

PATENT SPECIFICATION

(11)

1 484 805 (12)

1 484 805

(21) Application No. 33453/75 (22) Filed 11 Aug. 1975
(31) Convention Application No. 49/097 026 (32) Filed 13 Aug. 1974 in

(33) Japan (JA)

(44) Complete Specification published 8 Sept. 1977

(51) INT. CL.² G03B 15/05

(52) Index at acceptance

G2A 401 403 459 467 470 497 500 542 659 662 687 DC



(54) CAMERA

(71) We, KONISHIROKU PHOTO INDUSTRY COMPANY, LTD., a corporation organised and existing under the laws of Japan, of 1-10, 3-chome, Nihonbashi-Muromachi, Chuo-ku, Tokyo, Japan, 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:—

This invention relates to a camera equipped with a built-in electronic flash device.

Many types of cameras equipped with built-in electronic flash devices are marketed. However, when cameras, especially compact cameras, equipped with built-in electronic flash devices are operated, an undesirable phenomenon often occurs. When a camera is compact, the light-emitting portion of the built-in electronic flash device is positioned close to the optical axis of the camera objective. In this case, there may arise the phenomenon that the pupils of the eyes of a photographed person appear red-tinted in the finished photograph. This phenomenon, which is generally called the "red eye" phenomenon, is considered attributable to the incidence on the camera objective of red light reflected from the retina in the eyeball illuminated by the flash light.

The present invention is intended to provide a camera equipped with a built-in electronic flash device in which the "red eye" phenomenon is reduced or minimized. At the same time, the invention aims to prolong the life of the battery conventionally fitted in the camera to power the flash device.

In the camera according to the invention, a built-in electronic flash device has a light-emitting portion movable from a first position in which it is retracted within the camera casing to a second position where said portion is operatively

positioned outside the casing more distant from the axis of the camera objective than when said portion is in said first retracted position, said flash device also including a switch operable in response to outward and retracting movement of the light-emitting portion respectively to close and open a power source circuit for charging a capacitor means which is dischargeable to flash the light-emitting portion of said electronic flash device.

More especially, the flash device is arranged so that when the light-emitting portion is moved out to its extended (operative) position, the distance from the light-emitting portion to the optical axis of photographic objective becomes sufficiently greater than that when the light-emitting portion is in its retracted position substantially to avoid the "red eye" phenomenon.

According to one embodiment of the present invention, there is provided a first means for automatically adjusting a diaphragm aperture in accordance with the brightness of the object and second means for adjusting said diaphragm aperture in accordance with the distance of the object from the camera, said first and second means being selectively brought into the operative condition respectively in response to retracting and outward movement of the light-emitting portion of the electronic flash device.

The distance between the flash device centre and the objective optical axis which can prevent the "red eye" phenomenon is dependent on the photographing distance and differences of eyeball configuration between persons. However, since photographing with use of flash light is generally conducted with photographing distance of at most 7 metres and the difference of eyeball configuration between persons is relatively small, the red eye phenomenon is

effectively prevented by providing a distance of at least 60 mm between the centre of the light-emitting portion of the flash device and the optical axis of the camera objective.

Although the "red eye" phenomenon is not completely prevented by the above-mentioned minimum distance, this distance is satisfactory to minimise the phenomenon for all practical purposes.

The present invention is now exemplified by way of an embodiment thereof having reference to the accompanying drawings, in which:

Fig. 1 is a front view of a compact camera with an electronic flash device retracted;

Fig. 2 is a front view of the camera with the flash device extended into its operative position; and

Figs. 3 to 5 show camera coupling mechanism associated with the retractable flash device.

Referring generally to the drawings, reference numeral 1 designates a camera body or casing, 1a a stop formed in said camera body 1 for restricting projection of an electronic flash box 2 which is to be described later, and 1b is a light-receiving section for supplying photoelectric information of the brightness of the object to an exposure meter in an automatic exposure adjuster or controlling device (not shown), which is known per se and is contained in the camera body 1. The electronic flash box 2 is arranged projectable outwardly from or retractable into the camera body 1 and houses therein all or part of the electronic flash device which is known per se. For daylight photography, it is placed in its retracted position in the camera body 1 as shown in Figs. 1 and 3, but when flashlight photography is to be carried out, it is pulled out to its projected position above the top surface of the camera body, as shown in Figs. 2 and 4.

The amount of projection of the flash box 2 is set such that when said box is pulled out to its projected position, the centre of flash light-emitting portion 3 and the optical axis of photography O will be spaced at a distance L in Fig. 2 which is sufficient substantially to avoid occurrence of the aforementioned "red eye" phenomenon, for example a distance of 67 mm, and when said box 2 is in its retracted position, they will be spaced at a distance L (Fig. 1) for example 55 mm, selected to attain maximum compactness of the camera body with no regard to said "red eye" phenomenon. Numeral 4 designates a notch provided at a lower side of said box 2, 5 a pin planted on said box, 6 a tension spring stretched between said pin 5 and another

pins also secured on said box 2, and 10 a switching member pivotally secured to the camera body 1 by a shaft 12. The head 10a of said member 10 is exposed to the outside of the camera body.

11 is a protuberance formed on said switching member and designed to engage in said notch 4 formed in the flash box 2; 13 is a spring adapted to urge said switching member counterclockwise, 14 a spring stop, and 16 an intermediate lever pivoted on a shaft 15, one end 16a of said intermediate lever 16 being interposed between the pins 8 and 9 while the other end 16b has a coupling pin 18 fixed thereon. 17 is a switch-driving pin fixed on the back of the central part of the left arm of said intermediate lever 16. This pin 17 is so positioned that when the intermediate lever 16 is in the position shown in Fig. 3 (that is, when the flash box 2 is at its retracted position), said pin 17 opens the switch 19, 20 of the conventional capacitor-charging circuit of the flash light, which circuit is known per se, and when said lever 16 is at the position shown in Fig. 4 (that is, when the flash box 2 is at its projected position), said pin 17 closes said switch 19, 20.

When a CdS cell is used for the light receiving section of the automatic exposure adjuster, a special power source is necessary, so that in such a case a switch for opening and closing the power source circuit may be provided along with said switch 19, 20, or a double throw switch may be used instead of said switch 19, 20 so as to selectively open or close the power source circuit of the automatic exposure adjuster and the flash light capacitor charging circuit.

21 is a flashlight photography change-over ring movably mounted around the optical axis O. It has at its peripheral edge a radially elongated slot 21a, in which fits said coupling pin 18, and with a change-over cam 21b. Provided above said ring 21 is a guide number ring 22 also arranged movably around the optical axis O and provided with an operating protuberance 22a exposed outside of the camera body or outside of the objective mount, and a compensation cam 22b adapted for compensating for the change of the correlation of photographing distance and diaphragm aperture caused by difference in sensitivity of films being used. 23 is a diaphragm-driving plate, which plate couples a focusing ring and diaphragm blades, said driving plate being pivoted by a movable shaft 28 mounted on the free end of a rocker lever 27, which is described later. The end 23a of said driving plate 23 is pre-positioned so that it can contact with a pin 36 fixed on a diaphragm blade, to be described later,

when the ring 21 is turned from the position of Fig. 3 to that of Fig. 4. 24 is a first pin fixed on said diaphragm driving plate 23 such that it is engageable only with the changeover cam 21b of the flashlight photography changeover ring 21 when said ring 21 is maintained in its daylight photographing position shown in Fig. 3. That is, this first pin 24 is of such a height that it is engageable with said changeover cam 21b but not engageable with the guide number ring 22 thereabove. 25 is a second pin secured on the diaphragm driving plate 23 such that it is engageable with a cam 35a formed on a focusing ring 35 on the objective mount only when said changeover cam 21b is located in the flashlight photographing position shown in Fig. 4. The rocker lever 27 is pivoted on a shaft 29, and 28 is a movable shaft mounted at the free end of said lever 27. This movable shaft 28 is designed on the one hand to pivotally support the diaphragm drive plate 23 and on the other hand, to normally engage with the compensating cam 22b of said guide number ring 22. 30 is a spring adapted to engage a step 27a on the rocker lever to urge said rocker lever 27 clockwise, with one end of said spring being secured by a pin 31. 33 is a spring held in position by a central strut 32 and an end strut 34 and adapted to turn the diaphragm driving plate 23 clockwise relative to the movable shaft 28 through said second pin 25. 36 is an aperture pin in the diaphragm assembly provided in the lens mount. This aperture pin is arranged such that, on one hand, it is driven by the automatic exposure adjuster, such as the member 53 thereof described below, to automatically set the proper diaphragm aperture in the known manner and that, on the other hand (that is, when flashlight photography is to be carried out), it sets the diaphragm aperture via the diaphragm driving plate 23 by the operation of a cam (focus-aperture control cam 35a in the case of the present invention) which operates when focusing.

Fig. 5 schematically shows an example of the automatic aperture control mechanism. In this Figure, numeral 23a indicates an end of said diaphragm drive plate, 36 said aperture pin, 51 a meter pointer for automatic exposure adjustment, 52 a pointer abutment, and 53 a pointer detecting member having a toothed portion and swingably pivoted by a shaft 54. It is adapted to hold and fix said meter pointer 51 between it and said pointer abutment 52. 55 is a spring adapted to urge said toothed member 53 counterclockwise, 56 a shutter release plate operatively coupled to said toothed member 53 through a pin 57 on said plate, 58 a diaphragm driving lever

pivotally supported by a shaft 59 and urged counterclockwise by a relatively weak spring 60, 61 a transmission pin, and 62 an aperture blade pivoted by a shaft 63.

The meter pointer 51 is set such that it deflects to the left in the drawing (in the direction of minimizing the aperture) when the field brightness is high while it displaces to the right (in the direction of full opening the diaphragm blades) when the field is too dark to take a photograph without using a flash light.

The operation of this mechanism is now briefly described. If the field is bright, the meter pointer 51 deflects to the left, so that if the release plate 56 is pushed down under this condition, the detecting member 53 is caused by the spring 55 to swing a corresponding distance counterclockwise, to press the pointer 51 against the abutment 52 at the step of the toothed portion of the detecting member 53 corresponding to the brightness of the subject. Consequently, the diaphragm driving lever 58 is correspondingly turned to reduce the aperture provided by the blades 62 through the pin 36.

When the field is dark, the meter pointer 51 deflects to the right, so that in the case of flashlight photography, the aperture pin 36 is displaced in the aperture reducing direction by the end 23a of the diaphragm drive plate 23 which is moved by the action of the focus-aperture control cam 35a, and as a result, the aperture blades 62 provide an aperture corresponding to the photographing distance at that time.

The above-said operations are further described in respective cases. First, when the field is sufficiently bright, there is no need to use the flash device, so that photography is performed by the normal photographing operation with the flash box 2 in its retracted position in the camera body 1. When the camera is directed to the subject, the automatic exposure adjuster operates to deflect the meter pointer 51 to a predetermined position corresponding to the field brightness, so that if the shutter release plate 56 is pushed down under this condition, the toothed member 53 swings a predetermined amount to move the aperture blades 62 by an amount corresponding to the angle of swing of said member 53 to provide a proper diaphragm aperture, and after this, the shutter is released.

In this case, since the intermediate lever 16, flashlight photography changeover ring 21 and diaphragm driving plate 23 stay in the positions shown in Fig. 3, the aperture pin 36 can displace freely independently of these members. Also, as the flash light emission circuit operating switch 19, 20 stays open as shown in the drawing (Fig. 130

13

3), even if the flashlight synchronizing contacts (not shown) in the shutter assembly are closed with shutter release, no light is emitted from the flash device.

- 5 Second, when the field is dark, in ordinary cameras having a built-in automatic exposure adjuster, various types of warning are given when the field is so dark that the automatic exposure cannot operate. Therefore, if such warning is given, the flash box 2 is pulled up above the camera body by turning the head 10a of the changeover (member clockwise. That is, when the head 10a of the changeover member is turned 15 clockwise about the shaft 12, the protuberance 11 of said head is disengaged from the notch 4 in the flash box 2 so that the flash box 2 is projected upwardly of the camera body 1 by the force of the tension spring 6 as shown in Fig. 4. At this 20 time, the pin 9 provided on the flash box 2 consequently turns the intermediate lever 16 counterclockwise, causing the flashlight photography changeover ring 21 to turn 25 clockwise about the optical axis O through the coupling pin 18 in the elongated slot 21a, to break engagement of the changeover cam 21b and the first pin 24. Thereupon the diaphragm driving plate 23 is 30 turned by the spring 33 until the second pin 25 secured on said driving plate comes into contact with the focus-aperture control cam 35a on the focusing ring.

- At this time, the meter pointer 51 is already deflected to the position where the 35 aperture blades are full open, so that if the photographing distance is set by turning the focusing ring, the aperture pin 36 is urged by the cam of the focus-aperture 40 control cam 35a, corresponding to the amount of turn of said focusing ring, to slide the aperture blades 62 to provide an aperture which gives correct exposure as to the set photographing distance, the guide 45 number of the flash device being used and the sensitivity of the film being used. Further, when the intermediate lever 16 is turned counterclockwise, the operating switch 19, 20 is closed to bring the flash 50 light emission circuit into its operable condition, so that if the shutter release plate 56 is pushed down under this condition, the light circuit contacts (not shown) are closed to accomplish the proper flashlight 55 photography.

- In case the guide number of the flash light device is fixed, it is necessary to compensate for variation of the aperture that results from the difference of film sensitivity. Therefore, in the shown embodiment, a

guide number ring is provided to solve this problem. This is based on the principle that when the sensitivity of the film used differs from the predetermined one, the operating protuberance 22a is operated to 65 change the position of contact of the compensation cam 22b with the movable shaft 28, so as to change the diaphragm aperture from the aperture for the predetermined sensitivity. 70

WHAT WE CLAIM IS:—

1. A camera having a built-in electronic flash device, said electronic flash device having a light-emitting portion movable from a first position in which it is retracted within the camera casing to a 75 second position where said portion is operatively positioned outside the casing more distant from the axis of the camera objective than when said portion is in said 80 first retracted position, said flash device also including a switch operable in response to outward and retracting movement of the light-emitting portion respectively to close and open a power 85 source circuit for charging a capacitor means which is dischargeable to flash the light-emitting portion of said electronic flash device.

2. A camera according to claim 1, comprising first means for automatically 90 adjusting a diaphragm aperture in accordance with the brightness of the object and second means for adjusting said diaphragm aperture in accordance with the distance of 95 the object from the camera, said first and second means being selectively brought into the operative condition respectively in response to retracting and outward movement of the light-emitting portion of 100 the electronic flash device.

3. A camera according to claim 2, wherein said second adjusting means comprises a diaphragm driving member, a cam 105 formed on a focussing ring, means for coupling said diaphragm driving member with said cam and means for changing the correlation of said diaphragm driving member and said cam.

4. A camera equipped with a flash device 110 substantially as hereinbefore described with reference to the accompanying drawings.

MICHAEL BURNSIDE & PARTNERS,
Chartered Patent Agents,
Hancock House,
87 Vincent Square,
London SW1P 2PH.
Agents for the Applicants.

(13)

3), even if the flashlight synchronizing contacts (not shown) in the shutter assembly are closed with shutter release, no light is emitted from the flash device.

5 Second, when the field is dark, in ordinary cameras having a built-in automatic exposure adjuster, various types of warning are given when the field is so dark that the automatic exposure cannot operate. Therefore, if such warning is given, the flash box 10 2 is pulled up above the camera body by turning the head 10a of the changeover member clockwise. That is, when the head 15 10a of the changeover member is turned clockwise about the shaft 12, the protuberance 11 of said head is disengaged from the notch 4 in the flash box 2 so that the flash box 2 is projected upwardly of the camera body 1 by the force of the tension spring 6 as shown in Fig. 4. At this 20 time, the pin 9 provided on the flash box 2 consequently turns the intermediate lever 16 counterclockwise, causing the flashlight photography changeover ring 21 to turn 25 clockwise about the optical axis O through the coupling pin 18 in the elongated slot 21a, to break engagement of the changeover cam 21b and the first pin 24. Thereupon the diaphragm driving plate 23 is 30 turned by the spring 33 until the second pin 25 secured on said driving plate comes into contact with the focus-aperture control cam 35a on the focusing ring.

At this time, the meter pointer 51 is already 35 deflected to the position where the aperture blades are full open, so that if the photographing distance is set by turning the focusing ring, the aperture pin 36 is urged by the cam of the focus-aperture 40 control cam 35a, corresponding to the amount of turn of said focusing ring, to slide the aperture blades 62 to provide an aperture which gives correct exposure as to the set photographing distance, the guide 45 number of the flash device being used and the sensitivity of the film being used. Further, when the intermediate lever 16 is turned counterclockwise, the operating switch 19, 20 is closed to bring the flash 50 light emission circuit into its operable condition, so that if the shutter release plate 56 is pushed down under this condition, the light circuit contacts (not shown) are closed to accomplish the proper flashlight 55 photography.

In case the guide number of the flash light device is fixed, it is necessary to compensate for variation of the aperture that results from the difference of film sensitivity. Therefore, in the shown embodiment, a

guide number ring is provided to solve this problem. This is based on the principle that when the sensitivity of the film used differs from the predetermined one, the operating protuberance 22a is operated to 65 change the position of contact of the compensation cam 22b with the movable shaft 28, so as to change the diaphragm aperture from the aperture for the predetermined sensitivity. 70

WHAT WE CLAIM IS:—

1. A camera having a built-in electronic flash device, said electronic flash device having a light-emitting portion movable 75 from a first position in which it is retracted within the camera casing to a second position where said portion is operatively positioned outside the casing more distant from the axis of the camera objective than when said portion is in said 80 first retracted position, said flash device also including a switch operable in response to outward and retracting movement of the light-emitting portion respectively to close and open a power 85 source circuit for charging a capacitor means which is dischargeable to flash the light-emitting portion of said electronic flash device.

2. A camera according to claim 1, comprising first means for automatically 90 adjusting a diaphragm aperture in accordance with the brightness of the object and second means for adjusting said diaphragm aperture in accordance with the distance of 95 the object from the camera, said first and second means being selectively brought into the operative condition respectively in response to retracting and outward movement of the light-emitting portion of 100 the electronic flash device.

3. A camera according to claim 2, wherein said second adjusting means comprises a diaphragm driving member, a cam 105 formed on a focussing ring, means for coupling said diaphragm driving member with said cam and means for changing the correlation of said diaphragm driving member and said cam.

4. A camera equipped with a flash device 110 substantially as hereinbefore described with reference to the accompanying drawings.

MICHAEL BURNSIDE & PARTNERS,
Chartered Patent Agents,
Hancock House,
87 Vincent Square,
London SW1P 2PH.
Agents for the Applicants.



PATENTS ACT 1949

SPECIFICATION NO 1484805

In accordance with the Decision of the Superintending Examiner, acting for the Comptroller-General, dated 3 February 1983 this Specification has been amended under Section 14 in the following manner:-

Page 1, *delete* line 40, *insert* According to the present invention, there is provided a camera having a casing and a built-in electronic flash device,

Page 1, *delete* lines 41 to 79, page 4, *delete* lines 73 to 101, *insert* said electronic flash device comprising a light-emitting portion, a switch, a battery power source circuit and a capacitor means,

said light-emitting portion being carried by a flash box and facing forwardly of the camera,

said flash box being disposed to one side of the camera objective and being movable rectilinearly upwardly from a first position in which the light-emitting portion is retracted within the camera casing to a second position where said portion is operatively positioned outside and above the casing more distant from the axis of the camera objective than when said portion is in said first retracted position,

the distance between the centre of the light-emitting portion and the objective axis being at least 60 mm. when said portion is in said second position whereby effectively to prevent the red eye phenomenon,

said flash box being projected rectilinearly upwardly from said first to said second position by the force of a tension spring stretched between said box and said casing when a detent is disengaged from the flash box, said detent being disengageable from the flash box by operation of a portion exposed to the outside of the camera casing,

said switch being operable in response to upward and retracting movement of the flash box respectively to close and open said built-in power source circuit for charging said built-in capacitor means which is dischargeable to flash the light-emitting portion of said electronic flash device,

first means for automatically adjusting a diaphragm aperture in accordance with the brightness of an object, and second means for adjusting said diaphragm aperture in accordance with the distance of the object from the camera,

said first and second means being selectively brought into the operative condition respectively in response to retracting and upward movement of the flash box.

Page 4, *delete* line 72, *insert* 1. A camera having a casing and a built-in electronic flash device,

Page 4, *for* claims 3 and 4 *read* 2 and 3

Page 4, line 102, *for* 2 *read* 1