

June 12, 1928.

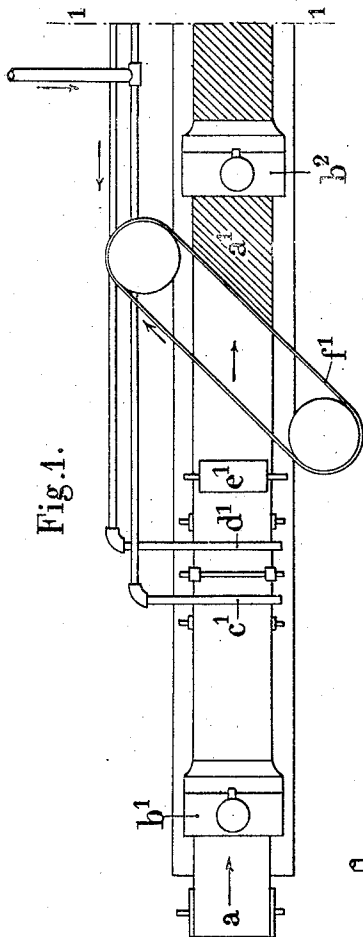
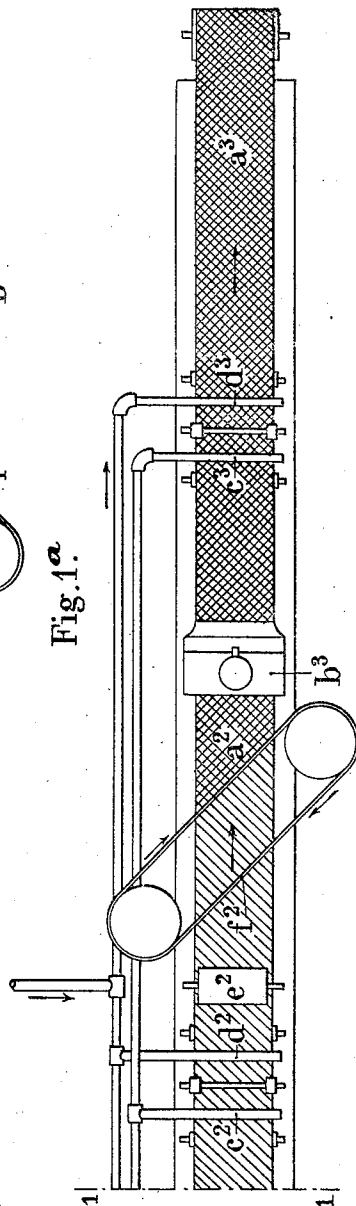
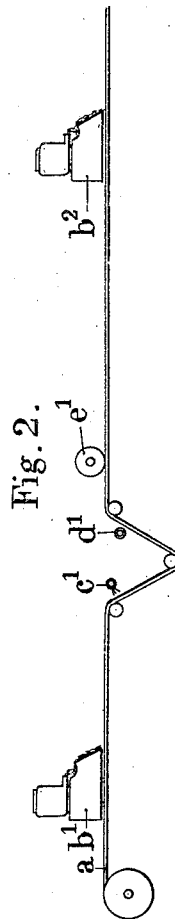
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1,673,349

PROCESS OF MAKING POLYCHROMATIC SCREENS FOR COLOR PHOTOGRAPHY

Filed Dec. 2, 1922

2 Sheets-Sheet 1



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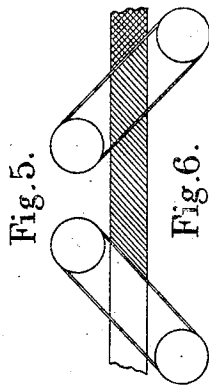
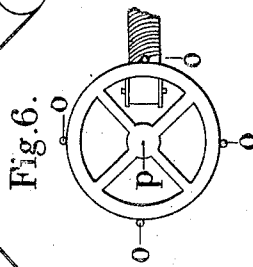
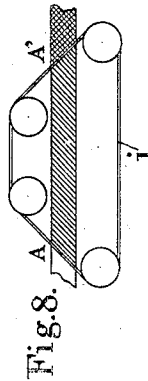
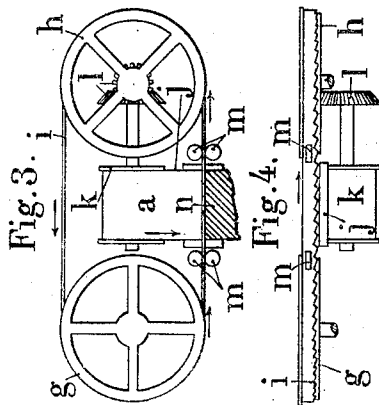
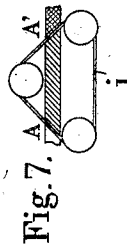
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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PROCESS OF MAKING POLYCHROMATIC SCREENS FOR COLOR PHOTOGRAPHY.

Application filed December 2, 1922, Serial No. 604,548, and in France December 5, 1921.

One of the different methods heretofore proposed for making screens with polychromatic divisions for color-photography, consists in automatically placing the three required colors by means of a successive drawing or tracing of parallel furrows or grooves in a transparent sheet which has been previously covered with one of these colors. These grooves uncover the inner non-colored part of the support and, due to an insulating agent previously spread over the whole surface, permit the coloring of the parts which have been thus uncovered.

The gelatine, which is the only insulating medium proposed for obtaining this result (in taking as a support a sheet of celluloid or a coat of collodion spread upon glass,) has the serious disadvantage of drying very slowly and rendering it impossible to make rapidly the three-color screen, a very long pause intervening between each run. Furthermore it offers a certain resistance to the drawing tool. The disadvantage, still exists when making use of varnishes or gums and some of the latter have, besides this, the disadvantage of making it impossible to draw or cut hollow plain lines.

The present invention has for its purpose to remedy these serious disadvantages and to permit, namely by means of the very simple device which will be hereinafter described, the making of the three series of microscopic colored elements, in the support itself, in a single operation comprising, it is true, several runs, but being effected without any interruption, so that a film, without any color for instance, can within a few minutes, in a single machine, be converted into a three-color screen capable of being used for color-photography.

The present invention consists essentially in replacing the gelatine or the varnishes by a substance which is impervious to water or alcohol and is of weak consistency such as: wax, tallow, paraffine, stearine, etc., according to the color used which thus constitutes no longer a varnish, but a more or less soft coating which can be spread if necessary by simple contact or by rubbing and which is capable at once of acting as a provisory protector of the colors already absorbed by the support. According to this new process nothing hinders the operations from taking place one after the other, without any interruption, resulting in a great saving of time.

Moreover the drawing tool can easily penetrate this soft coating.

This principle can be carried out by means of the device which is hereinafter described and schematically represented in Figure 1 of the drawing given by way of example, and can be used for rapidly making screens with polychromatic divisions.

An apparatus for carrying out the process is diagrammatically illustrated in the accompanying drawings in which:

Fig. 1 is a top plan view of the left portion, Fig. 1^a a top plan view of the right portion, and Fig. 2 is a partial side view of the apparatus. Fig. 3 is a plan view of a means for placing lines on the film or the like. Fig. 4 is a front view of the device shown in Fig. 3. Fig. 5 is a plan view of a device for placing lines at angles to each other on the film. Fig. 6 is a plan view of a device for placing curved lines on the film. Fig. 7 is a plan view of a single belt or band saw adapted to place lines at angles to each other on the film. Fig. 8 is a modification of the device shown in Fig. 7.

Supposing for example, it is desired to make a netting composed of small juxtaposed elements of the three selected colors: orange-red, green and violet-blue, in the thickness of a film as used for photography or cinematography.

The colorless film *a*, placed upon a moving apron, is first covered over its whole surface, by means of a distributing device *b*¹ of any construction, with an orange-red coloring matter dissolved in alcohol for example. After the time which is necessary to allow this color to soak sufficiently into this film (a few seconds), this film is submitted to the action of a water spray *c*¹ which drives out the excess of color and to that of a blower *d*¹ which dries the same. A suitable device such as a roller *e*¹ spreads over the whole surface a very thin layer of wax in its natural state or softened in a dissolving agent, which is at once evaporated; this layer or coating is then ready to perform its duty as an insulating medium.

A tool *f*¹ with multiple microscopic teeth, hereinafter described in detail, draws shallow parallel furrows or grooves in the film through the layer or coating of wax and thus uncovers the uncolored part of the support. The part *a*¹ of the film thus prepared and moving forward receives the green color

supplied from a feeder b^2 and also dissolved in alcohol which, although being spread over the whole surface, only locates itself in these grooves without interfering with the interspaces protected by the wax. The excess of this color is removed by a spray c^2 , the film being then dried by a blower d^2 . The film continuing to advance is again covered with wax by a roller e^2 and can then be submitted to the action of a second tool f^2 with multiple teeth making grooves at right angle to the first ones. This tool removes the superficial coating of the film already colored and it will be understood that the spreading of the violet-blue over the whole surface will cause only the coloring of the second series of grooves or furrows and that after washing and drying, the three-color netting will be constituted without any colorless interval or any superposition when the film comes to the end of its motion.

If gelatine is used for the support, it is then necessary to use an insulating agent, such as tallow, grease, etc.

The process can also be used for making three-color screens on glass coated with gelatine or collodion.

Figures 3 to 8 show different constructions of a mechanical device with continuous motion especially devised for the industrial preparation of the above mentioned screens, but also capable of being applied to many other uses.

This device has for its purpose to draw very quickly either bands, or parallel grooves or hollows, however narrow the same may be.

It is particularly adapted for working upon soft sheets (photographic films, papers, etc.) but can also be used for drawing upon rigid surfaces.

The lines may cross diagonally at any angle, this arrangement being the most suitable for the netted screens used in color-photography.

The device is essentially composed of: 1st two wheels g , h , or a greater number of same, preferably horizontally arranged and connected together by a sort of endless saw i (band saw) for which no path has been provided; 2nd, of a carriage j , or moving apron, the advance motion of which depends strictly on that of the said wheels, through the roller k and the gears l , for example, and arranged parallelly to these wheels, so that the teeth of the saw come in contact with the surface thereof. Rollers m prevent any deflection of the band.

The motions can be obtained through any mechanical means such as: pinions, belts, chains, racks and the like.

Figures 3 and 4 show schematically the essential parts of the device in its most common form. The photographic film a moves over the carriage j and the teeth of the saw

i cut during its passage distinct grooves or furrows therein. In fact, by virtue of the advancing motion of the film, each tooth draws its line in parallelism to that of the preceding tooth and the result is the formation of continuous grooves which are but slightly deflected, but all parallel. Figure 3 shows this tracing in n , the intervals being exaggerated for the sake of more clearness.

The width and the number of these lines, as well as their interspacing, can be regulated at will. In fact, the width depends on that of the teeth which can be narrowed as much as desired by means of a lateral sharpening; the number and the interval depend on the ratio between the speeds of the saw and the apron and also the number of teeth.

If it is desired to draw two series or parallel grooves or lines diagonally of different width and intersecting each other so as to make a quadrille, it is only necessary to dispose obliquely and in a reverse direction on the path of the apron two similar devices provided with tools suited to the widths which are to be obtained, as shown in Fig. 5. In this case, in order that the teeth of the band reach the sheet only once for every turn, the wheels or the apron can be slightly inclined.

However, if the lines or grooves are to be of the same width, a single toothed band guided by three or four rollers, as indicated in Figs. 7 and 8, will draw still more simply the same kind of lines, the teeth acting at A and A' in two different directions.

Claims:—

1. A process for providing color screens on photographic films or plates consisting in first applying a coloring agent to the surface of the film or plate, removing the superfluous portion of the coloring agent from the film or plate, then superposing a waxy insulating material upon the layer of coloring agent, then cutting parallel lines across the film or plate and through the layers of coloring agent and waxy insulating material to provide parallel grooves, and then superposing a layer of a differently colored coloring agent upon the film or plate to fill said grooves with the last mentioned coloring agent.

2. A process as claimed in claim 1 having the added steps of removing the superfluous portion of the second layer of coloring agent, then placing a second layer of a waxy insulating material over the second layer of coloring agent, then cutting other parallel lines through all of the applied layers, and afterwards superposing a third layer of a still differently colored coloring agent over the second layer of insulating material and in the last mentioned grooves.

3. A process for making color screens for photographic purposes consisting in feeding

a strip of film, applying a layer of coloring agent to the film during the feeding, removing a superfluous portion of the layer of coloring agent from the film, immediately afterwards applying a layer of waxy insulating material over the layer of coloring agent, then cutting a series of parallel lines through both layers, and immediately afterwards applying a second layer of a differently colored coloring agent over the layer of insulating material and permitting the second layer of coloring material to fill said grooves.

4. A process as claimed in claim 3 having the added steps of removing a superfluous portion of the second layer of coloring material from the film, immediately afterwards applying a second layer of a waxy insulating material over the second layer of coloring agent, then cutting a second series of parallel grooves through the several layers and out of alignment with the first mentioned series of grooves, then applying a third layer of a still differently colored coloring agent to the film.

5. In a process for making color screens for photographic purposes, feeding a strip of film and during the feeding performing the following operations on the film: first, applying a layer of coloring agent to the film, second, immediately afterwards wash-

ing the superfluous portion of the coloring agent from the film and drying the remaining portion of the coloring agent, third, immediately afterwards applying a layer of waxy insulating material over the layer of coloring agent; fourth, cutting parallel grooves through the two layers and fifth, applying a second layer of a differently colored coloring agent to the film to fill said grooves.

6. A process for making color screens for photographic purposes consisting in continuously feeding a strip of film, at one point along the line of travel of the film applying a layer of coloring material to the film, at a further point along the line of travel removing a superfluous portion of said layer from the film, at a still further point along the line of travel of the film applying a layer of waxy insulating material over the layer of coloring agent, at a further point along the line of travel of the film cutting a series of parallel grooves through the two layers, and at a still further point along line of travel of the film applying a second layer of a differently colored coloring agent to the film to fill the grooves with said second mentioned coloring agent.

The foregoing specification signed by me this 21st day of November, 1922.

RAYMOND CAMILLE MARIE DE BERCEGOL.