United States Patent

[11] 3,584,989

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[54] **APPARATUS FOR ARMING PERCUSSION-IGNITABLE FLASH UNITS**
11 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **431/93,** 431/269
[51] **Int. Cl.** **F21k 5/02**
[50] **Field of Search** ..... 431/92—95

[56] **References Cited**
UNITED STATES PATENTS

3,517,182 6/1970 Brooks et al. 431/93X

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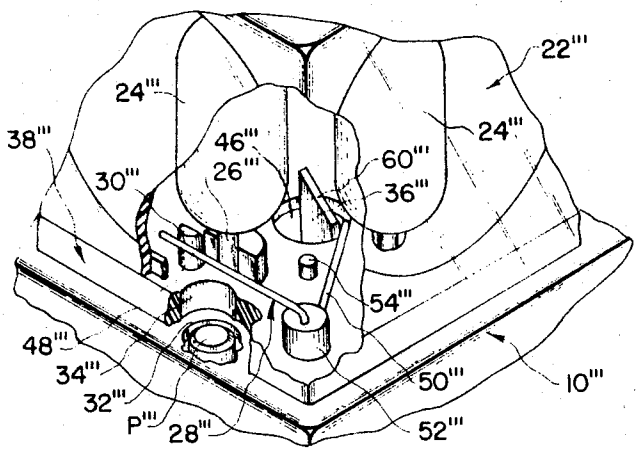
ABSTRACT: Multilamp, percussion-ignitable flash units include a striker element having a pair of arms, one for applying a percussive blow to a flashlamp and another, connected to the first arm through a torsion spring, for applying a biasing force to the first arm. Photographic apparatus adapted to receive such flash units include an arming post having a cam surface positioned to engage the second arm of the striker element when the flash unit is mounted on the photographic apparatus to move the second arm to a position applying the biasing force to the first arm.



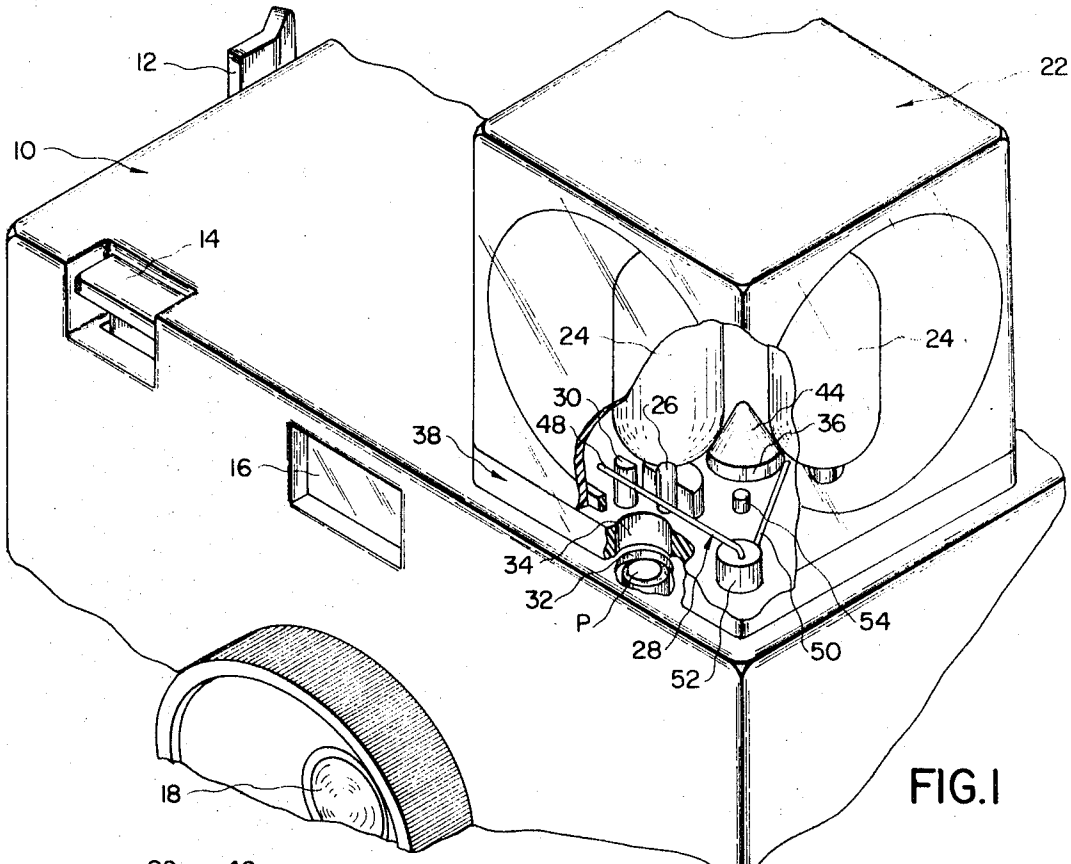


FIG.1

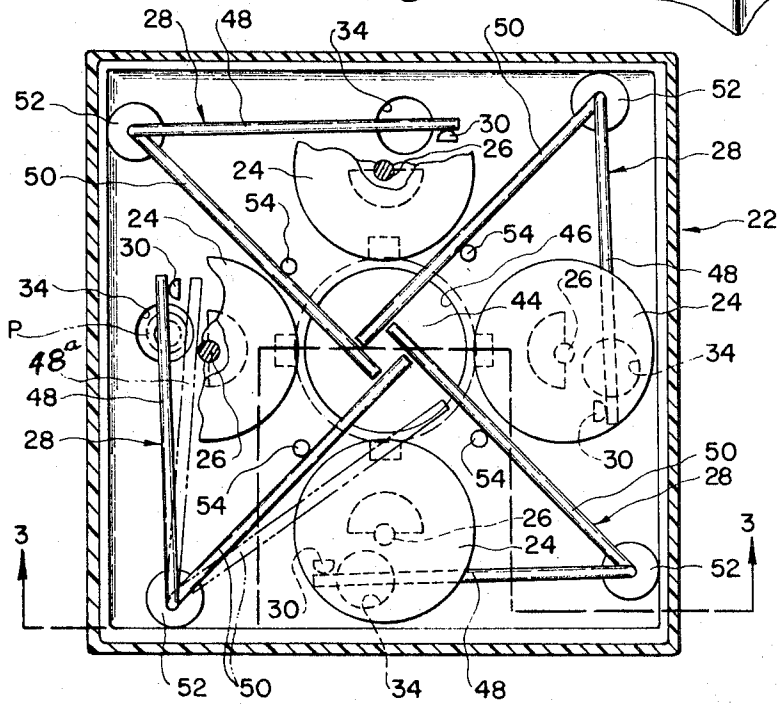


FIG.2

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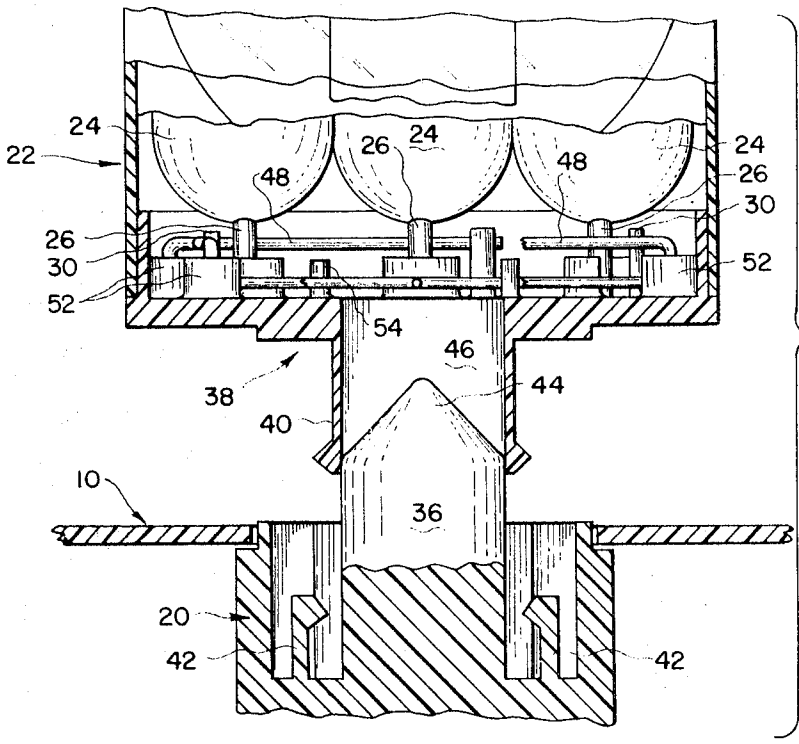

FIG.3

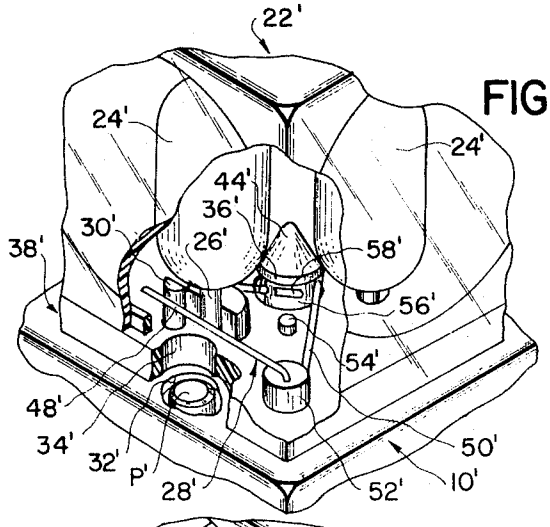

FIG.4

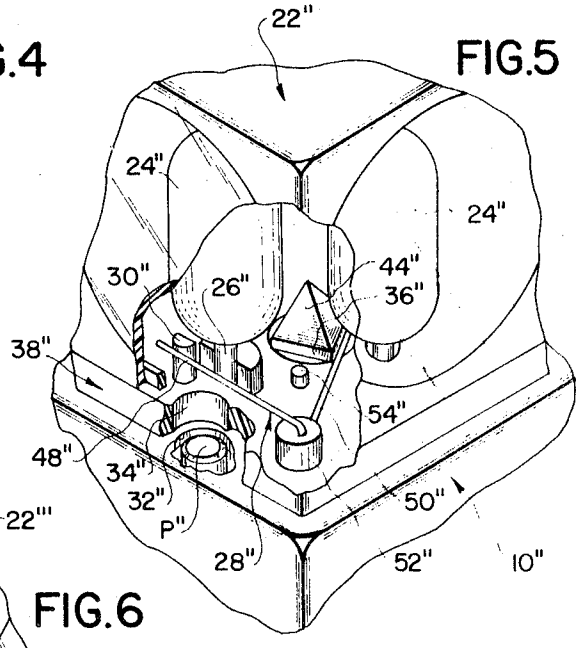

FIG.5

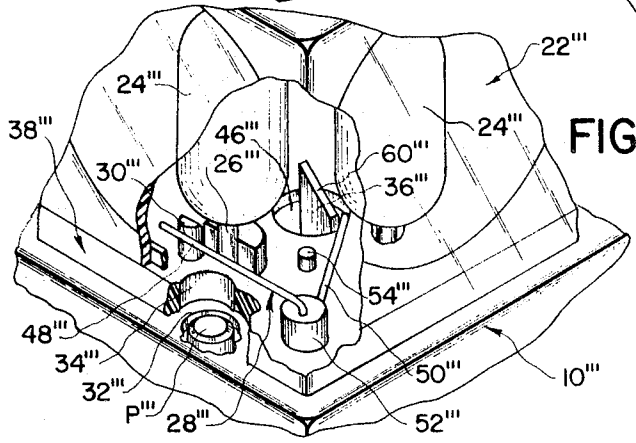

FIG.6

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APPARATUS FOR ARMING PERCUSSION-IGNITABLE FLASH UNITS

CROSS-REFERENCE TO RELATED APPLICATIONS

Reference is made to commonly assigned copending U.S. applications Ser. No. 765,930, entitled "Multilamp Flash Unit," filed Oct. 8, 1968, in the name of David E. Beach; Ser. No. 766,751, entitled "Percussion-Ignitable Flash Unit Having Contact-Actuable, Pre-Energized Strikers And Photographic Apparatus Using Such Units," filed Oct. 11, 1968, in the names of Joseph V. Poweska and Jeffrey R. Stoneham and Ser. No. 676,097, entitled "Photographic Apparatus For Arming Percussion-Ignitable Flash Units," filed Oct. 14, 1968, in the name of Clarence W. Van Duser.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to flash photography, and more particularly to photographic apparatus for use with percussion-ignitable flash units.

2. Description of the Prior Art

Recently, in order to obviate a necessity for providing an electrical source and circuit in photoflash apparatus, a percussion-ignitable photoflash lamp has been developed. One such percussion-ignitable flashlamp is disclosed in U.S. application Ser. No. 765,930, entitled "Multilamp Flash Unit," filed Oct. 8, 1968, in the name of David E. Beach. Such units in general employ lamps having an envelope containing a combustible material such as shredded zirconium foil and a combustion supporting gas such as oxygen sealed in the envelope at a pressure of several atmospheres. A percussive-activatable ignition tube is provided at the bottom end of such lamps, with the top of the ignition tube opening into the lamp envelope and the bottom end of the tube closed and extending outside the envelope to a location suitable for percussion striking. The ignition tube contains an anvil rod coated with percussion-sensitive material such as a mixture of zirconium and fulminate; and, upon striking of the tube, the material is activated and ignites a combustible material in the envelope through the open end of the ignition tube. Another type of percussion-ignitable photoflash unit is disclosed in U.S. application Ser. No. 766,751, entitled "Percussion-Ignitable Flash Unit Having Contact Actuable, Pre-Energized Strikers And Photographic Apparatus Using Such Units," filed Oct. 11, 1968 in the names of Joseph V. Poweska and Jeffrey R. Stoneham. The flash unit disclosed in this latter application employs percussion-ignitable flashlamps similar to the type described above wherein individual preenergized striker elements are positioned to impact upon the flashlamp ignition tubes when released for a restrained position. These striker elements are selectively released by a mechanism carried by the photographic apparatus upon which the flash unit is mounted.

As discussed in the latter mentioned application, it had been found desirable to maintain the striker elements in their energized positions by providing protrusions in the flash unit base and by dislodgably restraining the elements behind such protrusions. Actuation of such restrained striker elements may be effected by a movable post carried in the photographic apparatus which can be raised to lift the striker elements free of the protrusions. The spring restoring forces of the striker elements then move the freed striker into percussion impact with its associated flashlamp. Although it rarely happens in practice, it is possible to accidentally dislodge the striker elements from the restraining protrusions while the flash unit is not mounted on apparatus, thereby causing unintentional firing of the flashlamps.

In a recent invention by Clarence W. Van Duser which is described in U.S. application Ser. No. 676,097, entitled "Photographic Apparatus For Arming Percussion-Ignitable Flash Units," filed Oct. 14, 1968, photographic apparatus is adapted to receive percussion-ignitable flash units having preenergized strikers provided with disarming latch members which prevent accidental release of the strikers when the flash unit is not mounted on the photographic apparatus. The disarming latch members have cam portions associatable with surfaces on the photographic apparatus for moving the latch members to an inoperative (or nonlatching) position upon mounting of the flash units on the apparatus. While such a safety device is adequate for its intended purpose, it does necessitate multiple moving parts in the flash unit with the resultant extra expense in manufacturing and increased chance of system failure.

SUMMARY OF THE INVENTION

The present invention is addressed to the problems outlined above and provides photographic apparatus and/or socket means for photographic apparatus having a device associatable with arming means of percussion-ignitable flash units to arm normally disarmed flash units upon attachment of the flash unit to the photographic apparatus.

It is therefore an object of the present invention to provide photographic apparatus and/or socket means having means for actuating a percussion-ignitable flash unit's striker energizing means for urging the striker in the direction of the lamp.

It is another object of the present invention to provide an improved photographic apparatus and/or socket means which include means for applying a spring bias to the striker member of a percussion-ignitable flash unit upon attachment of the flash unit.

In accordance with a preferred embodiment of the present invention, photographic apparatus which is adapted to receive a percussion-ignitable flash unit having a percussion-ignitable flashlamp, a striker normally restrained in a position spaced from the lamp, and means actuable for energizing the striker by applying a spring force thereto in the direction of the lamp, includes means for detachably mounting such flash units to the photographic apparatus and arming means for actuating the striker energizing means of such flash units upon mounting such units on the mounting means.

BRIEF DESCRIPTION OF THE DRAWINGS

In the detailed description of the preferred embodiments of the invention presented below, reference is made to the accompanying drawings, in which:

FIG. 1 is a perspective view partially broken away showing the flash unit and photographic apparatus, in this instance a camera, which embody the present invention;

FIG. 2 is a top, sectional view of the flash unit and photographic apparatus of FIG, 1;

FIG. 3 is a sectional view taken along line 3–3 in FIG. 2 with the flash unit in FIG. 2 mounted on a socket with portions removed for illustration;

FIG. 4 is a fragmental, perspective view of another embodiment of the flash unit and photographic apparatus which embody the present invention;

FIG. 5 is a fragmental, perspective view showing still another embodiment of the flash unit and photographic apparatus which embody the present invention; and

FIG. 6 is a fragmental, perspective view showing yet another embodiment of the flash unit and photographic apparatus which embody the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

One embodiment of the present invention is shown schematically in FIGS. 1—3 as employed on a photographic camera 10. Camera 10 is of known type and a camera film advance lever 12, shutter release lever 14, viewfinder 16 and picture-taking opening 18 can be seen in FIG. 1. Because photographic cameras having means to successively index and ignite received flash units are well known, the present description will be directed in particular to elements of such apparatus forming part of, or cooperating more directly with, the present invention, particularly elements not specifically shown or

described herein being understood to be selectable from those known in the art.

Camera **10** includes a socket **20** which can be seen in FIG. **3**. Socket **20** is adapted to receive a flash unit **22** with four percussion-ignitable flashlamps **24**. Each flashlamp is of the type described in U.S. Pat. application Ser. No. 765,930 and has a depending anvil rod **26** coated with percussion-sensitive material. This type flashlamp is ignited by percussive impact on anvil rods **26**, and I have provided an equal number of striker elements **28** for this purpose. Although striker elements **28** will be discussed in greater detail hereinafter, it will be sufficient for the present to point out that this type of striker is normally spring biased towards anvil rod **26** and is retained in a spaced relation thereto by a lug **30** until lamp ignition is desired. A more detailed discussion of the general operation of strikers **28** can be found in the aforementioned Poweska and Stoneham application.

An actuating opening **32** is provided in the housing of camera **10**, opening **32** being aligned with an access opening **34** in the lower wall of flash unit **22** when the flash unit has been received and indexed by socket **20**. A portion of an arming post **36**, which forms a part of the present invention, can also be seen in FIG. **1**. The operation of post **36** will be subsequently described.

Flash unit **22** has a base portion **38** which can best be seen in FIG. **3**. Base portion **38** includes a hollow, cylindrical post **40** which cooperates with arming post **36** and a set of locating fingers **42** (of known type) in socket **20**. Arming post **36** has a conical upper portion **44** which passes through an opening **46** in post **40** and extends past base **38** into the interior of flash unit **22**.

Each striker element **28** is formed of spring wire material and includes a striker arm **48**, a tensioning arm **50** and a vertical portion. Each of the vertical portions is carried within a bearing member **52** and functions as a torsion spring in a manner to be described. Normally arms **48** and **50** of striker elements **28** assume the positions shown in full line in FIG. **2**, that is, striker arms **48** normally rest against the outer surfaces of posts **30** while tensioning arms **50** normally lightly press against posts **54** under only slight or no force. In this condition, the vertical portion is unstressed and there is no force urging striker arm **48** towards anvil rod **26**. Therefore, there is no risk of accidental ignition as long as the flash unit is not mounted on the camera. As will be understood from the description below, it is not necessary that arms **28** rest against post **54** in the unstressed state, but only that these arms remain on the opposite side of the vertical centerline of flash units **22** from arms **48**.

Upon mounting flash unit **22** on camera **10**, conical portion **44** of arming post **36** progresses through opening **46** in base **38** and progressively moves tensioning arms **50** outwardly, thereby applying a spring force through the vertical torsion portion of striker elements **28** to bias striker arms **48** for movement in directions towards anvil posts **26**, this movement being restrained by lugs **30**. In FIG. **2**, the position of the tensioning arm **50** of the striker element **28** in the lower left corner is shown in its active position in phantom lines. Once the striker elements **28** are armed, depression of shutter release lever **14** causes a post P to extend through openings **32** and **34** to dislodge the striker arm **48** associated with the front flashlamp **24** from lug **30**. Once dislodged, the striker arm rapidly moves towards anvil rod **26** and is stopped at a position **48'** shown in phantom lines, firing flashlamp **24**.

It will be appreciated that upon removal of flash unit **22** from socket **20**, the tensioning arm **50** of each striker element **28** will return to the position shown in full lines in FIG. **2** to once again relieve the tension on striker arms **48**, thereby again disarming flash unit **22**.

FIG. **4** shows another embodiment of the present invention. A flash unit **22'**, which is similar to flash unit **22** of FIGS. **1—3** except that post **40** (FIG. **3**) of base **38** need not be provided, is shown mounted on photographic apparatus **10'**. In FIG. **4**, like reference numerals are used to refer to structure shown in FIGS. **1—3**, except that in FIG. **4**, prime marks have been added to all numerals. An arming post **36'** has an upper, conical portion **44'** and a lower, cylindrical portion **56'** which is of slightly lesser diameter than the adjacent region of conical portion **44'**. Lower portion **56'** has a series of flats **58'** spaced circumferentially thereabout. In operation, flash unit **22'** is inserted over arming post **36'** in the same manner as described in connection with the embodiment shown in FIGS. **1—3**. However, in the embodiment shown in FIG. **4**, flash unit **22'** is held on photographic apparatus **10'** by the coaction between tensioning arms **50'** and the enlarged upper portion **44'** of arming post **36'**. Flash unit **22'** is held in an aligned position with one of flashlamps **24'** facing forward by the detent action between tensioning arms **50'** and flats **58'**. In all other respects, the embodiment of FIG. **4** is the same as that shown in FIGS. **1—3**.

The embodiment shown in FIG. **5** is similar to that of FIG. **4** except that arming post **36''** is formed with a square cross-sectional shape, terminating in a pyramid-shaped upper portion **44''**. The operation of this embodiment is also similar to that of FIG. **4** except that the square cross-sectional shape of arming post **36''** cooperates with tensioning arms **50''** to provide a detent action to ensure that one of lamps **24** is facing forwardly of photographic apparatus **10''**.

Referring to FIG. **6**, still another embodiment of the present invention is shown having an arming post **36'''** in the form of a blade having a sloped upper surface **60'''**. Blade **36'''** extends from approximately the center of opening **46'''** in base **38'''** to one side of opening **46'''**. The blade is conformed to engage only that tensioning arm **50'''** of the striker element **28'''** associated with the forward facing lamp **24'''**. Thus, only that one striker element is armed even when the flash unit **22'''** is mounted on the photographic apparatus, assuring that no other lamp can be fired accidentally. As flash unit **22'''** rotates to bring a new flashlamp into firing position, its tensioning arm **50'''** will be moved really outwardly as it is engaged by arming post **36'''**.

The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

I claim:

1. Photographic apparatus for use with flash units of the type having a percussion-ignitable flashlamp, striker means movable from a position spaced from the lamp into percussive contact with the lamp, and means actuable for energizing the striker for urging the striker in the direction of the lamp, said apparatus comprising:

a. means for detachably mounting such flash units; and

b. arming means for actuating the striker energizing means of such flash units upon mounting such units on said mounting means.

2. Photographic apparatus for use with flash units of the type having a percussion-ignitable flashlamp, a striker normally restrained in a position spaced from the lamp, and means actuable for applying a spring force to the striker in the direction of the lamp, said apparatus comprising:

a. means for detachably mounting such flash units; and

b. arming means for actuating the force applying means of such flash units upon mounting such units on said mounting means.

3. Photographic apparatus as defined in claim **2** wherein said arming means includes a cam surface associatable with the force applying means to move such force applying means to an operative position.

4. Photographic apparatus for use with flash units of the type having a percussion-ignitable flashlamp, a striker normally restrained in a position spaced from the lamp, spring means for selectively applying a force to the striker in a direction towards the lamp, and a member connected to the spring means and movable from a rest position in which substantially no force is applied to the striker to an armed position causing the spring means to apply the force to the striker, said apparatus comprising:

a. means for detachably mounting such flash units; and

b. arming means for moving the member from its rest to its armed position upon mounting such units on said mounting means.

5. Photographic apparatus as defined in claim 4 wherein said arming means comprises a cam surface associatable with the member to move the member from its rest to its armed position upon mounting such units on said mounting means.

6. A mechanism comprising:

a. a flash unit having a percussion-ignitable flashlamp, a striker normally restrained in a position spaced from said lamp, spring means for selectively urging said striker towards said lamp, and a member connected to said spring means and movable from a rest position in which substantially no force is applied to said striker to an armed position causing said spring means to apply force to said striker; and

b. a photographic apparatus including means for detachably mounting said flash unit, and arming means for moving said member from its rest position to its armed position upon mounting said flash unit on said mounting means.

7. A mechanism as defined in claim 6 wherein said arming means comprises a cam surface for moving said member.

8. A mechanism as defined in claim 6 further comprising means associated with said arming means for cooperating with said member to releasably retain said flash unit on said mounting means.

9. A mechanism as defined in claim 6 further comprising means associated with said arming means for cooperating with said member to hold said flash unit in a predetermined orientation relative to said photographic apparatus.

10. A socket mountable on photographic apparatus for receiving flash units of the type having a percussion-ignitable flashlamp, a striker restrained in a position spaced from the lamp, and means actuable for applying a spring force to the striker in the direction of the lamp, said socket comprising:

a. means for detachably receiving and supporting such flash units; and

b. arming means, cooperable with the force applying means of such flash units upon receipt of the units on said socket, for actuating the force applying means.

11. A socket as defined in claim 10 wherein said arming means includes a cam surface associatable with the force applying means to actuate said last-mentioned means.