

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN AND RELATING TO CAMERAS

(71) We, AGFA-GEVAERT AKTIENGESSELLSCHAFT, 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 cameras having means for indicating shutter speeds and/or apertures.

Previously proposed cameras of this type use moving coil instruments for measuring and indicating electrical voltages produced in the camera. It is usual to protect such instruments built into cameras against vibrations which occur during transportation and usage of the apparatus, and this can lead to considerable cost. This does not, however, always prevent sensitive moving coil instruments from being damaged in the event of severe mechanical stress on the apparatus, as may occur in practice, thus leading to the failure of the exposure indicating apparatus and, therefore, of the camera. Repairs are complicated and, therefore, costly and tedious, since the moving coil instruments must be removed from the cameras for this purpose.

Furthermore, like any electro-magnetic apparatus, moving coil instruments require a not inconsiderable amount of energy. When using passive photoelectrical elements, as is usual with modern exposure control systems, a battery must be used which tends to discharge relatively rapidly during the operation of the exposure measuring device. It has, therefore, become the practice to make the exposure measuring circuit capable of being interrupted for the intervals between exposures. The switching on and off of the exposure measuring device which is necessary in each case, however, affects convenience

[Price 33p]

and speed in the handling of such a camera.

It is an object of the invention, therefore, to provide a camera having electrical indicating means that are sufficiently accurate for photographic purposes and which are more robust and economical than conventional moving coil instruments.

The invention provides a camera which includes means for delivering a voltage determined in accordance with the shutter speed and/or aperture required for correct exposure and means for indicating the said shutter speed and/or aperture comprising a liquid crystal voltmeter connected to the voltage delivering means.

Liquid crystal voltmeters have recently been proposed and consist substantially of two glass plates, each of which has on its inside surface a transparent electrode layer and between which is a layer of a liquid crystal material. A potential is applied across the electrodes and when a critical value is exceeded light passing through the crystal is scattered diffusely, so that the previously completely transparent crystal appears matt. By adding suitable colouring matter it is possible to obtain colour changes.

There is a voltage drop between two points on the electrodes as a result of the resistance of the electrode layer. Since the clouding of the crystal commences at a certain voltage, a borderline is produced between the transparent and opaque parts of the crystal the position of which is determined according to the voltage applied.

These voltmeters are constructed without moving parts and are, therefore, very robust and are more economic than moving coil instruments.

Advantageously, the indicating means includes a scale of shutter speed and/or aperture values so arranged that it is visible in register with the voltmeter. Preferably,

the scale is so arranged that it is visible through the voltmeter, for example, the scale may be arranged on an electrode plate of the voltmeter. In this way the markings on the scale, in the region of the voltmeter that is transparent, will be clearly visible while those outside that region will be invisible or differently coloured. The scale may, advantageously, be so arranged that it is movable relative to the voltmeter to take into account further factors determining the required exposure.

Advantageously, the camera includes electrical exposure control means and the indicating means is arranged to indicate the shutter speed and/or aperture set. Preferably, there is provided means for varying the voltage to take into account further factors determining the required exposure. In this way factors such as film sensitivity can be taken into account.

One electrode plate of the voltmeter may, advantageously, be formed as a series of parallel strips, successive strips being joined at alternate ends.

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

Fig. 1 is a diagrammatic representation of a shutter speed indicating circuit.

Fig. 2 is a perspective view of a first form of liquid crystal voltmeter, and,

Fig. 3 is a perspective view of a second form of liquid crystal voltmeter.

Referring to the accompanying drawings Fig. 1 shows diagrammatically a shutter speed indicating system for a photographic camera which has electronic shutter speed control means. A photoresistor 1 and a variable resistor 2 are connected in series across a battery 3 to form a potential divider. The tapping 8 between the photoresistor 1 and the resistor 2 is connected to an electrode 5, which is mounted on a glass plate 15, and which together with a base electrode 6 mounted on a plate 16 encloses a liquid crystal material 7, either directly or through an amplifier 4 (shown in broken lines).

The resistance of the photo-resistor 1 alters in accordance with the brightness of the prevailing illumination so that the voltage at the tapping 8 alters so determining the position of the limit of cloudiness or colour change limit of the crystal, which is indicated by 9.

Alterations in aperture and film sensitivity are taken into account in a known manner by means of two light-attenuating elements 10 and 11, which may, for example, be circular grey wedges.

Fig. 2 of the drawings shows in per-

spective the association of a scale marked in shutter speeds with a liquid crystal voltmeter.

The voltmeter comprises two glass plates 15 and 16, electrodes 5 and 6, and the liquid crystal 7 lying between them and is arranged in front of a scale 12 on which there are shutter speed marks. As shown in the drawing the shutter speed marks 30, 60 and 125 are covered over by the clouded part of the element and, depending on the construction of the apparatus, are misty or quite invisible. The mark 500 can be seen through the completely transparent crystal above the limit of the cloudiness 9.

The marks may also be provided, in a manner which is not shown, on a movable strip-like scale arranged beside the voltmeter.

Referring to Fig. 3 of the accompanying drawings the electrode 5 is formed as a series of strips, adjacent strips being joined at alternate ends to obtain the required relationship between the applied voltage and the displacement of the matt/clear portions. As the voltage rises, the liquid crystal 7 becomes cloudy along the folded path of the electrode 5. Viewed in the direction of the shutter speed marks, however, the transition between cloudy and clear zones appears sharper than along the electrode path.

Furthermore, the shutter speed marks in this arrangement are etched onto the electrode plate 16. Film sensitivity or aperture corrections are applied in a known manner by electrical means or by means of filters as shown in Fig. 1.

In other forms of camera, both still and cinematographic, the voltmeter is used for indicating aperture values. The marks indicating the aperture or shutter speeds may also be arranged otherwise than within the area of the voltmeter itself.

WHAT WE CLAIM IS:—

1. A camera which includes means for delivering a voltage determined in accordance with the shutter speed and/or aperture required for correct exposure and means for indicating the said shutter speed and/or aperture comprising a liquid crystal voltmeter connected to the voltage delivering means.

2. A camera as claimed in claim 1, wherein the indicating means includes a scale of shutter speed and/or aperture values so arranged that it is visible in register with the voltmeter.

3. A camera as claimed in claim 2, wherein the scale is so arranged that it is visible through the voltmeter.

4. A camera as claimed in claim 2 or claim 3, wherein the scale is so arranged that it is movable relative to the voltmeter

the scale is so arranged that it is visible through the voltmeter, for example, the scale may be arranged on an electrode plate of the voltmeter. In this way the markings on the scale, in the region of the voltmeter that is transparent, will be clearly visible while those outside that region will be invisible or differently coloured. The scale may, advantageously, be so arranged that it is movable relative to the voltmeter to take into account further factors determining the required exposure.

Advantageously, the camera includes electrical exposure control means and the indicating means is arranged to indicate the shutter speed and/or aperture set. Preferably, there is provided means for varying the voltage to take into account further factors determining the required exposure. In this way factors such as film sensitivity can be taken into account.

One electrode plate of the voltmeter may, advantageously, be formed as a series of parallel strips, successive strips being joined at alternate ends.

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The resistance of the photo-resistor 1 alters in accordance with the brightness of the prevailing illumination so that the voltage at the tapping 8 alters so determining the position of the limit of cloudiness or colour change limit of the crystal, which is indicated by 9.

Alterations in aperture and film sensitivity are taken into account in a known manner by means of two light-attenuating elements 10 and 11, which may, for example, be circular grey wedges.

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The marks may also be provided, in a manner which is not shown, on a movable strip-like scale arranged beside the voltmeter.

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1. A camera which includes means for delivering a voltage determined in accordance with the shutter speed and/or aperture required for correct exposure and means for indicating the said shutter speed and/or aperture comprising a liquid crystal voltmeter connected to the voltage delivering means.

2. A camera as claimed in claim 1, wherein the indicating means includes a scale of shutter speed and/or aperture values so arranged that it is visible in register with the voltmeter.

3. A camera as claimed in claim 2, wherein the scale is so arranged that it is visible through the voltmeter.

4. A camera as claimed in claim 2 or claim 3, wherein the scale is so arranged that it is movable relative to the voltmeter



to take into account further factors determining the required exposure.

5. A camera as claimed in claim 2 or claim 3, wherein the scale is arranged on an electrode plate of the voltmeter.

6. A camera as claimed in any one of claims 1 to 5, which includes electrical exposure control means and the indicating means is arranged to indicate the shutter speed and/or aperture set.

7. A camera as claimed in any one of claims 1 to 6, wherein there is provided means for varying the voltage to take into account further factors determining the required exposure.

8. A camera as claimed in any one of

claims 1 to 7, wherein one electrode plate of the voltmeter is formed as a series of parallel strips, successive strips being joined at alternate ends.

9. A camera substantially as hereinbefore described with reference to and as shown in Fig. 1, modified substantially as hereinbefore described with reference to and as shown in Fig. 2 or Fig. 3.

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