

PATENT SPECIFICATION

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(54) SLIDE PROJECTOR

(71) We, FRANKE & HEIDECKE GmbH, a German Body Corporate, trading as ROLLEI-WERKE FRANKE & HEIDECKE, of 196 Salzdahlumerstrasse, Braunschweig, Germany, 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:—

10 The present invention relates to a magazine feed mechanism for a magazine-type slide projector with a side trough to accommodate the magazine which can be displaced parallel to the optical axis and with a slide or film changing slider movable transversely thereto, and with an indexing device which is rotatably mounted on the film changing slider and which, in the outermost position, engages indexing divisions of the magazine and which, by means of stops which can be caused to engage in alternation, is moved forwards or backwards from its central position by a distance corresponding to one indexing step of the magazine.

25 In one known magazine-type still-film projector there is provided a side trough to accommodate a magazine displaceable parallel to the optical axis of the projector and with a changing slider movable transversely thereto.

30 The known projector provides a particularly simple and operationally reliable magazine stepping system and changing slider movement, regardless of whether the changing slider is operated by a motor or by hand.

35 Systems are known in which the changing slider is provided with a step-shaped bar or groove interacting with the magazine compartments in such a way as to move the magazine forward by one step when it engages them. Wherever an optional forward or reverse transport mechanism is required, this quite simple system fails, since in this case at least the engagement point has to be hinge-mounted, or else a pivotable finger is required.

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as accurately as possible, particularly in view of the difficulties and interferences which may be caused by the varying thicknesses of the slide (as in the case of paste-board-mounted slides).

The known projector mechanism solves this problem by as simple a means as possible providing an easy means of switching over from the forward to the reverse movement of the magazine. Furthermore, optional change is ensured at any time by manual or electrical operation and vice versa, without any special reversing mechanisms or manipulations. This also makes it possible for the same model of projector to be used as a manual projector by simply omitting the electric drive.

Therefore the known projector mechanism includes a stepping or indexing device pivotably mounted on the changing slider, which in its outermost position engages the indexing divisions of the magazine and is provided with two oblique contact surfaces for two stops of the magazine guide system which can be engaged optionally and by which it is displaced from its central position by a distance corresponding to one magazine transport step in either the forward or the reverse direction. A fixed guide is advantageously provided by which the stepping device is guided in the central position only being released when the stops become operative. The latter are advantageously mounted on one common support which is rotatable about a fixed position, one stop of an indexing device lever being situated in the path of an oblique contact surface when the said support is in its position of rest, while the other is only situated in the path of another oblique contact surface when the indexing device lever has been swung out.

If the support of the stops is coupled with the release device of the single-rotation drive of the changing slider, then the change-over from forward to reverse magazine transport can be brought about by means of a release knob or release magnet, simply by actuating the release device instantaneously or continuously as the case may be.

[Price 25p]

Figures 3 to 6 of the accompanying drawings only show those parts of the changing slider and of the magazine stepping system which enable the known projector mechanism to be understood, the individual diagrams being as follows:

Fig. 3 is an illustration of a changing slider;

Fig. 4 shows the corresponding horizontal projection;

Fig. 5 is a cross sectional view perpendicular to the optical axis and to the axis of the magazine; and

Fig. 6 is a partial plan view of the slide gripper on a larger scale.

The magazine itself is not shown separately in Fig. 3; its position is implied by the slide shown in dot-and-dash lines, in the projection position, while in Fig. 4 a bar-type magazine is indicated by dot-and-dash lines; in Fig. 5 a cross section is shown through the magazine 20; and a slide 200. The position of the parts in relation to the optical axis A—A of the projector is shown in Fig. 3. The magazine is situated in a trough open at the top and provided on housing 203 (see Fig. 5). The changing slider consists of a sliding carriage or bar 204 mounted on the projector housing in such a way that it is displaceable perpendicularly in respect of the optical axis A—A.

The bar 204 emerges from the projector housing to one side, underneath the magazine, and terminates in a bracket 205 of which the free end 206, directed towards the slide 200, has a notch or groove 215. The bracket 205 can be used as a handle for operating the changing slider. Pins 207 projecting from the bar 204 extend through slits 208 of a sliding carriage 209 allowing movement of the carriage relative to the bar. The sliding carriage 209 bears a plate 210 which is bent upwards and serves as a covering for the picture gate. The carriage 209 is moved towards the slide, under tension, by a spring 211. A fixed stop 212 prevents the plate 210 from entering the zone of the magazine when the changing slider is moved outwards (to the left, as seen in Fig. 3). That edge 213 of the plate which is nearer to the magazine is provided with a perpendicular keyway or groove 214, corresponding to the notch 215. The slide is clamped in between these two grooves. The grooves 214 and 215 thus form an elastic clamp between which the slide is held during the transport of the slide into the projector and during the projection action, as shown in Figs. 3 and 6. The stop 212 prevents the keyway 214 from being moved into the zone of the magazine from the moment at which the slide has reached its correct position in the magazine, so that as the slider 205 continues to move outwards the notch 215 of the gripper will likewise be moved

away from the slide and passage afforded through the magazine.

A lever 217 is also provided, which is pivotable about a pin 216 on the bar 204 and which is provided with two oblique surfaces 218 and 219 taking opposite directions.

The projector housing also bears a pivotable lever 220 supporting stop pins 221 and 222. When this lever 220 is in the position of rest the pin 222 is situated in the path of the oblique contact surface 219 of the lever 217, so that when the slide changing slider is moved out the oblique contact surface 219 encounters the pin 222 and pivots the lever 217 in the direction shown by the arrow B. The lever 217 is provided with gripper points 2 which, at the moment when the notch 215 of the changing slider bracket 206 moves out of the path of the magazine, engages the teeth of the magazine compartment, moving the magazine on by one division, in the direction shown by the arrow C, as the changing slider is moved on. If, however, the lever 220 is pivoted, in the direction shown by the arrow C, into the other extreme position, the oblique contact surface 219 of the lever 217 is able to slide past the pin 222. Now, however, the pin 221 is situated in front of the oblique contact surface 218, so that in the same changing operation the lever 217 is pivoted in the direction shown by the arrow C, the magazine thus being moved on in the direction shown by the arrow B. If the lever 220 remains in its position of rest the magazine stepping operation takes place in the same direction C, each time a picture is changed, and when the lever 220, with the stop pins 221 and 222, has been swung out in the direction shown by the arrow C, in the course of the image changing operation, the magazine will be moved on in the direction shown by the arrow B. A bar 231 is situated in the plane of the oblique contact surfaces 218 and 219 in such a way that the gripper lever 217 cannot be pivoted until immediately before the gripper points 2 have engaged the magazine, whereas during the rest of the changing operation, any pivoting of the lever 17 is prevented. The change-over of the lever 220 is preferably effected by means of an electro-magnet 224. The lever 220 is able, via an extension 225, to move a lever 226 by which the run-off lock 227 of the single-rotation coupling 228 can be released.

When the apparatus is motor driven, therefore, the operation of the electro-magnet 224 sets up the image changing process. If the electro-magnet is de-energized immediately after this image changing operation has been initiated, the lever 220 will return to its normal position, in which the subsequent magazine stepping operation is brought about in the direction shown by the

arrow C. If, however, the electro-magnet 224 remains energized throughout the entire image changing process, the lever 220 will likewise remain in the extended direction C, so that the magazine stepping operation will take place in the direction shown by the arrow B. The single-rotation coupling is constructed in the known manner, in such a way that regardless of the position of the release device 226 the single-rotation drive 228 will be held up each time a rotation has been performed. The single-rotation drive 228 interacts with a stepped groove 230 of the bar slider 204 via a crank pin 229. In Fig. 3 the slider is in the outermost position. The groove 230 is interrupted at the bottom so that although the forward movement of the changing bar slider 204 takes place the reverse movement of the slider, in the second half of the rotation, also takes place on the stepped groove 230 releasing the pin 229 when the drive is in the position of rest, i.e. 180° away from the position shown in Fig. 3. When the drive 229 is in this position the changing slider can be operated by hand without any particular change-over process. In this case it may be necessary for the lever 220 likewise to be changed over by hand, to enable the transport direction of the magazine to be determined.

As described above, magazine-type slide projectors are provided with a stepping device for the bar-type unit magazine. These stepping mechanisms, however, suffer from the drawback that they only enable a magazine with a certain division to be used. Slide magazines of which the cogging for the feed movement is provided in some other place than in the case of the most commonly used magazine cannot be employed.

A further drawback resides in the fact that the step which the indexing gripper has to perform for the stepping movement cannot be satisfactorily adapted, particularly when round magazines are used, to the different spacing ratios (due to the different slide thicknesses or to the concentric arrangement of the slides).

The present invention enables different kinds of magazine to be used with magazine-type slide projectors based on the use of a two armed indexing device. A further purpose is to enable a designer of the magazine to choose where and how to mount feed cogging thereon.

According to the present invention there is provided a magazine feed mechanism for a magazine-type slide projector having means for receiving both rotary and linearly movable magazines arranged to move past the projector film gate in a direction substantially parallel to the optical axis of the projector, a slide change slider movable transversely to the optical axis, an indexing

device pivotally mounted on the slide change slider and stops located in the path of movement of the indexing device, the feed mechanism including two pawl sliders each mounted for independent linear longitudinal movement relative to the other, a pawl extending from each pawl slider, a contact surface on each pawl slider and a magazine feed pinion located for engagement by the pawls to move a magazine in a forward or reverse direction, wherein when the feed mechanism is located on the projector the indexing device is engageable with one or the other of the contact surfaces to move the corresponding pawl slider and pawl, which pawl engages the feed pinion to effect rotation thereof in one direction or the other and hence movement of a magazine in either the forward or reverse direction. The forward or reverse direction for the feed movement of a magazine is obtained by the fact that the sliders engage the magazine feed pinion by means of pawls in alternate stepping directions.

In a further advantageous version of the invention the pawl slider is provided, on the side corresponding to the feed cogging of the magazine, with lugs which, in the end position directly engage the feed cogging and function as a locking device. This ensures that the freely running feed pinion will not cause a slide to be "skipped" after the indexing step has been performed.

The problem of adapting the indexing step of the indexing device to the pitch of feed cogging of the particular magazine employed is solved as a result of the fact that the stepping movement of the indexing device via the pawl slider, effects rotary movement of the magazine feed pinion and hence movement of the magazine. This may be aided by the locking device formed by the lug on the pawl slider, which engages the teeth or cogging of the magazine and may provide a final adjustment of the relative positions of the magazine and feed pinion.

In accordance with other preferred features of the invention a magazine container, a slide projector or a magazine may include the magazine feed mechanism disclosed above in accordance with the present invention.

The magazine feed mechanism of the invention can be used with particular advantage to feed magazines of the round type, insertable in a largely perpendicular position into the bar-type magazine trough. The designer has to vary the pitch of the outer periphery according to the number of slides present in the round magazine. The invention leaves him a free choice as regards this division.

To ensure that during the transport of the magazine the slide will not fall out of the aperture which gives passage to the film

change slider, that end of the magazine container which faces towards the magazine-type slide projector is fitted with a safety device in the form of a vertical U-shaped slider.

5 When the magazine is inserted in the side trough of the projector this slide securing device is released by the ends of the U-shaped slider which project beyond the lower side of the container.

10 A constructional embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawing, wherein:—

15 Fig. 1 is a plan view of elements of a magazine feed mechanism for a circular magazine, the positions for the indexing device of the magazine-type slide projector being indicated; and

20 Fig. 2 is a partial view of the circular magazine, from the indexing device side, with a U-shaped slider as a safety device for the slides.

A circular magazine, which as a whole is marked 1, is intended for use in a magazine-type slide projector of the kind designed for receiving straight or rectangular box type magazines. In general the stepping movement of the elongate box-type magazine is effected by an indexing device 2 in the forward or reverse direction. Fig. 1 shows, symmetrically about a slide change slider, not shown in the drawings, magazine feed elements 3, 4, 5 and 6 by which stepping movement of the indexing device is transmitted to a feed cogging system 7, Fig. 2, of the circular magazine. As the slides are moved step-by-step a point 8 of the device 2 engages a contact surface 9 of a slider 3 of which a pawl 4 engages pins 5 provided on a magazine feed pinion 6. The magazine feed pinion 6, in its turn, engages the feed cogging 7 belonging to the circular magazine. The slider 3 in this system is mounted in the projector magazine container 10 by the aid of a guide pilot 11, in such a way that it is displaceable mainly in the direction of the slide change slider and in the stepping movement is guided by a contact pressure spring 12 in a wide guide slit 13 provided over the pilot 11. In the stepping movement the pawl 4 belonging to the slider 3 and extending to one side thereof engages one of the pins 5 provided on the lower end face of the feed pinion 6 and moves pinion 6 and cogging 7 until a locking lug 14 on the outermost end of the slider 3 engages the feed cogging 7 of the magazine, thus locking the latter. When the point 8 of the indexing device moves back into its initial position the pawl 4 of the slider 3 moves over and past the pin on the end face of the feed pinion 6, as a result of the force exerted by the restoring spring 15, since the pressure exerted by the contact pressure spring 12 is only slight. The slit

13 of the slider 3 is wide enough to ensure that the latter can easily perform the transverse movement set up by the "snap action" of the pawl. Reverse movement of the magazine can be effected by means of the symmetrically shown indexing elements to the left in Figure 1, which operate in exactly the same manner as that just described.

The stepping movement of the indexing device imparts rotary movement to the magazine feed pinion by the aid of the pawl slider and subsequently movement of a magazine thereby providing adaptation of the indexing step of the indexing device to the pitch of the feed cogging of the particular magazine employed. To clearly understand this point it must be understood that the pitch of the teeth or cogging on a magazine is entirely the choice of the designer of the magazine. It will vary, for example, if at given partition distances a variable number of slides has to be accommodated in the magazine i.e. for circular magazines the magazine diameters vary. Consequently, the tooth pitch of the cogging 7 varies and hence the movement of the feed pinion and the reduction ratio between the pinion 6 and cogging 7 also varies. However, the variation in the pitch of the cogging 7 from magazine to magazine can be overcome by the locking lug 14 on the pawl slider 3, since when the lug 14 engages the teeth or cogging 7 of the magazine an adjustment of the relative positions of the magazine and the pinion 6 can take place simultaneously to the locking action described above. Since, clearly, some rotary movement can be imparted to the pinion in this way the point of engagement of the pawl 4 with a pin 5 can vary and hence the actual slide change step movement can vary in accord with the cogging on the particular magazine being employed. Alternatively, movement of a magazine during locking action may be such as to impart no motion to the pinion 6, whereby upon movement of the pinion 6 by pawl 4 a tooth of the pinion engages a tooth of the cogging 7 for a shorter time than if when locked the tooth of the pinion was in contact with the tooth of the magazine cogging. It must be borne in mind that the variable movement imparted to the magazine is much smaller than the movement to effect a change of slide.

Fig. 2 shows a device for preventing a slide 19 from falling out during the transport of the magazine through the projector. This safety system resides in the fact that a U-shaped slider in the container of the circular magazine on the side facing the indexing device 2, its ends 17 pointing downwards. A blocking bar 18 at the upper end of the U-shaped slider 16 prevents the slides 19 from falling out. When the magazine container 10 is inserted in the elongate-

box-type magazine trough, not shown in the drawing, the ends 17 of the U-shaped slider which extend beyond lower edge 20 of a recess 21 of the magazine container 10 press on guide plates 22 which are fixed on the projector and serve to keep the slides in position in the elongate box-type magazine. Upon further insertion of the magazine container 10 the slider 16 is moved upwards and the bar 18 releases the slides 19.

The magazine feed elements operate as follows: If the indexing device 2 moves in the direction R towards the contact surface 9 of the slider 3, it is only the point 8 which encounters the surface 9, while the other point of the slider moves in empty space. The point 8 performs a sliding movement on the contact surface 9. The slider 3 is thus moved, transversely to the slide feed direction, along the guide pilot 11, in the guide slit 13. The pawl 4, mounted on one side of the slider 3, engages the pin 5 of the feed pinion 6 and moves this latter in a clockwise direction. The feed pinion 6, in its turn, engages the feed cogging 7 shown in Fig. 2 and moves the circular magazine, not shown in the drawing. At the end of the stroke of the slider 3 the locking lug 14 additionally engages the feed cogging 7. The reverse movement of the circular magazine is thus terminated, i.e. the magazine is ready for the operation of the projector slide change slider (not shown). When the point 8 of the indexing device moves back to its rest position, the slider 3 is caused, by the restoring spring 15, to accompany this movement. The pinion 6 firmly engages the feed cogging of the round magazine and therefore, owing to the inertia of the latter, cannot rotate back in an anti-clockwise direction. During the idle return stroke, therefore, the oblique edge of the pawl 4 of the slider 3 moves past the pins 5 of the feed pinion with a snap action and in opposition to the pressure exerted by the contact pressure spring 12.

When the slides are being fed in the forward direction the other slider is subjected to the action of the other point of the device 2, i.e. upon movement of the device 2 in the direction V. The sequence of movements is exactly similar to that already described, except that the direction or rotation of the feed pinion is reversed.

WHAT WE CLAIM IS:—

1. A magazine feed mechanism for a magazine-type slide projector having means for receiving both rotary and linearly movable magazines arranged to move past the projector film gate in a direction substantially parallel to the optical axis of the projector, a slide change slider movable transversely to the optical axis, an indexing device pivotally mounted on the slide change

slider and stops located in the path of movement of the indexing device, the feed mechanism including two pawl sliders each mounted for independent linear longitudinal movement relative to the other, a pawl extending from each pawl slider, a contact surface on each pawl slider and a magazine feed pinion located for engagement by the pawls to move a magazine in a forward or reverse direction, wherein when the feed mechanism is located on the projector the indexing device is engageable with one or the other of the contact surfaces to move the corresponding pawl slider and pawl, which pawl engages the feed pinion to effect rotation thereof in one direction or the other and hence movement of a magazine in either the forward or reverse direction.

2. A mechanism as claimed in Claim 1, including a plurality of pins extending from the magazine feed pinion, the pawls being engageable with the pins for rotating the feed pinion.

3. A mechanism as claimed in Claim 1 or 2, wherein each pawl slider is provided with a slit engageable with a guide member, which slit is of such dimensions as to allow movement in directions both parallel and transverse to the direction of movement of the slide change slider and first and second springs mounted on the pawl sliders, the first spring being effective to bias its respective pawl slider towards the feed pinion and the second spring being effective to bias its respective pawl slider away from the magazine feed pinion.

4. A mechanism as claimed in any one of Claims 1 to 3, including a lug on each pawl slider on the end thereof in the region of the feed pinion, which lugs are engageable directly with the feed cogging of a magazine to lock the same in position at the end of an indexing operation.

5. A mechanism as claimed in Claim 1 or 2, wherein the degree of movement imparted to a magazine by the indexing device is dependent upon the movement of the respective pawl slider and the feed pinion.

6. A magazine feed mechanism substantially as described herein with reference to and as illustrated by Figures 1 and 2 of the accompanying drawings.

7. A magazine container for receiving circular slide magazines including a magazine feed mechanism as claimed in any one of Claims 1 to 6.

8. A magazine slide projector for receiving slide magazines and including a magazine feed mechanism as claimed in any one of Claims 1 to 6.

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box-type magazine trough, not shown in the drawing, the ends 17 of the U-shaped slider which extend beyond lower edge 20 of a recess 21 of the magazine container 10 press on guide plates 22 which are fixed on the projector and serve to keep the slides in position in the elongate box-type magazine. Upon further insertion of the magazine container 10 the slider 16 is moved upwards and the bar 18 releases the slides 19.

The magazine feed elements operate as follows: If the indexing device 2 moves in the direction R towards the contact surface 9 of the slider 3, it is only the point 8 which encounters the surface 9, while the other point of the slider moves in empty space. The point 8 performs a sliding movement on the contact surface 9. The slider 3 is thus moved, transversely to the slide feed direction, along the guide pilot 11, in the guide slit 13. The pawl 4, mounted on one side of the slider 3, engages the pin 5 of the feed pinion 6 and moves this latter in a clockwise direction. The feed pinion 6, in its turn, engages the feed cogging 7 shown in Fig. 2 and moves the circular magazine, not shown in the drawing. At the end of the stroke of the slider 3 the locking lug 14 additionally engages the feed cogging 7. The reverse movement of the circular magazine is thus terminated, i.e. the magazine is ready for the operation of the projector slide change slider (not shown). When the point 8 of the indexing device moves back to its rest position, the slider 3 is caused, by the restoring spring 15, to accompany this movement. The pinion 6 firmly engages the feed cogging of the round magazine and therefore, owing to the inertia of the latter, cannot rotate back in an anti-clockwise direction. During the idle return stroke, therefore, the oblique edge of the pawl 4 of the slider 3 moves past the pins 5 of the feed pinion with a snap action and in opposition to the pressure exerted by the contact pressure spring 12.

When the slides are being fed in the forward direction the other slider is subjected to the action of the other point of the device 2, i.e. upon movement of the device 2 in the direction V. The sequence of movements is exactly similar to that already described, except that the direction or rotation of the feed pinion is reversed.

WHAT WE CLAIM IS:—

1. A magazine feed mechanism for a magazine-type slide projector having means for receiving both rotary and linearly movable magazines arranged to move past the projector film gate in a direction substantially parallel to the optical axis of the projector, a slide change slider movable transversely to the optical axis, an indexing device pivotally mounted on the slide change

slider and stops located in the path of movement of the indexing device, the feed mechanism including two pawl sliders each mounted for independent linear longitudinal movement relative to the other, a pawl extending from each pawl slider, a contact surface on each pawl slider and a magazine feed pinion located for engagement by the pawls to move a magazine in a forward or reverse direction, wherein when the feed mechanism is located on the projector the indexing device is engageable with one or the other of the contact surfaces to move the corresponding pawl slider and pawl, which pawl engages the feed pinion to effect rotation thereof in one direction or the other and hence movement of a magazine in either the forward or reverse direction.

2. A mechanism as claimed in Claim 1, including a plurality of pins extending from the magazine feed pinion, the pawls being engageable with the pins for rotating the feed pinion.

3. A mechanism as claimed in Claim 1 or 2, wherein each pawl slider is provided with a slit engageable with a guide member, which slit is of such dimensions as to allow movement in directions both parallel and transverse to the direction of movement of the slide change slider and first and second springs mounted on the pawl sliders, the first spring being effective to bias its respective pawl slider towards the feed pinion and the second spring being effective to bias its respective pawl slider away from the magazine feed pinion.

4. A mechanism as claimed in any one of Claims 1 to 3, including a lug on each pawl slider on the end thereof in the region of the feed pinion, which lugs are engageable directly with the feed cogging of a magazine to lock the same in position at the end of an indexing operation.

5. A mechanism as claimed in Claim 1 or 2, wherein the degree of movement imparted to a magazine by the indexing device is dependent upon the movement of the respective pawl slider and the feed pinion.

6. A magazine feed mechanism substantially as described herein with reference to and as illustrated by Figures 1 and 2 of the accompanying drawings.

7. A magazine container for receiving circular slide magazines including a magazine feed mechanism as claimed in any one of Claims 1 to 6.

8. A magazine slide projector for receiving slide magazines and including a magazine feed mechanism as claimed in any one of Claims 1 to 6.

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