

PATENT SPECIFICATION (11)

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(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 cartridges for handling flexible strip material such as motion picture film or magnetic tape, and in which a strip is moved from a supply chamber to a take-up means, such cartridges hereinafter being referred to generically as strip cartridges.

In our Letters Patent No. 1,096,300 there is described and claimed a motion picture cartridge in which film in a coreless roll is positioned in the supply chamber of the cartridge and is freely rotatable about the supply boss located therein. During operation of the cartridge in a camera, the film moves along a predetermined path through the cartridge, the path leading from the supply chamber, past an exposure aperture and into a film take-up chamber. Movement of film in the cartridge in any manner other than along the desired, predetermined path can be detrimental to the operation of the cartridge.

Films having a relatively thin base or overall web thickness have been developed in recent years. Attempts to use such thinner and highly flexible films in film cartridges have resulted in problems with film movement not previously envisaged. When the thinner and more flexible films are wound into a coreless roll and placed in a cartridge such as disclosed in aforesaid Letters Patent, the convolutions of the film tend to collapse. Also, impact forces tend to cause distortion of the roll of film and cause the roll to collapse radially inwardly and bulge radially outwardly so that it assumes a generally elliptical shape. Such movement or collapsing of film can result in the film cinching

upon the supply boss in the supply chamber or result in passage of the film into open areas of the cartridge. If the film were allowed to freely collapse or otherwise move about the cartridge in such a manner, excessive frictional forces could result, thereby causing unsteady film registration in the exposure aperture or otherwise causing erratic operation of the cartridge or camera which receives the cartridge.

Letters Patent No. 1,096,300 discloses an anti-friction disk which serves to confine the outer convolutions of a supply roll to a fixed diameter so that those convolutions do not "clockspring", i.e., displace radially outwardly, into contact with the walls of the supply chamber. Also, a lip extends from the inner portion of the anti-friction disk to prevent the inner convolutions from collapsing or otherwise contacting the supply boss in the supply chamber. Though adequate for preventing the inner convolutions of a roll of thicker base film from being displaced, experience has indicated that thin base films can collapse over such a lip and contact the supply post. Additionally, this inner lip is supported by the supply boss about which the disk rotates. In our Application Serial No. 1,293,112 there is described and claimed a cartridge in which the supply boss includes a cut-away portion in the area where the boss normally would support the lip. Without support being given by the supply boss to any portion of the lip existing in the area of the cut-away, the film can deflect the lip upon impact, thereby allowing the film to pass over the lip and collapse around the supply post. Any film passing over the lip in this manner would then be free to pass into the open cut-away area of the supply post and become compacted therein.

It is also suggested in Letters Patent No. 1,096,300 that the supply boss could include a freely rotatable member upon which the innermost convolutions of film may cinch. While this alternative is a viable one for supporting thin base films, the additional costs

[Price 33p]

for manufacturing and insert such members in the assembled cartridge and the additional inventory required for such members reduces the desirability of using this alternative.

In accordance with the present invention there is provided a strip cartridge comprising a stationary boss projecting from a wall of a supply chamber, the outer surface of the boss having a substantially cylindrical portion adjacent said wall and terminating in a frusto-conical portion having its end of smaller diameter remote from said wall, and the cylindrical and frusto-conical portions having an opening extending along a portion of the boss, and a disk rotatably mounted on the boss for receiving a supply roll of strip material disposed coaxially of the boss, wherein the disk includes a hub which projects through the inner convolution of a received roll and terminates in a reinforced rim which extends radially inwardly of the hub to avoid radially inward displacement of the received roll.

One form of the present invention will now be described as applied to a film cartridge and with reference to the accompanying drawings, in which:

Fig. 1 is a section through a film cartridge showing the film supply side of the cartridge with certain parts broken away; and

Fig. 2 is an exploded perspective view of portions of a film cartridge showing a stationary supply boss and an anti-friction disk constructed in accordance with the preferred embodiment of the invention.

Referring now to the drawings, Figure 1 shows a film cartridge generally designated 10 comprising a body 12 and a cover 14. Body 12 includes a cylindrical film supply chamber 28 and a cylindrical take-up chamber partially shown at 30 separated by a wall 32. The chambers are at opposite sides of the body substantially in coaxial alignment with each other. A stationary locating boss 36 is formed integral with wall 32 substantially at its centre and projects into the supply chamber 28. The locating boss 36 has a generally cylindrical bearing surface 162 projecting from wall 32 and a frusto-conical end portion 163 which tapers radially inwardly from portion 162 toward cover 14. An opening 164 extends through the locating boss as described and claimed in our Patent Application Serial No. 1,293,112. The locating boss 36 and the supply and take-up chambers all have a common axis X.

A flexible, substantially annular, anti-friction disk 38 comprises a flat tray 4, a lip 42 extending substantially perpendicular to the plane of and around the outer circumference of tray 40, and an outwardly turned rim 43 as described and claimed in British Patent No. 1,096,300. According to the illustrated embodiment of the present invention the inner periphery of disk 38 comprises

an integral, substantially cylindrical hub 145 and a rim 147. The hub 145 is substantially perpendicular to tray 40 and projects from the same side of the tray as the lip 42 by a distance substantially equal to, and preferably only slightly less than, the width of a film roll 44 to be placed in the supply chamber. Rim 147 projects radially inwardly from the end of the hub 145 remote from tray 40. The inner diameter of the rim 147 is smaller than the diameter of bearing surface 162 of the locating boss but is larger than the free end of the frusto-conical end portion 163 of the locating boss 36.

Anti-friction disk 38 is coaxially located over boss 36 for rotation thereabout in a plane substantially perpendicular to the axis X of boss 36. Disk 38 is supported in this position by bearing surface 162 on locating boss 36 which is slidably contacted by the portion of hub 145 nearest the tray 40. As is apparent from Fig. 1, this leaves the rim portion 147 and the part of the hub 145 remote from the tray portion 40 unsupported by bearing surface 162. Because rim 147 is not supported by locating boss 36, and in view of the tendency of rolls of relatively thin, highly flexible films to collapse or cinch around the boss 36, rim 147 is substantially rigid so that it supports the film roll.

The rim 147 can be made rigid by suitable reinforcing means, and in the preferred embodiment illustrated the reinforcing means comprises a metal ring approximately .015 inches thick. The ring can be vacuum formed into the anti-friction disk so that it is, in effect an integral part thereof. Alternatively, the disk and ring can be separately formed and assembled by pressing the ring into a seat in the cylindrical hub 145. Rim 147 is sufficiently rigid to support coreless film supply 44 and prevent the inner convolutions from deflecting or collapsing the hub 145 upon impact. This also prevents the film from passing over or from cinching upon boss 36 and from collapsing into opening 164. It should be noted that disk 38 is purposefully very thin and quite flexible except in the area of rim 147, and that the rim 147 together with the portion of the hub 145 positioned over surface 162 provides good firm support for the film roll throughout its width.

A film roll 44 is placed in supply chamber 28 coaxially with boss 36 so that one spirally wound edge of the film is positioned against the tray 40 of disk 38, and its other spirally wound edge lies in a plane substantially parallel to and closely adjacent to the inner wall of cover 14. By means of this positioning, the spirally wound convolutions of the film roll are prevented from being displaced axially of the roll relative

to one another by an amount which might cause jamming of the film within the supply chamber 28. Lip 42 of disk 38 will overhang the marginal portion of the radially outer convolution of the coiled film 44 and normally prevent the outermost flat surface thereof from excessively engaging the peripheral wall of supply chamber 28 during rotation of the film roll. Similarly hub 145 will prevent the innermost convolutions of roll 44 from crushing, collapsing, passing into opening 164 of the cartridge, or cinching around boss 36, any of which conditions would restrict free rotation of the film roll as the film is withdrawn from supply chamber 28.

The anti-friction disk 38, as disclosed, substantially confines the film roll 44 and isolates it from direct engagement with all stationary parts of the supply chamber except the cover. The outer convolution of the film is restrained from clockspringing by lip 42 and hub 145 prevents radially inward displacement of the inner convolution of film. Thus the anti-friction disk prevents the film from being displaced in an undesirable manner and thereby subjected to a frictional drag which would impede the film claw from readily pulling film from the film roll.

WHAT WE CLAIM IS:—

1. A strip cartridge comprising a sta-

tionary boss projecting from a wall of a supply chamber, the outer surface of the boss having a substantially cylindrical portion adjacent said wall and terminating in a frusto-conical portion having its end of smaller diameter remote from said wall, and the cylindrical and frusto-conical portions having an opening extending along a portion of the boss, and a disk rotatably mounted on the boss for receiving a supply roll of strip material disposed coaxially of the boss, wherein the disk includes a hub which projects through the inner convolution of a received roll and terminates in a reinforced rim which extends radially inwardly of the hub to avoid radially inward displacement of the received roll.

2. A strip cartridge according to Claim 1, wherein the reinforced rim comprises a separate ring attached to the hub at the end thereof remote from the disk, the inner diameter of the ring being smaller than the diameter of the cylindrical portion of the boss but larger in diameter than the frusto-conical portion of the boss that is located radially inwardly of the ring.

3. A strip cartridge according to Claim 1, constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawing.

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