

PATENT SPECIFICATION (11)

1 437 914

437 914

- (21) Application No. 3310/74 (22) Filed 24 Jan. 1974 (19)
(31) Convention Application No. 2 303 928
(32) Filed 26 Jan. 1973 in
(33) Germany (DT)
(44) Complete Specification published 3 June 1976
(51) INT. CL.³ G03B 3/08
(52) Index at acceptance

G2A 401 402 494 515 521 524 526 527 533 592 602 607
609 615 690 706 711 CS



(54) IMPROVEMENTS IN OR RELATING TO MONITORING ARRANGEMENTS FOR MOVIE CAMERAS

(71) We, BRAUN AKTIENGESSELLSCHAFT, a German Body Corporate, of 22 Rüsselsheimer Strasse, D 6000 Frankfurt-am-Main, 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 monitoring arrangements for movie cameras.

It is an object of the present invention to provide depth-of-focus monitoring for a movie camera having a zoom lens by means of an arrangement which is capable of providing a reliable indication to the user of the camera when the camera is set for a focal length and to a light density which corresponds to a slight depth of focus, as a warning to the user of the need to follow carefully and to keep an eye on the setting of the distance.

According to the present invention, there is provided, in a movie camera having a setting ring for the focal length of a zoom lens, a monitoring arrangement comprising means adapted to be controlled by said setting ring and by the intensity of incident light for indicating when the depth of focus falls below a predetermined value.

The monitoring arrangement preferably comprises a light sensitive element which lies behind a shutter coupled with the setting ring. An attenuating or damping device operative upon the light rays or in the electrical measuring circuit may be provided to account for the kind of film used, the film sensitivity and the exposure time.

In a movie-camera having a built-in electrical exposure meter, the light-sensitive element of the exposure meter may be used in the monitoring arrangement of the invention in conjunction with a variable resistor controlled by the setting ring. In such case, the variable resistor is preferably constructed as a sliding resistor and is arranged on the setting ring, with a slider fixed to the housing. Such a construction is relatively simple and requires very few components.

According to a preferred circuit arrangement, the voltage of the exposure meter is fed to the variable resistor and the value of the current obtained thereby is used as the test of the conditions of the focal length. For indicating purposes an indicating device, a luminescence diode or a light bulb may be used. The indicator may be fed through a threshold device so that an indication is given only when the depth-of-focus value passes a certain lower limit.

The indicator may be placed in the path of rays falling into the finder of the camera so that the user of the camera will be able to recognise a situation when only slight depth of focus is present.

The invention will become more readily apparent from the following description of preferred embodiments shown in the accompanying drawings, in which:—

Figure 1 is a perspective view of a movie camera having a depth-of-focus monitoring or warning device according to the present invention,

Figure 2 is a circuit arrangement of the exposure meter of a movie camera having a depth-of-focus monitoring arrangement according to the present invention,

Figure 3 is a circuit arrangement similar to Figure 2 with certain variations, and

Figure 4 is a perspective view, partly broken away, of a movie camera having a zoom lens, showing a structural arrangement of a resistor for the depth-of-focus warning device of the invention, the resistor being mounted on the setting ring for the focal length for the zoom lens.

With reference to Figure 1, it is seen that the illustrated movie camera has a housing 1, on the front side of which there is provided an opening 2 for the entry of light to a meter, the opening 2 lying above a zoom lens 3. The rearmost ring of the zoom lens is a setting ring 4 for the focal length. A control cam 5 is secured to the setting ring 4 close to the housing wall. The cam has a thickness which varies in a continuous fashion along its length and forms

a control surface 6 for a purpose herein-
after described. The control surface 6 of
the control cam 5 is engaged by a slider 7
which by means of a spring 13 is kept in
abutting relationship.

The slider 7 extends into the opening 2
for the entry of the light and in the region
of the opening 2 it is formed with a V-
shaped recess 8. This recess 8 functions as
an adjustable shutter device which accord-
ing to the focal length set by the ring 4
makes a greater or lesser part of the
opening 2 for the entry of the light due to
its operational engagement with the control
cam 5 secured to the ring 4.

Behind the opening 2 for the entry of the
light there is mounted a photo resistor 9
which is connected in series with a battery
10 and which is also coupled to a threshold
device 11 which can be any well-known cur-
rent discriminating device. Such current dis-
criminating devices are well-known in the
art and will not be described in detail.

A filter 12 is pivoted within the camera
to swing in front of the photo resistor 9
so that the sensitivity of the depth-of-focus
warning device can be adjusted according
to the kind of film and film sensitivity and/
or exposure time used.

At the output of the electronic threshold
device 11 there is provided a light source,
placed, for example, in the field of vision
of the finder of the camera. The light
source is arranged to glow at a certain low
limit of the depth of the focus to give a
visual warning to the user of the camera.

The photo resistor 9 together with the
shutter device 7 forms a meter. The cur-
rent flowing through the photo resistor 9
when the light entry opening 2 is fully
opened is approximately proportional to the
light intensity during the shooting. The
slider-shutter arrangement 7 takes effect in
the event that longer focal lengths or the
smallest possible focal lengths are used, when
only a portion of the light will fall onto the
photo resistor 9. It will be seen that the
current through the photo resistor 9 de-
pends upon the light intensity and the trans-
mission ratio to which the slider-shutter de-
vice 7 is set.

The shape of the V-shaped recess 8 should
be such that the transmission ratio of the
slider-shutter 7 is reduced in a way corres-
ponding to the reduction of the depth of
focus at increasing focal lengths. Thus the
transmission ratio resulting from movement
of slider 7 is required to vary in a non-
linear fashion and to this end a V-shaped
recess is adopted which has curving sides as
illustrated in Figure 1.

Figure 2 illustrates the circuit diagram
of a second embodiment comprising an ex-
posure meter of a movie camera incorpor-
ating a depth-of-focus warning device. The

circuit diagram includes a photoresistor 14
of the exposure meter which is coupled
through a battery 15 and a variable resistor
16 to an indicating instrument 17. The
photoresistor 14 is arranged in such a place
within the movie camera that it becomes
illuminated by light entering the camera
through the objective or other entry open-
ing to the region of the shutter. Light rays
passing through the objective may be
directed or guided to the photoresistor 14.

Parallel with the variable resistor 16 and
indicating instrument 17 are resistors 18 and
19 which may be switched into circuit by
means of the switches 20, 21. Thereby the
sensitivity of indication can be varied de-
pending on the film sensitivity and on the
set film speed. The circuit illustrated in
Figure 2 is as commonly used in exposure
meters for movie cameras with the addition
of adjusting resistor 16 and indicating de-
vice 17 to provide a voltage which is an in-
dication of the setting of the shutter of the
camera, this voltage being modified by fur-
ther circuit elements 22, 23 and 26. The
said voltage is in fact multiplied by a factor
which depends on the set focal length. For
this purpose to the connecting point of the
battery 15 with the adjustable resistor 16
a variable resistor 22 is connected which at
its other end is connected to a current dis-
criminator 23.

Variable resistor 22 is fastened on the
circumference of the focal-length-setting ring
24 of the zoom lens 25 as seen in Figure 4.
The characteristic of the variable resistor 22
is such that it is not a linear function of the
set focal length but depends upon a rela-
tionship of the depth of focus with respect
to the focal length. With an increasing focal
length the resistance value of the variable
resistor 22 will also increase.

Under the conditions that the variable
resistor 22 has a resistance which is con-
siderably larger than the resistance of the
indicating instrument 17 including the ad-
justable resistor 16 connected thereto, the
current through the current discriminator
23 will be proportional to the depth of focus.
When the depth of focus is relatively small
then a relatively small current will flow.

The current discriminator 23 is adjusted
in such a manner that when a light source
26 is connected thereto, such as a lumines-
cence diode, it will light up when the cur-
rent flowing into the current discriminator
23 is below a certain value.

Figure 3 represents a variation with re-
spect to Figure 2, in that, instead of a vari-
able resistor 22, a potentiometer 27 is used
which controls a voltage discriminator 28
to which an indicating device 29 is con-
nected. The remaining portions of the cir-
cuit are as described in connection with
Figure 2 and Figure 4.

The potentiometer 27 can be of construction like that of the variable resistor 22 but includes an additional end terminal 30 shown in Figure 4. As also shown in that figure, resistor strip or pad 22 is fastened on the circumference of the focal-length-setting ring 24. One end 31 of the resistor strip 22 can be grounded such as directly to the focal-length-setting ring 24. On the resistor pad 22 is a slider 32 fixed to but electrically insulated from the housing.

The multiplication of the parameters defining the depth of focus can be effected by summing the logarithms of the parameters defining the depth of focus.

WHAT WE CLAIM IS:—

1. A monitoring arrangement in a movie camera having a setting ring for the focal length of a zoom lens, the arrangement comprising means adapted to be controlled by said setting ring and by the intensity of incident light for indicating when the depth of focus falls below a predetermined value.

2. A monitoring arrangement in a movie camera as claimed in claim 1, including a shutter, means arranged on said focal length setting ring for variably setting said shutter, and a light entry opening provided in said camera for passing the light intensity during the shooting to an exposure meter arrangement, said shutter being arranged to move into the path of the light falling through said opening and partially masking said opening when said focal length setting ring is operated.

3. An arrangement as claimed in claim 2, wherein said exposure meter arrangement includes a photo resistor placed behind said opening.

4. An arrangement as claimed in claim 3, wherein light-attenuating means is placed between said opening and said photo resistor for adjusting the light quantity falling onto said photo resistor in accordance with the type of film, sensitivity and film speed used during shooting.

5. An arrangement as claimed in claim 1, wherein said means comprises a light sensitive element and an adjustable resistor adjustable according to the selected focal length.

6. An arrangement as claimed in claim 5, wherein said adjustable resistor comprises a resistor path adapted to be mounted on the focal-length-setting ring of the zoom lens and a slider arm cooperable with said resistor for sampling from said resistor a voltage quantity corresponding to the setting of said focal-length-setting ring.

7. An arrangement as claimed in claim 6, wherein the voltage appearing on said adjustable resistor means is indicative of the depth of focal value and controls an indicating device.

8. An arrangement as claimed in claim 6, wherein said adjustable resistor is a potentiometer including a slider arm for picking up and feeding a voltage indicative of the depth of focal value.

9. An arrangement as claimed in claim 1, wherein said means is coupled to an indicating device for visually indicating when the depth of focus has passed a low limit.

10. An arrangement as claimed in claim 9, wherein said indicating device is a luminescence diode.

11. An arrangement as claimed in claim 9 or 10, wherein the indicating device is fed through a threshold device for setting said low limit.

12. An arrangement as claimed in claim 9, 10 or 11, wherein said camera includes a finder arrangement, said indicating device being placed in the light path of said finder arrangement.

13. An arrangement as claimed in claim 2, wherein said indicating means comprises a camming means fixedly coupled to said setting ring for rotation therewith, a shutter mounted at one end for slidable movement over said camming surface and for vertical movement in response to said slidable movement, said shutter variably extending into the light path of the incident light of said exposure means and of said light sensitive means, and means controlled by said light sensitive means for indicating a predetermined value of said depth of focus magnitude.

14. An arrangement as claimed in claim 13, wherein said shutter means includes a V-shaped recess having sides of a predetermined curvature.

15. An arrangement according to claim 1, incorporated in an exposure meter.

16. A monitoring arrangement in a movie camera, substantially as herein described with reference to Figure 1, Figure 2 or Figures 3 and 4 of the accompanying drawings.

ARTHUR R. DAVIES,
Chartered Patent Agents,
27, Imperial Square, Cheltenham,
and
115, High Holborn,
London, W.C.1.
Agents for the Applicants.



The potentiometer 27 can be of construction like that of the variable resistor 22 but includes an additional end terminal 30 shown in Figure 4. As also shown in that figure, resistor strip or pad 22 is fastened on the circumference of the focal-length-setting ring 24. One end 31 of the resistor strip 22 can be grounded such as directly to the focal-length-setting ring 24. On the resistor pad 22 is a slider 32 fixed to but electrically insulated from the housing.

The multiplication of the parameters defining the depth of focus can be effected by summing the logarithms of the parameters defining the depth of focus.

WHAT WE CLAIM IS:—

1. A monitoring arrangement in a movie camera having a setting ring for the focal length of a zoom lens, the arrangement comprising means adapted to be controlled by said setting ring and by the intensity of incident light for indicating when the depth of focus falls below a predetermined value.

2. A monitoring arrangement in a movie camera as claimed in claim 1, including a shutter, means arranged on said focal length setting ring for variably setting said shutter, and a light entry opening provided in said camera for passing the light intensity during the shooting to an exposure meter arrangement, said shutter being arranged to move into the path of the light falling through said opening and partially masking said opening when said focal length setting ring is operated.

3. An arrangement as claimed in claim 2, wherein said exposure meter arrangement includes a photo resistor placed behind said opening.

4. An arrangement as claimed in claim 3, wherein light-attenuating means is placed between said opening and said photo resistor for adjusting the light quantity falling onto said photo resistor in accordance with the type of film, sensitivity and film speed used during shooting.

5. An arrangement as claimed in claim 1, wherein said means comprises a light sensitive element and an adjustable resistor adjustable according to the selected focal length.

6. An arrangement as claimed in claim 5, wherein said adjustable resistor comprises a resistor path adapted to be mounted on the focal-length-setting ring of the zoom lens and a slider arm cooperable with said resistor for sampling from said resistor a voltage quantity corresponding to the setting of said focal-length-setting ring.

7. An arrangement as claimed in claim 6, wherein the voltage appearing on said adjustable resistor means is indicative of the depth of focal value and controls an indicating device.

8. An arrangement as claimed in claim 6, wherein said adjustable resistor is a potentiometer including a slider arm for picking up and feeding a voltage indicative of the depth of focal value.

9. An arrangement as claimed in claim 1, wherein said means is coupled to an indicating device for visually indicating when the depth of focus has passed a low limit.

10. An arrangement as claimed in claim 9, wherein said indicating device is a luminescence diode.

11. An arrangement as claimed in claim 9 or 10, wherein the indicating device is fed through a threshold device for setting said low limit.

12. An arrangement as claimed in claim 9, 10 or 11, wherein said camera includes a finder arrangement, said indicating device being placed in the light path of said finder arrangement.

13. An arrangement as claimed in claim 2, wherein said indicating means comprises a camming means fixedly coupled to said setting ring for rotation therewith, a shutter mounted at one end for slidable movement over said camming surface and for vertical movement in response to said slidable movement, said shutter variably extending into the light path of the incident light of said exposure means and of said light sensitive means, and means controlled by said light sensitive means for indicating a predetermined value of said depth of focus magnitude.

14. An arrangement as claimed in claim 13, wherein said shutter means includes a V-shaped recess having sides of a predetermined curvature.

15. An arrangement according to claim 1, incorporated in an exposure meter.

16. A monitoring arrangement in a movie camera, substantially as herein described with reference to Figure 1, Figure 2 or Figures 3 and 4 of the accompanying drawings.

ARTHUR R. DAVIES,
Chartered Patent Agents,
27, Imperial Square, Cheltenham,
and
115, High Holborn,
London, W.C.1.
Agents for the Applicants.