

SPECIFICATION

A photographic projector

- 5 The invention relates to a photographic projector of the kind including a stepping mechanism having a pinion which projects into a guide track for receiving an elongated transparency magazine and which is engageable with a rack on the magazine to transport the magazine in stepwise manner along the guide track.

In projectors of the kind specified, in order to prevent tilting or crabbing of the magazine during transport, it is necessary to provide longitudinal guides for the magazine. With known projectors for conventional magazines, these guides consist of lugs which project laterally into the magazine guide track and are engageable over the top edge of a longitudinally extending magazine wall which extends over only part of the transparency frame height and part of the magazine length. However, these conventional longitudinal guides are unsuitable for use with the transparency magazine proposed in our co-pending British Patent Application No. 7911936. Serial No. 2019598. It is, nevertheless, desirable that the guide track of a projector should be suitable for receiving and guiding the magazine disclosed in said co-pending Application as well as conventional magazines and further that the stepping mechanism should be capable without undue complication of transporting different types of magazine by their own specific and differing pitch lengths.

German Patent No. 12 79 964 describes a transparency projector, in which the magazine transporting pinion has two co-axial toothed crowns having differing pitch circle radii. The arrangement of the projector is such that, when one type of transparency magazine is inserted in the guide track, one of the toothed crowns automatically engages the rack of the magazine while, when a different type of magazine is inserted in the guide track, its rack is engaged by the other crown, thereby effecting automatic selection of the movement pitch for the relevant type of magazine. However, special guides for preventing tilting or crabbing as a result of the forces applied during magazine transport are not provided for the different types of magazine.

An object of the present invention is therefore to provide a photographic projector of the kind specified which will enable a transparency magazine of the type disclosed in our co-pending British Patent Application No. 7911936 Serial No. 2019598 to be transported along the projector guide track substantially without canting or crabbing. A further object is to provide a projector which will receive and accurately transport by means of the same stepping mechanism a magazine of the type disclosed in said co-pending Application No. 7911936 Serial No. 2019598 and a conventional magazine requiring a different length of movement between transparency changes.

The invention resides in a photographic projector including a stepping mechanism having a pinion which projects into a guide track for receiving an

elongated transparency magazine, and which is engageable with a rack provided on the magazine to transport the magazine in stepwise manner along the guide track, the guide track including lateral boundary walls formed with respective parallel guide grooves which extend in the direction of magazine transport and which are adapted to receive respective guide ribs projecting from the longitudinally extending sides of a magazine to be inserted in the guide track.

In the accompanying drawings, which illustrate a projector according to one example of the invention,

Figure 1 is a part sectional view of the magazine guide track of the projector, in which a standard elongated transparency magazine is received;

Figure 2 is a view similar to *Figure 1*, but with the guide track receiving a transparency magazine of the kind proposed in our co-pending Application No. 7911936, said magazine having a shorter pitch length than that of the standard magazine shown in *Figure 1*;

Figure 3 is a part sectional view of the drive pinion of the stepping mechanism of the projector, and

Figure 4 is a plan view of the drive pinion shown in *Figure 3*.

Referring to the drawings, the projector 1 is provided with an elongated magazine guide track in the form of a guide recess 10 having transparency lifting ramps 11a, 11b projecting from the base 13 of the recess. The ramps 11a, 11b are arranged so that when a standard elongated transparency magazine 2 (*Figure 1*) having transparencies received in compartments defined between laterally extending walls of the magazine, is inserted in the recess 10, the ramps 11a, 11b raise the transparencies to the required vertical position in the projection arrangement (not shown), and above the upper edge of a short side wall 12 of the magazine facing the projection arrangement. The magazine 2 slides on guide runners on the base 13 of the recess 10 or on flat guide surfaces arranged on the base. Guide lugs 14 project laterally into the magazine guide recess 10 and, when a standard magazine 2 is received in the recess 10, are engageable over the top edge of the short side wall 12 to retain the magazine 2 against dropping out of the recess 10 or vertical removal from the recess. To the extent so far described, the projector 1 is entirely conventional.

Extending into the guide recess 10 of the projector 1 is a drive pinion 15 which is operated by means of suitable switching components of a stepping mechanism (not shown) so as to be moved angularly through a given angle each time a transparency is to be changed. The drive shaft 16 of the pinion 15 extends perpendicular to the base 13 of the magazine guide recess 1 and hence to the magazine guide plane. The drive pinion 15 includes two concentric axially spaced toothed crowns 17 and 18 having differing pitch circle radii r_1 and r_2 determined by the anticipated pitch lengths of the different types of magazine to be inserted in the recess 10. The pitch circles are shown at t_1 and t_2 in *Figure 4*.

The crowns 17, 18 have the same number of teeth, the number being selected so that on each operation of the stepping mechanism the pinion 15 is trans-

ported by a single tooth of the crowns 17 and 18. The toothed crown 17 with the greater pitch circle radius r_1 is located adjacent the drive-shaft 19, while the toothed crown 18 with the smaller pitch circle radius r_2 is located on the free end of the pinion 15.

As may be seen in Figure 1, when a conventional transparency magazine 2 is inserted in the guide recess 10, the toothed crown 17 with the greater pitch circle radius r_2 engages a rack 20 on the underside of the magazine 2, so that on rotation of the pinion 15 by an arc corresponding to a single tooth pitch, the magazine 2 is transported by a relatively large switching step. The end of the pinion 15 carrying the second toothed crown 18 then projects alongside the ramp 11a into a groove 22 in the magazine 2, but terminates just short of the upper surface of the ramps 11a and 11b, so that the transparencies in the magazine are free to move laterally into and out of the projection arrangement to allow transparency changing.

In Figure 2, the projector 1 is shown with a magazine 2' of the kind disclosed in our co-pending Application No. 7911936 located in the guide recess 10. The magazine 2' is adapted to receive, in a closely packed arrangement, transparencies with frames having profiled edge portions which include at least one projection and at least one groove and which co-operate with complementary location means provided on the magazine 2' so that the transparencies are free to move in the direction of the arrow A to allow transparency changing, but are retained against removal from the magazine in a direction perpendicular to the arrow A. The magazine 2' includes outwardly projecting parallel guide ribs 23, 24 which engage in guide grooves 25, 26 (Figure 1) provided in the opposing lateral walls of the guide recess 10 and extending in the direction of magazine transport. The position of the grooves 25, 26 is such that, when the ribs 23, 24 are engaged therein, the lugs 14 engage the upper surface of the rib 23.

When the magazine 2' is located in the guide track 10, the lower toothed crown 17 with the greater pitch circle radius r_1 is inoperative, whereas the upper toothed crown 18 engages with a suitable rack 20' on the underside of the magazine 2'. It follows from the arrangement of the pinion 15 that the ratio of the length of the steps through which the transparency magazine 2' is driven by the toothed crown 18 to the length of the steps through which the transparency magazine 2 is driven by the toothed crown 17 is equal the ratio of the pitch circle radius r_2 to the pitch circle radius r_1 . The stepping mechanism always drives the pinion 15 at the same speed for each transparency change, and rotates the pinion through the same angle. The pitch length transmitted by the rack 20 or 20' to the magazine 2 or 2' will depend upon which toothed crown (17 or 18) is engaged with the relevant magazine rack.

As an alternative to the above example in which two toothed crowns are provided for two magazines of different pitch length, sufficient toothed crowns to cater for a larger number of different types of magazine, for instance three, may be located on the same pinion, with the pitch circle diameter reducing

in stages towards the free end of the pinion 15. In such a case, the design of the magazine operating in conjunction with the lowest and the uppermost toothed crowns would correspond to that of magazines 2 and 2' respectively according to Figures 1 and 2. The magazine operating in conjunction with the middle toothed crown would preferably have the guide components 23, 24 of the magazine 2' and would also be provided with a recess similar to the recess 22 of the magazine 2 for receiving the ramp 11a and the inoperative upper toothed crown of the pinion 15.

CLAIMS

1. A photographic projector including a stepping mechanism having a pinion which projects into a guide track for receiving an elongated transparency magazine and which is engageable with a rack provided on the magazine to transport the magazine in stepwise manner along the guide track, the guide track including lateral boundary walls formed with respective parallel guide grooves which extend in the direction of magazine transport and which are adapted to receive respective guide ribs projecting from the longitudinally extending sides of a magazine to be inserted in the guide track.
2. A projector as claimed in Claim 1, wherein the guide grooves are located at a distance from the base surface of the magazine guide track.
3. A projector as claimed in Claim 1 or Claim 2, and further including guide lugs projecting into the guide track so as to be engageable with the upper edge of one of the guide ribs of said first-mentioned magazine or with a longitudinally extending side wall of a different type of magazine which can be used in the projector.
4. A projector as claimed in any preceding Claim, wherein the pinion includes at least two toothed crowns having different pitch circle radii and a drive shaft which extends perpendicular to the base of the guide track such that the toothed crown with the smallest pitch circle radius projects furthest from the base of the guide track.
5. A projector as claimed in Claim 4, wherein a transparency lifting ramp projects from the base of the guide track and the end of the pinion carrying the toothed crown with the smallest pitch circle radius terminates below the upper surface of said ramp.
6. A photographic projector as claimed in Claim 1 containing the combination and arrangement of parts substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.



ported by a single tooth of the crowns 17 and 18. The toothed crown 17 with the greater pitch circle radius r_1 is located adjacent the drive-shaft 19, while the toothed crown 18 with the smaller pitch circle radius r_2 is located on the free end of the pinion 15.

As may be seen in Figure 1, when a conventional transparency magazine 2 is inserted in the guide recess 10, the toothed crown 17 with the greater pitch circle radius r_2 engages a rack 20 on the underside of the magazine 2, so that on rotation of the pinion 15 by an arc corresponding to a single tooth pitch, the magazine 2 is transported by a relatively large switching step. The end of the pinion 15 carrying the second toothed crown 18 then projects alongside the ramp 11a into a groove 22 in the magazine 2, but terminates just short of the upper surface of the ramps 11a and 11b, so that the transparencies in the magazine are free to move laterally into and out of the projection arrangement to allow transparency changing.

In Figure 2, the projector 1 is shown with a magazine 2' of the kind disclosed in our co-pending Application No. 7911936 located in the guide recess 10. The magazine 2' is adapted to receive, in a closely packed arrangement, transparencies with frames having profiled edge portions which include at least one projection and at least one groove and which co-operate with complementary location means provided on the magazine 2' so that the transparencies are free to move in the direction of the arrow A to allow transparency changing, but are retained against removal from the magazine in a direction perpendicular to the arrow A. The magazine 2' includes outwardly projecting parallel guide ribs 23, 24 which engage in guide grooves 25, 26 (Figure 1) provided in the opposing lateral walls of the guide recess 10 and extending in the direction of magazine transport. The position of the grooves 25, 26 is such that, when the ribs 23, 24 are engaged therein, the lugs 14 engage the upper surface of the rib 23.

When the magazine 2' is located in the guide track 10, the lower toothed crown 17 with the greater pitch circle radius r_1 is inoperative, whereas the upper toothed crown 18 engages with a suitable rack 20' on the underside of the magazine 2'. It follows from the arrangement of the pinion 15 that the ratio of the length of the steps through which the transparency magazine 2' is driven by the toothed crown 18 to the length of the steps through which the transparency magazine 2 is driven by the toothed crown 17 is equal to the ratio of the pitch circle radius r_2 to the pitch circle radius r_1 . The stepping mechanism always drives the pinion 15 at the same speed for each transparency change, and rotates the pinion through the same angle. The pitch length transmitted by the rack 20 or 20' to the magazine 2 or 2', will depend upon which toothed crown (17 or 18) is engaged with the relevant magazine rack.

As an alternative to the above example in which two toothed crowns are provided for two magazines of different pitch length, sufficient toothed crowns to cater for a larger number of different types of magazine, for instance three, may be located on the same pinion, with the pitch circle diameter reducing

in stages towards the free end of the pinion 15. In such a case, the design of the magazine operating in conjunction with the lowest and the uppermost toothed crowns would correspond to that of magazines 2 and 2' respectively according to Figures 1 and 2. The magazine operating in conjunction with the middle toothed crown would preferably have the guide components 23, 24 of the magazine 2' and would also be provided with a recess similar to the recess 22 of the magazine 2 for receiving the ramp 11a and the inoperative upper toothed crown of the pinion 15.

CLAIMS

1. A photographic projector including a stepping mechanism having a pinion which projects into a guide track for receiving an elongated transparency magazine and which is engageable with a rack provided on the magazine to transport the magazine in stepwise manner along the guide track, the guide track including lateral boundary walls formed with respective parallel guide grooves which extend in the direction of magazine transport and which are adapted to receive respective guide ribs projecting from the longitudinally extending sides of a magazine to be inserted in the guide track.
2. A projector as claimed in Claim 1, wherein the guide grooves are located at a distance from the base surface of the magazine guide track.
3. A projector as claimed in Claim 1 or Claim 2, and further including guide lugs projecting into the guide track so as to be engageable with the upper edge of one of the guide ribs of said first-mentioned magazine or with a longitudinally extending side wall of a different type of magazine which can be used in the projector.
4. A projector as claimed in any preceding Claim, wherein the pinion includes at least two toothed crowns having different pitch circle radii and a drive shaft which extends perpendicular to the base of the guide track such that the toothed crown with the smallest pitch circle radius projects furthest from the base of the guide track.
5. A projector as claimed in Claim 4, wherein a transparency lifting ramp projects from the base of the guide track and the end of the pinion carrying the toothed crown with the smallest pitch circle radius terminates below the upper surface of said ramp.
6. A photographic projector as claimed in Claim 1 containing the combination and arrangement of parts substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.