United States Patent [19]

Lindner

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[45] **June 25, 1974**

[54] **EXPOSURE SETTING DEVICE IN PHOTOGRAPHIC APPARATUS**

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[73] Assignee: **PEN PENTACON DRESDEN Kamera-und Kinowerke,** Dresden, Germany

[22] Filed: **May 14, 1973**

[21] Appl. No.: **359,847**

Related U.S. Application Data

[63] Continuation of Ser. No. 131,259, April 5, 1971, abandoned.

[30] **Foreign Application Priority Data**

Sept. 11, 1970 Germany, W.....P 57a/151126

[52] **U.S. Cl.**.....**354/53,** 95/10 C

[51] **Int. Cl.**..... **G03b 7/02**

[58] **Field of Search**..... 95/10 R, 10 C, 10 CE; 116/124.4; 340/366 R; 334/32

[56] **References Cited**

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Primary Examiner—Samuel S. Matthews
Assistant Examiner—Russell E. Adams, Jr.
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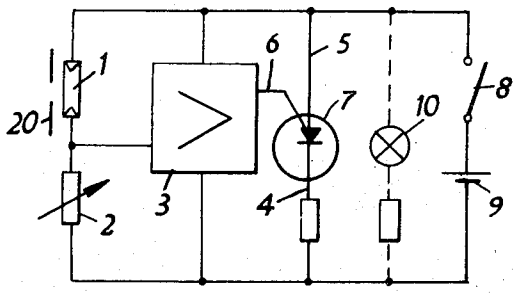
[57] **ABSTRACT**

The device for setting exposures in photographic apparatus is provided with a light indicator by which the set exposure factor combination is indicated as corresponding to under-exposure, over exposure or the correct exposure. The indicator is provided with a luminous surface the light-dark egee of which is displaceable in dependence upon the brightness of the subject and the exposure factor combination set. The light-dark edge can be aligned from opposite directions with a linear or punctiform fixed mark which is arranged directly adjacent the luminous surface and along the range of movement of the light-dark edge.

3 Claims, 4 Drawing Figures



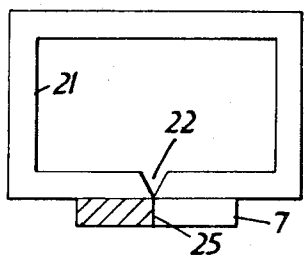


FIG. 1.

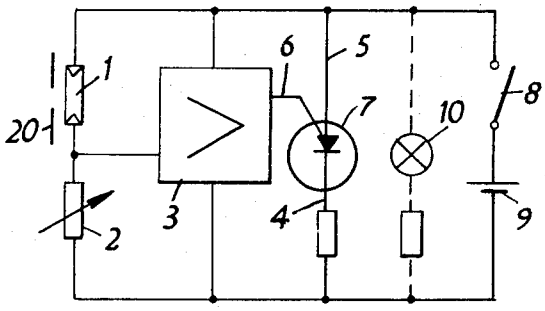


FIG. 2.

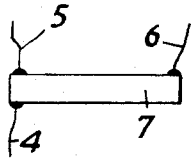


FIG. 3.

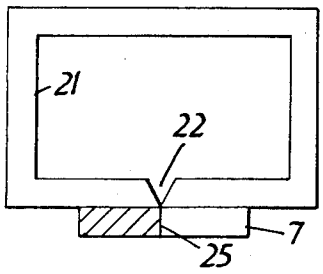
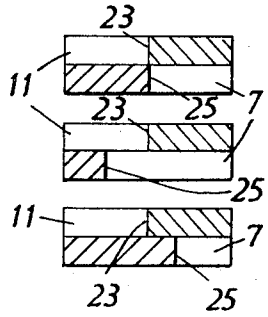


FIG. 4.



EXPOSURE SETTING DEVICE IN PHOTOGRAPHIC APPARATUS

This is a continuation of application, Ser. No. 131,259 filed Apr. 5, 1971, now abandoned.

BACKGROUND OF THE INVENTION

The invention relates to an apparatus for exposure-setting in photographic appliances, by means of a light indicator.

In known apparatus of this kind, two glow or incandescent lamps are used which are regulable in their illumination behaviour. The criterion of correct exposure-setting is either the lighting up of both lamps together or the burning of both lamps with equal brightness. In the case of deviation from the correct exposure-setting either only the one or the other lamp burns or the two have different brightnesses.

Glow lamps possess different ignition and extinguishing voltages so that exact exposure-settings with these light indicators are not possible. Moreover the voltage necessary for the glow lamps, and thus the space requirements necessary for the voltage source, are too high. The accuracy of the exposure-setting with brightness balancing of two lamps is dependent upon the subjective distinguishing capacity of the operator.

It is the purpose of the invention to simplify the exposure-setting apparatus both in its construction and in its handling.

The problem of the invention consists in providing an apparatus for exposure-setting with a light indicator which is minimal in cost and guarantees a hysteresis-free continuous setting of the correct exposure which is free from subjective errors and always indicates the degree of a set under-exposure or over-exposure and, without additional components, the direction of rotation of the setting members necessary for the purpose of correct exposure-setting.

SUMMARY OF THE INVENTION

According to the invention this problem is solved in that a luminous surface is used the light-dark edge of which is displaceable in dependence upon the respective object brightness and the diaphragm stop, exposure time and film sensitivity set in each case and can be aligned from opposite directions to a linear or punctiform fixed mark which is arranged adjoining the luminous surface and along the region of movement of the light-dark edge. The luminous surface is formed by an illuminating diode into the control electrode of which a variable current capable of displacing the light-dark edge of the illuminating diode is fed through an amplifier which is controllable by the object brightness and the exposure-setting members. The luminous surface can also be formed by a gap illuminated by means of an unregulated incandescent lamp, while over the one half of the incandescent lamp there is arranged an electromagnetically movable mask generating a defined light-dark edge. The fixed mark adjoining the variable luminous area can formed by a cut-away portion illuminated by the object brightness, of the framing mask in the view-finder of a photographic camera. The fixed mark can however also be formed by a gap illuminated by an unregulated auxiliary light source, upon the non-displaceable light-dark edge of which the light-dark edge of the variable luminous surface can be aligned.

Thus a simple and exactly obtainable alignment of edges serves as criterion for correct exposure-setting. The magnitude of the deviation of the displaceable light-dark edge from the fixed mark always indicates the degree of incorrectness of exposure and the direction of the deviation indicates the necessary direction of rotation of the setting members.

BRIEF DESCRIPTION OF DRAWING

The invention will be explained in greater detail hereinafter by reference to illustrated examples of embodiment.

FIG. 1 shows a circuit diagram for exposure-setting with illuminating diode,

FIG. 2 shows a lateral elevation of a controllable illuminating diode,

FIG. 3 shows a cut-away framing maks with regulable luminous surface,

FIG. 4 shows a plan view of the light balance with different exposure-settings.

DESCRIPTION OF PREFERRED EMBODIMENT

According to FIG. 1, in series after a voltage divider formed from a photoconductive cell 1 and a variable resistor 2 there is connected an amplifier 3 which feeds a current of variable magnitude into an illuminating diode 7 known *per se* having three electrodes 4, 5 and 6 (see FIG. 3) when the apparatus is connected through a switch 8 to a current source 9. 10 designates an unregulated incandescent lamp which can serve for the illumination of a gap 11 forming the fixed mark (see FIG. 4). According to FIG. 5 an unregulated incandescent lamp 12 is used which illuminates two gaps 13, 14 adjoining one another (FIG. 6) and over one half of which a rotatable mask 15 is arranged. The latter is coupled with a spring loaded rotating magnet 16 which is controlled by an amplifier 17 while a photoconductive cell 18 and a potentiometer 19 are connected into the input of the amplifier. 20 designates a diaphragm, for example the picture-taking lens diaphragm. According to FIG. 3 a framing mask 21 fitted in the viewfinder of a photographic camera is provided with a cut-away portion 22 the point of which adjoins the variable luminous surface of the illuminating diode 7. The light balance according to FIG. 4 consists of two luminous surfaces adjoining one another, of which the one can be formed by the illuminating diode 7 and the other by the gap 11 illuminated by means of the incandescent lamp 10 in constant length. The two luminous surfaces can however also be formed by the gaps 13, 14 illuminated by the incandescent lamp 12, the gap 14 being darkenable more or less by the maks 15. 23 and 24 designate the reference edges of the gaps 11 and 13 respectively and 25 and 26 designate the light-dark edges of the illuminating diode 7 and of the variable illuminating gap 14 respectively.

When the exposure-setting apparatus is used in a photographic camera the following manner of operation occurs:

When the variable resistor 2 coupled with the time and film sensitivity setting elements of the camera and lens diaphragm 20 are in a position which corresponds to correct exposure, the amplifier 3 feeds into the control electrode 6 of the illuminating diode 7 a current by reason of which its light-dark edge 25 forms one line with the point of the cut-away portion 22 or with the light-dark edge 23 of the illuminating gap 11. If now the

object brightness and thus the value of the photoconductive cell **1** should vary, by reason of the varied control current the illuminating surface of the illuminating diode **7** will reduce or enlarge. The light-dark edge **25** thus shifts to left or right in relation to the point of the cut-away portion **22** or to the reference edge **23,** and thus unambiguously indicates a set under-exposure or over-exposure. Since for the purpose of correct exposure-setting the light-dark edge **25** must always be returned to the cut-away portion **22** or the edge **23,** the direction of the deviation from the ideal position at the same time determines the necessary direction of movement of the lens diaphragm **20** or of the time-setting member of the camera. In the apparatus according to FIG. **5,** in dependence upon the respective values of the photoconductive cell **18** and of the potentiometer **19** coupled with the time-setting member the rotating magnet **16** is rotated more or less and thus so also is the mask **15.** In this way the gap illuminated by the lamp **12** is more or less darkened, that is to say the light-dark edge **26** travels in the direction of the longitudinal extent of the gap **14.** Here again a correct exposure is set when the edges **24** and **26** form one line with one another.

The apparatus according to the invention, although described above in connection with a photographic camera, is of course also usable in hand exposure meters.

I claim:

1. An exposure setting device including a light sensitive detector influenced by prevailing light conditions, a control element connected in circuit with the light sensitive detector which control element is influenced by presetable exposure factors, an amplifier having an input connected with the light sensitive detector, an electro-luminescent diode having a control electrode connected with an output of the amplifier which electroluminescent diode has a display surface progressively illuminatable in dependance on the signal supplied to its control electrode to provide a displaceable illuminated area boundary, and a fixed index mark disposed adjacent the display wherein the mark is formed when the exposure setting device is connected with a source of suitable supply potential the position of the illuminated area boundary is influenced by the prevailing light conditions and the exposure factor combination and its position relative to the fixed index mark distinguishes between correct exposure, over exposure and under exposure setting.

2. An exposure setting device according to claim **1,** wherein the fixed index mark comprises a slit illuminated by an auxilliary source of light.

3. In a photographic camera having a viewfinder provided with a mask defining the picture area, the provision of an exposure setting device according to claim **1** wherein the fixed index mark is formed by an opening in the mask which opening is illuminated by light emanating from the subject to be photographed.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,820,132 Dated June 25,1974

Inventor(s) FRITZ LINDNER

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

[73] Assignee: "PEN" should be --VEB--.

Signed and sealed this 1st day of July 1975.

(SEAL)
Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
and Trademarks

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