

CAMERA WITH BUILT-IN FLASH

The present invention relates to a single-lens reflex camera with a built-in flash.

Conventionally, a flash is attached over the pentaprism of a single-lens reflex camera every time the flash is used for photography. If the flash is heavy, it is coupled to the body of the camera by a special strong coupling device.

When a flash is secured over a pentaprism, the joint of the flash and the body of a camera has such a low mechanical strength that the joint is very likely to be damaged when the camera fitted with the flash on the body of the camera is carried. For that reason, the flash needs to be attached and detached to and from the camera body at a place where the flash is used.

The number of photographers who want to perform sophisticated photography of a subject by using not only ambient light around the subject but also auxiliary light has been increasing due to the appearance of high-sensitivity films. Such photographers tend to carry flashes with them all the time.

Since an object at a very small distance is likely to be photographed under flash light by a single-lens reflex camera, it is more desirable to place a flash tube on a vertical plane containing the central optical axis of the camera than to place the flash tube at the side of the camera.

In a single-lens reflex camera of the type with an exchangeable lens, a flash is embedded in the side part of the body of the camera near its front as in a compact camera of the lens shutter type. In a single-lens reflex

camera, there is mounted thereon a flash having a flash emitting section which can be protruded from the body of the camera.

Objects in a range from a very small distance to a very large distance are photographed by a single-lens reflex camera, particularly a single-lens reflex camera of the lens exchange type. The lens of the camera of the lens exchange type is often replaced with another one of appropriate focal length. For that reason, when a flash is built in the single-lens reflex camera, it is necessary to avoid making its lens barrel intercept light emitted from the flash. However, in a conventional single-lens reflex camera, having a flash, a light emitting section is located near beside the lens of the camera. For that reason, the light from the flash of the conventional single-lens reflex camera does not sufficiently illuminate an object when a long lens barrel is attached to the camera.

When a flash is used to photograph a flower, an insect or the like at a small distance by a single-lens reflex camera, it is desirable to irradiate light upon the object from the central part of the camera. For that reason, the flash is secured over the pentaprism (view prism) of the camera by electric contacts provided over the rear of the pentaprism. However, the structural strength of the secured portion of the flash is so low that the connecting portion is likely to be damaged. It is impossible to photograph an object at a very small distance by a compact camera of the lens shutter type. As for a single-lens reflex camera, it is desirable to easily use a flash to photograph an object at a very small distance. It is desired that a photographer not skilled in single-lens reflex photography can more easily use a flash.

A flash unit may be built into the body of a single-lens reflex camera of the lens exchange type in such a manner that the light emission means of the flash is located in the film rewinding section of the camera or in its pentaprism casing. Typically, objects at various distances including extremely small distances and very large distances are photographed by a single-lens reflex camera, particularly for a single-lens reflex camera whose lens is often replaced by other lenses of desired focal lengths. Since the performance of zoom lenses has recently been enhanced, the number of persons who usually do not use a standard lens but instead use such a zoom lens which covers the functions of a wide-angle lens, a medium-distance photographing lens and a telephoto-lens has been increasing. As for zoom lenses in general, the total length of a lens tube does not change even if the focal length of the lens is decreased for wide-angle photography. For that reason, it is necessary to build the flash in the single-lens reflex camera so that the light from the flash is not blocked by the lens barrel.

However, the light emission means of a flash built in such a conventional single-lens reflex camera is protruded nearly upwards from the body of the camera so that the light from the flash is blocked by a long barrel and therefore not enough light is irradiated upon an object to be photographed.

On the other hand, a flash for a large quantity of light is not much needed these days because high-sensitivity films such as the ISO 400 and the ISO 1000 have become available on the market. In addition, there is an increasing desire to reduce the weight of a camera, namely, to make its accessories light and compact.

In the prior art, since the light emission surface of an external flash which is attached to a conventional

camera by inserting the attaching foot of the flash into the attaching shoe of the camera is placed nearer an object to be photographed, the attaching foot is placed behind the light emission surface of the external flash.

When a built-in flash is to be used which has a light emission means mounted over and in front of a pentaprism casing and is incorporated in a single-lens reflex camera, the light emission means is protruded up from the pentaprism casing. When the built-in flash is not to be used, the built-in flash is housed in the pentaprism casing.

When the built-in flash of the single-lens reflex camera is in the operational position, namely, the light emission means is protruded up from the pentaprism casing, an external flash cannot be attached to the camera because the attaching foot of the external flash cannot be completely inserted into the attaching shoe of the camera. As a result, a synchronisation terminal might not be properly connected.

On yet another point, the automated control of a single-lens reflex camera has been recently so much advanced that the number of pieces of camera control information such as exposure information, film information and flash information, which are given to a photographing person, has become quite large. The space required for displaying these items of information has also become large along with the increase in the number of the items of information. For that reason, the use of a large-size display member made of an LCD display panel or the like has lately begun for such a single-lens reflex camera because of the low electric power consumption of the display member. However, it is a problem where the large-size display member should be located in the camera.

Since photography is often performed by using a flash these days, the flash is a common requirement. For that reason, various types of single-lens reflex cameras have been devised such as one with a built-in flash, which is protruded from the body of the camera at the time of use of the flash and is retracted into the body except during use for the sake of the convenience of carrying of the camera. Several such built-in flashes are a subject of this application. Since an object at a large distance is often photographed by such a single-lens reflex camera these days, a flash with a large quantity of light needs to be provided in the camera. Since the volume of the flash with the large quantity of light is large, the flash occupies a large space in the body of the camera.

However, it has been difficult to provide a large-size display member and a large-size flash in a single-lens reflex camera without degrading its handling and carrying properties.

It is an object of this invention to provide a new or improved camera in which some of the above described difficulties are overcome or reduced.

According to the present invention, there is provided a camera with a flash, comprising a camera body with a projecting portion at the top thereof projecting upwards and including an oblique rearward downward slope, a flash included in a flash housing, said flash housing being rotatable on a surface of said slope from an operating position of said light emitter facing forwardly of said camera body to a non-operating position of said light emitter facing rearward, and a switch in said camera body co-operating with said flash housing to render said light emitter operable when it is in said

operating position and inoperable when it is in said non-operating position.

This invention will now be described in more detail, by way of example, with reference to the drawings in which:-

Figure 1 shows an exterior view of a camera provided in accordance with an embodiment of the present invention and having a flash in an unused position;

Figure 2 shows a partial exterior view of the camera having the flash in an operational position;

Figure 3 shows a sectional view along a central vertical plan of the camera with the flash in the unused position;

Figure 4 shows a sectional view along the same plane of the camera with the flash in the used position;

Figure 5 shows a plan view of the bottom plate of a lamp housing; and

Figures 6 and 7 show the relationship between a flash control switch and a means for integrally providing the lamp housing in the body of the camera.

An embodiment of the present invention is hereafter described with reference to the drawings.

Figure 1 shows a perspective exterior view of a camera of this embodiment. Figure 2 shows a partial view of the camera having a flash in an operating position. A body 410 of the camera has mounted thereon a lamp housing 412 wherein a flash tube and a reflector are housed. Although a light emission control circuit and a power

supply for the flash tube are provided in the camera body 410, the circuit and the power supply may be partly or wholly located in the lamp housing 412.

The lamp housing 412 is rotatably supported on a backward and downward slope over the rear of the pentaprism, as shown in Figures 1 and 2. When the flash is not in the operating position, a light emission surface 414 of the lamp housing 412 is oriented backwards. When the flash is in the operational position, the flash housing 412 is rotated by 180 degrees to orient the light emission surface 414 forwards at such an angle as to illuminate an object located directly in front of the camera. Both the sides of the lamp housing 412 are provided with a large number of grooves 413 or projections for facilitating the manual rotation of the lamp housing. For aesthetic design, the top of the lamp housing 412 is also provided with grooves extending to the grooves 413 of both the sides of the housing 412.

Figure 3 is a sectional view along a central vertical plane of the camera with the flash in its unused position. Figure 4 is a sectional view along the plane of the camera with the flash in its used position. As shown in Figure 3, the lamp housing 412 is provided on the backward downhill slope of an upper cover 417 for the pentaprism 416 so that the rear surface 418 of the lamp housing 412 set almost horizontal when the flash tube 420 faces backwards. As shown in Figure 4, a wind and dust shield glass 422 is set vertical when the flash tube 20 faces forwards. A slender parabolic reflector 24 directs the flash light.

Figure 5 is a plan view of a bottom plate 426 of the lamp housing 412 in the unused position of the flash. The bottom plate 426 is provided with a shaft 427 at the center of rotation of the lamp housing 412. The shaft

427 has a through hole 428 for a wire for electric connection. The bottom plate 426 is also provided with an arc-shaped guide hole 430 extending through a rotation angle of 180 degrees and being centered on the shaft 427. The underside of the bottom plate 426 has click recesses 432 and 433 at both the sides of the through hole 428. As shown in Figures 3 and 4, the central portion of the backward downhill slope of the upper cover 417 has a hole 436 in which the shaft 427 is fitted. A rotation restraint pin 438 is affixed the backward downhill slope and is fitted in the guide hole 430. Click stops 434 and 435 project to the underside of the bottom plate 426 and are in such positions that the click stops 434 and 435 can be engaged in the click recesses 432 and 433.

The shaft 427 is secured to a disk 440 inside the upper cover 417. Plan views of the disk 440 are shown in Figures 6 and 7. The lamp housing 412 is attached to the upper cover 417 by the disk 440. Springs 442 are interposed between the disk 440 and the inside surface of the upper cover 417 to always pull the lamp housing 412 toward the body of the camera to restrain the movement of the lamp housing in two positions in which the click stops 434 and 435 drop into the click recesses 432 and 433. The positions and forms of the guide hole 430, the pin 438, the click recesses 432 and 433 and the click stops 434 and 435 are determined so that the orientation shown in Figures 1 and 3 and that shown in Figures 2 and 4 are established in the above-mentioned two positions. Wires 39 electrically connect the flash tube 420 to a flash circuit (which is not shown in the drawings). If the flash circuit is provided in the lamp housing 412, a flash trigger signal, a quench signal and electric power are supplied through the wires 439.

Figures 6 and 7 are views of the disk 440 as seen from the pentaprism 416. The orientation shown in Figure

6 is the same as that shown in Figure 3, while the orientation shown in Figure 7 is the same as that shown in Figure 4. A projection 444 is provided on the peripheral portion of the disk 444. A flash control switch 450 of the flash circuit is provided near the disk 440 so that when the lamp housing 412 is oriented forwards, namely, a photographer intends to use the flash, the switch 450 is turned on by the projection 344. The switch 450 connects and disconnects the power supply of the flash circuit with its voltage increase circuit, connects and disconnects the voltage increase circuit with a main capacitor, or connects and disconnects the main capacitor with the flash tube 420.

When the photographer is to use the flash for photographing, all he needs to do is orient the lamp housing 412 forwards. When he wishes to house the camera in a camera case or box, he orients the lamp housing 412 backwards to make the form of the whole camera easy to house.

In this embodiment, the switch of the flash is automatically turned on by orienting the lamp housing 412 forwards. Therefore, it can be immediately judged from the appearance of the camera whether the flash is in a usable state or not. When the flash is not in its used position, the lamp housing is so flat on the whole camera that it is easy to house the camera.

Although the front of the lamp housing 412 is slightly obstructive to the photographer seeing the object through the finder of the camera in the state shown in Figures 1 and 3, the obstructiveness can be eliminated by attaching a compensatory mask or the like to the finder.

The present invention can be applied not only to a single-lens reflex camera but also to other types of cameras. When the present invention is applied to the single-lens reflex camera, the light emission surface of a lamp housing can be placed in a high position because of the presence of the pentaprism so as to produce a desirable effect that the photographing lens of the camera is less obstructive. When the present invention is applied to a conventional compact camera of the lens shutter type, a projecting portion similar to the pentaprism casing of a single-lens reflex camera is provided at the center of the top of the compact camera and a lamp housing is provided on the backward downhill slope of the projecting portion.

As described in the foregoing, a flash can be compactly built in a camera. Since the light emission surface of the flash is located over the central axis of the camera, light can be uniformly irradiated upon an object such as a flower and an insect being photographed at a small distance from the camera.

CLAIMS

1. A camera with a flash, comprising:

a camera body with a projecting portion on the top thereof projecting upwards and including an oblique rearward downward sloping surface;

a flash included in a flash housing, said flash housing being rotatable on said surface from an operating position with said light emitter facing forwardly of said camera body to a non-operating position with said light emitter facing rearward; and

a switch in said camera body co-operating with said flash housing to render said light emitter operable when it is in said operating position and inoperable when it is in said non-operating position.

2. A camera as claimed in Claim 1 in which the projecting portion houses a view-finder pentaprism.



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3. A camera as claimed in Claim 1 or Claim 2 in which said flash housing has a rear surface which is substantially horizontal when the flash housing is in its non-operating position.

4. A camera as claimed in any preceding claim in which springs are provided to pull the flash housing towards said sloping surface, inter-engaging click stops and click recesses being provided to restrain the flash housing in its operating and non-operating positions.

5. A camera as claimed in any preceding claim in which the lamp housing is attached to said sloping surface by a disk.

6. A camera with a flash substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

