

PATENT SPECIFICATION

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DRAWINGS ATTACHED



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(54) MOTION PICTURE PROJECTOR

(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:—

This invention relates to motion picture projectors constructed to receive cartridges which enclose reels containing strip material.

This patent application is divided from Patent Application No. 55782/68 (Serial No. 1,261,525) which discloses and claims cartridges which can be received on the projector disclosed and claimed herein.

According to the present invention there is provided a motion picture projector having means for mounting in a predetermined position thereon a cartridge containing a reel of motion picture film, and having a spindle on which the reel within the mounted cartridge may be supported for rotation about a predetermined axis, the spindle being axially retractable from its reel-supporting extended position to permit the cartridge to be moved to and from the predetermined position in a direction transverse to the predetermined axis.

Also, according to the present invention there is provided a motion picture projector arranged to mount in a predetermined position against a surface thereof a cartridge containing a reel of motion picture film, comprising means defining a chamber in conjunction with the said surface for receiving the cartridge in the predetermined position, a spindle which is extendable into the chamber to support the reel within the mounted cartridge for rotation about a predetermined axis, the chamber being open at one end to permit the cartridge to be

inserted in the chamber by movement transversely to the predetermined axis and the chamber having a slot at its opposite end to permit film stripping means to extend into the chamber and into a cartridge therein, and means mounting the spindle for movement between an extended position in the chamber and a retracted position in which it permits the cartridge to be moved into and out of the chamber.

A construction of motion picture projector in accordance with the present invention, and cartridges therefor, will now be described by way of example with reference to the accompanying drawings in which:—

Fig. 1 is a perspective view of a cartridge and a portion of a projector which co-operates with the cartridge to locate and support the latter on the projector;

Fig. 2 is an enlarged fragmentary perspective of part of the cartridge locating structure;

Fig. 3 is a view showing part of the projector structure.

Referring to the drawings, a cartridge 1 comprises two separate cartridge halves or parts 3 and 5. Located in the cartridge is a reel 23 which comprises a hub 25 and a pair of spaced, generally parallel annular flanges. A length of motion picture film, is wound on hub 25 between the flanges. The lower portion of the cartridge is slotted to provide access for means for stripping film from reel 23. The film stripping means may be as described in Patent Application No. 55365/68 (Serial No. 1,254,705). The reel 27 fits loosely within the substantially cylindrical chamber formed in the cartridge parts so that the reel is free to rotate with respect to the cartridge during unwinding and rewinding of the film on the reel.

Means are provided on the cartridge for accurately locating the cartridge on a plate 125 of the projector. This locating means

comprises a pair of spaced and generally parallel ribs 101 and 103. The ribs extend from the lower edge 105 upwardly to the upper edges 53a and 53b respectively of cartridge part 5. These ribs are joined by a transverse rib 107 which projects from wall 37. There are four openings 109, 111, 113 and 115 through wall 37 near the upper ends and lower ends of the ribs 101 and 103 and at the outer side of the ribs. The ribs are preferably generally channel shaped except at the upper and lower edges where inclined chamfered surfaces slope inwardly toward the adjacent one of the openings 109, 111, 113 and 115.

The drawings show the mounting structure on the projector and on the cartridge, the cartridge being moved downwardly along face 125 into its mounted position. In order to accommodate the required movement of the cartridge, the spindle is made retractable with respect to plate 125. Fig. 3 illustrates one of the various ways in which this movement of the spindle may be effected. As shown, the spindle 181 is carried by a pair of bearings 183 and 185 which allow the desired axial movement of the spindle. The spindle is driven by a belt (not shown) trained around a pulley 187 surrounding the spindle. The pulley is carried by a sleeve 189 that is fixed to the spindle by a key (not shown) seated in an axial slot 191 in the spindle surface. This arrangement permits axial movement of the spindle with respect to the spindle driving mechanism.

A slotted plate 193 is mounted for sliding movement on a pair of pins 195 in a direction substantially parallel to the axis of spindle 181. A flange 197 on the plate 193 projects upwardly through the cartridge housing so that it can be manually moved to the left as viewed in Fig. 3. The plate is biased to the position shown in Fig. 3 by a tension spring 199 stretched between the plate and wall 125 of the projector. A finger 201 depending from plate 193 is received between a pair of collars 203 and 205 fixed to the spindle. Thus, movement of the flange 197 to the left produces axial movement of the spindle to the left through bearings 183 and 185 for retracting the outermost end of the spindle into the projector. The spindle is held in its retracted position by engagement between the collar 205 and a shoulder 207 on a latch member 209. The latch is pivoted at 211. Member 209 is biased into its latching position by a compression spring 213 and is moved about its pivot into an unlatched position by a linkage member 215. Link 215 is connected to the latch member and to a release lever 217, the latter being pivoted at 219. A portion of the release lever projects through plate 125 where it is engageable

by the cartridge as the cartridge reaches the end of its vertical travel during mounting of the cartridge onto the projector. Downward pressure by the cartridge against the outer end of release lever 217 pulls the linkage 215 downwardly, thereby swinging latch member 209 about its pivot until the collar 205 is disengaged from shoulder 207. The spindle is then returned to its extended position by the biasing force of spring 199. Thus, the lever 217 senses the presence of a cartridge on the projector and effects extension of the spindle in response to the positioning of a cartridge on the projector. The spindle is preferably frustoconical in shape at its outer end as shown at 221 to facilitate insertion of the spindle through the reel in the cartridge.

Referring now to Fig. 1, the projector has a chamber 222 which receives a cartridge through its open top. A slot 224 permits film stripping means to enter a cartridge in the chamber. The cartridge mounting structure on the projector comprises a pair of spaced, generally parallel vertically extending rails 223 and 225 forming a substantially channel-shaped recess 227. Two similar rails 229 and 231 form a channel-shaped recess 232, the latter being substantially parallel to recess 227. Both recesses are open at their top and they guide the cartridge into place along the face of the projector plate 125 and establish the position of the cartridge on the projector.

Vertical positioning of the cartridge is determined by three latching and locating members 233, 235 and 237. Members 233 and 235 are positioned laterally outwardly from rails 233 and 231, respectively near bar 143. Latch members 233 and 235 have notches 233a and 235a which receive the lower portion of cartridge wall 37 at openings 115 and 111, respectively. The upper part of each of latch members 233 and 235 abuts the outer surface of wall 37 to prevent outward movement of the cartridge away from the projector plate.

The latch member 237 is preferably formed in the upper end of rail 229 by providing a notch 237a on the rail. This notch is adapted to receive a portion of the cartridge rib 107. As shown in Fig. 2, the rib 107 is preferably undercut to form a downwardly opening recess 239 which receives the upper end of the latch member 237. This interlocking arrangement prevents outward movement of the upper portion of cartridge part 5. The relative dimensions between notch 237a and the recess 239 is preferably such that the lower edge 240 of rib 107 is seated at the bottom of the notch when the cartridge is in the desired vertical position. The latch members 233, 235 and 237 jointly locate the cartridge and the reel therein in the desired vertical plane sub-

stantially parallel to the outer face of projector plate 125. While the mounting structure on the projector has been described in terms of a single cartridge mounted on a single plate 125, it will be understood that a plurality of cartridges can be accommodated on the projector or a cartridge carrier by providing the described mounting structure on a series of plates each pair of which is spaced apart sufficiently to accommodate a cartridge therebetween.

Preferably, a retaining latch is provided for avoiding inadvertent upward or vertical movement of the cartridge along the surface of plate 125. Two constructions of such retaining structures are shown in Fig. 1. These comprise a curved lever arm 241 which is pivoted at 243 intermediate its ends. A lower end of the arm 241 projects through a window 245 in plate 125 and it is adapted to engage cartridge part 3 immediately above the rib 107 of the cartridge. The lower end of this arm is biased toward the cartridge by a tension spring 247 connected to the lever arm beneath the pivot 243. The upper end of the arm projects through an opening 249 in the projector housing. The lever arm is withdrawn from the opening for removal of the cartridge by finger pressure directed against the upper end of the lever.

As an alternative to the retaining structure just described, or in addition to such structure, the cartridge may be held in its mounted position by a latching member 251 pivoted at 253 intermediate its ends. One end of the lever has an offset latch portion 255 which projects through a window 257 in plate 125 and is adapted to be received within an opening 109 in cartridge part 5. The latch member is biased toward the opening by compression spring 259 which bears against the lever 251 between pivot 253 and latch member 255. The other end of member 251 projects from the projector housing. The latch portion 255 is withdrawn from the opening by finger pressure directed against the projecting end of the lever.

During assembly of the cartridge on the projector structure shown in Fig. 1, the spindle is first retracted by exerting finger pressure against flange 197. Flange 197 can be released after collar 205 clears shoulder 207 on latch member 209. Then the cartridge is placed above rails 223, 225, 229 and 231 with the cartridge ribs 101 and 103 aligned with the recesses 232 and 227, respectively. Then the cartridge is moved downwardly along the face of plate 125 until the lower edges of the cartridge are received within notches 233a and 235a and the upwardly projecting portion of latch 237 is received within the recess 239 on latch 107 with rib portion 240 seated on the

bottom of notch 237a. As this movement occurs, the lower end of retaining latch arm 241 and/or the retaining latch member 255 is retracted through plate 125 against their respective biasing forces. When the cartridge is properly located, the lower end of latch member 241 and/or the latch member 255 return to their normal latching position where they prevent inadvertent or accidental upward movement of the cartridge relative to the projector. As the cartridge reaches its lowermost position, its lower edge 105 engages release lever 217 to pull the latch member 209 downwardly, thus releasing the spindle and spring 199 returns the spindle to its normal extended position. Extension of the spindle is limited by engagement of a pin 195 with the end of the slot in plate 193.

Having regard to the provisions of Section 9 of the Patents Act, attention is directed to the claims of Application No. 37499/71 (Serial No. 1,261,527).

WHAT WE CLAIM IS:—

1. A motion picture projector having means for mounting in a predetermined position thereon a cartridge containing a reel of motion picture film, and having a spindle on which the reel within the mounted cartridge may be supported for rotation about a predetermined axis, the spindle being axially retractable from its reel-supporting extended position to permit the cartridge to be moved to and from the predetermined position in a direction transverse to the predetermined axis.
2. A projector as claimed in Claim 1, including means for defining a chamber for receiving the cartridge in the predetermined position and which is open at one end to permit a cartridge to be moved transversely of the predetermined axis from the predetermined position.
3. A projector as claimed in Claim 2, further comprising means for latching the spindle in its retracted position, and means for sensing movement of a cartridge into the said chamber and for releasing the spindle latch means when such movement is sensed.
4. A projector as claimed in Claim 2, further comprising means carried by the projector and engageable with the cartridge for clamping the cartridge in its mounted position in the said chamber.
5. A projector as claimed in Claim 2, wherein the locating means comprises an elongate recess on the projector positioned to co-operate with an elongate rib on the cartridge, said recess extending in a direction parallel to the direction of movement of the cartridge into and out of the chamber.
6. A projector as claimed in Claim 1,

stantially parallel to the outer face of projector plate 125. While the mounting structure on the projector has been described in terms of a single cartridge mounted on a single plate 125, it will be understood that a plurality of cartridges can be accommodated on the projector or a cartridge carrier by providing the described mounting structure on a series of plates each pair of which is spaced apart sufficiently to accommodate a cartridge therebetween.

Preferably, a retaining latch is provided for avoiding inadvertent upward or vertical movement of the cartridge along the surface of plate 125. Two constructions of such retaining structures are shown in Fig. 1. These comprise a curved lever arm 241 which is pivoted at 243 intermediate its ends. A lower end of the arm 241 projects through a window 245 in plate 125 and it is adapted to engage cartridge part 3 immediately above the rib 107 of the cartridge. The lower end of this arm is biased toward the cartridge by a tension spring 247 connected to the lever arm beneath the pivot 243. The upper end of the arm projects through an opening 249 in the projector housing. The lever arm is withdrawn from the opening for removal of the cartridge by finger pressure directed against the upper end of the lever.

As an alternative to the retaining structure just described, or in addition to such structure, the cartridge may be held in its mounted position by a latching member 251 pivoted at 253 intermediate its ends. One end of the lever has an offset latch portion 255 which projects through a window 257 in plate 125 and is adapted to be received within an opening 109 in cartridge part 5. The latch member is biased toward the opening by compression spring 259 which bears against the lever 251 between pivot 253 and latch member 255. The other end of member 251 projects from the projector housing. The latch portion 255 is withdrawn from the opening by finger pressure directed against the projecting end of the lever.

During assembly of the cartridge on the projector structure shown in Fig. 1, the spindle is first retracted by exerting finger pressure against flange 197. Flange 197 can be released after collar 205 clears shoulder 207 on latch member 209. Then the cartridge is placed above rails 223, 225, 229 and 231 with the cartridge ribs 101 and 103 aligned with the recesses 232 and 227, respectively. Then the cartridge is moved downwardly along the face of plate 125 until the lower edges of the cartridge are received within notches 233a and 235a and the upwardly projecting portion of latch 237 is received within the recess 239 on latch 107 with rib portion 240 seated on the

bottom of notch 237a. As this movement occurs, the lower end of retaining latch arm 241 and/or the retaining latch member 255 is retracted through plate 125 against their respective biasing forces. When the cartridge is properly located, the lower end of latch member 241 and/or the latch member 255 return to their normal latching position where they prevent inadvertent or accidental upward movement of the cartridge relative to the projector. As the cartridge reaches its lowermost position, its lower edge 105 engages release lever 217 to pull the latch member 209 downwardly, thus releasing the spindle and spring 199 returns the spindle to its normal extended position. Extension of the spindle is limited by engagement of a pin 195 with the end of the slot in plate 193.

Having regard to the provisions of Section 9 of the Patents Act, attention is directed to the claims of Application No. 37499/71 (Serial No. 1,261,527).

WHAT WE CLAIM IS:—

1. A motion picture projector having means for mounting in a predetermined position thereon a cartridge containing a reel of motion picture film, and having a spindle on which the reel within the mounted cartridge may be supported for rotation about a predetermined axis, the spindle being axially retractable from its reel-supporting extended position to permit the cartridge to be moved to and from the predetermined position in a direction transverse to the predetermined axis.

2. A projector as claimed in Claim 1, including means for defining a chamber for receiving the cartridge in the predetermined position and which is open at one end to permit a cartridge to be moved transversely of the predetermined axis from the predetermined position.

3. A projector as claimed in Claim 2, further comprising means for latching the spindle in its retracted position, and means for sensing movement of a cartridge into the said chamber and for releasing the spindle latch means when such movement is sensed.

4. A projector as claimed in Claim 2, further comprising means carried by the projector and engageable with the cartridge for clamping the cartridge in its mounted position in the said chamber.

5. A projector as claimed in Claim 2, wherein the locating means comprises an elongate recess on the projector positioned to co-operate with an elongate rib on the cartridge, said recess extending in a direction parallel to the direction of movement of the cartridge into and out of the chamber.

6. A projector as claimed in Claim 1,



including means for latching the spindle in its retracted position, and means biasing the spindle towards its extended position, whereby the spindle is automatically extended when the latch means is released.

5 7. A projector as claimed in Claim 1, further comprising latch means operably connected to the spindle for holding the spindle in its retracted position and for releasing the spindle for movement to its
10 extended position, and means for releasing the latch means to allow movement of the spindle from its retracted position to its extended position.

15 8. A projector as claimed in Claim 7 wherein the releasing means comprises a sensing member mounted to sense the presence of a cartridge on the projector in the predetermined position and, in response
20 thereto, arranged to release the latch means.

9. A motion picture projector arranged to mount in a predetermined position against a surface thereof a cartridge containing a

reel of motion picture film, comprising means defining a chamber in conjunction
25 with the said surface for receiving the cartridge in the predetermined position, a spindle which is extendable into the chamber to support the reel within the mounted
30 cartridge for rotation about a predetermined axis, the chamber being open at one end to permit the cartridge to be inserted in the chamber by movement transversely to the
35 predetermined axis and the chamber having a slot at its opposite end to permit film stripping means to extend into the chamber and into a cartridge therein, and means
40 mounting the spindle for movement between an extended position in the chamber and a retracted position in which it permits the cartridge to be moved into and out of the chamber.

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