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(54) PHOTOGRAPHIC SHUTTER MECHANISM

(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:—

This invention relates to photographic shutter mechanisms, and in particular to a shutter mechanism for controlling an exposure according to the intensity of incident scene light.

Most inexpensive cameras presently available are equipped to alternatively make daylight or flash exposures, by providing a variety of mechanisms for opening and closing an exposure aperture at a fixed shutter speed. Daylight exposures are commonly made at shutter speeds of about 1/60-1/125 seconds for the aperture settings at which fixed aperture cameras are generally set. On the other hand, flash exposures are generally made at shutter speeds of 1/25-1/40 seconds.

It is frequently desirable in even the most inexpensive cameras to vary the speed of operation of the camera's shutter, in order to enable the camera to make photographic exposures under various conditions.

A means commonly employed in many of these mechanisms providing a fixed shutter speed is to use a strong shutter return spring which biases the shutter to a closed position, and an adjustable rebound stop which is placed in the path of the shutter when a fast shutter speed is desired, to limit its opening movement and thereby reduce the period of time at which exposure aperture is uncovered. Or, to employ variable shutter return

springs for regulating shutter speed. Some cameras are provided with strong shutter return springs which are effective to close a shutter to obtain a fast shutter speed, and various retard devices which are introduced to obtain slower shutter speeds.

In accordance with the present invention there is provided a photographic shutter comprising shutter means movable between open and closed positions relative to an exposure aperture, the shutter means being operable in a first mode for providing a fixed exposure interval, and operable in a second mode for providing a variable exposure interval, detent means movable from a first position, in which it retains the shutter means in the open position during said variable exposure interval to a second position in which it allows the shutter means to move to the closed position, and an electronic circuit for causing actuation of the detent means from said first to said second position after a variable interval of time dependent upon the intensity of scene light, and responsive to scene light in excess of a predetermined intensity level for causing actuation of the detent means to said second position to allow the shutter means to close to provide said fixed exposure interval.

In the accompanying drawings:—

Figure 1 is an elevation of a shutter mechanism constructed in accordance with one form of the present invention, with a pair of shutter blades in a closed position;

Figure 2 shows the mechanism depicted in Figure 1, with the shutter blades in the open position;

Figure 3 is a perspective rear view of the mechanism of Figure 1 showing an electromagnet and detent mechanism for providing a variable shutter speed, the mechanism

being shown in a cocked position;

Figure 4 is a plan of the mechanism of Figure 3;

5 Figure 5 is a plan of the mechanism of Figure 3 in the release state wherein the shutter blades are open and the detent mechanism engages an actuating member;

10 Figure 6 is a plan of the mechanism of Figure 3 where the detent mechanism has released the actuating member and the shutter blades have closed; and

Figure 7 is a schematic diagram of an electronic circuit for use with the mechanism of Figures 1 to 6.

15 Because photographic cameras are well known in the art, the present description will be directed in particular to elements forming part of, or co-operating more directly with, the present invention, camera elements not specifically shown or described therein being understood to be selectable from those known in the art.

20 Briefly, the shutter mechanism provided hereby is operable in one of three modes depending upon the intensity level of the scene light. The first mode of operation is a fixed mechanical speed in which a pair of shutter blades are rotatably mounted on a common pivot, and adapted to cover and uncover an exposure aperture in a scissor-like fashion. The movement of the blades is effected by a bifurcated actuating or shutter blade moving member, which is coupled to the blades. The actuating member is biased towards a first position (in which the shutter blades are in their closed or aperture-covering position) by a pair of wire springs which are of sufficient strength to close the shutter from its open or aperture uncovering position to attain a fixed shutter speed. An arm of the actuating member is movable in a path across which lies a portion of one of the springs; the latter is engaged and deflected by the arm of the actuating member as the actuating member is driven to its second position (in which the shutter blades are opened), and this spring portion acts as a "kick" spring to start the return movement of the actuating member and thus acts together with the first spring to rapidly return the actuating member to its first position to attain the fixed shutter speed.

25 The shutter mechanism operates in a second mode when scene light intensity is below predetermined level and too low for the fixed mechanical shutter speed, by providing for a controlled time exposure based on the intensity of incident scene light. An electronic timing circuit provides the controlled time exposure and includes a photosensitive element arranged to receive light for controlling the triggering of a trigger circuit having an output controlling a transducer which, in turn, operates a detent mechanism for preventing the return movement of the actuat-

ing member until the end of the controlled time interval.

The shutter mechanism is operable in a third mode other than the fixed mechanical and timed shutter speeds, for flash photography, wherein the electronic timing circuit includes circuitry that sets a fixed shutter speed for flash photography, commensurate with the useful time of the flash lamp unit used, and further adjusts the shutter speed when the camera is focused for shortened object distances.

Referring now to the drawings, and in particular Figures 1 and 2, a camera 10, partially shown, includes a shutter mechanism 12 which is operative to control the opening and closing of an exposure aperture 14 in an aperture plate 16. Disposed on one side of the plate 16, as shown by the dotted lines of Figures 1 and 2, are a pair of shutter blades 18 and 20, which are mounted for rotation about a common pivot 22. Blades 18 and 20 are thus movable in a scissor-like fashion in opposite directions and co-operate to close or cover the exposure aperture 14.

The shutter blades are movable by an actuating member 24, which includes a pair of arms 26 and 28, and a pin 30 which extends through a slot 31 in the aperture plate 16, and through transversely disposed slots 32 and 34 in the shutter blades 18 and 20. The actuating member 24 is mounted for rotation about a post 38, and the orientation of the slots 31, 32 and 34 is such that the pin 30 simultaneously engages the edges defining the slots 32 and 34 and drives the blades 18 and 20 apart towards their open positions (so as to uncover aperture 14) in response to the counterclockwise rotation of the actuating member 24, and drives the blades 18 and 20 together towards their closed positions (so as to cover aperture 14) in response to the clockwise rotation of the member 24.

A spring 36, which is preferably a wire spring, is entwined about the post 38 and is held under tension by the retention of one leg 40 behind a tab 42 on the aperture plate 16, and of its other leg 41 behind a tab 44 on the arm 28 of the actuating member 24. The spring 36 exerts a bias in a clockwise direction on actuating member 24.

A "kick" spring 46, which also is preferably a wire spring, is similarly entwined about the post 38, and has a first leg 48 also restrained behind the tab 42 on the aperture plate 16, and a second leg 50 restrained against clockwise movement behind another tab 52 on the aperture plate 16. The leg 50 lies in the path of a tab 54 on the arm 26 of the actuating member 24 and, when the latter is rotated by a sufficient distance (i.e. when the shutter blades 18 and 20 near the open position) from its first position, the tab 54 engages and deflects the leg 50. The deflection of the leg 50 moves the leg 50

away from the tab 52 as the shutter blades 18 and 20 reach the open position creating tension in the spring 46 to give the actuating member 24 a return kick and assist the spring 36 in driving the actuating member 24 to its first position.

The counterclockwise rotation of actuating member 24 is accomplished by means of an impact driver 56 which is pivotally mounted on a pin 57 (Figure 3) and is driven from its position shown in Figure 1 to that shown in Figure 2 by a driving mechanism of any known type. The arm 28 of the actuating member 24 includes a nose 58 which lies in the path of the impact driver 56 and is displaceable thereby. The force with which the nose 58 is struck by the impact driver 56 must be sufficient to rotate the actuating member 24 to deflect the springs 36 and 46 and to open the shutter blades 18 and 20.

The shutter as thus far described with reference to Figures 1 and 2 forms the subject of Divisional Application No. 10549/75 (Serial No. 1,407,256).

As previously stated, the operation of the shutter mechanism 12 may be in one of three modes, depending upon the intensity of the scene light. In order to facilitate the multiple modes of operation, there is provided a detent mechanism 60, shown in Figures 3 to 6, and in particular Figures 3 and 4, wherein the detent mechanism 60 is shown supported on a camera plate 59. The detent mechanism 60 is disposed relative to an opening 63 of the plate 16, for movement into and out of engaging positions for the actuating member 24. The detent mechanism includes a T-shaped lever 64, one arm of which defines a detent 61, and the other arm of which is mounted for pivotal movement on a hinge 66, affixed to the plate 16, against the bias of a spring 65. Movement of the detent 61 relative to the opening 63 is accomplished through a pin 67 mounted on an armature 68 which is pivotal about a yoke 72 of an electromagnet 70, under the bias of a spring 76, the strength of the spring 76 being greater than that of the spring 65. The pin 67 engages a tab 62 on the post of the T-shaped lever 64 when the apparatus is in the position of Figure 3, and movement of the armature 68 about the yoke 72 pivots the T-shaped lever 64 on the hinge 66, thereby moving the detent 61 into and out of the opening 63. The detent 61 is moved through the opening 63 by means of a cam surface 78 on the impact driver 56 engaging the pin 67 and urging the armature 68 into the yoke 72 wherein a notch 69 engages the yoke 72, thereby positioning the detent 61 in the opening 63. As may best be seen from Figure 5, when the apparatus operates in ambient scene light, the first mode of operation as previously discussed, the impact driver 56 moves to engage the actuating member 24, and the cam sur-

face 78 rotates, releasing the pin 67. As shown in Figure 6, the cam surface 78 releases the pin 67 and the armature 68 pivots on the yoke under the bias of the spring 76 pivoting the T-shaped lever 64 on the hinge 66, thereby removing the detent 61 from the opening 63. In this manner, the nose 58 moves back over the opening 63 allowing the blades 18 and 20 to close at a fixed rate.

When the intensity of the scene light is too low for exposure in the fixed shutter speed mode of operation, an electronic circuit to be discussed later, is operative to control the detent mechanism 60 in a manner to maintain the detent 61 in the opening 63 as shown by the phantom lines of Figure 6, for engaging the nose 58, thus preventing the actuating member 24 from closing the blades 18 and 20. During this timed mode of operation, the electromagnet 70 becomes energized and the armature 68 is attracted to the yoke 72, the position of Figure 3. Therefore, the armature 68 is not free to pivot about the yoke 72 as the impact driver 56 moves to open the blades 18 and 20 and the T-shaped lever 64 is maintained with the detent 61 protruding through the opening 63. To facilitate the movement of the nose 58 over the opening 63, but engage the nose 58 as it attempts to move back over the opening 63, the detent 61 is provided with a cam surface 75 and a square surface 79, as may be best seen in Figure 4, the cam surface 75 being engaged by the nose 58 of the actuating member 24 as it moves to open the blades 18 and 20. As the nose 58 engages the cam surface 75, the T-shaped lever 64, being freely movable on the hinge 66, against the bias of the spring 65, will move out of the opening as the actuating member 24 engages it, allowing the actuating member 24 to move past the opening 63. However, prior to the return movement of the nose 58, the spring 65 will move the T-shaped lever 64 back into a position wherein the detent 61 protrudes into the hole 63, and the square surface 79 will engage and hold the nose 58 as the springs 36 and 46 move the actuating member 24 in a direction to close the blades 18 and 20. A normally closed switch S2 is located adjacent to a cam lobe 80 on the cam surface 78 so that as the impact driver 56 moves to engage the actuating member 24 to open the blades 18 and 20, the cam lobe 80 opens the switch S2. The switch S2 is a timing switch in the electronic circuit which, when opened, initiates the timing cycle as will be described in more detail later. The nose 58 will be held for a time interval that depends upon the operation of the electronic circuit of Figure 7.

The circuit of Figure 7 is adapted to be actuated as a switch S1 is closed upon a slight actuation of the camera release member, not shown. Closure of the switch S1 connects a

battery 90 in circuit with a trigger circuit 92 which serves, as will be explained, to energize a coil 94 associated with the electromagnet 70. The trigger circuit 92 is adapted to be conducting or non-conducting immediately upon closure of the switch S1, depending upon the intensity of the scene light. If intensity of the scene light is above a first predetermined value, the trigger circuit 92 is biased to the non-conducting state, as will be explained subsequently. If the intensity of the scene light is below this predetermined value, upon application of the potential, the trigger circuit 92 is immediately disposed from a first or the non-conductive state to a second or conductive state thereby to establish a conductive path through the coil 94 in circuit with the battery 90. As a result, the electromagnet 70 is energized and the armature 68 is attracted to, and held by the yoke 72. If the scene light is relatively high, or above the first predetermined value, the trigger circuit 92 is biased in the second or non-conducting state, thereby maintaining the electromagnet 70 in the de-energized state.

If the scene illumination is below a second predetermined level, an indicator lamp 97 will be energized to provide an indication thereof. The indicator lamp 97 is operated in conjunction with a radiation sensitive assembly 96 which includes first and second radiation sensitive elements 98 and 100, both responsive to the incident scene radiation to vary a parameter, e.g. electrical resistivity, as a function of the incident scene radiation. When the trigger circuit 92 is disposed in its first or conductive state, a circuit is established through radiation sensitive element 100 and variable impedance 106 to the negative terminal of the battery 90, so that the variable impedance 106 and radiation sensitive element 100 form a voltage dividing network, the junction point 116 of which is connected to an input terminal 120 of a trigger circuit 118. If the resistivity of the radiation sensitive element 100 exceeds a predetermined value, i.e., the incident scene radiation is below a second predetermined value lower than the first value, a signal will be applied to the input terminal 120 which will dispose the trigger circuit 118 from its first or non-conductive state to a second or conductive state to thereby provide a conductive path between its terminals 120 and 121 and to energize the indicator lamp 97. The energized lamp 97 indicates that the incident scene illumination is too low to provide a normal exposure without the aid of an additional light source or camera support.

The switch S2, normally in a closed condition, short-circuits a capacitor 122 to ground, and the switch S2, when opened, initiates the exposure interval. More specifically, a time integration circuit is formed by the capacitor 122 and the radiation sensitive element 98.

The capacitor 122 charges at a rate determined by resistivity of the radiation sensitive element 98; therefore, a potential at a junction 93 therebetween increases at a rate which is a function of the incident scene radiation. When the capacitor 122 has charged to a level corresponding to the threshold level of the trigger circuit 92, the circuit 92 is disposed from its second or conductive state to its first or nonconductive state to thereby de-energize the coil 94. The threshold level of the trigger circuit is set illustratively at a value of .6 times the voltage of the battery 90. This threshold level whereby the trigger circuit 92 is biased to the non-conducting state may be reached in a second manner by means of a resistor 95 connected in series with the radiation sensitive element 98 to form a voltage dividing network for establishing a voltage at junction 93 immediately after the switch S1 is closed. If scene light is high, the impedance of the radiation sensitive element 98 will reach a preselected value which establishes a voltage level at the junction 93 (immediately upon closure of the switch S1) sufficient to render the trigger circuit 92 to its nonconductive state and, consequently the electromagnet 70 will not become energized.

A feed-back path is provided between an output terminal 124 of the trigger circuit 92 and the input terminal 116 of the trigger circuit 118. As a result, when the trigger circuit 92 is disposed in its first or nonconductive state, the circuit between the input terminal 116 of the trigger circuit 118 through the variable impedance 106 and the negative terminal of the battery 90 is broken and the potential applied to the input terminal 116 approaches that potential of the positive terminal of the battery 90. At this more positive potential, the trigger circuit 118 is disposed in its first or nonconductive state to de-energize the indicator lamp 97. As a result of the feed-back-path, the indicator lamp 97 is used not only to indicate a low light condition under which sufficient film exposure cannot be achieved without the aid of an additional light source or camera support, but also to indicate the termination of an extended or timed exposure.

A further feature is provided in the circuit of Figure 7 for use when the scene illumination is below the second preselected intensity level, in that, a switch S3 is disposed to couple a resistor 130 in parallel circuit with the radiation sensitive element 98. The switch S3 may for example be actuated by insertion of a flash lamp unit (not shown) into a camera receptacle (not shown). By actuating the switch S3, the parallel combination of the radiation sensitive element 98 and resistor 130 is connected in circuit between the battery 90 and the capacitor 122. The resistance of the combination is light dependent but

provides a maximum time interval of an open shutter condition for use in flash photography. A second switch S4 is adapted to couple a resistor 131 in parallel circuit with the resistor 130 and radiation sensitive element 98 by means of for example, a focus adjustment for photography at shortened object distances. When the switches S3 and S4 are both closed during the time interval of exposure, the parallel resistance established by resistors 130, 131 and the radiation sensitive element 98 reduces the composite value of the elements by an amount sufficient to reduce the exposure interval for exposure to be taken at a shortened object distance. It is to be noted in Figure 7, that the switch S4, if closed without a flash lamp unit inserted in the camera for closing the switch S3, is not effective to reduce the time interval of exposure from that established by the radiation sensitive element 98 and the capacitor 122.

In the operation of the shutter mechanism 12, during the first mode of operation when scene light intensity is high, the trigger circuit 92 is biased to the non-conducting state by the voltage divider resistance of radiation sensitive element 98 and resistor 95 at junction 93. An operator actuates a camera release, not shown, to release the impact driver 56 for movement under its bias, the impact driver 56 engaging the nose 58 of the actuating member 24 and pivoting the actuating member 24 in a counterclockwise direction. Remembering that the trigger circuit 92 is in the nonconductive state, the electromagnet 70 is not energized and the armature 68 is not attracted to the yoke 72 and is therefore free to pivot on the yoke 72. The armature 68 being free to pivot, allows T-shaped lever 64 to pivot on the hinge 66 and remove the detent 61 from the opening 63. The pin 30 moves in slots 31, 32 and 34 as the blades 18 and 20 open, as shown in Figure 2, permitting scene light to pass through the exposure aperture 14. As further shown in Figure 2, the movement of the actuating member 24 creates tension in the spring 36 as the blades 18 and 20 open, and the tab 54 of the arm 26 engages the spring 46, deflecting the spring 46 away from the tab 52. This deflection of the spring 46 produces tension therein and the spring 46 acts as a "kick" spring to give the actuating member 24 an initial start back to the closed position of the blades 18 and 20. When the tension of the spring 46 is added to the tension of the spring 36, the blades 18 and 20 are rapidly closed by pivoting the actuating member 24 in a clockwise direction. The shutter speed thus obtained is a fixed shutter speed which may be set at the desired rate of opening and closing by adjusting the tension in the springs 36 and 46.

In a second mode of operation when the

scene light is below the first predetermined value, the voltage level at the junction 93 is below the level which biases the trigger circuit 92 into the nonconductive state so that the trigger circuit 92 is biased in the conductive state when the switch S1 is closed. As in the operation previously described, the impact driver 56 moves to engage the arm 28 of the actuating member 24, and pivots the actuating member 24 to open the blades 18 and 20. The movement of actuating member 24 brings the nose 58 of the arm 28 over the opening 63 into engagement with the detent 63 protruding therethrough, as shown in Figure 6. The trigger circuit 92 is in the conductive state and the electromagnet 70 is energized, and the armature 68 is attracted to the yoke 72; therefore, the bias of the spring 76 does not pivot the armature 68 as the cam surface 78 moves away from pin 67. The T-shaped lever 64 is, therefore, maintained in the position of Figure 4 under the bias of the spring 65, wherein the detent 61 protrudes through the opening 63. As the nose 58 engages the cam surface 75, the T-shaped lever 64 is pivoted on the hinge 66 momentarily removing the detent 61 from the opening 63; however, the bias of the spring 65 is sufficient to move the detent 61 back into the opening 63 as the nose 58 passes the opening 63, and the square surface 79 engages the nose 58, as shown by Figure 5. As the impact driver 56 moves, the cam lobe 80 engages the switch S2, opening the switch to start the time interval; and at the end of the time interval, the trigger circuit 92 is switched to the nonconductive state, thereby de-energizing the electromagnet 70. As the flux field of the electromagnet 70 collapses, the yoke 72 and the armature 68 separate and, under the bias of the spring 76, the armature 68 pivots, pivoting the T-shaped lever 64. As the T-shaped lever 64 pivots, the detent 61 moves out of the opening 63 freeing the arm 28, and the shutter blades 18 and 20 close the exposure aperture 14.

The operation of the apparatus in the third mode of operation may be used when the intensity of the scene light is below the second preselected level. Operation of the camera at the lower light intensity may be accomplished in the second mode, however, due to the low level of light producing a high resistance in the radiation sensitive element 98, the time constant of the integrating circuit is long, and the shutter remains open for an extended time interval. The operation in the third mode, therefore, establishes a maximum time interval for flash photography and the basic operation of the apparatus is the same as that of the second mode. In the third mode, the switch S3 is closed, connecting the parallel combination of the resistor 130 and radiation sensitive element 98 in series with the capacitor 122 for establishing

a time constant for the integrating circuit. The time constant allows the trigger circuit 92 to be switched to the nonconducting state at a preselected time to allow closure of the blades 18 and 20 at a shutter speed commensurate with the useful duration of the light from the flash lamp.

WHAT WE CLAIM IS:—

1. A photographic shutter comprising shutter means movable between open and closed positions relative to an exposure aperture, the shutter means being operable in a first mode for providing a fixed exposure interval, and operable in a second mode for providing a variable exposure interval, detent means movable from a first position, in which it retains the shutter means in the open position during said variable exposure interval to a second position in which it allows the shutter means to move to the closed position, and an electronic circuit for causing actuation of the detent means from said first to said second position after a variable interval of time dependent upon the intensity of scene light, and responsive to scene light in excess of a predetermined intensity level for causing actuation of the detent means to said second position to allow the shutter means to close to provide said fixed exposure interval.

2. A photographic shutter according to claim 1, wherein the electronic circuit includes an electromagnet having an armature which, upon energization of the electromagnet, is moved in a first direction to allow a first spring to move the detent means to said first position, and, upon deenergization of the electromagnet, is moved in a direction opposite to said first direction by a second spring, which is stronger than said first spring, to move the detent means to said second position.

3. A photographic shutter according to claim 2, wherein the detent means comprises a T-shaped lever which is pivotally mounted at the end of one arm, the other arm terminating in a detent which is engageable by the shutter means, and the leg of the lever

being engageable with the armature under the action of said first spring.

4. A photographic shutter according to claim 3, wherein the shutter means comprises a pair of shutter blades movable in a scissor-like manner between open and closed positions relative to the exposure aperture by means of an actuating member movable from a first to a second position for opening the shutter blades, the detent being movable to its first position relative to the actuating member for retaining the actuating member in said second position in which the shutter blades are in the open position and being movable to its second position to allow the actuating member to move to its second position in which the shutter blades are in the closed position.

5. A photographic shutter according to claim 4, including an impact member movable from a first to a second position for engaging and moving the actuating member to open the shutter blades, the impact member including a cam surface which, when the impact member is in its first position, holds the armature against movement under the action of said second spring and, when the impact member is moved to its second position, is moved relative to the armature to allow the armature to move under the action of said second spring so as to move the detent from its first to its second position.

6. A photographic shutter according to claim 5, wherein the actuating member is mounted for rotation about a post and has a first arm engageable by the impact member for rotating the actuating member from its first to its second position to cause opening of the shutter blades against the action of spring means tending to rotate the actuating member to its first position to close the shutter blades.

7. A photographic shutter according to claim 1, constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

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a time constant for the integrating circuit. The time constant allows the trigger circuit 92 to be switched to the nonconducting state at a preselected time to allow closure of the blades 18 and 20 at a shutter speed commensurate with the useful duration of the light from the flash lamp.

WHAT WE CLAIM IS:—

1. A photographic shutter comprising
10 shutter means movable between open and closed positions relative to an exposure aperture, the shutter means being operable in a first mode for providing a fixed exposure interval, and operable in a second mode for
15 providing a variable exposure interval, detent means movable from a first position, in which it retains the shutter means in the open position during said variable exposure interval to a second position in which it
20 allows the shutter means to move to the closed position, and an electronic circuit for causing actuation of the detent means from said first to said second position after a variable interval of time dependent upon the
25 intensity of scene light, and responsive to scene light in excess of a predetermined intensity level for causing actuation of the detent means to said second position to allow the shutter means to close to provide said
30 fixed exposure interval.

2. A photographic shutter according to claim 1, wherein the electronic circuit includes an electromagnet having an armature which, upon energization of the electromagnet, is moved in a first direction to
35 allow a first spring to move the detent means to said first position, and, upon deenergization of the electromagnet, is moved in a direction opposite to said first direction by a
40 second spring, which is stronger than said first spring, to move the detent means to said second position.

3. A photographic shutter according to claim 2, wherein the detent means comprises
45 a T-shaped lever which is pivotally mounted at the end of one arm, the other arm terminating in a detent which is engageable by the shutter means, and the leg of the lever

being engageable with the armature under the action of said first spring.

4. A photographic shutter according to claim 3, wherein the shutter means comprises a pair of shutter blades movable in a scissor-like manner between open and closed positions relative to the exposure aperture by means of an actuating member movable from a first to a second position for opening the shutter blades, the detent being movable to its first position relative to the actuating member for retaining the actuating member in said second position in which the shutter blades are in the open position and being movable to its second position to allow the actuating member to move to its second position in which the shutter blades are in the closed position.

5. A photographic shutter according to claim 4, including an impact member movable from a first to a second position for engaging and moving the actuating member to open the shutter blades, the impact member including a cam surface which, when the impact member is in its first position, holds the armature against movement under the action of said second spring and, when the impact member is moved to its second position, is moved relative to the armature to allow the armature to move under the action of said second spring so as to move the detent from its first to its second position.

6. A photographic shutter according to claim 5, wherein the actuating member is mounted for rotation about a post and has a first arm engageable by the impact member for rotating the actuating member from its first to its second position to cause opening of the shutter blades against the action of spring means tending to rotate the actuating member to its first position to close the shutter blades.

7. A photographic shutter according to claim 1, constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

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