

PATENT SPECIFICATION

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- (21) Application No. 55354/72 (22) Filed 30 Nov. 1972
 (31) Convention Application No. 203 209 (32) Filed 30 Nov. 1971 in
 (33) United States of America (US)
 (44) Complete Specification published 27 Nov. 1974
 (51) International Classification G03B 17/00
 (52) Index at acceptance
 G2E A6A2
 (72) Inventor ARCHIE JAMES TUCKER, JR.



(54) MOTION PICTURE CARTRIDGES

(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 motion picture film cartridges having an anti-backup mechanism for the take-up spool for controlling reverse rotation thereof.

In our Letters Patent No. 1,096,300 there is described and claimed a motion picture film cartridge (commonly referred to as a super 8 cartridge) in which a supply roll of film is disposed about either a fixed or movable projection and the film is withdrawn from the projection along a film threading path past an exposure aperture and then wound onto a film take-up spool. If cartridges of this general type are subjected to rough handling (as may occur during shipping) there is a tendency for successive outer convolutions of the film roll to be radially displaced relative to the central axis thereof. Such a displacement, known in the art by the term "clock-spring", can be guarded against by various cartridge devices which prevent reverse film movement. These devices are known as anti-backup mechanisms.

However, it is often desirable to include capability for moving film in a reverse direction. Reverse film movement is necessary for photographing "fade, lap and dissolve" sequences. It is also desirable, for processing the film, to be able to simply withdraw exposed film in the reverse direction from the cartridge without destroying the cartridge.

In accordance with the present invention [Price 25p]

there is provided a motion picture film cartridge comprising a rotatably and slidably mounted take-up spool, a ratchet carried by the take-up spool for movement therewith, and spring means for axially urging the spool to a position in which the ratchet is engaged by a detent to prevent rotation of the spool in a film unwinding direction, the ratchet being disengaged from the detent upon axial movement of the spool, against the action of the spring means, to allow rotation of the spool in either a film take-up direction or the film unwinding direction.

In the accompanying drawings:—

Fig. 1 is a cross-sectional view of a portion of a film cartridge according to the invention showing a hub for receiving the supply roll of film and a film take-up spool, and illustrating one embodiment of the anti-backup mechanism according to the present invention in an engaged position;

Fig. 2 is a view similar to Fig. 1, but with the take-up spool in an actuated position such that the anti-backup mechanism illustrated therein is disabled;

Fig. 3 is a view of a portion of the cartridge, similar to Fig. 1, but showing an alternative embodiment of the anti-backup mechanism according to the present invention;

Fig. 4 is a section taken on the line 4-4 of Fig. 1;

Fig. 5 is a view of the take-up chamber of the cartridge shown in Fig. 3 with the take-up spool removed;

Fig. 6 is a view, partially in section and partially in elevation, of the cartridge shown in Figs. 3 and 5 showing film wound on the take-up spool and the anti-backup mechanism illustrated therein in the disabled position; and

Fig. 7 is a perspective view of a cartridge incorporating an anti-backup mechanism.

Price 33p

ism of the present invention.

Because film cartridges are well known, the present description will be directed in particular to elements forming part of, or
5 cooperating more directly with, apparatus in accordance with the present invention. It is to be understood that elements not specifically shown or described may take various forms well known to those skilled
10 in the art.

Referring to Figs. 1, 2, 4 and 7, a film cartridge 10 for a motion picture camera is of a type disclosed in the before-mentioned Letters Patent No. 1,096,300. Cartridge 10
15 has a partition 12 which has an aperture 13 therein and extends longitudinally through the cartridge for defining along with the exterior walls of the cartridge, and other walls (not shown in their entirety) a
20 film supply chamber 14 and a film take-up chamber 16 in substantially coaxial alignment with each other on opposite sides of the partition. Mounted substantially within the centre of supply chamber 14 opposite
25 to the aperture 13 is a hollow hub 18 for receiving a supply roll of film F (not shown). Rigidly secured within the centre of hub 18 is a post 20, extending upwardly through aperture 13 into take-up chamber
30 16. Post 20 is defined in the lowermost region by a circular base or pedestal portion 21 and in the uppermost region by a truncated substantially conically-shaped portion 22. Journalled on the upper end of post 20
35 for rotation in either direction and for slidable movement in the axial direction is a film take-up spool 24.

Cartridge 10 includes a film exposure aperture 23 (see Fig. 7) and film guide
40 means (also not shown). Film F is withdrawn from a roll positioned around hub 18 and advanced into communication with the exposure aperture, wherein the film is exposed for a predetermined time to light
45 from a scene, whereafter the film is guided onto take-up spool 24.

Spool 24 has at its centre and on the uppermost side thereof a hollow hub 25
50 located opposite the end of truncated portion 22 of the post to define a cavity 26 therebetween. Hub 25 is centred within an aperture 28 in a sidewall 29 of cartridge 10 and defines a cavity 30. Lugs 31 (Fig. 7) in the recess are adapted to be engaged by a
55 conventional rotatable drive member (not shown) mounted within a camera for drivingly engaging take-up spool 24 for winding or unwinding film F. Spool 24 defines on the lowermost side thereof an integral, hollow member 32 which extends
60 downwardly through aperture 13 with its lowermost portion being cylindrical and fitting snugly around pedestal member 21. This fit with member 21 serves to maintain
65 spool 24 in a substantially upright position

when the spool is moved in the axial direction for engaging and disabling an anti-back-up mechanism in accordance with the present invention.

In accordance with the present invention, 70 the anti-backup mechanism of cartridge 10 comprises, in the embodiments illustrated in the attached drawings, a ratchet assembly adapted for securing take-up spool 24 against rotation in a reverse or counter-
75 clockwise direction (as viewed from the take-up side of cartridge 10), when the cartridge is outside a camera and for permitting rotation of the spool in a reverse
80 direction when a force is applied to spool 24 in the axial direction, as described in more detail hereinafter. In the embodiments illustrated herein, the ratchet assembly includes a detent comprising an
85 elongate resilient pawl finger 34 formed integral with and disposed in the plane of partition 12 and a ratchet 36 on the take-up spool 24. Ratchet 36 is adapted to cooperate with pawl finger 34 to secure
90 spool 24 against rotation in a reverse direction when the spool is in a first axial position (Figs. 1 and 3). As seen in the attached drawings and described more completely hereinbelow, pawl finger 34 is dis-
95 posed such that when the anti-backup mechanism is in the engaged position (Figs. 1 and 3) the pawl finger engages ratchet 36, and when the anti-backup mechanism is in its disabled position (Fig. 2) the pawl
100 finger is disengaged therefrom.

In the embodiment illustrated in Figs. 1, 2, and 4, the anti-backup mechanism includes a helical spring 38 disposed within
105 cavity 26 to bias the backup mechanism toward its first (engaged) position, shown in Fig. 1, when cartridge 10 is out of a camera, and to permit axial movement of the mechanism to its second position, as
110 shown in Fig. 2, when an axial force "A" greater than the biasing force of the spring is applied to the spool in the downward
115 direction. Force "A" can be applied manually or automatically when the cartridge is operably coupled to a camera drive mechanism or when it is in a film processing
120 apparatus, for example. Secured to the top portion of post 20 is a small knob 40 that serves to centre helical spring 38 at the top of the post and to maintain the spring in an upright position.

As illustrated in Fig. 1, hollow member 32 includes a section 42 having an enlarge
125 outer diameter 43 defining ratchet 36. In a preferred embodiment, ratchet 36 comprises a plurality of teeth 44 (Fig. 4) adapted for cooperatively engaging pawl
130 finger 34 when spool 24 is in its first position. Teeth 44 are defined in the counter-clockwise direction by gradually inclined surfaces 45 and sharply inclined surfaces

46, as seen in Fig. 4. When spool 24 is in the first position and is rotated in the clockwise direction, the distance between the end of pawl finger 34 and surface 45 changes from a maximum value at one end of a tooth 44 to a zero value substantially midway along such a surface. Then pawl finger 34 flexes and follows the slope of surface 45 until the opposite end of such a tooth is reached wherein the finger member returns to its original position. Pawl finger 34 flexes radially outward to the axis of spool 24 as it follows the slope of tooth 44 and produces a minimum of resistance to the clockwise rotation of the spool. However, when spool 24 is rotated in the counterclockwise direction, sharply inclined surface 46 of a tooth impacts the ends of pawl finger 34 and the spool is secured against further rotation in the counterclockwise direction.

When spool 24 is moved downwardly to the second position (Fig. 2) by force "A", ratchet teeth 44 are no longer disposed in a plane common to partition 12 so that the spool is free to rotate in either a take-up or an unwinding direction. In this position the anti-backup mechanism is disabled since ratchet 36 and pawl finger 34 are disengaged, thereby permitting rotation of the take-up spool in either direction for filming fade, lap and dissolve sequences. Also, when a camera is operated with the ratchet assembly disengaged, the cartridge does not generate a noise signal in response to the rotation of take-up spool 24 as film F is wound thereon.

Another embodiment of an anti-backup mechanism for a film cartridge is best illustrated in Figs. 3, 5 and 6. In this embodiment, spring means in the form of one or more resilient members 50 bias the spool 24 into its first (engaged) position and allow axial movement of the spool to its second (disengaged) position. The spring means shown comprises three resilient fingers 51, each of which has one end formed integral with partition 12 and the opposite end curved upwardly into chamber 16. The outermost or free end of each finger defines a detent 52 which bears against the lowermost side of spool 24. Members 51 are distributed circumferentially about the axis of spool 24 at approximately 120° intervals, and normally they maintain the spool in the first position when the cartridge is outside the camera. However, the fingers permit slidable movement of the spool in the axial direction to a second position for disabling the anti-backup mechanism when cartridge 10 is loaded into a camera, film processor, etc. The fingers 51 eliminate the need for the separate spring 38 used in the previously described embodiment. While not shown in

Fig. 5, it is to be understood, of course, that ratchet 36 cooperates with pawl finger 34 in the manner described in connection with Figs. 1, 2 and 4.

When a force "A" is applied to spool 24 in the downward direction of a magnitude in excess of the bias force of the spring means (38 or 50) of the embodiments described herein, the spool will slide downwardly along the outer periphery of post 20 to the second position wherein the anti-backup mechanism is in a disabled position and spool 24 can be rotated freely in either direction. When such a downward force is applied, spool 24 will slide axially downwardly guided by pedestal member 21 until ratchet 36 is no longer positioned in the plane of partition 12 for engagement with pawl finger 34. When the downward force on spool 24 is released, the spool will automatically return to the first position wherein ratchet 36 is again positioned for engagement with pawl finger 34. Spool 24 is returned to the first position by the bias force of the spring means which is directed against the spool in the upward direction.

When the cartridge 10 is properly loaded into a motion picture camera (not shown) the anti-backup mechanism of the subject invention can be disabled either manually or automatically. Such a camera could be either the normal silent camera or a "sound" camera. Either type of camera can have a reversible drive mechanism for cooperatively engaging spool 24 to enable an operator to photograph "fade, lap and dissolve" sequences. Such reversible drive mechanisms are well known in the art and need not be further described herein.

When cartridge 10 is loaded into a movie camera, the camera drive mechanism normally is coupled through lugs 31 to take-up spool 24 by means of a camera drive member as is well known in the art. If automatic disengagement of the anti-backup mechanism is required, such a drive member could project or have a projection such as a drive lug, post or stud extending greater than the depth of cavity 30, so that coupling the clutch member to the spool automatically effects axial movement of the anti-backup mechanism to the second position as permitted by the spring means. In the second position, shown in Fig. 2, the ratchet assembly comprising ratchet 36 and pawl finger 34 are completely disengaged, so that when the drive mechanism is energized, spool 24 can rotate within cartridge 10 in either the forward or the reverse direction.

Utilizing a film cartridge such as cartridge 10 with the herein disclosed anti-backup mechanism with a sound-type movie camera has the advantage that when cartridge 10 is loaded into the camera, the

ratchet assembly of the anti-backup mechanism can be completely disabled so that the mechanism is prevented from generating noise signals which might be recorded by the camera sound system.

When cartridge 10 is removed from a camera, the anti-backup mechanism is automatically returned to the engaged position by the spring means so that clockspringing of the film is prevented. More specifically, the bias force exerted on spool 24 by spring means (spring 38 or resilient member 50) effects axial movement of the spool in the upward direction to the positions shown in Figs. 1 and 3, respectively. In these engaged positions, ratchet 36 intersects the plane of partition 12 and cooperatively communicates with pawl finger 34 to secure spool 24 against reverse rotation of no more than a fraction of a single revolution, whereby film clockspringing is prevented.

The anti-backup mechanism of the subject invention offers a simplified method for removing film F from cartridge 10. Normally, in order to process the film the cartridge has to be destroyed under dark-room conditions, or pawl finger 34 has to be disabled by a punch, for example as described and claimed in our copending application No. 25298/71 (Serial No. 1,293,112). In addition to the obvious disadvantage of destroying the cartridge, there is danger that the film may be damaged, such as by cartridge fragments scratching the film surface.

With the anti-backup mechanism of the subject invention, exposed film F can be removed directly from cartridge 10 through exposure aperture 23 by applying pressure to spool 24 in the downward direction. This pressure will cause spool 24 to slide to the second position wherein the anti-backup mechanism is disabled, film F can be withdrawn through the exposure aperture 23 directly from the take-up spool either manually or by suitable apparatus and fed into the film processor.

WHAT WE CLAIM IS:—

1. A motion picture film cartridge comprising a rotatably and slidably mounted take-up spool, a ratchet carried by the

take-up spool for movement therewith, and spring means for axially urging the spool to a position in which the ratchet is engaged by a detent to prevent rotation of the spool in a film unwinding direction, the ratchet being disengaged from the detent upon axial movement of the spool, against the action of the spring means, to allow rotation of the spool in either a film take-up direction or the film unwinding direction.

2. A motion picture film cartridge according to Claim 1, including a housing having a partition defining a supply chamber and a take-up chamber, the detent comprising an elongate flexible member integral with the partition.

3. A motion picture film cartridge according to Claim 2 wherein the partition has an aperture through which a portion of the take-up spool projects, and the ratchet comprises at least one finger rigidly secured to said portion of the take-up spool for rotation therewith.

4. A motion picture film cartridge according to Claim 2 or 3, wherein the take-up spool has a portion which is disposed within the take-up chamber and is accessible from the exterior of the cartridge housing for axial movement of the take-up spool to disengage the ratchet from the detent.

5. A motion picture film cartridge according to any one of the preceding claims, wherein the spring means comprises a helical spring.

6. A motion picture film cartridge according to any one of the preceding Claims 2 to 4, wherein the spring means comprises a plurality of resilient fingers distributed about the axis of the take-up spool, each of said fingers having one end portion integral with the partition and having a detent portion resiliently bearing against the take-up spool.

7. Motion picture film cartridges according to Claim 1, constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

L. A. TRANGMAR, BSc, CPA.
Agent for the Applicants.



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