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DRAWINGS ATTACHED

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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 photographic flashlight device for use with percussion-ignitable flash lamp units (hereinafter referred to as "of the kind defined") comprising one or more flash lamps, the or each flash lamp having a primer which, upon being struck, activates the flash lamp. The striker for the primer may be incorporated in the flash lamp unit or form a part of the flash light device.

In accordance with the present invention there is provided a photographic flashlight device comprising a socket for receiving a percussion-ignitable unit of the kind defined, an actuating member movable into contact with a flash unit received in the socket to ignite a percussion-ignitable lamp of the received unit and electromagnetic means, operatively associated with the actuating member, for effecting movement of the member into contact with a received unit in response to energization of the electromagnetic means whereby a percussion-ignitable flash lamp is ignited in response to energization of the electromagnetic means.

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

Fig. 1 is a perspective view of an adapter that could incorporate either of the forms of the preferred embodiment of the present invention illustrated schematically in Figs. 1a and 1b, the adapter having a socket for receiving a multilamp flash unit and a foot insert-

able into a shoe atop a photographic apparatus;

Fig. 1a is a schematic view of one form of the preferred embodiment of the present invention wherein the electromagnetic means is connected electrically to synchronizing contacts in a photographic camera and wherein the electromagnetic means moves the actuating member directly;

Fig. 1b is a schematic view of another form of the embodiment illustrated in Fig. 1a wherein the electromagnetic means releases a spring-loaded actuating member;

Fig. 1c is a fragmentary view of the form of the embodiment illustrated in Fig. 1b, showing schematically the actuating member in operative relationship to a multilamp flash unit;

Fig. 2 is a perspective view of a slave flash device that could incorporate any of the forms of an alternative embodiment of the present invention illustrated schematically in Figs. 2a, 2b, and 2c, the device having a socket for receiving a multilamp flash unit and a sensor to receive signal energy transmitted from a photographic apparatus;

Fig. 2a is a schematic view of one form of the alternative embodiment of the present invention wherein a slave flash device includes a photoelectric cell to receive signal energy in the form of light transmitted from a master flash lamp on a photographic camera;

Fig. 2b is a schematic view of another form of alternative embodiment of the present invention wherein a slave flash device includes an antenna to receive signal energy in the form of radio frequency energy transmitted from a transmitter on a photographic camera; and

Fig. 2c is a schematic view of still another form of the alternative embodiment of the present invention wherein a slave flash device includes a sonic pickup to receive signal energy in the form of a sonic signal transmitted from a sonic emitter on a photographic camera.

[Price 25p]



Because certain parts of photographic and related apparatus are well known, the following description is directed in particular to those elements forming, or cooperating directly with, the present invention, elements that are not specifically shown or described herein being understood to be selectable from those known in the art.

Fig. 1a of the drawings illustrates, schematically, one form of the preferred embodiment of the present invention, in which electromagnetic means comprising a solenoid 10 is connected by means of a pair of wires 11 to a pair of synchronizing contacts 12 in a photographic camera 13. Included in a circuit 14 containing a coil 15 of the solenoid and the synchronizing contacts 12 is a source of electrical potential such as a battery 16. The solenoid 10 is disposed in an electromagnetically attracting relationship to a movable actuating member such as hammer 17, the actuating member being attracted to the solenoid coil upon energization of the coil by the closing of the synchronizing contacts. The actuating member, or hammer 17, is shown schematically in the form of a simple, spring-biased lever pivotally mounted in the device and having, at the opposite end thereof, a wedge-shaped portion 18 that moves into percussive contact with the primer element or ignition tube 19 of a percussion-ignitable flash lamp 20 seated in a suitable socket (not shown). In operation, the preferred embodiment as illustrated in Fig. 1a effects ignition of the percussion-ignitable lamp 20 in response to the camera operator's movement of a shutter-release member 21 on the camera, such movement of the shutter-release member causing simultaneous release of the camera shutter (not shown) and closing of synchronizing contacts 12, whereupon solenoid 10 becomes energized and thereby moves the actuating member or hammer 17 into percussive contact with the primer element or ignition tube 19 of the percussion-ignitable flash lamp 20.

Fig. 1b illustrates, schematically, another form of the preferred embodiment of the present invention, in which the actuating member 30, instead of being moved directly by the solenoid, is moved by a spring 31 or other biasing means into percussive contact with the primer element or ignition tube 32 of a percussion-ignitable flash lamp 33, the solenoid 34 operating, when energized, to move a retaining member 35 and thereby release the actuating member 30 for movement by the spring 31 into percussive contact with the lamp.

Fig. 1c illustrates, schematically, a portion of the form of the embodiment of Fig. 1b with the actuating member 30 shown cocked by retaining member 35 for movement by spring 31 into contact with a multilamp flash unit 40 containing a plurality of percussion-

ignitable flash lamps such as the type disclosed, for example, in copending Application No. 49434/69 (Serial No. 1287293).

The forms of the preferred embodiment illustrated schematically in Figs. 1a, 1b, and 1c may be incorporated in an adapter connectable to a photographic camera, as shown, for example, in Fig. 1, or in a remotely located device connectable to a photographic camera by means of electrical conductors such as flexible wires. The adapter 50 shown in Fig. 1 comprises a body portion 51, a socket 52 for receiving a percussion-ignitable multilamp flash unit 56, and a foot 53 insertable into a shoe 54 atop a photographic camera 55. Sockets of the type suitable for receiving a percussion-ignitable multilamp flash unit are described, for example, in Letters Patent No. 1240784. Insertion of the foot into the shoe effects an electrical connection, by suitable contacts in both members, between a solenoid (not shown) in body portion 51 and a synchroflash circuit (not shown) in camera 55, as is well known in the art. The adapter of Fig. 1 thus provides a convenient means of adapting a photographic camera having a synchroflash circuit intended for the ignition of an electrically ignitable flash lamp to effect the ignition of a percussion-ignitable flash lamp.

As a possible modification of the adapter illustrated in Fig. 1, the foot 53 could be replaced by a base similar to the base of a multilamp flash unit for insertion into a multilamp-flash-unit socket on a photographic camera. With such an arrangement, some means would have to be provided for preventing rotation of the adapter by the socket rotating mechanism usually present in such a camera. In addition to serving as an adapter, such a device as that illustrated in Fig. 1 may serve as an extender for the purpose of extending the distance between the picture-taking axis of the camera and the photoflash lamp being used, thereby aiding in preventing the condition known in the photographic art as "red eye". For an illustration of a flash extender, reference is made to Letters Patent No. 1156137.

Fig. 2 illustrates a slave type of flash device incorporating an alternative embodiment of the present invention. Such a unit may be responsive to photoflash illumination received from a master flash unit on an associated photographic camera, as is known for the purpose of igniting an electrically energizable flash-lamp unit received in the slave-device socket, as shown, for example, in U.S. Patent No. 3,312,086, issued April 4, 1967 in the name of O. T. Casebeer et al. The slave flash device illustrated in Fig. 2, however, has been adapted, by incorporation of the present invention, to receive signal energy, in one form or another, from a remotely located

photographic apparatus to ignite a percussion-ignitable lamp of a multilamp flash unit on the device. The slave flash device 60 illustrated in Fig. 2 includes a housing 61, a rotatable socket 62 for receiving a multilamp flash unit 63 of the percussion-ignitable type, and a sensor 64, which can be conveniently oriented by rotating the sensor until the arrow 65 thereon points toward a signal emitter on the associated photographic apparatus.

Figs. 2a, 2b, and 2c illustrate, schematically, three forms of the alternative embodiment of the present invention which may be incorporated in a slave flash device of the type illustrated in Fig. 2. Fig. 2a shows, in the left-hand portion thereof, a photographic camera 70 having a flash unit 71 thereon aimed to emit flash light *L* in a direction parallel with the picture-taking axis *O* of the camera. In the right-hand portion of Fig. 2a is shown, schematically, a form of the alternative embodiment that is suitable for use with camera 70. In this form of the embodiment there is a photoelectric cell 72 connected by suitable circuit means 73 to an electromagnetic means such as solenoid 74. Included in circuit means 73 are electronic means 75 for filtering and amplifying signal energy received by cell 72 in order to render such signal energy suitable for energizing solenoid 74. Also included in circuit means 73 is a source of electrical potential such as battery 76 connected to the electronic means 75 as shown. The solenoid 74 includes an electromagnet 77 and a spring-biased movable member 78 which is electromagnetically attracted to the electromagnet upon energization of the electromagnet. In the embodiment illustrated in Fig. 2a, the movable member 78 is pivotally mounted, as at 79, on a fixed portion of the device for pivotal movement toward and away from the electromagnet 77.

Schematically pictured above the electromagnet is a multilamp flash unit 80 having a plurality of percussion-ignitable flash lamps 81, each of which lamps has a primer element or ignition tube 82 depending therefrom as shown, the ignition tube of the lamp that is in a lamp-firing position being located in the path of movement of end portion 83 of movable member 78. With this arrangement, energization of solenoid 74 causes movement of movable member 78 into contact with the ignition tube 82 of a lamp 81 in the unit 80, thereby effecting percussion ignition of the lamp.

Percussion ignition may result from movement by the movable member of the solenoid in either of two ways. First, the movable member, hereinafter referred to as the actuating member, may directly strike the ignition tube in a percussive fashion, thereby causing percussion ignition of the lamp. Second, the multilamp flash unit may have a spring-biased striking member mounted thereon in a cocked

position adjacent to but spaced from each ignition tube, the striking member, or another part of such a unit holding the striking member in its cocked position, being in the path of movement of the actuating member, the actuating member then contacting either the striking member or the other part of the unit holding it, as the case may be, to thereby release the striking member for movement into percussive contact with the ignition tube. A multilamp flash unit of the type just referred to, having a biased striking member adjacent to each ignition tube, is disclosed in co-pending Application No. 49434/69 (Serial No. 1287293).

Also, as shown schematically in Fig. 2a, the movable actuating member 78 may be associated with means 84 for rotating the multilamp flash unit socket (not shown). The socket rotating means 84 includes a shaft portion 85 coupled to the socket, biasing means such as spring 86 for rotating the shaft portion, and a plurality of ratchet teeth 87, corresponding in number to the number of lamps 81 in the multilamp flash unit 80, for stopping socket rotation at each lamp-firing position of a unit in the socket. For each lamp-firing position, one of the ratchet teeth 87 is engaged by a portion 88 of the solenoid actuating member 78, as is apparent in Fig. 2a. Movement of the actuating member 78 into contact with the flash unit 80 simultaneously disengages portion 88 of the actuating member from the ratchet tooth 87 with which it has been engaged, thereby permitting spring 86 to rotate the shaft portion 85, and hence the socket and multilamp flash unit in the socket, to a succeeding lamp-firing position.

Also shown in Fig. 2a is another feature of the present invention whereby the device of either embodiment can be used to ignite, alternatively, a percussion-ignitable flash unit received in the socket and an electrically ignitable flash unit received in the socket. Means for igniting a percussion-ignitable flash unit so received have already been described. The means for igniting an electrically ignitable flash unit so received (not shown) comprises a pair of electrical contacts 89 connected electrically in parallel with the solenoid 74 and connectable to suitable flash-lamp contacts on the received flash unit. With such an arrangement, energization of the solenoid 74 also effects energization of the electrical contacts 89, thereby igniting the connected electrically ignitable flash lamp. Thus the device illustrated in Fig. 2a is operable, upon receipt of flash illumination from the photo-flash camera 70, to ignite either a percussion-ignitable flash lamp or an electrically ignitable flash lamp, and may also effect rotation of the flash-unit socket to a succeeding lamp-firing position.

Fig. 2b illustrates, schematically, another form of the alternative embodiment of the invention which may be incorporated in a slave flash device of the type illustrated in Fig. 2. In the left-hand portion of Fig. 2b is shown a photographic camera 90 having radio-frequency-energy transmitting means 91 therein. In the right-hand portion of Fig. 2b is shown, schematically, a form of the alternative embodiment that is suitable for igniting a percussion-ignitable flash lamp in response to radio frequency energy R transmitted by camera 90. Included in this form of the embodiment is an antenna 92 for receiving the transmitted radio frequency energy. The antenna is connected to suitable circuit means 93, similar to circuit means 73 shown in Fig. 2a, for filtering and amplifying the received signal energy and then communicating the filtered and amplified energy to an electromagnetic means such as solenoid 94. As in the Fig. 2a embodiment, the solenoid 94 includes a spring-biased, movable, actuating member 95 pivotally mounted, as at 96, on a fixed portion of the device for pivotal movement, upon energization of electromagnet 97, into contact with a percussion-ignitable flash unit 98 received in an appropriate socket (not shown). With this arrangement, transmission of radio frequency energy from camera 90 is effective to ignite a percussion-ignitable flash lamp received in the device. Although not shown, socket rotating means and electrical igniting means such as those illustrated in Fig. 2a may also be incorporated in the device illustrated in Fig. 2b.

Fig. 2c illustrates, schematically, still another form of the alternative embodiment of the present invention which may be incorporated in a slave flash device of the type illustrated in Fig. 2. In the left-hand portion of Fig. 2c is shown a photographic camera 100 having means 101 for emitting a sonic signal S, and in the right-hand portion of Fig. 2c is shown, schematically, a form of the alternative embodiment that is suitable for receiving, filtering, amplifying, and communicating the sonic signal to thereby energize a solenoid 102 to effect ignition of a percussion-ignitable flash unit 103 received in an appropriate socket (not shown). The sensor in this instance, which receives the signal energy emitted by camera 100, is a sonic pickup 104 that is connected by suitable circuit means 105, similar to circuit means 73 in Fig. 2a, to solenoid 102. The circuit means here, as in the forms illustrated in Figs. 2a and 2b, includes means for filtering and amplifying the received signal. The solenoid and alternative ways of effecting percussive contact with an ignition tube of a received flash-lamp unit also are similar to those previously described with reference to Figs. 2a and 2b.

WHAT WE CLAIM IS:—

1. A photographic flashlight device comprising a socket for receiving a percussion-ignitable unit of the kind defined, an actuating member movable into contact with a flash unit received in the socket to ignite a percussion-ignitable lamp of the received unit and electromagnetic means, operatively associated with the actuating member, for effecting movement of the member into contact with a received unit in response to energization of the electromagnetic means whereby a percussion-ignitable flash lamp is ignited in response to energization of the electromagnetic means.
2. The device claimed in Claim 1, wherein the actuating member is movable directly into percussive contact with a lamp of a received unit to ignite the lamp.
3. The device claimed in Claim 1, wherein the socket is adapted to receive a flash unit including a percussion-ignitable lamp and a striking member movable into percussive contact with the lamp, and wherein the actuating member is movable into contact with such a unit received in the socket to effect movement of the striking member into percussive contact with the lamp.
4. The device claimed in Claim 1, 2 or 3, wherein the said electromagnetic means moves the actuating member directly into contact with the received unit in response to energization of the electromagnetic means.
5. The device in claim 1, 2 or 3, further comprising biasing means for urging the actuating member into contact with a received unit and retaining means for releasably retaining the actuating member in a position spaced from the received unit in opposition to the biasing means, the retaining means being movable by the electromagnetic means, in response to energization of the electromagnetic means, to release the actuating member and thereby permit the member to be moved by the biasing means into contact with the received unit.
6. The device claimed in any one of the preceding Claims, wherein the socket is adapted to receive a multilamp flash unit having a plurality of percussion-ignitable lamps.
7. The device claimed in Claim 6, wherein the socket is rotatable, and further comprising means for rotating the socket between successive lamp-firing positions, in each of which positions one of the lamps of a received multilamp flash unit is located for percussion ignition by the actuating member.
8. The device claimed in Claim 7, wherein the electromagnetic means is operatively associated with the rotating means to effect rotation of the socket from a lamp-firing position to a succeeding lamp-firing position in response to energization of the electromagnetic means, whereby one of the lamps



Fig. 2b illustrates, schematically, another form of the alternative embodiment of the invention which may be incorporated in a slave flash device of the type illustrated in Fig. 2. In the left-hand portion of Fig. 2b is shown a photographic camera 90 having radio-frequency-energy transmitting means 91 therein. In the right-hand portion of Fig. 2b is shown, schematically, a form of the alternative embodiment that is suitable for igniting a percussion-ignitable flash lamp in response to radio frequency energy *R* transmitted by camera 90. Included in this form of the embodiment is an antenna 92 for receiving the transmitted radio frequency energy. The antenna is connected to suitable circuit means 93, similar to circuit means 73 shown in Fig. 2a, for filtering and amplifying the received signal energy and then communicating the filtered and amplified energy to an electromagnetic means such as solenoid 94. As in the Fig. 2a embodiment, the solenoid 94 includes a spring-biased, movable, actuating member 95 pivotally mounted, as at 96, on a fixed portion of the device for pivotal movement, upon energization of electromagnet 97, into contact with a percussion-ignitable flash unit 98 received in an appropriate socket (not shown). With this arrangement, transmission of radio frequency energy from camera 90 is effective to ignite a percussion-ignitable flash lamp received in the device. Although not shown, socket rotating means and electrical igniting means such as those illustrated in Fig. 2a may also be incorporated in the device illustrated in Fig. 2b.

Fig. 2c illustrates, schematically, still another form of the alternative embodiment of the present invention which may be incorporated in a slave flash device of the type illustrated in Fig. 2. In the left-hand portion of Fig. 2c is shown a photographic camera 100 having means 101 for emitting a sonic signal *S*, and in the right-hand portion of Fig. 2c is shown, schematically, a form of the alternative embodiment that is suitable for receiving, filtering, amplifying, and communicating the sonic signal to thereby energize a solenoid 102 to effect ignition of a percussion-ignitable flash unit 103 received in an appropriate socket (not shown). The sensor in this instance, which receives the signal energy emitted by camera 100, is a sonic pickup 104 that is connected by suitable circuit means 105, similar to circuit means 73 in Fig. 2a, to solenoid 102. The circuit means here, as in the forms illustrated in Figs. 2a and 2b, includes means for filtering and amplifying the received signal. The solenoid and alternative ways of effecting percussive contact with an ignition tube of a received flash-lamp unit also are similar to those previously described with reference to Figs. 2a and 2b.

WHAT WE CLAIM IS:—

1. A photographic flashlight device comprising a socket for receiving a percussion-ignitable unit of the kind defined, an actuating member movable into contact with a flash unit received in the socket to ignite a percussion-ignitable lamp of the received unit and electromagnetic means, operatively associated with the actuating member, for effecting movement of the member into contact with a received unit in response to energization of the electromagnetic means whereby a percussion-ignitable flash lamp is ignited in response to energization of the electromagnetic means. 70
2. The device claimed in Claim 1, wherein the actuating member is movable directly into percussive contact with a lamp of a received unit to ignite the lamp. 75
3. The device claimed in Claim 1, wherein the socket is adapted to receive a flash unit including a percussion-ignitable lamp and a striking member movable into percussive contact with the lamp, and wherein the actuating member is movable into contact with such a unit received in the socket to effect movement of the striking member into percussive contact with the lamp. 80
4. The device claimed in Claim 1, 2 or 3, wherein the said electromagnetic means moves the actuating member directly into contact with the received unit in response to energization of the electromagnetic means. 85
5. The device in claim 1, 2 or 3, further comprising biasing means for urging the actuating member into contact with a received unit and retaining means for releasably retaining the actuating member in a position spaced from the received unit in opposition to the biasing means, the retaining means being movable by the electromagnetic means, in response to energization of the electromagnetic means, to release the actuating member and thereby permit the member to be moved by the biasing means into contact with the received unit. 90
6. The device claimed in any one of the preceding Claims, wherein the socket is adapted to receive a multilamp flash unit having a plurality of percussion-ignitable lamps. 95
7. The device claimed in Claim 6, wherein the socket is rotatable, and further comprising means for rotating the socket between successive lamp-firing positions, in each of which positions one of the lamps of a received multilamp flash unit is located for percussion ignition by the actuating member. 100
8. The device claimed in Claim 7, wherein the electromagnetic means is operatively associated with the rotating means to effect rotation of the socket from a lamp-firing position to a succeeding lamp-firing position in response to energization of the electromagnetic means, whereby one of the lamps 105



of a multilamp flash unit received in the socket is ignited and the socket is rotated to a succeeding lamp-firing position in response to energization of the electromagnetic means.

5 9. The device claimed in Claim 8, wherein the rotating means includes biasing means for urging the socket rotatively from a lamp-firing position to a succeeding lamp-firing position and retaining means for releasably retaining the socket in a lamp-firing position in opposition to the biasing means, the retaining means being movable by the electromagnetic means, in response to energization
10 of the electromagnetic means, to release the socket and thereby permit the socket to be rotated by the biasing means to a succeeding lamp-firing position.

10 10. The device claimed in any one of the preceding Claims, wherein the socket is adapted to receive alternatively a flash unit including a percussion-ignitable lamp and a flash unit including an electrically ignitable lamp, and further comprising a pair of
25 electrical contacts connected electrically in parallel with the electromagnetic means and connectable to an electrically ignitable flash-lamp unit received in the socket to effect ignition of an electrically ignitable lamp of
30 the received unit in response to energization of the electromagnetic means.

11. The device claimed in any one of the preceding Claims, further comprising means, electrically connectable to a synchroflash

circuit of a photographic apparatus, for energizing the electromagnetic means in response to operation of the apparatus.

12. The device claimed in any one of the preceding Claims 1—10, further comprising a sensor to receive signal energy transmitted from a photographic apparatus and circuit means for communicating signal energy received by the sensor to the electromagnetic means to energize the electromagnetic means; whereby a lamp of a flash unit received in the socket is ignited in response to transmission of signal energy from the photographic apparatus.

13. The device claimed in Claim 12, wherein the sensor includes a photoelectric cell to receive light transmitted from the photographic apparatus.

14. The device claimed in Claim 12, wherein the sensor includes an antenna to receive radio frequency energy transmitted from the photographic apparatus.

15. The device claimed in Claim 12 wherein the sensor includes a sonic pickup to receive a sonic signal transmitted from the photographic apparatus.

16. Photographic flashlight devices according to Claim 1, constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

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