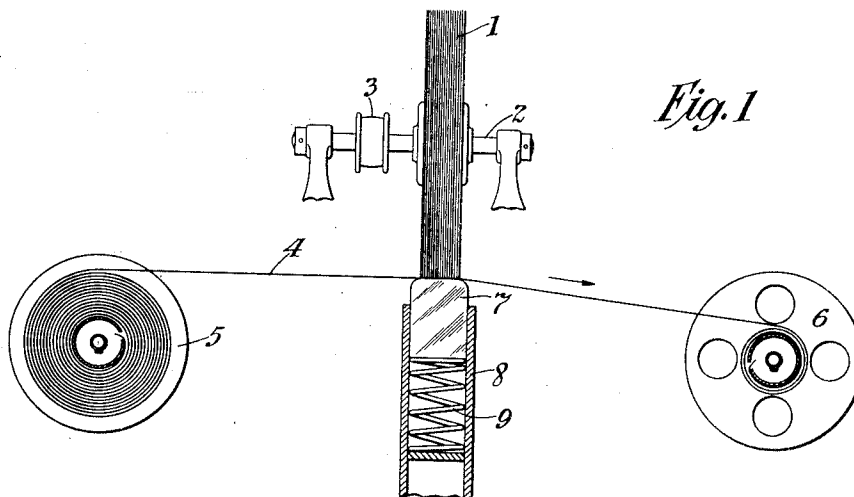
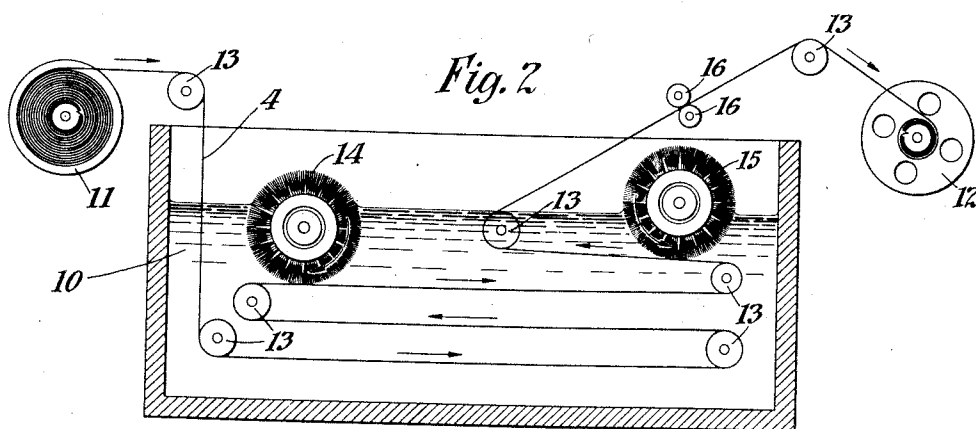


E. DAVIS.
METHOD OF TREATING FILMS.
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1,257,682.

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Witnesses:

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METHOD OF TREATING FILMS.

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To all whom it may concern:

Be it known that I, EDWARD DAVIS, a citizen of the United States, and a resident of Newark, Essex county, New Jersey, have invented a certain new and useful Method of Treating Films, of which the following is a description.

My invention relates to methods for treating film and more especially motion picture film which, through continued use or otherwise, has become scratched and dirty or otherwise marred and the value of which has, in consequence, been greatly reduced.

The principal object of my invention is to provide a practical and simple method for treating film of this character, whereby, without marring or injuring the photographic image or images on the film, the same may be quickly, economically and thoroughly renovated and rendered substantially as good as new.

In the drawings accompanying and forming part of this specification, Figure 1 is a somewhat diagrammatic view illustrating my apparatus for carrying out one step of my improved method; and Fig. 2 is a view similar to Fig. 1 showing apparatus for carrying out another step of such method.

When moving picture film has been subjected to considerable use in the exhibition of moving pictures, the film becomes dirty, scratched and otherwise marred through continued handling and by the passage thereof through the projecting machine, and the pictures projected therefrom will in consequence appear streaked or lined and otherwise impaired. The scratches thus produced are mainly in the direction of the length of the film. In treating said film in accordance with my invention, I first eliminate the scratches from the non-emulsion surface of the film, preferably by "buffing" or rubbing such surface with suitable abrasive and polishing materials and in a direction transverse to the said scratches. This is conveniently accomplished by yieldingly holding the non-emulsion surface of the film, preferably under a substantially uniform pressure, in engagement with the periphery of a rapidly rotating buffing wheel, such as the ordinary cloth or rag wheel, having a suitable substance, preferably containing both abrasive and polishing materials, applied thereto, while slowly moving the film in a direction transverse to the plane of rotation of the wheel. In Fig.

1, which illustrates the means for "buffing" the non-emulsion surface of the film, reference character 1 represents the buffing wheel which is mounted on a shaft 2 supported in suitable bearings and which is adapted to be rotated at a high speed by suitable means comprising a pulley 3 secured to said shaft. Reference character 4 represents the film which is fed in a direction transverse to the periphery of the buffing reel 1 from a reel 5 onto a reel 6, the latter reel being driven at the desired speed by suitable means (not shown). The nonemulsion surface of the film 4, in the passage of the latter from reel 5 to reel 6, is maintained in engagement with the periphery of buffing wheel 1 under a substantially uniform pressure by means of a block 7 which is slidably mounted in a support 8 and is forced toward said wheel by means of a spring 9. The substance which I have found to be most satisfactory for application to the periphery of the buffing wheel is a compound or mixture consisting of abrasive and polishing materials and a greasy or fatty carrying material. It is important from the standpoint of economy to move the film past the buffing wheel as rapidly as possible, but it is also important that the film and the buffing wheel be moved at the proper relative speeds, for, if the film is moved too slowly with respect to the wheel, it will be burnt, while if it is moved too fast, all the scratches will not be removed and the film will not be properly cleaned and polished. The buffing wheel is preferably about sixteen inches in diameter and is rotated as rapidly as safety permits, namely, at such a speed that the peripheral velocity thereof is approximately 6500 feet a minute, and under these conditions I find that the proper speed of movement of the film is about 50 feet per minute. In other words, the proper ratio of the peripheral speed of the buffing wheel and the speed of movement of the film is approximately 130 to 1. Accordingly, about 1000 feet of film can be subjected to this "buffing" or rubbing action in about twenty minutes. The buffing or rubbing of the film in this manner does not appreciably wear the film, but causes a sort of flouring of the non-emulsion or celluloid surface thereof and effectively eliminates the scratches from such surface and renders the same smooth and even.

The film is now immersed in a suitable

bath 10 (see Fig. 2), preferably of pure benzene, which will act to dissolve and cut or loosen the grease, dirt, and other foreign substances on the film and partially remove the same from the film. The film is preferably continuously fed from a reel 11 to a reel 12 through this bath at a moderate speed and in the direction indicated by the arrows in Fig. 2. A series of rolls 13 over which the film passes is arranged between the reels 11 and 12 in such a manner that twelve or fifteen feet of the film will always be submerged in bath 10. The speed at which the film is moved is preferably such that it will take about fifteen minutes to run 1000 feet of film through the bath. In order to remove more of the dirt, grease, and other foreign matter from the film, each side of the film, while the latter is so immersed, is preferably subjected to a scrubbing or brushing action, preferably applied in the direction of the length of the film and opposite to the direction of movement thereof. A pair of rotating brushes of medium stiffness, such as badger hair brushes 14 and 15, may be conveniently employed for this purpose. As the film emerges from bath 10, the benzene, or other fluid of the bath, is removed from the film preferably by passing the latter between a pair of rollers 16 or subjecting the same to the action of a squeegee. The bath 10 and the scrubbing or brushing action to which the film is subjected while immersed therein, will also effect the removal of some of the dirt from the scratches in the emulsion surface of the film.

The film is next immersed in a bath of water and ammonia (not shown), or other strongly alkaline bath, which will not injure the photographic images thereon. This alkaline bath should be maintained at a substantially constant temperature of 62° to 70° according to weather conditions, and the film should be kept therein for about thirty minutes. The alkaline bath will act to soften the emulsion surface of the film and will also remove all foreign matter from the film which has not been removed by the benzene bath, with the exception, perhaps, of a small amount of dirt in the scratches on the emulsion surface.

The film, the emulsion surface of which is now in a softened condition, is removed from the alkaline bath and immersed in a bath of water (not shown) maintained at a constant temperature of 62° to 70°, according to the weather conditions, and while so immersed the emulsion surface thereof is subjected to a rubbing or massaging operation preferably by manually rubbing the film with the hands or with a silk sponge. This massaging operation removes the remaining dirt from the scratches in the emulsion side of the film and acts on the gelatin or other material of the emulsion surface to

close the scratches therein and thereby render this surface smooth and even. The more the film is rubbed or massaged in this manner, the better the condition of the film will be. Experienced operators can readily subject 500 feet of film to this operation in about fifteen minutes and eliminate practically all the scratches from the emulsion surface thereof.

The film is now removed from the water bath and washed or rinsed in any suitable manner for ten or fifteen minutes, as by immersing the same in a tank (not shown) into which water is continuously fed at the bottom and drawn off at the top.

After the film is washed, the same is immersed in a glycerin bath (not shown) and left therein from five to fifteen minutes, according to the weather conditions and the hardness of the film, in order to soften the film and render the same pliable. The film is then dried in any suitable manner, then cleaned to remove all dust spots or the like which have accumulated on the film during the drying thereof, and finally polished.

It is sometimes desirable to retone or tint the film, and in this event, in place of subjecting the film to the action of the glycerin bath, as described above, the same is immersed in a proper toning or tinting bath (not shown) and then rinsed or washed in one or more water baths before drying the same.

Film treated in accordance with my invention is rendered practically as good as new, it being almost impossible to distinguish between pictures projected by the use thereof and pictures projected by the use of new film.

While I consider it preferable to carry out my method by employing all the steps described herein and in the order mentioned, it is to be understood that my invention is subject to many changes without departing from the spirit thereof and the scope of the appended claims.

Having now described my invention, I claim:—

1. The method of treating moving picture film, which consists in maintaining one surface of the film in engagement with a moving abrasive member while moving the film in a direction transverse to the direction of movement of said member, substantially as described.

2. The method of treating moving picture film, which consists in yieldingly maintaining one surface of the film in engagement with a moving abrasive member while moving the film in a direction transverse to the direction of movement of said member, substantially as described.

3. The method of treating moving picture film, which consists in maintaining one surface of the film in engagement with a mov-

ing abrasive member under a substantially uniform pressure while moving the film in a direction transverse to the direction of movement of said member, substantially as described.

4. The method of treating moving picture film, which consists in maintaining the non-emulsion surface of the film in engagement with a moving abrasive member while moving the film in a direction transverse to the direction of movement of said member, substantially as described.

5. The method of treating moving picture film which consists in continuously feeding a film in a longitudinal direction and simultaneously rubbing with an abrasive one surface of the film in a direction transverse to the length of the film, substantially as described.

6. The method of treating moving picture film, which consists in continuously feeding a film in a longitudinal direction and simultaneously rubbing one surface of the film in a direction transverse to the length of the film with a substance containing polishing material, substantially as described.

7. The method of treating moving picture film, which consists in continuously feeding a film in a longitudinal direction and simultaneously rubbing one surface of the film in a direction transverse to the length of the film with a substance containing abrasive and polishing materials, substantially as described.

8. The method of treating moving picture film, which consists in maintaining one surface of the film in engagement with the periphery of a rapidly rotating abrasive member while slowly moving the film in a direction transverse to the periphery of said member, substantially as described.

9. The method of treating film to remove scratches therefrom, which consists in rubbing the film with an abrasive in a direction transverse to such scratches, substantially as described.

10. The method of treating film, which consists in feeding the film through a bath comprising a suitable fluid for cutting or loosening the grease, dirt or other foreign matter on the film, and scrubbing the film while so immersed, substantially as described.

11. The method of treating film, which consists in feeding the film through a bath comprising a suitable fluid for cutting or loosening the grease, dirt or other foreign matter on the film, and scrubbing both surfaces of the film while so immersed, substantially as described.

12. The method of treating film, which consists in immersing the film in a benzene bath and scrubbing the film while so immersed, substantially as described.

13. The method of treating moving picture film, which consists in immersing the film in a bath comprising a suitable fluid for cutting or loosening the grease, dirt, and other foreign matter on the film, and scrubbing the film while so immersed in the direction of the length thereof, substantially as described.

14. The method of treating film, which consists in immersing the film in a bath maintained at a substantially uniform temperature and comprising a suitable fluid for loosening the grease, dirt or other foreign matter on the film, and scrubbing the film while so immersed, substantially as described.

15. The method of treating film, which consists in moving the film through a bath adapted to cut or loosen the dirt, grease and other foreign matter on the film, and applying a scrubbing action to the film while in said bath and in a direction opposite to the direction of movement of the film through the bath, substantially as described.

16. The method of treating film, which consists in moving the film through a bath adapted to cut or loosen the dirt, grease and other foreign matter on the film, and applying a scrubbing action to both surfaces of the film while the latter is in said bath and in a direction opposite to the direction of movement of the film through the bath, substantially as described.

17. The method of treating film, which consists in softening the emulsion surface of the film and then rubbing such surface, substantially as described.

18. The method of treating film which consists in softening the emulsion surface of the film and then manually rubbing such surface substantially as described.

19. The method of treating film to remove scratches from the emulsion surface thereof, which consists in softening the emulsion surface of the film, immersing the film in a bath, and rubbing such surface while the film is so immersed, substantially as described.

20. The method of treating film, which consists in cleaning the film and softening the emulsion surface thereof, and then rubbing such surface, substantially as described.

21. The method of treating film, which consists in cleaning the film and softening the emulsion surface thereof, then rubbing such surface, and then treating the film with glycerin, substantially as described.

22. The method of treating film, which consists in cleaning the film and softening the emulsion surface thereof, then rubbing such surface, and then treating the film with a suitable material to render the same pliable, substantially as described.

23. The method of treating film, which consists in removing the scratches from the non-emulsion surface of the film, cleaning

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the film and softening the emulsion surface thereof, and then rubbing such surface, substantially as described.

24. The method of treating film to remove scratches therefrom, which consists in rubbing the emulsion surface of the film while such surface is in a softened condition, substantially as described.

25. The method of treating film, which consists in subjecting the film to the action of an alkaline bath, removing the film from such bath, and then rubbing the emulsion surface of the film, substantially as described.

26. The method of treating film, which consists in subjecting the film to the action of an alkaline bath, removing the film from such bath, immersing the film in another bath, and then rubbing the emulsion surface of the film while the latter is so immersed, substantially as described.

27. The method of treating film, which consists in first softening the emulsion surface of the film by immersing the latter in a suitable bath maintained at a substantially uniform temperature, and then rubbing the softened emulsion surface of the film to eliminate the scratches therefrom, substantially as described.

28. The method of treating film, which consists in removing the scratches from and polishing the non-emulsion surface of the film, cleaning the film and softening the

emulsion surface thereof, then rubbing the emulsion surface of the film to eliminate the scratches therefrom, washing or rinsing the film, rendering the same pliable, and then drying and polishing the film, substantially as described.

29. The method of treating film, which consists in removing the scratches from the non-emulsion surface of the film, cleaning the film and softening the emulsion surface thereof, then rubbing the emulsion surface of the film to remove the scratches therefrom, and then washing, drying and polishing the film, substantially as described.

30. The method of treating moving picture film which consists in feeding the film in a given direction, and rubbing with an abrasive one surface of the film in a direction transverse to the direction in which the film is being fed, substantially as described.

31. The method of treating moving picture film which consists in feeding the film in a longitudinal direction, and rubbing with an abrasive one surface of the film in a direction transverse to the length of the film, substantially as described.

This specification signed and witnessed this 3rd day of May 1915.

EDWARD DAVIS.

Witnesses:

WILLIAM A. HARDY,
FREDERICK BACHMANN.