UNITED STATES PATENT OFFICE.

CARL SPÄTH, OF STEGLITZ, NEAR BERLIN, GERMANY, ASSIGNOR TO EASTMAN KODAK COMPANY, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

PROCESS FOR MANUFACTURING COLOR-SCREENS.

1,069,039. Specification of Letters Patent. Patented July 29, 1913.

No Drawing. Application filed March 24, 1913. Serial No. 756,460.

To all whom it may concern:

Be it known that I, CARL SPÄTH, of Steglitz, near Berlin, Empire of Germany, have invented certain new and useful Improvements in Processes for Manufacturing Color-Screens; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention has for its object to improve the construction of screens used in photography, and particularly polychrome color screens used in so called color photography, said screens consisting of a transparent sheet of converted cellulose, and particularly nitro-cellulose, having fine lines, dots or areas stained in different colors, and it consists generally in staining or dyeing at least one class of the areas in such manner that the color will neither fade nor be discharged by any of the processes to which the film may be subjected.

Briefly stated, the invention consists in opening or treating the portions of the film or sheet of converted cellulose as nitro-cellulose so as to render these portions capable of receiving a dye in an aqueous solution preferably containing a colloid, such as gum arabic, glue or gelatin, and then tanning or hardening the colloid so as to render the same insoluble and unaffected by light. The process, generally speaking, may be applied to larger areas than are required in the production of color screens in which latter the stained areas are very minute, I prefer to use in all instances stains or dyes in aqueous solutions, as these are less liable to be affected by light or to fade.

In carrying out my invention the sheet of converted cellulose, preferably nitro-cellulose, or such portions thereof as are to be dyed or stained, are treated in a bath of a mixture of alcohol and acetone, the proportion of these materials being dependent in some degree upon the composition and quality of the converted cellulose used which can easily be determined by preliminary tests. It has been found that the proportions of the quantity of the alcohol-acetone bath vary between eighty per cent. alcohol to twenty per cent. acetone and ninety-four per cent. alcohol to six per cent. acetone. The alcohol-acetone bath in which the sheet remains for from thirty seconds to two minutes, dependent also upon the composition and quality of the sheet, serves to open the surface of the unprotected portion or renders it capable of absorbing water for a brief length of time, and the sheet is then treated for a half a minute in pure water, and then it is dipped or treated for about one minute in a four per cent. aqueous solution of a dye, such as chinolin yellow to which has been added twenty-five per cent. of a solution of five per cent. gum arabic or gelatin and then is tanned for about five minutes in a ten per cent. solution of tannic acid. A cellulose sheet or parts thereof which are dyed and tanned in such a way is not affected by any subsequent baths and in consequence cannot be redyed.

As a practical manner of utilizing the process above described in the manufacture of polychrome screens containing lines, dots or differently colored areas for use in color photography, I proceed as follows: I take a sheet or film of nitro-cellulose and print a series of fine lines thereon in resist ink of a resinous or fatty nature and then immerse the sheet in a preparatory or softening bath containing from 5 to 20 parts acetone to 95 to 80 parts of grain alcohol, the proportions depending upon the age of the sheet and quality of the cotton from which it is formed, more acetone being required as the film surface is harder. After removal from the bath the surface of the sheet is washed with water and then is allowed to dry very slightly and then is passed into an aqueous solution of a red dye also containing a small percentage (about 20%) of a 5% solution of a colloid as gelatin and a little alcohol. This dye stains the parts unprotected by the resist, and the sheet is passed through a solution of tannic acid or similar material to tan or render the colloid insoluble. The surplus dye is then washed from the surface and the resist removed by benzol or other solvent. I then print lines in the resist ink diametrically across the red stained lines in the sheet, stain the unprotected portions of the cellulose with a blue dye in either an alcoholic or aqueous solution which will not affect the red lines, then remove the resist lines and dye the remaining portions of the film with a green dye of such nature that it will not affect the previously dyed surface.

I claim as my invention:

1. The process of making photographic screens having a converted cellulose base consisting in placing lines of resist upon a

converted cellulose sheet, subjecting the surface of the sheet to the action of a bath containing acetone and alcohol, then subjecting the sheet surface to the action of a dye in an aqueous solution containing a small quantity of a colloid and then to the action of a tanning solution.

2. The process of making color screens consisting in treating predetermined portions of the surface of a nitro-cellulose sheet by subjecting them to the action of a partial solvent of the nitro-cellulose, staining or dyeing the parts so treated with an aqueous dye containing a colloid and then tanning the colloid and thereby fixing the dye in such portions.

3. The process of making polychrome photographic screens consisting in covering certain portions of a sheet of nitro-cellulose with a resist, subjecting the unprotected surface of the sheet to the action of a bath containing acetone and alcohol, then subjecting said parts to the action of an aqueous dye containing a colloid, then applying a tanning solution, then washing the surface with water, then partially drying the surface, then removing the resist and applying a resist to parts only of the surface protected by the first resist, then dyeing the exposed surface, then removing the resist and finally subjecting the remaining surface of the sheet to the action of a dye solution which will not injuriously affect the dye last previously applied.

CARL SPÄTH.

Witnesses:
JOSEPH NEUMÜLLER,
JOSEF P. WILDEGGEE.