

PATENT SPECIFICATION

(11) 1331924

DRAWINGS ATTACHED

1331924

- (21) Application No. 5043/72 (22) Filed 3 Feb. 1972
 (31) Convention Application No. 113874 (32) Filed 9 Feb. 1971 in
 (33) United States of America (US)
 (44) Complete Specification published 26 Sept. 1973
 (51) International Classification G03B 17/20
 (52) Index at acceptance

G2A 12AX 15X

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(54) CAMERAS HAVING A LENS COVER

(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 cameras having a lens cover for the picture taking lens thereof.

Camera lenses are very susceptible to damage by virtue of their glass or plastic compositions, the thin coatings applied to lens surfaces, and the prominent position of the lens on a camera. The likelihood of breaking or scratching a camera lens, or of dirt, moisture, fingerprints etc. appearing on the lens, has led to the provision of a variety of lens protecting devices. Thus many photographers use leather or plastic carrying casing for protecting their cameras despite the substantial bulk of the camera-case combination. In addition to camera cases, or a substitute therefor, cameras are frequently equipped with lens caps which are small, and which effectively protect the lens against the deleterious elements mentioned above.

Lens caps also have disadvantages, the most serious of which is the possibility that the photographer will inadvertently fail to remove the lens cap from the lens before taking a picture, so that the desired exposure will not be made, and the luckless photographer may not learn of his error until his film has been developed. The foregoing problem is of less significance in single lens reflex cameras since the photographer can not see through the viewfinder when the picture taking lens is covered. In cameras having picture taking lens systems and viewfinders which are independent of one another, as is the case with most cameras, the blockage of the camera lens by a lens cap or other cover can easily go undetected.

In accordance with the present invention

there is provided a camera comprising a slidably mounted lens cover movable between lens covering and uncovering positions, a pivotally mounted flag which is spring urged toward an inoperative position in which it is disposed outside the field of view of the camera viewfinder, and a spring biased connecting member which, upon movement of the lens cover to a lens covering position, is engaged by a surface of the lens cover and translates the sliding movement of the lens cover into pivotal movement of the flag, against the action of its spring, to a position in which the flag provides a visible signal in the camera viewfinder.

In the accompanying drawings:—

Figs. 1 to 3 are schematic views of a portion of a camera constructed according to one embodiment of the invention, the embodiment being shown in several operational conditions;

Figs. 4 and 5 are schematic views of a portion of a camera constructed according to another embodiment of the invention, the apparatus again being depicted in different operational conditions;

Figs. 6 and 7 schematically show the operational conditions of still another embodiment of the invention; and

Figs. 8 and 9 illustrate an embodiment of the invention wherein the shutter release is blocked when the lens cover is in front of the camera lens.

Referring now to Figs. 1—3, the portions of a camera 1 are shown which are relevant to an understanding of the present invention. The views show the front of camera 1 with portions omitted to reveal the parts of present interest, which include a picture taking lens 3, the front of a viewfinder 5, a lens cover 7, a signal device in the form of a flag 9, and a connecting member 11. Flag 9 is pivotally mounted on a post 13 and is biased in a clockwise direction by means of a relatively weak spring 15 which can be in the form of a leaf spring integral with the device. The connecting member 11 is preferably formed from a thin sheet of a resilient metal, and

has a downwardly extending leg 25 attached to the camera at a tab 19 by appropriate connecting means 17, which can be spot welds, rivets, adhesives or the like. An arm 21 of connecting member 11 is disposed adjacent to an ear 23 on the flag 9 and is engageable therewith. The downwardly extending leg 25 on connecting member 11 provides a spring force to member 11 and has a vertical equilibrium position. Thus, arm 21 is biased to the position shown in Fig. 3 under the influence of leg 25, and since the spring force of leg 25 exceeds that of spring 15, arm 21 tends to rotate the flag 9 in a counterclockwise direction. A lug 27 is attached to the back of lens cover 7 and is engageable with a forwardly bent tab 29 on the connecting member 11.

Lens cover 7 is mounted for sliding linear movement across the front of camera 1 between the open position shown in Fig. 1 wherein lens 3 is completely uncovered, and the closed position shown in Fig. 3 wherein lens 3 is completely covered by lens cover 7. When lens cover 7 is in the open position, lug 27 engages tab 29 and holds member 11 in a position such that flag 9 is acted on solely by the spring 15, member 11 thus being restrained against the bias of leg 25. As a result, the spring 15 rotates flag 9 out of viewfinder 5 giving the photographer an unobstructed view therethrough.

On the other hand, whenever lens cover 7 partially covers lens 3 as shown in Fig. 2, or completely covers lens 3 as shown in Fig. 3, lug 27 disengages tab 29, and member 11 is displaced to the left-hand side by means of the leg 25. The foregoing movement moves the arm 21 into engagement with the ear 23 and flag 9 is rotated in a counterclockwise direction by an amount sufficient to bring it into the viewfinder field as shown. In the latter situations, the photographer is warned upon attempting to observe a scene through viewfinder 5 that lens cover 7 is blocking lens 3 and that remedial action should be taken.

The entire mechanism as described above comprises but three elements; namely, flag 9, connecting member 11, and lens cover 7. The mechanism can therefore be incorporated in a camera without increasing the bulk of the camera and without appreciably increasing the complexity thereof. It is extremely simple to operate, requiring the mere sliding of lens cover 7 in a linear path to uncover lens 3 and to effect the responsive displacement of the flag. The bulk of the camera is not increased by the lens cover since it is flat and preferably recessed slightly in the front portion of the camera, and because the signal device and connecting member are disposed inside the camera in available space. These attributes are applicable to the other embodiments described herein as well.

Referring next to Figs. 4 and 5 which also show the front views of a camera in appropriate schematic form, a camera 101 includes a picture taking lens 103 and a viewfinder 105 as described previously. A lens cover 107 is mounted for linear sliding movement between an open position and a closed position as shown in Figs. 4 and 5, respectively. A flag 109 is pivotally mounted on a post 113 and is biased in a clockwise direction by means of a spring 115. A connecting member 111 is pivotally mounted on a post 117 and is biased in a clockwise direction by means of a spring 119. An ear 121 depends from one end of member 11 and is in engagement with the contoured upper surface of the lens cover 107. Such upper surface has a first or lower section 123 and a second or upper section 125. An ear 127 depends from the opposite end of connecting member 111 and is in engagement with a bent tab 129 on flag 109 for transmitting the movement of the lens cover 107 to the flag 109.

The first section 123 of lens cover 107 is of such length that the ear 121 rides thereon so long as the lens cover 107 does not block the lens 103, that is, the lens 103 is completely uncovered. However, as the lens cover 107 approaches a lens blocking position, the ear 121 rides up a ramp connecting the two sections 123, 125 so that as soon as the lens cover 107 moves in front of lens 103, the lever 111 is pivoted in a counterclockwise direction against the bias of spring 119 by a distance sufficient to cause the ear 127 to rotate flag 109 against the bias of the spring 115 and into the field of viewfinder 105, as shown in Fig. 5. On the other hand, as the lens cover 107 is removed from a lens covering or lens blocking position to the position shown in Fig. 4, the ear 121 rides onto section 123 of the lens cover and the spring 115 is enabled to rotate the flag 109 into its inoperative position to provide the photographer with an unobstructed view through the viewfinder.

Figs. 6 and 7 show another embodiment of the invention with a lens cover in its respective inactive and active conditions. Thus, a camera 201 comprises a picture taking lens 203, a viewfinder 205, a slideable lens cover 207, a flag 209, and a connecting member 211. Flag 209 is pivotally mounted on a post 213 and is biased in a clockwise direction by means of a spring 215. Connecting member 211 is fabricated from a strip of resilient material, and includes a depression 217 for receiving a pointed lug 219 extending from the camera so that the member 211 is supported for pivotal movement about lug 219. The upper surface of cover 207 includes first and second sections 223 and 225 similar in construction and function to sections 123 and 125 described previously with reference to Figs. 4 and 5. A shoulder

221 is provided in the slightly bent part of member 211 to the right-hand side of the depression 217, for engaging surfaces 223 and 225. The right-hand part of member 211 is constrained against upward displacement by means of a post 226. Thus, the right-hand part of member 211 bears against lug 219 and post 226, and the resiliency and configuration of this part of member 211 causes the central portion thereof to be biased downwardly. That part of member 211 to the lefthand side of lug 219 is, therefore, biased in a clockwise direction about the lug. An ear 227 depends from the lefthand end of member 211 and is engaged with a bent tab 229 on the flag 209.

Whenever the lens cover 207 is not blocking the lens 203, shoulder 221 rides on the first section 223 of the lens cover 207, and spring 215 holds the flag 209 in its inactive position in which it is not visible in the viewfinder, as indicated in Fig. 6. However, whenever lens cover 207 is moved so as partially to overlap lens 203, or to cover it completely as shown in Fig. 7, shoulder 221 rides onto the second section 225 to displace ear 227 in a counterclockwise direction by an amount sufficient to move the flag 209 into sight in the viewfinder 205. In this embodiment, as in the other embodiments described above, a compact and simple device has been provided for protecting a camera lens and for effectively indicating to the photographer whether the camera picture taking lens is blocked by the lens protecting device.

Referring now to Figs. 8 and 9, an arrangement is provided for blocking the shutter release of the camera whenever the lens is not completely uncovered. This shutter blocking arrangement is combined with a viewfinder signal, so that the photographer is not only prevented from taking a picture when the lens is covered, but he is also given the reason for this condition.

The elements depicted in Figs. 8 and 9 are very similar to those shown in Figs. 1—3, and identical numerical designations are therefore used, reference being made to the earlier description for a discussion of these elements. The camera shown in Figs. 8 and 9 further includes a shutter release 301, which is actuated to release the camera shutter mechanism and possibly to effect the operation of other camera mechanism in a known manner. Shutter release 301 is displaceable along a path defined by a pin 303 extending through a slot 305 in the shutter release. An ear 307 extends from shutter release 301 for the purpose described below.

A blocking element in the form of a tab 309 extends from connecting member 11, and is located relative to ear 307 so that it blocks the path of ear 307 to prevent the movement of shutter release 301 whenever member 11 moves to the left in response to

the partial or complete covering of lens 3 by lens cover 7. Thus, whenever lens cover 7 is in a lens blocking position, as is indicated in Fig. 9, member 11 moves to shift the tab 309 into the path of movement of ear 307, and the photographer cannot depress shutter release 301 to release the shutter. Flag 9 appears in the viewfinder to indicate to the photographer the reason for his inability to take a picture. When lens cover 7 is moved to uncover lens 3 as shown in Fig. 8, member 11 carries tab 309 out of the path of movement of ear 307 to allow the unimpeded operation of the camera, and flag 9 is removed from the viewfinder field.

WHAT WE CLAIM IS:—

1. A camera comprising a slidably mounted lens cover movable between lens covering and uncovering positions, a pivotally mounted flag which is spring urged toward an inoperative position in which it is disposed outside the field of view of the camera viewfinder, and a spring biased connecting member which, upon movement of the lens cover to a lens covering position, is engaged by a surface of the lens cover and translates the sliding movement of the lens cover into pivotal movement of the flag, against the action of its spring, to a position in which the flag provides a visible signal in the camera viewfinder.

2. A camera according to Claim 1, wherein the connecting member is formed of resilient strip material and has a depending leg intermediate its ends secured to the camera, one end of the strip lying in the path of movement of a tab carried by the lens cover and the other end of the strip being engageable with an ear on the flag so that upon movement of the lens cover to the lens covering position the connecting member is displaced by the tab against the resiliency of the depending leg and pivots the flag into a position in which it is visible in the viewfinder.

3. A camera according to Claim 1 or 2, wherein the connecting member blocks the movement of a shutter release upon movement of the lens cover to the lens covering position.

4. A camera according to Claims 2 and 3, wherein the connecting member carries a tab which is moved into the path of movement of an ear carried by the shutter release upon movement of the lens cover to the lens covering position.

5. A camera according to Claim 1, wherein the connecting member comprises a pivotally mounted lever having one end engageable with the flag and the other end spring urged into engagement with the upper surface of the lens cover which is stepped so that upon movement of the lens cover to the lens covering position the lever is pivoted in a direc-



221 is provided in the slightly bent part of member 211 to the right-hand side of the depression 217, for engaging surfaces 223 and 225. The right-hand part of member 211 is constrained against upward displacement by means of a post 226. Thus, the right-hand part of member 211 bears against lug 219 and post 226, and the resiliency and configuration of this part of member 211 causes the central portion thereof to be biased downwardly. That part of member 211 to the lefthand side of lug 219 is, therefore, biased in a clockwise direction about the lug. An ear 227 depends from the lefthand end of member 211 and is engaged with a bent tab 229 on the flag 209.

Whenever the lens cover 207 is not blocking the lens 203, shoulder 221 rides on the first section 223 of the lens cover 207, and spring 215 holds the flag 209 in its inactive position in which it is not visible in the viewfinder, as indicated in Fig. 6. However, whenever lens cover 207 is moved so as partially to overlap lens 203, or to cover it completely as shown in Fig. 7, shoulder 221 rides onto the second section 225 to displace ear 227 in a counterclockwise direction by an amount sufficient to move the flag 209 into sight in the viewfinder 205. In this embodiment, as in the other embodiments described above, a compact and simple device has been provided for protecting a camera lens and for effectively indicating to the photographer whether the camera picture taking lens is blocked by the lens protecting device.

Referring now to Figs. 8 and 9, an arrangement is provided for blocking the shutter release of the camera whenever the lens is not completely uncovered. This shutter blocking arrangement is combined with a viewfinder signal, so that the photographer is not only prevented from taking a picture when the lens is covered, but he is also given the reason for this condition.

The elements depicted in Figs. 8 and 9 are very similar to those shown in Figs. 1-3, and identical numerical designations are therefore used, reference being made to the earlier description for a discussion of these elements. The camera shown in Figs. 8 and 9 further includes a shutter release 301, which is actuated to release the camera shutter mechanism and possibly to effect the operation of other camera mechanism in a known manner. Shutter release 301 is displaceable along a path defined by a pin 303 extending through a slot 305 in the shutter release. An ear 307 extends from shutter release 301 for the purpose described below.

A blocking element in the form of a tab 309 extends from connecting member 11, and is located relative to ear 307 so that it blocks the path of ear 307 to prevent the movement of shutter release 301 whenever member 11 moves to the left in response to

the partial or complete covering of lens 3 by lens cover 7. Thus, whenever lens cover 7 is in a lens blocking position, as is indicated in Fig. 9, member 11 moves to shift the tab 309 into the path of movement of ear 307, and the photographer cannot depress shutter release 301 to release the shutter. Flag 9 appears in the viewfinder to indicate to the photographer the reason for his inability to take a picture. When lens cover 7 is moved to uncover lens 3 as shown in Fig. 8, member 11 carries tab 309 out of the path of movement of ear 307 to allow the unimpeded operation of the camera, and flag 9 is removed from the viewfinder field.

WHAT WE CLAIM IS:—

1. A camera comprising a slidably mounted lens cover movable between lens covering and uncovering positions, a pivotally mounted flag which is spring urged toward an inoperative position in which it is disposed outside the field of view of the camera viewfinder, and a spring biased connecting member which, upon movement of the lens cover to a lens covering position, is engaged by a surface of the lens cover and translates the sliding movement of the lens cover into pivotal movement of the flag, against the action of its spring, to a position in which the flag provides a visible signal in the camera viewfinder.

2. A camera according to Claim 1, wherein the connecting member is formed of resilient strip material and has a depending leg intermediate its ends secured to the camera, one end of the strip lying in the path of movement of a tab carried by the lens cover and the other end of the strip being engageable with an ear on the flag so that upon movement of the lens cover to the lens covering position the connecting member is displaced by the tab against the resiliency of the depending leg and pivots the flag into a position in which it is visible in the viewfinder.

3. A camera according to Claim 1 or 2, wherein the connecting member blocks the movement of a shutter release upon movement of the lens cover to the lens covering position.

4. A camera according to Claims 2 and 3, wherein the connecting member carries a tab which is moved into the path of movement of an ear carried by the shutter release upon movement of the lens cover to the lens covering position.

5. A camera according to Claim 1, wherein the connecting member comprises a pivotally mounted lever having one end engageable with the flag and the other end spring urged into engagement with the upper surface of the lens cover which is stepped so that upon movement of the lens cover to the lens covering position the lever is pivoted in a direc-

tion to pivot the flag into a position in which it is visible in the viewfinder.

6. A camera according to Claim 1, wherein the connecting member comprises a strip of resilient material having one end engageable with the flag, a shoulder in engagement with the stepped upper surface of the lens cover, the other end constrained against upward displacement and a depression located between said first end and the shoulder in engagement with a pointed lug extending from the camera, so that upon movement of the lens

cover to the lens covering position the strip is pivoted about the pointed lug and pivots the flag to a position in which it is visible in the viewfinder. 15

7. A camera having a lens cover and indicator substantially as hereinbefore described with reference to, and as shown in, Figs. 1 to 3, Figs. 4 and 5, Figs. 6 and 7, or Figs. 8 and 9 of the accompanying drawings. 20

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Printed for Her Majesty's Stationery Office, by the Courier Press, Leamington Spa, 1973.
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

