

PATENT SPECIFICATION

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 (72) Inventor ARCHIE JAMES TUCKER



(54) CARTRIDGES FOR STRIP MATERIAL

(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 strip cartridges for use with film or other strip material having an anti-backup device for preventing "clockspringing" of the strip in the cartridge due to reverse rotation of a take-up core.

In certain types of film cartridges, such as described in our Letters Patents Nos. 1,031,930 and 1,096,300 (commonly known as "super 8" cartridges), film wound around the take-up core can "clockspring." Clockspringing refers to a partial loosening of successive coils of a film roll that results in a loose roll of film. Clockspringing of the film in the cartridge can be avoided by securing the take-up core against the rotation when the cartridge is out of the camera. This is desirable since it is known that such clockspringing can adversely affect operation of the cartridge in the camera. In order to prevent the occurrence of clockspringing, an anti-backup device usually is employed. However, because of the "clicking" noise made by the device during operation, it is desirable that the device be disengaged when the cartridge is within the camera. This is especially important when filming is accompanied by recording of sound because this noise may be picked up by the sound apparatus of the camera. Also, disengagement of the anti-backup device permits a "fade, lap and dissolve" type of filming operation in specialized cameras.

In accordance with the present invention there is provided a strip cartridge (for film

or other strip material) having a take-up core and an anti-backup device comprising a ratchet on an inner surface of the take-up core and a fork-like control member mounted for movement relative to the core and having spaced flexible arms which in one position of the control member engage the ratchet to prevent rotation of the core in an unwinding direction whilst allowing rotation in a take-up direction and in a second position of the control member are disengaged from the ratchet to allow rotation of the core in either direction.

In the accompanying drawings:—

Fig. 1 is a fragmentary cross-section through a super 8 type film cartridge incorporating an anti-backup device constructed according to one form of the present invention and showing a fork-like control member of the anti-backup device positioned within the core post in its ratchet engaging position;

Fig. 2 is a section, to an enlarged scale, taken on the line 2-2 of Fig. 1;

Fig. 3 is a similar view to Fig. 1 but showing the control member in its ratchet disengaging position within the core post;

Fig. 4 is a section, to an enlarged scale taken on the line 4-4 of Fig. 3, but with the control member omitted to more clearly illustrate certain structures;

Fig 5 is an isometric view, to an enlarged scale, of the control member shown in Figs. 1 and 3; and

Fig. 6 is a perspective view of the inside of part of a loaded film cartridge as viewed from the film take-up side (the cartridge cover being omitted), and showing the position of the film take-up core within the film cartridge.

As shown in Fig. 6, a film take-up core 14 (on which film 20 is wound after it is exposed) is positioned in a "super 8" film cartridge generally designated 24. The film cartridge 24 may be, for example, 90

generally similar to those disclosed in our Letters Patents Nos. 1,031,930 and 1,096,300. In order to avoid unnecessary lengthening of this specification and complication of the drawings, and since a description of the cartridge may be found in the above-cited patents, the following description will be directed primarily to the back-up device of the present invention.

The illustrated preferred embodiment of the invention includes a fork-like member 10 located within a core post 12 and aligned therein in a manner explained more fully hereinafter. A series of three circumferentially spaced ratchet surfaces 14a, 14b, and 14c (Fig. 2) are formed in the inner surface of the hollow take-up core 14. These three surfaces extend generally radially so that they are engageable with portions of control member 10 as the core 14 rotates in a reverse direction. Surfaces 14a-c are separated by arcuate ramp surfaces 14d-f.

The fork-like control member 10 is shown in detail in Fig. 5 and, as illustrated, comprises a generally rectangular body portion 10a and a pair of flexible, substantially parallel elongated arms 10b and 10c that are integral with and extend from one end of the body portion 10a in spaced relation to each other. The free end portions of the arms (i.e., the end portions remote from body portion 10a) are enlarged to form head portions having bevelled surfaces 10d and 10e, that are adapted to cooperate with portions of the post 12 as hereinafter explained. Guide portions 10f and 10g of the control member are integrally formed with the body portion 10a and comprise short, finger-like members that project from the end of the body portion in a direction opposite from the arms 10b and 10c. The guide portions 10f and 10g include outwardly projecting, part-cylindrical flange portions 10f' and 10g' that extend beyond opposite side edges of the body portion 10a. During insertion of the control member 10 into the core post 12, these cylindrical portions 10f' and 10g' engage and slide along surfaces 16a and 16b of a generally rectangular slot 16 in the core post 12 so as to guide the control member 10 through the slot 16. The guide portions 10f and 10g are flexible and in their normal (unflexed) state their outermost cylindrical portions 10f' and 10g' are spaced apart by a distance slightly greater than the width of the slot 16. As a result, the guide portions of 10f and 10g are flexed inwardly as they travel through the slot 16. As shown in Figures 1, 3 and 4, the slot 16 extends from the upper end of the post 12 to an enlarged generally cylindrical cavity 16c, thereby forming a ledge or shoulder 16d. When the control member 10 is inserted into the positions shown in Figures 1-3 the cylindri-

cal flange portions 10f' and 10g' snap outwardly into the cavity 16c. If the control member 10 is then moved upward (as viewed in Figures 1-3) in a direction toward the open end of the core post 12, the portions 10f' and 10g' engage the shoulder 16d and prevent the control member 10 from being inadvertently withdrawn through the slot 16. The core post 12 preferably includes a stop member 17 (Figures 1, 3 and 75) which extends across the cavity 16c and is spaced from shoulder 16d by a distance which permits the normal range of movement of the control member 10 from its Figure 1 position to its Figure 3 position. However, the stop member 17 does limit movement of the control member 10 downwardly beyond its Fig. 3 position and thereby prevents the control member from being accidentally pushed too far through the slot 16. Thus member 17 and shoulder 16d each comprise stop means for limiting movement of the control member in one direction. The body portion 10a and slot 16 are shaped and dimensioned with respect to one another so that the body portion can be moved up and down in the slot along the axis of post 12, but cannot rotate with respect to slot 16. This cooperation also prevents rotation of control member 10 with the take-up core 14 during winding of film onto the core.

The free end portions of arm 10b and 10c have surfaces 10h that cooperate with ratchet surfaces 14a, 14b and 14c when the anti-backup device is engaged. The head portions of the arms also have generally cylindrical edge surfaces 10i adapted to slide along the ramp portions 14d-f of the ratchet surfaces on take-up core 14. Surfaces 10d and 10e, alone or together with surfaces 10i, serve to space the arms 10b, 10c, respectively, from slot surfaces 16a and 16b so that the arms can flex in operation as as hereinafter described. As the member 10 is inserted into slot 16 in core post 12 through the open, upper end of the slot (as viewed in Figs. 1 and 3), the arms are cammed inwardly toward each other slightly as bevelled surfaces 10d, 10e engage and then pass through the edge of the opening in core post 12. Because of this deflection of the arms and the flexible nature of the arms, the free end portions of the arms are urged outwardly (away from each other).

As shown in Figs. 1 and 3, the upper end of core post 12 terminates short of the upper end of the hollow portion of take-up core 14. As illustrated, this results from the cooperating shapes of the exterior surface of core post 12 and core 14 and the relative dimensions of these parts. The ratchet surfaces 14a-f are in the area of the take-up core 14 located between the

upper edge of the core and the upper edge of core post 12 so that the ratchet surfaces are engageable by the surfaces 10*h* and 10*i* when the control member 10 is located as shown in Figs. 1 and 2. The upper end portion of the core post 12 is tapered as shown at 12*a* and 12*b* in Figs. 1, 3 and 4 to facilitate inward flexing of arms 10*b* and 10*c* as control member 10 is moved from its Fig. 1 position to its Fig. 3 position.

Engaged and disengaged positions of the control member 10 relative to the ratchet surfaces of the take-up core 14 are shown in Figs. 1-3. In the engaged position, shown in Figs. 1 and 2, the arms 10*b* and 10*c* are positioned so that the surfaces 10*h* on the free end portions thereof are engageable with any one of the ratchet surfaces 14*a*, 14*b* and 14*c* to secure the take-up core 14 against any significant rotation in a reverse direction (a counter clockwise direction as viewed in Fig. 2). In the position illustrated in Figs. 1 and 2, ratchet surface 14*a* is engaged by surface 10*h* of arm 10*c*. Once one of the ratchet surfaces 14*a-c* is engaged with a surface 10*h*, the take-up core 14 is secured against rotation in the reverse direction. When the take-up core 14 is rotated in a forward or clockwise direction (shown by the arrow in Fig. 2), the cam surfaces 14*a*, 14*b* and 14*c* are not engaged by arms 10*b* and 10*c*, and the surfaces 10 of arms 10*b* and 10*c* merely slide substantially unimpeded along the arcuate ramp surfaces 14*d-f* as the core 14 rotates. Hence, the take-up core 14 can rotate freely in the forward direction but is secured against substantial rotation in the reverse direction. As is well known in the art, the core 14 can be rotated in a camera, etc. by means of a drive (not shown) that can be coupled to lugs 26 (Fig. 6) on core 14.

As the take-up core 14 rotates in the forward direction, the relative movement between the ratchet surfaces 14*a-f* and the arms 10*b* and 10*c* gives rise to a "clicking" sound, caused by the arms 10*b* and 10*c* snapping outwardly as they pass from the end of one arcuate ramp surface to the next ramp surface. In accordance with an important feature of the invention, the control member 10 can be disengaged if desired as, for example, during filming when sound is simultaneously being recorded and it is possible for the "clicking" sound to be recorded, for removal of film from the cartridge for processing, for fade, lap and dissolve filming sequences, etc.

As shown in Fig. 3, this may be accomplished by means of a disengaging bar or pin 18, which can be part of a camera, processing apparatus, etc. The bar is activated (moved downwardly) either manually by an operator or automatically when the cartridge 24 is within the camera or other

apparatus. The disengaging bar 18 is positioned and dimensioned so that it can pass through an opening 14*g* in core 14 and come into contact with and push against the arms 10*b* and 10*c* of the control member 10. The disengaging bar 18, when thus activated, presses against arms 10*b* and 10*c* forcing the control member 10 downward within slot 16 into its disengaged position shown in Fig. 3 wherein it is fully retracted into the slot 16. As the control member 10 moves downwardly, bevelled core portions 12*a*, 12*b* are engaged by the bevelled surfaces 10*d*, 10*e* of the control member 10 to flex the arms 10*b* and 10*c* inwardly. The bar must exert sufficient force to overcome the upward component of force resulting from the inward deflection of the flexible arms of the control member by core portions 12*a* and 12*b*. When the pressure exerted by bar 18 is removed, this upward force causes the control member 10 to "spring" back into its normal engaged position shown in Fig. 1. In the disengaged (Fig. 3) position, the disengaging bar 18 removes the control member from contact with the ratchet surfaces on core 14, thereby allowing free rotation of the core 14 both in the forward and reverse direction, and eliminating any "clicking" noise associated with the anti-backup device. Penetration of the bar into the cartridge is limited by the upper end 12*c* of the post 12.

WHAT WE CLAIM IS:—

1. A strip cartridge (for film or other strip material) having a take-up core and an anti-backup device comprising a ratchet on an inner surface of the take-up core and a fork-like control member mounted for movement relative to the core and having spaced flexible arms which in one position of the control member engage the ratchet to prevent rotation of the core in an unwinding direction whilst allowing rotation in a take-up direction and in a second position of the control member are disengaged from the ratchet to allow rotation of the core in either direction.

2. A strip cartridge according to Claim 1, wherein the core is rotatably mounted on a post having an axially extending slot open at one end thereof and in which the control member is slidably and non-rotatably mounted and the ratchet bearing portion of the take-up core is located beyond the open end of the post.

3. A strip cartridge according to Claim 2, wherein the arms are fully retracted into the slot when the control member is in its ratchet disengaging position, the end of the slot at its opening into the post has bevelled surfaces, and the arms have bevelled portions which cooperate with the bevelled surfaces of the slot to effect in-



upper edge of the core and the upper edge of core post 12 so that the ratchet surfaces are engageable by the surfaces 10h and 10i when the control member 10 is located as shown in Figs. 1 and 2. The upper end portion of the core post 12 is tapered as shown at 12a and 12b in Figs. 1, 3 and 4 to facilitate inward flexing of arms 10b and 10c as control member 10 is moved from its Fig. 1 position to its Fig. 3 position.

Engaged and disengaged positions of the control member 10 relative to the ratchet surfaces of the take-up core 14 are shown in Figs. 1-3. In the engaged position, shown in Figs. 1 and 2, the arms 10b and 10c are positioned so that the surfaces 10h on the free end portions thereof are engageable with any one of the ratchet surfaces 14a, 14b and 14c to secure the take-up core 14 against any significant rotation in a reverse direction (a counter clockwise direction as viewed in Fig. 2). In the position illustrated in Figs. 1 and 2, ratchet surface 14a is engaged by surface 10h of arm 10c. Once one of the ratchet surfaces 14a-c is engaged with a surface 10h, the take-up core 14 is secured against rotation in the reverse direction. When the take-up core 14 is rotated in a forward or clockwise direction (shown by the arrow in Fig. 2), the cam surfaces 14a, 14b and 14c are not engaged by arms 10b and 10c, and the surfaces 10 of arms 10b and 10c merely slide substantially unimpeded along the arcuate ramp surfaces 14d-f as the core 14 rotates. Hence, the take-up core 14 can rotate freely in the forward direction but is secured against substantial rotation in the reverse direction. As is well known in the art, the core 14 can be rotated in a camera, etc. by means of a drive (not shown) that can be coupled to lugs 26 (Fig. 6) on core 14.

As the take-up core 14 rotates in the forward direction, the relative movement between the ratchet surfaces 14a-f and the arms 10b and 10c gives rise to a "clicking" sound, caused by the arms 10b and 10c snapping outwardly as they pass from the end of one arcuate ramp surface to the next ramp surface. In accordance with an important feature of the invention, the control member 10 can be disengaged if desired as, for example, during filming when sound is simultaneously being recorded and it is possible for the "clicking" sound to be recorded, for removal of film from the cartridge for processing, for fade, lap and dissolve filming sequences, etc.

As shown in Fig. 3, this may be accomplished by means of a disengaging bar or pin 18, which can be part of a camera, processing apparatus, etc. The bar is activated (moved downwardly) either manually by an operator or automatically when the cartridge 24 is within the camera or other

apparatus. The disengaging bar 18 is positioned and dimensioned so that it can pass through an opening 14g in core 14 and come into contact with and push against the arms 10b and 10c of the control member 10. The disengaging bar 18, when thus activated, presses against arms 10b and 10c forcing the control member 10 downward within slot 16 into its disengaged position shown in Fig. 3 wherein it is fully retracted into the slot 16. As the control member 10 moves downwardly, bevelled core portions 12a, 12b are engaged by the bevelled surfaces 10d, 10e of the control member 10 to flex the arms 10b and 10c inwardly. The bar must exert sufficient force to overcome the upward component of force resulting from the inward deflection of the flexible arms of the control member by core portions 12a and 12b. When the pressure exerted by bar 18 is removed, this upward force causes the control member 10 to "spring" back into its normal engaged position shown in Fig. 1. In the disengaged (Fig. 3) position, the disengaging bar 18 removes the control member from contact with the ratchet surfaces on core 14, thereby allowing free rotation of the core 14 both in the forward and reverse direction, and eliminating any "clicking" noise associated with the anti-backup device. Penetration of the bar into the cartridge is limited by the upper end 12c of the post 12.

WHAT WE CLAIM IS:—

1. A strip cartridge (for film or other strip material) having a take-up core and an anti-backup device comprising a ratchet on an inner surface of the take-up core and a fork-like control member mounted for movement relative to the core and having spaced flexible arms which in one position of the control member engage the ratchet to prevent rotation of the core in an unwinding direction whilst allowing rotation in a take-up direction and in a second position of the control member are disengaged from the ratchet to allow rotation of the core in either direction.

2. A strip cartridge according to Claim 1, wherein the core is rotatably mounted on a post having an axially extending slot open at one end thereof and in which the control member is slidably and non-rotatably mounted and the ratchet bearing portion of the take-up core is located beyond the open end of the post.

3. A strip cartridge according to Claim 2, wherein the arms are fully retracted into the slot when the control member is in its ratchet disengaging position, the end of the slot at its opening into the post has bevelled surfaces, and the arms have bevelled portions which cooperate with the bevelled surfaces of the slot to effect in-



ward flexing of the arms when the control member is moved from its ratchet engaging position to its ratchet disengagng position.

- 5 4. A strip cartridge according to Claim 2 or 3, wherein the ratchet comprises a plurality of arcuate ramp surfaces located around the inner surface of the take-up core and forming therebetween a plurality of generally radially extending surfaces engageable by the arms.

- 10 5. A strip cartridge according to Claim 2, 3 or 4, including stop means disposed in the post relative to the control member for limiting movement of the control member relative to the post.

6. A strip cartridge according to Claim 5, wherein the stop means comprises a shoulder in the post at the end of the slot

remote from the open end thereof and the control member includes means engageable with the shoulder for limiting movement of the control member in a direction from the shoulder toward the open end of the post. 20

7. A strip cartridge according to Claim 5 or 6, wherein the stop means comprises a stop member located in the slot along the path of movement of the control member to limit movement of the control member into the slot. 25

8. A strip cartridge having disengageable anti-backup means substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings. 30

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