

PATENT SPECIFICATION

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(54) 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 to a photographic or cinematographic camera with a spring motor.

In accordance with the present invention there is provided a photographic or cinematographic camera comprising a spring motor, a cover member arranged to move between operative and inoperative positions in such a manner as to tension the spring motor and indication means for indicating that the spring motor is tensioned to a level below a predetermined level.

The present invention will now be described by way of example with reference to the accompany drawings in which:—

Figure 1 shows one form of camera according to the present invention with its spring motor in its untensioned condition;

Figure 2 shows the camera of Figure 1 with its spring motor in its tensioned condition;

Figure 3 shows a detailed perspective view, partially exploded, of the mechanism shown in Figures 1 and 2;

Figure 4 shows an overall view of a second form of camera according to the present invention; and

Figure 5 shows the spring motor of the camera of Figure 4.

Referring to Fig. 1, a camera housing 2 is shown containing a film cartridge 4. A transport wheel 6 of the cardidget 4 for advancing film therethrough is driven, through intermediate wheels 8 and 10, by the drive side of a spring motor 12.

The drive side of spring motor 12 is also in engagement with an intermediate wheel 14 which meshes with a toothed segment 16. The toothed segment 16 is attached to a

back cover 18 of the camera, with which it is mounted for rotation about a pivot 20 on the camera housing 2.

A blocking lever 22 is pivotably mounted about a pivot 24 on the camera housing 2 and spring-biased in an anticlockwise direction. The lever 22 scans the coil radius of the drive spring of spring motor 12, while, with the arm 26 thereof, it cooperates with a projection 28 on the back cover 18 in a manner described below.

The mode of operation of the device is as follows: To insert the cartridge 4, the back cover 18 is opened (Fig. 1) and the cartridge 4 inserted. Upon opening of the back cover 18 the blocking lever 22 becomes effective. When the drive spring of spring motor 12 is unwound, its coil diameter is larger than that when it is wound up. An arm 30 of the control lever 22 senses this difference in diameter and, when the drive spring is partially or fully unwound, the control lever 22 is urged by the drive spring in a clockwise direction such that the arm 26 of the control lever 22 moves to block the path followed by the projection 28 during the closing movement of the back cover 18.

After insertion of the cartridge 4, the photographer must close the back cover 18. During this operation, the toothed segment 16 effects winding of the spring motor 12 by way of intermediate wheel 14. Since the force required for closing the back cover 18 must not demand an undue exertion from the photographer, the transmission ratio has to be chosen such that several closing movements are necessary for winding the spring motor 12.

Spring motor 12 has a wheel 32 which is freely rotatable on its shaft 34 and carries a pawl 36. The pawl 36 cooperates with a toothed wheel 38 in such a manner that the wheel 38 is rotated when the door 18 is closed but not when the door 18 is opened. An anti-reversing pawl 40 prevents spring 42 of the spring motor 12 from rotating the wheel 38 when the door is in the open position.

Film winding by wheels 44, 10 and 8 is

controlled by a metering pawl 46 acting on a gear 48 coupled to wheel 10.

The blocking lever 22 serves to inform the photographer that there is insufficient stored energy in that it prevents closing of the back cover 18. This is effected by engagement of projection 28 with arm 26; indicated by dot-dash lines in Figure 1.

The photographer opens and closes the back cover 18 a number of times (e.g. 2 or 3 times) until the drive spring of spring motor 12 is fully wound. When the drive spring is fully wound, the blocking lever 22 moves out of the range of projection 28, so that the back cover 18 can be closed.

The camera is now ready for use and the photographer can expose the film without having to first execute any movements for advancing the film and tensioning the shutter.

After each exposure the spring motor 12 rotates, by way of intermediate wheels 8 and 10, the transport wheel 6 of the cartridge 4 to advance the film. The tensioning motions, such as tensioning of the shutter, necessary to make the camera ready for the next exposure take place simultaneously.

As an alternative to the illustrated embodiment, the blocking lever 22 may cooperate with other parts influenced by the degree of compression of the drive spring, e.g. with a deformable return locking device (not shown), in order to inform the photographer on the amount of motive power stored.

In any case, the action of the lever 22 and projection 28 spares the photographer bothersome considerations and observations concerning the motive power of the spring motor, because whenever he is able to close the back cover 18, he can expose the entire length of film.

Referring now to Figure 4 a cover portion 50 is slidably mounted on camera housing 52 in which are located a lens 54, a viewfinder 56, a spring motor 58 and an intermediate wheel 60. A cover slider 62 and a rack 64 are arranged on the cover portion 50. A cartridge 66 is received in the camera as shown.

The rack 64 meshes with a drive wheel 68 (Figure 5) of the spring motor 58 and a second drive wheel (not shown) of the motor is mounted on the same axis of rotation as the drive wheel 68, spaced therefrom, and is in engagement with the intermediate wheel 60. The intermediate wheel 60 engages a transport wheel 70 of the cartridge 66.

Arranged between the drive wheel 68 and the second drive wheel are a pawl 72, a ratchet wheel 74 and a drive spring 76. The pawl 72 is pivotably mounted about a bearing 78 on the drive wheel 68 and is urged towards the ratchet wheel 74 by a spring 80.

On the ratchet wheel 74 there is a pin

82 around which one end of the drive spring 76 (torsion spring) is attached. The other end of the drive spring 75 is attached to the second drive wheel. The ratchet wheel 74 is also engaged by a leaf spring 84 which serves as a reverse motion stop and a control means for indication of the spring force. The drive wheel 68, the ratchet wheel 74 and the second drive wheel (not shown) can be rotated independently of one another, while being mounted about a common bearing together with the drive spring 76.

The arrangement operates as follows: Figure 4 shows the camera in its open position, ready for taking a picture. As soon as the camera is closed by pushing the cover portion 50 toward the camera housing 52 the drive wheel 68 rotates clockwise via the rack 64. The pawl 72 (see Fig. 5) thereby takes the ratchet wheel 74 along in the same direction of rotation, the drive spring 76 being tensioned via the pin 82. The second drive wheel is arrested by a locking device (not shown) the driving force of the drive spring 76 thus being stored, retained by the leaf spring 84.

The leaf spring 84 is so designed that it can be deflected (shown by dot-dash line in Fig. 5) depending on the spring force stored, i.e. it assumes the relaxed position shown in solid lines if the spring force is insufficient. An indicating lug 86, spring-biased towards the leaf spring 84, extends into the range of deflection of said leaf spring 84. The lug 86 moves into the viewfinder 56 as soon as a force in the drive spring 76 which is insufficient for operation of the camera acts upon the leaf spring 84 (leaf spring 84 relaxed). The user is thus given a timely warning if the driving energy is inadequate.

Once the spring motor 58 has been tensioned the camera can either stay in its closed position in which the lens 54 is covered by the cover slider 62 and the viewfinder 56 by the cover portion 50 and the release is locked, or it may be transferred to the position shown in Fig. 4 where it is ready for exposure and the release (not shown) is unlocked. This is accomplished by withdrawing the cover portion 50.

With the camera ready for exposure the shutter (not shown) is caused to run down by actuation of the release. When the shutter has run down the second drive wheel is released by means not shown and film transport takes place via the intermediate wheel 60 and the transport wheel 70 of the cartridge 66 until the transport mechanism is locked by a locking means dropping into the second drive wheel after one frame. Simultaneously with the film transport, the shutter (not shown) is also cocked via means which are not shown but are driven by the spring motor 58, and the release is cleared ready for another exposure.

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Because the spring motor 58 stores the driving force for several cocking and transport operations a number of pictures can be taken in rapid succession without the need for fresh cocking—which would impair the readiness of the camera for exposure.

The transmission and the drive spring 76 of the spring motor 58 are so co-ordinated that one tensioning movement stores the driving energy for several exposures. The user can also tension the mechanism more than once, thus storing the driving energy for even more exposures.

To prevent the drive spring 76 from being over-tensioned flanks 88 of the ratchet wheel toothing and the angle of surface 90 of the pawl 72 are so co-ordinated that the pawl 72 is disengaged from the ratchet wheel 74 when a specific maximum tensioning of the spring is reached.

In contrast to the embodiment which has been described, the viewfinder indication as to the spring tension in the drive spring 76 can also be effected by sensing the diameter of the coil of the drive spring 76. It is also possible to design the mechanism appropriately so that the spring motor 58 is only tensioned during the withdrawal of the cover portion 50, should such tensioning movement prove beneficial.

Furthermore, instead of the leaf spring 84 described, any other suitable spring such as a wire spring or hairpin spring may constitute the reverse motion stop. Similarly, the lug 86 can cooperate with the leaf spring 84 via intermediate members.

WHAT WE CLAIM IS:—

1. A photographic or cinematographic camera comprising a spring motor, a cover member arranged to move between operative and inoperative position in such a manner as to tension the spring motor and indication means for indicating that the spring motor is tensioned to a level below a predetermined level.

2. A camera according to claim 1 wherein the indication means comprises a blocking member which cooperates with the cover member and the drive spring of the spring motor such that, when the motive power stored in the drive spring is below said predetermined level, the blocking member extends into the path of motion of the cover member and prevents it from being closed.

3. A camera according to claim 2, wherein the blocking member comprises a two-armed pivotable lever, one arm of which is spring biased to rest against the circumference of the drive spring and the other arm of which is cooperable with a projection on the cover member.

4. A camera according to claim 1, 2 or 3, wherein the cover member is provided with a toothed segment which, by way of

an intermediate gear wheel, is coupled to the spring motor and winds the latter upon movement of the cover member.

5. A camera according to claim 1 wherein the cover member is slidable between an extended operative position, in which the camera is ready for exposure, and an inoperative position, in such a manner as to tension the spring motor.

6. A camera according to claim 5 wherein the cover member has a rack in engagement with a drive wheel of the spring motor.

7. A camera according to claim 6 wherein a pivotable, spring-urged pawl is mounted on the drive wheel, said pawl being in engagement with a ratchet wheel which is mounted to be independently rotatable about the axis of rotation of the drive wheel.

8. A camera according to claim 7 wherein one end of a drive spring of the spring motor is attached to the ratchet wheel.

9. A camera according to claim 8 wherein flanks of the ratchet wheel and a surface of the pawl are in contact with one another at an acute angle transmitting the winding force to said ratchet wheel, and wherein the connection between the said surface of the pawl and the ratchet wheel is disengaged in the case of the force stored in the drive spring reaching a second predetermined level.

10. A camera according to claim 8 or 9 wherein a stationarily mounted spring engages, with a free spring leg, the ratchet wheel, said spring being deflected an amount dependent on the spring force stored in the drive spring, and wherein an indication means engages the spring leg under spring influence, for indicating insufficient driving energy storage in the drive spring.

11. A camera according to claim 8, 9 or 10, wherein the drive spring takes the form of a helical torsion spring the other end of which engages a second drive wheel which is mounted to be independently rotatable about the axis of rotation of the first-mentioned drive wheel.

12. A camera according to claim 11 wherein an intermediate wheel meshes the second drive wheel of the spring motor, said intermediate wheel being in engagement with a drive wheel of a film cartridge received in the camera.

13. A camera according to any one of claims 6 to 12 wherein a locking device co-operates with the spring motor, said locking device being responsive to transport of a film received in the camera through one film frame and co-operating with the camera exposure mechanism.

14. A camera according to claim 1, 5 or 6 comprising a stationarily mounted reverse motion stop in the form of a spring which engages, with a free spring leg, a ratchet wheel which tensions a drive spring

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Because the spring motor 58 stores the driving force for several cocking and transport operations a number of pictures can be taken in rapid succession without the need for fresh cocking—which would impair the readiness of the camera for exposure.

The transmission and the drive spring 76 of the spring motor 58 are so co-ordinated that one tensioning movement stores the driving energy for several exposures. The user can also tension the mechanism more than once, thus storing the driving energy for even more exposures.

To prevent the drive spring 76 from being over-tensioned flanks 88 of the ratchet wheel toothing and the angle of surface 90 of the pawl 72 are so co-ordinated that the pawl 72 is disengaged from the ratchet wheel 74 when a specific maximum tensioning of the spring is reached.

In contrast to the embodiment which has been described, the viewfinder indication as to the spring tension in the drive spring 76 can also be effected by sensing the diameter of the coil of the drive spring 76. It is also possible to design the mechanism appropriately so that the spring motor 58 is only tensioned during the withdrawal of the cover portion 50, should such tensioning movement prove beneficial.

Furthermore, instead of the leaf spring 84 described, any other suitable spring such as a wire spring or hairpin spring may constitute the reverse motion stop. Similarly, the lug 86 can cooperate with the leaf spring 84 via intermediate members.

WHAT WE CLAIM IS:—

1. A photographic or cinematographic camera comprising a spring motor, a cover member arranged to move between operative and inoperative position in such a manner as to tension the spring motor and indication means for indicating that the spring motor is tensioned to a level below a predetermined level.

2. A camera according to claim 1 wherein the indication means comprises a blocking member which cooperates with the cover member and the drive spring of the spring motor such that, when the motive power stored in the drive spring is below said predetermined level, the blocking member extends into the path of motion of the cover member and prevents it from being closed.

3. A camera according to claim 2, wherein the blocking member comprises a two-armed pivotable lever, one arm of which is spring biased to rest against the circumference of the drive spring and the other arm of which is cooperable with a projection on the cover member.

4. A camera according to claim 1, 2 or 3, wherein the cover member is provided with a toothed segment which, by way of

an intermediate gear wheel, is coupled to the spring motor and winds the latter upon movement of the cover member.

5. A camera according to claim 1 wherein the cover member is slidable between an extended operative position, in which the camera is ready for exposure, and an inoperative position, in such a manner as to tension the spring motor.

6. A camera according to claim 5 wherein the cover member has a rack in engagement with a drive wheel of the spring motor.

7. A camera according to claim 6 wherein a pivotable, spring-urged pawl is mounted on the drive wheel, said pawl being in engagement with a ratchet wheel which is mounted to be independently rotatable about the axis of rotation of the drive wheel.

8. A camera according to claim 7 wherein one end of a drive spring of the spring motor is attached to the ratchet wheel.

9. A camera according to claim 8 wherein flanks of the ratchet wheel and a surface of the pawl are in contact with one another at an acute angle transmitting the winding force to said ratchet wheel, and wherein the connection between the said surface of the pawl and the ratchet wheel is disengaged in the case of the force stored in the drive spring reaching a second predetermined level.

10. A camera according to claim 8 or 9 wherein a stationarily mounted spring engages, with a free spring leg, the ratchet wheel, said spring being deflected an amount dependent on the spring force stored in the drive spring, and wherein an indication means engages the spring leg under spring influence, for indicating insufficient driving energy storage in the drive spring.

11. A camera according to claim 8, 9 or 10, wherein the drive spring takes the form of a helical torsion spring the other end of which engages a second drive wheel which is mounted to be independently rotatable about the axis of rotation of the first-mentioned drive wheel.

12. A camera according to claim 11 wherein an intermediate wheel meshes the second drive wheel of the spring motor, said intermediate wheel being in engagement with a drive wheel of a film cartridge received in the camera.

13. A camera according to any one of claims 6 to 12 wherein a locking device co-operates with the spring motor, said locking device being responsive to transport of a film received in the camera through one film frame and co-operating with the camera exposure mechanism.

14. A camera according to claim 1, 5 or 6 comprising a stationarily mounted reverse motion stop in the form of a spring which engages, with a free spring leg, a ratchet wheel which tensions a drive spring



of the spring motor, said spring being deflected an amount dependent on the spring force stored in the drive spring, and wherein the indication means engages the spring leg under spring influence, for indicating insufficient driving energy storeg in the spring motor drive spring.

15. A camera according to claim 14, wherein the reverse motion stop is designed as a leaf spring mounted at one end and engaging, with its free end, the toothing of the ratchet wheel.

16. A camera according to claim 15, wherein the indication means is designed as a slidably mounted indicating lug one end of which is in contact with the leaf spring under spring influence and the other end of which is located in the region of a viewfinder of the camera.

17. A camera according to claim 14, 15 or 16, wherein the ratchet wheel is engaged by a pivotably mounted, spring-urged pawl whose bearing is attached to a or the drive wheel which is mounted to be independently rotatable about the axis of rotation of said ratchet wheel.

18. A camera according to claim 17 wherein flanks of the ratchet wheel and a surface of the pawl are in contact with one another at an acute angle transmitting the winding force to said ratchet wheen, and the connection between the said surface of the pawl and the ratchet wheel is disengaged in the case of the force stored in the drive

spring spring reaching a second predetermined level.

19. A camera according to any one of claims 14 to 18 wherein one end of the spring motor drive spring is attached to the ratchet wheel.

20. A camera according to claim 17, 18 or 19 as appendant to 17 or 18 wherein the drive spring takes the form of a helical torsion spring one end of which engages a second drive wheel mounted to be independently rotatable about the axis of rotation of the drive wheel.

21. A camera according to claim 20 wherein an intermediate wheel meshes with the second drive wheel of the spring motor, said intermediate wheel being in engagement with a drive wheel of a cartridge received in the camera.

22. A camera according to any one of claims 14 to 21 wherein a locking device co-operates with the spring motor, said locking device being responsive to transport of a film received in the camera through one film frame and co-operating with the camera exposure mechanism.

23. Cameras constructed substantially as hereinbefore described with reference to, and as shown in, Figures 1 to 3 or 4 and 5 of the accompanying drawings.

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