Dec. 18, 1923. 1,477,880

I. KITSEE

PRODUCING MULTICOLORED SCREENS

Original Filed March 29, 1921 2 Sheets-Sheet 1

Fig. 1.

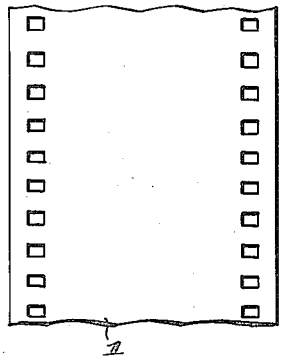


Fig. 2.

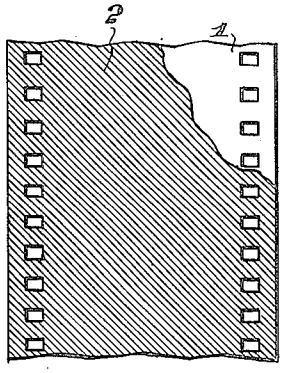


Fig. 3.

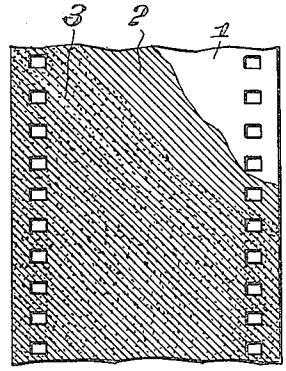


Fig. 4.

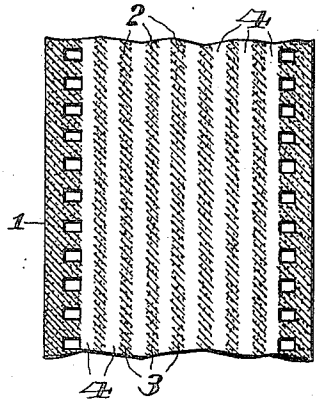


Fig. 5.

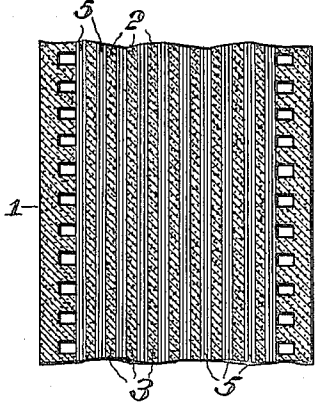
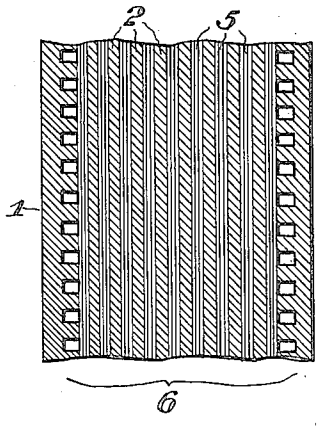


Fig. 6.



INVENTOR.

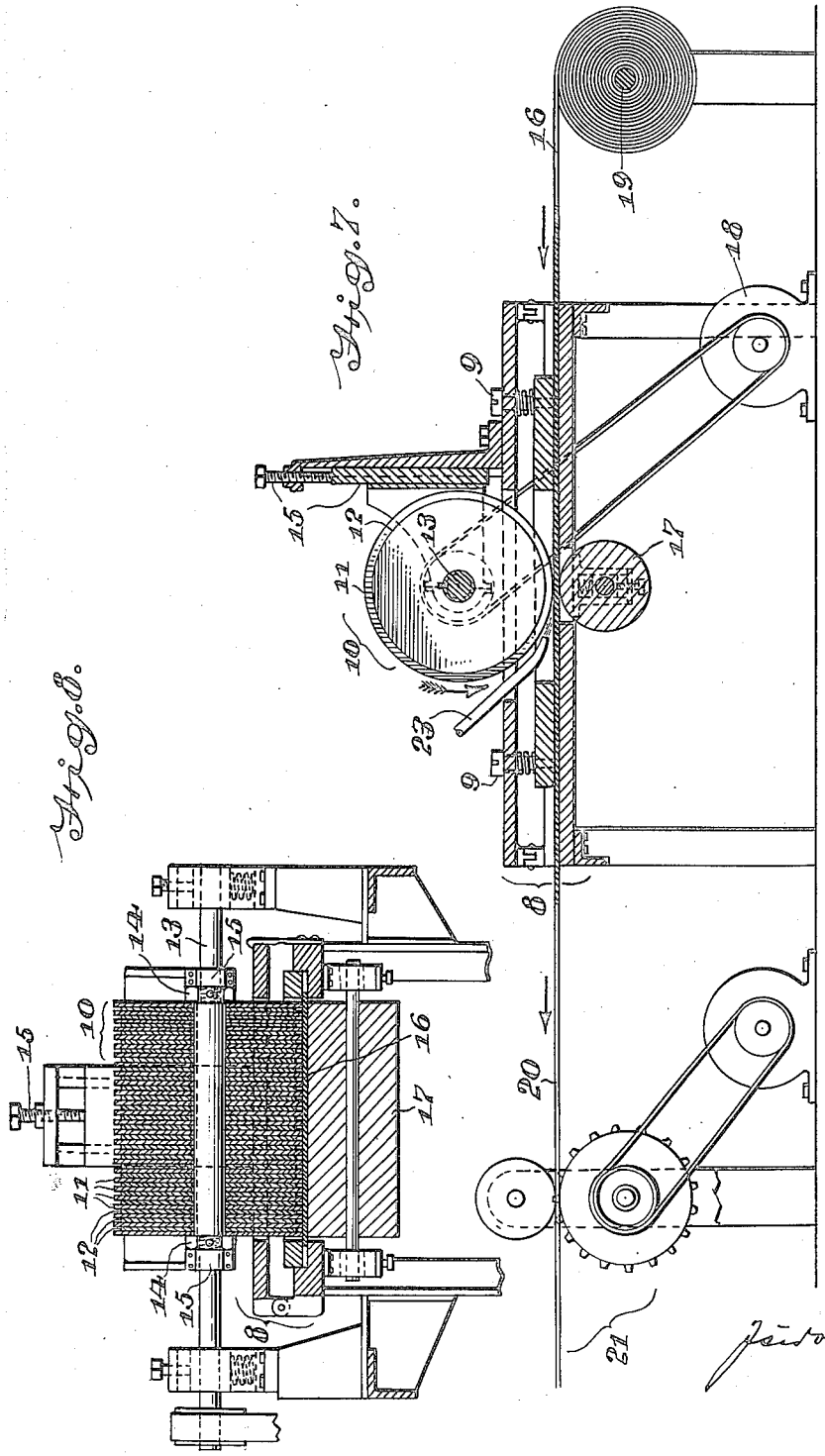
Isidor Kitsee

Dec. 18, 1923. 1,477,880

I. KITSEE

PRODUCING MULTICOLORED SCREENS

Original Filed March 29, 1921 2 Sheets-Sheet 2



INVENTOR.

Isidor Kitsee

Patented Dec. 18, 1923. 1,477,880

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

PRODUCING MULTICOLORED SCREENS.

Application filed March 29, 1921. Serial No. 456,743. Renewed August 16, 1923.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Producing Multicolored Screens, of which the following is a specification.

My invention relates to an improvement in producing multi-colored screens integral with photographic blanks.

My invention embraces not only the process with the aid of which a celluloid or like blank may be provided with figurations of different colors, but it also contemplates the means and method of applying these figurations in a simple and economical manner to the photographic blank. I am well aware that attempts have been made to produce multi-colored screens integral with photographic blanks, I am also aware that Letters Patents in the United States and other countries were issued for multi-colored screens, but so far no multi-colored screens integral with photographic blanks, useful for moving picture work is made commercially, and none of the Letters Patents describe the means, so that persons versed in the art can produce such screens on commercial basis.

It is one thing, to state that figurations of two or more colors should be produced in required minuteness on a photographic blank, but it is of far greater importance to clearly point-out not only the different steps required, but also the different parts of the apparatus to be used in constructing such screens, so that persons versed in the art may successfully produce the same in commercial quantities.

I will first describe the process or method, with the aid of which a multi-colored screen can be produced directly on a celluloid or other suitable blank. As my invention has more special reference to moving picture films I take it for granted that the photographic blank consists of the usual celluloid film.

In the accompanying drawing, which illustrates one form my invention may take. Figs. 1 to 6 inclusive are plan views of parts of a film representing different stages in the course of producing the multi-colored screen thereon. Fig. 7 is a vertical longitudinal section partly in elevation of the device used in the production of the integral color screen. Fig. 8 is a vertical transverse section taken on the line 8—8 of Fig. 7.

In Figs. 1 to 6, 1 is the celluloid base, 2 the color with which one surface of the celluloid is tinted, and as I have selected here the screen to consist of the two colors green and red, the color 2 represents here, green. 3 indicates a protective coating, surfacing the green tinted celluloid. 4 indicates the spaces from which the protective coating and green tint have been removed. 5 indicates the, formerly clear spaces tinted now with a second color, here red. In Fig. 6 the whole screen is indicated by 6 and consists here of red lines inter-spaced by green lines, the protective coating being entirely removed. In Figs. 7 and 8 the device consists of a race-track 8, in its broad construction similar to the construction of the race-track in moving picture projectors and provided with means 9—9 to adjust the same, so that the film passing through the race-track should be provided with the required pressure to hold the same in level position. 10 indicates a series of discs comprising the discs 11 and the discs 12, the discs 12 positioned alternating between the discs 11. The discs 11 of a larger diameter than the intervening discs 12. The whole series of discs positioned on and keyed to the revolvable shaft 13. 14—14 are the means to hold the discs together in tight assembly. 15 are the means to raise and lower and place in exact relation the whole series of discs as to the film 16 passing through the race-track. In practice, I have found that the multi-colored screen does not need to have colored lines thereon of a smaller width than about 1-500 of an inch for each line. The screen therefore will consist here of green lines of about 1-500 of an inch in width interspaced by red lines approximately the same width. Taking now for granted that the screen will consist of 500 lines per inch, 250 of each color, and taking for granted the screen will be produced with the aid of the device as illustrated in Figs. 7 and 8, it has to be stated, that each of the discs, 11 as well as 12 should be about 1-500 of an inch in thickness. For better understanding I call the whole series of discs, as assembled on the shaft, the cutting roller and each inch of this cutting roller will therefore consist of 500 discs, 250 of which are of larger diameter than the intervening 250. In practice, I have found

that a very convenient size for these discs are about 2 inches in diameter for the larger and about 1 31-32 in diameter for the smaller discs. 17 is an adjustable free revolving roller, positioned in the cut-out place of the race-track and adapted to contact with the film 16, so that the same may not deviate from its proper position. 18 are the means here shown as an electric motor, with the aid of which the cutting roller may be revolved. I have here shown the motor as being connected to the shaft 13 with the aid of a belt. This for the reason that, if the motor is connected directly to the shaft, the vibrations of the motor may injuriously affect the operation of the cutting roller. 19 is a spool from which the film is wound during operation and 20 the film already acted upon by the cutting roller and 21 are the means to draw the film through the cutting roller.

The mode or method of producing the multi-colored screen according to my invention is substantially as follows: As my invention has more special reference to moving picture films, I will refer to the celluloid blank as film or part of film, useful to take thereon, after completion of the process and proper coating with pan chromatic emulsion, photographs and with the aid of which, positives may be produced and exhibited in the same manner and with substantially the same apparatus as moving pictures are projected today.

The first requisite is, a celluloid blank in the form of a film, either perforated or unperforated. This film is then tinted on one surface with one color. The tinting with the color may be produced with the aid of rollers or brushes, and in this case, the opposite surface does not require any protective coating. The dye-solution should be such as to affect the celluloid proper, but in a very mild degree. For this purpose dyes have to be selected, soluble in alcohol, and an agent affecting the celluloid has to be added. This agent may consist of any of the usual solvents, such for instance as amylacetate, acetone or ether. In the practical working of the tinting, it was found, that a very even tint can be applied to the celluloid, if the film is immersed in the liquid and moved to and fro. But in this case the underside or opposite surface has to be protected from the action of the dye solution. This can readily be accomplished by covering the under side with a light coating of gelatine or gum arabic. Care should be taken not to make the dye solution too active or to leave the film too long in this solution, as otherwise the tinting will penetrate to a depth greater than desired. After the film is taken from the color bath, the same is subjected to a drying process either with or without the aid of artificial means. When completely dry, the tinted surface is provided with a protecting layer, such for instance as was used for protecting the underside from the dye solution, that is with a coating of gelatine, gum arabic or substance similar in action. After drying the film is subjected to a cutting process with the aid of the device, substantially, as is illustrated in Figs. 7 and 8, in the following manner: The film is wound around a spool and the free end of the film is threaded or carried through the race-track of the device and this end is then carried through the pulling means, here 21. These means are adapted to be rotated with the aid of an electric motor or device similar in action. In practice I prefer an electric motor as its speed can easily be regulated with the aid of a variable rheostat. The cutting roller has to be adjusted then in a manner so that the discs of larger diameter should slightly press on the film and should, when rotated cut into the protecting layer and that part of the surface of the film which is tinted, so that the protective layer as well as the tinted surface is removed and a space, freed from the color and protective coating is produced. In practice it was found that the greater the rotating speed of the cutting roller, the greater the efficiency of same and for all practical purposes it is suggested, that the speed of the cutting roller should be about double or greater than the speed of the moving film. 1800 to 2500 revolutions per minute of the cutting roller is not excessive, this speed can also be regulated by the size of the pulleys on the shaft of the cutting roller and motor respectively. The movement of the film should be in a direction opposite to the direction of the revolving cutting roller, as is clearly indicated by the different arrows; the feathered arrow indicating the direction of rotation of the cutting roller and the unfeathered arrow the direction of the movement of the film through the race track. After the whole length of the film has passed through the race track and was acted upon by the cutting roller, it will present an appearance substantially as follows: Straight colored lines with the protective coating intact, interspaced by straight lines minus the color and protective layer. In other words the film will represent a surface in which colored lines will alternate with clear lines. A film of this description is clearly illustrated in Fig. 4.

The upper surface of the film so produced is then subjected to a dye solution of color different from that of the first dye solution, but this solution should have substantially the same properties as the first dye solution, it should effectually tint the celluloid now laid bare through the cutting off of the pro-

tective layer and formerly tinted part of the celluloid. It has to be stated, that if the laying on of the second color is produced with the aid of roller or brushes, it is unnecessary to give the underside a protective coating; but, as it was found in practice, that the immersion of the whole film in the dye solution is the more practical and efficient, then the underside has to be provided with a protective coating similar to the protective layer above referred to. Care has to be taken that the individual cutters or discs should be of exactly the same diameter, so that no disc should protrude or be recessed as compared with the other disc, as otherwise the finished product will not be satisfactory. Care should also be taken, to place the cutting roller in exact position as to the surface of the film to be cut and therefore the adjustment as indicated by 15 in Figs. 7 and 8 should be micrometrically correct. The film, after the second tinting will, if green and red are used as dyeing solutions, represent a surface substantially as illustrated in Fig. 5. The remaining protective coating may then be removed by simply washing the film in water and the film will present a surface substantially as illustrated in Fig. 6.

To reduce the heat, generated through the friction of the cutting roller and moving film, means have to be provided to conduct this heat from the device and a blast of cool air, as practice has proven, will effectually reduce the temperature of the cutting roller as well as the film. In Fig. 7, 23 indicates part of the means through which the cold air is conveyed onto the cutting roller and moving film.

In the drawing I have selected to be shown a perforated film as being acted upon by the cutting roller, and therefore the means to draw the film through the race-track are illustrated as the usual sprocket wheels. But if the film is unperforated, suitable friction rollers may be substituted for the sprocket wheels.

During the explanation of the drawing I have given figures of the diameter of the cutting as well as intervening discs, but it is obvious that the diameter of the cutting as well as the intervention discs may be increased or decreased in accordance with requirements. I have also pointed out satisfactory speeds of the cutting roller as well as of the moving film; this speed and relation of the speed between the roller and film may also be increased or decreased in accordance with requirements without departing from the scope of my invention. Where requirements necessitate, the cutting as well as the intervening discs may be reduced or increased in thickness, and if it is desired that the lines of one color should deviate in width from the lines of the second color, then the thickness of the intervening discs should be either increased or decreased as to the thickness of the cutting discs.

I have illustrated the disc as to be smooth-edged because I have found this construction of the discs very satisfactory, but if it is desired to make the edges ragged, notched or toothed results may also be produced from the revolving roller, but care has to be taken that the ragged edges or teeth should not be clogged up or when clogged up, cleaned as otherwise the result will not be satisfactory and will present an uneven appearance. I must also add, that if toothed discs are employed, the movement of the film as to the number of revolutions of the discs should be greatly reduced.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The method of producing multi-colored screens on blanks useful for photographic purposes which consists in tinting one surface of a celluloid blank with one color, protecting the tinted surface with a coating, removing the tinted surface and protective coating from predetermined parts of the tinted blank with the aid of revolving discs, and tinting the freed parts with a second color.

2. In the process of producing multi-colored screens on celluloid blanks the step which consists in first tinting one surface with one color and then removing with the aid of revolving discs predetermined parts of said surface.

3. The method of producing multi-colored screens integral with moving picture films which consists in first providing one surface of a celluloid blank with a protective coating, immersing then said blank in a dye-solution adapted to attack the unprotected surface in a manner, so as to tint the same, coating the tinted surface when dry with a protective layer, clearing predetermined parts of the tinted surface from its protective layer and tint, immersing the blank in a second dye-solution different in color from the first dye-solution, and adapted to tint the free parts with a second color and then removing the protective layer entirely.

4. The process of producing an integral screen on moving picture films, the screen comprising lines of different colors, consisting therein that with the aid of rotating discs, lines are cut into the surface of a previously tinted celluloid film in a manner, so as to remove the tint from said lines and then tinting the lines from which the color is removed, with a second color.

5. A moving picture film provided with lines of different colors, both color lines directly on the celluloid proper and one color line recessed as to the adjoining color line.

6. In the art of producing integral screens for moving picture films the steps as follows:—removing with the aid of a series of revolving discs predetermined parts of the coating and tint of a previously tinted and coated celluloid film and then selectively tinting the freed parts with a color differing from the first tint.

7. As a new article of commerce a moving picture film provided directly on the celluloid with a series of lines of one color interspaced by lines of a second color, one series of said lines in intaglio as compared with the second of said series.

In testimony whereof I affix my signature.

ISIDOR KITSEE.