

PATENT SPECIFICATION

(11) 1 555 237

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- (21) Application No. 29752/76 (22) Filed 16 July 1976
 (31) Convention Application No. 2531884
 (32) Filed 17 July 1975 in
 (33) Federal Republic of Germany (DE)
 (44) Complete Specification published 7 Nov. 1979
 (51) INT CL² G03B 7/04
 (52) Index at acceptance



G2A 201 203 212 217 218 219 CI CV
 (72) Inventors HELMUT ETTISCHER and
 PETER HUSCHLE

(54) FOLDABLE PHOTOGRAPHIC CAMERA

(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 generally to photography, and particularly to means, in a foldable camera, for preventing shutter operation both when the camera is folded and during a film transport cycle.

An object of the present invention is the provision of a foldable camera with a simple but reliable undesired-exposure prevention device.

According to the present invention, there is provided a photographic camera foldable between an erected operative condition and a folded inoperative condition and having drive means for advancing a film, whilst the camera is in the operative condition, after each exposure, a blocking means including a blocking device for disabling the camera's shutter release member and a sensing member for moving the blocking device to its disabling position upon folding the camera, and upon initiation of film transport.

The invention will be described further, by way of example, with reference to the accompanying drawings, wherein like reference numerals denote like elements, and wherein:

Fig. 1 is a perspective view of a foldable camera constructed in accordance with the present invention;

Fig. 2 is a perspective view of the camera of Fig. 1, showing the camera in its folded configuration;

Fig. 3 is a vertical section through the camera of Fig. 1;

Fig. 4 is a section, similar to Fig. 3, of the camera shown in Fig. 2;

Fig. 5 is a partial vertical section through

the camera of Fig. 1, at a later stage of the camera's operating cycle; and

Fig. 6 is a section, similar to Fig. 5, through a foldable camera constructed in accordance with an alternative embodiment of the present invention.

As photographic cameras are well known, the following description is directed in particular to those elements forming, cooperating directly with, or relating to the present invention. Elements that are not specifically shown or described herein are selectable from those known in the art.

As shown in Figs. 1 and 2, a bellows cover member 2 is hingedly mounted on a camera housing 1. The cover member 2 is integral with a lens carrier 3. Another cover member 4 is hingedly mounted on the lens carrier 3 and, at its opposite end, is attached to housing 1 so as to be slidable therein and latchable thereto from the position shown in Fig. 1 to that shown in Fig. 2. In their folded positions shown in Fig. 2, the cover members 2 and 4 rest against the front and rear wall portions, respectively, of the housing 1 approximately parallelly thereto.

In its folded position shown in Figs. 2 and 4, the cover member 4 is latched to the rear wall portion of housing 1 and exerts pressure on an arm 5b of a sensing lever 5 inside the housing. The arm 5b extends through an opening in the rear wall portion of the housing so as to be engageable by cover member 4. The resulting movement of the engaged sensing lever 5 causes a blocking lever 6 to be pivoted into the path of a projection 7a on an externally accessible shutter release button 7, whereby the release button 7 is blocked against movement when the camera is folded.

Further details of the release button blocking means are shown in Figs. 3 and 4. The sensing lever 5 is mounted for rotation about a pivot 20, rigidly connected to the housing, and is urged in a clockwise direction by a spring 9 engaging a projection 5c on the lever 5. The blocking lever 6 is

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mounted for rotation about a pivot 19 on the lever 5 and is urged counterclockwise against the projection 5c by a spring as shown. The blocking lever 6 is so resiliently supported on the sensing lever 5 in order to avoid any damage to members 5, 6, 7a should the release button 7 be held in its depressed position whilst the cover member 4 is moved to its folded position shown in Fig. 4, inasmuch as the blocking lever 6 cannot be pivoted into the path of the projection 7a whilst the release button 7 is so depressed.

Besides cooperating with the cover member 4, the sensing lever 5 also cooperates with an indexing wheel 10, in that a projection 5a on the lever 5 engages either a recess 10a on the wheel 10 or the circumferential surface of the wheel 10 as the wheel rotates. The wheel 10 also is provided with a recess 10b having a sawtooth surface 10c. Cooperating with the surface 10c is a pivotably mounted lever 11 spring-biased toward the release button 7. Another recess 10d on the wheel 10 serves to actuate a switch 12 for energizing an electric motor 13. The switch 12 is so designed that it cannot be actuated by recesses 10a and 10b.

The wheel 10 is driven by the motor 13 via gears 14 and 15. The gear 15 has on its face a lug 15a, which cooperates with ribs 10e on the wheel 10, and a cam groove 15b, which cooperates with a lever 17 adapted to actuate a film-transporting claw 16. The gear 15 is meshed with a gear 8 which drives a pair of juxtaposed film-transporting rollers 18.

The operation of the camera will now be described.

As the camera is unfolded from its storing-and-carrying configuration shown in Figs. 2 and 4 to its picture-taking configuration shown in Figs. 1 and 3, the cover member 4 is disengaged from the arm 5b of the sensing lever 5. The sensing lever 5 and the blocking lever 6 then occupy their positions illustrated in Fig. 3, wherein the release button 7 is not blocked.

If an exposure is now to be effected, the release button 7 is depressed and the camera shutter thereby actuated via transmission members not shown. At the same time, the lever 11 is pivoted in a counterclockwise direction, its lower end sliding over the sawtooth surface 10c. When pressure is relieved from the release button 7, the lever 11 is pivoted in a clockwise direction by its return spring, thereby rotating the wheel 10 in a counterclockwise direction. The sensing lever 5 is thereupon pivoted in a counterclockwise direction as its projection 5a is cammed out of the recess 10a, causing the blocking lever 6 to be pivoted into the path of the projection 7a

and thus into blocking relationship with the release button 7, as shown in Fig. 5. At the same time, the switch 12 is closed and the motor 13 thereby energized.

The motor 13 now drives the gears 14, 15 and 8. During each revolution of the gear 15, the lug 15a thereon indexes the wheel 10 by striking a succeeding one of its ribs 10e.

During the first revolution of the gear 15, the cam groove 15b thereon reciprocates the claw 16 once, causing the claw to advance the exposed film unit 21 (see Fig. 3) from its cartridge (not shown) to the nip of the rollers 18. While the claw 16 undergoes this movement, the camera shutter is recocked by means not shown. Upon completion of the first revolution of the gear 15, the claw 16 is uncoupled by means not shown. During subsequent revolutions of the gear 15, the lug 15a indexes the wheel 10 further, and the rollers 18 eject the film unit 21 from the camera through an exit slot 1a.

Another exposure must not be effected until the already-exposed film unit has been ejected. Such undesired exposure is prevented in that release button 7 remains blocked throughout the film transport cycle, which is synchronous with one revolution of the wheel 10.

Only when the wheel 10 has completed one revolution can the sensing lever projection 5a re-enter the wheel recess 10a, thereby withdrawing the blocking lever 6 from the movement path of the projection 7a to permit another actuation of the release button 7. At the same time, the switch 12 re-enters the wheel recess 10d, causing the switch to open and thereby to de-energize the motor 13. The camera is now ready for another exposure and film-transport cycle.

The movements of blocking lever 6 and the release button projection 7a are so coordinated that, when the camera is folded, the blocking relationship is effective when the release button 7 is initially depressed, i.e. before the lever 11 moves over the sawtooth surface 10c.

In the alternative embodiment shown in Fig. 6, the blocking lever 6 has a blocking nose 6a which comes into engagement with blocking teeth 22a on a release button 22. An advantage of this embodiment is that the release button 22 is prevented from being depressed again immediately after it has started to move back towards its initial position. Thus, when the camera has been folded to its storing-and-carrying configuration by moving the cover members 2 and 4 against the housing 1, and whenever a film-transport cycle has been initiated, whilst the camera is in its picture taking configuration, the release button blocking means here shown is immediately effective to prevent an undesired exposure.

In both embodiments, the release button

blocking means of the present invention not only prevents such undesirable exposure but it also permits uninterrupted completion of an operating cycle once the cycle has commenced.

The invention has been described in detail with particular reference to the illustrated preferred and alternative embodiment thereof, but it will be understood that variations and modifications can be effected within the scope of the invention.

WHAT WE CLAIM IS:—

1. A photographic camera foldable between an erected operative condition and a folded inoperative condition and having drive means for advancing a film, whilst the camera is in the operative condition, after each exposure, a blocking means including a blocking device for disabling the camera's shutter release member and a sensing member for moving the blocking device to its disabling position upon folding the camera and upon initiation of film transport.

2. A camera as claimed in Claim 1 wherein the drive means includes a motor.

3. A camera as claimed in Claim 1 or 2 wherein the blocking device is pivotally movable between a rest position and a disabling position in which movement of the shutter release member is blocked.

4. A camera as claimed in Claim 1, 2 or 3 wherein the sensing member comprises a pivotally mounted lever having two integral sensing projections and arranged for movement from a rest position to move the blocking device to its disabling position

when pivoted by engagement of camera elements with either of the projections.

5. A camera as claimed in claim 4 wherein a first sensing projection of the sensing member extends through the camera housing and is engageable by a housing portion to be moved thereby, when the camera is folded.

6. A camera as claimed in Claim 4 or 5 wherein the second sensing projection of the sensing member is arranged to engage the periphery of a timing wheel of the drive mechanism and to be moved thereby, the timing wheel having a notch in its periphery which permits the sensing member to return to its rest position when the notch is in alignment with the second sensing projection.

7. A camera as claimed in Claim 4, 5 or 6 wherein the sensing member is spring loaded to its rest position.

8. A camera as claimed in any preceding claim wherein the shutter release member is rectilinearly movable and the blocking device includes an arm pivotally movable into the path of movement of a projection on the release member.

9. A camera as claimed in any preceding claim wherein the blocking device is spring loaded to its blocking position.

10. A foldable photographic camera substantially as hereinbefore described with reference to and as illustrated in Figs. 1 to 5, or Figs. 1 to 5 modified by Fig. 6, of the accompanying drawings.

L. A. TRANGMAR, B.Sc., C.P.A.,
Agent for the Applicants.

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Printed for Her Majesty's Stationery Office, by the Courier Press, Leamington Spa, 1979
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

