Patented Oct. 27, 1931 1,828,958

# UNITED STATES PATENT OFFICE

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## METHOD OF PRODUCING POLYCHROMATIC SCREENS AND THE LIKE

No Drawing. Application filed May 23, 1929. Serial No. 365,578.

This invention relates to polychromatic screens and filters, such as photographic films or plates adapted for producing photographs in natural colors, and more particularly to improvements in the method or process of producing polychromatic screens and the like.

Among the principal objects of the present invention is to produce a polychromatic screen or filter by means of which colored pictures are obtainable directly and without the use or intervention of special prisms, lenses or mirrors.

A further object of the invention is to produce a polychromatic screen by a process which is not only inexpensive and simple to carry out but which also results in the production of color filters wherein all of the primary colors may be effectively utilized to produce colored pictures much more perfectly and with greater efficiency than has been possible heretofore.

A still further object of the invention is the provision of an improved and simplified method of applying minute dots of various colors upon the surface of a photographic film or light filter, the color dots being so applied and of such character that they do not cause distortion of the light rays projected therethrough nor appear as distinct spots of color when the picture is projected in magnified form upon the regular screen.

Other objects and advantages of the present invention will appear more fully hereinafter.

It will, of course, be understood that the present invention relates to the treatment of color filters or light screens, the base or body of which may be of glass, celluloid or other appropriate material suitable for color photography and the projection of colored pictures upon a suitable screen. In ordinary practice the color film or light screen with which the present invention is concerned consists of a film of gelatin, collodion or the like which is superposed upon a suitable light-transparent support therefor.

Heretofore and prior to this invention polychromatic filters have been produced by applying variously colored starch or similar particles to the surface thereof. These starch particles are of such size, however, that they interfered with the rapid transmission of light through the filter so treated and at the same time caused distortion of the light rays projected therethrough. In order to obviate these and other objections and to attain the aforestated objects in the most effective manner, the present invention provides a method by which the surface of the color screen or filter is covered or stained with variously colored microscopic dots or spots, the latter being so thin and of such uniform character as not to absorb too much of or distort the light rays projected therethrough.

The practical manufacture of color filters produced in accordance with the present invention is carried out as follows: minute particles of iron or other such magnetic material are passed rapidly through a suitable oxidizing agent with the result that the surfaces of these particles are oxidized. The particles of magnetic material so oxidized are then stained with variously colored dyes, the dyes employed for this purpose being preferably soluble in ether and of the primary colors. There are thus obtained several groups of differently colored particles. Approximately equal quantities of these variously colored particles (such as red, yellow and blue, or orange, green and violet or other combinations of the primary colors of the spectrum) are then thoroughly mixed together. This mixture of the colored particles of iron is then applied directly to the surface of the color filter or screen, the application of said particles to the surface of the filter being by spraying, brushing, or the equivalent thereof. Preliminarily to applying these colored particles to the filter surface, the latter is preferably slightly moistened with ether which assists in removing the dye from the iron particles, thereby producing colored stains or spots of microscopic size upon the surface upon which the particles have been applied. A magnet, which is brought into close proximity with the surface of the color filter or screen, is employed for removing all of the iron particles from the filter, the surface being freed of all particles or elements which of themselves might cause dis-

tortion of the light rays projected therethrough, the entire surface of the filter being, however, covered with a uniform layer or film of microscopic dots or spots of various colors. The final step in the process is to coat this colored film with a light sensitive or panchromatic coating.

While I have described the magnetic particles as being only partially oxidized, it is possible, of course, to stain such particles with various colored dyes without having subjected said particles to the influence of an oxidizing agent. It is preferable, however, to partially oxidize the magnetic particles for the reason that the dyes are the more easily retained thereby. I have also mentioned that it is preferable to employ dyes which are soluble in ether and that the dyed magnetic particles are applied to a color filter, the surface of which has been slightly moistened with ether. It will, of course, be understood that dyes may be employed which are soluble in a medium other than ether and that the surface of the filter is treated with the solvent for these dyes preliminarily to applying the dyed particles thereto. The important point to be observed is that the dyestuffs with which the magnetic particles are stained have a less powerful affinity for said particles than for the medium with which the filter surface has been treated prior to the step of applying the stained particles thereto, the function of the magnetic particles being merely to serve as vehicles for transmitting the various dyes to the surface of the filter.

Inasmuch as the conveying medium for the dye to the filter is of magnetic material it becomes a simple expedient to remove these dye conveying vehicles through the employment of a sufficiently powerful magnet. The surface of the filter is thus left with only microscopic dots of various colors none of which overlap each other and all of which cooperate to produce a polychromatic film of uniform character and infinitesimal depth. These microscopic dots of color do not show as color blotches when magnified for moving picture screen work, nor do they absorb so much light as to increase the time of exposure to such extent that the film cannot be employed in the taking of motion pictures.

It will be understood, of course, that the invention is susceptible of various changes and modifications without departing from the real spirit or principles thereof, and it is accordingly intended to claim the invention broadly as well as specifically as indicated by the appended claims.

What is claimed as new and useful is:—

1. The process of manufacturing polychromatic films for color photography which consists in applying vari-colored magnetic particles to the surface of the film whereby to transfer the color from said particles to said film and then removing said particles by means of a magnet, said particles being initially prepared by dividing the same into several groups respectively stained with differently colored dye-stuffs.

2. The process of manufacturing polychromatic films for color photography which consists in transmitting spots of various colors to the surface of the film by means of vari-colored particles of magnetic material, applied directly to said surface and adapted to be removed by magnetic attraction, said particles being initially prepared by respectively staining batches of the same with differently colored dye-stuffs.

3. The process of manufacturing polychromatic films for color photography which consists in staining miscroscopic particles of magnetic material with various colors, applying said particles to the surface to be treated, whereby to effect a transference of said colors to said surface and then removing said particles by magnetic attraction, said particles being initially prepared by separating the same into several batches, staining each batch with a different color, and mixing the differently colored batches together.

4. The process of manufacturing polychromatic films for color photography which consists in respectively staining batches of magnetic particles with differently colored dyestuffs, applying said differently colored particles indiscriminately to a surface to be treated having a greater affinity for said dyestuffs than have said particles, and removing said particles by magnetic attraction.

5. The process of producing color films which consists in subjecting particles of magnetic material to the influence of an oxidizing agent whereby to oxidize the same, respectively staining the oxidized surfaces of several batchs of said particles with variously colored dyestuffs, then indiscriminately applying said variously stained particles to a surface having a greater affinity for said dyestuffs than have said particles, then magnetically removing said particles after said dyestuffs have been absorbed by said surface.

6. The process of producing filters which consists in staining particles of magnetic material divided into several groups with soluble dyestuffs of various colors, each group being differently colored, moistening the surface to be treated with a solvent for said dyestuffs, indiscriminately applying said variously stained particles to said moistened surface whereby to transfer said dyestuffs from said particles to said surface, and finally removing said particles by magnetic attraction.

7. The process of producing color filters which consists in staining minute particles of iron divided into groups with variously colored ether soluble dyestuffs, each group being differently colored, moistening the surface to be colored with ether, indiscriminate-

ly applying said variously stained particles of iron to said moistened surface, and removing said iron particles by magnetic attraction after said dyestuffs have been absorbed by said surface.

In testimony whereof, I have hereunto affixed my signature.

ALLEN A. CANTON.