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METHOD OF MAKING PARTY COLORED SCREENS FOR USE IN COLOR PHOTOGRAPHY.

APPLICATION FILED AUG. 20, 1909.

1,081,484. Patented Dec. 16, 1913.

Fig. 1.

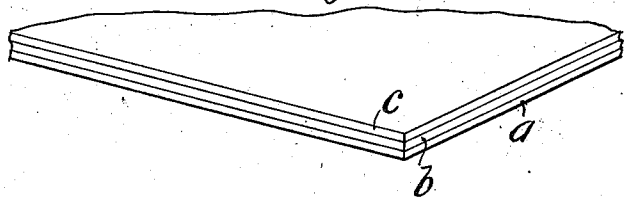


Fig. 2.

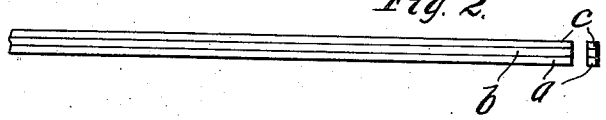


Fig. 3.

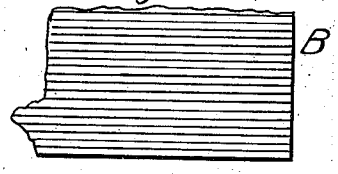


Fig. 4.

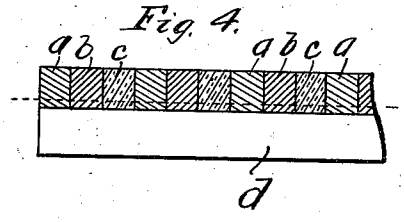
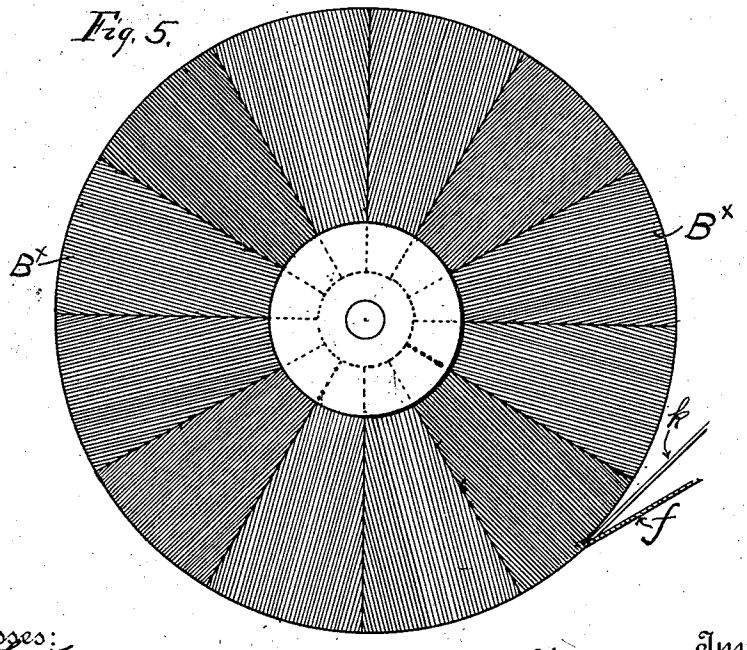


Fig. 5.



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UNITED STATES PATENT OFFICE.

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METHOD OF MAKING PARTY-COLORED SCREENS FOR USE IN COLOR PHOTOGRAPHY.

1,081,484. Specification of Letters Patent. Patented Dec. 16, 1913.

Application filed August 20, 1909. Serial No. 513,895.

To all whom it may concern:

Be it known that I, CHARLES L. A. BRASSEUR, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Methods of Making Party-Colored Screens for Use in Color Photography, of which the following is a specification.

The present invention relates to a method of making party-colored screens for use in color photography, the primary object of the invention being to secure a more even or uniform distribution of the different colored grains forming the screen.

Another object is to provide such screens of any desired lengths and width for use in conjunction with films for moving picture work.

Other objects will appear hereinafter.

Heretofore, party-colored screens for use in color-photography have been made in regularly recurring "patterns," and of grains or dots promiscuously distributed over the surface of a plate. Sub-divided photographs taken according to color measurements and theory, require the use of two screens—one for taking the negative, which negative is of itself colorless, and one for viewing the colorless positive printed by contact from such a negative, and such positives when viewed in combination with a viewing screen in such a position that each colored area of the screen is exactly opposite the corresponding color record of the positive, may correctly represent all the colors of the original subject. It is evident not only that this method is costly, but that it can only be used where the material employed as a support for the screen and for the positive is rigid and not liable to distortion. In the case of roll films where the celluloid or other pliable supporting material is liable to distortion by reason of unequal contractions, it is impossible to employ this method as the patterns of the screen and of the positive can no longer be made to match.

Duplication from colored negatives, that is, those in which the photographic emulsion is flowed directly on the screen, is always possible by the method described in my application filed February 28, 1907, Serial No. 359,895, and that irrespective of whether the pattern on the screen be a regularly recurrent one, as lines, or whether it be grained. But it is evident that absolute perfection of color can only be obtained when the pattern is so fine and so nearly regularly recurrent, that the smallest detail of the negative can be reproduced in correct color on the positive. This fineness of pattern and perfection of distribution is particularly necessary in the case of the moving picture industry, where the details, owing to the small size of the picture used, are necessarily extremely fine.

If grained screens, with the grains promiscuously distributed be employed, it will be very difficult to obtain correct color synthesis of small details, such as an eye, as the grains are very liable to bunch together in groups of one color, and grains of the necessary color may be entirely absent from the spot at which they happen to be needed.

The method herein described is illustrated in the accompanying drawing, forming part hereof, in which—

Figure 1 is a partial view in perspective showing three sheets *a*, *b*, *c* united together; Fig. 2 shows a slice from such a sheet in side and end elevations; Fig. 3 illustrates a part of a block made from slices such as shown in Fig. 2; Fig. 4 illustrates a slice from a block such as shown in Fig. 3, mounted on a film or support preparatory to thinning down the screen; and Fig. 5 illustrates the formation of a long screen from a circular block.

According to the present invention, I form threads or filaments of the different colors required and bunch them together lengthwise, and compact them under suitable conditions by pressure. I then slice off thin sheets, cutting transversely to the lengths of the threads or filaments in the solid block, as by a veneer machine. But with veneer cutting machines as now built, the sheet so cut is not thin enough as it comes out of the machine. The thickness must be reduced by grinding, or other appropriate means until the thickness of the sheet be no greater than the diameter of the individual thread forming one of the colored areas. It will be far better, indeed to have the sheet much thinner than the diameter of such thread, since it is highly advantageous that the cone of light coming from the lens to a focus on a film shall be as unimpeded as possible in its course through the colored area to the underlying

film. While the threads used in this process can be natural filaments or threads spun by methods analogous to those employed in producing artificial silk, I prefer to cut sheets of plastic material, as celluloid, for example, into threads, as a much greater regularity of section, and, therefore, of colored area, is obtained. The threads can be grouped in sets of three different colors by winding them together; or, better still, three thin sheets of the plastic material can be cemented together and then be cut into threads, each thread showing a section of three differently colored areas. If we now bunch these threads together lengthwise, either the single threads, or the triple-colored threads, or threads woven of a greater number of groups of single or triple threads, and press them together under appropriate conditions, we will obtain a solid block of plastic material which has only to be cut in a veneering machine, at right angles, or substantially at right angles, to the direction of the threads to obtain sheets composed of the differently colored areas practically uniformly distributed. As above stated, grinding or other appropriate means may have to be used to get such sheets down to the required thinness.

A cone of light coming to a focus at a point near the principal optical axis will go through unimpeded even if the colored areas be fairly thick, but along the margins of the photograph where the axis of the cone of light strikes the plate or film at an angle which may be as high as 45°, and, in cases of very wide angle lenses, even more than this, it is evident that rays will be impeded in their courses unless the material forming the colored areas be extremely thin as compared to their width in the plane of the screen.

In my line screens, I had adopted a width of line of one five-hundred-and-twentieth of an inch (1/520″) and a thickness of not more than one twenty-five hundredth of an inch (1/2500″) and with some colors a thinness as small as one four-thousandth of an inch (1/4000″). It is evident that, as sheets of such thinness cannot be obtained directly on a veneering machine, recourse must be had to grinding or other means in order to reduce the thickness. Such reduction of the thickness can be done after the sheet has been mounted on a supporting film or plate to give it body. The supporting film may be colorless, or it may have incorporated in it the light orange color which is generally used to equalize the times of exposure under the three colors; in the latter case, when working under the same conditions of light, it will be possible to obtain correctly colored negatives without using a separate orange colored screen at the lens.

If it is desired to use threads of other than plastic material, such as artificial silk, or natural filaments of any kind, it is only necessary to impregnate the dyed material with a thin solution of celluloid or other cementing compound which will enable the threads to form a solid block when pressed together. This block can be then veneered as in the former case.

In case a material be used which cannot be compressed sufficiently to obliterate all the spaces between the threads, the interstices so remaining must be filled by a powder which will not dye the threads but which will fill up such interstices and render them opaque to light; a powder, such as carbon may be added to the celluloid used as a cement, or the opacity may be obtained by chemical development after the sheets have been veneered. In that case, of course, one of the necessary chemical elements must be incorporated in the celluloid used as a cement.

Referring to the drawing, three differently colored sheets *a*, *b*, *c*, are cemented together to form a thin compound sheet or veneer, and this is sliced into tri-chromatic strings as shown in Fig. 2, the several threads, strings or striæ being rectangular in section and having sides as small as may be convenient, as, say, one one-thousandth of an inch (1/1000), which can be cut with such a thin sheet. These tri-colored strings are then gathered together and compacted by pressure, a suitable cement being used if necessary, to form a block B of suitable size. This block is then shaved off across the filaments *a*, *b*, *c* to form as thin sheets as may be, such sheets being a mosaic, as will be evident. The next step is to thin down such sheets, which is done by mounting them on supports, as a plate or film *d*, as shown in Fig. 4, and then grinding or otherwise thinning down to a point such as that indicated by the dotted line, Fig. 4, in which, it will be noted, the final thickness of the dots *a*, *b*, *c*, is much less than their width along the support *d*.

For the purpose of making films for use in moving picture work I form sectors B^x and unite them into a circular block as shown in Fig. 5, each sector being formed of filaments arranged substantially parallel, as far as may be, to a radius of the compound block; from this compound block the screen is cut in a continuous strip by a shaving or veneer knife *k* as indicated at *f*, the dots forming a mosaic wherein the dots are substantially at right angles to the plane of the film. Thereafter, the screen is mounted on a film and is thinned down as above described in connection with Fig. 4. Afterward, the photographic emulsion is placed on the screen side of the film.

While I have mentioned the one one-thousandth (1/1000) of an inch above, I

have done so merely as an example; I contemplate making the dots of as small dimensions as possible.

In order to obtain screens long enough for use in connection with films for moving picture work, a circular block may be built up of a plurality of sectors or truncated sectors (or sector blocks) in which circular block the threads forming such sector-blocks are arranged so that the knife will cut them at substantially right angles to their length. The long screen thus obtained is then to be mounted on the film and then thinned down as above explained. Of course, the threads in each truncated sector are not of equal lengths, as those on the sides decrease in length as the distance from the central radius of the sector increases, being cut off in trimming a rectangular block to form the sectors or truncated sectors.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. The method, substantially as herein set forth, of making party-colored screens for use in color photography, consisting in forming separate threads of different colors, compacting the same to form a fibrous block, cutting the block transversely of the threads to form a party-colored sheet, and thinning down said sheet to form the screen.

2. The method, substantially as herein set forth, of making long party-colored screens for use in conjunction with moving picture films in color photography, consisting in forming separate threads of different colors, compacting the same to form blocks, forming fibrous sectors from said blocks, forming a circular block from said sectors, cutting the circular block circumferentially into a ribbon, and thinning down said ribbon.

3. The method, substantially as hereinbefore set forth, of making party-colored screens for use in color photography, consisting in forming threads of different colors, compacting the same to form a fibrous block, cutting the block transversely of the length of the threads to form a party-colored sheet, mounting said sheet on a compensating screen, and then thinning down said sheet to form the screen.

4. The method, substantially as hereinbefore set forth, of making party-colored screens for use in color photography, consisting in forming threads of different colors, compacting the same into fibrous blocks, forming sectors from said blocks with the threads of each sector running in the direction of a radius thereof, forming a circular block from said sectors, cutting the circular block transversely of all the threads to form a ribbon, mounting said ribbon on a compensating screen, and then thinning down said ribbon to form the color-sifter.

5. The method, substantially as hereinbefore set forth, of making partycolored screens for use in color photography, consisting in forming partycolored threads by twisting three threads, each of its own color, into one thread, uniting a series of such twisted threads into a mass having such threads lying substantially in one direction therein, and cutting said mass in a direction at right angles to said direction to form a partycolored screen.

6. The method, substantially as hereinbefore set forth, of making partycolored screens for use in color photography, consisting in twisting together three threads each of its own color to form a single party-colored thread, uniting a series of such partycolored threads into one mass having such threads lying in one direction therein, cutting said mass at right angle to said direction to form a partycolored screen, and then thinning or grinding down said screen.

7. The method, substantially as hereinbefore set forth, of making partycolored screens for use in color photography, consisting in twisting together three threads each of its own color to form a single party-colored thread, uniting a series of such partycolored threads into sector-shaped masses having the threads therein running parallel to a radius thereof, uniting said sector-shaped masses into a circular block, and cutting said block spirally to form a continuous partycolored screen.

8. The method, substantially as hereinbefore set forth, of making partycolored screens for use in color photography, consisting in twisting together three threads each of its own color to form a single party-colored thread, uniting a series of such partycolored threads into sector-shaped masses having the threads therein running parallel to a radius thereof, uniting said sector-shaped masses into a circular block, cutting said block spirally to form a continuous partycolored screen-film, mounting the same upon a support, and thinning or grinding down said screen.

9. The method substantially as hereinbefore set forth, in making party-colored screens in color photography, consisting in forming threads of different colors, uniting a series of such party-colored threads into one mass having said threads lying in one direction therein, cutting said mass at right angles to said direction to form a party-colored screen, and then thinning or grinding down said screen until the thickness thereof is not greater than the diameter of an individual thread.

10. The method substantially as hereinbefore set forth, in making partycolored screens in color photography, consisting in forming threads of different colors, uniting a series of such party-colored threads into one mass having said threads lying in one

direction therein, cutting said mass at right angles to said direction to form a party-colored screen, and then thinning or grinding down said screen until the thickness thereof is less than the diameter of an individual thread.

Signed at Orange in the county of Essex and State of New Jersey this 13th day of August A. D. 1909.

CHARLES L. A. BRASSEUR.

Witnesses:
ANNA R. KLEHM,
DYER SMITH.