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PERCY DOUGLAS BREWSTER, OF EAST ORANGE, NEW JERSEY.

COLORING OR DYEING PHOTOGRAPHIC IMAGES.

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To all whom it may concern:

Be it known that I, PERCY D. BREWSTER, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Coloring or Dyeing Photographic Images, of which the following is a full, clear, and exact description.

This invention relates to the coloring or dyeing of the silver images in photographic prints, transparencies, or cinematographic film particularly with a view of producing natural color prints or motion picture film.

The chief object of this invention is to provide means for converting the silver of the photographic image into a preferably transparent adsorption compound of a silver salt capable of mordanting dyes or other coloring matter while the photographic image is wet. By my invention a print or film as soon as it is fixed after development and preferably washed may be converted directly into a color image without drying as has been necessary heretofore. Particularly in handling motion picture film in long, if not continuous, bands it is apparent that great economy and freedom from dirt and scratches may be secured if the development and coloring can be done in one continuous machine without drying.

In practising my invention I prefer to treat the photographic image after development, fixation and wash in a solution of a halogen salt before immersing in the solution adapted to change the silver of the image into an adsorption compound and I prefer to use potassium iodide as the halogen salt. The exact strength of the solution depends on the character of the emulsion used, being affected by the size of the silver grains, the character of the developing agent used and by the temperature of the film and solution so no rigid formula may be given. Using Eastman positive motion picture film stock with a full exposure and relatively short development with a "surface" developer such as metol and at temperature of 65° F. I find an immersion of about one minute in a five to ten per cent solution of potassium iodide gives very good results. This is followed by immersion in preferably a solution containing free iodine, such as a five per cent solution of potassium iodid containing a small amount of free iodine, until the image is entirely bleached when the excess of free iodine may be removed in a bath containing a suitable reducing agent such as sodium bisulphite. After washing out the bisulphite the picture or film may be treated in a dye bath of a suitable color for from one to five minutes. The best results are secured with dyes of the basic group such as malachite green, auramine, or methylene blue. A wash of from five to twenty minutes suffices to clear the highlights of any excess dye.

After the excess of iodine is cleared from the film, the film is absolutely transparent when viewed by transmitted light, the silver of the image being entirely converted into a transparent silver salt, though under certain conditions by reflected light a "relief" image is visible. An addition of a very little iodine to the first potassium iodide solution (until a weak straw color) sometimes appears advantageous.

To the best of my knowledge and belief the gelatine about the silver grains in the emulsion is somewhat swollen and prepared or even partly peptonized by the first halogen salt solution so that when the free halogen acts directly upon the silver, the silver grains and the gelatine about them is in a better condition to be converted into a gelsol or hydrosol of a silver salt which is absolutely transparent and, I believe, very finely divided.

I prefer iodine and potassium iodide as the halogen and the halogen salt, rather than chlorine or bromine and sodium or potassium chloide or bromide, in the solutions referred to above.

It is to be understood that the invention is not limited to the precise materials and proportions herein given but can be practised in other ways without departing from its spirit.

I claim,—

1. In the art of coloring or dyeing photographic silver images, the improvement comprising treating the silver of the image with

a solution containing a potassium halide of the iodine-chlorine-bromine class, and with a solution containing the same halide and the corresponding halogen.

2. In the art of coloring or dyeing photographic silver images, the improvement comprising treating the silver of the image with a solution of potassium iodide containing a relatively small amount of free iodine, and afterwards with a solution of potassium iodide containing a relatively large amount of free iodine.

In testimony whereof I affix my signature.

PERCY DOUGLAS BREWSTER.