Dec. 22, 1931. G. J. KOHLMEIER 1,837,223

SELF ALIGNING ROLLER FOR DEVELOPING MACHINES

Filed Oct. 11, 1930

Fig. 1.

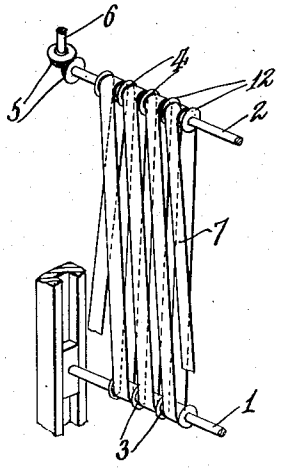


Fig. 2.

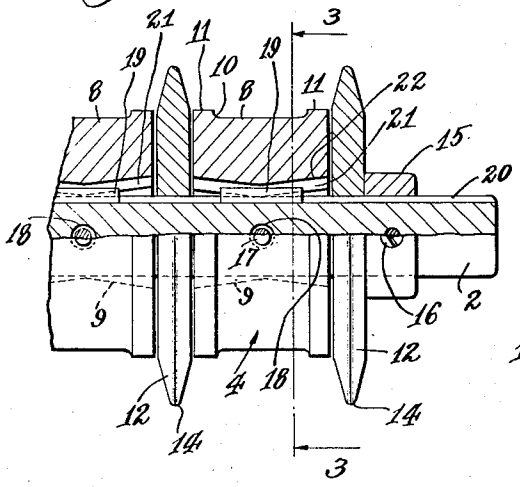
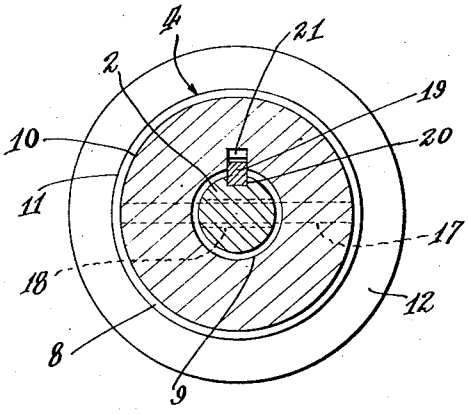


Fig. 3.



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UNITED STATES PATENT OFFICE

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SELF-ALIGNING ROLLER FOR DEVELOPING MACHINES

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This invention relates to developing machines and more particularly to developing machines of the type wherein the film is caused to travel in a spiral path, or through a series of spiral paths, and to the use of means in such developing machine for the purpose of maintaining uniform tensions over the surface of the film as it travels through such spiral path.

In developing machines as heretofore made and used, rollers have been employed for the purpose of guiding and driving the film therethrough as it is caused to travel through the different developing, rinsing, fixing and washing tanks and through the drier thereof, the film being caused to travel through said developing apparatus and like apparatus in a spiral track.

When the film is thus passed through these developing machines in a spiral track, tension has been developed at one edge of the film due to the fact that the rollers, whether guide rollers or driven rollers used for guiding and driving the film, have been mounted in horizontal planes while the films have been traveling due to the spiral path through which they are passed in a direction at an angle to the horizontal on passing over the guide or driven rollers.

It is therefore an object of this invention to provide in a developing or like film handling apparatus a means for guiding and driving the films as they are passed spirally through such apparatus which will automatically adjust itself to the direction of travel of the film.

Another object of this invention is to provide a self-aligning roller for developing machines or similar film handling apparatus which is adapted to engage and guide or drive the film from the edges thereof, and which is provided with an oppositely tapered bore on its inner periphery permitting the said roller to rock upon the shaft upon which it is supported, or by which it is driven to automatically compensate for the angularity of the film from the horizontal as it travels through such spiral path.

Other objects and advantages of this invention it is believed will be apparent from the following detailed description of a preferred embodiment thereof as illustrated in the accompanying drawings;

In the drawings:

Figure 1 is a perspective view diagrammatically illustrating a film carriage unit removed from a developing or similar film treating apparatus.

Figure 2 is a fragmental elevation partly in section of a roller assembly detached from the film carriage unit.

Figure 3 is an end sectional view taken substantially on the line 3—3 of Figure 2.

In the preferred embodiment of my invention illustrated in the accompanying drawings there is illustrated a film carriage unit which includes spaced shafts 1 and 2 upon which rollers 3 and 4 are mounted. The shafts 1 and 2 are usually, but not always, vertically spaced, and one of said shafts, for example, the shaft 2, is driven by means of gears 5 from a countershaft 6. The countershaft 6 is driven in any suitable or desirable manner from a shaft which extends in position to drive a series of such film carriage units. The film 7 is spirally passed over the rollers 3 and 4 so that the film is caused to travel in a spiral path.

The film in traveling in such spiral path passes over the rollers 3 and 4 mounted upon the shafts 1 and 2 at an angle to the axis of rotation of the shafts 1 and 2 upon which the rollers are mounted. The angle of deviation from the axis of the shafts upon which the rollers are mounted increases as the shafts 1 and 2 are brought closer together. In many forms of film developing machines, or film treating apparatus, a floating shaft is employed in some cases for the driven rollers, and in some cases for the idler rollers, so that the angle of deviation from the horizontal or axis of the shaft varies continuously through the processing of the film.

The rollers embodied in this invention are both driven and idler rollers, the construction of which rollers is similar except that in the case of the idler rollers the rollers may be free to rotate upon the shaft 1 upon which they are mounted. In the case of the

driven rollers, they are secured to the driven shaft.

In view of the foregoing it is believed only necessary to specifically set forth the construction of one of said rollers, for example, a driven roller, as it includes the elements of the idler roller and also includes the elements of the driven roller.

Each of the rollers includes a self-aligning spool 8 the bore of which is tapered from substantially the mid-point of the rollers as indicated at 9 so that the self-aligning spool fits the shaft only at the center portion or the portion of minimum diameter. The spool 8 is undercut as indicated at 10 to provide spaced annular flanges at its opposed ends upon which the film being processed rides at the sides of the film, the center portion being undercut for the purpose of avoiding contacting the emulsion face or faces of the film.

In order to maintain the film on the spools 8, there are provided on the shafts of the structure flanged members 12 positioned on the shaft between the spaced spools 8, the distance between the spaced spools being greater than the width of the flange members 12 and the flange members 12 are loosely journaled on the shafts so that they may slide back and forth upon the shafts to or from the spools 8 as the spools 8 alter their positions on the shafts in accordance with the direction of travel of the film thereover. The flange members 12 are beveled to a point from their opposite faces above the annular flanges 11 of the spools 8 as indicated at 14. The beveling of the flanges permits the film to pass under the spools at such angles as may be required for the film to follow the required spiral path.

The self-aligning rollers thus formed are maintained from endwise movement upon the shafts by means of retaining or thrust collars 15 which are pinned to the shafts by means of pins 16. In the case of both the idler and driven rollers, two of such thrust collars 15 are mounted one at each end of the roller assembly on the shaft.

In case of the driven rollers, the rollers are pinned to the shaft by means of pins 17 which are fitted within the bores 18 formed in the shaft 2 and fit within enlarged bores of the diameter sufficiently larger than the diameter of the pins formed in the spool portions 8 of the rollers permitting the rollers to rock freely on the shafts 2 to align the rollers with the angular travel of the film 7.

Keys 19 are likewise provided which fit keyways 20 formed in the shaft and likewise fit keyways 21 formed from the inner periphery of the bore of the spools 8. The keyways within which the keys are fitted are beveled as indicated at 22 to correspond with the bevel formed from the inner periphery of the bore of the spools 8 so as to permit the keying of the rollers to the shaft without restricting the movement of the spool portions 8 of the rollers on said shafts.

Having fully described my invention, it is to be understood that I do not wish to be limited to the details herein set forth, but my invention is of the full scope of the appended claims.

I claim:

1. In a film carriage, the combination of a pair of spaced shafts, means for driving one of said shafts, self-aligning rollers mounted on said shafts, and means for mounting said self-aligning rollers on said shafts to permit the periphery of said rollers to align with the film as it passes over said rollers.

2. In a self-aligning roller, the combination of a spool member, a shaft on which the spool member is adapted to be mounted, flanges on said shaft at the opposed ends of said spool member, and a spool member having its axial bore beveled outwardly from an intermediate portion thereof to permit the spool member to rock transversely of said shaft.

3. In a device of the class described, the combination of a shaft, a spool member mounted in the shaft, the spool member being provided at its intermediate portion with its undercut perimeter and at its edges with spaced annular flanges, and the axial bore of the spool member being tapered outwardly from an intermediate portion thereof to permit the spool member to rock on the shaft.

4. In a device of the class described, the combination of a shaft, a spool member mounted in the shaft, the spool member being provided at its intermediate portion with its undercut perimeter and at its edges with spaced annular flanges, the axial bore of the spool member being tapered outwardly from an intermediate portion thereof to permit the spool member to rock on the shaft, and means for connecting the spool member with the shaft in driving and driven relation.

5. In a device of the class described, the combination of a shaft, a spool member mounted in the shaft, the spool member being provided at its intermediate portion with its undercut perimeter and at its edges with spaced annular flanges, the axial bore of the spool member being tapered outwardly from an intermediate portion thereof to permit the spool member to rock on the shaft, the shaft being provided with a keyway, a keyway formed in the spool member tapered outwardly from an intermediate portion to receive a key mounted in the keyway.

6. In a device of the class described, the combination of a shaft, a spool member mounted in the shaft, the spool member being provided at its intermediate portion with its undercut perimeter and at its edges with spaced annular flanges, the axial bore of the spool member being tapered outwardly from

an intermediate portion thereof to permit the spool member to rock on the shaft, the shaft being provided with a keyway, a keyway formed in the spool member tapered outwardly from an intermediate portion to receive a key mounted in the keyway, and a pin passed through the shaft and through the spool member.

7. In a device of the class described, the combination of a shaft, a spool member mounted in the shaft, the spool member being provided at its intermediate portion with its undercut perimeter and at its edges with spaced annular flanges, the axial bore of the spool member being tapered outwardly from an intermediate portion thereof to permit the spool member to rock on the shaft, the shaft being provided with a keyway, a keyway formed in the spool member tapered outwardly from an intermediate portion to receive a key mounted in the keyway, a pin passed through the shaft and through the spool member, and a pair of independent flange members mounted on said shaft at the opposed ends of said spool member.

Signed at Los Angeles, California, this 4th day of October, 1930.

GEORGE J. KOHLMEIER.