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(54) 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 for firing an electrically ignitable flash lamp or flash cube and for use with a photographic apparatus (hereinafter referred to as "of the kind defined") having a socket for receiving a percussion-ignitable flash lamp unit having one or more flash lamps, each of which has a primer for activating the lamp upon being struck by an actuating member within the apparatus or by a striker which is incorporated in the unit and is dislodged or released by the actuating member within the apparatus.

In accordance with the present invention there is provided a photographic flashlight adapter for use with photographic apparatus of the kind defined, comprising a socket for operably receiving an electrically ignitable flash lamp, means for operably receiving a source of electrical potential, means for electrically connecting the socket, the source-receiving means and switch means, and means for mounting the switch means on the photographic apparatus for actuation by the actuating member thereof to ignite an electrically ignitable flash lamp in the socket by a source of electrical potential in the source-receiving means in response to movement of the actuating member of the photographic apparatus.

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

Fig. 1 is a perspective view of a photographic camera designed for use with a multi-lamp flash unit of the type having a plurality of percussion-ignitable flash lamps, showing

such a flash unit supported in a suitable socket adjacent to a striking member of the camera;

Fig. 2 is a perspective view of the photographic camera of Fig. 1, showing an adapter constructed in accordance with one form of the present invention supported in the camera socket;

Fig. 3 is a fragmentary perspective view of a base portion suitable for use on the adapter of Fig. 2;

Fig. 4 is a perspective view of the photographic camera of Figs. 1 and 2, showing an adapter constructed in accordance with another form of the present invention connected to the camera by a flexible power cord plugged into the camera socket;

Fig. 5 is a schematic view of a socket-rotating mechanism suitable for use in the adapter of Fig. 4;

Fig. 6 is a schematic view of one form of switch means for use with the adapters shown in Figs. 2 and 4 wherein one of two electrical conductors plugged into the camera socket is movable into contact with the other, when struck by the camera actuating member, to close the lamp-igniting circuit; and

Fig. 7 is a schematic view of an alternative form of switch means for use with the adapters shown in Figs. 2 and 4, wherein one of two electrical conductors plugged into the camera socket is electrically connected to the camera striking member, which then strikes the other conductor to close the lamp-igniting circuit.

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. 1 of the drawing illustrates a camera 10 having a housing 11, a view finder 12, a lens 13, a shutter-release member 14, a film-winding and shutter-cocking lever 15, and a socket 16 to operably support a multi-

lamp flash unit 17 having a plurality of percussion-ignitable flash lamps therein. Depending from each percussion-ignitable flash lamp of unit 17 is a primer 18. Disposed in camera 10 is an actuating member 19 having an end portion 20 that is movable into percussive contact with primer 18 by a suitable camera mechanism (not shown). The point in the path of movement of end portion 20 at which end portion 20 contacts primer 18, or some other part of the received flash unit responsive when struck to ignite a percussion-ignitable lamp in the unit, defines what will hereinafter be referred to as the firing site of the camera or other photographic apparatus. The present invention provides a means, in the form of an adapter, by which a camera of the kind illustrated in Fig. 1 can be used with a multilamp flash unit of the type having a plurality of electrically ignitable flash lamps, such a multilamp flash unit being described, for example, in U.S. Patent No. 3,244,087, issued April 5, 1966, in the name of L. F. Anderson et al.

An adapter constructed in accordance with one form of the invention is shown in Fig. 2, which illustrates the camera 10 of Fig. 1 with an adapter 30 operably positioned thereon. Adapter 30 comprises a body portion 31 which has, at the top thereof, a socket 32 for receiving a multilamp flash unit 33 having a plurality of electrically ignitable flash lamps 34 therein. Suitably disposed in socket 32 are a plurality of pairs of electrical contacts 35 and 36, the number of pairs of contacts corresponding to the number of lamps 34 in the multilamp flash unit 33. Each pair of contacts 35 and 36 is electrically connected to a source of electrical potential, such as electrical cells 37 received in body portion 31, by wires 40, 41a and 41b when a pair of conductors 38 and 39 depending from the bottom of body portion 31 are brought into contact with each other, there being one pair of conductors 38 and 39 and one set of connecting wires 40, 41a, and 41b for each pair of contacts 35 and 36. As shown in Fig. 2, the pairs of conductors 38 and 39 are insertable into socket 16 of camera 10, conductor 38 of the forward-facing pair being thereby positioned at the firing site of the camera, i.e., in the path of movement of end portion 20 of actuating member 19, conductor 39 being disposed in a position adjacent to but spaced from conductor 38.

Fig. 3 is a fragmentary view of a guard 41 that could be used on adapter 30 to partially enclose and thereby protect each pair of conductors 38 and 39 from damage before and during insertion of the conductors into socket 16. One such guard would depend rigidly from the bottom of body portion 31 of adapter 30 for each pair of conductors 38 and 39, the guards being insertable into corresponding portions of socket 16. Each

guard 41 comprises an enclosure 42 having an opening 43 to permit access to conductor 38 by end portion 20 of actuating member 19.

Referring to Fig. 2 with regard to the operation of adapter 30, actuating member 19 is moved, in response to the camera operator's depression of shutter-release member 14, into percussive contact with conductor 38, thereby causing conductor 38 to be moved into contact with conductor 39. With conductors 38 and 39 in physical contact with each other, the circuit between cells 37 and the connected flash lamp 34 is closed and the connected lamp ignited. Because a camera of the kind illustrated as camera 10 is usually provided with a mechanism (not shown) for effecting rotation of socket 16 at some stage during the picture-taking cycle, it is assumed that operation of camera 10 results in rotation of adapter 30 and multilamp flash unit 33 from one lamp-firing position to the next. As adapter 30 and flash unit 33 are thus rotated, one pair of conductors 38 and 39 is moved away from the firing site of the camera while the succeeding pair of conductors 38 and 39, connected to the succeeding one of flash lamps 34, is moved into position at the firing site to be brought together by striking member 19 during the next operation of the camera.

Referring to the form of the invention shown in Fig. 4, an adapter 50 is operatively positionable at a location remote from camera 10 by means of a flexible power cord 61 terminating in a plug 62 having a pair of conductors that are insertable into socket 16 of the camera. A remotely locatable adapter such as adapter 50 is desirable for producing special photoflash effects, as is well known in the photographic art.

Adapter 50 comprises a body portion 51, a base 52, and a socket 53 for receiving a multilamp flash unit 54 having a plurality of electrically ignitable flash lamps 55 therein. Operably disposed in socket 53 is a pair of electrical contacts 56 and 57 for electrically connecting a selected one of the flash lamps 55 to a source of electrical potential such as electrical cells 58 received in body portion 51. Included in an electrical circuit between contacts 56 and 57 and received cells 58 are wires 59, 60a, and 60b as shown. Wires 59 and 60b extend from body portion 51, through flexible power cord 61, to plug 62 and electrical conductors 63 and 64, respectively. Plug 62 is shown in Fig. 4 with conductors 63 and 64 inserted in socket 16 of camera 10, conductor 63 being thereby positioned at the firing site of the camera, i.e., in the path of movement of end portion 20 of actuating member 19, conductor 64 being disposed in a position adjacent to but spaced from conductor 63.

In operation, the camera operator's

depression of release member 14 causes end portion 20 of actuating member 19 to be moved into percussive contact with conductor 63, thereby moving conductor 63 into contact with conductor 64 to close the circuit and thereby ignite the connected flash lamp 55. Because camera 10 is assumed to have a mechanism (not shown) for effecting rotation of socket 16 at some stage of the picture-taking cycle, means must be provided, for preventing rotation of socket 16 when plug 62 is inserted therein. Such a means is provided in the form of a hook member 65, shown extending from a side wall of plug 62 and around a corner of housing 11 to hold plug 62 and socket 16 in a fixed angular position, it being understood that such prevention of socket rotation will in no way harm a socket-rotating mechanism of the type commonly provided in a camera such as camera 10.

In using the adapter 50 shown in Fig. 4, socket 53 may be rotated manually simply by turning flash unit 54 therein from one lamp-firing position to another. Or, a mechanism for automatically rotating socket 53 may be included within body portion 51, such a mechanism being shown schematically in Fig. 5 where it is designated generally by the reference numeral 70. Mechanism 70 includes a socket rotator 71 having a shaft portion 72 drivingly connected to socket 53 and rotatably movable by a biasing means such as spring 73. Secured at one end of shaft portion 72 is a disc portion 74 having a plurality of ratchet teeth 75 thereon disposed radially outwardly as shown, the number of ratchet teeth 75 corresponding to the number of flash lamps 55 in multilamp flash unit 54. To control the operation of socket rotator 71, mechanism 70 further includes an electromagnetic means such as solenoid 76 comprising an electromagnet 77, having a coil 78 electrically connected to the previously described circuit of adapter 50, and a movable member 79 which is pivotally mounted as at 80 and biased in a clockwise direction, as viewed in Fig. 5, by a spring 81. Movable member 79 has, at a mid-portion thereof, a pawl 82 which, as shown, lies in the path of movement of, and engages, one of the ratchet teeth 75 as shaft portion 72 and socket 53 are rotated, pawl 82 thereby preventing further rotation of socket 53. Upon electrical energization of coil 78, movable member 79 is electromagnetically attracted by electromagnet 77 to the position shown in dashed lines, the resulting counterclockwise rotation of member 79 being in opposition to the biasing force of spring 81 and, at the same time, disengaging pawl 82 from the engaged one of ratchet teeth 75. Such disengagement releases shaft portion 72 and socket 53 for rotation by spring 73 to a succeeding lamp-firing position. Inasmuch as the conductors

63 and 64 are but momentarily joined by the action of resilient striking member 19, solenoid 76 is but momentarily energized, after which spring 81 returns movable member 79 to its position shown in solid lines to engage the succeeding one of ratchet teeth 75 and thereby prevent further socket rotation. It will be understood that the mechanism 70 is shown in schematic form for the purpose of describing, in simplified terms, a means of rotating socket 53 in adapter 50, socket-rotating mechanisms per se being well known in the art. In operation, with a socket-rotating mechanism such as that shown schematically in Fig. 5 incorporated in adapter 50, the camera operator's depression of shutter-release member 14 effects both ignition of the connected flash lamp 55 and rotation of socket 53 to a succeeding lamp-firing position.

As will be apparent to those skilled in the art, a guard such as guard 41 shown in Fig. 3 may be used with plug 62 of adapter 50 to protect conductors 63 and 64 from damage before and during insertion of the conductors into socket 16 of the camera.

The switch means used in the adapters described with reference to Figs. 2 and 4 is shown schematically in Fig. 6 which shows a portion of a camera housing 11', a camera socket 16', and, inserted in socket 16', an adapter 90 having a pair of electrical conductors 91 and 92 depending therefrom, conductors 91 and 92 being connected by wires 93, 94, and 95 to an electrical cell 96 and an electrically ignitable flash lamp 97. Conductor 91 is resiliently movable into contact with conductor 92, in response to movement of end portion 20 of actuating member 19 into percussive contact with conductor 91, to complete the circuit and thereby ignite lamp 97.

Fig. 7 illustrates schematically an alternative form of switch means for use in the adapters described with reference to Figs. 2 and 4 of the present invention and shows a portion of a camera housing 11', a camera socket 16', and, inserted in socket 16', a plug 100 having a pair of electrical conductors 101 and 102 depending therefrom, conductors 101 and 102 being connected by wires 103, 104, and 105 to an electrical cell 106 and an electrically ignitable flash lamp 107. As indicated, when plug 100 is inserted into socket 16', conductor 102 becomes electrically grounded to a common conducting member of the camera. Also grounded is the camera actuating member 19, as shown. Movement of end portion 20 of actuating member 19 into percussive contact with conductor 101 thus closes the electrical circuit between cell 106 and lamp 107 and ignites the lamp. Neither one of conductors 101 and 102 need be movable relative to the other since conductor 101 need only be contacted by striking

member 19 to close the circuit and ignite the lamp. The alternative embodiment illustrated schematically in Fig. 7 could be incorporated, in lieu of the preferred embodiment illustrated schematically in Fig. 6, in the adapters of Figs. 2 and 4, the primary consideration in the alternative embodiment being the electrical interconnection of conductor 102 and actuating member 19 when plug 100 is inserted into the socket 16'.

WHAT WE CLAIM IS:—

1. A photographic flashlight adapter for use with photographic apparatus of the kind defined, comprising a socket for operably receiving an electrically ignitable flash lamp, means for operably receiving a source of electrical potential, means for electrically connecting the socket, the source-receiving means and switch means, and means for mounting the switch means on the photographic apparatus for actuation by the actuating member thereof to ignite an electrically ignitable flash lamp in the socket by a source of electrical potential in the source-receiving means in response to movement of the actuating member of the photographic apparatus.

2. An adapter as claimed in Claim 1, wherein the switch means comprises a pair of electrical conductors, one of which is resiliently movable into momentary contact with the other conductor, when mounted on the photographic apparatus, in response to movement of the actuating member into percussive contact with said resiliently movable conductor, thereby momentarily closing said connecting means.

3. An adapter as claimed in Claim 1, wherein the switch means comprises a pair

of electrical conductors, one of which is electrically connected to the actuating member, when mounted on the photographic apparatus, the actuating member, when moved into percussive contact with the other conductor, electrically connecting the pair of conductors to close the connecting means.

4. An adapter as claimed in Claim 1, 2 or 3 wherein the socket is adapted to receive a multilamp flash unit having a plurality of electrically ignitable flash lamps and is rotatable between successive lamp-firing positions, in each of which positions one or the lamps of a received multilamp flash unit is electrically connected to the connecting means.

5. An adapter as claimed in Claim 4, further comprising means for rotating the socket.

6. An adapter as claimed in Claim 5, 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 electromagnetic means connected to the switch means to release the socket and thereby permit the biasing means to rotate the socket to a succeeding lamp-firing position.

7. An adapter as claimed in any one of the preceding claims, wherein said receiving means is adapted to receive an electrical cell.

8. Photographic flashlight adapters as claimed in Claim 1, constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawing.

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member 19 to close the circuit and ignite the lamp. The alternative embodiment illustrated schematically in Fig. 7 could be incorporated, in lieu of the preferred embodiment illustrated schematically in Fig. 6, in the adapters of Figs. 2 and 4, the primary consideration in the alternative embodiment being the electrical interconnection of conductor 102 and actuating member 19 when plug 100 is inserted into the socket 16'.

WHAT WE CLAIM IS:—

1. A photographic flashlight adapter for use with photographic apparatus of the kind defined, comprising a socket for operably receiving an electrically ignitable flash lamp, means for operably receiving a source of electrical potential, means for electrically connecting the socket, the source-receiving means and switch means, and means for mounting the switch means on the photographic apparatus for actuation by the actuating member thereof to ignite an electrically ignitable flash lamp in the socket by a source of electrical potential in the source-receiving means in response to movement of the actuating member of the photographic apparatus.

2. An adapter as claimed in Claim 1, wherein the switch means comprises a pair of electrical conductors, one of which is resiliently movable into momentary contact with the other conductor, when mounted on the photographic apparatus, in response to movement of the actuating member into percussive contact with said resiliently movable conductor, thereby momentarily closing said connecting means.

3. An adapter as claimed in Claim 1, wherein the switch means comprises a pair

of electrical conductors, one of which is electrically connected to the actuating member, when mounted on the photographic apparatus, the actuating member, when moved into percussive contact with the other conductor, electrically connecting the pair of conductors to close the connecting means.

4. An adapter as claimed in Claim 1, 2 or 3 wherein the socket is adapted to receive a multilamp flash unit having a plurality of electrically ignitable flash lamps and is rotatable between successive lamp-firing positions, in each of which positions one or the lamps of a received multilamp flash unit is electrically connected to the connecting means.

5. An adapter as claimed in Claim 4, further comprising means for rotating the socket.

6. An adapter as claimed in Claim 5, 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 electromagnetic means connected to the switch means to release the socket and thereby permit the biasing means to rotate the socket to a succeeding lamp-firing position.

7. An adapter as claimed in any one of the preceding claims, wherein said receiving means is adapted to receive an electrical cell.

8. Photographic flashlight adapters as claimed in Claim 1, constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawing.

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