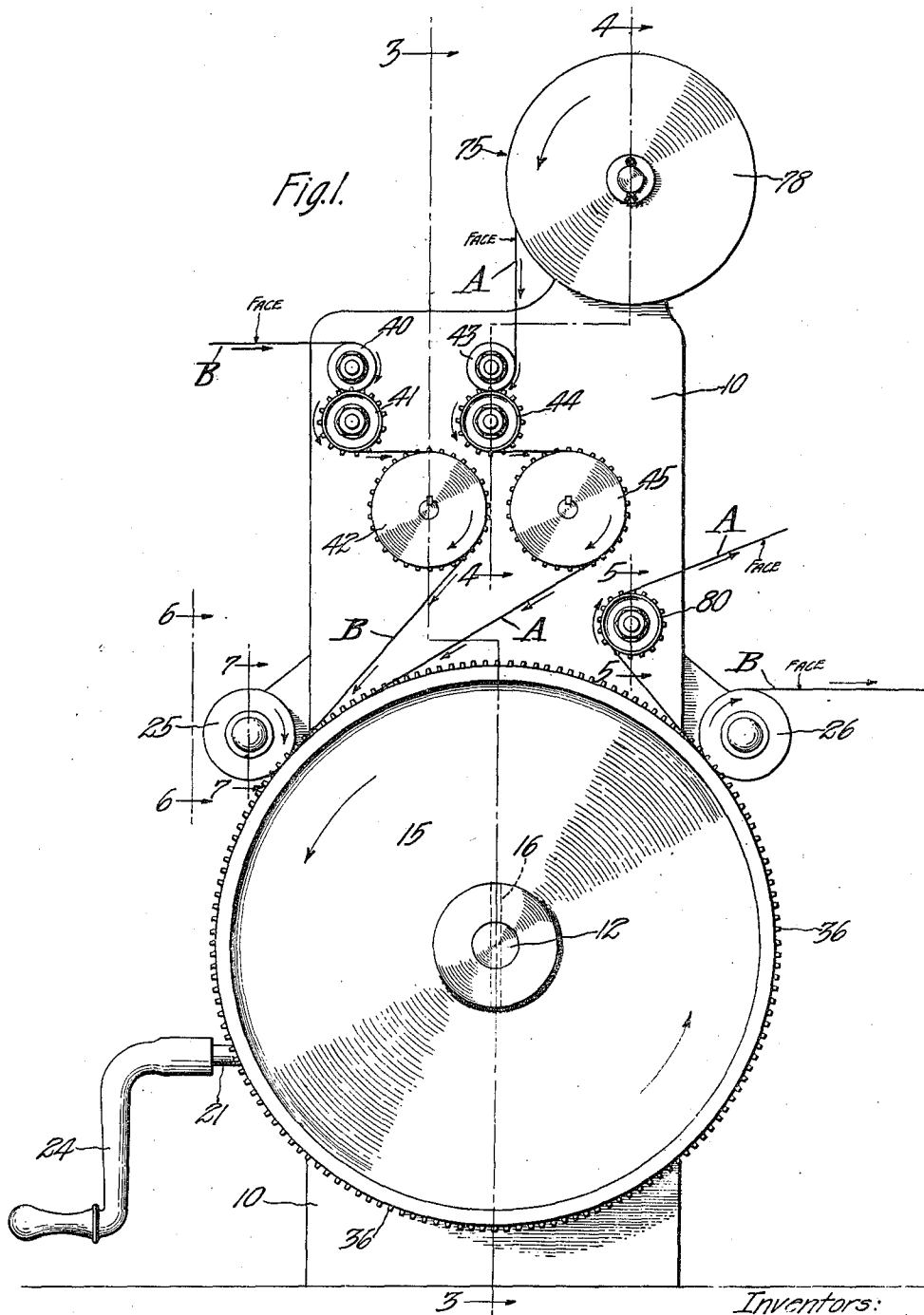


A. WYCKOFF AND M. HANDSCHIEGL.  
MACHINE FOR AND ART OF COLORING CINEMATOGRAPHIC FILMS.  
APPLICATION FILED NOV. 20, 1916.

1,303,837.

Patented May 13, 1919.  
3 SHEETS—SHEET 1.

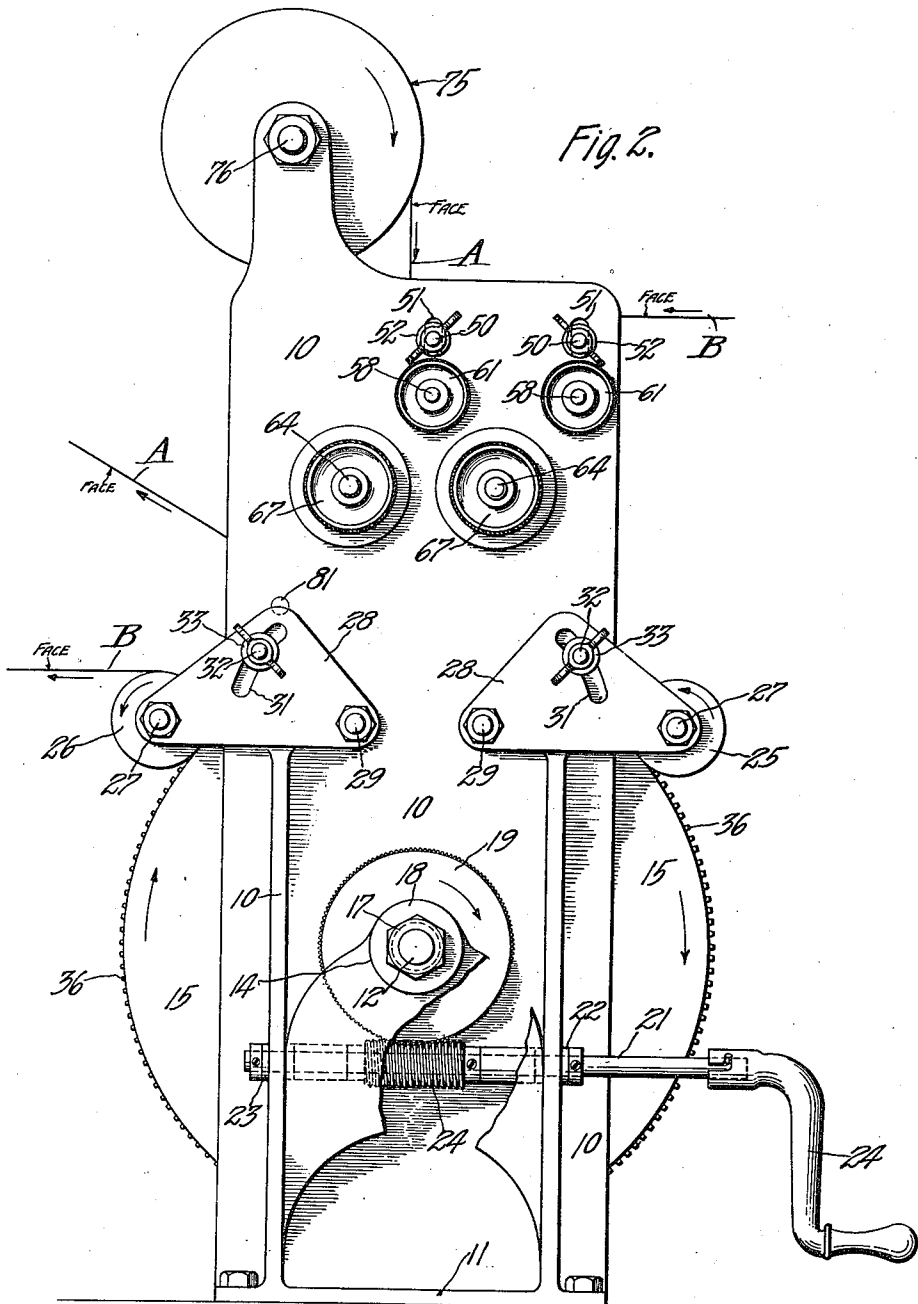


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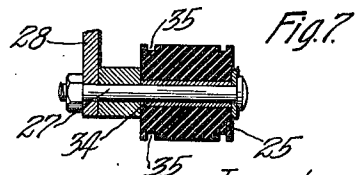
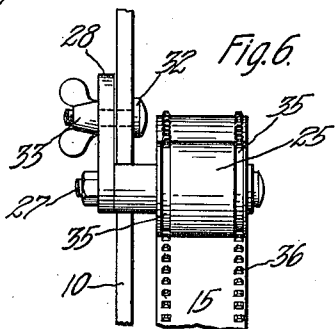
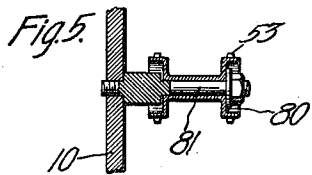
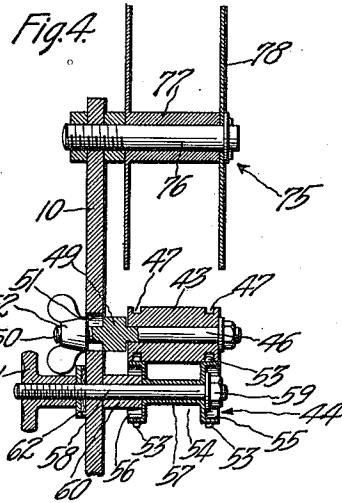
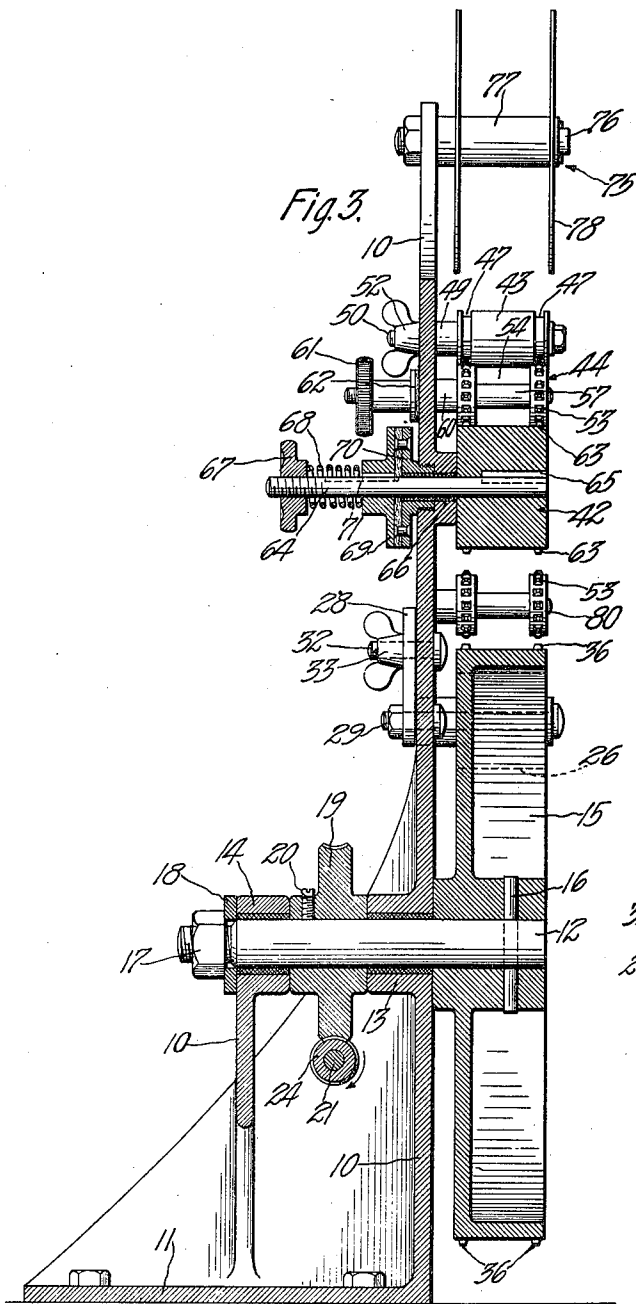


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 Alvin Wyckoff and  
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# UNITED STATES PATENT OFFICE.

ALVIN WYCKOFF AND MAX HANDSCHIEGL, OF LOS ANGELES, CALIFORNIA, ASSIGNORS  
TO FAMOUS PLAYERS-LASKY CORPORATION, A CORPORATION OF NEW YORK.

MACHINE FOR AND ART OF COLORING CINEMATOGRAPHIC FILMS.

1,303,837.

Specification of Letters Patent.

Patented May 13, 1919.

Application filed November 20, 1916. Serial No. 132,351.

*To all whom it may concern:*

Be it known that we, ALVIN WYCKOFF and MAX HANDSCHIEGL, citizens of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Machine for and Art of Coloring Cinematographic Films; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to machines for coloring or tinting motion picture films, and the like, and more particularly to machines adapted for use in the application of coloring matter, such as anilin dyes or like substances, to the said films after they have been exposed, developed and made ready for exhibition.

Broadly speaking, this invention relates to apparatus for carrying out several of the various steps in our method of coloring motion picture films and the like, shown and described in our application for United States Letters Patent, entitled Art of coloring cinematographic films, filed November 20, 1916, Serial No. 132,350; and wherein the coloring or tinting of a positive film is accomplished by subjecting it to pressurable contact with a negative or similar film, carrying coloring matter.

Heretofore the methods employed in the coloring of motion picture films have been tedious, expensive and productive of unsatisfactory results. Those most commonly used at the present time are three, viz., (1) the taking of the pictures in colors by means of color screens attached to the camera; (2) the application of coloring matter directly to the finished positive film with the aid of stencils cut from fac-similes of the positive being colored; and (3) the application of the coloring matter directly to the finished positive film with a brush and without the aid of stencils. The first is a step in color photography and does not properly come within the purview of this invention; but it is the last two that we have considered, and it is the prime object of our invention to overcome the difficulties and great expense attendant upon their use.

In the stencil method great care must be exercised in cutting the apertures and the minuteness of the figures and images in the views of a motion picture film render this extremely difficult of perfect results; furthermore a separate film must be cut for each color it is desired to apply to the various images in the views, making it extremely expensive. This stencil is adapted to be laid down upon the film to be colored, in register therewith, and the coloring matter applied over its surface. As no two films shrink the same after being wet in the developing process, it is practically impossible to color more than a limited number of views on a film without readjustment of the stencil to register with its corresponding views on the positive film.

This method offers little advantage over the last named method wherein no stencil is used and where the coloring matter must be directly applied with a brush, or equivalent instrument, to every positive film. The advantage gained in the time saved over the direct method by the use of the stencil is more than offset by the labor and expense in cutting it; and in both methods the coloring matter is generally unevenly applied, the outlines being indistinct and blurred, and frequently overlapping other images in the pictures.

Our invention comprises essentially means for accomplishing the aforementioned results, wherein a positive film, which has been previously immersed in a chemical solution to soften the gelatinous coating upon its face sufficient to absorb coloring matter, and a negative film or fac-simile of the said positive film, to which coloring matter has been previously applied to the gelatinous matter upon its face, are drawn over a series of toothed stretching rollers and onto a drum where they are brought into facial contact with each other, and pressed together in perfect register, for such length of time as will permit the positive film to moisten and absorb coloring matter from the negative film.

The principal object of our invention resides in the provision of a simple device, by which the two films are brought into a pressurable contact, during continuous and uninterrupted movement, and the contact is

maintained throughout a predetermined length of time and travel, upon a surface adapted to insure perfect contact, both laterally and longitudinally.

5 A further object is the provision of means for adjustably stretching the films, or either one, to register perfectly before coming in contact, and to continuously maintain such registry, and a constant and even pressure  
10 sufficient to transfer the coloring matter, during such contact.

These and other objects of our invention will be more fully disclosed in the following specification taken in connection with the accompanying drawings in which is illustrated  
15 the preferred form of our device, and in which:

Figure 1, is a front elevation of our machine;

20 Fig. 2, is a rear elevation of the same;

Fig. 3, is a vertical transverse section taken on line 3—3 of Fig. 1;

Fig. 4, is a detailed vertical transverse section taken on line 4—4 of Fig. 1;

25 Fig. 5, is a detailed vertical section taken on line 5—5 of Fig. 1;

Fig. 6, is a detailed elevation of one of the friction contact rollers taken on line 6—6 of Fig. 1;

30 Fig. 7, is a vertical section of the same taken on line 7—7 of Fig. 1.

Referring now to the drawings the numeral 10 may designate a frame for supporting the moving parts of the machine and  
35 11 its supporting base. A main shaft 12, revolubly supported in bearings 13 and 14, carries at one end a toothed drum 15 immovably secured thereto by a pin 16; the whole being secured against lateral movement by a nut and washer 17 and 18, respectively, or any other suitable means.

Interposed between bearings 13 and 14 is a worm wheel 19, mounted upon shaft 12 and rigidly fixed thereto by means of a cap  
45 screw 20. A drive shaft 21 revolubly supported in bearings 22 and 23, in frame 10, with its axis at right angles to shaft 12, carries a worm 24 co-acting with worm wheel 19 in driving drum 15, through the medium  
50 of shaft 12. We have here shown the machine to be manually operable by means of crank 24, which is preferable; however, any suitable motive power may be used.

Juxtaposed adjacent the top of drum  
55 15 are friction rollers 25 and 26, which are typical. These rollers are loosely mounted upon shafts 27 carried by adjustable supports 28, said supports being pivotally mounted upon the frame 10 by means of  
60 pins 29. Roller 25 is adapted to frictionally engage the back of the upper film as it passes onto the periphery of drum 15, pressing the two films together to facilitate in the transfer of the coloring matter from one to the  
35 other. Members 28 are provided with slots

31 through which extend bolts 32, immovably attached in frame 10. Thumb nuts 33 frictionally engage plates 28 and hold them against movement. The initial contactual pressure between the films may be varied by  
70 adjustment of the support 28 carrying roller 25 to the desired position where it may be rigidly secured. Rollers 25 and 26 are preferably constructed of soft rubber, or other  
75 suitable material, and are provided with metal bearing sleeves 34, as illustrated in Fig. 7. They are positioned in alinement with drum 15, as best shown in Fig. 6; and are provided at either end with annular  
80 grooves 35 to permit the passage of teeth 36 on drum 15, which engage the perforations in the films, when the two are brought into engagement with each other while passing  
therebetween.

Roller 25 may be entirely dispensed with  
85 in the operation of our device, or its position altered from that shown, as its function is merely to exert an initial contactual pressure between the films as they pass onto the drum, and also to squeeze out excessive moisture.  
90 In its absence, however, sufficient contactual pressure would be exerted and maintained between the films and the drum by the rollers 40, 41, 42, 43, 44 and 45. Roller 26 may be dispensed with as a pressure roller and  
95 any type of roller or device substituted for the films to pass over as they leave the machine, as its function is to cooperate with rollers 40, 41, 42, 43, 44 and 45 in holding the films in arcual contact upon the drum.  
100 The position of roller 26, and also roller 80, when it is used, may be altered from that shown, with equally good results.

The series of rollers 40, 41 and 42, over which the positive film is drawn as it enters  
105 the machine, and rollers 43, 44 and 45, over which the negative is drawn, are typical of each other in the order named, therefore a detailed description of but one set will be given. Referring more particularly to Figs.  
110 3 and 4, wherein the above mentioned rollers are more clearly shown; roller 43 may be constructed of any suitable material and is loosely mounted upon a shaft 46, being provided at either end with annular grooves 47,  
115 to permit the free passage of teeth 53 on roller 44, when the two are brought into peripheral engagement with the films passing therebetween. Shaft 46 has a shoulder portion 49 engaging the face of frame 10,  
120 and an extension 50 adapted to protrude through a vertical slot 51, wherein it is adjustably held by means of thumb nut 52. Rollers 40 and 43 are thus vertically adjustable with reference to rollers 41 and 44,  
125 both for holding the films in proper contact with the latter two and for convenience in inserting the films thereover.

Roller 44 is preferably of the construction shown and is provided at either end with  
130

teeth 53 adapted to engage the perforations of the films. Intermediate of teeth 53 the roller is recessed, as at 54, constituting two cylindrical end portions 55 and 56, joined together by a hub or bearing surface 57. The recessed portion is preferably of a width equal to that of the views upon the films, so as to allow them to pass thereover with their sensitized surfaces in contact therewith without danger of injury to the gelatinous coating. This is especially desired of the positive film which is wet while passing over roller 41. As the negative film is dry while passing over rollers 43, 44 and 45, slight contact with their surfaces will not tend to injure the gelatinous coating thereon; however, it is desired to construct the machine so that the films may be drawn through as above described or vice versa. Roller 44 is revolvably mounted upon a shaft 58 rigidly supported in frame 10, and is held against lateral movement between nut 59 and collar 60. A thumb nut 61, screwthreadedly mounted on shaft 58 and separated from the rear face of frame 10 by a leather faced washer 62, or other suitable material, is adjustably adapted to frictionally hold roller 44 against revoluble movement, causing it to drag, and when acting in conjunction with roller 45, stretches the film before it passes onto drum 15.

Roller 42 is provided with the requisite teeth 63 for engaging the perforations of the film, and is immovably secured to the shaft 64 by key 65, or any other suitable means. Shaft 64 is revolvably supported in bearing 66, of frame 10. A thumb nut 67, screwthreadedly mounted on shaft 64, through the medium of spiral spring 68, yieldingly holds disk 69 into frictional engagement with a leather faced disk 70, said last named disk being rigidly secured to frame 10. Disk 69 is adapted to move laterally along shaft 64, and is held against revolving thereon by means of a key way 71.

A reel 75 for holding the negative film is revolvably mounted on a shaft 76, and comprises a bearing and side portion 77, and a demountable side 78, which may be moved for placing the coiled film thereon.

A toothed roller 80, over which the negative film passes on leaving the machine, is typical of rollers 41 and 44, and is loosely mounted upon a shaft 81 immovably supported in frame 10.

In the operation of our machine the process of applying coloring matter to a positive film by subjecting it to a pressurable contact with a negative film, or fac-simile of the same, carrying coloring matter, is accomplished in the following manner. Suppose, for instance, it is desired to apply a green tint to certain shrubbery in a series of views comprising a scene in the picture. A coating of green soluble coloring matter

is first applied to the gelatinous or sensitized surface of the negative film, by any suitable means, upon those portions of such views as correspond with similar portions in the views upon the positive film it is desired to color. This coloring matter is allowed to dry before putting the film in the machine.

The negative film A is then placed on the reel 75 and is threaded under roller 43, around and over toothed drag rollers 44 and 45, under rubber pressure roller 25, around underneath toothed drum 15, and lastly around toothed roller 80, as indicated by the arrows in Fig. 1. It is preferred to place the negative film first upon the periphery of the drum, facing outwardly, and the positive film on top of it facing inwardly; however, this order may be reversed and equally good results obtained. A sufficient length of waste or undeveloped film is usually left at the ends of the portions to be treated to allow their being threaded into the machine, as above described, before beginning the operation.

Prior to entering the machine positive film B is immersed in a chemical solution for moistening and softening its gelatinous surface sufficient for its absorption of coloring matter from the negative film A upon coming in contact therewith. Any suitable means such as a series of rollers, carrying the film through a receptacle containing the solution, may be employed for this purpose. Film B is then carried over roller 40, around and over toothed drag rollers 41 and 42, under rubber pressure roller 25, around underneath toothed drum 15, and leaving the machine over pressure roller 26, as indicated by the arrows in Fig. 1.

Film B is now threaded through the machine with its sensitized surface facing that of the negative A and both films carefully placed in register. By turning crank 24, drum 15 is revolved in the direction indicated by the arrow, thereby drawing the films over the rollers 40, 41 and 42, and 43, 44 and 45, under pressure roller 25, around underneath drum 15, and are taken off over rollers 26 and 80. Any suitable means may be utilized for rewinding the films after leaving the machine. Various lengths of time are required in making the transfer of coloring matter, but it has been found by experiment that the best results are obtained when the machine is operated at such a speed as will permit the films being in contact between rollers 25 and 26 for at least one and one-half minutes; and for this reason the machine is geared to revolve drum 15 at a very slow speed.

A film after being wet, such as the positive in this case, usually stretches, and in order that the two may be made to register perfectly, which is absolutely essential to perfect results, the negative is stretched be-

fore passing onto the drum by tightening thumb nuts 61 and 67 of drag rollers 44 and 45, respectively, thus retarding their movement sufficient to stretch the film the desired amount. As the peripheral teeth upon the drum 15 necessarily limits the extent to which either of the films may be shifted thereon, relative to the other, it is necessary that they be stretched intermediate the drum and said rollers before passing on to the teeth. It is possible to stretch a dry film in this manner about one eighth of an inch in one foot, which is usually ample to meet the expansion of the moistened film. It may be that the moistened film would require stretching to register with the dry film, in which event the necessary adjustments would be made on drag rollers 41 and 42.

It will be noted that not only do the rollers 41, 42, 44 and 45 stretch the films to register before passing on to the drum 15, but they also serve to exert and maintain a constant and even pressure between the films and the drum, sufficient to transfer the exact amount of coloring matter from one to the other, and to hold the films flat upon its peripheral surface, thereby insuring perfect contact. The latter function is quite essential, owing to the tendency of the films to curl longitudinally when stretched.

Drag rollers 42 and 45 are preferably offset with reference to drag rollers 41 and 44 and drum 15, positioned to give the greatest bearing surface of the films thereon, and adapted to distribute the strain on the films as evenly as possible between the drum 15 and drag rollers 41 and 44.

It can be readily seen that should it be desired to apply more than one color to the positive film it will only be necessary to set a series of the machines side by side in alignment with each other and run the positive film continuously from one to the other, having in each machine a negative film carrying one of the several colors, and all operated as above described. In such a case it would be unnecessary to subject the positive film to more than the original immersion, as it will remain sufficiently moist to dissolve and absorb coloring matter from several such negatives. It has been found from experiments made with our machine, as above described, that it is possible to color several positives from a single coating of a negative.

The following claims are directed to the machine and process herein set forth, embodying the means and method of bringing the two films into register, and printing while brought into register in such manner. The companion case, herein mentioned, has claims to a method of preparing the negative for printing; but this present application is not limited to such a printing surface prepared in such manner, and in fact is not

limited by the specific descriptive matter herein except as specifically stated in the following claims.

Having described our invention, we claim:

1. In a machine for transferring coloring matter from one film to another by pressurable contact, a revoluble toothed drum and distinct adjustably retardable means to exert a longitudinal tension upon the films separately to bring them to register upon said drum.

2. In a machine for transferring coloring matter from one film to another by pressurable contact, a revoluble drum for rolling the films in contact, distinct adjustably retardable means to exert a longitudinal tension upon said films separately to bring them to register before coming in contact on said drum, and means to hold said films in movable contact upon said drum.

3. In a machine for transferring coloring matter from one film to another by pressurable contact, a revoluble drum for rolling said films in contact, distinct adjustably retardable sprockets to stretch said films separately to bring them to register before coming in contact, and means to hold said films in movable contact upon said drum.

4. In a machine for transferring coloring matter from one film to another by pressurable contact, a revoluble toothed drum, means to hold the films in movable contact upon a substantial portion of the periphery of said drum, and adjustable means to continuously stretch said films separately in constant ratio to bring them to register upon said drum.

5. In a machine for transferring coloring matter from one film to another by pressurable contact, a revoluble drum, means to hold said films in movable contact with the periphery of said drum, distinct adjustably retardable means to stretch said films separately to bring them to register upon said drum, said first mentioned means and said second mentioned means being so positioned that the said films in passing therebetween will pass in arcual contact upon the periphery of said drum.

6. In a machine of the class described, a revoluble drum, for rolling the films in contact, means adjacent the periphery of said drum to hold the films in movable contact therewith, distinct adjustably retardable means over which said films are drawn separately to exert a longitudinal tension upon each independently of the other to bring them to register at their point of incidence upon the periphery of said drum, said first mentioned means and said second mentioned means being so positioned with reference to said drum that the said films in traveling therebetween will pass in arcual contact upon the periphery thereof.

7. In a machine of the class described, the

combination of a revolving toothed drum, series of adjustably retardable toothed rollers adjacent said drum, a pressure roller adapted to frictionally engage the periphery of the drum.

8. In a machine of the class described, the combination of a revolving toothed drum, two series of adjustably retardable toothed rollers adjacent said drum, an adjustable pressure roller adapted to frictionally engage the periphery of said drum, a roller adjacent the periphery of the drum opposite said pressure roller.

9. In a machine of the class described, the combination of a frame, a revolving toothed drum mounted on said frame, actuating means for revolving said drum, two sets of adjustably retardable toothed rollers mounted on said frame adjacent the drum, a pressure roller adjustably mounted on said frame adjacent the drum and adapted to engage the periphery thereof, a roller adjustably mounted upon said frame adjacent the drum opposite the said pressure roller, all substantially as described.

10. In a machine for coloring cinematographic films, the combination of a supporting frame, a revolving drum mounted on said frame, said drum being toothed upon its periphery for engaging the perforations of the films, actuating means for revolving said drum, rubber friction rollers adjustably mounted on said frame adjacent the top of said drum and on opposite sides thereof, said rollers adapted to frictionally engage the periphery of said drum and being provided at either end with annular grooves in alinement with the teeth of the drum, two series of adjustably retardable rollers mounted on said frame adjacent the top of said drum, each comprising a loosely mounted grooved guide roller, an adjustably retardable roller immediately below and adapted to peripherally engage said guide roller, said adjustably retardable roller being provided with teeth upon its periphery adapted to engage the perforations of a film and being recessed intermediate its toothed portions, an adjustably retardable roller interposed between the last named roller and the drum, said roller being provided with teeth upon its periphery adapted to engage the perforations of a film.

11. In a machine for coloring cinematographic films, the combination of a supporting frame, a revolving drum mounted on said frame, said drum having peripheral teeth for engaging the perforations of a film, actuating means for revolving said drum, rubber friction rollers adjustably mounted on said frame adjacent the top of said drum and on opposite sides thereof, said rollers adapted to frictionally engage the periphery of said drum and being provided at either end with annular grooves in aline-

ment with the teeth of the drum, two series of adjustably retardable rollers mounted on said frame adjacent the top of said drum, each comprising a loosely mounted grooved guide roller, an adjustably retardable roller immediately below and adapted to peripherally engage said guide roller, said adjustably retardable roller being provided with teeth upon its periphery adapted to engage the perforations of a film and being recessed intermediate its toothed portions, an adjustably retardable roller intermediate said last named roller and said drum, said roller being provided with peripheral teeth adapted to engage the perforations of a film and being offset with reference to said last named roller and said drum, substantially as and for the purpose set forth.

12. The herein described machine for transferring coloring matter from one film to another by pressurable contact during continuous travel of such films, a revoluble drum for rolling said films in contact, distinct adjustably retardable means to exert a longitudinal tension upon said films separately to bring them to register before coming in contact on said drum, and means to hold said films in movable contact upon said drum, said last mentioned means being circumferentially opposed to the point of incidence of said films upon the drum to hold said films in arcual contact therewith.

13. The herein described machine for transferring coloring matter from one film to another by pressurable contact during continuous travel of such films, a revoluble drum for rolling said films in contact, distinct adjustably retardable means to exert a longitudinal tension upon said films separately to bring them to register before coming in contact on said drum, and means to hold said films in movable arcual contact upon said drum.

14. In a machine for transferring coloring matter from one film to another by contact, a means for drawing the two films into contact and to hold them in register during contact, and distinct retardable means acting on each film to exert a longitudinal tension thereon to bring them to registering lengths.

15. In a machine of the character described adapted to move two films in registration with each other, means for simultaneously drawing the two films ahead, and adjustable means for retarding the motion of one film independently of the other, said two mentioned means being applied to the films at different points and the movement being from the point of application of the second mentioned means toward the point of application of the first mentioned means, so that a stretching tension is applied to a film as it is drawn ahead.

16. The herein described method of coloring a film by contact with a similar film car-



- rying coloring matter, embodying continuously bringing successive portions of the two films into register and into pressurable contact with each other and continuously exerting on each film, prior to and during the time of bringing into register and contact, a tension whereby either one or both of the films may be stretched to bring the two films to registering dimensions.
- 10 17. In a method of coloring films by subjecting the film to be colored to a pressurable contact with a similar film carrying coloring matter, continuously moving the films, exerting a tension upon a portion of each  
15 of the films and adjusting the tensions separately to bring the films to registering dimensions, and bringing the said film portions together in pressurable contact while under tension.
- 20 18. The herein described method of bringing two films into register, embodying applying to corresponding successive portions of each film a tension and adjusting the tensions separately to stretch either one or both of said films and to bring such corresponding portions to registering dimensions, and bringing the said film portions together in register with each other.
19. The herein described method of bringing two films into register, embodying applying to successive portions of one film a tension and adjusting said tension to stretch that portion and bring it to registering dimension with the other film, and bringing corresponding portions of the two films together in register with each other.

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Witnesses:

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