

PATENT SPECIFICATION

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(54) CAMERA WITH ELECTRONIC FLASH

(71) We, KABUSHIKI KAISHA SUNPAK, a joint-stock Company duly organized under the laws of Japan of No. 8, 1-chome, Ebisu, Shibuya-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 handy camera suitable for amateur photography. More particularly, the invention relates to a cheap camera having an electronic flash utilizing the discharge of a discharge tube.

Cameras which can be operated very easily and can provide photographs of an appropriate quantity merely by pressing a shutter button have already been developed for use in good light conditions. However, at night or in dark places an artificial light source is usually required for photography. When an artificial light source is employed, a photograph of an appropriate quantity cannot be obtained only by pushing a shutter button. Additionally an appropriate lens aperture must be chosen depending on the distance to an object to be photographed. Selection of an appropriate value for the lens aperture is very troublesome and difficult to amateurs. Further, an artificial light source as well as a camera must be provided and accordingly, amateurs seldom conduct photography at night.

Accordingly, development of cameras which will allow easy photography even at night is desired in the art. Such cameras are improved by installing an artificial light source in them. Especially useful in this regard is an electronic flash utilizing discharge of a discharge tube. In fact, several cameras with electronic flashes of this type have been proposed. All of these cameras are still difficult to carry because of large size or special shape. Each of these cameras, however, is advantageous in that an electronic flash can be used any time it is desired, but many are of complex construction. On the other hand, cheap

cameras having an associated electronic flash while available, are only useful in limited conditions, and they are not really practical from an amateur's viewpoint. In a typical instance of cheap cameras of this type, both the shutter speed and the aperture value are set. Even by such a simple camera, adequate photographs can be obtained because the quality of films has recently been much improved. Accordingly, such cameras are widely used because of their low price and simple operation. However, in these cameras with both the shutter speed and the aperture value set photographic results leave much to be desired. Where the aperture values are controllable, but the shutter speed remains constant photographic results are substantially improved. However, amateurs often find it difficult to select an appropriate aperture value, particularly in cameras having an electronic flash where the parameters for selection of an appropriate aperture value when using an electronic flash are quite different from the parameters for selection of appropriate values in day-light. Confusion therefore often arises.

Figures indicating the aperture values are incomprehensible to amateurs, and it is not really necessary to indicate the aperture values by such figures. Especially when the shutter speed is fixed, an appropriate aperture value is naturally set depending on the brightness of an object to be photographed, and hence, the aperture values can be indicated by pictures showing weather conditions (e.g. bright, dull, etc.). Amateurs can then select appropriate values accordingly. When an electronic flash is used, if the aperture values are indicated by pictures showing the distance to an object to be photographed, a desired value can also easily be selected even by amateurs. Thus, in the case of a camera with an electronic flash, two sets of pictures showing either the weather conditions or the distance are necessary. If these two sets of pictures were shown together in

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combination, further confusion is caused to no purpose, and hence some means is required to avoid such confusion. In this invention a camera is provided with a switch for turning on or off a power source for an electronic flash which is utilized so that only pictures showing the distance can be seen in the "on" state, i.e. when the flash is to be used and only pictures indicating the weather conditions can be seen in the "off" state i.e. when the flash is switched off.

Accordingly, when the camera of this invention is used for daylight photography the power source for the electronic flash is switched off and only pictures indicating the weather conditions can be seen. An appropriate aperture value can now easily be selected by matching the picture indicating the weather conditions to the actual weather. When the electronic flash is used the switch is switched to on, pictures indicating the weather conditions disappear, and pictures indicating the distance to an object to be photographed, for example, a half-figure of one man or a gathering of three men, appear instead. Therefore, an appropriate aperture value can easily be selected depending on an image of an object seen through the viewfinder.

According to the present invention therefore, there is provided an assembly of a camera and an electronic flash therefor, said assembly comprising,

a switch for control of an electrical power supply to the electronic flash, and

a display means indicative of an aperture to be set comprising at least two sets of non-numerate symbols, one set being for daylight operation and the other set for flash operation; the arrangement being such that operation of this switch additionally selects the set displayed such that only symbols from that set are displayable.

Figure 1 is a perspective view showing one embodiment of a camera of the present invention in the disassembled state.

Figure 2 is a plan view showing only the moving display device of the embodiment of Figure 1; other elements are not shown.

Figure 3 is a plan view showing the moving display device of another embodiment, where other elements are not shown.

Figure 4 is a perspective view showing a disassembled display means for indicating desired symbols through an aperture value indication window in still another embodiment of the present invention.

A lens 10 is formed in a casing 13. Laterally spaced on either side of the lens 10 in the casing 13 are film magazines 11 and 12 for storing a cartridge film. A shutter lever 14 is disposed so that by pressing the lever 14 a shutter vane (not shown) mounted

in the lens 10 is opened to expose the film. A small electronic flash 20 installed adjacent the magazine 11. This is of about GN 14 (ASA 100 may be used). The flash 20 comprises a flash window 22, disposed in the open part of a reflection mirror 21, which is arranged in parallel to the lens 10. A discharge tube 23 is disposed through the reflection mirror 21 and remote from the window 22. A flash from this discharge tube 23 is reflected by the reflection mirror 21 and is directly radiated through the flash window 22. Electric parts of the electronic flash 20 are attached to a printed circuit board 24, and these include a switch 25 acting as a power switch for switching on and off the electric power source for the electronic flash 20. This switch 25 is constructed so that the switching operation can be performed by sliding a toggle thereon. A switch board 30 is attached to this toggle through a hole 31 in which the toggle locates so that the switch board 30 is moved co-operatively with the movement of the toggle in switch 25. A change-over lever 32 is attached perpendicular to this switch board 30 and terminates in an inclined face 33 remote from the board 30. A symbol changing device for changing pictures indicating the aperture value, which will be detailed hereinafter, is constructed in part by this changeover lever 32 and switch board 30. A diaphragm 40 having an aperture 41 is disposed in front of the lens 10 to control the aperture opening value thereof. The diaphragm 40 further depends from a perpendicularly disposed lever 42. A hole 43 is formed at the top end of the lever 42, and the diaphragm 40 is pivotable about a pin 44 disposed below said hole 43.

A symbol display device 50 is mounted so that it can be moved horizontally in the direction indicated by an arrow by a knob 51 disposed on a connector portion 56, as shown in the drawing. This symbol display device 50 comprises a symbol board supporting portion 55 on which a symbol board 54 is slidably supported. The board 54 has thereon weather symbols 52 (see Fig. 2) indicating the weather conditions by pictures and distance symbols 53 indicating the distances to objects by pictures. A pin 57 is disposed on said connector portion 56 so that it may be inserted into the hole 43 of the diaphragm 40 whereby the iris member 40 may be rotated about the pin 44, thus changing the aperture value of the lens 10. Weather symbols 52 and distance symbols 53 are formed in two bonds on the symbol board 54 which is attached slidably to the symbol board supporting portion 55 of the symbol display device 50. The weather symbols 52 include a picture of sunshine 52a indicating fine weather, and a picture of cloud-covered sun 52b indicating cloudy

weather. The distance symbols 53 include a near distance symbol 53a which is an image of a torso and a far distance symbol 53b which is a picture of a gathering of three men. The near distance symbol 53a and cloudy weather symbol 52b are placed in parallel, and the far distance symbol 53b is placed adjacent to the near distance symbol 53a on the side opposite to the fine weather symbol 52a. This indicating board 54 is always biased by a spring 58 toward the change-over lever 32. A bar-shaped guide member 60 is fitted through a buffer member 59 to the symbol board 54 on the side remote from the spring 58, whereby the indicating board 54 is prevented from separating from the symbol display device 50. The guide member 60 has on either end thereof, arms 61 and 62 extending in the direction perpendicular thereto to partially surround the symbol board 54. The guide member 60 further includes a centrally disposed projection 63 extending in the direction opposite to the extending direction of the arms 61 and 62. This guide member 60 is so mounted as to move the indicating board 54 along the supporting portion 55 in the direction of arms 61 and 62 through the buffer member 59. The top end of the projection 63 is formed into a semicircular shape, and is contacted with the inclined face 33 of the change-over lever 32. Accordingly, when the toggle on switch 25 is moved to the left in the drawings to switch on the power source of the electronic flash, the change-over lever 32 is similarly moved to the left via the switch board 30. The inclined face 33 then presses the projection 63 of the guide member 60, whereby the indicating board 54 is moved against the bias spring 58 as pointed out hereinbefore. When the toggle of the switch 25 is moved to switch off the power source of the electronic flash, the indicating board 54 is returned to the position shown in the drawings by tension of the spring 58. Thus by movement of the toggle of the switch 25 the indicating board 54 is moved until the distance symbols are shifted to the position of the weather symbols 52 and vice versa. On an outer casing 70, there are formed an aperture value indicating window 71 having a size sufficient to see one of the symbols 52 or 53 therethrough, a hole 72 into which the toggle of the switch 25 is inserted and an diaphragm adjusting hole 73 into which the knob 51 of the symbol display device 50 is inserted. When a shutter button 74 is depressed, it presses the shutter lever 14 thereby to actuate the shutter of the lens 10. A view-finder 80 is disposed adjacent the film magazine 12 and is fitted to the outer casing 70 through an attachment hole 81 disposed through the outer casing 70.

When the power source of the electronic flash 20 is switched off while the symbol display device 50 and the switch 25 are located at positions indicated in the drawings (i.e. centrally disposed) the symbol board 54 is pressed inwardly by the spring 58 and only the cloudy weather symbol 52b of the weather symbols 52 can be seen. At this time, the diaphragm 40 is positioned so that the center of the iris hole 41 is set substantially in front of the lens 10 to obtain an aperture value of F 8.

Since the shutter speed is fixed to 1/125 second, a photograph of an appropriate exposure can be obtained by depressing the shutter button 74 in this state if it is cloudy. When it is fine, the knob 51 is moved to the left within the hole 73 and thus only the fine weather symbol 52a can be seen. By the leftward movement of the pin 57 the diaphragm 40 is pivoted such that the smallest portion of the aperture 41 is located in front of the lens 10 to give an aperture value of F:16. Thus, when it is fine, photography can be accomplished at an iris opening value of F:16 and a shutter speed of 1/125 second and a photograph of an appropriate quantity can be obtained. When the knob 51 is moved completely to the right, the diaphragm 40 is turned in the opposite direction, namely in the clockwise direction, and the lens 10 is completely opened to obtain an aperture value of F:4. At this point, since no symbol is drawn next to the cloudy mark 52b of the weather marks 52 on the left side, no mark can be seen from the iris opening indicating window 71. This means that since it is too dark, photography cannot be performed without the electronic flash 20. In this case, the toggle of the switch 25 is moved to switch on the power source of the electronic flash 20. At this point, both the switch board 30 and the change-over lever 32 are similarly moved in the above-mentioned manner, whereby the projection 63 of the guide member 60 is pressed by the inclined face 33 of the change-over lever 32. Accordingly, the symbol board 54 is moved so that distance symbols 53 can be seen instead of weather symbols 52 through the aperture value indicating window 71. When no weather symbol 52 is seen through the window 71 (i.e. when the iris opening value is F:4), if the toggle of switch 25 is moved in the above-mentioned manner, the far distance mark 53b is seen through the window 71. When the state of an object seen through the view finder 80 is in agreement with the state of the symbol 53b, the shutter button 74 is depressed and a photograph of an appropriate quantity can be obtained by using the electronic flash 20. If the size of the object seen through the view finder 80 is visually larger than the picture of the mark

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53b, the knob 51 of the symbol display device 50 is moved to the left so that the near distance mark 53a can be seen through the window 71, and a photograph of an appropriate quantity can again be taken by using the electronic flash 20. Thus when the near distance symbol 53a is seen in the window 71, the aperture value is adjusted to F:8, and since the GN value of the electronic flash is 14, an appropriate aperture can be obtained with respect to an object at from 1.3 to 2.5 m from the camera. When the far distance symbol 53b is seen in the window 71, an appropriate aperture value is obtained with respect to an object of from 2.5 to 5 m away.

As is apparent from the foregoing illustration, since an electronic flash 20 is installed in the camera of the present invention, the camera is handy to carry. Further, if the switch 25 of the electronic flash 20 is switched off in the daytime, since weather symbols 52 can be seen through the window 71, an appropriate aperture can be obtained merely by selecting the fine weather symbol 52a or the cloudy weather symbol 52b depending on the weather condition at the time. When photography is conducted at night or in the dark, if the switch 25 is switched on, the weather symbols 52 disappear and distance symbols 53 can be seen in the window 71 instead. Accordingly, an appropriate aperture can be obtained merely by selecting the near distance symbol 53a or the far distance symbol 53b depending on the size of an object seen through the view finder 80. Therefore, when the camera of the present invention is employed, photography can be easily performed at an appropriate F value at any time.

Fig. 3 illustrates another embodiment of the present invention where the method of displaying symbols through the window 71 is modified. In Fig. 3, 25 and 26 denote a switch and a toggle therefor, respectively, as in Fig. 1. A switch board 330 in Fig. 3 corresponds to the switch board 30 in Fig. 1, and it is moved together with the toggle 26. A change-over lever 332 is attached at one end to this switch board 330, and at its other end to one end of a stop lever 333 described below. A display device 350 has a knob 351 inserted in an aperture adjusting hole 73 of the outer casing 71 and is adapted to move the entire assembly. Similarly to the embodiment shown in Fig. 2, weather symbols 352a and b, including a fine weather symbol 352a and a cloudy weather symbol 352b, are drawn on the top end of the portion attached in parallel to the portion on which the knob 351 is mounted. The display device 350 is moved within a range defined by a solid line and a one-dot line in Fig. 3 of the drawings. A display

board 354 upon which weather symbols 353a and b are drawn, is slidably mounted on said portion of the display device 350. Also on this display board 354, there are drawn a near distance symbol 353a and a far distance symbol 353b along with one blank area. A stopper 355 is mounted on the remote end of said portion of the display device 350 where the display board 354 is formed, so that in use the display board 354 cannot become separated from the display device 350. A projection 356 is formed on the display board 354 and a spring 357 is disposed through a hole in this projection 356 so that it exerts a tensile force biasing the board 354 toward the stopper 355. The end of the stop lever 333 remote from the change-over lever 332 is caused to contact the projection 356 so that the positional relation shown in the drawings is maintained regardless of the tension of the spring until the end of the stop lever 333 is disconnected from the projection 356. This happens only when the toggle 26 of the switch 25 is moved to switch on the switch 25. The symbol board 354 is then freed and is caused to contact the stopper 355 by means of the spring 357. Although other elements are not shown in Fig. 3, the movement of the display device 350 causes the aperture value to be changed as described in the embodiment shown in Fig. 1.

In the embodiment shown in Fig. 3, when the switch 25 is kept in the "off" state, since the board 354 is held by the stop lever 333 as shown in the drawings, the board 354 cannot be moved by movement of the display device 350 by the operation of the knob 351. Thus only weather symbols 352 below the window 71 can be moved. When the switch 25 is switched on, the stop lever 333 is disconnected from the projection 356 of the symbol board 354. Accordingly, the symbol board 354 is pulled by the tensile force of the spring 357, and is only stopped when it hits on the stopper 355 of the display device 350. Thus, the weather symbols 352 on the moving device 350 are covered by the symbol board 354 and replaced by the near distance symbols 353a or far distance symbols 353b. Thus in the embodiment shown in Fig. 3, the change-over lever 332 and the stop lever 333 constitute the change-over device. Thus in the embodiment shown in Fig. 3, as in the embodiment shown in Figs. 1 and 2, an appropriate aperture value can easily be obtained merely by selecting a picture corresponding to the photographic conditions through the window 71 whether the electronic flash is used or not.

In Fig. 4 illustrating still another embodiment of the present invention, two aperture value windows 471 and 472 are formed in parallel in an outer casing 470. In

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5 this embodiment, an arrangement is provided so that when the switch 25 is switched on or off, one of the windows 471 or 472 is covered. For this purpose, a switch board 430 is provided with a hole 431 for insertion of the toggle of the switch 25, which is similar to the switch board 30 of the embodiment shown in Fig. 1. This is formed with a length sufficient to extend to the positions of the windows 471 and 472, and is provided with windows 432 and 433 having the same size as that of the display windows 471 and 472. These windows 471 and 472 are formed in the switch board 430 in an oblique arrangement so that when the switch 25 is switched on, the window 432 is in register with the window 471 and when the switch 25 is switched off, the moving window 433 is in register with the window 472. A display device 450 is movably mounted below the switch board 430. The same weather symbols 452 and distance symbols 453 as those drawn on the indicating board 54 in the embodiment shown in Fig. 1 are drawn on the portion of the display device 450 where the aperture value windows 471 and 472 are located. As in the embodiments shown in Figs. 1, 2 and 3, a knob 451 is inserted into the aperture adjusting hole 73 and moves the entire assembly, and the display device 450 has a pin 457 for attaching to a diaphragm 440 generally as in the embodiment shown in Fig. 1.

35 In this embodiment, two aperture indicating windows are formed, and one of them is covered by the switch board 430 so that when the switch 25 is switched on, the distance symbols 453 can be seen through one window 453 and when the switch 25 is switched off, the weather symbols 452 can be seen through the other window 472. Accordingly, the same effects as attained in the foregoing two embodiments can be similarly attained in this embodiment.

WHAT WE CLAIM IS:—

1. An assembly of a camera and an electronic flash therefor, said assembly comprising,
50 a switch for control of an electrical power supply to the electronic flash, and
a display means indicative of an aperture to be set comprising at least two sets of non-

numerate symbols, one set being for daylight operation, and another set for flash operation; the arrangement being such that operation of this switch additionally selects the set displayed such that only symbols from that set are displayable.

2. An assembly according to claim 1 wherein when the switch is arranged to supply power to the electronic flash the display means displays a symbol indicating distance.

3. An assembly according to claim 1 wherein when the switch is arranged to prevent power being supplied to the electronic flash the display means is provided with a symbol indicating the brightness of the object to be photographed.

4. An assembly according to any preceding claims including means for adjustment of F values.

5. An assembly as claimed in any one of the preceding claims wherein said two sets of symbols are both operable in response either to a change in the F value or in response to operation of the switch.

6. An assembly according to any one of the preceding claims wherein the display means includes a display window formed in the outer casing of the camera.

7. An assembly according to any one of the preceding claims wherein the display means comprises biasing means, and wherein when the switch is moved to the 'on' position it moves against said spring bias.

8. An assembly according to any of the preceding claims wherein the iris opening values are set to F_4 , F_8 , or F_{16} .

9. An assembly according to any one of claims 5 to 8 wherein the first set of symbols comprises marks indicating weather conditions and the second set of symbols comprises marks indicating distance.

10. An assembly of a camera and an electronic flash therefor substantially as hereinbefore set forth with reference to Figures 1 and 2, 3 or 4 of the accompanying drawings.

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1. An assembly of a camera and an electronic flash therefor, said assembly comprising,
50 a switch for control of an electrical power supply to the electronic flash, and
a display means indicative of an aperture to be set comprising at least two sets of non-

numerate symbols, one set being for daylight operation, and another set for flash operation; the arrangement being such that operation of this switch additionally selects the set displayed such that only symbols from that set are displayable.

2. An assembly according to claim 1 wherein when the switch is arranged to supply power to the electronic flash the display means displays a symbol indicating distance.

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6. An assembly according to any one of the preceding claims wherein the display means includes a display window formed in the outer casing of the camera.

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10. An assembly of a camera and an electronic flash therefor substantially as hereinbefore set forth with reference to Figures 1 and 2, 3 or 4 of the accompanying drawings.

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