Oct. 3, 1933. A. TEITEL ET AL 1,929,180

COLOR PROCESS FOR FILMS

Filed Sept. 12, 1930 2 Sheets-Sheet 1

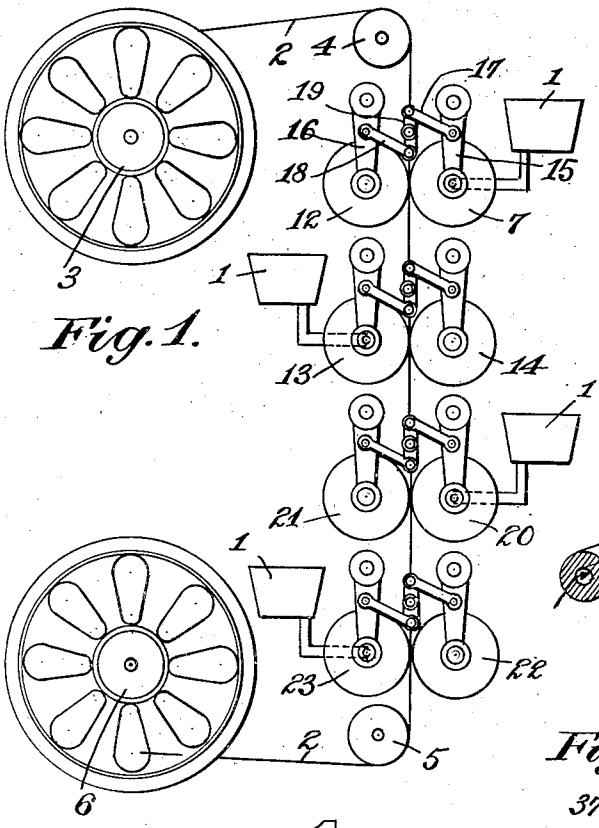


Fig. 1.

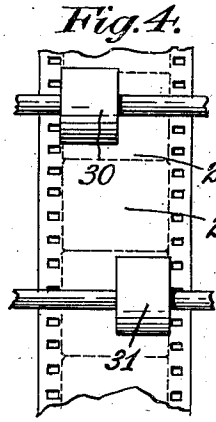


Fig. 4.

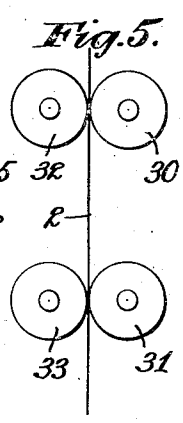


Fig. 5.

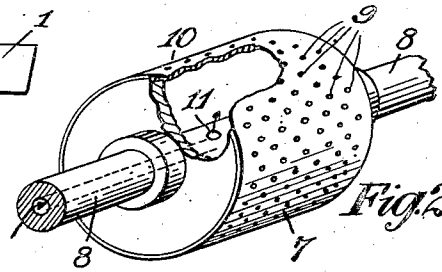


Fig. 2.

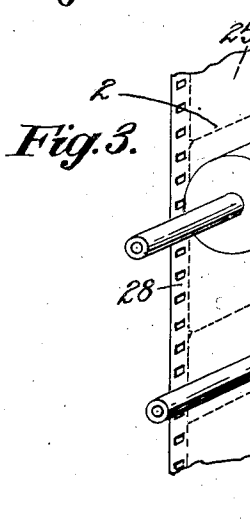


Fig. 3.

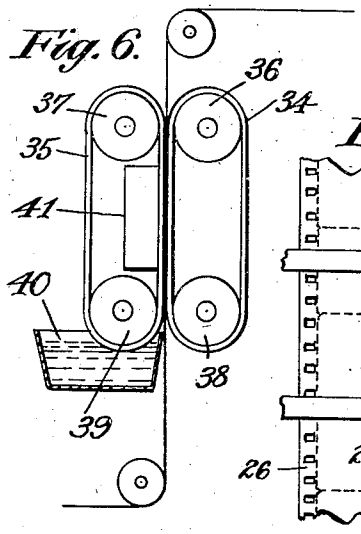


Fig. 6.

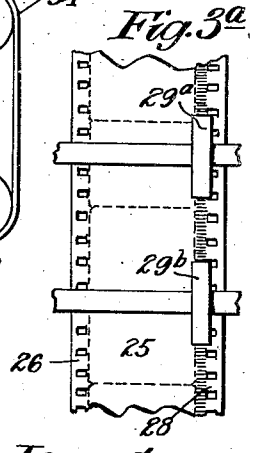


Fig. 3a

Inventors
Albert Teitel
Clara Teitel
By Wm. H. Reid
Attorney

Oct. 3, 1933. A. TEITEL ET AL 1,929,180

COLOR PROCESS FOR FILMS

Filed Sept. 12, 1930 2 Sheets-Sheet 2

Fig. 7.

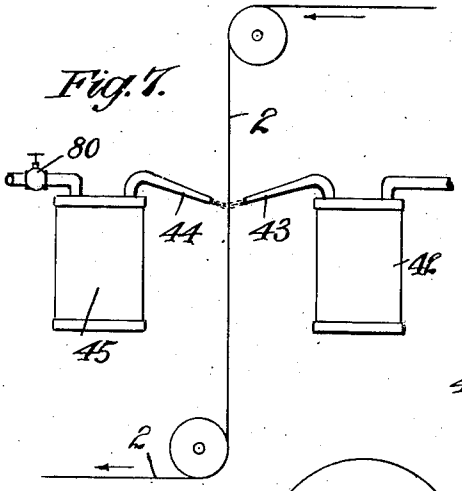


Fig. 8.

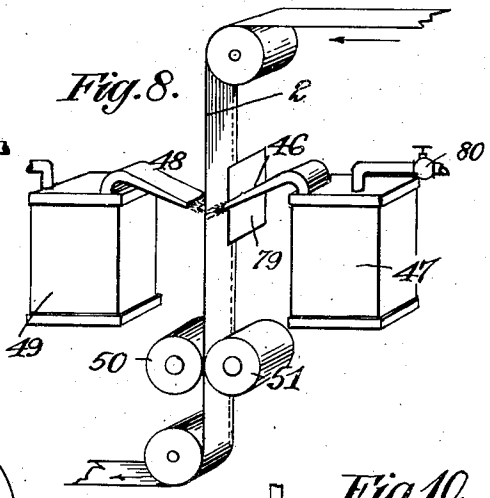


Fig. 9.

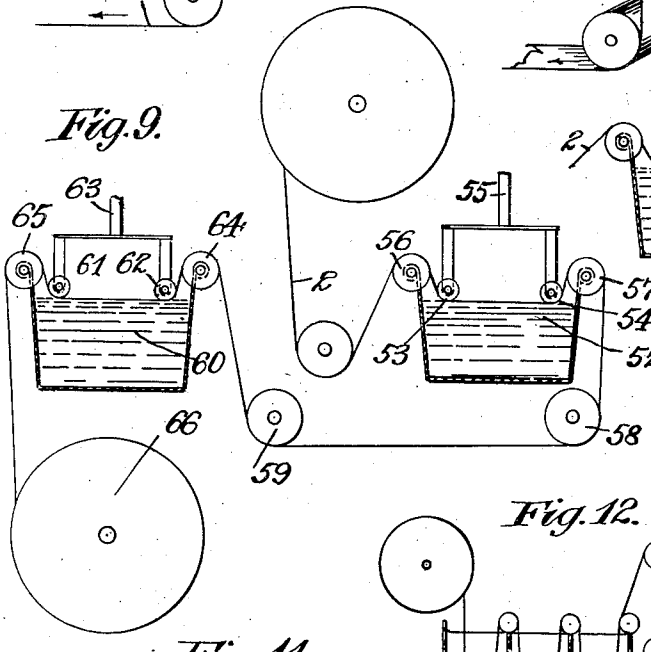


Fig. 10.

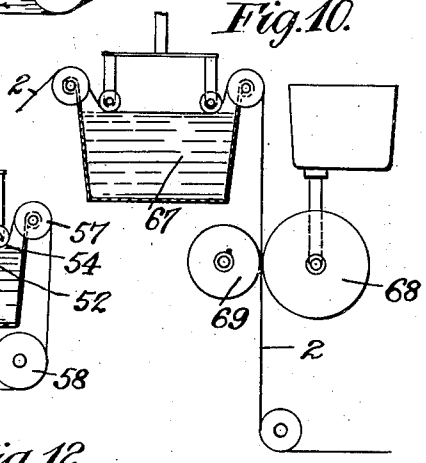


Fig. 11.

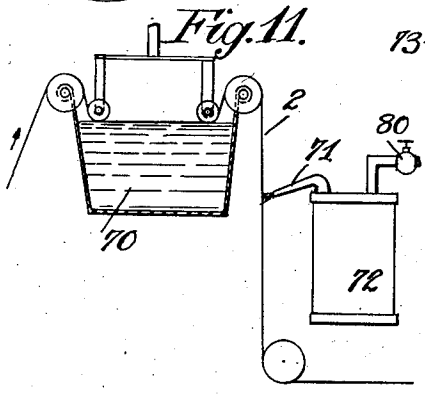
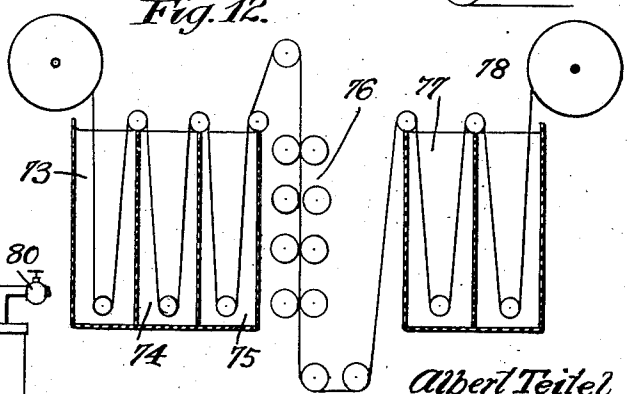


Fig. 12.



Albert Teitel
Inventors Clara Teitel
By Wm. H. Reid
Attorney

Patented Oct. 3, 1933 1,929,180

UNITED STATES PATENT OFFICE

1,929,180

COLOR PROCESS FOR FILMS

Albert Teitel and Clara Teitel, Corona, N. Y., assignors of one-half to Louis M. Cohen, New York, N. Y.

Application September 12, 1930
Serial No. 481,413

8 Claims. (Cl. 95—5)

This invention relates to the development as regards the coloring of films in the form of a long web or band, especially moving picture films. The invention particularly relates to the application of coloring material generally known as a chemical tone or dye tint that is applied to the opposite sides of a film that has been exposed on a double emulsion process, or a single emulsion process.

The invention further relates to the application in a continuous process of the film immediately after it has been treated as set forth, with a coloring material in the nature of a dye tint that will operate only upon the portions of the film where the light sensitive ingredient has been changed to the so called "high lights", whereby such portions can be specially treated with another color or tint, or several colors, on opposite sides, to produce a special tint by the combined effects.

One of the objects of the present invention is to treat a film of this character, that has been exposed through different color screens or sensitized films, or both, in a continuous process, by the application on the opposite faces of the film of tone materials of different colors, and which is preferably effected on opposite sides of the film at the same location; and in which process the film is passed through a suitable dryer, or washer and dryer, immediately after such treatment.

A further object is to so apply these materials to the opposite faces of the film, that the marginal portion that has been used as a sound tract, to record sound at the same time that the pictures are taken, will not receive application of these coloring materials but will be left free of color to any extent.

Another object is to provide in connection with the latter, means for washing off any coloring material that might have been received on the sound tract, and also for applying any special tone color or fluid treatment to improve the character of this portion of the sound tract of the film.

A further object of the invention is to so apply the coloring materials that each coloring means will engage and treat a longitudinal zone that extends only part way across the image band of the film; and the remaining longitudinal zone of the image surface will be treated, on the same side, or on the opposite side, by a different coloring material; or this remaining zone can be left in the usual black and white as developed.

Another object of the invention is to provide a continuous process by which the film is first passed through a developing apparatus, such as a developer tank, then a hypo or fixing tank, and then through wash water, and the film as it emerges from the developing apparatus is passed at once into engagement with the coloring means, as above set forth.

In the accompanying drawings showing embodiments of our invention,

Figure 1 shows somewhat diagrammatically apparatus for carrying out one process or method of our invention.

Fig. 2 shows enlarged one of the treating rolls.

Fig. 3 shows separate rolls engaging the image surface and the sound tract of the film.

Fig. 3ª shows rolls for the sound tract only.

Figs. 4 and 5 show rolls that treat different zones of the film.

Fig. 6 shows the film engaged by opposed endless bands.

Fig. 7 shows the film engaged on opposite faces by the color material or fluid in the form of a spray.

Fig. 8 shows the film engaged on one side by a spray and on the opposite face by a color roll.

Fig. 9 shows the film engaged on opposite faces by floating them in sequence in tanks of different coloring fluid.

Fig. 10 shows the film colored on one face by floating in a tank of coloring fluid, and then the opposite face is engaged by coloring rolls.

Fig. 11 shows the film engaged on one face by floating in a bath of color fluid, and then the opposite face is colored by a color fluid in a spray or stream.

Fig. 12 indicates the film passed through a developing apparatus and then passed through color applying means such as rolls.

One method for carrying out our improved process is to apply the coloring material to one or both faces of the film as advanced continuously by means of a roll or rolls, such as set forth in Figs. 1–5, wherein the film 2 as advanced from a supply roll 3 around guide rolls 4 and 5 to a take-up roll 6, is engaged by a number of rolls, in the stretch between the two guide rolls. Certain of these rolls, shown arranged in opposed pairs, have a coating of the coloring material or fluid on their periphery, and may be constructed as shown in Fig. 2. Here a cylinder 7 with closed ends turns on a shaft 8, and the cylinder has numerous perforations 9 throughout its face as shown, to cause the fluid in the cylinder to pass out to engage a fabric coating 10 of the cylinder. The shaft 8 is shown as tubular with an outlet

at 11 for the color fluid that is fed into the tubular shaft, from tank 1, and thus the fabric roll will receive a supply of the fluid and remain saturated for engagement with the film. Any desired number of these rolls may be arranged to engage one or both faces of the film as advanced, and while two of these rolls as set forth in Fig. 2 might be arranged opposite, preferably each of the color rolls will have a roll opposite that will have a dry surface, or may be similar to the roll 7 and may receive water or other inactive fluid, and operates mechanically to press the film against the color roll. The roll 12 opposite to the roll 7 may act in this manner, and one face only of the film is treated with the coloring material. Beyond these rolls are shown rolls 13 and 14 on opposite sides of the film, and the roll 13 may be a color roll similar to the roll 7, while the roll 14 may simply hold the film engaging the other roll. The roll 7 will contain a certain coloring fluid such as red for instance, while the lower and opposite roll 13 may contain another coloring fluid such as green or blue, and thus the film as advanced will receive different color treatments on its opposite faces. But it is to be understood that two color rolls like the roll 7 can be placed opposite and which contain different color fluids, such as the red and green mentioned, or any other contrasting colors desired.

With such means of applying color to the opposite faces of the film, or other color applying means, such as herein set forth, these separate coloring means are preferably arranged to be rendered inoperative separately at will, so that the operator can at intervals cause the color treatment to be arrested during the advance of the film, and thus portions of the film will remain in the natural black and white, instead of color on either face as desired. The operator, by inspection of the film, or from signals sometimes used in this art, can learn just what parts of the film are to be colored in either of the desired colors or both, and what parts are to be left natural. As shown the rolls 7 and 12 may be carried by arms 15 and 16, that connect by links 17 and 18 with a lever 19, and swinging this lever will move the rolls 7 and 12 away from the path of movement of the film and leave it free. The same applies to the rolls 13 and 14, and the same links and levers can shift any of the pairs of rolls into and out of engagement with the film.

In this art of colored film production the film is treated on one or both faces usually with a chemical tone fluid or other fluids, that will act upon the portions of the film that are more or less heavily shaded, but will not act on what is known as the "high lights". The latter portions of the film, in a subsequent treatment to the color process as set forth are sometimes acted on by what is known as a dye tint coloring matter. As shown in these views the two pairs of rolls can supply the chemical tone colors to one or both faces in any colors desired; and beyond these rolls another roll or pairs or sets of rolls can apply the dye tints to the film in substantially the same manner, or by other color applying means, such as herein set forth. The rolls 20 and 21 may correspond in structure to the rolls 7 and 12, with dye tint supplied to the roll 20, and water to the roll 21, and one face of the film will thus receive the dye tint. Additional rolls 22 and 23 are shown in which the roll 23 can receive a dye tint fluid of different color from that contained in the roll 20, while the roll 22 may contain water. By this means the dye tints are applied to the opposite faces of the film, and in a continuous process with the application of the chemical tone color fluids to the opposite sides of the film. It will be further understood that the latter pairs of rolls that treat the film by the color dye tints are mounted in the same manner to be readily shifted to inactive position at the will of the operator. It will be apparent that by the means set forth four different color effects can be produced on the film, in addition to leaving the film natural in portions desired, and that various combinations can be arranged. Also these rolls or pairs of rolls can be duplicated in any number, each with a different color, to be brought into operation, or remain inactive at the will of the operator, and thus a great variety of different colors can be produced in the same film. While in this operation the film is preferably advanced by rotation of the take-up roll, and thus the friction of the film will serve to rotate the color rolls, the latter may be driven by power if desired.

In this art very frequently these moving picture films have a marginal portion that is used to record sound to produce the talking moving pictures, and this band is called the "sound tract", and which is adjacent to one side row of perforations. It is highly desirable to avoid treating this "sound tract" by the coloring materials used in the process we have set forth, and therefore the several treating rolls, or other means by which the color chemical tone or dye tint or other similar fluids are applied, do not extend to this "sound tract" portion of the film, but leave it free from color. It is also a part of the present invention to provide a special roll or rolls to treat this portion of the film, so that if by chance any of this coloring material should have engaged this "sound tract", it can be removed by a moistening roll and the "sound tract" left entirely free of color. It is also an object to provide a roll of this character to engage the "sound tract" that may receive special fluids applied thereto, and which will serve to improve the character of the "sound tract". Such an arrangement is shown in Fig. 3 where the film 2 is provided with a "sound tract" 24 extending in a longitudinal zone at one side of the image portion 25 inside of the perforated margin 26, and the color applying roll 27 is of a width to extend from this sound tract 24 across the image surface to the opposite perforated margin 28; whereby only the image surface will receive color treatment, and not the sound tract. If desired a narrow roll 29 is provided to engage the sound tract, and such roll may have a coating of any desired material on its periphery to improve this zone of the film, and any number of these narrow rolls can be provided, in pairs or otherwise arranged. As set forth in Fig. 3a, any film provided with a sound tract, with or without the color processes, can be specially treated by applying desired chemicals or fluids to the sound tract only. Where the image surface and the sound tract are developed at the same time, frequently one of these zones will not have the proper result produced, and further development or treatment of the sound tract can be obtained by means of these narrow rolls, or equivalent means for directing or applying the developing material, or other fixing fluids, or any desired material, to improve the sound reproduction quality of the film. But if at any time it is desired to color the sound tract by any of the processes herein described, or their equivalent, the rolls or other color applying means are made

of sufficient width to engage the sound tract as well as the image portion, and this applies to the chemical tone colors or the dye tints. While in the various processes of our invention, the image portion, or the image portion and also the sound tract, are treated with the color material without engaging the perforated margins of the film, if desired the rollers or other color applying means can be made of sufficient width to act also upon these perforated margins.

In Figs. 4 and 5 we show color applying means that will serve to engage the film in a longitudinal zone of less width than the image surface or zone, and in these views a roll 30 is shown about one-half the width of the surface or image zone 25, and beyond this roll 30 is arranged a similar roll 31 of about the same width, that will engage the other zone portion of the image surface, not engaged by the roll 30, and which roll 31 is placed on the opposite side of the film; such rolls having co-acting rolls 32 and 33 respectively. By this means different colors can be applied to different longitudinal zones of the film, and each zone can have another pair of rolls on the opposite sides respectively with different colors, and dye tints can also be applied to these zones, whereby a combination of eight colors or tints can be produced.

Another means of applying the color fluids is to have a kind of endless band surface, such as the bands 34 and 35 shown in Fig. 6 that are mounted on guide rolls 36 and 37 for one and 38 and 39 for the other band. The band 35 passes into a tank 40 to receive a coating of the color fluid. Obviously any number of such pairs of bands can be applied to carry out the processes herein set forth. Instead of a moving surface carrying coloring material, a stationary member such as a block having a surface or a coating containing a surface of absorbent material, may be employed. For instance a block 41 is shown inside of the band 35, that may be normally fixed, and only advanced intermittently to provide a fresh coated surface to the film, or if preferred a fixed piece of absorbent cotton or wick or similar textile may be used, supplied with the color fluid.

In the described processes the coloring materials are applied to the film by a roller, or by a fixed surface having a coating of the coloring material; but if desired the coloring fluid may be directed upon the film in a stream or spray, and the film does not contact with any engaging surface. In such operation the color fluid can be sprayed or blown on one face of the film, while a stream of water or air can be directed on the opposite face at such location, so that the color fluid will not in any manner affect the opposite face at such time; and as the other color fluid is sprayed on the opposite face of the film at an advanced location, a spray of water or air is provided for the other side of the film at this advanced location, and which will not injure or affect the face of the film already treated by the first application of the color spray. In Fig. 7 the film 2 will receive color fluid from a tank 42 through a nozzle 43, produced by air pressure in the tank, or other means for impelling the fluid.

On the opposite face of the film is arranged another nozzle 44 fed by a tank 45, which two tanks can provide different color fluids. If preferred the nozzle 44 and tank 45 can direct a stream of water or air on the film, and in advance of this arrangement, another set of tanks and nozzles can be provided, so that one of them will direct a stream of the color fluid to the opposite face of the film, with a stream of water or air in engagement on the opposite side of the location.

Another arrangement is shown in Fig. 8 in which the film 2 receives color from nozzle 46 and tank 47, with a nozzle 48 and tank 49 on the opposite side, by which one face of the film is colored; and the other face of the film will receive color from rolls 50 and 51 corresponding to the rolls 7 and 12 shown in Fig. 1. Shield 79 prevents spray from nozzle 46 striking the sound tract. The use of a valve 80 for tanks 42, and other similar nozzles will permit the arresting of any one color spray treatment at will.

Our improved process can also be used by floating the film in transit on a bath of one color fluid to treat one side of the film; and the opposite side of the film is then caused to engage a bath of another color in a continuous operation, which can be carried out by causing the film to be inverted or reversed. In Fig. 9 the film 2 is first floated in a bath 52 by suitable guide rollers 53 and 54 carried by a frame 55 to be withdrawn from the tank at will and permit the film to move above the bath over the guide rollers 56 and 57. The film then passes around guides 58 and 59 and is thereby inverted so that the face that was uppermost at the tank 52 is now lowermost. The film is now caused to float in a bath or tank 60 by movable rolls 61 and 62 on a frame 63, this tank also having guide rolls 64 and 65, from which the film passes to a take-up roll 66.

Another process is indicated in Fig. 10, where the film 2 is treated in a tank or bath 67 similar to the arrangement at 52, and then the film is passed between rolls 68 and 69 similar to the rolls 7 and 12, whereby coloring fluid is applied to one face of the roll, after a different coloring material is applied to the other face of the roll in the tank 67.

In Fig. 11 the film 2 is treated in a bath or tank 70 corresponding to the tank 52, and then the film is acted upon by a spray of color fluid from nozzle 71 and tank 72. It is to be understood that in the several processes in which the tank or bath is employed, the guide rolls that hold the film against the bath can be raised during the transit of the film and the operation suspended.

In the processes as above described, the film may have been developed and dried, with our processes as a subsequent separate operation, but the developing and the color treating processes set forth herein, can be combined in one continuous operation and apparatus. In Fig. 12 the film is shown as first passing into a developing tank 73, then into a tank 74 of hypo or fixer, and then through a tank 75 of wash water, and the film thereupon engages a set of rolls at 76, corresponding to the arrangement shown in Fig. 1, by which the film is treated on both sides by the color process; and then the film is passed through a tank 77 of wash water, and through a suitable drier at 78; and thus a film that has been exposed can be developed and colored in a continuous operation.

It is to be understood that our several processes can be used to treat a single emulsion colored film, or a double emulsion film where the emulsions are on opposite sides, or both on the same side. It will be further understood that by any of the processes, any one of the treatments can be suspended at will by the operator, and later

resumed during the continuous operation of the process.

While the usual motion picture films are comparatively narrow, and are marginally perforated, it is to be understood that our various processes can be applied to films of any desired width, or length, or to a single sensitized plate, whether of celluloid, glass, fabric or any other material.

What we claim is:—

1. The herein described process of producing a film colored in a plurality of colors, that consists in applying the coloring fluid to the opposite faces of the film simultaneously and at the same location in a continuous operation.

2. The herein described process of producing a film colored in a plurality of colors, that consists in advancing the film pressed against a pair of rollers placed on opposite sides of the film and which contain on their faces different coloring fluids whereby the film will be treated at opposite portions in sequence in the same operation.

3. The herein described process of producing a film colored in a plurality of colors, that consists in advancing the film between a pair of rollers placed opposite and which contain on their faces different coloring fluids whereby the film will be treated at opposite portions at the same time.

4. The herein described process of producing a film colored in a plurality of colors, that consists in applying the coloring fluid to the opposite faces of the film in a continuous operation and causing the film as advanced beyond said applying means to be treated by another means to apply coloring material in the nature of a dye tint to operate upon film portions not changed by the said previous applying means.

5. The herein described process of producing a colored film that consists in advancing the film across a bath of a coloring material to engage its lower face only, and thereupon causing the opposite face of the film that was not treated in the bath to engage a contact coloring member that carries a coating of another coloring material.

6. The herein described process of producing a colored sound record film that consists in advancing the film, and directing a stream or spray of coloring fluid against one face of the film as advanced, and directing a stream of an inactive fluid against the opposite face of the film at the same location, and shielding the sound tract of the film so that it will not receive the color fluid.

7. The herein described process of producing a colored film, that consists in advancing the film and applying a coloring fluid to one longitudinal image zone of the film of less width than the image surface, and applying a different coloring fluid to another longitudinal image zone of the film, on the opposite side of the film.

8. The herein described process of producing a film colored in a plurality of colors, that consists in first passing the film through developing means, and thereupon in a continuous operation during the advance of the film applying coloring fluid, and then passing the film into engagement with rolls on its opposite faces to apply different coloring materials to the two faces.

ALBERT TEITEL.
CLARA TEITEL.