

1.154.171



PATENT SPECIFICATION

DRAWINGS ATTACHED

1.154.171

Date of Application and filing Complete Specification: 12 May, 1966.

No. 21017/66.

Two Applications made in United States of America (Nos. 457,980 and 458,016) on 24 May, 1965.

Complete Specification Published: 4 June, 1969.

© Crown Copyright 1969.

Index at acceptance:—G2 A1G

Int. Cl.:—G 03 b 15/04

COMPLETE SPECIFICATION

Photographic Camera

We, EASTMAN KODAK COMPANY, a Company organised 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 (Assignees of MICHAEL CHARNEY and DAVID EASTON BEACH) 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 photographic still cameras with built-in flash systems for receiving a unitary package containing a plurality of photoflash lamps and individual reflectors.

There has been developed a unitary, disposable multilamp photoflash package. The present invention has for its object the provision of a compact and reliable mechanism for receiving and automatically indexing such a package successively to place unused photoflash lamps in a camera photoflash circuit for augmenting scene light in timed relation with operation of the camera.

According to the present invention, there is provided a photographic camera having means to wind film to successively place frames of film on a picture taking axis, a rotatable socket portion to receive and retain a unitary flash lamp package containing a plurality of photoflash lamps and individual reflectors in a fixed position relative thereto, means operatively connecting the film wind means and socket means to rotate the socket portion and a received package through selected positions to successively place the photoflash lamps at a photoflash synchronizing circuit location for flashing the lamps in timed relation with successive film frame exposures upon operation of the camera to take a photograph, the operative means comprising a rotatable socket cam engaging the socket portion, indexing means engaging the cam to prevent cam rotation when the socket is in a selected position,

and slip clutch means to rotate the cam with film wind until engagement of the cam by the indexing means.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is a perspective view of a photographic still camera according to the present invention and showing a multilamp package or unit inserted therein;

Fig. 2 is a rear perspective view of the camera with the multilamp package removed;

Fig. 3 is a simplified perspective view showing a preferred embodiment of the indexing mechanism of a camera of the present invention;

Fig. 4 is a cross section of a socket arrangement, taken on line 4—4 of Fig. 3;

Fig. 5 is an exploded view showing the various elements of the socket of Figs. 3 and 4;

Fig. 6 is a cross-section of a drive mechanism and package ejection arrangement of the camera of the present invention;

Figs. 7 and 8 show two stages of operation of a release and an indexing feature; and

Figs. 9 and 10 respectively show top and side views of an alternative arrangement of an indexing mechanism.

Referring to Figs. 1 and 2, a camera according to the present invention comprises a light-tight housing 10 in which roll film is typically exposed by successively positioning frame portions of the film in the film plane of a picture taking axis 11. Exposure is made through a light aperture on the axis 11 by focusing an image of a scene on the film plane by an objective lens 12 for a predetermined time period. Operation of the camera is accomplished by depressing an accessible body release button 13, which operates a shutter and aperture control mechanism in a known manner. Winding of the roll film to successively position the film frames on the



film plane is accomplished by means of a winding lever 14 accessible from the back of the camera housing 10.

- 5 On the top wall of housing 10 is located a socket assembly 15 for receiving a multilamp photoflash package 16 with a selected one of a plurality of flash lamps 17 facing in the direction of the picture taking axis 11.

- 10 The multilamp package or unit 16 comprises a plurality (four) miniature photoflash lamps 17 of known manufacture (AG variety) mounted on a rotatable base 18 about, and parallel to, an axis of rotation defined by a depending centre post 19. The centre post 15 19 has a hollow cylindrical shape and includes four radially extending lugs 20 having upper and lower ramped surfaces engageable with retaining means in a receiving socket arrangement.

- 20 The base 18 defines four lamp sides at which the lamps 17 are located, and disposed behind each lamp 17 is a dish-shaped light reflector 21 of preformed sheet material to provide the desired light emission pattern. 25 A light transmitting protective cover 22 of cubic shape is fixed to the base and overlies the lamps 17 and reflectors 21 to enclose the package.

- 30 An annular contact ring 23, coaxial with the centre post 19, extends below the base 18. Pairs of lead-in wires 24, 25 from each photoflash lamp 17 pass through the base 18 and are wrapped vertically around the contact ring 23 for selective electrical connection by 35 engagement with the terminals of a flash synchronizing circuit to fire the flash lamp in timed relation with camera operation in a known manner.

- 40 Located within the camera housing 10 are the elements of the multilamp flash package advancement mechanism operable to receive and selectively advance an inserted multilamp package during film wind.

- 45 Mounted at the top wall of the camera housing 10 is the receiving socket assembly 15, which is formed of an upper portion 27 and a lower portion 28 (See Figs. 4, 5 and 6), a part of which is telescoped into the upper portion 27 and fixed thereto. The upper portion 50 27 defines an access opening shaped as shown to permit insertion of the connecting post 19 and retaining lugs 20 of a multilamp package 16 in any one of four preselected positions in which one flash lamp 17 faces in the 55 direction of the picture taking axis 11.

- 60 The lower socket portion 28 also defines slots 30 (Fig. 5) aligned with the access opening of the upper portion 27. The top surface of the lower portion 28 further defines a raised rectangular boss 31 about which is positioned a square hair spring 32. The resilient arms of the spring 32 overlie a pair of opposing slots 30 for lateral movement outwardly and engagement with a pair of

opposing retaining lugs 20 of an attached package. 65

Fitting within the slots 30 of the lower socket portion 28 is a four legged plate spring 35 having a centre opening in which is mounted a stabilizing stud 33 fixed to a 70 shaft 34 by threading or the like. As may be seen in Fig. 4, the plate spring 35 is held down by a collar on the stud 33, and the spring legs act against the bottom socket portion 28 to urge the bottom portion downwardly. Both the socket portion 28 and spring 35 are, however, free to rotate relative to stud 33. 75

The socket assembly 15 is spaced from the top wall of the housing 10 to define an annular recess 29 which receives the contact ring 23 of an inserted flash unit 16. A pair of contact terminals 36, 37 of a suitable flash synchronizing circuit are disposed at the front of the recess 27 to engage the lead-in wires 24, 25 80 of the forward facing lamp 17, thereby placing the forward lamp 17 in the flash circuit.

To attach a multilamp package 16, the centre post 19 of the package is inserted into the socket access opening with the stabilizing stud 33 fitting into the centre post 19. During insertion, the lower ramped surfaces of an opposing pair of retaining lugs 20 85 urge the arms of the returning spring 32 outwardly until the package 16 is fully seated. At this time, the arms of the spring 32 spring inwardly over the upper ramped surfaces of the opposing lugs 20 firmly to retain the package 16 in the socket assembly 15. 90 95 ramped

Encircling the upper socket portion 27 is 100 an annular ejector ring 38 which is vertically slidable relative to the socket to engage the lower edge of the contact ring 23 and thereby eject the package from the socket. The ejector ring 38 is controlled from below by a bifurcated ejector yoke 39 which fits on both sides of the ring 38 at the bifurcated end under a suitable collar formed on the ejector ring 38. The yoke is pivotably mounted by 105 an integral pin 40 to a fixed mechanism plate 26 within the housing 10. The other end of yoke 39 is engaged by the lower end of an ejector button 41 which is accessible from the top wall of the camera housing 10 as shown in Figs. 1 and 2. A compression spring 110 42 mounted between the button 41 and yoke 39 urges the button 41 upwardly against the top camera wall and further urges the bifurcated end of yoke 39 upwardly against the ejector ring 38 to eliminate play. 115 120

One leg of the bifurcated end or ejection yoke 39 has an extension to engage a movable member 43 forming part of a known camera operating control mechanism, such as a shutter speed change or a diaphragm adjustment mechanism 44. For example, the member 43 may be biased by a control spring 44 to a day-light operation position (to the 125

light as seen in Fig. 6) in which the camera mechanism is set for daylight or automatic exposure control. Insertion of a flash package 16 moves the ejection ring 38 and yoke 39 down to thereby move the member 43 against the spring bias to a flash exposure control position (at the left in Fig. 6). An operating control mechanism of this type to control shutter speed is disclosed, for example in U.K. Specification No. 1,062,577.

According to the present invention, rotation of an attached package 16 successively to place the lamps 17 in the flash circuit is accomplished by coordination with film wind. Thus, there is shown in Fig. 3 a portion of a typical film take-up spool 45 on which roll film is wound frame by frame after each exposure. The take-up spool 45 is operatively connected to a film wind gear 46 which is selectively rotated by movement of a winding rack 47 in the direction of the arrow. The winding level arm 14, accessible from outside the camera body may be formed integrally with the rack to move the rack to the left as shown in Fig. 3 (to the right in Fig. 2) against the bias of a rack return spring (not shown) and thereby to wind film onto the spool 45. Metering notches in the film or suitable frame numbers visible through a window in the back of the camera housing 10 may be used to indicate when the next successive unexposed frame of film is positioned on the film plane.

The film wind gear 46 is formed to define an annular recessed bearing surface 48 in its top surface, the rear circumference of which intersects the axis of rotation of the socket assembly 15 and inserted flash package 16. A pivot idler pin 49 (Fig. 6) of circular shape fits within the surface 48 to define a lower rotational bearing surface for the shaft 34. Integral and coaxial with film wind gear 46 is a socket indexing drive gear 50 which meshes with a driven gear 51. The lower surface of the gear 51 forms a friction clutch surface with the upper face of a friction clutch plate 52 fixed to the shaft 34.

Thus, rotation of the film gear 46 by the rack 47 causes simultaneous rotation of the drive gear 50 and the driven gear 51. The rotation of the driven gear is then transmitted to shaft 34 by the friction clutch plate 52 until the frictional engagement of the clutch is overcome. A bearing 53, mounted on the fixed mechanism plate 26, permits stable rotation of the shaft 34.

In order selectively to rotate the socket assembly 15 and the inserted package 16 to place the lamps 17 in the flash circuit, there is provided a latching and release mechanism designed to control the rotational motion from the film wind. In this respect, a socket cam 54 is located below the lower portion 28 of the socket assembly 15. The cam 54 is keyed to shaft 34 for rotation therewith and includes

four equi-spaced radial detent grooves 55 in its upper surface. Correspondingly, the lower surface of the lower portion 28 includes mating curved lobes 56 engageable with the grooves 55. The engaging grooves and lobes couple the cam 54 and socket assembly 15 to transfer the rotational motion of the slip clutch mechanism through the shaft 34 and keyed cam 54 to the socket assembly 15. Sufficient torque applied directly to the socket 15, however, as by grasping and turning an inserted package 16 by hand, results in lobes 56 raising the socket 15 against the bias of the plate spring 35 permitting manual rotation of the socket assembly without disturbing the winding and indexing mechanism.

The cam 54 further includes a reduced diameter step portion defining four radial indexing slots 57 equi-spaced on the periphery of the step portion as extensions of the grooves 55. A metering pawl 58 pivotable about a fixed pivot 59 on the mechanism plate 26 includes a metering lug 60 selectively engageable with the slots 57. The metering pawl 58 defines an elongated slot 64 cooperating with pivot 59, and a tension spring 61 biases the pawl lug 60 into selective engagement with the slots 57 and along the periphery of the cam in a direction opposite to the cam rotation (downwardly in Figs. 7 and 8).

A separate latch lever 62 may also be provided, the latch lever 62 pivoted for rotational motion only about the pivot 59 and including a lug 63 engageable with the slots 57. A latch spring 65 urges the latch lever 62 toward the cam for selective engagement of the lug 63 with the slots 57. A control lug 66 at the movable end of latch 62 is engaged by the metering pawl 58 to move the latch lever 62 against the spring bias whenever the metering pawl is moved against its spring bias (clockwise in Figs. 7 and 8). Movement of the metering pawl 58 is controlled by a lug 67 on the pawl 58 engaged by an end 69 of a metering lever 68. The lever 68 is pivoted about a pivot 70, and its movement, in turn, is controlled by a lug 71 on a lever 72. The lever 72 is pivoted about a pin 73 (counterclockwise in Fig. 3) upon downward movement of the body release button 13. A spring 75 normally urges the button 13 upwardly, which, in turn, urges the linked levers toward the positions shown in Fig. 3.

For camera operation augmented with flash, a flash package 16 is inserted into the receiving socket assembly 15 with an unused flash lamp 17 facing in the direction of the picture taking axis 11. As the package is inserted, the contact ring 23 urges the ejection ring 38 and the yoke 39 downwardly to set the exposure control mechanism for flash operation by movement of member 43 in response to movement of the extended arm of the ejection yoke 39. At this time, both the lugs 60 and 63 are in engagement with the

70

75

80 assembly

85

90

95

100

105

110

115

120

125

130



adjacent slot 57 to maintain the socket in position (Fig. 7).

Assuming the camera to be otherwise ready for operation, the camera is then aimed at the desired subject and the body release button 13 is depressed to operate the shutter mechanism expose the frame of photosensitive film on the film plane according to predetermined flash exposure values. In timed relation therewith, the forward facing flash lamp 17, which is placed in the flash circuit by engagement with terminals 36, 37, is fired by the closing of a known shutter synchronizer switch.

Immediately before operation of the shutter mechanism, the release lever 72 acts in response to the body release button 13 to move the metering lever 68 counterclockwise and thereby disengage the latch lug 63 and the indexing pawl lug 60 from the adjacent indexing slot. As this occurs, the pawl spring causes the metering pawl 58 to be displaced forwardly due to its pivot slot 64 and thereby prevents re-engagement of the pawl lug 60 with the adjacent slot 57. In like manner, the latch lug 63 is prevented from re-engaging the slot 57 because of the control lug 66 (Fig. 8).

After the film exposure with augmenting flash, the film is then wound onto the film take-up spool 45 by the winding lever 14 until the next film frame is positioned on the picture taking axis 11. As the film wind drive gear 46 is rotated in the direction of the arrow to wind film, the integral clutch drive gear 50 rotates the socket assembly 15 through the operative drive connection described until the cam 54 (and the socket assembly 15) has turned clockwise (Fig. 8) through a one quarter turn to place the next lamp 17 in the circuit. As the socket assembly 15 approaches the limit of rotation, the subsequent indexing notch 57 corresponding to the position of the next lamp 17 moves into alignment with the forwardly displaced metering pawl lug 60. The metering pawl lug 60 then engages the notch 57 due to the pawl spring 61, and the cam causes the pawl 58 to be moved back into the position shown in Fig. 7 as the socket assembly 15 completes the quarter turn. The latch lug 63 then engages the notch 57 by virtue of its spring bias, and the cam 54 and socket assembly 15 are latched in the position shown in Fig. 7 and prevented from further rotation. Further operation of the film winding mechanism completely to wind the subsequent frame of film onto the film plane causes the friction clutch (gear 51—plate 52) to slip, thereby permitting additional indeterminate rotation of the film spool 45 without further rotation of the socket assembly 15.

In the event that a lamp 17 other than the forward firing lamp is desired to be placed in the circuit, the package and socket assembly 15 may be grasped and rotated by hand to

permit relative rotation of the socket assembly 15 and the cam 54 as described and place any selected one of the flash lamps in the circuit without disturbing the film and socket drive mechanism. The latch lug 63 prevents rotation of the cam 54 in either direction until after camera operation to make an exposure as described.

After four complete flash pictures have been taken, or whenever daylight operation of the camera is desired, the package 16 may be removed by depressing the accessible ejection button 41 to pivot the yoke 39 and to move ejector ring 38 upwardly against the package contact ring 23. The upper ramped surfaces of the engaged lugs 20 move the arms of the retaining spring 32 outwardly to enable ejection of the package.

Figs. 9 and 10 show an alternative construction of the socket cam arrangement to ensure exact alignment of the socket assembly 15 with the picture taking axis 11, thereby providing exact placement of the forward facing lamp 17 and reflector 21 in the photoflash circuit.

The alternative construction shown in Figs. 9 and 10 comprise a socket cam 54' having four wedge-shaped teeth 76 positioned adjacent the indexing slots 57' (and grooves 55') as shown. A spring end 77 is engageable with the teeth 76 with a bias in the direction of the arrow to urge the cam 54' counterclockwise (Fig. 9) in an indexed position to prevent play between a lug 60' and pawl 58' and the engaged indexing slot 57'. Stops 78 and 79 are provided to prevent excessive spring motion. Whenever the cam 54' is rotated clockwise during film wind, the engaged tooth 76 moves the spring end 77 against its bias for engagement with a fixed control cam 80 to cause the spring end 77 to release the engaged tooth 76 and return to a position enabling it to engage the next tooth 76. Of course, whenever the pawl 58' is provided with an elongate pivot slot as in the preferred embodiment, a latch lever corresponding to the latch lever 62 in Fig. 7 would prevent counterclockwise rotation during engagement of a slot 57'.

The subject matter of the present application is closely related to that of our copending patent application No. 2526/69 (Serial No. 1,154,173).

WHAT WE CLAIM IS:—

1. A photographic camera having means to wind film to successively place frames of film on a picture taking axis, a rotatable socket portion to receive and retain a unitary flash lamp package containing a plurality of photoflash lamps and individual reflectors in a fixed position relative thereto, means operatively connecting the film wind means and socket means to rotate the socket portion and a received package through selected positions to successively place the photoflash lamps at a

comprises

adjacent slot 57 to maintain the socket in position (Fig. 7).

Assuming the camera to be otherwise ready for operation, the camera is then aimed at the desired subject and the body release button 13 is depressed to operate the shutter mechanism expose the frame of photosensitive film on the film plane according to predetermined flash exposure values. In timed relation therewith, the forward facing flash lamp 17, which is placed in the flash circuit by engagement with terminals 36, 37, is fired by the closing of a known shutter synchronizer switch.

Immediately before operation of the shutter mechanism, the release lever 72 acts in response to the body release button 13 to move the metering lever 68 counterclockwise and thereby disengage the latch lug 63 and the indexing pawl lug 60 from the adjacent indexing slot. As this occurs, the pawl spring causes the metering pawl 58 to be displaced forwardly due to its pivot slot 64 and thereby prevents re-engagement of the pawl lug 60 with the adjacent slot 57. In like manner, the latch lug 63 is prevented from re-engaging the slot 57 because of the control lug 66 (Fig. 8).

After the film exposure with augmenting flash, the film is then wound onto the film take-up spool 45 by the winding lever 14 until the next film frame is positioned on the picture taking axis 11. As the film wind drive gear 46 is rotated in the direction of the arrow to wind film, the integral clutch drive gear 50 rotates the socket assembly 15 through the operative drive connection described until the cam 54 (and the socket assembly 15) has turned clockwise (Fig. 8) through a one quarter turn to place the next lamp 17 in the circuit. As the socket assembly 15 approaches the limit of rotation, the subsequent indexing notch 57 corresponding to the position of the next lamp 17 moves into alignment with the forwardly displaced metering pawl lug 60. The metering pawl lug 60 then engages the notch 57 due to the pawl spring 61, and the cam causes the pawl 58 to be moved back into the position shown in Fig. 7 as the socket assembly 15 completes the quarter turn. The latch lug 63 then engages the notch 57 by virtue of its spring bias, and the cam 54 and socket assembly 15 are latched in the position shown in Fig. 7 and prevented from further rotation. Further operation of the film winding mechanism completely to wind the subsequent frame of film onto the film plane causes the friction clutch (gear 51—plate 52) to slip, thereby permitting additional indeterminate rotation of the film spool 45 without further rotation of the socket assembly 15.

In the event that a lamp 17 other than the forward firing lamp is desired to be placed in the circuit, the package and socket assembly 15 may be grasped and rotated by hand to

permit relative rotation of the socket assembly 15 and the cam 54 as described and place any selected one of the flash lamps in the circuit without disturbing the film and socket drive mechanism. The latch lug 63 prevents rotation of the cam 54 in either direction until after camera operation to make an exposure as described.

After four complete flash pictures have been taken, or whenever daylight operation of the camera is desired, the package 16 may be removed by depressing the accessible ejection button 41 to pivot the yoke 39 and to move ejector ring 38 upwardly against the package contact ring 23. The upper ramped surfaces of the engaged lugs 20 move the arms of the retaining spring 32 outwardly to enable ejection of the package.

Figs. 9 and 10 show an alternative construction of the socket cam arrangement to ensure exact alignment of the socket assembly 15 with the picture taking axis 11, thereby providing exact placement of the forward facing lamp 17 and reflector 21 in the photoflash circuit.

The alternative construction shown in Figs. 9 and 10 comprise a socket cam 54' having four wedge-shaped teeth 76 positioned adjacent the indexing slots 57' (and grooves 55') as shown. A spring end 77 is engageable with the teeth 76 with a bias in the direction of the arrow to urge the cam 54' counterclockwise (Fig. 9) in an indexed position to prevent play between a lug 60' and pawl 58' and the engaged indexing slot 57'. Stops 78 and 79 are provided to prevent excessive spring motion. Whenever the cam 54' is rotated clockwise during film wind, the engaged tooth 76 moves the spring end 77 against its bias for engagement with a fixed control cam 80 to cause the spring end 77 to release the engaged tooth 76 and return to a position enabling it to engage the next tooth 76. Of course, whenever the pawl 58' is provided with an elongate pivot slot as in the preferred embodiment, a latch lever corresponding to the latch lever 62 in Fig. 7 would prevent counterclockwise rotation during engagement of a slot 57'.

The subject matter of the present application is closely related to that of our copending patent application No. 2526/69 (Serial No. 1,154,173).

WHAT WE CLAIM IS:—

1. A photographic camera having means to wind film to successively place frames of film on a picture taking axis, a rotatable socket portion to receive and retain a unitary flash lamp package containing a plurality of photoflash lamps and individual reflectors in a fixed position relative thereto, means operatively connecting the film wind means and socket means to rotate the socket portion and a received package through selected positions to successively place the photoflash lamps at a

70

75

80

85

90

95

100

105

110

115

120

125

130

comprises

assembly



* C L M S *

photoflash synchronizing circuit location for flashing the lamps in timed relation with successive film frame exposures upon operation of the camera to take a photograph, the operative means comprising a rotatable socket cam engaging the socket portion, indexing means engaging the cam to prevent cam rotation when the socket is in a selected position, and slip clutch means to rotate the cam with film wind until engagement of the cam by the indexing means.

2. A camera according to claim 1 wherein the cam and the socket portion have inter-engaging grooves and lobes, and further comprising spring means urging the cam and socket toward engagement, the grooves and lobes permitting manual rotation of the socket portion relative to the cam by overcoming the spring means.

3. A camera according to claim 1 or 2 further comprising means responsive to camera operation to release the indexing means from engagement, and means preventing re-engagement of the indexing means until the next successive selected position and corresponding lamp is at the photoflash circuit location.

4. A camera according to claim 3 wherein the indexing means comprises a pivotable pawl biased toward engagement with corresponding slot means defined by the cam, and the

preventing means includes means to move the pawl out of alignment with the slot means.

5. A camera according to any preceding claim wherein the film wind means includes a rotatable film drive gear for winding film to place successive frames of film on a picture taking axis, the drive gear defining an annular bearing surface on a face thereof, a socket drive gear coaxial with the film drive gear and rotatable with the film drive gear, a driven gear meshing with the socket drive gear and defining a friction surface, a driving plate defining a friction surface engageable with the gear friction surface, and a shaft defining the axis of rotation of the plate having one end positioned in the annular bearing surface of the film drive gear, the shaft being fixed to the plate for rotation therewith.

6. A camera as claimed in claim 5 wherein the socket cam is fixed to the other end of the shaft for rotation therewith.

7. A photographic camera substantially as hereinbefore described with reference to and as illustrated in Figs. 1 to 8 or Figs. 1 to 8 as modified by Figs. 9 and 10 of the accompanying drawings.

L. A. TRANGMAR, B.Sc., C.P.A.
Agent for the Applicants.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1969.
Published by the Patent Office, 25 Southampton Buildings, London, W.C.2, from which copies may be obtained.

