

Sept. 29, 1959

R. F. McCAMMON
PHOTOGRAPHIC FLASH LAMP

2,906,862

Filed Aug. 29, 1957

FIG. 1

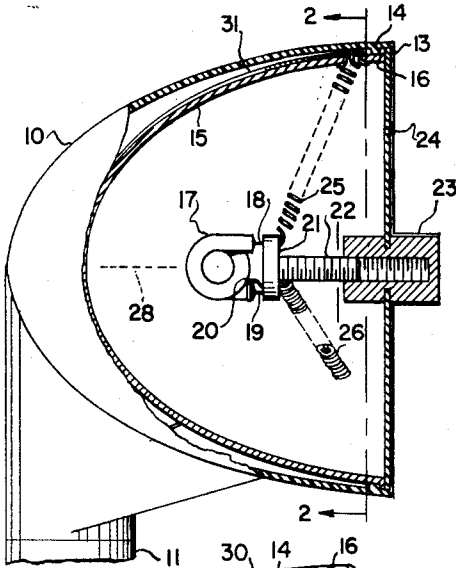


FIG. 2

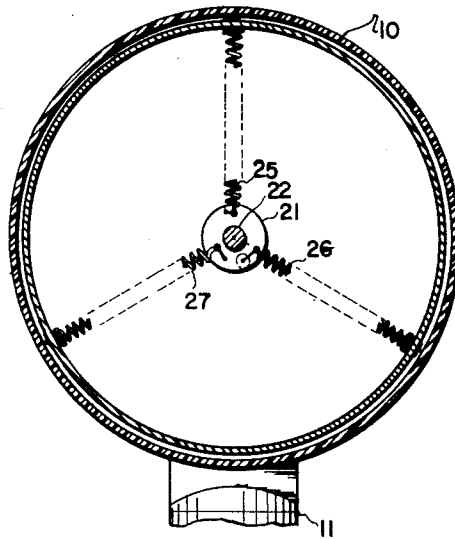


FIG. 1a

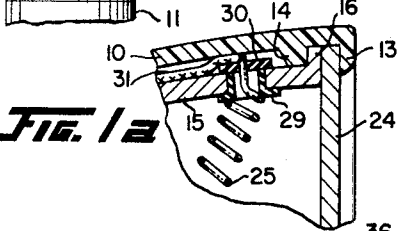


FIG. 4

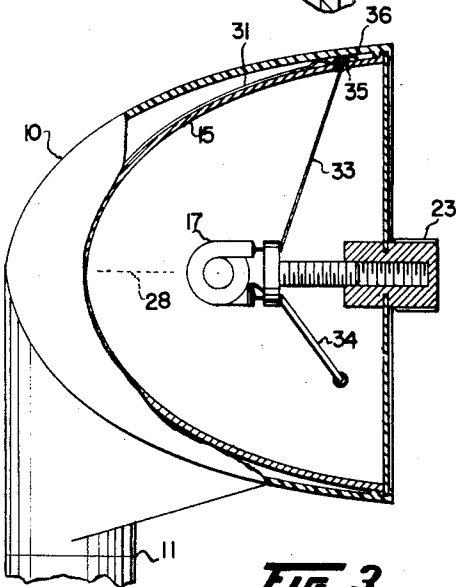
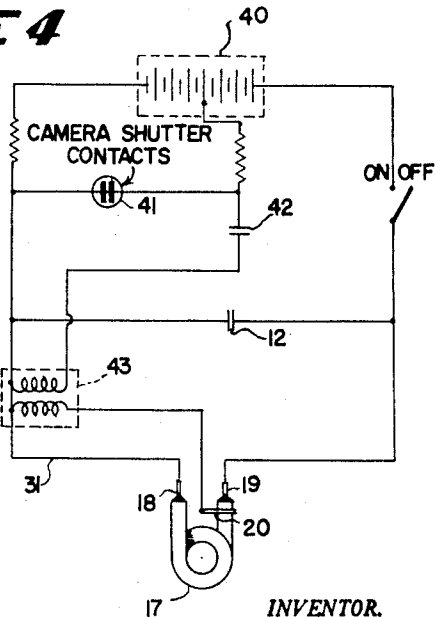


FIG. 3

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2,906,862

PHOTOGRAPHIC FLASH LAMP

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Application August 29, 1957, Serial No. 681,098

4 Claims. (Cl. 240—1.3)

The present invention is concerned with an improved illumination apparatus and more particularly an electronic photographic flash type illumination apparatus.

In photographic flash apparatus, it is common to provide a reflector to give a directional characteristic to the light produced by a photographic flash tube. Normally, such a flash tube is mounted in a socket in a fixed relationship to the reflector of the apparatus.

It is an object of the present invention to provide an illumination apparatus having a reflector wherein the light source consists of an electrically operable bulb which is positioned relative to the reflector by means of resilient electrical conductors which both support the bulb in relation to the reflector and are the means by which electrical energy is supplied to energize the bulb.

It is a further object of the present invention to provide an illumination apparatus having a reflector and an electrically operable light source wherein the light source is positioned within the reflector by means of a plurality of resilient electrical conductors and wherein means is provided to cause movement of the light source relative to the reflector against the force exerted by the resilient electrical conductors to thereby provide for focusing of the apparatus.

It is still a further object of the present invention to provide an improved electronic photographic flash apparatus of the high voltage type having an open end reflector and a high voltage flash tube including a pair of main electrodes and a starting electrode, and further having three resilient electrical conductors which connect to the electrodes of the flash tube and to the reflector to thereby position the flash tube within the reflector, the apparatus further having a transparent closure member overlying the open end of the reflector to thereby protect the flash tube and prevent contact with the high voltage terminals thereof, the closure member being provided with a manually movable member which cooperates with the flash tube such that movement of the movable member moves the flash tube relative to the reflector to provide for focusing of the apparatus.

These and other objects of the present invention will be apparent to those skilled in the art upon reference to the following specification, claims, and drawings of which

Figure 1 is a side view, partially broken away, of the improved illumination apparatus which takes the form of an electronic photographic flash unit wherein the resilient electrical conductors take the form of coiled spring type conductors;

Figure 1a is a section view of a portion of the apparatus of Figure 1,

Figure 2 is a view of the apparatus of Figure 1 taken along the line 2—2,

Figure 3 is a showing of a modification similar to that of Figure 1 wherein the coiled spring type electrical conductors have been replaced by flat spring type electrical conductors, and

Figure 4 is a schematic diagram showing a representa-

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tive electronic flash system wherein the electronic flash tube disclosed in Figures 1 and 3 is utilized.

Referring specifically to Figure 1, the reference numeral 10 designates the head portion of a photographic flash unit having a handle member 11, shown broken away. The head unit 10 of Figure 1 is preferably constructed of a durable plastic and is mechanically fastened to the upper end of the handle member 11, handle member 11 preferably being constructed of a metal. By way of example, the handle member 11 may be a chromium plated brass member housing a capacitor of the photographic flash system designated by the reference numeral 12 of Figure 4.

The head unit 10 is provided with an outer annular portion designated by the reference numeral 13 such that the head unit 10 generally resembles a cup having an open end when viewed as seen in Figure 2. This annular portion 13 of the head unit 10 is further provided with an annular ridge identified by the reference numeral 14 and shown in Figures 1 and 1a.

The reference numeral 15 designates a reflector which is also of a cup-shape having an open end and which is placed within the head unit 10. Reflector 15 is provided with an annular lip 16 which engages the annular ridge 14 in the head unit 10 when the reflector 15 is placed in position within the head unit. The reflector 15 may be constructed of a metal or of a plastic.

The reference numeral 17 designates an electrically operable light source and more specifically an electronic flash tube having a pair of main electrodes 18 and 19 and a starting electrode 20. Flash tubes of this type consist of a glass envelope filled with a gas which is capable of being ionized by means of voltage applied between the starting electrode 20 and the main electrode 18, which ionization spreads throughout the tube and causes a discharge between the main electrodes 18 and 19. The operating voltages of such a flash tube are in the hundreds of volts, for example 450 volts between the electrodes 18 and 19.

The flash tube 17 is mounted on an insulating button or member 21, shown in Figures 1 and 2. Member 21 is provided with a screw threaded extension 22 which cooperates with the screw threads formed in a manually operable member of knob 23. This knob 23 is rotatably mounted in a light transparent closure member 24 which overlies the annular lip 16 and the reflector 15, thereby protecting the flash tube 17 and preventing physical and electrical contact by the operator with the high voltage electrodes of the flash tube. Preferably, the light transparent member 24 is formed of an unbreakable type of plastic which is transparent so that light from the light source 17 may readily be reflected from the reflector 15 and pass out of the open end of the reflector 15 to the subject being photographed.

The flash tube 17 is supported in relation to the reflector 15 not only by the screw threaded member 22 but also by means of a plurality of resilient electrical conductors, two of which are shown in Figure 1 and are designated by the reference numerals 25 and 26. These conductors are more clearly seen in Figure 2 wherein three conductors 25, 26 and 27 are shown as being connected from the electrodes 18, 19 and 20 of the flash tube 17 to three substantially equally spaced points about the annular open end of the reflector 15. In actual practice, the resilient electrical conductors 25, 26 and 27 are formed of a metal which is capable of conducting electrical current and which can be formed into a spring. Thus, the conductors 25, 26 and 27 not only provide electrical contact to the electrodes of the flash tube 17, but also provide resilient support to the flash tube within the reflector 15. The reflector 15 has an axis of asymmetry designated generally by the broken line 28 and preferably

the light source 17 is positioned along this axis. As can be seen, rotation of the knob 23 causes movement of the light source 17 along the axis 28 and thereby focuses the illumination apparatus including the light source 17 and the reflector 15.

As shown in Figure 1a, the reflector end of the resilient electrical conductors may be fastened in place through an opening in reflector 15 which is provided with an insulating bushing 29 and a further insulating plate 30 which has an opening to receive the end of the conductor 25. The end of the conductor 25 is then coupled as by soldering to a further conductor 31 which leads to the components of the flash system, as shown in Figure 4.

Referring to Figure 3, a further modification is shown wherein the resilient electrical conductors take the form of leaf type springs 33 and 34. As above described in connection with Figures 1 and 2, the modification of Figure 3 is provided with three such resilient electrical conductors which make contact to the three electrodes of the flash tube 17. The spring members in this case are fastened one end to each of the electrodes of the flash tube 17 and the other end passes through an insulating bushing 35 in the reflector 15. The outer end of spring 33, designated by the reference numeral 36, abuts the inner surface of the head unit 10. This end 36 is likewise connected to the conductor 31, as by soldering. Upon the knob 23 being rotated, the flash tube 17 is moved along the axis designated by the reference numeral 28 and the end 36 of the resilient electrical conductors move along the inner surface of the head unit 10, with the resilient electrical conductors at all time assisting in mounting the flash tube 10 within reflector 15 and likewise making electrical connection to the electrodes of the flash tube.

Figure 4 is a showing of a typical electronic flash system having a relatively high voltage battery designed by the reference numeral 40, camera shutter contacts 41, a trigger capacitor 42, and a trigger transformer 43. Briefly describing the system, upon the shutter contacts 41 being closed, the charged capacitor 42 is discharged through the primary winding of trigger coil 43 and a high voltage is induced in the secondary of this trigger coil to thereby cause a discharge between electrodes 18 and 20. This discharge immediately spreads throughout the flash tube 17 and a discharge occurs between the electrodes 18 and 19, this discharge causing capacitor 42 to be discharged to produce a brilliant flash of light.

From the above description it can be seen that I have provided an improved illumination apparatus particularly adapted to the electronic flash type of device wherein the electronic flash tube is supported in relation to the reflector by means of resilient electrical conductors which both support the flash tube and provide electrical connections to the flash tube, thereby providing for focusing of the apparatus by movement of the flash tube relative to the reflector.

I claim as my invention:

1. A variable focus photographic illumination apparatus comprising; a generally cup-shaped reflector having an open end through which light is projected, a light source in the form of an electrically operable bulb having electrical conductors, a plurality of resilient electrical conductors each having one end fixed to said reflector at spaced points about the open end of said reflector and having the other end fixed to the conductors of said bulb to thereby position said bulb within said reflector, a transparent closure member overlying the open end of

said reflector, and a movable member mounted in said closure member and mechanically engaging said bulb such that movement of said movable member moves said bulb against the force exerted by said resilient electrical conductors to thereby focus the illumination apparatus.

2. An electronic photographic illumination apparatus comprising; a reflector, an electronic flash tube having a pair of main electrodes and a starting electrode, and three resilient electrical conductors each having one end thereof fixed at substantially equally spaced intervals about the outer edge of said reflector and each having the other end thereof connected to one each of the main electrodes and the starting electrode of said flash tube, said resilient electrical conductors thereby resiliently mounting said electronic flash tube in relation to said reflector.

3. An electronic photographic flash device comprising; an open end cup-shaped reflector having an annular outer surface, an electronic flash tube having a pair of main conductors and a starting electrode, three resilient electrical conductors each having one end thereof fixed to said reflector about the annular open end of said reflector and each having the other end connected to one of the main conductors and starting electrode of said flash tube, said resilient electrical conductors thereby being placed under tension and mounting said flash tube within said reflector, a transparent closure member overlying the annular portion of said reflector to thereby protect said flash tube, and a movable member cooperating with said electronic flash tube such that movement of said movable member causes movement of said electronic flash tube within said reflector to thereby provide for focusing of the device.

4. A high voltage electronic photographic flash unit comprising; a cup-shaped reflector having a central axis and having an annular outer rim defining the open end of said reflector, a high voltage electronic flash tube having a pair of main electrodes and a starting electrode, three resilient electrical conductors each having one end thereof connected to one of the three electrodes of said electronic flash tube and each having the other end thereof connected at spaced intervals about the annular outer rim of said reflector, said resilient electrical conductors thereby positioning said electronic flash tube substantially in alignment with the axis of said reflector, a protective transparent closure member overlying the annular rim of said reflector to protect said electronic flash tube and prevent contact with the high voltage electrodes of said flash tube, and manually operable knob rotatably mounted in said closure member and having screw threads cooperating with a screw member coupled to said electronic flash tube such that rotation of said knob causes movement of said electronic flash tube along the axis of said reflector to thereby provide for focusing of the unit.

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