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DRAWINGS ATTACHED

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 (72) Inventor MARCUS JACOB MILLET



(54) A PHOTOGRAPHIC FLASHLIGHT ADAPTER

(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 adapter enabling use of percussion-ignitable flash-lamp units with photographic apparatus that has been designed for use with electrically ignitable flash-lamp units.

In accordance with the present invention there is provided a photographic flashlight adapter comprising means for receiving a percussion-ignitable flash lamp, an actuating member for initiating percussion-ignition of a received lamp, means for sequentially cocking and firing the actuating member and means for connecting the adapter to a socket on a photographic apparatus adapted for use with electrically-ignitable flash lamps.

In the accompanying drawings:

Fig. 1 is a fragmentary perspective view of a photographic camera having a rotatable socket for receiving a multilamp unit of the type having a plurality of electrically ignitable flash lamps, showing an adapter of the present invention inserted in the camera socket with a percussion-ignitable multilamp unit on the adapter;

Fig. 2 is an enlarged, exploded view, in perspective, of the adapter of Fig. 1, showing the adapter in a position suitable for insertion into the camera socket with the percussion-ignitable multilamp unit above the adapter;

Fig. 3 is an enlarged, fragmentary, sectional view, taken on the line 3—3 of Fig. 1, showing portions of the adapter, the camera socket, and the percussion-ignitable multilamp unit in their operative relationship;

Fig. 4 is an enlarged, fragmentary, sectional view similar to that of Fig. 3 but

showing a first alternative embodiment of the adapter of the present invention; and

Fig. 5 is an enlarged, fragmentary, sectional view similar to that of Fig. 4 but showing a second alternative embodiment of the adapter of the present invention.

As shown in Fig. 1 a camera 10 comprises a housing 11, a viewfinder 12, a lens 13, a shutter-release member 14, a socket 15 for operatively supporting a multilamp flash unit (not shown) having a plurality of electrically ignitable flash lamps, and an operating lever 16 for effecting film winding, shutter cocking, and socket rotation. The operating lever 16 is pivotally mounted at 17 for rotational movement and has at one end an upwardly extending tab 18, which is externally accessible for movement by the camera operator, and at the other end a gear sector 19 in mesh with a gear 20 rotatably mounted at 21. Gear 20, in turn, is meshed with another gear 22 rotatably mounted as at 23, which, in turn, is meshed with a gear 24 coupled to the socket 15. Thus, actuation of the tab 18 by the camera operator effects rotation of the socket 15 and a received flash-lamp unit 28 from one-lamp firing position to another. Cooperating with the socket rotating mechanism just described is a socket indexing means comprising a pawl 25 which is engageable with one of a plurality of notches 26 in the socket 15, each notch 26 corresponding in angular position with a lamp 27 of the received multilamp flash unit 28, the indexing means thereby serving to stop socket rotation when the socket has reached an operative orientation.

The shutter-release member 14 includes an externally accessible portion 29, which is depressable by the camera operator to effect shutter release, and at the right-hand end of member 14, as viewed in Fig. 1, another portion 30 having a cam surface 31 for closing a pair of synchroflash contacts 32 and 33, which are connected electrically to a source of electrical potential such as a battery 34 and to a pair of electrical contacts 35 and 36 in the socket 15. Electrical contacts 35 and

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36 are electrically connectable to corresponding leads depending from an electrically ignitable flash lamp of a multilamp flash unit (not shown) that may be inserted into socket 15. As is well known in the photographic art, the camera operator's depression of portion 29 of the shutter-release member 14, effects shutter release and simultaneous closing of the synchroflash contacts 32 and 33 to ignite an electrically ignitable flash-lamp unit received in the socket 15. Shown inserted in the socket 15 in Fig. 1 is an adapter 37 constructed according to the present invention, the adapter 37 having at the top thereof a socket 38 for receiving multilamp flash unit 28 having a plurality (four) of percussion-ignitable flash lamps 27 therein.

Fig. 2 shows the adapter 37 in greater detail and the relationship between adapter 37, camera socket 15, into which the adapter is insertable, and a percussion-ignitable flash-lamp unit 28 which is insertable into the adapter socket 38. As best seen in Fig. 2, the adapter 37 is of cylindrical shape, the cylindrical sidewall 39 being coupled to the socket 38 for rotation therewith. Depending from the socket 38 beneath the base 40 of adapter 37 is a mounting stem 41 having a plurality of lugs 42 which are insertable into channel portions 43 of socket 15 and, when so inserted, serve to retain the adapter 37 against inadvertent dislodging during operation. Mounting stem 41 is coupled to the socket 38, which, in turn, is coupled to the cylindrical sidewall 39, so that rotation of the camera socket 15 effects simultaneous rotation of the mounting stem 41, socket 38, and cylindrical sidewall 39 when the adapter 37 is inserted in the camera socket 15. In this fashion, a percussion-ignitable flash-lamp unit inserted in the adapter is rotated from one lamp-firing position to another upon normal operation of the camera socket rotating mechanism.

The percussion-ignitable flash-lamp unit 28 for which the adapter 37 herein illustrated is intended contains a plurality (four) of percussion-ignitable flash lamps 27, each having an ignition tube or primer element 44 depending therefrom which, when struck by a suitable striker or hammer, ignites the associated lamp. The percussion-ignitable multilamp flash unit 28 illustrated herein is of the type that includes, for each flash lamp 27, a striker 45 in the form of a resilient spring, shown retained in a cocked position by a stationary cocking pin 46 extending upwardly from the base 47 of the flash-lamp unit. Cocking pin 46 may be separated from the striker 45 or it may be integral therewith, as shown in Fig. 3, comprising a fixed end portion of striker 45, in which case the whole striker operates in a manner similar to that of a common safety pin, striker 45 being

secured to the base 47 at 47a. Adjacent to each cocking pin 46 and beneath its associated striker 45 is an opening 48 through which an actuating member in the adapter can protrude to push the striker 45 in an upward direction a sufficient distance to disengage the striker 45 from the cocking pin 46 and thereby allow the potential energy in the cocked striker to move the striker into percussive contact with the ignition tube 44 of the adjacent lamp 27.

In the top wall 49 of adapter 37, surrounding the socket 38 in an annular fashion, is a plurality of openings 50 which are angularly aligned with the openings 48 of a received flash-lamp unit 28. Shown in Figs. 2 and 3 is a means for initiating percussive ignition of a received percussion-ignitable flash-lamp unit 28. As illustrated, the percussive-ignition-initiating means comprises an actuating member in the form of a resilient spring 51 fixedly mounted at 52 and having an outwardly extending portion 53 and an upwardly extending portion 54. Portions 53 and 54 are movable in a generally upward direction from a first, or cocked, position, shown in solid lines, to a second position, shown in broken lines, in which the upwardly extending portion 54 protrudes through one of the openings 50 and the overlying opening 48 to disengage a striker 45 from its cocking pin 46. The actuating member or spring 51, as illustrated in solid lines, is in a cocked position, in which member 51 has stored therein potential energy providing a biasing influence for urging the member 51 upwardly upon its release from the cocked position.

Shown adjacent to member 51 is a controlling means for alternatively preventing and permitting upward movement of member 51 by said biasing influence. The controlling means illustrated comprises a solenoid 55, which is electrically connectable, through leads 56 and 57 and camera socket contacts 35 and 36, to the camera synchroflash circuit for energization thereby during picture-taking operation of the camera. Included in solenoid 55 is a movable member or armature 58 that is movable horizontally, as viewed in Fig. 3, from an extended position of engagement with actuating member 51 to a retracted position of disengagement from member 51 upon energization of the solenoid coil, not shown, by operation of the camera as aforesaid. As will be apparent to those skilled in the art, when the adapter 37 is operatively received in socket 15, the camera operator's depression of the shutter-release-member portion 29 to effect picture-taking operation of the camera is thus operative to energize the solenoid 55 and thereby move the solenoid member 58 out of engagement with the actuating member 51 to release member 51 for movement from its cocked position upwardly into contact with a received flash-lamp unit 28 to effect percussive

sive ignition of the operatively orientated flash lamp 27 therein.

As can be seen most readily in Figs. 1 and 2, the lower portion of cylindrical sidewall 39 of adapter 37 has a plurality of cut-out portions 59 spaced therearound, corresponding in number and location to the percussion-ignitable lamps 27 of a received flash-lamp unit 28. Each cut-out portion 59 provides a camming means 60 engageable with the outwardly extending portion 53 of actuating member 51 when member 51 is in its upper, or lamp-igniting, position to effect the return of member 51 to its lower, or cocked, position upon rotation of socket 38 and cylindrical sidewall 39. With this arrangement, outwardly extending portion 53 of actuating member 51 acts as a cam follower during rotation of sidewall 39 and camming means 60 in effecting return movement of member 51 from its lamp-igniting position to its cocked position. To facilitate downward movement of actuating member 51 to its cocked position, solenoid member 58 is provided with a cam surface 61 which is engageable by the outwardly extending portion 53 during such downward movement of member 51 to move the member 58 out of the path of travel of member 51 and thereby permit member 51 to reach its cocked position without interference by solenoid member 58 when in its extended position. As shown in Figs. 2 and 3 solenoid 55 is provided with a spring 62 for returning member 58 from its retracted position to its extended position when solenoid 55 is not energized. Thus, after the actuating member 51 has passed beyond end 63 of the member 58 and reached its lowermost position, the spring means 62 is operative to return the member 58 to its extended position to engage member 51 and thereby retain member 51 against upward movement until the solenoid 55 is again energized by a subsequent picture-taking operation of the camera. Because cylindrical sidewall 39 is coupled to the socket 38 for rotation therewith by the socket rotating mechanism of the camera, the camming means 60 in the cut-out portions 59 of cylindrical sidewall 39 are effective in providing a means for returning member 51 to its cocked position during rotation of received unit 28 from one lamp-firing position to the next. Thus, by the time the next flash lamp 27 of a received flash unit 28 has been rotated to its operative site above actuating member 51, the member 51 has been returned to its cocked position to be ready for another cycle of operation.

It should be understood that the socket rotating mechanism shown in Fig. 1 is for purposes of illustration only, other means of effecting socket rotation being well known in the camera art. Thus, for example, the camera socket could be rotated automatically in

response to the camera operator's depression of the shutter release member, or the camera socket could be rotated in response to the operator's movement of a lever or knob provided on the camera to effect socket rotation only or socket rotation in combination with shutter cocking, film winding, and/or some other phase of the cyclic operation of a camera. The particular means of effecting camera socket rotation, therefore, is not critical to the operation of the adapter of the present invention, the significant feature of adapter 37 being the inclusion of means, operatively associated with the actuating member 51 and associatable with and actuatable by some means for effecting operation of the camera, for returning the actuating member 51 from its lamp-igniting position to its cocked position. The phrase "means for effecting operation of the camera" is meant to include any means, such as those mentioned, for accomplishing some part of the cyclic operation of the camera.

It should also be understood that the adapter of the present invention comprises, basically, two pairs of elements, one pair being rotatable relative to the other pair. In the illustrated embodiment of Figs. 1-3, one pair comprises socket 38 and camming means 60, both socket 38 and camming means 60 being rotatable together upon rotation of mounting stem 41 by the camera socket rotating mechanism; the other pair comprises actuating member 51 and solenoid 55, both of which are prevented from rotating with socket 38 and camming means 60 by virtue of their being coupled to a securing means, such as a hook member 64, which is engageable with camera housing 11 when adapter mounting stem 41 is fully inserted in the camera socket 15, the securing means or hook member 64 thereby serving to prevent rotation of actuating member 51 and solenoid 55 with socket 38 and camming means 60 upon rotation of camera socket 15.

Figs. 4 and 5 illustrate alternative embodiments of the adapter of the present invention, parts that are the same as those already described with reference to the preferred embodiment of Figs. 1 to 3 being designated by the same reference numerals primed in Fig. 4 and the same reference numerals double-primed in Fig. 5. Fig. 4 shows a first alternative embodiment wherein the upwardly extending portion 54 of the actuating member 51 in Fig. 3 is replaced by a separately movable striking element or pin 70 vertically slideable within a bushing 71, pin 70 being movable in an upward direction in response to upward movement of an actuating member 72 and in a downward direction by a spring or other biasing means 73 urging the pin 70 toward member 72.

Fig. 5 illustrates a second alternative embodiment in which the actuating member, instead of taking the form of a resilient spring as in Figs. 1-4, takes the form of a rigid member 80, pivotally mounted at 81, having an upwardly extending portion 82 and an outwardly extending portion 83, member 80 being biased for movement in a clockwise direction, as viewed in Fig. 5, by means of a spring 84 connected to the member 80 at 85 and to a non-rotatable portion 86 of the adapter. In the embodiment of Fig. 5, rigid actuating member 80 and spring 84 perform the same function as does, the single-piece, resilient-spring-type actuating member 51 in the embodiment of Figs. 1-3 and as do the resilient-spring-type actuating member 72 and separate striking pin 70 in the embodiment of Fig. 4.

It should be understood that the adapter of the present invention is not restricted to use with percussion-ignitable flash-lamp units of the type shown herein for illustrative purposes only. For example, the actuating member or its equivalent could be moved into direct contact with the ignition tube or primer element of a percussion-ignitable flash lamp in the received unit, the significant feature in this regard being that movement of the actuating member or its equivalent into contact with some part of the percussive ignition of a lamp in that unit. The adapter of the present invention is not limited to use with percussion-ignitable flash-lamp units containing a plurality of percussion-ignitable lamps. That is to say, the adapter of the present invention could be used to receive a percussion-ignitable single-lamp flash unit, and the adapter could be made insertable into a single-lamp-receiving socket of the photographic apparatus, the significant feature here being that the means for returning the actuating member from its lamp-igniting position to its cocked position is actuatable by some means in the apparatus for effecting one or more phases of the cyclic operation of the apparatus, as discussed hereinabove.

WHAT WE CLAIM IS:—

1. A photographic flashlight adapter comprising means for receiving a percussion-ignitable flash lamp, an actuating member for initiating percussion-ignition of a received lamp, means for sequentially cocking and firing the actuating member and means for connecting the adapter to a socket on a photographic apparatus adapted for use with electrically-ignitable flash lamps.

2. An adapter according to claim 1, wherein the percussion-ignitable flash lamp unit receivable by the receiving means is a multilamp unit containing a plurality of percussion-ignitable flash lamps, the receiving means being rotatable successively to place the percussion-ignit-

able lamps of a unit received by the receiving means at an operative site.

3. An adapter according to claim 1 or 2, wherein the actuating member is retained in its cocked position by means of an electro-magnetic device and is released for movement to the firing position upon energization of the electro-magnetic device.

4. An adapter according to claim 3, wherein the actuating member is spring urged to the firing position.

5. An adapter according to any one of the preceding claims, wherein the actuating member is movable to its cocked position by means of a cam.

6. An adapter according to claims 2 and 5, wherein the receiving means is rotatable relative to the actuating means and is coupled to the cam, the receiving means and cam being adapted for rotation, when the adapter is connected to a photographic apparatus, by the operating mechanism of such apparatus.

7. An adapter to enable use of a multilamp photoflash unit of the type having a plurality of percussion-ignitable flash lamps with a photographic camera that includes a rotatable socket for receiving a multilamp photoflash unit of the type having a plurality of electrically ignitable flash lamps, means for rotating the socket to successively place the electrically ignitable lamps of the multilamp unit received by the socket in an operative orientation, and a synchroflash circuit for energizing each operatively oriented electrically ignitable lamp of the received unit in synchronization with picture-taking operation of the camera, said adapter comprising:

(a) means for receiving the multilamp photoflash unit of the type having a plurality of percussion-ignitable flash lamps, said receiving means being rotatable to successively place the percussion-ignitable lamps of the multilamp unit received by said receiving means at an operative site;

(b) means, movable from a first position to a second position, for initiating percussive ignition of each operatively sited percussion-ignitable lamp of the received unit;

(c) means for urging said initiating means from said first position to said second position to thereby initiate percussive ignition of each operatively sited lamp;

(d) means, including a solenoid operatively associated with said initiating means and electrically connectable to and energizable by the camera synchroflash circuit, for controlling movement of said initiating means from said first position toward said second position, said solenoid having a member movable from a first location to a second location and engageable with said initiating means, said member when in said first location engaging said initiating



Fig. 5 illustrates a second alternative embodiment in which the actuating member, instead of taking the form of a resilient spring as in Figs. 1-4, takes the form of a rigid member 80, pivotally mounted at 81, having an upwardly extending portion 82 and an outwardly extending portion 83, member 80 being biased for movement in a clockwise direction, as viewed in Fig. 5, by means of a spring 84 connected to the member 80 at 85 and to a non-rotatable portion 86 of the adapter. In the embodiment of Fig. 5, rigid actuating member 80 and spring 84 perform the same function as does the single-piece, resilient-spring-type actuating member 51 in the embodiment of Figs. 1-3 and as do the resilient-spring-type actuating member 72 and separate striking pin 70 in the embodiment of Fig. 4.

It should be understood that the adapter of the present invention is not restricted to use with percussion-ignitable flash-lamp units of the type shown herein for illustrative purposes only. For example, the actuating member or its equivalent could be moved into direct contact with the ignition tube or primer element of a percussion-ignitable flash lamp in the received unit, the significant feature in this regard being that movement of the actuating member or its equivalent into contact with some part of the percussive ignition of a lamp in that unit. The adapter of the present invention is not limited to use with percussion-ignitable flash-lamp units containing a plurality of percussion-ignitable lamps. That is to say, the adapter of the present invention could be used to receive a percussion-ignitable single-lamp flash unit, and the adapter could be made insertable into a single-lamp-receiving socket of the photographic apparatus, the significant feature here being that the means for returning the actuating member from its lamp-igniting position to its cocked position is actuable by some means in the apparatus for effecting one or more phases of the cyclic operation of the apparatus, as discussed hereinabove.

WHAT WE CLAIM IS:—

1. A photographic flashlight adapter comprising means for receiving a percussion-ignitable flash lamp, an actuating member for initiating percussion-ignition of a received lamp, means for sequentially cocking and firing the actuating member and means for connecting the adapter to a socket on a photographic apparatus adapted for use with electrically-ignitable flash lamps.

2. An adapter according to claim 1, wherein the percussion-ignitable flash lamp unit receivable by the receiving means is a multilamp unit containing a plurality of percussion-ignitable flash lamps, the receiving means being rotatable successively to place the percussion-ignit-

able lamps of a unit received by the receiving means at an operative site.

3. An adapter according to claim 1 or 2, wherein the actuating member is retained in its cocked position by means of an electro-magnetic device and is released for movement to the firing position upon energization of the electro-magnetic device.

4. An adapter according to claim 3, wherein the actuating member is spring urged to the firing position.

5. An adapter according to any one of the preceding claims, wherein the actuating member is movable to its cocked position by means of a cam.

6. An adapter according to claims 2 and 5, wherein the receiving means is rotatable relative to the actuating means and is coupled to the cam, the receiving means and cam being adapted for rotation, when the adapter is connected to a photographic apparatus, by the operating mechanism of such apparatus.

7. An adapter to enable use of a multilamp photoflash unit of the type having a plurality of percussion-ignitable flash lamps with a photographic camera that includes a rotatable socket for receiving a multilamp photoflash unit of the type having a plurality of electrically ignitable flash lamps, means for rotating the socket to successively place the electrically ignitable lamps of the multilamp unit received by the socket in an operative orientation, and a synchroflash circuit for energizing each operatively oriented electrically ignitable lamp of the received unit in synchronization with picture-taking operation of the camera, said adapter comprising:

- (a) means for receiving the multilamp photoflash unit of the type having a plurality of percussion-ignitable flash lamps, said receiving means being rotatable to successively place the percussion-ignitable lamps of the multilamp unit received by said receiving means at an operative site;
- (b) means, movable from a first position to a second position, for initiating percussive ignition of each operatively sited percussion-ignitable lamp of the received unit;
- (c) means for urging said initiating means from said first position to said second position to thereby initiate percussive ignition of each operatively sited lamp;
- (d) means, including a solenoid operatively associated with said initiating means and electrically connectable to and energizable by the camera synchroflash circuit, for controlling movement of said initiating means from said first position toward said second position, said solenoid having a member movable from a first location to a second location and engageable with said initiating means, said member when in said first location engaging said initiating



means when in said first position to retain said initiating means against movement from said first position toward said second position, said member being movable from said first location to said second location in response to energization of said solenoid to release said initiating means for movement from said first position toward said second position;

(e) means, including rotatable camming means engageable with said initiating means, for returning said initiating means from said second position to said first position;

(f) means, coupled to said receiving means and said returning means and insertable into the camera socket, for operatively connecting said adapter to the camera, said connecting means when inserted in the camera socket thereby coupling said receiving means and said returning means to the camera socket for rotation therewith by the camera socket rotating means and electrically connecting said controlling means to the camera synchroflash circuit for energization thereby in synchronization with picture-taking operation of the camera.

8. The adapter claimed in Claim 7 wherein said initiating means includes a striking element that is moved into contact with the received unit to effect percussive ignition of each operatively sited lamp in response to movement of said initiating means from said first position to said second position.

9. The adapter claimed in Claim 7 wherein said solenoid includes means for urging said member from said second location to said first location when said solenoid is not energized.

10. The adapter claimed in Claim 9 wherein said member includes a cam surface which, when said member is in said first location, is engaged by said initiating means to move said member from said first location, in opposition to the influence of said solenoid urging means, as said initiating means is moved toward said first position, thereby enabling said initiating means to be moved to said first position, said member then being returned by said solenoid urging means to said first location to retain said initiating means in said first position.

11. The adapter claimed in Claim 7 further comprising means, coupled to said initiating means and said controlling means and engageable with the camera when said connecting means is inserted into the camera socket, for securing said initiating means and said controlling means against rotation with said receiving means and said returning means when said connecting means is inserted in the camera socket and rotated by the camera socket rotating means.

12. Photographic flashlight adapters constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

L. A. TRANGMAR, B.Sc.,
Chartered Patent Agent,
Agent for the Applicants.