

PATENT SPECIFICATION (11)

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(54) PHOTOGRAPHIC SHUTTER

(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 a photographic shutter.

In accordance with the present invention there is provided a photographic shutter comprising a pair of shutter blades pivotally mounted on a common pivot and rotatable in opposite directions about the pivot, the blades overlapping across an exposure aperture when in the closed position and being separated when in the open position, actuating means coupled to the shutter blades by a pin connected to the actuating means for movement in simultaneous engagement with the shutter blades in a path extending generally towards the pivot to move the shutter blades to the open position in response to displacement of the actuating means from a first position to a second position, the shutter blades being moved by the pin to the closed position in response to displacement of the actuating means from the second to the first position, drive means for displacing the actuating means from the first position to the second position, first spring means urging the actuating means from the second position to the first position, and second spring means for urging the actuating means towards the first position in response to the displacement of the actuating means from the first position towards the second position, the actuating means being returned from the second position to the first position by the combined action of the first and second spring means.

In the accompanying drawing:—

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; and

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

Referring now to the drawing, a camera, 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 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 the 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 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 movement of the actuating member 24 in a counterclockwise direction 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 of the springs 36 and 46.

WHAT WE CLAIM IS:—

1. A photographic shutter comprising a pair of shutter blades pivotally mounted on a

common pivot and rotatable in opposite directions about the pivot, the blades overlapping across an exposure aperture when in the closed position and being separated when in the open position, actuating means coupled to the shutter blades by a pin connected to the actuating means for movement in simultaneous engagement with the shutter blades in a path extending generally towards the pivot to move the shutter blades to the open position in response to displacement of the actuating means from a first position to a second position, the shutter blades being moved by the pin to the closed position in response to displacement of the actuating means from the second to the first position, drive means for displacing the actuating means from the first position to the second position, first spring means urging the actuating means from the second position to the first position, and second spring means for urging the actuating means towards the first position in response to the displacement of the actuating means from the first position towards the second position, the actuating means being returned from the second to the first position by the combined action of the first and second spring means.

2. A photographic shutter according to claim 1, wherein the actuating means comprises a member having first and second arms mounted for rotation about a post, the first arm being engageable by the drive means for rotating the member to the second position, the first arm being engageable by the first spring means for urging the member toward the first position, and the second arm being engageable by the second spring means in response to the rotation of the member towards the second position, the second spring means being deflectable by the member and creating tension to displace the member towards the first position.

3. A photographic shutter according to claim 2, wherein the first spring means is a wire spring entwined about the post of the member and having a portion engageable with the member for biasing the member towards the first position, and the second spring means is a wire spring entwined about the post of the member and having a portion deflectable by the member to render said portion effective to bias the member towards the first position.

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

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and of its other leg 41 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 the 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 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 movement of the actuating member 24 in a counterclockwise direction 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 of the springs 36 and 46.

WHAT WE CLAIM IS:—

1. A photographic shutter comprising a pair of shutter blades pivotally mounted on a

common pivot and rotatable in opposite directions about the pivot, the blades overlapping across an exposure aperture when in the closed position and being separated when in the open position, actuating means coupled to the shutter blades by a pin connected to the actuating means for movement in simultaneous engagement with the shutter blades in a path extending generally towards the pivot to move the shutter blades to the open position in response to displacement of the actuating means from a first position to a second position, the shutter blades being moved by the pin to the closed position in response to displacement of the actuating means from the second to the first position, drive means for displacing the actuating means from the first position to the second position, first spring means urging the actuating means from the second position to the first position, and second spring means for urging the actuating means towards the first position in response to the displacement of the actuating means from the first position towards the second position, the actuating means being returned from the second to the first position by the combined action of the first and second spring means.

2. A photographic shutter according to claim 1, wherein the actuating means comprises a member having first and second arms mounted for rotation about a post, the first arm being engageable by the drive means for rotating the member to the second position, the first arm being engageable by the first spring means for urging the member toward the first position, and the second arm being engageable by the second spring means in response to the rotation of the member towards the second position, the second spring means being deflectable by the member and creating tension to displace the member towards the first position.

3. A photographic shutter according to claim 2, wherein the first spring means is a wire spring entwined about the post of the member and having a portion engageable with the member for biasing the member towards the first position, and the second spring means is a wire spring entwined about the post of the member and having a portion deflectable by the member to render said portion effective to bias the member towards the first position.

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

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