

PATENT SPECIFICATION

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(54) PHOTOGRAPHIC FLASHLIGHT DEVICE

(71) We, EASTMAN KODAK COMPANY, a Company organized under the Laws of the State of New Jersey, United States of America of 343 State Street, Rochester, New York 14650, United States of America, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a flash extender for use with a camera (hereinafter being referred to as "of the kind defined") having a socket for receiving a percussion-ignitable flashlamp unit and means for applying a mechanical force to a received flashlamp unit to ignite a flashlamp thereof.

Photographers using colour film for snapshots of human subjects occasionally find the resulting colour prints exhibit "redeye." This condition results when light from the flash unit is reflected by the retinas of the subject's eyes onto a colour photographic film, thereby showing the pupils as red on the developed colour print. Redeye may be reduced by moving the flash unit further from the camera's optical axis so that light from the flash unit reaches the subject at too great an angle to be reflected by the retinas onto the film.

In cameras using electrically actuated flashlamps, the flashlamp may be placed in any position which can be reached by electrical connections from the camera flash actuating mechanism. Moreover, the flashlamp need not be physically connected to the camera. The only limitations on position are that the flashlamp does not interfere with the operator's handling of the camera as positioning on the camera ends might do and that the flashlamp not produce undesirable lighting effects such as the shadows which might occur if the flashlamp were positioned under the optical axis. Thus, redeye can be prevented in larger

cameras adapted for use with electrically ignitable flashlamps by positioning the flashlamp at a relatively large distance from the optical axis.

The development of photographic cameras adapted for use with disposable multi-lamp electrically actuated flash units has been accompanied by a reduction in the size of the camera so as to increase the ease of handling, storage, use, etc. As a consequence, the separation between a flash unit mounted on the camera and the camera's optical axis has been reduced, thereby accentuating the redeye problem. An extender for use in increasing this separation, for use with a camera having a built-in electrically actuated flash system is described and claimed in our Letters Patent No. 1 156 137.

Photographic cameras of the kind defined have recently been developed and marketed. The possible positions for a flashlamp unit on such a camera are limited by the same considerations of operator convenience and prevention of undesirable lighting effects as for the electrically actuated flash camera. In addition, the flash actuating mechanism in such a camera should be located fairly close to the shutter actuating mechanism for several reasons. First, the closeness makes it easier to synchronise the firing of the flash unit with the opening of the shutter. Second such a location ensures that sufficient energy is imparted to the firing mechanism to fire the flash unit, by minimizing energy losses due to frictional effects present in any elongated connecting mechanism between the shutter and flash unit actuating mechanisms. Thus, the choice of position for such a flash unit is more restrictive than for an electrically fired flash unit. Reduction in the size of the photographic camera and the more restrictive flash actuating positions available in a batteryless camera have both accentuated the problem of redeye.

It is an object of the present invention to provide a flash extender for increasing the distance between a flash unit and the optical axis of a camera having a built-in mechanical flash actuating mechanism.

In accordance with the present invention there is provided a flash extender for use with a camera of the kind defined, said extender comprising an extender column, a socket portion at one end of the column to receive a percussion-ignitable flashlamp unit, a camera mating portion at the other end of the column for insertion in a camera socket, and means, located for cooperating with the force applying means of a camera on which the extender is mounted, for applying a mechanical force to a received unit to ignite a flashlamp therein in response to receipt of a force from the force-applying means of the camera.

According to the present invention there is also provided a flash extender for use with a camera which is of the kind defined and has an indexable socket for receiving a multi-lamp, percussion-ignitable flashlamp unit, said extender comprising an extender column, a socket portion at one end of the column for receiving a multi-lamp percussion-ignitable flashlamp unit, a camera mating portion at the other end of the column for insertion in a camera socket, and a plurality of push rods extending from the camera mating portion to the socket portion for selectively transmitting, when the extender is mounted on a camera, a mechanical force from the camera force-applying means to the flashlamps of a received unit.

In the accompanying drawings:

Fig. 1 is a pictorial view of an extender according to one embodiment of the present invention mounted on the camera, with a multilamp flash unit mounted on the flash extender;

Fig. 2 is an exploded view showing the base of a multilamp flash unit with the mating socket of the flash extender of the present invention;

Fig. 3 is an exploded view showing the base of the flash extender of the present invention with the mating camera socket;

Fig. 4 is a perspective view of one embodiment of the flash extender with portions of the flash extender broken away to reveal the interior working components of the embodiment;

Fig. 5 is a perspective view of another embodiment of the present invention, with portions cut away to reveal interior working components thereof;

Fig. 6 is a section taken on line 6-6 of Fig. 5, showing the central stud of the flash extender of Fig. 5 in its inactive position, when not mated to a photographic camera; and

Fig. 7 is a view similar to Fig. 6, but showing the flash extender of Fig. 5 mated to a camera, with a multilamp flash unit coupled to the flash extender.

Because cameras are well known, the present description will be directed in particular to camera elements forming part of, or cooperating more directly with, apparatus in accordance with the present invention. It is to be understood that camera or flash elements not specifically shown or described may take various forms well known to those skilled in the art.

Referring now to Fig. 1, the flash extender 10 includes a housing 12, a camera mating portion 14, and a flash unit mating portion 16. Flash extender 10 is shown mounted on the flash socket of a photographic camera 18, with a multi-lamp flash unit 20 coupled to flash unit mating portion 16 of flash extender 10.

As many best be seen in Fig. 2, flash unit mating portion 16 of flash extender 10 includes a top wall 30 having four apertures 32 equispaced around its periphery and a central flashlamp socket 34. Flashlamp socket 34 has a centrepost 36, four latches 38 and a plurality of inwardly extending walls 40 which define four recesses 42. Flash unit 20 has four apertures 41 in its bottom wall which provide access to four strikers 45, each movable from a pre-energized position to percussively fire a flashlamp in unit 20. Flash unit 20 further has a downwardly extending base 43 formed with integral walls 44 which mate with recesses 42 in flash unit mating portion 16, a central recess 46 which receives centrepost 36, and cam surfaces 48 which mate with latches 38. Centrepost 36, latches 38 and recesses 42 are designed to receive and releasably retain flash unit 20. Apertures 32 in top wall 30 are located so as to be aligned with apertures 41 in the bottom wall of a flash unit 20 which is mounted on flash extender 10.

Camera mating portion 14 of flash extender 10 is substantially identical to the bottom of flash unit 20, as may be seen in Fig. 3, and includes a downwardly extending base 50 formed with integral walls 52, a central recess 54, cam surfaces 56 and four apertures 58 which provide access to the interior of housing 12 of extender 10. Socket 60, in the top of camera 18, is substantially identical to socket 34 and has a centrepost 62, four latches 64 and a plurality of inwardly extending walls 66 which define four recesses 68. It may be seen that one of the apertures 58 in the camera mating portion 14 of the flash extender 10 may be aligned with a single aperture 70 in the top of camera 18, when camera mating portion 14 of flash extender 10 is coupled to socket 60, by rotating socket 60 to the position illustrated in Fig. 3. Alignment of an aperture 58 with

the aperture 70 ensures that a flash sensing and actuating member 72 of the camera 18, which extends through aperture 70, may extend through an aperture 58 into the interior of the housing 12 of the flash extender 10.

As shown in Fig. 4, the housing 12 of extender 10 has a top wall in which socket 34 is formed, side walls 80 downwardly depending from top wall 30 and a bottom wall 82 in which are formed the apertures 58. The interior of housing 12 of flash extender 10 is provided with four push rods 84, each of which includes a central generally cylindrical portion 86, a lower end 88 and an upper flash actuating end 90 which extends through an adjacent one of the four apertures 32 in top wall 30 of flash extender 10. Central portion 86 of each push rod 84 fits within a generally cylindrical sleeve 92 which extends upwardly from bottom wall 82 of flash extender 10 and is aligned with an aperture 58 so that the lower end 88 of each push rod 84 is aligned with an aperture 58.

In operation, flash extender 10 is coupled with a camera by mating walls 52, recess 54 and cam surfaces 56 with recesses 68, centrepost 62 and latches 64, respectively. One of apertures 58 is aligned with aperture 70 of the camera when the camera socket is in firing position thereby aligning flash sensing and actuating member 72 of the camera with lower end 88 of a push rod 84. A flash unit may now be inserted in the socket 34 of flash extender 10. Upon actuation of the shutter release mechanism of the camera, actuating member 72 moves upward, thereby urging a push rod 84 in an upward direction. The actuated push rod sequentially senses and then causes firing of the flashlamp located immediately above its upper end 90 by release of the pre-energized striker of the flashlamp. In a camera which is not adapted for both sequential sensing and firing, the actuated push rod 84 will move upwardly to fire the corresponding flashlamp by release of its pre-energized striker.

Indexing of a received unit to present an unfired flashlamp in firing position may be done by any method in the art. In the embodiment shown in Fig. 1, flash extender 10 is rotatable along with camera socket 60 in response to actuation of camera elements (not shown) for indexing flashcubes mounted on the camera socket 60 after actuation of a flash unit. The camera could be adapted to automatically rotate its flash receiving socket with each operation of the film advance mechanism, or the camera flash socket could be rotated after operation of the shutter release mechanism. In either case, actuation of the flash indexing mechanism of the camera causes rotation of the camera socket 60 and flash extender 10, thereby moving an unfired

flashlamp to a firing position for actuation. Alternatively, extender socket 34 could be directly coupled to camera socket 60 for rotation therewith while extender housing 12 remains stationary, or flash indexing could be achieved by manual rotation by the operator of a flash unit mounted on extender 10. In both cases, only one push rod 84 is required because the housing 12 remains stationary and the flash unit is moved relative thereto.

Referring now to Figs. 5—7, housing 12 of flash extender 10 includes a side wall 100 depending downwardly from top wall 30 to a bottom wall 101. Top wall 30, side wall 100 and bottom wall 101 define an inner chamber 102 in which are disposed a central spider 104 and four push rods 106. The socket 34 extends downwardly through wall 30 into chamber 102 and terminates in a sleeve 108. A mounting pin 109 extends upwardly from bottom wall 101.

Spider 104 consists of four flutes 110, a flange 112, four lugs 113 and a central stud 114 depending downwardly from the flange 112. Flange 112 further defines a mounting aperture 115 and four apertures 116 which may be aligned between apertures 58 in camera mating portion 14 and apertures 32 in top wall 30 of flash extender 10. Spider 104 is biased downwardly by means of a spring 118 which is held between socket 34 and flutes 110. When assembled, the upper portions of flutes 110 extend into the sleeve 108 while central stud 114 extends into recess 54 and mounting pin 109 extends into aperture 115. Spring 118 then urges spider 104 in a downward direction.

Each push rod 106 has an upper end 120, a generally straight middle portion 122 and a lower bent portion 124. Push rods 106 are assembled with spider 104 so that the upper ends 120 of push rods 106 extend through apertures 32 in top wall 30, middle portions 122 extend through apertures 116 in flange 112 of spider 104 and bent portions 124 of push rods 106 are aligned with apertures 58 of flash extender 10. It may be seen in Fig. 6 that when spider 104 is urged downwardly by spring 118, the lugs 113 on spider 104 rest on the push rods 106, which are thereby held against bottom wall 101 of flash extender 10, in an inactive position.

For operation, a flash unit 20 is coupled to extender 10 by mating walls 44, recess 46 and cam surfaces 48 with recesses 42, centrepost 36 and latches 38, respectively. Upper ends 120 of push rods 106, which extend through apertures 32 in top wall 30, will now be aligned with apertures 41 in flash unit 20. During coupling of flash extender 10 with socket 60 of a photographic camera, central stud 114 impinges upon centrepost 62 of flash socket 60, thereby forcing spider 104 upward against the urging

of spring 118 and freeing push rods 106. As shown, one push rod 106 has its bent portion 124 aligned with an aperture 58 of the extender and also with sensing and actuating member 72 of the camera when camera socket 60 is in firing position. Release of the shutter actuating member of the camera thereby actuates flash actuating member 72 for movement in an upward direction. Flash actuating member 72 impinges upon bent portion 124, thereby forcing push rod 106 in an upward direction, raising upper end 120 into the interior of unit 20. Push rod 106 sequentially senses a good flashlamp and causes firing of the flashlamp by release of its pre-energized striker.

WHAT WE CLAIM IS:—

1. A flash extender for use with a camera of the kind defined, said extender comprising an extender column, a socket portion at one end of the column to receive a percussion-ignitable flashlamp unit, a camera mating portion at the other end of the column for insertion in a camera socket, and means, located for cooperating with the force applying means of a camera on which the extender is mounted, for applying a mechanical force to a received unit to ignite a flashlamp therein in response to receipt of a force from the force-applying means of the camera.

2. A flash extender according to Claim 1, wherein the extender force-applying means comprises at least one push rod which is operable in response to receipt of a force

from the force-applying means of a camera on which the extender is mounted.

3. A flash extender for use with a camera which is of the kind defined and has an indexable socket for receiving a multi-lamp, percussion-ignitable flashlamp unit, said extender comprising an extender column, a socket portion at one end of the column for receiving a multi-lamp, percussion-ignitable flashlamp unit, a camera mating portion at the other end of the column for insertion in a camera socket, and a plurality of push rods extending from the camera mating portion to the socket portion for selectively transmitting, when the extender is mounted on a camera, a mechanical force from the camera force-applying means to the flashlamps of a received unit.

4. A flash extender according to Claim 3, wherein the column comprises a housing having openings in its upper wall for the passage of the upper ends of the push rods and openings in its lower wall which are aligned with the lower ends of the push rods and, when the extender is mounted on a camera, are selectively brought into alignment with the camera force-applying means.

5. A flash extender for use with a camera of the kind defined, substantially as hereinbefore described with reference to, and as shown in, Figs. 1 to 4, or Figs. 5 to 7 of the accompanying drawings.

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5 of spring 118 and freeing push rods 106. As shown, one push rod 106 has its bent portion 124 aligned with an aperture 58 of the extender and also with sensing and actuating member 72 of the camera when camera socket 60 is in firing position. Release of the shutter actuating member of the camera thereby actuates flash actuating member 72 for movement in an upward direction. Flash actuating member 72 impinges upon bent portion 124, thereby forcing push rod 106 in an upward direction, raising upper end 120 into the interior of unit 20. Push rod 106 sequentially senses a good flashlamp and causes firing of the flashlamp by release of its pre-energized striker.

WHAT WE CLAIM IS:—

1. A flash extender for use with a camera of the kind defined, said extender comprising an extender column, a socket portion at one end of the column to receive a percussion-ignitable flashlamp unit, a camera mating portion at the other end of the column for insertion in a camera socket, and means, located for cooperating with the force applying means of a camera on which the extender is mounted, for applying a mechanical force to a received unit to ignite a flashlamp therein in response to receipt of a force from the force-applying means of the camera.

2. A flash extender according to Claim 1, wherein the extender force-applying means comprises at least one push rod which is operable in response to receipt of a force

from the force-applying means of a camera on which the extender is mounted.

3. A flash extender for use with a camera which is of the kind defined and has an indexable socket for receiving a multi-lamp, percussion-ignitable flashlamp unit, said extender comprising an extender column, a socket portion at one end of the column for receiving a multi-lamp, percussion-ignitable flashlamp unit, a camera mating portion at the other end of the column for insertion in a camera socket, and a plurality of push rods extending from the camera mating portion to the socket portion for selectively transmitting, when the extender is mounted on a camera, a mechanical force from the camera force-applying means to the flashlamps of a received unit.

4. A flash extender according to Claim 3, wherein the column comprises a housing having openings in its upper wall for the passage of the upper ends of the push rods and openings in its lower wall which are aligned with the lower ends of the push rods and, when the extender is mounted on a camera, are selectively brought into alignment with the camera force-applying means.

5. A flash extender for use with a camera of the kind defined, substantially as hereinbefore described with reference to, and as shown in, Figs. 1 to 4, or Figs. 5 to 7 of the accompanying drawings.

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