

PATENT SPECIFICATION (11)

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(54) ELECTRONIC FLASH APPARATUS

(71) We, FRANKE & HEIDECHE G.m.b.H., a German Body Corporate, trading as ROLLEI-WERKE FRANKE & HEIDECHE, of 196 Salzdahlumerstrasse, Braunschweig, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a photographic flash apparatus preferably with automatic regulating systems for regulating the quantity of light by measuring the exposure light reflected from the subject. To avoid errors with this type of apparatus a sensor has to remain aligned to the subject at all times, or else the sensor must be kept constantly paraxial to the camera lens.

To enable photographs to be taken with indirect exposure likewise, it has been suggested that the sensor should be attached by a base connected to the camera in the usual manner by an accessory shoe and that the actual flash apparatus be tilted about a shaft belonging to the said base and situated transversely to the optical axis, or else that only the actual reflector should be pivoted about a transverse shaft of this kind.

In another method, only the sensor is affixed to the camera, being connected via a cable to the flash lamp, which is thus freely movable in all directions.

Unlimited pivotability or mobility of the flash lamp or reflector, however, may cause partial overlapping between the cone of rays from the lamp and the cone of rays from the lens; with indirect illumination, therefore, the lamp and the reflector must be pivoted upwards by a certain minimum distance, in order to prevent the incidence of direct light in the exposure image field, particularly with wide-angle lenses.

According to the invention there is provided a photographic electronic flash apparatus comprising a two part housing, a reflector mounted in a first housing part, means in the first housing part for mounting an electronic flash tube in front of the reflector, means in the second housing part

for activating an electronic flash tube mounted in said first housing part in front of said reflector, and mating surfaces on the first and second housing parts, wherein the first housing part may be rotated relative to the second housing part about an axis which is perpendicular to the mating surfaces and which subtends an angle of more than 0°, but not more than 45° with the optical axis of the reflector, wherein the mating surfaces are so formed that in two relative rotational positions of the housing parts mutually spaced by 180°, the mating surfaces are congruent with respect to each other, and wherein the second housing part has a sensor for measuring the amount of light reflected by the subject during exposure and a device coupled to the sensor for terminating a flash exposure when the required degree of exposure has been effected, the axis of the sensor being parallel to the optical axis of the reflector in one but not the other of said two relative rotational positions.

Ideally, the first and second housing parts are rotatable about a shaft which is hollow to accommodate a cable passing from the activation means to the flash tube mounting means. This pivoting shaft is preferably situated in the central point of the mating surfaces between the two parts of the housing, and the contours of the said joint faces constructed on axially symmetrical lines. The mating surfaces are preferably circular or square. The apparatus may have a stop and/or catch for retaining the second housing part in each of said two relative rotational positions.

A restoring spring may also be provided, which is subjected to tension on departure from the normal position, to which the reflector will therefore automatically return when released.

A constructional embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawing, wherein:—

Fig. 1 is a section through a compact club-shaped apparatus with the reflector in the normal position;

Fig. 2 is the same view, after the reflector has been pivoted;

Fig. 3 is a non-sectional view of a similar apparatus showing two reflector positions;

5 Fig. 4 is an illustration of a box-shaped apparatus, with the reflector in the normal position; and

Fig. 5 is the same view, after the reflector has been pivoted.

10 The flash apparatus is subdivided into the basic housing 1 and the reflector housing 2 with the reflector 3, the latter housing being rotatable about a hollow bearing 4. Means (not shown) are provided in the reflector housing 2 for mounting in known manner an electronic flash tube in front of the reflector 3. The bearing 4 is made hollow to give passage to the cable 7 for the connection of the conductor plates 8 and 9. The two parts of the housing are held together, without clearance, by a spring disc 5 and a securing ring 6. A spring catch 10 is also provided to secure the reflector in the position to which it has been rotated. Stops are preferably provided in addition, to limit the rotation to 180° in each direction and thus prevent the cable from being unduly twisted and squeezed. Rotation of the reflector through an angle of less than 180° would in any case serve little purpose but is nevertheless fundamentally possible.

The joint face 11 between the two housing parts 1 and 2 is flat and its contours are axially symmetrical, so that the two parts of the housing, in either of the extreme positions, fit together without any projections or offsets. The maximum angle of inclination β of the pivoting axis in relation to the axis of the sensor 12, or to the reflector axis, parallel thereto, in the normal position (Fig. 1) is 45° as the maximum permissible angle of inclination of the reflector axis in respect of the vertical (in respect of the axis of the sensor) i.e. 2β amounts to 90°. In the event of an angle β of more than 45° the light would be thrown backwards when the reflector was rotated into the upper position. In known manner, the housing part 1 also includes means (not shown) for actuating the electronic flash tube and a device (not shown) coupled to the sensor 12 for terminating the flash exposure when the required degree of exposure has been effected.

55 Figs. 4 and 5 illustrate the principle of the invention as applied to a flash apparatus of the box-shaped type. In this case the reflector housing part 22 with the reflector 23 is once again rotatably mounted on the main housing 21 in the same manner as in the versions shown in Figs. 1 to 3.

60 WHAT WE CLAIM IS:—

1. A photographic electronic flash ap-

paratus comprising a two part housing, a reflector mounted in a first housing part, means in the first housing part for mounting an electronic flash tube in front of the reflector, means in the second housing part for activating an electronic flash tube mounted in said first housing part in front of said reflector, and mating surfaces on the first and second housing parts, wherein the first housing part may be rotated relative to the second housing part about an axis which is perpendicular to the mating surfaces and which subtends an angle of more than 0°, but not more than 45° with the optical axis of the reflector, wherein the mating surfaces are so formed that in two relative rotational positions of the housing parts mutually spaced by 180°, the mating surfaces are congruent with respect to each other, and wherein the second housing part has a sensor for measuring the amount of light reflected by the subject during exposure and a device coupled to the sensor for terminating a flash exposure when the required degree of exposure has been effected, the axis of the sensor being parallel to the optical axis of the reflector in one but not the other of said two relative rotational positions.

2. A photographic electronic flash apparatus in accordance with Claim 1, wherein the mating surfaces are of circular or square shape.

3. A photographic electronic flash apparatus in accordance with Claim 1 or 2, wherein the first and second housing parts are rotatable about a shaft which is hollow to accommodate a cable passing from the activation means to the flash tube mounting means.

4. A photographic electronic flash apparatus in accordance with any one of Claims 1 to 3, having a stop and/or catch for retaining the second housing part in each of said two relative rotational positions.

5. A photographic electronic flash apparatus in accordance with Claim 4, having a restoring spring which is subjected to tension when the apparatus is moved out of one of said two relative rotational positions, so that on release the first housing part will automatically return thereto.

6. A photographic electronic flash apparatus, substantially as described herein with reference to and as shown in any one of the accompanying drawings.

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Fig. 2 is the same view, after the reflector has been pivoted;

Fig. 3 is a non-sectional view of a similar apparatus showing two reflector positions;

Fig. 4 is an illustration of a box-shaped apparatus, with the reflector in the normal position; and

Fig. 5 is the same view, after the reflector has been pivoted.

The flash apparatus is subdivided into the basic housing 1 and the reflector housing 2 with the reflector 3, the latter housing being rotatable about a hollow bearing 4. Means (not shown) are provided in the reflector housing 2 for mounting in known manner an electronic flash tube in front of the reflector 3. The bearing 4 is made hollow to give passage to the cable 7 for the connection of the conductor plates 8 and 9. The two parts of the housing are held together, without clearance, by a spring disc 5 and a securing ring 6. A spring catch 10 is also provided to secure the reflector in the position to which it has been rotated. Stops are preferably provided in addition, to limit the rotation to 180° in each direction and thus prevent the cable from being unduly twisted and squeezed. Rotation of the reflector through an angle of less than 180° would in any case serve little purpose but is nevertheless fundamentally possible.

The joint face 11 between the two housing parts 1 and 2 is flat and its contours are axially symmetrical, so that the two parts of the housing, in either of the extreme positions, fit together without any projections or offsets. The maximum angle of inclination β of the pivoting axis in relation to the axis of the sensor 12, or to the reflector axis, parallel thereto, in the normal position (Fig. 1) is 45° as the maximum permissible angle of inclination of the reflector axis in respect of the vertical (in respect of the axis of the sensor) i.e. 2β amounts to 90° . In the event of an angle β of more than 45° the light would be thrown backwards when the reflector was rotated into the upper position. In known manner, the housing part 1 also includes means (not shown) for actuating the electronic flash tube and a device (not shown) coupled to the sensor 12 for terminating the flash exposure when the required degree of exposure has been effected.

Figs. 4 and 5 illustrate the principle of the invention as applied to a flash apparatus of the box-shaped type. In this case the reflector housing part 22 with the reflector 23 is once again rotatably mounted on the main housing 21 in the same manner as in the versions shown in Figs. 1 to 3.

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paratus comprising a two part housing, a reflector mounted in a first housing part, means in the first housing part for mounting an electronic flash tube in front of the reflector, means in the second housing part for activating an electronic flash tube mounted in said first housing part in front of said reflector, and mating surfaces on the first and second housing parts, wherein the first housing part may be rotated relative to the second housing part about an axis which is perpendicular to the mating surfaces and which subtends an angle of more than 0° , but not more than 45° with the optical axis of the reflector, wherein the mating surfaces are so formed that in two relative rotational positions of the housing parts mutually spaced by 180° , the mating surfaces are congruent with respect to each other, and wherein the second housing part has a sensor for measuring the amount of light reflected by the subject during exposure and a device coupled to the sensor for terminating a flash exposure when the required degree of exposure has been effected, the axis of the sensor being parallel to the optical axis of the reflector in one but not the other of said two relative rotational positions.

2. A photographic electronic flash apparatus in accordance with Claim 1, wherein the mating surfaces are of circular or square shape.

3. A photographic electronic flash apparatus in accordance with Claim 1 or 2, wherein the first and second housing parts are rotatable about a shaft which is hollow to accommodate a cable passing from the activation means to the flash tube mounting means.

4. A photographic electronic flash apparatus in accordance with any one of Claims 1 to 3, having a stop and/or catch for retaining the second housing part in each of said two relative rotational positions.

5. A photographic electronic flash apparatus in accordance with Claim 4, having a restoring spring which is subjected to tension when the apparatus is moved out of one of said two relative rotational positions, so that on release the first housing part will automatically return thereto.

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