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(54) ILLUMINATION INDICATING APPARATUS FOR CAMERAS

(71) We, AGFA-GEVAERT AKTIEN-GESELLSCHAFT, a body-corporate recognised under German Law, of Leverkusen, 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 apparatus for use in cameras to indicate whether the brightness of the prevailing illumination is above or below a predetermined value.

It is an object of the invention to create an indicating apparatus of the type outlined above which is particularly simple in construction and which has the lowest possible electrical energy consumption.

The present invention provides apparatus for use in a camera to indicate whether the brightness of the prevailing illumination is above or below a predetermined value comprising a photosensitive receiver arranged so to control the voltage delivered by a power supply to a light emitting diode that when the brightness of prevailing illumination corresponds to the predetermined value the voltage delivered to the light emitting diode corresponds to its threshold potential.

Advantageously, the photosensitive receiver is a photo resistor and there is provided a fixed resistor connected in series with the photoresistor to form a voltage divider the light emitting diode being connected in parallel with the photo resistor or the fixed resistor.

There is, advantageously provided a semiconductor amplifier stage, preferably, comprising a transistor, the input of which is taken from the photosensitive receiver and the output of which is connected to the light emitting diode. Preferably, the photosensitive receiver is a photoresistor and the output of the amplifier is connected to a voltage divider comprising the photoresistor and a fixed resistor.

Advantageously, the photosensitive receiver is a photosensitive controllable semiconductor device, for example, a photo-

thyristor, a photo-transistor or a photo-field-effect-transistor, the light emitting diode being connected to the output of the semiconductor device.

The invention also provides a camera fitted with an indicating apparatus substantially as described above.

Several forms of indicating apparatus constructed in accordance with the invention will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 shows a first form of indicating apparatus,

Fig. 2 shows a second form of indicating apparatus,

Fig. 3 shows a third form indicating apparatus,

Fig. 4 shows a fourth form of indicating apparatus, and

Fig. 5 shows a fifth form of indicating apparatus.

Referring to Fig. 1 of the accompanying drawings, a camera top section 1 is shown having a viewfinder 2 and 3, and a window 4. Arranged to be visible through the viewfinder 2, 3 is a light emitting diode 5 which is connected across a photoresistor 6 arranged behind the window 4. A switch 7 a power supply 8, and a resistor 9 are connected in series with the photoresistor 6.

If the brightness of the prevailing illumination which impinges on the window 4 in the direction of the arrows 10 is low, and consequently it is no longer possible to take a correctly-exposed photograph, the resistance of the photoresistor 6 is large relative to the resistance of the fixed resistor 9. The voltage applied to the light emitting diode 5 is, therefore, greater than its threshold value, so that the diode lights up and indicates to the camera-user that in order to take a correctly-exposed photograph either a flash apparatus must be used or exposures in the 'B' setting must be made.

If the lighting conditions are adequate, the resistance of the photoresistor 6 is low relative to the resistance of the resistor 9,

so that the voltage applied to the light emitting diode 5 lies below its threshold value. The light emitting diode 5 does not, therefore, light up.

5 Referring to Fig. 2 a light emitting diode 11, is connected in parallel with a fixed resistor 12 which is connected in series with a photoresistor 13, a power supply 14 and a switch 15.

10 When the illumination is adequate, the resistance of the photoresistor 13 is low so that the voltage drop across the resistor 12 or at the light emitting diode 11 is above the threshold value of the light emitting diode. 15 The light emitting diode 11, therefore, lights up. When the illumination is inadequate, the resistance of the photoresistor 13 is high and, consequently, the voltage drop at the light emitting diode 11 is low, and, 20 therefore, below the threshold voltage. The light emitting diode 11 does not, therefore, light up.

Referring to Fig. 3, a light emitting diode 16 is connected to the collector of a transistor 17. The base of the transistor 17 is connected to a voltage divider which consists of a photoresistor 18 and a fixed resistor 19. A power supply is indicated by 20 and a switch by 21.

30 When the illumination is adequate, the potential at the base of the transistor 17 is positive with respect to the potential at the emitter. Therefore, the transistor 17 conducts. The voltage drop at the diode 16 is above the threshold value, so that the diode lights up. When the illumination is inadequate, the resistance of the photoresistor 18 is high and, therefore, the potential at the base of the transistor 17 is less than or equal to the potential at the emitter. 40 The conduction of the transistor 17 is, therefore, such that the potential across the diode 16 is below its threshold value. The diode 16 does not, therefore, light up.

45 Referring to Fig. 4, a camera top section 1¹ is shown having a viewfinder 2¹/3¹, and a window 4¹. Arranged to be visible through the viewfinder is a light emitting diode 5¹ which is connected in series with a photothyristor 6¹ arranged behind the window 4¹. Connected in series with the photothyristor 6¹ there is a fixed resistor 7¹ which can be connected to a power supply 9¹ by a switch 8¹.

55 When the illumination is adequate, so much light falls onto the photo-thyristor 6¹ that its threshold voltage is exceeded and it is therefore, switched on. A voltage which is above the diode threshold voltage is applied across the diode 5¹, so that the diode 5¹ lights up and indicates to the camera-user that the lighting conditions are adequate for correctly-exposed photographs. To terminate the indication the contact 8¹ 65 is reopened.

When the illumination is inadequate, the photo-thyristor 6¹ is switched out so that the diode 5¹ cannot light up.

Referring to Fig. 5, a resistor 11¹ is connected in series with a diode 10¹, and to the collector of a photo-transistor 4¹. The base of the photo-transistor 14 is connected to the tapping of a voltage divider formed by two resistors 12¹ and 13¹ which are connected across a power supply 15¹ by way of a switch 16¹.

The voltage divider 12¹, 13¹ is so set that the photo-transistor 14¹ is switched out when the illumination is inadequate and is switched in when the illumination is adequate. 80 When the illumination is adequate, therefore, the diode 10¹ lights up, but does not when the illumination is inadequate.

WHAT WE CLAIM IS:—

1. Apparatus for use in a camera to indicate whether the brightness of the prevailing illumination is above or below a predetermined value comprising a photosensitive receiver arranged so to control the voltage delivered by a power supply to a light emitting diode that when the brightness of the prevailing illumination corresponds to the predetermined value the voltage delivered to the light emitting diode corresponds to its threshold potential. 95

2. Apparatus as claimed in claim 1, wherein the photosensitive receiver is a photoresistor and there is provided a fixed resistor connected in series with the photoresistor to form a voltage divider the light emitting diode being connected in parallel with the photoresistor or the fixed resistor. 100

3. Apparatus as claimed in claim 1, wherein there is provided a semiconductor amplifier stage the input of which is taken from the photosensitive receiver and the output of which is connected to the light emitting diode. 105

4. Apparatus as claimed in claim 3, wherein the photosensitive receiver is a photoresistor and the input of the amplifier is connected to a voltage divider comprising the photoresistor and a fixed resistor. 110

5. Apparatus as claimed in claim 3 or claim 4, wherein the amplifier comprises a transistor. 115

6. Apparatus as claimed in claim 1, wherein the photosensitive receiver is a photosensitive controllable semiconductor device the light emitting diode being connected to the output of the semiconductor device. 120

7. Apparatus as claimed in claim 6, wherein the semiconductor device is a photo-thyristor, a photo-transistor or a photo-field-effect-transistor. 125

8. A camera fitted with an apparatus

so that the voltage applied to the light emitting diode 5 lies below its threshold value. The light emitting diode 5 does not, therefore, light up.

5 Referring to Fig. 2 a light emitting diode 11, is connected in parallel with a fixed resistor 12 which is connected in series with a photoresistor 13, a power supply 14 and a switch 15.

10 When the illumination is adequate, the resistance of the photoresistor 13 is low so that the voltage drop across the resistor 12 or at the light emitting diode 11 is above the threshold value of the light emitting diode.

15 The light emitting diode 11, therefore, lights up. When the illumination is inadequate, the resistance of the photoresistor 13 is high and, consequently, the voltage drop at the light emitting diode 11 is low, and, therefore, below the threshold voltage. The light emitting diode 11 does not, therefore, light up.

20 Referring to Fig. 3, a light emitting diode 16 is connected to the collector of a transistor 17. The base of the transistor 17 is connected to a voltage divider which consists of a photoresistor 18 and a fixed resistor 19. A power supply is indicated by 20 and a switch by 21.

30 When the illumination is adequate, the potential at the base of the transistor 17 is positive with respect to the potential at the emitter. Therefore, the transistor 17 conducts. The voltage drop at the diode 16 is above the threshold value, so that the diode lights up. When the illumination is inadequate, the resistance of the photoresistor 18 is high and, therefore, the potential at the base of the transistor 17 is less than or equal to the potential at the emitter. The conduction of the transistor 17 is, therefore, such that the potential across the diode 16 is below its threshold value. The diode 16 does not, therefore, light up.

45 Referring to Fig. 4, a camera top section 1^a is shown having a viewfinder 2^a/3^a, and a window 4^a. Arranged to be visible through the viewfinder is a light emitting diode 5^a which is connected in series with a photothyristor 6^a arranged behind the window 4^a. Connected in series with the photothyristor 6^a there is a fixed resistor 7^a which can be connected to a power supply 9^a by a switch 8^a.

55 When the illumination is adequate, so much light falls onto the photothyristor 6^a that its threshold voltage is exceeded and it is therefore, switched on. A voltage which is above the diode threshold voltage is applied across the diode 5^a, so that the diode 5^a lights up and indicates to the camera-user that the lighting conditions are adequate for correctly-exposed photographs. To terminate the indication the contact 8^a is reopened.

When the illumination is inadequate, the photothyristor 6^a is switched out so that the diode 5^a cannot light up.

Referring to Fig. 5, a resistor 11^a is connected in series with a diode 10^a, and to the collector of a photo-transistor 4^a. The base of the photo-transistor 14 is connected to the tapping of a voltage divider formed by two resistors 12^a and 13^a which are connected across a power supply 15^a by way of a switch 16^a.

The voltage divider 12^a, 13^a is so set that the photo-transistor 14^a is switched out when the illumination is inadequate and is switched in when the illumination is adequate. When the illumination is adequate, therefore, the diode 10^a lights up, but does not when the illumination is inadequate.

WHAT WE CLAIM IS:—

1. Apparatus for use in a camera to indicate whether the brightness of the prevailing illumination is above or below a predetermined value comprising a photosensitive receiver arranged so to control the voltage delivered by a power supply to a light emitting diode that when the brightness of the prevailing illumination corresponds to the predetermined value the voltage delivered to the light emitting diode corresponds to its threshold potential.

2. Apparatus as claimed in claim 1, wherein the photosensitive receiver is a photoresistor and there is provided a fixed resistor connected in series with the photoresistor to form a voltage divider the light emitting diode being connected in parallel with the photoresistor or the fixed resistor.

3. Apparatus as claimed in claim 1, wherein there is provided a semiconductor amplifier stage the input of which is taken from the photosensitive receiver and the output of which is connected to the light emitting diode.

4. Apparatus as claimed in claim 3, wherein the photosensitive receiver is a photoresistor and the input of the amplifier is connected to a voltage divider comprising the photoresistor and a fixed resistor.

5. Apparatus as claimed in claim 3 or claim 4, wherein the amplifier comprises a transistor.

6. Apparatus as claimed in claim 1, wherein the photosensitive receiver is a photosensitive controllable semiconductor device the light emitting diode being connected to the output of the semiconductor device.

7. Apparatus as claimed in claim 6, wherein the semiconductor device is a photothyristor, a photo-transistor or a photo-field-effect-transistor.

8. A camera fitted with an apparatus



substantially as claimed in any one of claims 1 to 7.

5 9. Apparatus substantially as hereinbefore described with reference to and as shown in any one of Figs. 1 to 5 of the accompanying drawings.

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