

# PATENT SPECIFICATION

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## (54) PHOTOGRAPHIC EXPOSURE CONTROL DEVICE

(71) We, EASTMAN KODAK COMPANY, a Company organized under the Laws of the State of New Jersey, United States of America of 343 State Street, Rochester, New York 14650, United States of America 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 an exposure control device for use in cameras.

In cameras providing for automatic or semiautomatic control of shutter-diaphragm apparatus, an exposure aperture opening is often set with the best estimate of light intensity, and a shutter is opened and closed automatically based on the intensity of light available, or vice-versa. The exposure aperture size may be controlled in many ways, for example by a mechanical coupling which sets the aperture as a lens is moved to focus the scene to be photographed. The automatic control of such apparatus may equally be controlled in many ways, but is most often accomplished by the use of electronic switching circuitry utilizing a photosensitive element as a controlling element in the circuit. The photosensitive element has an impedance that varies inversely with the intensity of the scene light incident thereon. It is known that when using such a photosensitive element, that error will result, and consequently improper exposure, if the exposure aperture has been reduced in size, and correspondingly the amount of light striking the photosensitive element is not attenuated by a preselected amount. The error arises from the fact that the photosensitive element has a response characteristic which is substantially nonlinear, and the electronic circuit is calibrated to respond most accurately to the photosensitive element when it is operating in a substantially linear region of its characteristic

[Price 33p]

curve. Apparatus is known whereby the exposure aperture and shutter speed are set automatically as a function of scene light, and the light incident on the photosensitive element is filtered to compensate for the reduced exposure aperture dimension.

In accordance with the present invention there is provided a photographic exposure control device comprising a member mounted for movement to bring an aperture therein into alignment with an exposure aperture, a first transducer operable to move shutter means from a closed to an open condition, a second transducer operable to prevent movement of the apertured member into alignment with the exposure aperture and an electronic circuit including photosensitive means arranged to receive scene light and having an electrical parameter variable as the intensity of the scene light varies, the photosensitive means being arranged in the electronic circuit for establishing an electrical signal for actuation of the first transducer to move the shutter means from the closed to the open condition after a time interval dependent upon scenelight intensity, and for actuating the second transducer when scene light is below a preselected intensity level.

In the accompanying drawings:—

Fig. 1 is a perspective view of a photographic exposure control device constructed according to the present invention, shown in a cocked position;

Fig. 2 is an elevation to a reduced scale, of Fig. 1 showing the device in a condition to provide an exposure in average light conditions;

Fig. 3 is a view similar to Fig. 2 but showing an apertured member in a position wherein the exposure aperture dimensions are reduced, and the amount of light incident on the photosensitive element has been attenuated;

Fig. 4 is an elevation, to an enlarged scale, of a latch mechanism shown in Figs. 1 to 3 for retaining the shutter blade in an aperture covering position until the electronic circuitry has reached a preselected operating state; and

Fig. 5 shows an electronic circuit diagram for use with the device of the present invention.

Because cameras are well known, the present description will be directed in particular to elements forming part of or co-operating more directly with the present invention. The camera elements not specifically shown or described may take forms well known to those skilled in the art.

Referring now to the drawings, and in particular to Fig. 1, there is shown a camera base plate 10 defining an exposure aperture 12 for the passage of scene light there-through. A safety shutter blade 14, having a disc 19 on one end thereof, is pivotally mounted on a pin 16 and is urged by means of a spring 18 in a direction for moving the disc 19 over the exposure aperture 12 for preventing an unwanted exposure prior to camera actuation. A controlled shutter blade 20, is pivotally mounted on a pivot pin 22 and includes on one end thereof, a disc 21 which is disposed between the disc 19 and the exposed aperture 12 for movement into and out of a blocking position relative to the exposure aperture 12, a spring 24 serving to urge the shutter blade 20 to the open position.

The illustrated apparatus of Fig. 1 provides for variation in the size of the exposure aperture 12 by means of an irregularly shaped, apertured member 30 having a first aperture 32 in an elbow 34 thereof and a second aperture 36 in one end 38. The apertured member 30 is pivotally mounted at its other end 35 on a pin 37, for movement in a counterclockwise direction under the influence of a spring 33. As shown in Fig. 3 the elbow 34 is movable angularly relative to the exposure aperture 12, for aligning the first aperture 32 with the apertures for reducing the size of the exposure aperture 12. The second aperture 36 is simultaneously movable relative to a photosensitive element 39, such as a cadmium sulphide cell, or the like, having an electrical impedance which varies inversely as the intensity of scene light varies. The second aperture 36 attenuates incident scene light onto the photosensitive element 39 when the first aperture 32 is coincident with the exposure aperture 12. The photosensitive element 39 is encased in a housing 40 having an aperture 41 for the passage of scene light to the photosensitive element 39. In the embodiment disclosed, a notch 42 is provided in the housing 40 for receiving the end 38 of the apertured member 30. The movement

of the end 38 into the notch 42 aligns the second aperture 36, which is smaller than the aperture 41, with the aperture 41, thereby reducing the amount of light incident on the photosensitive element 39. The particular amount of attenuation or reduction required may be calculated by well known techniques and is, of course, dependent upon relative size of the apertures formed.

The apertured member 30 is released for movement by means of a camera release lever 44 which is mounted for axial movement by means of a pair of slots 48 engaging a pair of pins 46 on the base plate 10. The camera release lever 44 is movable against the bias of a spring 49 and includes a portion exterior to the camera for manual actuation. Initial movement of the release lever 44 actuates a switch S1 to the closed position. A pair of projections 51 and 52 on the release lever 44 have tabs 51a and 52a which are disposed to engage and retain the apertured member 30 and the safety shutter blade 14 against the bias of the spring 33 and 18, respectively, when the apparatus is in the cocked position as shown in Figure 1. Axial movement of the release lever 44 as shown in Fig. 3, moves the projections 51 and 52 downwardly which allows the spring 18 to pivot the safety shutter blade 14 about pin 16, and allows the spring 33 to pivot the apertured member 30 about pin 37. The controlled shutter blade 20 is movable into and out of the light blocking position relative to the exposure aperture 12, by means of the spring 24 and an electromagnet 50 having a core 55. When the electromagnet 50 is de-energized, the spring 24 maintains the controlled shutter blade 20 in the position of Fig. 1, against a stop pin 51. When energized, the electromagnet 50 attracts a keeper 53 on the controlled shutter blade 20 thereby pivoting the latter about the pivot pin 22 against the bias of the spring 24 to uncover the exposure aperture 12.

The electromagnet 50 is connected in an electronic circuit, to be described later, which is energized as the switch S1 is closed. Upon initial energization of the electromagnet 50, the controlled shutter blade 20 will not open because, as also shown in Fig. 1, and more clearly shown in Fig. 4, a latch mechanism 60 is provided for preventing the opening of the controlled shutter blade 20 prior to the predetermined operating state of the electronic circuitry, i.e., the predetermined flux field of the electromagnet 50. The latch mechanism 60 includes a movable ring 62 having a detent 67 and gear teeth 62a on the periphery thereof, and a pivotal arcuate arm 64 having teeth 64a meshing with the teeth 62a. The arm 64 extends angularly from a lever 65 which is pivotal about a pin 61.

The lever 65 is retained in the position shown in Fig. 1, against the bias of a spring 66, by means of an extension 52c of the projection 52. The extension 52c extends through a slot 52d of the support plate 10 and engages a biased cocking lever 68, as shown in Fig. 1. Also, the detent 67 on the ring 62, engages the disc 21 and prevents the shutter blade 20 from opening until the ring 62 is rotated in a clockwise direction to the position shown in Fig. 4 to free the detent 67 from the shutter blade 20, whereupon the attractive force of the electromagnet 50 upon the keeper 53 pivots the controlled shutter blade 20 to uncover the exposure aperture 12. The arcuate arm 64 includes a foot 69 for engaging a pair of switches S2 and S3, when the arm 64 reaches its terminal pivotal position in a clockwise direction, whereby the switches S2 and S3 are opened substantially simultaneously with the opening of the exposure aperture 12.

The apertured member 30 is adapted to be moved to align the first aperture 32 with the exposure aperture 12, when the intensity of the scene light is too high for exposure at the fixed exposure aperture 12. The movement of the apertured member 30 to align the apertures is prevented if scene light is below the high level by means of a detent mechanism 70, which is actuable by means of an electromagnet 78 in the electronic circuit of Fig. 5. The detent 70 comprises a yoke 71 having legs 74 and 75 and pivotal about a pivot pin 72 centered in a yoke base 80. The leg 74 includes a keeper 74a disposed adjacent to, and attractable by the electromagnet 78, so that when attracted by the electromagnet 78, the yoke 71 pivots about the pin 72 in a clockwise direction against the action of a spring 76. The leg 75 is normally biased against a pin 96 by means of the spring 76 but as the yoke 71 pivots in a clockwise direction, upon energization of the electromagnet 78, the leg 75 engages a notch 73 in the elbow 34, thereby preventing the apertured member 30 from moving the first aperture 32 into alignment with the exposure aperture 12.

An upper end 95 of a second apertured lever 94 is disposed relative to a holder (not shown) for a flash lamp unit so that the lever 94 is moved in a clockwise direction about a pin 96 upon insertion of a flash lamp unit into the holder. Clockwise movement of the lever 94 moves an aperture 90 therein to a position in which it is aligned with the exposure aperture 12 and also closes a switch S4.

The relative size of the exposure apertures formed by the exposure aperture 12 or the apertures 32 and 90 are selected, as previously indicated, as a function of the intensity of the incident scene light. The

first aperture 32, being smaller in dimension than the exposure aperture 12, has a dimension selected as an exposure aperture when conditions of high scene brightness occurs, and the exposure aperture 12 has a dimension selected for an exposure at a lower scene brightness.

The third aperture 90 represents an aperture for use with artificial light when the intensity of the scene light is below that which will produce a good exposure without the aid of artificial light. Thus, exposure apertures may be formed that span the full light intensity range encountered in photographing an object scene. Illustratively, photographic exposures made with the apertures thus formed may represent exposures as defined by the customary f numbers, at f/8, f/11, or an f/16 aperture. The f/8 aperture representing the largest exposure aperture formed, the f/11 aperture representing the aperture formed when the apertured member 30 moves to align the first aperture 32 with the exposure aperture 12 and the f/16 aperture representing the exposure using artificial lighting equipment.

An electronic circuit suitable for use with the apparatus of Fig. 1, for indicating the need for a specified exposure dimension, for controlling the selection of the exposure aperture, and for controlling the length of the exposure interval is shown in Fig. 5. The circuit is energizable by the closure of the switch S1 as the release lever 44 is actuated axially, and power is supplied to the circuit from a battery 100. Closure of the switch S1 connects the battery 100 in circuit with a trigger circuit 102, such as a Schmitt trigger, and trigger circuit 102 is switched from a nonconducting state to a conducting state. A second trigger circuit 104 is provided, which may also be a Schmitt trigger, and which is adapted to be in a conducting state when the scene light is too low for proper exposure. The trigger circuit 104 controls the energization or de-energization of a lamp 106 which is indicative of the level of scene brightness. A third trigger circuit 108 is adapted to be energized when scene light is of an intensity level requiring an extended exposure interval. The trigger circuit 102 controls the energization of the electromagnet 50 while the trigger circuit 108 controls the energization of the electromagnet 78.

The three trigger circuits 102, 104, and 108 are controlled in accordance with the intensity of the scene light by means of the photosensitive element 39 arranged in the camera to receive the scene light and having an electrical resistivity which varies inversely with the amount of scene light incident thereon. The photosensitive element 39 includes a first element 112, connected in circuit with a capacitance 114 and the

battery 100 to form a conventional R-C voltage integrating network, the time constant of which is dependent upon the capacitance of the capacitor 114 and the resistance of the element 112 as established by the intensity of the scene light incident thereon. The capacitor 114 is normally shunted to ground by the switch S2 connected in circuit at a junction 118, between the element 112 and the capacitor 114. When the switch S2 is opened, the rise time of the voltage at the junction 118, being dependent upon the intensity of the scene light, and being coupled to the input of the trigger circuit 102, controls the triggering thereof at varying time intervals dependent upon the intensity of the scene light. The switch S2 is opened by the foot 69 of the arcuate arm 64, simultaneously with the opening of the exposure aperture 12 and, upon opening the switch S2, the voltage at the junction 118, will rise approximately exponentially; therefore, the trigger circuit 102 will be switched from its normally conductive state to its non-conductive state in a time period depending upon the scene light intensity. The electromagnet 50 will be energized or de-energized according to current flow in coil 92 of the electromagnet 50, being in circuit with the output stage of the trigger circuit 102. For a high scene light intensity the resistance of the element 112 will be low, consequently, a short time constant, and conversely if the scene light intensity is low, the resistivity of the element 112 will be high producing a longer time-constant.

Conduction of the trigger circuits 104 and 108 is dependent upon the scene light incident on a second element 120 of the photosensitive element 39. The second element 120 is coupled in circuit with the battery 100 and a parallel variable resistance combination 122, in which one variable resistor 123 of the parallel combination controls current to the input of the trigger circuit 108 and a second variable resistor 125 of the parallel combination controls the current to the input of the trigger circuit 104. The variable resistors 123 and 125, in circuit with the element 112 form voltage divider networks which are inputs to the trigger circuits 104 and 108 and accordingly bias the trigger circuits to be conducting, in the case of trigger circuit 104 when the scene light intensity is low, and in the case of the trigger circuit 108 when the scene light intensity is a nominal light. When the trigger circuit 104 is in a conductive state, the lamp 106 will be energized thereby indicating to a camera operator that the scene light intensity is too low for normal exposure. The operator, therefore, has the option of using the timed exposure or actuating the flash aperture lever 94 by

inserting an appropriate flash lamp unit into a holder on the camera (not shown). The trigger circuit 108 is adapted to be in the conductive state when the scene light is below a high intensity level, however, not low enough for photoflash equipment to be used. In the event that the scene light is such that the trigger circuit 108 is rendered conductive, current flowing through coil 97 in the output circuit of trigger circuit 108 will energize the electromagnet 78, thereby preventing the movement of the apertured member 30 to reduce the effective size of the exposure aperture 12. The switch S3 which is opened by the foot 69 of the arcuate arm 64 as the shutter blade 20 opens, is adapted to disconnect the trigger circuit 108 from the closed circuitry of trigger circuit 102, thereby removing any influence that the trigger circuit 108 may have on the timing cycle as established by the element 112 and the capacitor 114. Although S3 is opened, the frictional force of the mechanical engagement of the notch 73 with the arm 75 will retain the apertured member 30 in the position shown in Fig. 2.

When the light conditions are too low for exposure without the aid of artificial light, and the operator inserts the flash lamp unit, the switch S4 is closed and a fixed resistor 124 is connected between the battery 100 and the input of the trigger circuit 102. The resistor 124 and capacitor 114 set a fixed time-constant which is established in accordance with the time interval that the aperture 12 is to be opened relative to the useful length of the flash lamp illumination. The electromagnet 50 is accordingly energized and de-energized within the time period which establishes the correct opening and closing time of the exposure aperture for flash photography.

The switches S1 - S5 are shown positioned to be mounted on the reverse side of the plate 10 and having contacts protruding therethrough for engagement by their respective operating members. However, it will be appreciated by one skilled in the art that actuation of the respective switches is not relative to the form of mounting used.

With reference to Figs. 1, 2, and 3, the following sequence takes place and, depending upon the state of the electronic circuit of Fig. 5, one of the three exposure apertures will be formed. Initially, the operator partially depresses the release lever 44 to close the switch S1. The closure of the switch S1 energizes the trigger circuit 102 and, depending upon the intensity level of the scene light, will energize the trigger circuits 104 and 108. The lamp 106 will be energized in the event that the scene light intensity is too low for normal or timed exposure. In the event that the lamp 106 does not become energized when the release

lever 44 is slightly depressed, the operator continues to depress the release lever 44 thereby releasing the apertured member 30, and the safety shutter 14 for initial movement in a counterclockwise direction under the action of springs 33 and 18, respectively. This operation is shown in Fig. 3. As may best be seen by reference to Fig. 2, in the event that scene light is in the range below high intensity but above the low-light condition, the bias established by the resistor 123 and the element 120 biases the trigger circuit 108 to the conductive state. The electromagnet 78 having its coil 97 in the output circuit thereof becomes energized and the keeper 74a is accordingly attracted to the electromagnet 78 and the yoke 71 is pivoted about the pivot pin 72. As the yoke 71 pivots, the leg 75 engages the notch 73 of the apertured member 30, thereby preventing the apertured member 30 from moving to align the first aperture 32 with the exposure aperture 12, thus keeping the exposure aperture 12 at the largest dimension.

When the switch S1 is initially closed, the trigger circuit 102, normally in a nonconductive state, is switched to a conductive state and accordingly energizes the electromagnet 50. When the electromagnet 50 becomes energized, it attracts the keeper 53 on the controlled shutter blade 20 thereby attempting to pivot the shutter blade 20 in a counterclockwise direction away from the exposure aperture 12. However, the latch mechanism 60 momentarily prevents the controlled shutter blade 20 from opening prior to the selected energization level of the electromagnet 50. The operation of the latch member 60 may best be seen from Fig. 4. As the operator depresses the release lever 44 the extension 52c releases the lever 65 for movement about the pin 61, under the bias of the spring 66. As the lever 65 pivots about the pin 61 in a clockwise direction, the gear teeth 62a and 64a cause rotation of the ring 62 in a clockwise direction, thereby removing the detent 67 from the latching position so that the controlled shutter blade 20 accordingly moves in a counterclockwise direction due to the attraction of the keeper 53 by the electromagnet 50. As the arm 64 reaches a final position, the foot 69 engages the switches S2 and S3 opening both simultaneously with the opening of the exposure aperture 12, thereby starting the timing cycle substantially simultaneously with the opening of the exposure aperture 12. After a time interval, as established by the element 112 and the capacitor 114 as previously described, a voltage level has built up at the junction 118 and the trigger circuit 102 will be switched from its normally conducting state to a non-conducting state, thereby de-energizing the electro-

magnet 50. When the electromagnet 50 becomes de-energized it releases the keeper 53 and the spring 24 moves the controlled shutter blade 20 in a clockwise direction to a position wherein the disc 21 covers the aperture 12 for preventing the passage of scene light therethrough.

In the event that scene light is high as best seen in Fig. 3, the trigger circuit 108 is non-conductive and the electromagnet 78 accordingly is not energized and the yoke 71 remains as in the position shown in Fig. 1. Therefore, the apertured member 30 pivots about the pin 37, under the bias of the spring 33, as the operator depresses the release lever 44, and the aperture 32 is moved into alignment with the exposure aperture 12, thereby reducing the effective size of the exposure aperture 12 in accordance with the high scene brightness. Operation of the circuit 102, and other members of the circuitry, would be as previously described. During periods of low scene light intensity the lamp 106 will be energized indicating the need for artificial light in order to make a proper exposure. Under these conditions, insertion of a flash lamp unit pivots the lever 94 about its pivot pin 96 bringing the aperture 90 into alignment with the exposure aperture 12 and, at the same time actuating the switch S4 to the closed position, thereby connecting the fixed resistor 124 in series with the capacitor 114 for establishing a fixed time constant for the circuit 102, for energizing and de-energizing the electromagnet 50, thereby opening and closing the exposure aperture in a fixed time interval based on the flash equipment used.

A tab 75a of the arm 75 is shown adjacent to a switch S5 and is a means for lighting a lamp 130 that is part of a battery checker. The battery checker feature is explained as follows with reference to Figs. 1 and 5. The camera operator covers the housing 40 with his hand to shield the photosensitive element 39 from incident light. This action simulates a low light condition to the circuit of Fig. 5, which energizes the electromagnet 78. The electromagnet 78 attracts the keeper 74a pivoting the detent 70 and closing the switch S5. The operator then closes a switch S6. Under these conditions, provided the battery is capable of operating the mechanism, the lamp 130 will be energized thus indicating to the operator that sufficient power is in the battery to operate the mechanism.

#### WHAT WE CLAIM IS:

1. A photographic exposure control device comprising an exposure aperture, a member mounted for movement from an initial position, in which the exposure aperture is completely uncovered thereby, to a second position in which an aperture



lever 44 is slightly depressed, the operator continues to depress the release lever 44 thereby releasing the apertured member 30, and the safety shutter 14 for initial movement in a counterclockwise direction under the action of springs 33 and 18, respectively. This operation is shown in Fig. 3. As may best be seen by reference to Fig. 2, in the event that scene light is in the range below high intensity but above the low-light condition, the bias established by the resistor 123 and the element 120 biases the trigger circuit 108 to the conductive state. The electromagnet 78 having its coil 97 in the output circuit thereof becomes energized and the keeper 74a is accordingly attracted to the electromagnet 78 and the yoke 71 is pivoted about the pivot pin 72. As the yoke 71 pivots, the leg 75 engages the notch 73 of the apertured member 30, thereby preventing the apertured member 30 from moving to align the first aperture 32 with the exposure aperture 12, thus keeping the exposure aperture 12 at the largest dimension.

When the switch S1 is initially closed, the trigger circuit 102, normally in a nonconductive state, is switched to a conductive state and accordingly energizes the electromagnet 50. When the electromagnet 50 becomes energized, it attracts the keeper 53 on the controlled shutter blade 20 thereby attempting to pivot the shutter blade 20 in a counterclockwise direction away from the exposure aperture 12. However, the latch mechanism 60 momentarily prevents the controlled shutter blade 20 from opening prior to the selected energization level of the electromagnet 50. The operation of the latch member 60 may best be seen from Fig. 4. As the operator depresses the release lever 44 the extension 52c releases the lever 65 for movement about the pin 61, under the bias of the spring 66. As the lever 65 pivots about the pin 61 in a clockwise direction, the gear teeth 62a and 64a cause rotation of the ring 62 in a clockwise direction, thereby removing the detent 67 from the latching position so that the controlled shutter blade 20 accordingly moves in a counterclockwise direction due to the attraction of the keeper 53 by the electromagnet 50. As the arm 64 reaches a final position, the foot 69 engages the switches S2 and S3 opening both simultaneously with the opening of the exposure aperture 12, thereby starting the timing cycle substantially simultaneously with the opening of the exposure aperture 12. After a time interval, as established by the element 112 and the capacitor 114 as previously described, a voltage level has built up at the junction 118 and the trigger circuit 102 will be switched from its normally conducting state to a non-conducting state, thereby de-energizing the electro-

magnet 50. When the electromagnet 50 becomes de-energized it releases the keeper 53 and the spring 24 moves the controlled shutter blade 20 in a clockwise direction to a position wherein the disc 21 covers the aperture 12 for preventing the passage of scene light therethrough.

In the event that scene light is high as best seen in Fig. 3, the trigger circuit 108 is non-conductive and the electromagnet 78 accordingly is not energized and the yoke 71 remains as in the position shown in Fig. 1. Therefore, the apertured member 30 pivots about the pin 37, under the bias of the spring 33, as the operator depresses the release lever 44, and the aperture 32 is moved into alignment with the exposure aperture 12, thereby reducing the effective size of the exposure aperture 12 in accordance with the high scene brightness. Operation of the circuit 102, and other members of the circuitry, would be as previously described. During periods of low scene light intensity the lamp 106 will be energized indicating the need for artificial light in order to make a proper exposure. Under these conditions, insertion of a flash lamp unit pivots the lever 94 about its pivot pin 96 bringing the aperture 90 into alignment with the exposure aperture 12 and, at the same time actuating the switch S4 to the closed position, thereby connecting the fixed resistor 124 in series with the capacitor 114 for establishing a fixed time constant for the circuit 102, for energizing and de-energizing the electromagnet 50, thereby opening and closing the exposure aperture in a fixed time interval based on the flash equipment used.

A tab 75a of the arm 75 is shown adjacent to a switch S5 and is a means for lighting a lamp 130 that is part of a battery checker. The battery checker feature is explained as follows with reference to Figs. 1 and 5. The camera operator covers the housing 40 with his hand to shield the photosensitive element 39 from incident light. This action simulates a low light condition to the circuit of Fig. 5, which energizes the electromagnet 78. The electromagnet 78 attracts the keeper 74a pivoting the detent 70 and closing the switch S5. The operator then closes a switch S6. Under these conditions, provided the battery is capable of operating the mechanism, the lamp 130 will be energized thus indicating to the operator that sufficient power is in the battery to operate the mechanism.

#### WHAT WE CLAIM IS:

1. A photographic exposure control device comprising an exposure aperture, a member mounted for movement from an initial position, in which the exposure aperture is completely uncovered thereby, to a second position in which an aperture



therein is in alignment with the exposure aperture, the aperture being smaller than the exposure aperture, a first transducer operable to move shutter means from a closed to an open condition relative to the exposure aperture, a second transducer operable to prevent movement of the apertured member into alignment with the exposure aperture and an electronic circuit including photosensitive means arranged to receive scene light and having an electrical parameter variable as the intensity of the scene light varies, the photosensitive means being arranged in the electronic circuit for establishing an electrical signal for actuation of the first transducer to move the shutter means from the open to the closed condition after a time interval dependent upon scene light intensity, and for actuating the second transducer when scene light is below a preselected intensity level, prior to actuation of the first transducer.

2. A photographic exposure control device according to Claim 1, including means for covering a preselected portion of the photosensitive means to block light incident thereon when the apertured member moves to align its aperture with the exposure aperture.

3. A photographic exposure control device according to Claim 2, wherein the electronic circuit includes a time delay circuit coupled to the photosensitive means for providing an electrical signal variable in time dependent upon the intensity of the scene light, first trigger circuit means operable in a first state and responsive to said electrical signal to be disposed to a second state, and second trigger circuit means operable in a first state and responsive to variations in said electrical parameter to be disposed to a second operable state when the scene light is below a preselected intensity level, the first transducer means being coupled to the first trigger circuit to be actuated when the first trigger circuit is disposed in said first state for moving the shutter means to the open condition and to be deactuated when the first trigger circuit is disposed to said second state for permitting the shutter blade to move to the closed condition, and the second transducer means being coupled to the second trigger circuit to be actuated when the second trigger circuit is in said second state for preventing movement of the apertured member into alignment with the exposure aperture.

4. A photographic exposure control device according to Claim 3, wherein the apertured member has a pair of apertures therein, one aperture being movable to a position in alignment with the exposure aperture and the other aperture being simultaneously movable to a position in

alignment with the photosensitive means.

5. A photographic exposure control device according to Claim 4, wherein the second transducer includes an armature movable from a first position when the second transducer is actuated, the armature being disposed when in said second position to prevent the apertured member from moving to align its apertures with the exposure aperture and the photosensitive means.

6. A photographic exposure control device according to Claim 5, wherein the first trigger circuit is actuated to said first state upon actuation of the electronic circuit, the first transducer being actuated when the first trigger circuit is in said first state, and the shutter means includes an armature movable by the first transducer between said closed and open condition of the exposure aperture.

7. A photographic exposure control device according to Claim 3, 4, 5 or 6, including detent means movable from a first position in which the detent means retains the shutter means in the closed condition, to a second position in which the detent means actuates the time delay means and releases the shutter means for movement to the open condition substantially simultaneously with the actuation of the time delay means.

8. A photographic exposure control device according to Claim 7, wherein the detent means comprises a pivotally mounted member having an extension thereon provided with gear teeth mating with gear teeth on a rotatable member including a detent for retaining the shutter means in the closed condition, so that as the pivotal member pivots, the rotatable member rotates and the detent releases the shutter means to move to the open condition.

9. A photographic exposure control device according to Claim 8, wherein the extension actuates the time delay means as the extension pivots.

10. A photographic exposure control device according to any one of the preceding Claims 3 to 9, wherein the photosensitive means comprises first and second photosensitive elements arranged to receive light, each having an electrical parameter variable as the scene light intensity varies, the time delay circuit being coupled to one photosensitive element and the second trigger circuit means being coupled to the other photosensitive element for providing a signal when scene light is below a preselected intensity level and wherein a third trigger circuit means is coupled to said other photosensitive element to provide a signal to actuate indicating means indicating a scene light intensity below said preselected level.



11. A photographic exposure control device according to Claim 1, constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings. 10
- 5 the open to the closed condition. L. A. TRANGMAR, B.Sc., C.P.A.
12. A photographic exposure control Agent for the Applicants

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