United States Patent

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Rochester, N.Y.

[54] **TORSION STRIKING DEVICE FOR USE IN FIRING PERCUSSION-IGNITABLE PHOTOFLASH LAMPS**
4 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **95/11.5,** 240/1.3
[51] **Int. Cl.** **G03b 9/70**
[50] **Field of Search** 95/11.5; 240/1.3; 431/92, 93

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

961,021	5/1910	Roesner	431/92
1,814,299	7/1931	Drucker	431/92

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ABSTRACT: A striking device is disclosed for use in firing percussion-ignitable photoflashlamps, which device includes a torsion spring for biasing a striking means towards the flashlamp. Upon release of the striking means the torsional restoring forces of the spring move the striking means at high velocity into percussion-contact with a flashlamp so that the percussion energy is transmitted rapidly and therefore more reliability ignites the flashlamp.

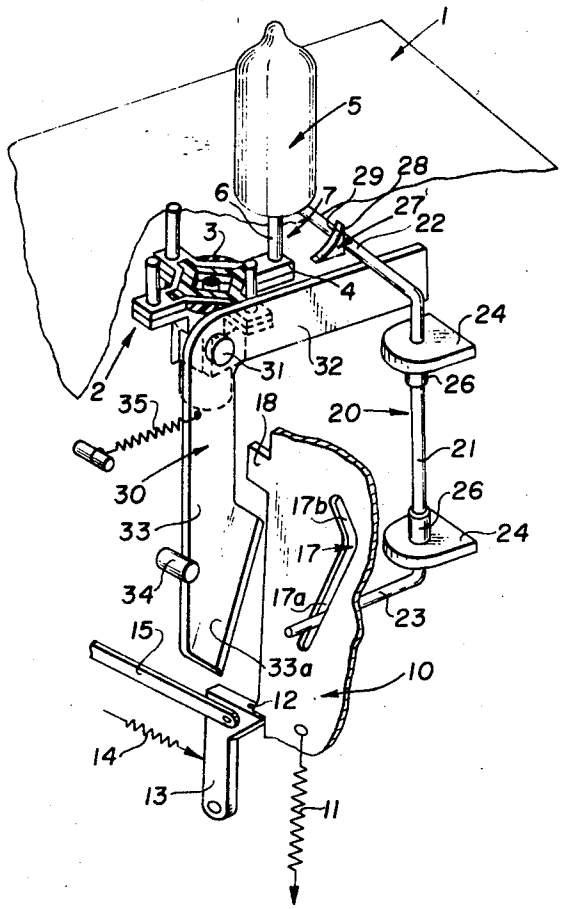
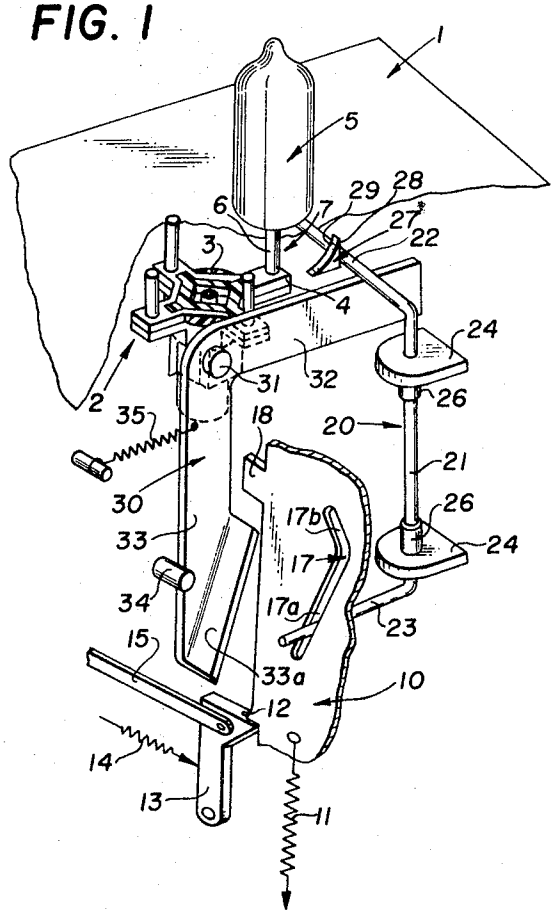


FIG. 1



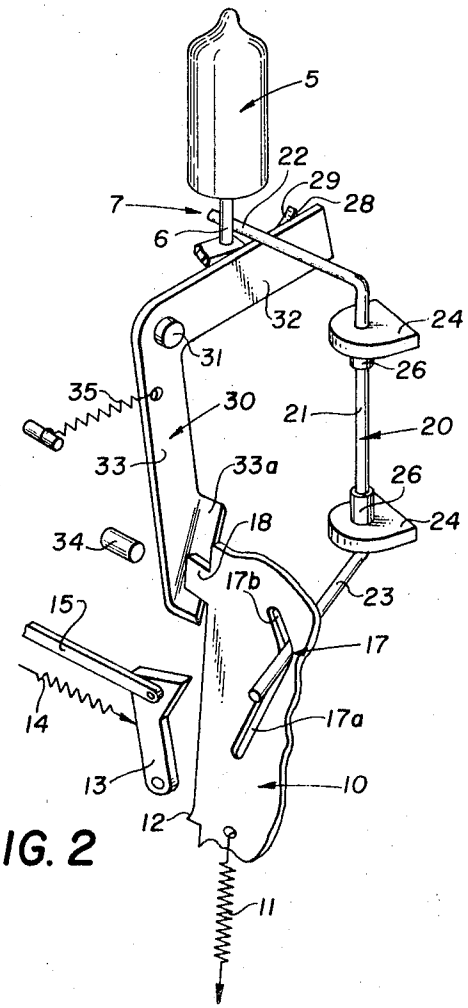


FIG. 2

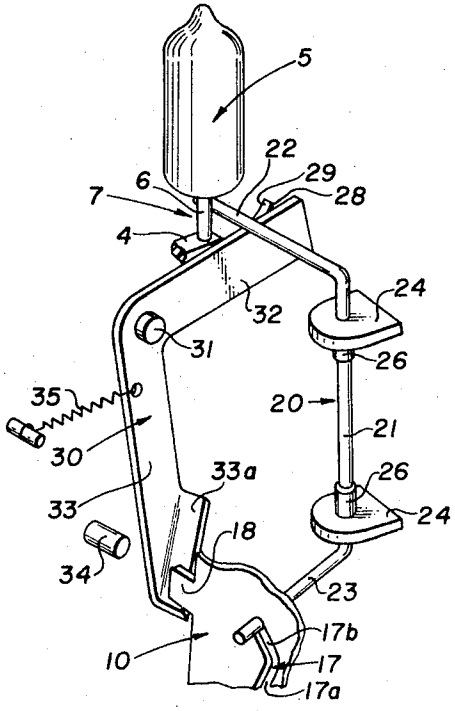


FIG. 3

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TORSION STRIKING DEVICE FOR USE IN FIRING PERCUSSION-IGNITABLE PHOTOFLASH LAMPS

CROSS-REFERENCE TO RELATED APPLICATIONS

Reference is made to U.S. application Serial No. 765,930, entitled "Multilamp Flash Unit" filed Oct. 8, 1969, in the name of David E. Beach and U.S. application Ser. No. 813,420, entitled "Percussion Activatable Flash Units Having Individual Striker Elements and Photographic Apparatus for Using such Units" filed Apr. 4, 1969, in the name of David E. Beach.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to flash photography and in particular to a device for use in firing percussion-ignitable flashlamps.

2. Description of the Prior Art

Recently, in order to obviate the necessity of providing electrical sources and circuits in photographic apparatus employing photoflash, several types of percussion-ignitable photoflash lamps have been developed. Two such percussion-ignitable lamps are disclosed respectively in U.S. application Ser. No. 765,930, entitled "Multilamp Flash Unit" filed Oct. 8, 1969 in the name of David E. Beach and U.S. application Ser. No. 813,420, entitled "Percussion Activatable Flash Units Having Individual Striker Elements and Photographic Apparatus for Using such Units,"filed Apr. 4, 1969, in the name of David E. Beach. In general such flashlamps have an envelope containing combustible material such as shredded zirconium foil and a combustion-supporting gas such as oxygen under several atmospheres pressure. These lamps include a hollow ignition-tube containing a percussion-ignitable primer such as a powder or solid charge of zirconium and fulminate; however, other known primer charges such as ballastic primers can be used in the ignition tubes. The ignition tube is open on one end into the lamp envelope so that upon activation of the primer charge by a sufficient percussion impact on the ignition tube or percussion cap, the combustibles inside the envelope are ignited.

The primer charges in such photoflash units are selected so as to be relatively unsusceptible to accidental firing, such as might be caused by dropping the lamps. Because the percussion-ignitable lamps are designed for activation by a percussion of higher energy than normally would be sustained inadvertently, a problem has been encountered in providing a compact device which can be incorporated in photographic apparatus and will yield the requisite energy for reliably firing the lamps.

Devices previously employed in photographic apparatus for this purpose include spring-loaded hammers and cantilever spring wires; however, because of the large input energy required in cocking these devices for firing and for other reasons, these devices have not proven entirely satisfactory for use as percussion strikers for such flash units.

SUMMARY OF THE INVENTION

In accordance with the present invention, it has been found that the torsional restoring forces of wire spring members, such as for example a steel piano wire, provide an improved and highly satisfactory striking element for percussion-activatable flashlamps of the type described above. It has been found that the reliability of activation of ignition tubes of percussion-ignitable flashlamps such as described herein is dependent upon the rate of transmission of percussion energy to the primer as well as on the amount of energy transmitted and the exceptional results in reliability of firing percussion-ignitable lamps using torsional restoring forces to drive a striker element is believed at least in part due to the high velocity at impact which is obtained with torsionally driven strikers. An important feature of the present invention therefore is the provision of firing devices for use in activating percussion-ignitable flashlamps which utilize torsional restoring forces of a spring member to effect movement of a striker into percussion contact with the flashlamp.

It is therefore an object of the present invention to provide an improved striker device for firing percussion-ignitable photoflashlamps.

It is another object of the present invention to provide a torsionally biasable striker element for firing percussion-ignitable flashlamps.

Another object of the present invention is to provide a high velocity and low inertia striking system for activating percussion-ignitable photoflashlamps.

Another object of the present invention is to provide a torsionally biasable striker mechanism and means for distorting and releasing said mechanism for activating of a percussion-ignitable photoflashlamp in synchronization with the picture-taking operation of photographic apparatus.

Yet another object of the present invention is to provide in photographic apparatus, a torsion spring striker and means for selectively controlling energization and release of the striker and for providing withdrawal of a fired striker from a firing site of such photographic apparatus.

DESCRIPTION OF THE DRAWINGS

These and other objects and advantages will be apparent to one skilled in the art from the following description of preferred embodiments of the invention with reference to the accompanying drawings in which like numerals denote like characters and wherein:

FIG. 1 is a perspective view of one embodiment of the present invention showing the striking system in a cocked position with the striker portion in a restrained position, ready for energization and release;

FIG. 2 is a perspective view of the apparatus shown in FIG. 1 after energization and release of the striker portion but before drawback of the striker portion; and

FIG. 3 is a perspective view of the apparatus shown in FIGS. 1 and 2 showing the apparatus in its uncocked position after drawback of the striker portion.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

In FIG. 1 a photographic apparatus **1**, in this instance a camera, is shown having a percussion-ignitable multilamp photoflash unit **2** detachably mounted in a socket **3** of the apparatus. Because photographic cameras having structure to sequentially index multilamp photoflash units and to effect film advance and picture-taking operations are generally known, the present description is directed to particular elements of such cameras which cooperate more directly with the present invention, elements not shown or described herein being understood to be selectable from those known in the art.

In FIG. 1 it can be seen that the base **4** of multilamp unit **2** and socket **3** of the camera **1** are of the general type disclosed in U.S. application Ser. No. 764,930, entitled "Multilamp Flash Unit," filed Oct. 8, 1969. in the name of David E. Beach. The individual flashlamps **5** of unit **2** include ignition tubes **6** such as those disclosed in the last-mentioned application which extend outside socket **3** and are successively indexable to a firing site **7** of the camera **1** by rotation of the socket **3** in a known manner.

The camera **1** also includes a shutter driver **10** which is mounted for sliding vertical movement in the camera by means now shown and is urged downwardly as viewed in FIG. **1** by a shutter drive spring **11**. In FIG. **1** the shutter driver **10** is shown held at projection **12** thereon in its cocked position by a lever **13**. The lever **13** is urged towards shutter driver **10** by spring **14** and is movable out of holding engagement with projection **12** against spring **14** by a member **15** which is operatively associated with the camera shutter release mechanism (not shown). In accordance with known camera structure, the

shutter driver is released in response to movement of the camera shutter (not shown). The shutter driver **10** also includes a guide slot **17** and release lug **18**, the operation of which will be subsequently described.

In FIG. **1**, one embodiment of the torsion spring striker **20** of the present invention can be seen to include a main body portion **21**, a string portion **22** and a drive arm portion **23**. The striker **20** in this instance is an integral unit formed of various spring materials such as for example, steel piano wire. However, it will be appreciated that the striking portions can be formed separately of lighter weight material and attached to the body portion. The striker **20** is supported in camera **1** by brackets **24** which have apertures allowing rotational movement of the striker **20** on the longitudinal axis of the main body portion **21** thereof. Enlarged locating surfaces **26** can be provided on the striker to cooperate with brackets **24** in positioning the striker portion **21** at the proper height in the camera for rotation into contact with an ignition tube **6** located at firing site **7**. It can be seen that an end of drive arm **23** is located in slot **17** of shutter driver **10** for movement following the slot. It can also be seen in FIG. **1** that striker portion **22** is restrained in a position spaced from firing site **7** by a stop **27** having a restraining surface **28** and cam surface **29**.

A striker release member **30** is pivotally mounted in the camera **1** on pin **31** and includes a release arm **32** extending under striking portion **22** of striker **20** and a follower arm **33** with a surface **33***a* which is located to cooperate with lug **18** of shutter driver **10**. The member **30** is urged about pin **31** in a clockwise direction, as viewed in FIG. **1**, and against a post **34** by spring **35**.

Referring now to FIGS. **1**—**3** the operation of this embodiment of the present invention will be described. With the shutter driver **10** cocked in a position and urged downwardly by spring **11** as shown in FIG. **1**, it can be seen that drive arm portion **23** of striker **20** is in the bottom portion **17***a* of inclined slot **17**. Also, it can be seen that striking portion **22** is behind restraining surface **28** of stop **27** and release arm **30** rests against post **34** with its release arm **32** spaced from striking portion **22**.

Upon actuation of a picture-taking operation of camera **1**, shutter driver **10** is released by withdrawal of lever **13** and moved downwardly by spring **11** to operate the camera shutter. It can be seen that because slot **17***a* is inclined drive arm **23** of striker in following that slot is rotated counterclockwise, looking down in FIG. **1**. Because striking portion **22** of striker **20** is restrained by stop **26**, the rotation of drive arm **23** creates torsional restoring forces in main body portion **21** in a direction urging the striking portion **22** towards the firing site **7**.

It can also be seen that when shutter driver **10** has moved downward to the location where drive arm **23** is near the top of slot **17***a*,the lug **18** on the shutter driver **10** is in contact with surface **33***a* of striker release member **30**. The surface **33***a* is inclined so that downward movement of lug **18** causes the member **30** to pivot counterclockwise. Therefore it can be seen that when drive arm **23** is rotated by slot **17***a* to the position creating maximum torsional stress in body portion **22**, the release arm **32** has been rotated to raise striking portion **22** above restraining surface **28** of stop **27**. The striker portion is then moved rapidly by restoring torsional forces of the main body portion **21**, into percussion contact with an ignition tube **6** of a lamp **2** located at firing site **7**. This position of the various elements at this stage of operation can be seen in FIG. **2**.

In FIG. **3** it can be seen that further downward movement of shutter driver **10** causes the drive arm **23** to move into ad follow slot **17***b* causing a slight clockwise rotation of the striker **20**. This clockwise rotation moves striking portion **22** slightly back from firing site **7** after firing to afford a clearance for socket rotation and/or removal and insertion of flash units with the camera uncocked.

During the cocking operation of the camera **1**, which usually occurs in conjunction with film advance, the shutter driver **10** is moved upward by known means which are not shown. During the upward movement of the shutter driver **10**, the drive arm **23** again follows slot **17** rotating drive arm **23**, main body portion **21** and striking portion **22** of striker **20** back to the position shown in FIG. **1**. It can be seen that because lug **18** moves off of surface **33***a*, release member **30** is free to move back against post **34** and that therefore striking portion **22** of the striker **20** can move over ramped surface **29** of stop **27** and back behind restraining surface **28**.

When shutter driver **10** has been fully cocked against spring **11**, the lever **13** is free to move into retaining position shown in FIG. **1** and the apparatus is ready for another picture-taking operation.

It will be appreciated that, although the particular apparatus for operating the torsion spring striker of the present invention does in itself embody unique features, the concept of torsionally driving a striking element which is disclosed herein can be used in conjunction with various other structures to afford its unique firing capability. Such torsion-drivable strikers can be used with other cocking and release mechanism in photographic apparatus or incorporated in preenergized condition in a flash package.

Further, it will be appreciated that although only one configuration of striker mechanism has been disclosed for utilizing torsional restoring forces of spring members, various torsion spring configurations can be utilized in accordance with the teachings disclosed herein and that it is within the scope of this invention to include any such member which utilizes substantial torsional restoring forces of springs to move a striker into percussion contact with a percussion-ignitable flashlamp.

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. In photographic apparatus having a firing site and means for supporting a percussion ignitable photoflashlamp at said firing site, a firing device comprising:

a spring mounted for torsional movement;

striking means operatively associated with said spring and supported for movement into percussive contact with a lamp at said firing site in response to torsional restoring movement of said spring;

means for torsionally distorting said spring in a direction creating restoring forces in said spring urging said striking means towards said firing site;

means for restraining said striking means at a position spaced from said firing site;

means for releasing said striking means after a predetermined torsional distortion of said spring permitting said striker to contact said lamp; and

means associated with said distorting means for moving said striking means away from said firing site after contact with said lamp.

2. The invention defined in claim **1** wherein said means for torsionally distorting said spring includes the shutter driving member of said camera and said shutter driving member includes means for actuating release of said striking means.

3. In a camera, a device for use with photoflashlamps fireable by striking an impact receiving element located at a firing site, said device comprising:

a spring mounted for torsional movement;

striking means supported for movement in a striking path towards said firing site in response to torsional movement of said spring;

means for torsionally distorting said spring urging said striking means towards said firing site;

means for restraining said striking means at a position spaced from said striking site;

means for releasing said striking means after a predetermined torsional distortion of said spring permitting said striker to move toward said firing site; and

means associated with said distorting means for moving said striking means away from said firing site immediately after contact with said impact receiving element.

4. In a camera, a device for use with photoflashlamps fireable by striking an impact receiving element located at a firing site, said device comprising:

means for receiving such a photoflashlamp;

an elongated torsion spring having a longitudinal axis and first and second opposed ends disposed transverse to said longitudinal axis;

means for supporting said spring for rotation on its longitudinal axis;

a striking element integral with said first end of said torsion spring and movable in a striking path towards said firing site in response to torsional movement of said spring;

means for restraining said first end at a position spaced from said firing site;

a control member mounted for movement in a first direction between first, second and third positions, said control member including:

a first cam surface for engaging the second end of said spring during movement of said control member from said first to said second positions, said cam surface being shaped to cam said second end in a direction creating torsional restoring forces in said spring during such movement,

means for engaging and actuating said releasing means as said control member moves through said second position, and

a second cam surface for engaging the second end of said spring during movement of said control member from said second position to said third position, said second cam surface being shaped to cam said second end in a direction removing said striking element from said firing site; and

means for moving said control member from said first position to said third position through said second position.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,584,556 Dated June 15, 1971

Inventor(s) Donald M. Harvey

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, Claim 3, line 66:

Between the words "spring" and "urging" insert ---in a direction creating restoring forces in said spring---.

Signed and sealed this 21st day of December 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Acting Commissioner of Patents