May 27, 1930. L. DUFAY 1,760,048

APPARATUS FOR MAKING MOSAIC SCREENS FOR COLOR PHOTOGRAPHY

Filed March 8, 1929 3 Sheets-Sheet 1

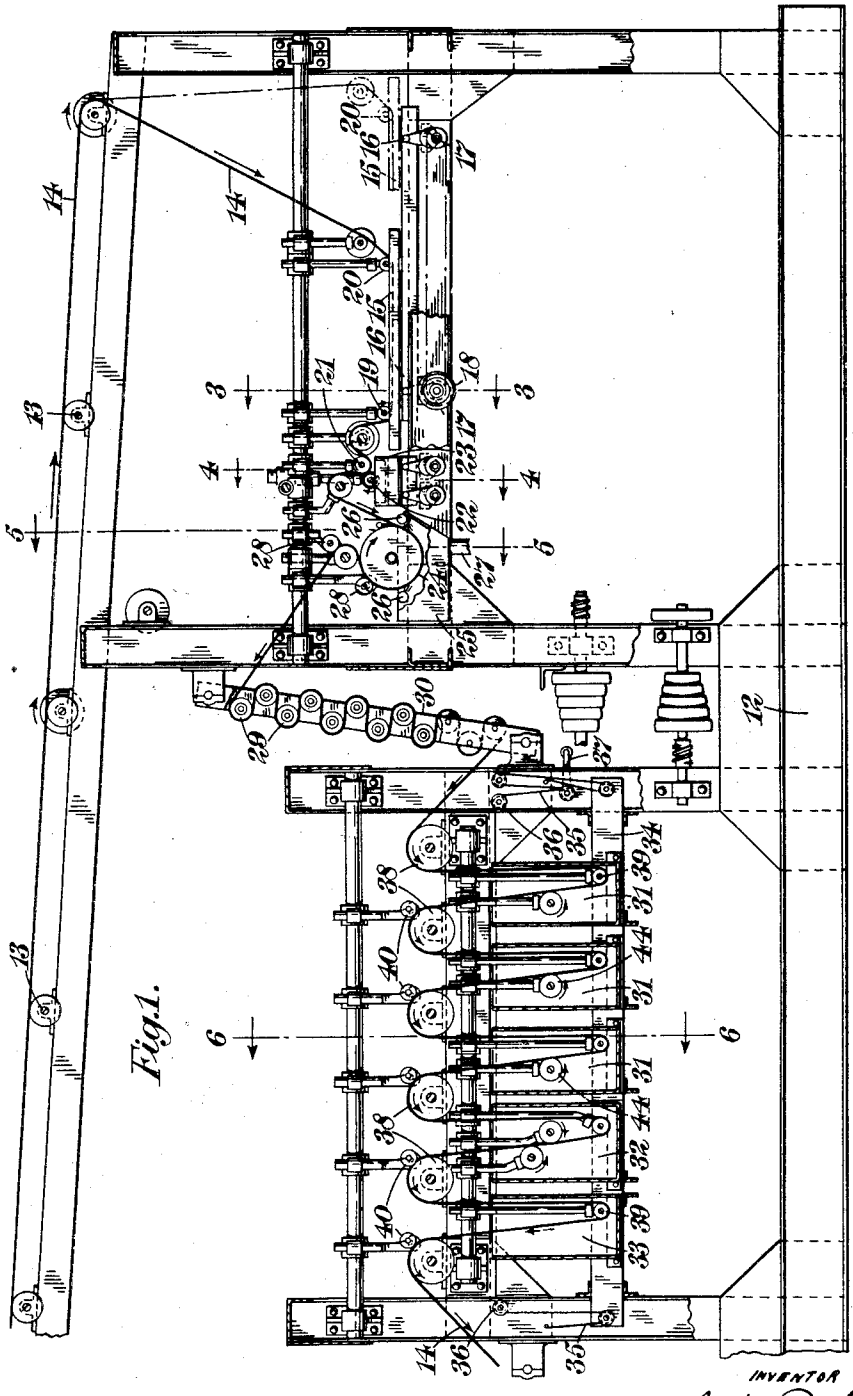


Fig.1.

INVENTOR
Louis Dufay
By Watson, Cole, Morse & Grindle
ATTYS

May 27, 1930. L. DUFAY 1,760,048

APPARATUS FOR MAKING MOSAIC SCREENS FOR COLOR PHOTOGRAPHY

Filed March 8, 1929 3 Sheets-Sheet 2

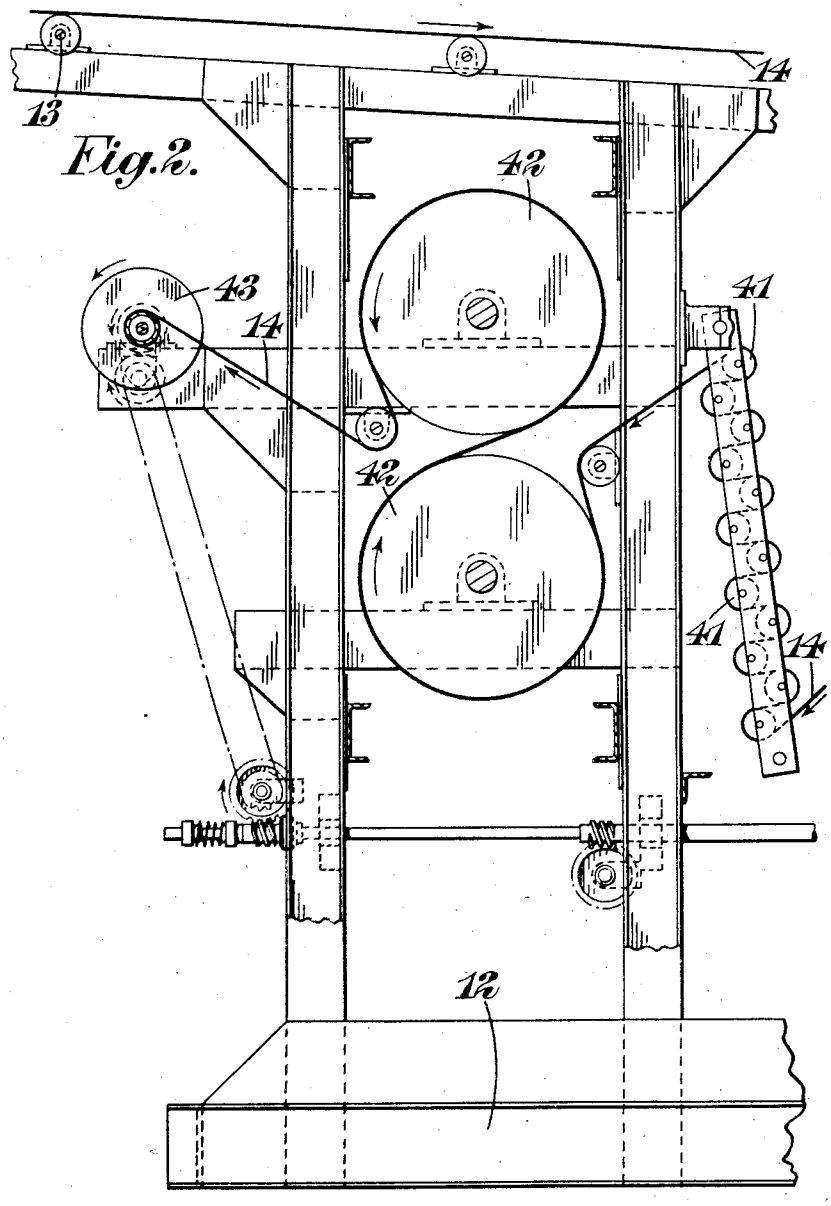


Fig. 2.

INVENTOR
Louis Dufay
by Watson, Coit, Morse & Grindle
Atty's

May 27, 1930. L. DUFAY 1,760,048

APPARATUS FOR MAKING MOSAIC SCREENS FOR COLOR PHOTOGRAPHY

Filed March 8, 1929 3 Sheets-Sheet 3

Fig. 3.

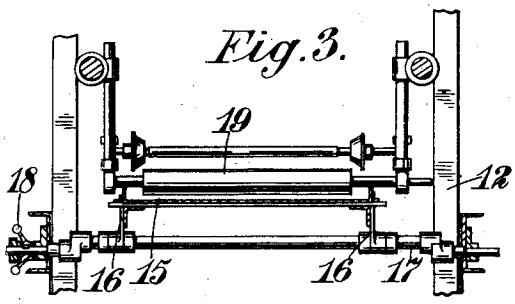


Fig. 4.

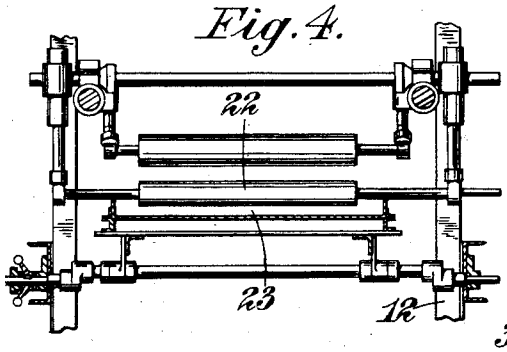
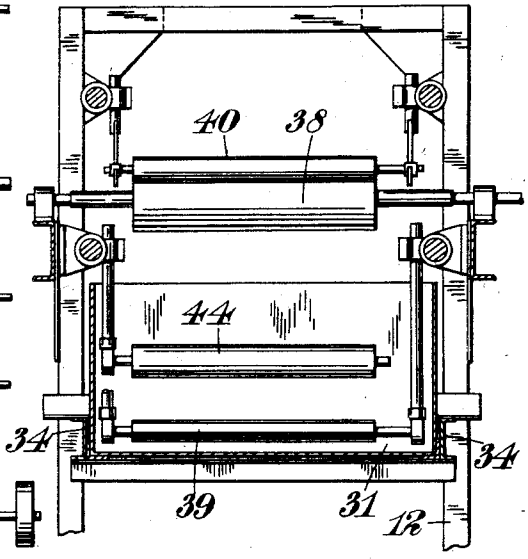


Fig. 6.



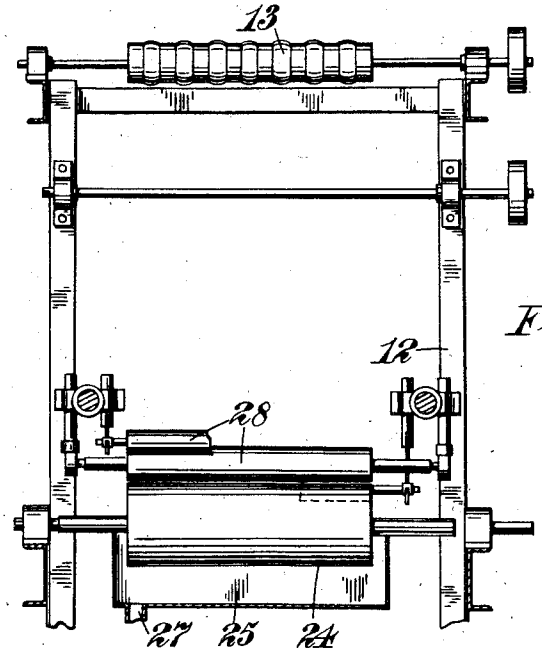


Fig. 5.

INVENTOR

Louis Dufay

By Watson, Cole, Morse & Grindle

ATTYS

Patented May 27, 1930 1,760,048

UNITED STATES PATENT OFFICE

LOUIS DUFAY, OF VERSAILLES, FRANCE, ASSIGNOR TO HAROLD WADE, OF LONDON, ENGLAND

APPARATUS FOR MAKING MOSAIC SCREENS FOR COLOR PHOTOGRAPHY

Application filed March 8, 1929, Serial No. 345,400, and in Great Britain August 4, 1928.

This invention provides a machine for treating long strips of dyed sheet material (for example cellulose acetate film) having a resist pattern imprinted thereon, for the production of mosaic color-screens for direct color photography and cinematography. The invention is particularly adapted for the carrying out of the method of making three-color screens described in the specification of L. Dufay application Serial No. 345,604, filed March 8, 1929, but it is equally well adapted for the production of linear two-color screens.

The machine according to the present invention comprises in combination a trough for a decolorizing agent, a device for applying a dye, a washing device, a drying device, a trough (or more than one) for a solvent of the resist material, a wiping device within said trough, a second drying device, and means for guiding and moving the strips to be treated continuously through the troughs and devices in the order named.

In the accompanying drawings which illustrate by way of example one practical embodiment of the invention;—

Figure 1 is a side elevation partly in section of part of the machine;

Figure 2 is a side elevation partly in section of the remainder and is a continuation of Figure 1 towards the left;

Figure 3 is a section on the line 3—3 of Figure 1;

Figure 4 is a section on the line 4—4 of Figure 1;

Figure 5 is a section on the line 5—5 of Figure 1;

Figure 6 is a section on the line 6—6 of Figure 1.

Like reference characters indicate like parts throughout the drawings.

The machine as a whole comprises a main frame 12 having a succession of rollers 13 to lead the film 14 along the top of the machine to the inlet end.

The decolorizing trough 15, which is in the form of a shallow dish, is mounted at one end of the machine upon two pairs of brackets 16 carried by two eccentric shafts 17 geared together, one of which carries a hand-wheel 18. By turning the hand-wheel 18 the trough 15 may be raised or lowered at will. Just above the trough two guide-rollers 19, 20 are mounted. These rollers are so arranged that the strip 14 passing under them is exactly horizontal, and when the apparatus is in use the trough 15 is adjusted so that the liquid decolorizing agent therein just touches the underside of the strip.

After leaving the decolorizing trough, the strip passes under a roller 21 upon which it receives dye from a ebonite dye-applying roller 22 which dips into a dye-trough 23, (mounted in a similar manner to the decolorizing trough) and which rotates in close proximity to but not in contact with the strip.

Preferably the peripheral speed of this roller 22 is greater than the speed of the strip (or it may alternatively revolve in a direction opposite to that in which the strip is moving) whereby any traces of the decolorizing agent which may still cling to the surface of the strip may be swept away.

The strip then passes around a positively driven drum 24 about 20 cm. in diameter, upon which it is washed by means of jets of water directed from pipes 26 upon its exposed side, further jets of water being directed upon the other side just before it comes into contact with the drum for the purpose of removing any dye which may have encroached upon that side. Beneath the drum 24 is a trough 25 provided with a waste-pipe 27 for collecting and removing the washing-water.

After washing, the strip passes between rubber squeegee rollers 28 and then enters between a series of twelve drying or "blotting" rollers 29 covered with absorbent cotton sleeves. These rollers 29 are carried by

a frame 30 in two rows of six each, in staggered relationship, and the strip passes in a zig-zag manner over the rollers so that its opposite sides are dried (by absorption or blotting) by alternate rollers.

From the drying or blotting rollers the strip passes to the resist-solvent troughs 31, of which there are three, then to the de-greasing trough 32 and finally to the rinsing trough 33. These five troughs are mounted on a frame 34 capable of vertical movement and suspended by wire cables 35 led over pulleys 36 to a winch 37 by which it can be raised or lowered.

The strip passes over six upper rollers 38 and five lower rollers 39, the axes of which are fixed, these lower rollers being so situated that each is inside and near the bottom of one of the troughs 31, 32, 33 when the frame 34 carrying them is in its upper position, the upper rollers 38 being above the troughs and serving to conduct the strip from one trough to the other. The upper rollers 38, which are positively driven, are of larger diameter than the lower ones 39 and each (with the exception of the first) is provided with a squeegee roller 40 in contact with the strip passing around it.

The resist material is usually of a greasy nature and the solvent in the first three troughs 31 is accordingly benzene, petrol or like solvent of grease. The first and second squeegee rollers 40 must therefore be of a material not attacked by this solvent, and it is preferred to cover them with soft gelatine. The remaining two squeegee rollers, which are in contact only with aqueous alkaline solution and plain water respectively, are coated with rubber.

After leaving the rinsing trough, the strip passes between a second set of drying or blotting rollers 41 similar to those just described, and then over two positively driven internally heated drums 42, one of which contacts with one side of the strip, and the other with the other side.

Finally the strip is wound upon a storage spool 43 which is driven through a slipping clutch or its equivalent the adhesion of which is controlled by a spring- or weight-loaded jockey-pulley bearing against the strip, the connection between the jockey-pulley and the slipping clutch being such that when the tension in the strip increases beyond a certain amount the clutch is caused to slip.

The imprinted pattern of greasy resist material must not be touched by any solid body until after the dye has been applied to the decolorized interspaces. Accordingly, every roller which has to engage the side bearing the resist material, up to the first washing stage, is of the kind comprising two conical roller-elements spaced apart on a spindle, which engage the edge only of the strip.

In each solvent tank is a positively-driven flannel-covered wiping roller 44 bearing lightly against the side of the strip on which is the greasy resist material, and these rollers rotate in the same direction as the strip but with a rather greater peripheral speed, (alternatively these wiping rollers may rotate in the direction opposite to the movement of the strip). Two such rollers are provided in the degreasing trough, one on either side of the strip, but there are no wiping rollers in the final rinsing trough.

All the rollers over which the strip passes, particularly those which are not positively driven, are preferably mounted in self-aligning ball-bearings.

It will be readily understood that the strip, after treatment in the apparatus described, will be dyed in two colors, namely the original color in those areas protected by the resist material, and the applied color in the unprotected areas. If the colors are suitably chosen, the strip may be used after this treatment as a screen for two-color photography or cinematography. If, however, it is desired to produce a three-color screen according to the specification of L. Dufay application No. 345,604, filed March 8, 1929, a second pattern in resist material must be impressed upon the film, followed by a second decolorizing, dyeing and washing treatment similar to that described above.

A second apparatus, similar to that described above, may be employed for this second treatment, or the same apparatus may be employed. In the latter alternative, it is found that (when the method described in the aforesaid specification is used) a longer time of treatment in the decolorizing bath is necessary. According to a further feature of the invention, therefore, means are provided for enabling the length of that part of the strip which is under treatment in the decolorizing trough to be readily varied. For this purpose, one of the two rollers 19, 20 around which the strip passes in its transit along the surface of the decolorizing bath is made adjustable towards and away from the other. Instead of a single adjustable roller 20, two alternative rollers may be provided, either of which may be employed according as a longer or shorter time of treatment is desired.

I claim:—

1. A machine for treating long strips of dyed sheet material having a resist pattern imprinted thereon for the production of mosaic screens for color photography and cinematography comprising in combination a trough for a decolorizing agent, a device for applying a dye, a washing device, a drying device, a trough for a solvent of the resist material, a wiping device within said trough, a second drying device and means for guiding and moving the strip to be treated continuously through the troughs and devices in the order named.

2. A machine for treating long strips of dyed sheet material having a resist pattern imprinted thereon for the production of mosaic screens for color photography and cinematography comprising in combination a trough for a decolorizing agent, a device for applying a dye, and means for guiding and moving the strip to be treated with one side only in contact with the decolorizing agent and subsequently with the dye-applying device, namely that side which is dyed and bears the imprinted resist pattern.

3. A machine for treating long strips of dyed sheet material having a resist pattern imprinted thereon for the production of mosaic screens for color photography and cinematography comprising in combination a trough for a decolorizing agent mounted to be movable at will in a vertical direction whereby the surface of the decolorizing agent can be brought into contact with the lower side of the strip, a device for applying a dye, a washing device, a drying device, a trough for a solvent of the resist material, a wiping device within said trough, a second drying device and means for guiding and moving the strip to be treated continuously through the troughs and devices in the order named.

4. A machine for treating long strips of dyed sheet material having a resist pattern imprinted thereon for the production of mosaic screens for color photography and cinematography comprising in combination a trough for a decolorizing agent, a device for applying a dye comprising a roller dipping into a dye-trough and revolved in close proximity to the surface of the strip, a washing device, a drying device, a trough for a solvent of the resist material, a wiping device within said trough, a second drying device and means for guiding and moving the strip to be treated continuously through the troughs and devices in the order named.

5. A machine for treating long strips of dyed sheet material having a resist pattern imprinted thereon for the production of mosaic screens for color photography and cinematography comprising in combination a trough for a decolorizing agent, a device for applying a dye comprising a roller dipping into a dye-trough and revolved in close proximity to the surface of the strip, a washing device, a drying device, a trough for a solvent of the resist material, a wiping device within said trough, a second drying device and means for guiding and moving the strip to be treated continuously through the troughs and devices in the order named at a linear speed different from the peripheral speed of the dye-applying roller.

6. A machine for treating long strips of dyed sheet material having a resist pattern imprinted thereon for the production of mosaic screens for color photography and cinematography comprising in combination a trough for a decolorizing agent, a device for applying a dye, a washing device comprising a roller of relatively large diameter for supporting the moving strip and a plurality of water-jets directed upon the strip, a drying device, a trough for a solvent of the resist material, a wiping device within said trough, a second drying device and means for guiding and moving the strip to be treated continuously through the troughs and devices in the order named.

7. A machine for treating long strips of dyed sheet material having a resist pattern imprinted thereon for the production of mosaic screens for color photography and cinematography comprising in combination a trough for a decolorizing agent, a device for applying a dye, a washing device, a drying device, a trough for a solvent of the resist material, a wiping device within said trough comprising a roller having a covering of soft fibrous material and rotated in contact with the strip at a peripheral speed differing from the linear speed of the strip, a second drying device and means for guiding and moving the strip to be treated continuously through the troughs and devices in the order named.

8. A machine for treating long strips of dyed sheet material having a resist pattern imprinted thereon for the production of mosaic screens for color photography and cinematography comprising in combination a trough for a decolorizing agent, a device for applying a dye, a washing device, a drying device comprising a series of rollers of soft fibrous absorbent material in contact alternately with opposite sides of the strip and rotated at peripheral speeds different from the linear speed of the strip, a trough for a solvent of the resist material, a wiping device within said trough, a second drying device and means for guiding and moving the strip to be treated continuously through the troughs and devices in the order named.

9. A machine for treating long strips of dyed sheet material having a resist pattern imprinted thereon for the production of mosaic screens for color photography and cinematography comprising in combination a trough for a decolorizing agent, a device for applying a dye, a washing device, a drying device, a trough for a solvent of the resist material, a wiping device within said trough, a trough for an alkaline de-greasing bath, a trough for rinsing water, a second drying device and means for guiding and moving the strip to be treated continuously through the troughs and devices in the order named.

10. A machine for treating long strips of dyed sheet material having a resist pattern imprinted thereon for the production of mosaic screens for color photography and cinematography comprising in combination a trough for a decolorizing agent, a device for applying a dye, and means for guiding and

moving the strip to be treated with one side only in contact with the decolorizing agent and subsequently with the dye-applying device, namely that side which is dyed and bears the imprinted resist pattern, said guiding means including two rollers guiding the strip horizontally along the surface of the decolorizing agent and means enabling at least one of said rollers to be adjusted towards and away from the other.

In testimony whereof I affix my signature.

LOUIS DUFAY.