May 6, 1924.

D. F. COMSTOCK

1,493,246

REMOVAL OF SUPERFICIAL LIQUID FROM CINEMATOGRAPHIC FILMS

Filed Sept. 1, 1921

FIG. 1.

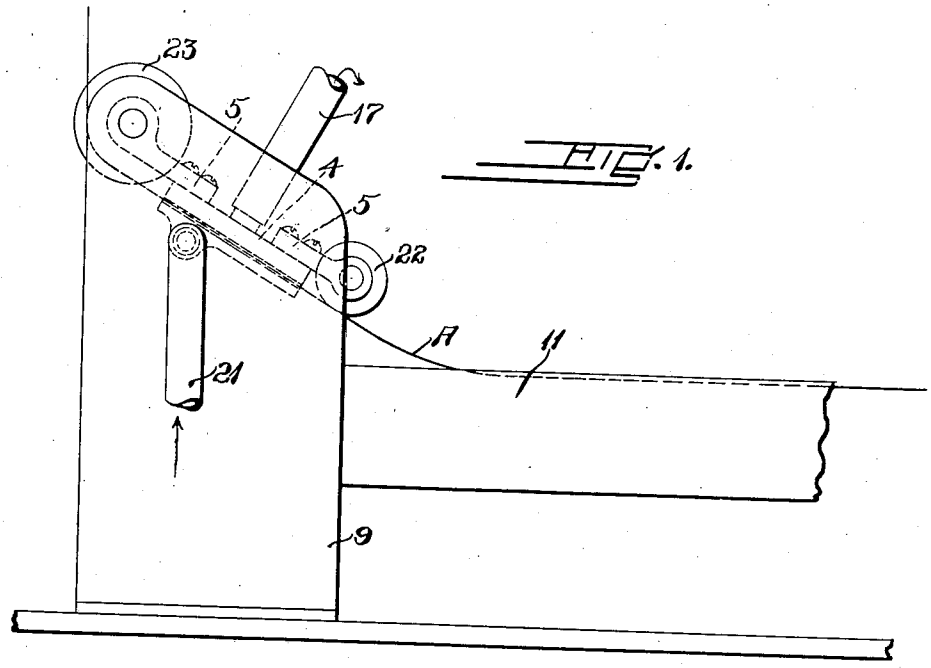


FIG. 3.

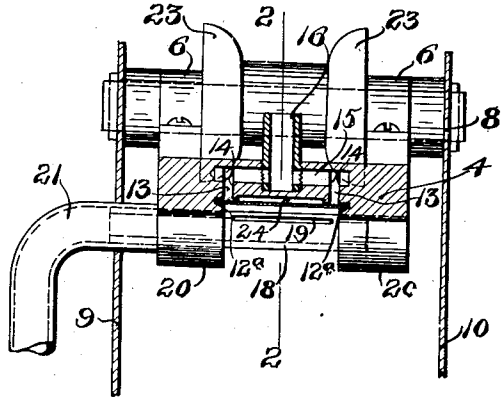


FIG. 2.

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his attys.

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UNITED STATES PATENT OFFICE.

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REMOVAL OF SUPERFICIAL LIQUID FROM CINEMATOGRAPHIC FILMS.

Application filed September 1, 1921. Serial No. 497,703.

To all whom it may concern:

Be it known that I, DANIEL F. COMSTOCK, a citizen of the United States of America, and resident of Cambridge, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Removal of Superficial Liquid from Cinematographic Films, of which the following is a specification.

This invention relates particularly to the removal of superficial liquid from one side of a film, which is wet only upon one side, but in certain aspects the invention is capable of use in removing superficial liquid from films which have been wet upon both sides.

In preparing color pictures, particularly motion pictures, it is sometimes desirable to apply a liquid to one side of the film without wetting the opposite side. For example, in making a cinematographic film having a series of pictures on one side representing one color aspect of a scene and having a complemental series of pictures on the other side representing another color aspect, it is essential, in staining the series of images different colors respectively, that each dye be wholly confined to one side. The best way of applying dye (or other liquid) to one side of a film at a time, so far as I am aware, is to float the film first on one dye and then, with the film turned over, on the other dye, as disclosed in application Ser. No. 497,590, filed on even date herewith.

When a cinematographic film is treated as aforesaid considerable liquid adheres to the wet side and capillary pellicles of the liquid bridge the sprocket holes as the film leaves the surface of the liquid. These capillary pellicles burst soon after the film leaves the surface of the liquid and in bursting they frequently spatter liquid over the dry side of the film, thereby seriously damaging the film. When the liquid comprises a dye it is essential to remove the excess dye superficially adhering to the surface to prevent it from drying on the film.

Objects of the present invention are to remove all superficial liquid from the treated side of a film, to remove this liquid without forcing it upon the opposite or untreated side of the film, to break the capillary pellicles of liquid over the sprocket holes before they burst, to intercept the spatter of liquid resulting therefrom and prevent its contact with the adjoining portions of the film, and in general to avoid spotted, blotched, streaked or otherwise imperfect films resulting from an imperfect removal of surface liquid.

The invention involves the step, in the liquid treatment of cinematographic films wherein capillary pellicles of liquid bridge the sprocket holes, of artificially breaking the pellicles, as by an air current or by suction, before they burst. It further involves the step of restraining the liquid of the pellicles from spattering on at least one side of the film when they burst and of simultaneously carrying the liquid of the pellicles away from the film.

The invention comprises means for breaking the film of liquid over the sprocket holes of a cinematographic film emerging from a liquid treatment and for removing the superficial liquid therefrom. It further comprises means for preventing the splash of the liquid over the adjoining portions of the film. It further comprises means for rolling back the superficial liquid from the treated face of the film. More particularly it comprises suction means disposed on one side of the film in line with the sprocket holes for breaking the films of liquid thereacross, together with surfaces or walls for intercepting the resulting spatter of liquid and preventing its contact with the adjoining portions of the film, and a blower for sweeping the opposite face of the film clear of surface liquid.

It has been found that when the film of liquid over the sprocket holes has first been broken or removed as by suction, the surface liquid can then be rolled back as by a jet of air, and the wave or roll of liquid will not be forced through the sprocket holes but will blow around them.

As an illustration of the invention one concrete embodiment thereof is shown in the accompanying drawings, in which—

Fig. 1 is an elevational view;

Fig. 2 is a longitudinal sectional view on the line 2—2 of Fig. 3; and

Fig. 3 is a transverse sectional view on the line 3—3 of Fig. 2.

The particular embodiment of the invention chosen for the purpose of illustration

comprises a block 4 supported by brackets 5 having integral collars 6 which encircle shafts 7 and 8 mounted on spaced supports 9 and 10 at one end of treatment trough 11. The block is recessed on the lower side to form a guideway for the film A issuing from trough 11. The block preferably has flanges 12^a projecting inwardly at the lower part of the recess to form supports for the edges of the film. Extending longitudinally of the block and directly above the sprocket holes in the film are elongate slots 13 of the shape and extent indicated by the dotted line in Fig. 2, the slots having straight side walls 14 and being connected by a bore 15. Threaded into the top of the block 4 and connected with the transverse bore 15 is a pipe connection 16 to which is attached a flexible tube 17 extending to an exhaust pump or other suction means, not shown. Disposed below the block 4 and transversely thereof is a nozzle 18 having an elongate slotted opening 19 disposed at an angle of approximately 45° toward the film A as it issues from the treatment trough 11. The nozzle is suitably supported upon the block 4 by brackets 20 and a flexible tube 21 leads from the nozzle 18 to any suitable source of compressed air, not shown. Mounted upon the shafts 7 and 8 between the collars 6 of brackets 5 are guide rollers 22 and 23 for properly directing the film through the guideway 12.

The operation of the device is as follows: As film A issues from trough 11 in which it has undergone liquid treatment upon its lower side, it is directed by the guide rollers 22 and 23 through the guideway of block 4. As the sprocket holes in the film come under the slots 13, the force of the suction breaks the capillary pellicles of liquid therein and the liquid is drawn up through bore 15, pipe 16 and tube 17, whereby the liquid is effectively prevented from coming in contact with the upper or untreated face of the film. The blast of air issuing from slot 19 in nozzle 18 strikes the film intermediate the ends of suction slots 13, preferably beyond the points where the sprocket hole pellicles are broken, and rolls or sweeps back the superficial liquid along the lower face of the film. As the capillary pellicles of liquid across the sprocket holes have already been broken the wave of surface liquid is not forced through the sprocket holes but rather flows around them, but any liquid which by chance enters the sprocket holes is prevented from flowing over the upper surface of the film by the suction through the slots 13. The blast of air upon the lower side of the film combined with the suction above the sprocket holes effectively clears the film of all superficial liquid.

In order to prevent the upper surface of the central portion of the film from rubbing against the block 4, the central portion of the block is recessed as shown at 24 in Figs. 2 and 3. However, the inner walls 14 of slots 13 extend to the film adjacent the sprocket holes and thereby obstruct the liquid from spattering upon the portion of the film between the sprocket holes, the jet of air below the film and the suction above the film serving to hold the film against the block 4.

I claim:

1. The method of treating a cinematographic film which comprises passing the film over a body of liquid with one side in contact therewith and as the film leaves said body with pellicles bridging the sprocket holes, breaking the pellicles before they burst and restraining the liquid of the broken pellicles from spattering on the other side of the film.

2. The method of coloring a cinematographic film having an absorptive coating on each side which comprises passing the film over a body of coloring liquid with one side in contact therewith and as the film leaves said body with pellicles of the coloring liquid bridging the sprocket holes, breaking the pellicles before they burst and restraining the liquid of the broken pellicles from spattering on the other side, and at the same time removing the superficial liquid from said first side.

3. In the liquid treatment of cinematographic films wherein capillary pellicles of liquid bridge the sprocket holes, the method which comprises artificially breaking the pellicles by suction before they burst.

4. The method of treating a cinematographic film having an absorptive coating on each side which comprises passing the film over a body of coloring liquid with one side in contact therewith and as the film leaves said body blowing the surface liquid from the treated side of the film and conjointly producing a suction through adjacent sprocket holes.

5. The method of treating a cinematographic film which comprises passing the film over a body of liquid with one side in contact therewith and as the film leaves said body rolling the superficial liquid backwardly toward said body with a current of air and restraining the liquid from reaching the untreated side.

6. In the liquid treatment of cinematographic film upon one side only, the method which comprises advancing the film obliquely from the surface of the liquid and rolling the superficial liquid backwardly toward said surface with a thin jet of air impinging upon the under side of the film continuously along a line extending transversely across the space between the sprocket holes.

7. In the liquid treatment of cinematographic film upon one side only, the method

which comprises advancing the film from the surface of the liquid and rolling the superficial liquid backwardly toward said surface with a thin jet of air impinging upon the under side of the film continuously along a line extending transversely across the space betwen the sprocket holes, and at the same time producing a suction through adjacent sprocket holes to restrain the liquid from reaching the other side.

8. In the liquid treatment of cinematographic film upon one side only, the method which comprises advancing the film past a thin jet of air impinging upon the treated side of the film continuously along a line extending substantially across the portion of the film intermediate the sprocket holes and near the opposite ends of said jet drawing air through the sprocket holes to restrain the liquid from contacting with the opposite side of the film.

9. The method of removing superficial liquid from cinematographic films after treatment upon one side only which comprises breaking the capillary pellicles of liquid in the sprocket holes, and then clearing the treated side of the film of surface liquid.

10. The method of removing superficial liquid from cinematographic films after treatment upon one side only which comprises breaking the capillary pellicles of liquid in the sprocket holes by suction, and then cleaning the treated side of the film of surface liquid.

11. The method of removing superficial liquid from cinematographic films after treatment upon one side only which comprises breaking the capillary pellicles of liquid in the sprocket holes, and then blowing the surface liquid from the treated side of the film.

12. The method of removing superficial liquid from cinematographic films after treatment upon one side only which comprises breaking the capillary pellicles of liquid in the sprocket holes by suction, and then blowing the surface liquid from the treated side of the film.

13. The method of treating cinematographic films after a liquid treatment which comprises clearing the sprocket holes of liquid by suction, and simultaneously blowing against the opposite side of the film.

14. Apparatus for treating a cinematographic film comprising a support having gaseous fluid openings adjacent opposite sides of a film passageway and means to guide a film along the passageway.

15. Apparatus for treating a cinematographic film comprising members having gaseous fluid openings adjacent opposite sides of a film passageway and means to guide a film along the passageway, one of the openings being a suction opening.

16. Apparatus for treating a cinematographic film comprising a blower nozzle on one side of the film, and a suction opening on the opposite side of the film, and means to guide the film between the nozzle and the opening.

17. Apparatus for removing liquid from the sprocket holes of a cinematographic film comprising means for guiding the film along a predetermined path, and a member having spaced suction openings disposed adjacent the path of the sprocket holes of the film.

18. Apparatus for removing superficial liquid from cinematographic films comprising guide means for the film, a blower for sweeping one side of the film clear of surface liquid, and means for removing liquid in the sprocket holes.

19. Cinematographic apparatus for removing superficial liquid from a film wet on one side, comprising suction chambers disposed on one side of the film in line with the sprocket holes therein for breaking the capillary pellicles of liquid in the sprocket holes, and a blower for subsequently rolling back the surface liquid on the opposite side of the film.

20. Apparatus for removing superficial liquid from a film comprising means for directing a thin stream of air against the film along a line extending transversely across one side of the film substantially from one row of sprocket holes to the other row and adjacent means having openings confined to the marginal portions of the film for drawing air through the sprocket holes.

21. Apparatus for treating cinematographic film comprising a blower having an elongate opening extending transversely across one side of the film intermediate the sprocket holes, and suction means having elongate openings extending along the sprocket holes at each margin of the film.

Signed by me at Boston, Massachusetts, this 30th day of August 1921.

DANIEL F. COMSTOCK