 53, resists outward movement of the plunger from its inward position. It is however immaterial to operation whether the plunger 51 is disposed in this inner position or in any intermediate position between the full line and dotted line positions of Figure 1 when there is no bulb in the socket. When a screw thread based bulb is thrust into the socket, its screw threads engage spring contact fingers 42 and 43 and its bottom contact comes into engagement with the head of screw 53, and the full line showing in Figure 1 illustrates the condition of the parts substantially at the moment of such contact.

As the bulb B is thrust into its innermost position, shown in dotted lines in Figure 1, plunger 51 is pushed rearwardly to assume its dotted line position of Figure 1, spring 56 in the meantime offering little or no resistance to such movement and collapsing and the conical shape of spring 56 enabling the spirals thereof to nest until the fully collapsed spring approximates a substantially flat annulus. Spring 56 maintains contact between washer 57 and head 53. Plunger 51 and head 55 assume the dotted line position of Figure 1 projecting from housing 11. When the bulb has been thrust into its dotted line position in Figure 1, it is firmly held and maintained there by the spring fingers 42 and 43, and the flash bulb actuating unit is ready for actuation.

After the camera shutter is operated to make

an exposure, the operator immediately pushes inwardly on head 55 to positively project plunger 51 to the left in Figure 1 as far as permitted by engagement of head 55 with shoulder 26, and this positive movement pushes the bulb outwardly to a position where it will readily drop out of the socket by substantially its own weight. There is absolutely no spring action in the ejection of the bulb so that there is no danger of the bulb being thrown across the room or striking the party being photographed. Ordinarily, after the plunger has been pushed in to eject the bulb, it remains in substantially the full line position of Figure 1 with head 55 seated within recess 25.

Shell 37 is provided with a pair of diametrically opposed bayonet slots 58 for accommodation of an insulated adapter base 59 having a metal shell 61 and diametrically disposed bayonet pins 62 adapted to enter slots 58. The adapter has a pair of spring fingers 63 bent out of shell 61 and adapted to engage the corrugated base of a small size bulb when the adapter is used. A metal plunger 64 having opposite heads 65 and 66 is slidably and centrally mounted within adapter base 59. The location of the bayonet slots 58 and the length of plunger 64 are chosen such that when the adapter is mounted in position in shell 37 by bayonets 62, the adapter plunger 64 will engage head 53 of the main plunger, and insertion of a bulb axially into the adapter will push plunger 64 rearwardly and in turn displace plunger 51 rearwardly into the dotted line position of Figure 1. Then when the bulb in the adapter has been used, it is removed merely by pushing on button 55 to thereby advance both plungers 51 and 64 to the left and positively eject the bulb from the adapter.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. In a flash lamp apparatus, a non-conductive support, a socket shell assembly on said support adapted to receive and hold a bulb thrust axially thereinto, a metal sleeve on said support substantially concentric with and electrically insulated from said socket shell, a non-metallic non-conductive plunger slidable in said sleeve and having an operating head projecting externally of the support, a conductive center contact for the socket on the inner end of said plunger, and a flexible conductor extending between said head and said sleeve in all positions of said plunger.

2. In a flash lamp apparatus, a housing having a forwardly facing opening, a bulb receiving socket in said opening secured to said housing, a spring backed light weight non-metallic bulb ejector plunger slidably mounted in a base on said housing at the bottom of said socket and projecting at opposite ends into said socket and exteriorly of said housing, an enlarged head on said plunger and a pocket in the exterior surface of said housing at the outer end of said bore, said head being held in projected position out of said pocket when a bulb is in said socket, and said pocket being adapted to receive said head when the plunger is pushed inwardly to eject a bulb from said socket.

3. In a flash lamp ejector socket, an insulated support, an outer socket member on said support having resilient means to grip and hold the base of a bulb thrust axially thereinto, a slidable non-conductive plunger carrying the center contact of said socket at its inner end and having an enlarged head externally of said support, a battery connected relatively stationary conductor sleeve fixed on said support and insulated from said outer socket member and slidably supporting said plunger, and a flexible current carrying member extending between said center contact and said conductor sleeve.

4. In the flash lamp ejector socket defined in claim 3, said current carrying member comprising a substantially conical coil spring at its smaller end on said center contact.

5. In a flash lamp apparatus, a housing of electrically insulating material, a conductive thimble secured in an aperture in a rear wall of said housing, a non-conductive lamp ejector plunger slidably mounted in said thimble, a socket shell secured to the rear wall of said housing by said thimble and insulated from said thimble, means on said socket for resiliently gripping and holding the base of a bulb thrust axially into said socket, a center contact for said socket mounted on said plunger, and a flexible conductor between said contact and said thimble.

6. In a flash lamp ejector socket assembly, a support of electrically insulating material, a socket shell, resilient means on said shell for gripping and holding the base of a bulb thrust axially into said socket, a tubular conductive member rigid with said support clamping said shell on said support, said member being insulated from said shell, a plunger of insulating material slidably mounted in said member and carrying the center contact of said socket at its inner end, means providing electrical connection between said contact and said member in all positions of said plunger, and an operating head on said plunger outside said support.

HOBERT W. FRENCH, JR.

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The following references are of record in the file of this patent:

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Certificate of Correction

Patent No. 2,565,492 August 28, 1951

HOBERT W. FRENCH, JR.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 6, line 1, for "base" read *bore*; line 27, after "spring" insert *bearing*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 13th day of November, A. D. 1951.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.