C. A. SENTOU AND E. JACQUET.

MACHINE FOR TREATING PHOTOGRAPHIC MOVING PICTURE FILMS.

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1,385,403.

Patented July 26, 1921.

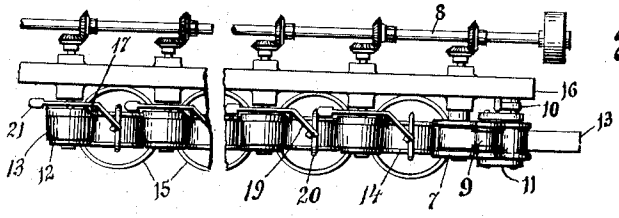


Fig. 2.

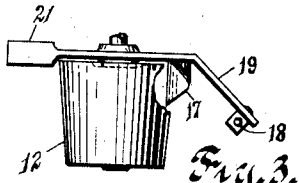


Fig. 3.

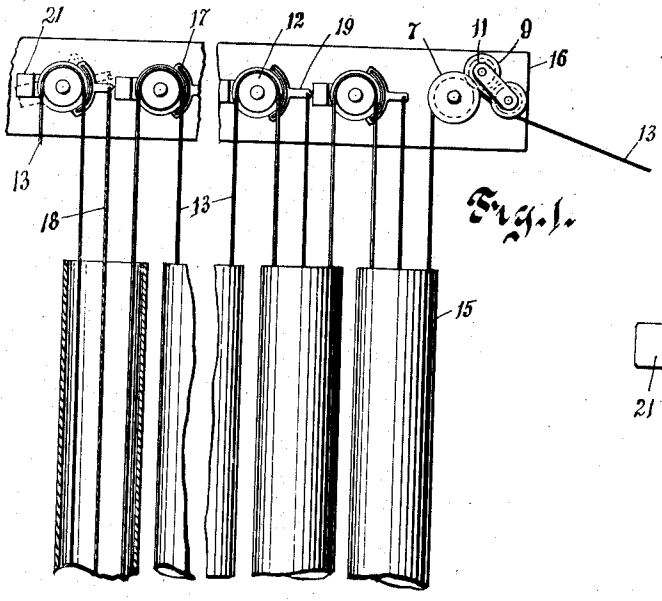


Fig. 1.

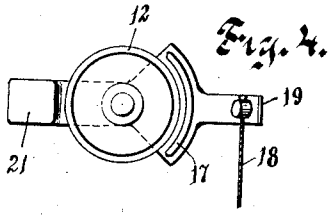
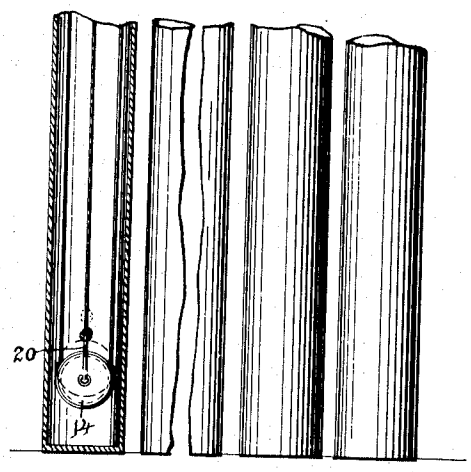


Fig. 4.



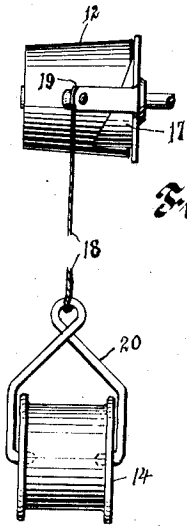


Fig. 5.

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MACHINE FOR TREATING PHOTOGRAPHIC MOVING-PICTURE FILMS.

1,385,403. Specification of Letters Patent. Patented July 26, 1921.

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To all whom it may concern:

Be it known that we, CAMILLE A. SENTOU and ETIENNE JACQUET, both citizens of the Republic of France, and residents of Fort Lee, county of Bergen, and State of New Jersey, have invented a new and Improved Machine for Treating Photographic Moving-Picture Films, of which the following is a full, clear, and exact description.

An object of our invention is to provide a machine of the character mentioned which will eliminate the wear upon the perforations of the film and reduce chances of rupturing the film, while the same is subjected to developing, fixing, tinting and drying.

An object of the invention is to provide a festoon or loop-forming machine, which machine has means adapted to maintain the length of the loops or festoons substantially constant, while the said loops or festoons are subjected to different solutions, or being dried, and in consequence may vary the length due to the treatment.

To attain the different objects of our invention we utilize as driving members for the propulsion of the film, smooth surface driving members, in lieu of utilizing toothed members as is common in machines of this type hitherto employed. Means are provided between adjacent driving members to continuously maintain a festoon or loop between and below the said driving members. The portion of the film below the said driving members while in motion is being treated in suitable tubes or vats, provided with the proper chemicals, or is dried in a suitable chamber.

In view of the fact that the materials forming the loops of the film are subjected to different chemicals during their propulsion, and the material of the film not being absolutely uniform, the deformation in the body of the film causes shortening of some of the loops and lengthening of others. In view of this it is necessary to provide some means whereby the lengthening and shortening of the loops is to be prevented by varying the speed of the film in motion, in proximity of these loops where the shortening or lengthening takes place.

The change in speed may be obtained by presenting a contact surface to the film which has a varying peripheral speed, although the speed of the axis remains constant.

One form of such arrangement is disclosed in the appended drawing in which similar character references indicate corresponding parts of the different figures in the drawing, and in which—

Figure 1 is an elevation of a fragment of a machine embodying one form of our invention,

Fig. 2 is a plan of the fragment, as shown in Fig. 1,

Fig. 3, is an enlarged plan of one of the driving members, and means associated therewith for varying the speed of the film while the driving member is rotating at constant speed.

Fig. 4 is a front elevation of the driving member and cam, and

Fig. 5, is a side elevation of the said driving member and compensating means.

Before proceeding to a more detailed description of the form of the invention illustrated, it must be understood that the film is fed to the machine or from the machine, at a constant speed by any suitable means. For this purpose, we provide a smooth cylindrical member 7, driven at constant peripheral speed from the master shaft 8. The contact of the film 13 with the cylinder is maintained by a pressure roller 9 which is held against the cylinder 7 by a yielding member 10, coöperating in any suitable manner with the frame 11, which carries the rollers. This arrangement permits us to feed a constant length of film per unit of time. The driving members 12 which follow the film feeding device are truncated cones driven also from the master shaft 8. The said driving members are spaced so that festoons or loops 13′ may be formed therebetween by means of spools or rollers 14 which form the weights for maintaining the loops, these loops being adapted to immerse in tubes 15 disposed below the frame 16, which carries the propulsion mechanism for the film.

It is self evident that the loops in the drying chamber may be said to be immersed in the air which dries them. The driving members 12 being revolved at a constant speed, the speed of the film will be greater when it passes the portion of the cone which

is nearer to the large base of the driving members, and it is self evident that the normal tendency of the moving film at all times is to ride toward the larger base of the driving members. Therefore, by regulating the position of the film on the conical surface of the driving members, it is possible to vary the speed of the film itself, although the driving members are rotating at constant speed, thereby preventing the shortening or elongating of the loops 13, within a predetermined limit.

To control the position of the film on the conical driving members, we provide a cam 17 for each driving member, which is preferably mounted to oscillate about the axis of the corresponding driving member, and which cam is adapted to bear against the edge of the film nearest to the larger base of the corresponding driving member. The cam itself is in the shape of an inclined plane preferably arcuated to be coaxial with the driving member, and by varying the angular position of the cams it is possible to allow the film to move laterally on the driving members while the film is propulsed, the frictional engagement of the edge of the film with the cam being negligible.

The angular movement of each cam is controlled from the spool 14 which the cam overhangs, through the medium of a flexible member 18, one end of which is connected to an arm 19 of a corresponding cam, and the other end to a yoke 20 which bears in the corresponding spool. Each of the cams is provided with corresponding counterbalances 21 to render the movement of the cam more responsive to the changes of length of the loops 13 which may take place due to its uneven expansion or contraction caused by the treatment of the film with liquids, or while drying. From the description it will be seen that if a loop 13 begins to shorten, the shortening of the loop will carry therewith a spool 14, thereby permitting the counterbalance 21 of the corresponding cam to move the cam 17 angularly, and in consequence move the film laterally on the corresponding driving member 12 toward the smaller base of the driving member. Due to this lateral displacement of the film on the driving member, the speed of the film on the said driving member will be reduced thereby preventing the shortening of the corresponding loop. On the other hand, if a loop 13 lengthens it permits a spool 14 to descend, in consequence carrying therewith the cam and permitting the film to ride on the conical surface laterally toward the larger base of the conical driving member, thereby increasing the speed of the film, and, in consequence preventing the lengthening of the corresponding loop.

In spite of the fact that we have described a specific form of our invention, we do not want to be limited to a specific structure thereof, for the reason that we have pointed out previously that the same results may be accomplished by a similar device with substantially little variation.

We claim:

1. In a machine of the class described, means for propulsing a film, means for forming a loop in the film, and means associated with the film propulsion means and operated from the loop forming means to vary the speed of the film so as to maintain substantially constant the length of the loop.

2. In a machine of the class described, means for propulsing a film, gravitational means for forming a loop in the moving film and means associated with the film propulsion means and operated from the loop forming means to vary the speed of the film so as to maintain substantially constant the length of the loop.

3. In a machine of the class described, smooth surface driving means, means for proplusing a film, means for forming a loop in the moving film, and means associated with the smooth surface driving means and operated from the loop forming means to vary the speed of the film so as to maintain a loop of substantially constant length.

4. In a machine of the class described, film propulsion means adapted to have varying peripheral speeds, means for forming a loop in the moving film and means associated with the film propulsion means and operating from the loop forming means to affect the position of the film on the driving means so as to maintain a loop of substantially constant length.

5. In a machine of the class described, a driving cone for propulsing a film, gravitational means for forming a loop in the moving film and means associated with the cone and operating from the loop forming means to move the film laterally on the cone so as to maintain a loop of substantially constant length.

6. In machine of the class described, a driving cone for propulsing a film, means for forming a loop in the film below the driving cone, a cam adapted to engage an edge of the film to move the film laterally of the cone and means for moving the cam operable from the loop forming means.

7. In a machine of the class described, a driving cone for propulsing a film, a spool for forming a loop in the film below the driving cone, a cam mounted to oscillate in proximity of the cone and adapted to engage the edge of the film on the cone to move the film laterally on said cone, and a flexible member connecting the spool to the cam.

8. In a machine of the class described, a smooth surface driving member for pro-

pulsing a film, gravitational means for forming a loop in the film below the driving member, means associated with the driving member and operable from the loop forming member and adapted to affect the speed of the film so as to maintain a loop of substantially constant length.

9. In a machine of the class described, a smooth surface driving member, means for driving the said member at a constant speed, gravitationally operable means for forming a loop in the film below the driving member, means associated with the driving member and adapted to engage the film to affect the position of the film on the driving member, and motion transmission means connecting the loop forming means to the means for varying the position of the film on the driving member.

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