March 1, 1932. L. HORST 1,847,833

APPARATUS FOR APPLYING SOLUTIONS

Filed Oct. 18, 1929 2 Sheets-Sheet 1

FIG. 1.

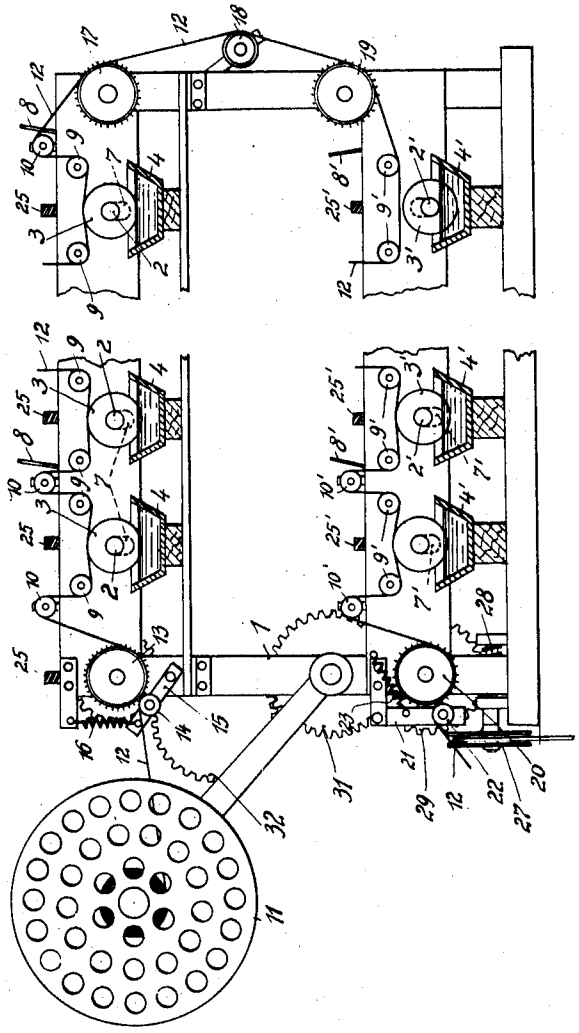

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FIG. 2.

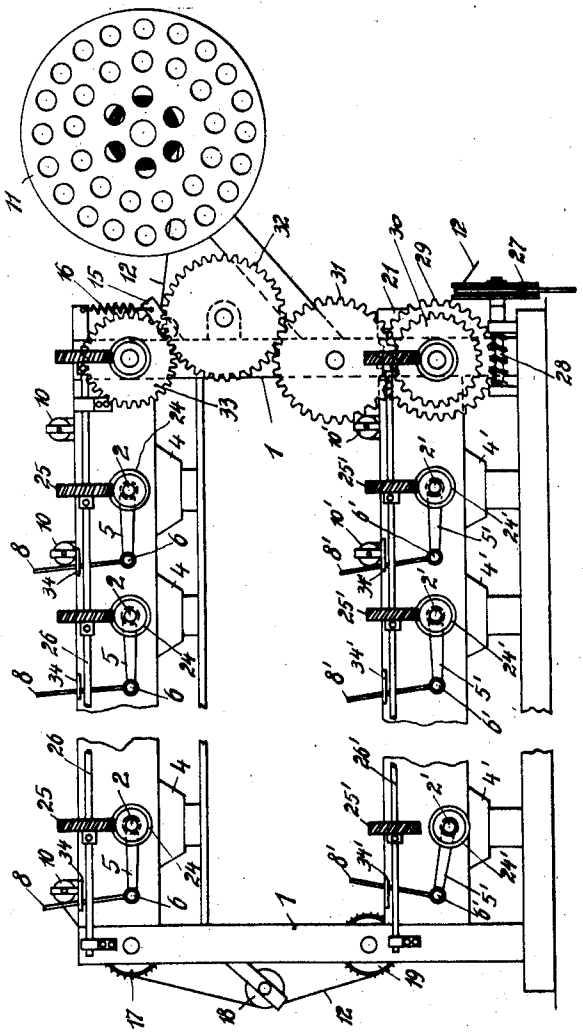
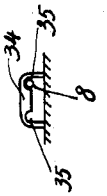


FIG. 3.



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Patented Mar. 1, 1932

1,847,833

UNITED STATES PATENT OFFICE

LUDWIG HORST, OF BERLIN-STEGLITZ, GERMANY, ASSIGNOR TO "SIRIUS" KLEUREN-FILM-MAATSCHAPPIJ, OF BOSCH EN DUIN, NETHERLANDS

APPARATUS FOR APPLYING SOLUTIONS

Application filed October 18, 1929, Serial No. 400,662, and in Germany August 20, 1928.

My invention relates to improvements in apparatus for applying solutions, more particularly of coloring solutions and varnishes to color motion-picture films.

By the machine or apparatus according to my invention the application of the solution is effected in a single cycle of operations in such a manner that first one side of the film is treated with the solution and then the other. My machine is particularly suitable for the manufacture of multi-color films. If, for instance, a subtractive two-color film is to be colored on a positive film sensitized on both sides, the mordanted or dark silver salts constituting the image are first colored on one side of the film with one dye solution and then on the other side with the other dye solution.

My improved machine is illustrated diagrammatically in the accompanying drawings. In the drawings:

Fig. 1 is a front elevation of the improved machine with one of the sides of the frame structure removed and the troughs shown in section.

Fig. 2, a rear view of the same, and

Fig. 3, a detail on a larger scale.

In the frame 1 of the machine there are journaled the dye solution applying rollers 3 upon spindles 2. These rollers 3 dip into troughs 4 containing the dye solution and their spindles are journaled in arms 5 of bell-crank levers adapted to rock upon pivot pins 6 fixed on the side-walls of the machine frame. The spindles of the rollers pass through the sidewalls of the frame and are guided in short slots 7 provided therein. By operating the other arms 8 of the bell-crank levers the rollers may be moved up and down. Above and at the side of each roller there are provided guide rollers 9 and between guide rollers of two coloring rollers a further guide roller 10.

The film 12 unwound from the reel 11 passes over the sprocket feed roller 13. 14 is a roller journaled in a pivoted arm 15 which by means of a spring 16 presses the film 12 against the sprocket roller 13 to maintain them in engagement with the film perforations. At the other end of the machine the film runs over a sprocket roller 17 and is passed downwards across a roller 18 and a further sprocket roller 19 and conducted over a second row of coloring and guide rollers 2′, 3′. Underneath each coloring roller 2′ there are again provided troughs 4′ containing dye solutions. At the end of this second row of rollers there is provided a roller 20 across which the film is passed on to the taking up reel. The accurate guidance of the film is effected by a roller 22 pivoted in a suspended arm 21 and pulled against the roller 22 by a spring 23.

On the spindle of each roller there is, preferably in the rear of the machine frame, see Fig. 2, provided a worm 24 or 24′ respectively in engagement with a wormwheel 25 or 25′ respectively. The wormwheels 25 of the upper row of rollers are keyed to a transverse shaft 26 journaled on the machine frame and the wormwheels 25′ of the lower row to a transverse shaft 26′. The shafts 26, 26′ are driven from any suitable source of power by means of a strap pulley 27, worm 28, wormwheel 29 and the spur wheels 30, 31, 32, 33.

The arms 8 of the bellcrank levers are guided in slotted links 34, 34′ secured to the machine frame, see in particular Fig. 3 of the drawing showing them on an enlarged scale. Each link is provided with two notches 35 in which the arms 8 of the bell-crank levers are arrested in one of their end positions.

On the upper row of rollers the film is colored on one side while the other side is colored while the film passes over the lower row of rollers.

The troughs contain solutions of different dyes. In accordance with the color to be applied to the film one or the other of the respective rollers is raised by means of the bellcrank lever 5, 8 and brought in contact with the film. Simultaneously with the raising or lowering of the coloring roller its driving gear is thrown into or out of engagement, so that a coloring roller not in contact with the film does not rotate, as shown in Fig. 1 at the right-hand lower roller and in Fig. 2 at the left-hand lower roller. The rollers are preferably made shorter than the width of the film so that the film perforations are

not completely covered by the rollers, for the purpose of avoiding collection of the liquid in the perforations.

It will be understood that brushes and the like may be used instead of the rollers for applying the solutions.

I claim as my invention:

1. In a machine for applying fluid to both sides of a motion picture film, separate sets of color applying devices, film feeding and guiding means for presenting one side of the film to one set of devices and the opposite side of the film to the other set of devices, each set of coloring devices including a plurality of rollers and stationary fluid troughs, and means movably mounting each roller permitting manual adjustment of the latter with respect to a moving film.

2. In a machine for applying fluid to both sides of a motion picture film, separate sets of color applying devices, film feeding and guiding means for presenting one side of the film to one set of devices and the opposite side of the film to the other set of devices, each set of coloring devices including a plurality of rollers and stationary fluid troughs, and means movably mounting each roller permitting manual adjustment of the latter with respect to a moving film, and common drive means for the coloring devices of each set.

3. In a machine for applying fluid to both sides of a motion picture film, separate sets of color applying devices, film feeding and guiding means for presenting one side of the film to one set of devices and the opposite side of the film to the other set of devices, each set of coloring devices including a plurality of rollers and stationary fluid troughs, and means movably mounting each roller permitting manual adjustment of the latter with respect to a moving film, common drive means for the coloring devices of each set, the driving connection between the drive means and the individual rollers being interrupted upon displacement of the rollers to inoperative position.

4. In a machine for applying fluid to both sides of a motion picture film, separate sets of color applying devices, film feeding and guiding means for presenting one side of the film to one set of devices and the opposite side of the film to the other set of devices, each set of coloring devices including a plurality of rollers and stationary fluid troughs, and means movably mounting each roller permitting manual adjustment of the latter with respect to a moving film, and means for driving the first roller of each set in the direction of travel of the film and the following rollers in the opposite direction.

5. In a machine for applying fluid to both sides of a motion picture film, separate sets of color applying devices, film feeding and guiding means for presenting one side of the film to one set of devices and the opposite side of the film to the other set of devices, each set of coloring devices including a plurality of rollers and stationary fluid troughs, and means movably mounting each roller permitting manual adjustment of the latter with respect to a moving film, the sets of rollers being superposed one above the other in the machine and the film being passed in one direction across one set of rollers and back in the opposite direction across the other set of rollers.

In testimony whereof I have affixed my signature.

LUDWIG HORST.