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Anderson et al.

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[54] **PHOTOGRAPHIC FLASHLAMP UNIT**

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Related U.S. Application Data

[63] Continuation of Ser. No. 773,176, Nov. 4, 1968, abandoned.

[52] **U.S. Cl.** **431/93,** 240/1.3

[51] **Int. Cl.** **F21k 5/02**

[58] **Field of Search** 431/92, 93, 95; 240/1.3

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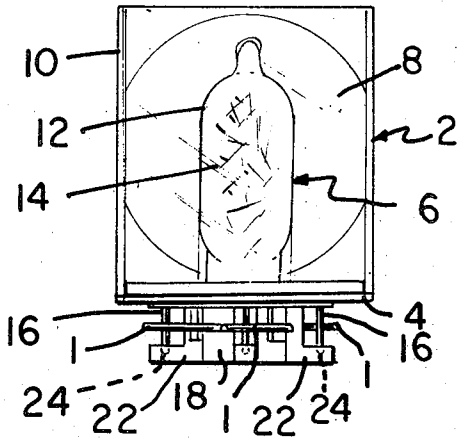
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[57] **ABSTRACT**

A flashcube having lamps of the percussive primer type and having self-contained means for firing them.

5 Claims, 4 Drawing Figures



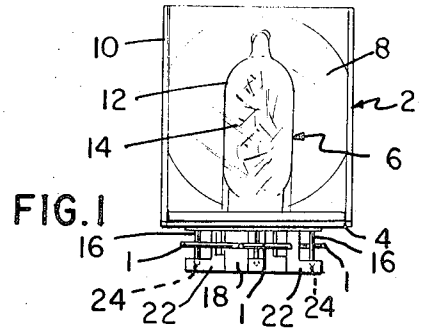


FIG. 1

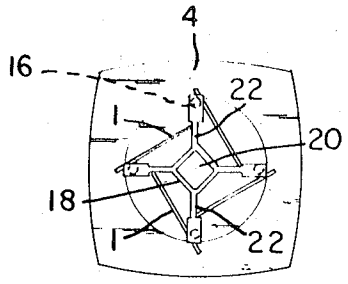


FIG. 2

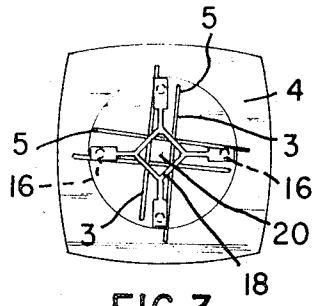


FIG. 3

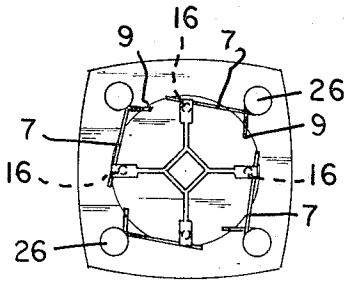


FIG. 4

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PHOTOGRAPHIC FLASHLAMP UNIT

This application is a continuation of our earlier filed application, Ser. No. 773,176 filed Nov. 4, 1968 entitled "Photographic Flashlamp Unit," now abandoned.

This invention relates to the manufacture of multilamp photographic flashlamp units and more particularly to the means employed to fire the lamps.

The introduction of the multilamp photographic flashlamp unit, generally known as a flashcube, represented a significant advance in the art. It eliminated the need for flashguns and it eliminated the need for built-in camera reflectors. It also eliminated handling of the flashlamp individually. However, it did not eliminate the need for batteries.

One of the most chronic problems and perhaps most exasperating circumstance with which the average amateur photographer is confronted is weak batteries—batteries too weak to fire the lamp properly or in synchronization. The average amateur photographer will usually have a spare flashlamp or two but rarely if ever will he have a pair of spare fresh batteries. Thus a single shot, or more probably a whole sequence of shots will be lost. Dry cell batteries, by their very nature tend to lose their strength gradually over an extended period of time. Many amateur photographers take flash pictures less than half a dozen times a year, thus providing more than enough time between uses for the batteries to deteriorate from strong to weak—from operativeness to inoperativeness.

More recently a percussive-type flashlamp has been suggested, i.e., a flashlamp which does not depend on a source of electrical energy for its operation. Generally speaking, a percussive-type photoflash lamp comprises an hermetically sealed, light-transmitting envelope containing a source of actinic light and having a primer secured thereto. More particularly, the percussive-type photoflash lamp may comprise a length of glass tubing constricted to a tip at one end thereof and having a primer sealed therein at the other end thereof. The length of glass tubing which defines the lamp envelope contains a combustible such as shredded zirconium foil and a combustion-supporting gas such as oxygen. The primer may comprise a metal tube or cup with a charge of fulminating material and an anvil supported therein. Operation of the lamp is initiated by an impact onto the metal tube or cup sufficient to cause deflagration of the fulminating material and thus ignition of the combustible in the lamp envelope.

Heretofore, several means have been suggested for firing these percussive-type flashlamps, all of which involve some form of spring mechanism built into the camera with the spring serving as an almost frictionless moving hammer. Cocking of the spring is usually accomplished by the film transport and/or cocking of the lens shutter mechanism, whether or not there is a flashlamp assembly being used for the picture taking. Cameras in the lower price ranges are built to withstand about 2,000 operations. Thus the firing spring must be able to withstand the stresses necessary to deliver the required energy and impact velocity for about 2,000 pictures. Only springs which are never overstressed in use and therefore have to be overdimensioned are suitable for such a task. However, the available space inside small cameras and the force required to cock and release the spring make it exceedingly difficult, and in some cases practically impossible, to provide a spring having the diameter, length and deflection characteristics necessary to develop the required energy at the required velocity. Thus in many cases such firing mechanisms frequently have to be underdimensioned and as a result may not operate satisfactorily for the full life of the camera.

In view of the foregoing, the principal object of this invention is to provide a simple, effective and efficient means for firing percussive-type flashlamps.

This and other objects, advantages and features are attained, in accordance with the principles of this invention, by providing a flash-cube with self-contained means for firing the percussive-type lamps disposed therein. In accordance with the principles of this invention, a wire spring about three-eighths to one-half inch long and having an elastic limit of about 350×10^3 psi and a deflection range of about one-sixteenth to one-eighth inch may be employed. The spring is an integral part of the flashcube assembly and each lamp has its own spring. Thus the spring has to be flexed only about 5 to 10 times, even if testing of the spring is included in the count. In view thereof, an overstressed spring action with the desired high velocity is therefore permissible. The positioning of the spring can be done efficiently and accurately during the assembly of the lamps and their springs on the plastic base of the flashcube. The impact of the spring is very efficient since the plastic base of the flashcube is designed to hold the primer tube of the lamp and the spring in predetermined position with respect to one another. Four of these springs can be fitted on the plastic base within a concentric circular area having a radium which is equal to or only about one-sixteenth inch larger than the radius required for the location of the primer tubes depending from the lamps. The inexpensive spring material, a piano wire for example, can be overstressed and still work perfectly well for the few times it has to deliver the desired energy and impact velocity, which may be 1–3 in-oz. at more than 1,800 in./sec. velocity.

One of the more practical advantages of this invention which will be readily appreciated by most users of this type of photographic equipment is the ease and accuracy with which one can determine whether or not the camera or a lamp is responsible for a malfunction. It is simply necessary to flex the spring manually and release it. A good lamp will flash and thus it is readily apparent that a faulty camera mechanism is the cause of the malfunction. The user is also assured of a new firing spring for each lamp in the flashcube and this represents a significant quality advantage.

In the specific embodiments of the invention illustrated in the accompanying drawing,

FIG. 1 is a side elevational view of a flashcube which includes self-contained means for firing the percussive-type photoflash lamps disposed therein.

FIG. 2 is a bottom view of the base of the flashcube of FIG. 1 in which the lamp firing springs are embedded in the wings extending from the center post of the flashcube base.

FIG. 3 is a bottom view of a flashcube base in which a short segment of one end of each of the lamp firing springs is bent at 90° and embedded in the flashcube base.

FIG. 4 is a bottom view of a flashcube base having a pin at each corner around which an intermediate segment of each lamp firing spring is coiled.

Referring first to FIG. 1, the flashcube 2 comprises a substantially rectangular base 4 along each side of

which a percussive-type flashlamp **6** is arranged. Each lamp **6** is provided with its own reflector **8** and the assemblage of lamps and reflectors is enclosed in a transparent container **10** secured to the base **4.** Each lamp **6** comprises an hermetically sealed light-transmitting envelope **12** having a primer depending therefrom and a filling of combustible foil **14** and a combustion-supporting gas disposed therein. The primer comprises a metal tube **16** within which an anvil and a charge of fulminating material are disposed. The base **4** (FIGS. **1** and **2**) is provided with a center post **18** having a central aperture **20** and four wings **22** extending radially therefrom. The outer end of each wing **22** is provided with a pocket **24** within which a primer tube **16** is seated.

In the specific embodiment of the invention illustrated in FIGS. **1** and **2,** one end of a straight wire spring **1** is embedded in each of the four wings **22** extending radially from the center post **18** and the other or free end thereof touches and extends slightly beyond the primer tube **16** seated in the pocket of an adjacent wing **22.** The spring **1** is bent by a wiping action against the free end thereof. In this embodiment the wire spring is about 0.438 inch in length and 0.024 inch in diameter. The distance of deflection is about 0.09 to 0.1 inch. The spring acts as a cantilever and delivers an energy of about 1.22 in.-oz. at an impact velocity of 1,500–1,800 in./sec. Since the center post **18** is provided with a central aperture **20** as a means for seating the flashcube on a socket or receiving member of a camera, the means for bending the wire spring to cock it may comprise a pin, finger or the like forming a part of the camera and connected to the shutter release mechanism thereof to insure synchronization of the firing of the lamp with the tripping of the shutter.

In the specific embodiment of the invention illustrated in FIG. **3** a short segment of a straight wire spring **3** is bent at 90° at one end thereof and is embedded in the base **4** at **5** whereas the free end thereof touches a primer tube **16** and extends slightly therebeyond. In this embodiment the walls of the center post **18** are provided with paired aligned apertures so that each wire spring **3** extends through the center post **18** and its central aperture **20.** Thus in this embodiment, when a spring is flexed to cock it, a wall of the center post **18** functions as a fulcrum point. The action of this spring, which is about 0.75 inch in length and about 0.024 inch in diameter, is somewhat different from that of a simple cantilever since it permits additional storage of energy from the fulcrum to the free end.

In the specific embodiment of the invention illustrated in FIG. **4,** the base **4** of the flashcube is provided with a headed pin **26** near each corner thereof and around which a segment of a wire spring **7** intermediate its end is coiled. The shorter end of the spring is bent at a right angle and embedded in the base **4** at **9.** When not stressed, the longer free end segment of the spring **7** touches and extends slightly beyond the primer tube **16** of a flashlamp. In this embodiment, the length of the free end segment of the spring measured from the center of the pin **26** is about 0.45 inch, the diameter 0.024 inch and the maximum deflection to operate it is about 0.09 to 0.1 inch.

Although three embodiments have been illustrated and described, it will be readily apparent to those skilled in the art that other modifications may be employed without departing from the spirit and scope of this invention.

What we claim is:

1. A photographic flashlamp unit for use with a camera having a socket for receiving said unit, said unit comprising:

a platform;

a container having a plurality of transparent sides mounted on said platform, said container being secured to said platform along the peripheral edges thereof, thereby defining an enclosed and an exposed face of said platform;

a plurality of reflectors disposed in said container;

a plurality of flashlamps mounted on the enclosed face of said platform, each flashlamp being disposed between one of said reflectors and one of the transparent sides of said container, and each flashlamp comprising an hermetically sealed, light-transmitting envelope having a source of actinic light disposed therein and a primer depending therefrom, said primer comprising a metal tube having an anvil and a charge of fulminating material disposed therein, said metal tube extending through said platform and beyond the exposed face thereof thereby defining an exposed segment of said tube;

and mechanical means mounted on said platform for striking the exposed segment of said primer tube to cause deflagration of said fulminating material and ignition of said source of actinic light.

2. The combination of claim **1** in which said platform includes a center post depending from the exposed face therefrom and said primer tube striking means is a straight wire spring anchored at one end thereof in said center post with the other end thereof being disposed in operative relationship with respect to said primer tube.

3. The combination of claim **1** in which said primer tube striking means is a straight wire spring having a short segment at one end thereof bent at about a 90° angle and embedded in the exposed face of said platform with the other end thereof being disposed in operative relationship with respect to said primer tube.

4. The combination of claim **1** in which the exposed face of said platform is provided with a headed pin depending therefrom and said primer tube striking means is a straight spring wire coiled intermediate its ends about said pin, one end thereof being bent at about a 90° angle and embedded in the exposed face of said platform with the other end thereof being disposed in operative relationship with respect to said primer tube.

5. The combination of claim **1** in which each of said flashlamps has its own primer tube striking means associated therewith.

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