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PATENT SPECIFICATION

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DRAWINGS ATTACHED.

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Int. Cl.:—G 03 b 1/04.

COMPLETE SPECIFICATION.

Web Handling Apparatus.

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 4, New York 14650, United States of America (Assignees of ROBERT JUSTIN ROMAN), 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 a web handling apparatus and more particularly, but not exclusively, to a motion picture projector.

In accordance with the present invention there is provided a web handling apparatus comprising drive means for transporting a web through an operating station in one direction from a supply reel to a take-up reel, shifting means movable between a forward position in which it couples the drive means to the take-up reel to wind up the web thereon after it has passed through the operating station in said one direction, and a reverse position in which it couples the drive means to the supply reel for rewinding the web thereon, and control means for the shifting means including a latch movable between a latched position for releasably holding the shifting means in its forward position when the web is transported in said one direction, and an unlatched position in response to increased web tension for moving the shifting means to its reverse position for automatically rewinding the web on to the supply reel.

In the accompanying drawings:—

Fig. 1 is a side elevation of a motion-picture projector having incorporated there-

in an automatic rewinding mechanism constructed in accordance with one embodiment of the present invention, and showing the projector in its normal projecting position with portions thereof omitted for purposes of clarity;

Fig. 2 is a segmental view similar to Fig. 1 showing the automatic rewind mechanism in a position for automatically rewinding the projected film on to the supply reel following the release thereof by the tensioned film;

Fig. 3 is a rear elevation view of Fig. 1 showing the clutching mechanism, with other portions of the projector omitted for purposes of clarity;

Fig. 4 is a section, to an enlarged scale, taken on the line 4—4 of Fig. 2; and

Fig. 5 is a diagrammatic view, partially schematic, of an automatic rewinding mechanism incorporated in a motion picture projector or the like.

Referring to the drawings, a motion picture projector comprises a supply reel 6 mounted on a supply spindle 8, an operating station comprising an apertured film gate 10 and pressure pad 12 through which a film 14 is transported by an intermittent pull-down mechanism of known type of which only the claw 16 is shown in Fig. 4, and a take-up reel 18 mounted on a take-up spindle 20 and having a hub with teeth thereon, not shown, for automatically catching and winding the projected film thereon. As the film 14 is intermittently advanced through the apertured film gate 10 one frame at a time, it is illuminated by means of a lamp (not shown) and an image thereof projected by means of a lens 22. A film guide 24 is provided for guiding the portion of the film 14 leaving the film gate 10 past a

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Price 5s. 0d.

snubber 26 and between the flanges of the take-up reel 18 where it is caught by the teeth on the take-up reel hub and automatically wound thereon.

5 The supply and take-up spindles 8, 20 are retained axially on respective shafts 28, 30 (see Fig. 3) by wire hairpin-shaped springs (not shown) which are inserted in slots 32, 34 and meet with grooves (not shown) in the respective shafts. Additional slots 36, 38 are provided for the use of additional wire springs for applying a slight friction drag to respective shafts 28, 30 and reels 6, 18 as required to improve smoothness of reel rotation.

15 The drive system for the projector (see Fig. 3) comprises a drive motor 39 and pulley 41 for driving a multi-grooved drive pulley 44, rotatably mounted on supply shaft 28, by means of a belt 40 riding in a groove 42 in the pulley 44. Another belt 46 rides in a groove 48 in drive pulley 44 and a groove 50 in a take-up pulley 52 which is rotatably mounted on take-up shaft 30 for driving the take-up pulley upon rotation of drive pulley 44. The drive pulley 44 further has a lug 53 thereon for engaging a shoulder 54 on the supply spindle 8 when the drive pulley is axially moved to the right in Fig. 3 for clutching the drive pulley 44 to the supply spindle 8. The take-up pulley 52 has another groove 56 for receiving a clutch spring 58, the end of which in the clutch position engages a shoulder 60 on take-up spindle 20, as seen in Figs. 1 and 3.

35 The shifting mechanism for selectively clutching the drive system to the supply and take-up spindles 8 and 20, respectively, comprises a clutch plate 62 secured at its midpoint to a rod 64 mounted for rotation about its axis. The ends of plate 62 have notches therein for receiving respective cylindrical portions 66, 68 of respective pulleys 44, 52. A spring 70 having a portion thereof encircling rod 64, biases the rod and plate 62 in a clockwise direction (as viewed in Fig. 3) causing one end thereof to engage a flange 72 of the drive pulley 44 for urging it axially into driving engagement with the supply spindle 8, and its opposite end to engage a flange 74 on the take-up pulley 52 for moving it and the clutch spring 58 axially out of driving engagement with the take-up spindle 20. Movement of the plate 62 in a counterclockwise direction (as viewed in Fig. 3) against the bias of the spring 70 by means of an automatic rewind mechanism to be explained hereinafter causes the ends of plate 62 to engage flanges 76, 78 respectively, for axially urging the pulleys 44, 52 in the opposite directions, thereby clutching the drive system to the take-up spindle 20 and declutching the drive system from the supply spindle 8, as seen in full lines in Fig. 3.

The automatic rewind mechanism comprises a multi-armed lever 80 pivotally mounted on a pin 84 secured to a support plate 82, and biased in a counterclockwise direction (as viewed in Figs. 1 and 2) by a spring 86 having one end connected to a lug 88 on the lever 80 and its opposite end connected to a lug 90 on a latch lever 92. The latch lever 92 is pivotally mounted on a pin 94, and has an arm 96 for engaging a shoulder 98 on the lever 80 for releasably holding the lever 80 in a cocked position, as seen in Fig. 1. The lever 80 also has an arm 100 having an arcuate surface 102 engaging the underside of a crank end 104 of the aforementioned rod 64 for holding the latter against the bias of the spring 70.

70 The hub of the supply reel 6 has a clip 106 to which the tail end of the film 14 is secured. Accordingly, when all of the film has been projected, the tension applied to the film 14 by the film transport mechanism, slidably urges a snubber 108, which is guided for reciprocal movement by a pair of spaced apart ways 110 against the bias of a spring 111. Movement of snubber 108 causes a pin 112 thereon extending through a slot 114 in the support plate 82 to engage an arm 116 of the latch lever 92 and urge the latch lever in a counterclockwise direction (as viewed in Figs. 1 and 2) against the bias of the spring 86. When the film tension exceeds the force exerted by the springs 86 and 111, the latch lever 92 is pivotally moved, thereby withdrawing the arm 96 from the shoulder 98 to release the cocked lever 80. The lever 80 is pivoted by the spring 86 in a counterclockwise direction (as viewed in Figs. 1 and 2) until the end of a slot 118 therein engages a headed stop lug 120 as seen in Fig. 2. The lever 80 in pivoting to this position causes two projections 122 and 124, of unequal length at the end of one of its arms to engage pressure pad 12 and apertured plate 10, respectively, for moving the two into their withdrawn positions shown in Fig. 4. In this position, the film 14 has been disengaged from the claw 16 by the plate 10, and the pressure pad 12 is clear of the film 14 so that it is free of any pressure in the film gate. Also, pivotal movement of the lever 80 causes the surface 102 of the arm 100 to move downwardly from its Fig. 1 position to its Fig. 2 position. This allows the spring 70 to urge the rod 64 and clutch plate 62 in a clockwise direction (as viewed in Fig. 3) for declutching the drive system from the take-up spindle 20 and clutching it to the supply spindle 8. Accordingly, the projected film 14 is automatically rewound on to the supply reel 6. Upon completion of the rewind cycle, the lever 80 is manually pivoted by finger pressure on a lug 126 in a clockwise direction (as viewed in Figs. 1 and 2) moving

the lever to its projection.

5 The projector point in its re- power to the switch S (see take-up reel 1 ning, recockin heretofore, ar 10 drive motor the film trans ing the film through the and to drive up the pro cycle can b forward pro latch lever tion by fin 20 wardly proj arm 130 of The film 22 are mo pivotal by 25 pivot 132, justment o The upper cocked po centre is 30 According 82 to var jected im mechanism

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the lever to its cocked position for normal projection.

The projector may be stopped at any point in its rewind cycle by turning off the power to the drive system by means of a switch S (see Fig. 5), manually braking the take-up reel 18 to prevent it from over-running, recocking the lever 80 as described heretofore, and closing switch S to energize drive motor 39 for driving the claw 16 of the film transport mechanism for transporting the film 14 in a forward direction through the operating station for projection, and to drive the take-up spindle 20 to wind up the projected film. Also, the rewind cycle can be initiated at any time during forward projection by manually pivoting the latch lever 92 in a counterclockwise direction by finger pressure exerted on an outwardly projecting lug 128 at the end of an arm 130 of the lever 92.

The film pull-down mechanism and lens 22 are mounted on the plate 82 which is pivotal by any known mechanism about a pivot 132 (see Fig. 1) to permit vertical adjustment of the projected image on a screen. The upper surface of the arm 102 in its cocked position has a constant radius whose centre is also the centre of the pivot 132. Accordingly, it is possible to pivot the plate 82 to vary the vertical position of the projected image without affecting the clutching mechanism.

WHAT WE CLAIM IS:—

1. A web handling apparatus comprising drive means for transporting a web through an operating station in one direction from a supply reel to a take-up reel, shifting means movable between a forward position in which it couples the drive means to the take-up reel to wind up the web thereon after it has passed through the operating station in said one direction, and a reverse position in which it couples the drive means to the supply reel for rewinding the web thereon, and control means for the shifting means including a latch movable between a latched

position for releasably holding the shifting means in its forward position when the web is transported in said one direction, and an unlatched position in response to increased web tension for moving the shifting means to its reverse position for automatically rewinding the web on to the supply reel.

2. A web handling apparatus according to Claim 1, wherein the control means includes a spring biased pivotal lever, and the latch in its latched position releasably holds the lever and the shifting means in its forward position against the bias of the spring.

3. A web handling apparatus according to Claim 2, wherein the shifting means comprises a pivotal plate mounted on a rotatable rod having a crank in engagement with the pivotal lever for controlling movement of the shifting means between its forward and reverse positions upon movement of the pivotal lever.

4. A web handling apparatus according to Claim 1, 2 or 3, wherein the operating station comprises an apertured plate and a pressure plate between which the web is transported, and the pivotal lever has a pair of projections which engage the plates when the lever is released by the latch, and moves same in a direction to disengage the drive means from the web and to remove any pressure on the web.

5. A web handling apparatus according to any of Claims 1 to 4, wherein the latch is biased into engagement with the web and the trailing end of the web is secured to the supply reel whereby when the end of the web is reached, the web is subjected to a tension by the drive means sufficient to overcome the latch bias and release the latch for moving the shifting means to its reverse position for rewinding the web on to the supply reel.

6. A motion picture projector constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

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