

PHOTOGRAPHIC CARTRIDGE-LOADING CAMERA

The invention relates to a camera for use with a cartridge containing a rotatable film disc.

Japanese patent public disclosure 25096/80, published February 22, 1980 discloses a cartridge having a rotatable film disc enclosed in a casing and a cover member movable between positions in which it covers and uncovers an exposure opening in the casing.

The cartridge is receivable in a camera having a film support positioned to enter the exposure opening to engage the film disc. A resilient means is positioned to urge the cartridge toward the film support and opening means is positioned to engage the cover member to move it between its covering and uncovering positions.

In operation, the cover member is in its covering position when the cartridge is inserted in the camera and moved to its uncovering position by the opening means after the door to the film compartment in the camera is closed. Before the door is opened again, the cover member is returned to its covering position.

However, when the cartridge is inserted in the camera and the door closed, the film support engages the cover member creating friction resisting movement of the cover member to its uncovering position. Subsequent movement of the cover member from its uncovering position back to its covering position is even more restricted. Interference by the film support of the camera thus greatly increases the force required to move the cover member and can cause damage to the cover member, the film support, or both.

It is the object of the invention to provide a camera for receiving a cartridge generally of the type described but which, in operation, requires less force to move the cover member and thereby minimise the risk of damage to the cover member and the film support
5 from such movement.

According to the present invention there is provided a camera for receiving a cartridge of the type having a film disc enclosed in a casing and a cover
10 member movable between positions in which it covers and uncovers an exposure opening in the casing, the camera including opening means for engaging the cover member and moving it between its uncovering and covering positions, a film support positioned to enter the exposure opening
15 to engage the film disc, and resilient means urging the cartridge toward the film support, the camera further including a force applying component for applying, upon operation, a force to the cartridge urging the cartridge in a direction generally away from the film support against
20 the urging of the resilient means to facilitate movement of the cover member.

Although it is within the invention to control the adjustment of the force applying component by a separate manual or motor driven means, in its preferred
25 form, it is controlled in response to operation of the opening means, for example, by locating both the opening means and the force applying component on opposite ends of the same lever rotatable around the axis of a received film disc.

Also, according to a preferred embodiment of the invention, the force applying component is movable in a direction parallel to the movement of the cover member and is engageable with a control ramp on the outside of the cartridge shaped to control the force
30 applied by the force applying component.
35

The invention will be described further, by way of example, with reference to the accompanying drawings.

In the drawings:

Fig. 1 shows the cartridge receiving area of a camera loaded with a cartridge, with a cover member of the cartridge in its covering position;

Fig. 2 shows the camera and cartridge of Fig. 1, with the cover member in its uncovering position;

Fig. 3 is a partial plan view of the camera and cartridge of Fig. 1;

Fig. 4 shows another embodiment of a camera and cartridge, with a cover member of the cartridge in its covering position; and

Fig. 5 shows the camera and cartridge of Fig. 4, with the cover member in its uncovering position.

Referring to Figs 1 to 3 of the drawings, a camera housing 1 is shaped to receive a cartridge 2 in a cartridge chamber 1e. Details not shown of either the camera or the cartridge can be as shown in Japanese patent public disclosure 25096/80 mentioned above.

The camera housing 1 supports a taking lens 9 and a film support 1a extending into the cartridge chamber 1e.

A lever 4 is mounted on an outer circumferential wall of a collar 1f of the camera housing 1 to be pivotable about a driving spindle 10 corresponding to the centre of the cartridge and, via a pin 4b, engages a slider 7 of a locking mechanism of the rear cover of the chamber 1e which is not illustrated in detail.

The driving spindle 10 is rotatably mounted on an inner circumferential wall of the collar 1f and, by means of a toothing, drivingly engages teeth on the cartridge. It is driven by a film indexing mechanism in the camera (not shown).

The lever 4 includes a force applying component 4c which extends into the cartridge chamber 1e through

an opening 1d of the camera housing 1, the opening being arcuately shaped, generally concentric with the driving spindle 10 and located between the spindle and the film support 1a.

The cartridge 2 is provided with an exposure opening 2d in its casing through which the film support 1a of the camera extends into the interior of the cartridge.

A circular film disc 8 is located within the cartridge 2 and is engageable by the film support 1a. A cover member 3 for covering and uncovering the exposure opening 2d is mounted for pivotable movement between said film disc and exposure opening 2d.

The camera includes opening means, for example, a pin 4a attached to an end of lever 4 generally opposite component 4c, which opening means 4a is positioned to engage the cover member 3.

As can be seen in particular from Fig. 3, a control ramp 2a in the form of a ring section generally concentric with the driving spindle 10 is moulded on the casing of the cartridge 2.

The control ramp 2a is situated at the same radial distance from the driving spindle 10 as the force applying component 4c of the lever 4 and is engageable thereby.

The control ramp 2a comprises a surface section extending approximately in parallel with the outer surface of the casing of cartridge 2 and an inclined ramp-shaped surface section 2b which connects the parallel section with such outer surface.

Within the cartridge chamber 1e, resilient means, for example, springs 5 and 6 urge the cartridge 2 toward inner surface 1c of cartridge chamber 1e and toward film support 1a. These springs seat the cartridge in the camera. Japanese public disclosure No. 25096/80,

mentioned above, shows an adjustable spring directly opposite the film support which spring urges a movable portion of the cartridge casing toward the film disc and the film disc in turn toward the film support. The present invention is useful if the resilient means is adjustable, not adjustable, or if both adjustable and not adjustable resilient means are present.

In operation, when the cartridge chamber 1e is open, the slider 7 of the rear cover locking mechanism is in the position shown in Fig. 3 in which it keeps lever 4 in the position shown in Figs. 1 and 3.

When a cartridge 2 is loaded in the cartridge chamber 1e, toothing provided on the cartridge is brought into engagement with teeth of the driving spindle 10 and opening means, the pin 4a engages the cover member 3.

The shape of the cartridge 2 and the corresponding design of cartridge chamber 1e (not illustrated) ensure, in a conventional manner, that the cartridge 2 can be loaded in the correct orientation only.

When the cartridge 2 is loaded, as shown in Fig. 1, the parallel surface section of the control ramp 2a makes contact with the force applying component 4c of the lever 4 so that the cartridge 2 is pivoted about a pivot 1b and assumes the inclined position illustrated in Fig. 1 in response to a force applied by component 4c urging the cartridge away from the film support against the urging of the resilient means 6.

In this inclined position, the film support 1a of the camera, although extending through exposure opening 2d into the cartridge 2, does not make contact (or makes very light contact) with the cover member 3 situated in its covering position to facilitate movement of the cover member.

After the cartridge 2 has been loaded, the cartridge chamber 1e is closed and locked.

During locking, the slider 7, as shown in Fig. 3, is moved to the right, which pivots the lever 4 in a clockwise direction. The opening means 4a rotates the cover member 3 in a clockwise direction from an exposure opening covering position to an exposure opening uncovering position.

During this pivotal movement, the force applying component 4c of the lever 4 first slides along the parallel surface section of the control ramp 2a of the cartridge 2, maintaining the cartridge 2 in its inclined position, as shown in Fig. 1.

As soon as the cover member 3 has uncovered the exposure opening 2d of the cartridge 2, the component 4c of the lever 4 moves onto the ramp-shaped surface section 2b. Under the influence of the springs 5 and 6, the component 4c slides down the control ramp to the outer surface of the cartridge 2. The cartridge 2 now assumes the position illustrated in Fig. 2 in which it is urged by the springs 5 and 6 toward the surface 1c of the camera housing 1.

The cartridge 2 is now in a position ready for exposure, with the cover member 3 and the lever 4 assuming the positions indicated in dash-dotted lines in Fig. 3.

By indexing the film disc 8 by means of a film transport mechanism not illustrated, successive areas of the disc are exposed.

When the partially or completely exposed cartridge 2 is to be unloaded, the door on the cartridge chamber 1e is unlocked by moving the slider 7 to the left. This movement causes the lever 4 to be pivoted in a counterclockwise direction.

This first moves the component 4c out of its position shown in dash-dotted lines in Fig. 3 onto the ramp-shaped surface section 2b, and the cartridge is pivoted about a pivot 1b and moved into the inclined position shown in Fig. 1.

When the cartridge has reached its inclined position, the film support 1a is no longer located in the path of movement of the cover member 3. The component 4c now slides along the parallel surface section of the control ramp 2a, and the cover member 3 is pivoted into its position in front of the exposure opening 2d of the cartridge 2 and covers the opening in a light-tight manner.

When the cartridge 2 has once again been closed in a light-tight manner by the cover member 3, the slider 7 reaches its unlocking position in which the cartridge chamber 1e can be opened.

As a variation of the embodiment illustrated in Figs. 1-3, the cartridge 2 can also be provided with a plurality of control ramps 2a concentrically disposed around the cartridge centre and cooperating with a corresponding number of force applying components 4c on the lever 4 such that the cartridge 2 is moved approximately parallel to the axis of the driving spindle 10, remaining parallel to a surface 1c of the cartridge chamber 1e to space the cover member 3 from the film support 1a during its movement.

Another embodiment of a camera according to the invention is shown in Figs. 4 and 5. In this embodiment, like parts have been given similar reference numerals, prefixed by "1", to those in the embodiment of Figs. 1 to 3. In this embodiment, the inclined position

of the cartridge 12 is brought about exclusively by means provided in the camera, and the cartridge may be constructed according to the prior art, i.e., without the control ramp 2a moulded on the cartridge casing.

In the embodiment of camera illustrated in Figs. 4 and 5, a control ramp 11i in the form of a ring section extending concentrically around the driving spindle 110 of the cartridge centre is arranged on a wall 11g of the camera housing 11. The lever 14 comprises, on its rear side opposite force applying components 14c and on an extension of the component 14c, a cam rider 14d contacting the control ramp 11i on the camera.

The control ramp 11i, the cam rider 14d and the component 14c are arranged at a common radial distance from the driving spindle 110.

The control ramp 11i comprises a surface section running approximately parallel with a surface 11h of the camera housing 11 and a ramp-shaped surface section inclined to the first mentioned section and terminating in a surface 11h.

The lever 14 is mounted on a collar 11f of the camera housing 11 which is longer because its outer diameter supports both rotatable and axial movement of the lever 14.

In this embodiment, a cartridge 12 has a substantially planar outer surface and, as mentioned above, may be constructed according to the prior art.

The camera functions as follows:

When the cover locking mechanism is unlocked, the lever 14 assumes the position shown in Fig. 4. The cam rider 14d rests on the raised portion of the control ramp 11i thereby pushing the force applying component 14c beyond the surface 11c and into the cartridge chamber 11e. The force applying component 14c urges the loaded cartridge 12 away from the surface 11c causing it to pivot about a pivot 11b and assume the

inclined position illustrated in Fig. 4 so that the film support 11a on the camera is not situated in the path of movement of the cover member 13.

When the cartridge chamber 11e is closed and locked, the lever 14 is pivoted in a manner analogous to that described with reference to the embodiment shown in Figs. 1 to 3. During such movement, the cam rider 14d of the lever 14 first slides along the parallel surface section of the control ramp 11i whilst the cover member 13 clears the exposure opening 12d of the cartridge 12. When the cover member 13 has cleared the exposure opening 12d, the cam rider 14d slides down the ramp-shaped surface section onto the surface 11h relieving the force of the component 14c on the cartridge and allowing the cartridge 12 to seat against the cartridge-contacting surface 11c (Fig. 4) as illustrated in Fig. 5.

When the cover of the cartridge chamber is unlocked to remove the cartridge 12, the lever 14 is pivoted. The cam rider 14d slides up the ramp-shaped surface section onto the parallel surface section of control ramp 11i.

This moves the component 14c into the cartridge chamber 11e and pivots the cartridge 12 about the pivot 11b into the inclined position illustrated in Fig. 4.

In this inclined position, the film support 11a is again situated outside the path of movement of the cover member 13 so that the member's movement is not inhibited. When the exposure opening 12d has been covered, the cartridge chamber 11e can be opened and the cartridge 12 removed.

The camera shown in Japanese patent public disclosure No. 25096/80, mentioned above, has a pawl which enters metering notches in the periphery of the film disc through the exposure opening. In such a

camera, the pawl must be removed in order to move the cover member to its covering position. The pawl can be removed by a linkage to the slider 7, lever 4 or 14, or force applying component 4c or 14c, or by being cammed out by the cover member itself.

The embodiment according to Figs. 4 and 5 can be modified in that a plurality of control ramps 11i and cam riders 14d may be provided by which the cartridge is lifted in a direction perpendicular to the surface 11c whilst the cover member 13 is being moved. Instead of the elevated control ramps 12a and 11i, it is of course also possible to provide indentations (not shown) with suitably shaped surface sections.

The control ramps 12a and 11i can be straight rather than curved concentrically of the centre of the cartridge or curved in another manner, in which case the control ramp can be engaged by a force applying means or cam rider guided along a corresponding path to bring the cartridge 12 into the inclined position described above.

Still other embodiments will occur to those skilled in the art. For example, the force applying component 14c can be separated from lever 14 and mounted to move only in an axial direction (toward or away from the cartridge). Its position could then be controlled by a control ramp located on another portion of lever 14. Further, some mechanism other than a control ramp can be used for converting the movement of the slider 7 into the proper movement of the component 4c or 14c. For example, the component 4c or 14c could be connected directly to slider 7, or through a lever system or gearing. As another example, the latch on the cover door (not shown) could be mounted for movement in two directions, first in an axial direction (with respect to the film disc) by which movement a rocker having the force applying component 14c on its opposite end would move the

component 14c into its Fig. 4 position and second, in a direction perpendicular to the first direction by which the slider 7 would move opening means 14a.

The component 14c could also be spring urged toward the cartridge with the spring force relieved in response to movement of slider 7, the lever 14 or another camera element.

The drawings show the cartridge inclined about the pivot 1b or 11b as a result of the force applied to the cartridge by the component, 4c or 14c. The invention would also be effective, although somewhat less so, if the force applied by component 4c or 14c is insufficient to incline the cartridge but partially offsets the force applied by the resilient means 6 or 16 on the opposite side of the cartridge. This would then reduce the force required to slide the cover member under the film support but would not totally eliminate it.

The term "opening means" is applied to pin 4a or 14a for convenience when, in fact, it both "opens" and "closes" the cover member. These functions could be accomplished by separate means, for example, with movement of the cover member to its covering position being accomplished with opening of the door as shown in the drawings while movement of the cover member to its uncovering position is accomplished with the first indexing of the film disc. The covering movement, as opposed to the uncovering movement, being more difficult in the prior art, it is within the scope of the invention, although less desirable, to utilize force applying component 4c or 14c only during the covering movement.



CLAIMS

1. A camera for receiving a cartridge of the type having a film disc enclosed in a casing and a cover member movable between positions in which it covers and
5 uncovers an exposure opening in the casing, the camera including opening means for engaging the cover member and moving it between its uncovering and covering positions, a film support positioned to enter the exposure opening to engage the film disc, and resilient means urging the
10 cartridge toward the film support, the camera further including a force applying component for applying, upon operation, a force to the cartridge urging the cartridge in a direction generally away from the film support against the urging of the resilient means to facilitate movement
15 of the cover member.
2. A camera as claimed in claim 1 wherein the force applying component is adjustable between its first and second conditions in response to operation of the opening means.
- 20 3. A camera as claimed in claim 1 or 2 wherein the force applying component and the opening means are positioned on opposite ends of a lever which is rotatable around the axis of a received film disc, the force applying component being positioned to pivot the cartridge
25 about a pivot located on the same side of the axis as the opening means.
4. A camera as claimed in claim 1, 2 or 3 wherein the force applying component is movable in a direction parallel to the movement of the cover member and is
30 engageable with a control ramp on the outside of the cartridge shaped to control the force applied by the force applying component.



-13-

5. A camera as claimed in claim 2 or claims 2 and 3 wherein the force applying component is movable in a direction toward and away from a received cartridge in response to movement of the opening means.

6. A camera as claimed in claim 5, wherein the camera includes a control ramp, a cam rider, means for causing relative motion parallel to the cartridge casing between the control ramp and the cam rider, the force applying means being coupled to either the control ramp or the cam rider for movement toward and away from the cartridge in response to such relative movement.

7. A camera substantially as hereinbefore described with reference to and as illustrated in Figs. 1 to 3 or Figs. 4 and 5 of the accompanying drawings.
