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(54) SHUTTER MECHANISMS

(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 shutter mechanisms having spring operated opening and closing blades.

According to the present invention there is provided a shutter mechanism comprising an opening blade movable relative to an exposure aperture between a cocked aperture covering position in which it is held by releasable latch means and an aperture uncovering position, a first spring coupled with the opening blade and urging it toward its aperture uncovering position, a closing blade movable relative to the exposure aperture between an aperture uncovering position and an aperture covering position, means engageable with a portion of the closing blade and responsive to movement of the opening blade from its aperture covering position toward its aperture uncovering position for effecting movement of the closing blade from its aperture uncovering position in a first direction away from its aperture covering position, and a second spring which is weaker than the first spring and is coupled with the closing blade for urging the closing blade in a direction toward its aperture covering position.

In the accompanying drawing:—

Fig. 1 shows schematically a shutter mechanism constructed in accordance with the present invention, with the elements shown in the cocked position and ready for initiating an exposure;

Fig. 2 is a schematic view similar to Fig. 1 but showing the elements during exposure; and

Fig. 3 is a schematic view similar to Figs. 1 and 2 but showing the elements in an uncocked position after exposure has been terminated.

Photographic cameras being well known in the art, the present description will be limited to those elements forming part of, or cooperating directly with the present invention, the elements of a camera not shown or described herein being understood to be selected from those known in the art.

Referring now to the drawings, Fig. 1 shows the shutter mechanism in a cocked position ready for an exposure and Fig. 2 shows the shutter mechanism during an opening phase. As best seen by reference to Fig. 1, when a release member 10 is actuated in the direction of arrow A, a pawl 12, disposed in the path of movement thereof, is pivoted in the direction of arrow B and a lug 14 of an opening blade 16 is disengaged from a nose 18 of the pawl 12. The disengagement permits the opening blade 16 to swing in the direction of arrow C, driven by the force of a spring 20, and to clear an exposure aperture 22 to permit the passage of light therethrough.

During movement of the opening blade 16 to uncover the exposure aperture 22, a lug 24 of said opening blade 16 is engaged with an extension 26 of a closing blade 28 to turn the closing blade 28 in the direction of arrow D until it reaches an adjustable stop 30. As will be apparent from Fig. 2, at this time in the cycle of operation, lug 24 has swung to a position beyond the range of travel of extension 26.

After striking the adjustable stop 30, the closing blade 28 changes its direction of motion to the direction shown by arrow E in Fig. 2 and returns, urged by spring 32, to cover the exposure aperture 22, i.e. to close the shutter, as shown in Fig. 3. Spring 32 is effectively weaker than spring 20 to allow it to be tensioned by spring 20. The adjustable stop 30 which is associated with the closing blade 28 can be adjusted in a slot 34 so that the length of travel of the closing blade 28 is variable, giving rise to various exposure times. If, for example, the adjustable stop 30 is translated to the point indicated in phantom at 36, a different exposure

time results which is longer than the exposure time obtained when stop 30 is at the left end of slot 34 as shown in solid lines in Figs. 1-3.

In the embodiment illustrated a manually operated adjusting member 38 serves for the displacement of the adjustable stop 30. In addition to, or in substitution for this adjusting member 38, it would be advantageous if the adjusting means provided is operationally connected to the flash device of the camera and, for instance, is effective to automatically place the adjustable stop 30 to a particular position (such as the position 36) when a flashcube is inserted into the flashlamp socket, thereby setting the shutter to the desired flash time in each case, in a simple manner.

After an exposure has been made the camera is cocked by moving a winding slider 40 in the direction of the arrow F as shown in Fig. 3. Movement of the slider in direction F effects rotation of gears 42 for advancing the film in a known manner. At the same time the opening blade is brought into its cocked position as shown in Fig. 1 by means of ramp 44 on the winding slider 40 engaging runner 46 on the opening blade 16. Projection 48 on opening blade 16 engages closing blade 18, thereby simultaneously returning closing blade 28 to its cocked (Fig. 1) position. Extension 26 of closing blade 28 and/or lug 24 of opening blade 16 are made of flexible or resilient material so that some relative movement between these parts can occur in a direction perpendicular to the plane of the drawings as extension 26 passes lug 24 during cocking of the shutter. The shutter when cocked is ready for the next exposure.

WHAT WE CLAIM IS:-

1. A shutter mechanism comprising an opening blade movable relative to an exposure aperture between a cocked aperture covering position in which it is held by releasable latch

means and an aperture uncovering position, a first spring coupled with the opening blade and urging it toward its aperture uncovering position, a closing blade movable relative to the exposure aperture between an aperture uncovering position and an aperture covering position, means engageable with a portion of the closing blade and responsive to movement of the opening blade from its aperture covering position toward its aperture uncovering position for effecting movement of the closing blade from its aperture uncovering position in a first direction away from its aperture covering position, and a second spring which is weaker than the first spring and is coupled with the closing blade for urging the closing blade in a direction toward its aperture covering position.

2. A shutter mechanism according to Claim 1, wherein the means engageable with a portion of the closing blade comprises a lug forming a portion of the opening blade.

3. A shutter mechanism according to Claim 1 or 2, wherein the degree of movement of the closing blade away from its aperture covering position is limited by a stop which is adjustable to allow a selection of exposure times.

4. A shutter mechanism according to Claim 1, constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawing.

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