

PATENT SPECIFICATION

(11) 1 211 021

DRAWINGS ATTACHED



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- (21) Application No. 49650/67 (22) Filed 1 Nov. 1967.
 (31) Convention Application No. 591 314 (32) Filed 1 Nov. 1966 in
 (33) United States of America (US)
 (45) Complete Specification published 4 Nov. 1970.
 (51) International Classification G 03 b 17/30 G 11 b 23/04
 (52) Index at acceptance

G2E A17A A6A2

E2A BU D5C2U

G5R 53DY 54B2A 54B2Y 54B3 54B6 54BY 54C2C 54C2Y
54CY 54F3 54FY 56X7S

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(54) AUTOMATIC LATCHING MECHANISM FOR STRIP LOADED CARTRIDGE

(71) We, EASTMAN KODAK COMPANY, a Company organised 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 an automatic latching mechanism for the attachment and release of a cartridge containing a strip to be used with a strip-using apparatus, and is particularly but not exclusively directed to an automatic latching mechanism for use on a motion picture projector so that a cartridge containing film strip material may be readily attached to and released from the motion picture projector.

In United States Patent Specification No. 3,467,341 there is disclosed a cartridge for containing a strip of motion picture film. In order to facilitate setting up a projector for operation, the cartridge is provided with an arrangement by which the film leader is trapped in the outer periphery of the cartridge each time the film is rewound in the cartridge. This arrangement enables the projectionist to grasp the film leader through a finger opening in the cartridge and remove the film leader from the cartridge for insertion in the automatic threading mechanism of the projector.

Accordingly, one of the objects of the present invention is to further facilitate the operation of setting up the projector by providing on the projector an automatic latching mechanism for latch engagement with latching surfaces on the cartridge to readily attach the cartridge to the projector and permit release of the cartridge from the projector.

The motion picture projector on which the mechanism may be incorporated may be one that is suitable for use with conventional

film supply reels of different sizes as well as being suitable for receiving a cartridge such as that described in the present specification and in the above-mentioned U.S. Patent Specification. The motion picture projector may be similar to the one disclosed in U.S. Patent Specification No. 3,300,155. In U.S. Patent Specification No. 3,467,341, a film guide arm is disclosed as being vertically disposed in a predetermined operative position on the projector relative to the finger opening in the cartridge to serve certain purposes more fully described in that application. Since the film guide arm or idler arm and idler, as described in that specification, is not used when a conventional film supply reel is to be used on the projector, the film guide arm must be removed from the path of the reel. Accordingly, a subsidiary object of the present invention is to provide on the motion picture projector a film guide arm that is to be used with the cartridge when the cartridge is loaded on the projector and to arrange the film guide arm so that it is movable automatically from an inoperative position to an operative position when the automatic latching mechanism is actuated by the cartridge being loaded on the projector.

According to the present invention an automatic latching mechanism on a strip-using apparatus for latching to the apparatus and permitting release from the apparatus of a strip-loaded cartridge having latching surfaces comprises first and second independently mounted levers each being individually spring-biased from a cartridge-releasing position to a latching position in which it can engage a latching surface on the cartridge, and mutually co-operating means on the first and second levers for moving the second lever towards the releasing position in response to movement of the first lever towards its releasing position.

The automatic latching mechanism may include a spring-biased strip guide arm movable from an inoperative position to an

[Price 5s. 0d. (25p)]

operative position in predetermined relationship to the cartridge, and the latching mechanism and the strip guide arm may have co-operating means for retaining the strip guide arm in its inoperative position against its spring bias.

One embodiment of an automatic latching mechanism in accordance with the invention, as applied to a motion picture projector adapted to draw a film strip from a projection cartridge, will now be described by way of example with reference to the accompanying drawings.

In Fig. 1 is shown a perspective exploded view of parts of the projection cartridge, of a supply reel of film, and of that portion of the film projector adapted to receive the cartridge;

In Fig. 2 is shown a view in elevation of the cartridge, automatic latching mechanism and its release arm and a film guide arm, and illustrating: the automatic latching mechanism in solid lines in latched engagement with the cartridge and in unlatched position in phantom lines, the film guide arm in the inoperative position in solid lines and in the operative position in phantom lines, and the cartridge in phantom lines;

In Fig. 3 is shown a fragmentary view of the automatic latching mechanism taken along line 3-3 of Fig. 2 as the cartridge is about to be loaded on the projector and illustrating portions of the film-loaded cartridge, a chamfered latching surface on the cartridge, and the projector;

In Fig. 4 is shown a view similar to Fig. 3 and illustrating the engagement of the chamfered surface with the automatic latching mechanism as the cartridge is being moved toward seated position on the projector; and

In Fig. 5 is shown a view similar to Figs. 3 and 4 and illustrating the latched position of the automatic latching mechanism after the cartridge is in seated position on the projector; and

The automatic latching mechanism of this mechanism constitutes an improvement over the prior art and is designed to attach a cartridge in loaded position on a projector and to release the cartridge from the projector.

The arrangement by which the film guide arm of this invention is readily released for movement from an inoperative to an operative position by the actuation of the automatic latching mechanism also constitutes an improvement over the prior art.

In reference to the drawings, the automatic latching mechanism is indicated generally at 10 in Fig. 2, the film guide or idler arm at 12 in Figs. 1 and 2, the motion picture film projector at 14 in Figs. 3, 4 and 5, the projection cartridge at 16, the film supply reel at 18, and the film at 20.

Only the pertinent portions of a motion

picture film projector necessary to an understanding of the invention are shown since those portions not shown would be conventional. Thus, in Fig. 1 the projector 14 is provided with a recessed support plate 22 for receipt of the projection cartridge; a supply spindle 24 for rotatably receiving the film supply reel 18 in the cartridge; and a drive member (not shown) which rewinds the reel by means of the engagement of the spring member 26 on the spindle with the reel. The manner in which the drive member operates is more fully described in the above-mentioned U.S. Patent Specification No. 3,300,155. The construction and operation of the supply spindle 24 and its spring member 26 are more fully described in Patent Application No. 49651/67 (Serial No. 1,209,475).

In Fig. 1 the projection cartridge is shown in two separate parts: 16a for the outer casing and 16b for the inner cartridge piece. Both inner cartridge piece and outer casing are preferably formed from a suitable plastic, and the inner cartridge piece is designed to fit within the outer casing in properly oriented position. The outer casing may be provided with a key (not shown) which fits within a keyway 11b in the inner cartridge piece to facilitate the orientation of one part in relation to the other. An additional key 77 may be provided on the recessed plate 22 of the projector for fitting within a keyway 79 provided on the inner cartridge piece 16b so as to ensure proper orientation of the cartridge to the projector when the cartridge is loaded on the projector. The film supply reel 18 snap-fits within the cartridge when the two parts 16a and 16b are in assembled relation.

The cartridge 16 is provided on the outside periphery with two recessed surfaces 32, each recessed surface being terminated at one edge of the cartridge, respectively, by an abutting surface 32a, and by a chamfer 32b. Each set of these surfaces, 32, 32a and 32b, will henceforth be described as a "chamfered latching surface".

Automatic Latching Mechanism

The automatic latching mechanism 10 includes lever 36 pivotally mounted on stud 38, and lever 40 pivotally mounted on stud 42. Lever 36 has an offset arm 44 which constitutes a latch end with a bevelled surface 44a for co-operating with the chamfered latching surface located at the bottom of the cartridge when looking at Fig. 2. Lever 40 has an offset arm 46 with a bevelled surface 46a which constitutes a latch end for co-operating with the other chamfered latching surface located at the upper right hand side of the cartridge, also when looking at Fig. 2.

Lever 36 has a second arm 48 at the opposite end from the offset arm 44 which is provided with a tab 50, and lever 40 has a

second arm 52 at the opposite end from the offset arm 46 which is provided with a tab 54, both tabs serving a purpose to be described.

- 5 Lever 40 further has a release arm 56 which may be operated to move lever 40 against the bias of its spring 58 to a position for releasing the cartridge from the projector. When lever 40 is moved against its spring-bias, its tab 54 is moved into engagement with tab 50 on lever 36 to be moved against the bias of its spring 60 to a position also for releasing the cartridge from the projector. Each of the springs 58 and 60, are torsion springs which fit respectively over the studs 42, 38.
- 10 One of the arms of springs 58 abuts pin 62 on the projector and the other arm abuts a tab 64 on the lever 40. Spring 60 has one arm abutting a pin 66 on the projector and another arm abutting a tab 68 on the lever 36.

Operation of Automatic Latching Mechanism

- In reference particularly to Figs. 3, 4 and 5, as the cartridge is moved toward seated position on the recessed support plate 22 of the projector, the chamfers 32b are brought into engagement, respectively, with the bevelled surface latch ends of offset arms 44, 46 and thereby causing the offset arms to be cammed laterally, as viewed from these figures, respectively within the recessed surfaces 70 on the support plate 22 of the projector. This lateral movement, of course, causes each of the levers 36, 40 to be moved about their pivots against the bias of their springs 60, 58.
- 25 When the cartridge reaches seated position, as shown in Fig. 5, the latch ends of offset arms 44, 46 return to their normal spring-biased position in latched engagement with the cartridge with the latch ends being in positive engagement, respectively, against an abutting surface 32a on the cartridge.

- One advantage in individually springing each lever 36, 40 is to assure positive latching even if the cartridge is not inserted so as to cause simultaneous latch engagement of both latch ends with the cartridge.

- Release of the cartridge is accomplished by manually pressing down on the release arm 56 of the lever 40. This manual force causes the lever 40 to rotate about its pivot 42 against its spring-bias. After a partial rotation the tab 54 will travel through the gap between the respective tabs until the tab 54 contacts tab 50 on lever 36, thus causing lever 36 also to rotate about its pivot 38 against its spring-bias as force continues to be exerted on release arm 56. In this manner the latch ends of the levers are caused to move laterally or to retract within the recessed surfaces 70 on the projector support plate 2, thus permitting manual removal of the cartridge from the support plate.

Film Guide Arm

The automatic latching mechanism may, when actuated, also serve to release the film guide arm 12 from its inoperative position, shown in solid lines in Fig. 2, so that the film guide arm may be rotated by its torsion spring 76 about its pivot 78 counterclockwise to operative position, shown in phantom lines in Fig. 2. The counterclockwise rotation continues until the film guide arm meets the stop surface 80 (Fig. 1) on the projector.

In order to accomplish the release of the film guide arm to its operative position, a hook 82 is provided adjacent the latch end on lever 40. A pin 84 is provided on the film guide arm, and the hook 82 so engages the pin 84 when the film guide arm is moved to its inoperative position as to retain the film guide arm in the inoperative position. A small rotation of the lever 40, caused either by inserting a cartridge as described above, or by applying a downward pressure on the release arm 56 will cause the hook to move out of retaining engagement with the pin 84 and thus release the film guide arm for movement to operative position. The film guide arm may be manually moved to its inoperative position when the projector is to be used with a conventional film supply reel.

The film guide or idler arm is provided with a roller or idler 86 and the purpose of this arrangement, as mentioned above, is more fully described in United States Patent Specifications Nos. 3,467,341 and 3,467,340. The latter specification shows the co-operation of the idler arm and idler with the finger opening 88 in the edge of the cartridge (Figs. 1 and 2).

Although the apparatus on which the automatic latching mechanism operates is described as a motion picture film projector, it will be recognized that the latching mechanism could be used on any other type of apparatus that is designed to receive a cartridge containing strip material to be used with the apparatus. Similarly, the guide arm would also be suitable for operating on other apparatus involving the use and guidance of strip materials such as sound recording tape.

WHAT WE CLAIM IS:—

1. An automatic latching mechanism on a strip-using apparatus for latching to the apparatus and releasing from the apparatus a strip-loaded cartridge having latching surfaces, comprising first and second independently mounted levers each being individually spring-biased from a cartridge-releasing position to a latching position in which it can engage a latching surface on the cartridge, and mutually co-operating means on the first and second levers for moving the second lever towards the releasing position in response to movement of the first lever towards its releasing position.

2. An automatic latching mechanism as defined in Claim 1, wherein each of the mounted levers has an offset arm for engaging a latching surface on the cartridge.
- 5 3. An automatic latching mechanism as defined in Claim 1, wherein the mutually co-operating means on the first and second levers each constitute a tab on an arm offset at one end of each of the levers.
- 10 4. An automatic latching mechanism as defined in Claim 1, wherein the first lever has a release arm against which force can be exerted to move the first lever against its spring-bias to the releasing position.
- 15 5. An automatic latching mechanism as defined in Claim 1, and including a spring-biased film guide arm movable from an inoperative position to an operative position in predetermined vertical relationship to said cartridge, and wherein the latching mechanism and the guide arm have co-operating means for retaining the guide arm in its inoperative position against its spring-bias.
6. An automatic latching mechanism as defined in Claim 5, wherein the latching mechanism has a hook and the guide arm has a pin, with the hook being adapted to engage the pin for retaining the guide arm in its inoperative position against its spring-bias.
7. An automatic latching mechanism on a motion picture projector substantially as hereinbefore described with reference to the accompanying drawings.
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Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1970.
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY,
from which copies may be obtained.

