

UNITED STATES PATENT OFFICE.

JOHN BRACEWELL, OF NORTH ADAMS, MASSACHUSETTS.

PROCESS OF PRINTING ANILINE-BLACK.

SPECIFICATION forming part of Letters Patent No. 409,821, dated August 27, 1889.

Application filed February 15, 1889. Serial No. 299,983. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN BRACEWELL, of North Adams, in the county of Berkshire and State of Massachusetts, have invented a certain new and useful Improved Method of Printing and Producing White or Colored Figures on Aniline-Black Grounds, of which the following is a specification.

My invention relates to the printing and producing figures, white or colored, on the aniline-black grounds of cloth; and it consists in certain improvements in the process therefor, substantially as hereinafter described and claimed.

Heretofore efforts have been made to discharge aniline-black grounds with white or colored figures by simply printing the discharge pattern on the cloth and aging or oxidizing in an aniline-ager; but the result was uncertain, because of the aniline-black oxidizing before the discharge could be printed on the aniline-black ground and because of the ingredients used for the black tendering the cloth. Moreover, the pigment colors when so used were not properly fixed by the same process that developed the aniline-black. Besides, the slowness of the development of the aniline-black allowed the discharge printed upon it to act irregularly along the edges of the patterns in which the discharge was printed and impaired their sharpness and beauty in the shades or outline of the colors where they come together. So great have been these difficulties that the practical discharging of aniline-black grounds has been pronounced impossible.

It is well known that the successful process of discharging a ground color by printing upon it either white or colored discharges gives a peculiar clearness, beauty, and neatness to the patterns produced. It is to accomplish this safely and practically with aniline-black grounds that my process is devised. In carrying it out I proceed as follows: I print a cover, or I pad on one side of the cloth, or I pad both sides of the cloth, or I slop-pad with or dip the cloth into the following color, using the starch named for the slop-padding: I mix cold twelve gallons of the ferro-cyanide paste given below with four gallons of the solution of aniline-salt crystals given below and add thereto four pints of aniline-oil, when

the color is ready for use. The aniline-oil is added to neutralize any free acid which may exist in the aniline solution, and it may be omitted if that solution contain no free acid.

The ferro-cyanide paste is formed as follows: Take forty-five gallons of water and dissolve in it seventy pounds of ferro-cyanide-of-soda crystals and twenty-three and three-fourths pounds of chlorate of potash. Add twenty pounds of corn-starch and boil till thickened, and cool. The corn-starch may be omitted or added in greater or less amount as the printing, padding, or saturating of the cloth with the aniline color may require.

The solution of aniline salt is prepared as follows: Dissolve sixty pounds of aniline-salt crystals in ten gallons of hot water, and cool.

Instead of salts of aniline, an equivalent amount of aniline-oil neutralized with hydrochloric acid may be employed.

The proportions of the ferro-cyanide to the aniline salts in the above color may be varied, as I have only given the proportions I prefer to employ; but care should be taken that the proportion of the ferro-cyanide to the aniline shall never be less than eighty per cent. of the latter in any given quantity of color.

I do not confine myself to the precise proportions of ingredients given in the above compounds and in forming the color therefrom, as they may be varied without losing the properties of the color, and chemical equivalents may be employed in lieu of those given. In all cases, however, the essential properties of the color must be preserved, and these are that it shall not set or oxidize, when applied to the cloth, rapidly enough to prevent the effective action of the discharge printed thereon, as hereinafter described, whether white or colored, and that the color shall be what is known as a "steam color"—i. e., capable of being set and developed by steaming under pressure after the discharge is printed thereon and retain the strength of the cloth. This dual property of my steam-color enables me to prepare the printed goods with bright fast colors and the most delicate impression of the figures on the aniline-black ground without destroying the strength of the fiber of the goods. After treating with the aniline-black color the cloth should then

be dried, and for this purpose hot air, steam chests, cans, or drums can be employed in the usual manner; but in case these are employed the cloth must be carried to the printing-machine at once, before the aniline color has time to oxidize, to have the discharge printed thereon. In drying with air heated to a temperature of about 160° Fahrenheit or on steam-cans in the usual manner, however, great care must be taken in order to get the cloth to the printing-machine for the purpose mentioned before this oxidation, and I prefer to employ the following method of drying, which I have devised, by means of which this difficulty is minimized. This method is the subject of a separate application for a patent made simultaneously with this one. I take the cloth treated with the aniline color, as described, and partially dry it on the steam-cans or by hot air. When it is still damp and too moist to print the discharge upon, I remove it into a cool atmosphere of, say, about 50° Fahrenheit temperature and complete the drying by means of that. If the previous drying has been by hot air, the cool air may be forced into the drying-room instead of removing the cloth into it. The cloth is suspended in the cool air in the usual way until well dried, when it may be kept in a cool atmosphere for several hours, or days even, before being taken to the printing-machine. This cool drying of the cloth might be conducted without previous drying by heat, if desired. It arrests the oxidation of the aniline black so completely that the discharge has full effect when printed thereon.

I do not limit myself to any particular degree of temperature in this drying of the cloth by cool air, as any temperature below 70° Fahrenheit may be employed, but I prefer the degree I have mentioned.

When the cloth is dried, I print upon it with a calico-printing machine, the discharge, either plain or mixed with colors, in the figures or patterns I desire, and thus arrest the oxidation of the aniline-black on those parts. The discharge used is an alkali, or a salt of an alkaline nature—as, for instance, acetate of soda. It is to be thickened with gum or other suitable thickening sufficient to print properly on the cloth in the usual way. Equal parts, by weight, of gum substitute and the acetate form a good discharge mixed with water for white patterns. If the pattern is to be in colors, pigment or similar colors are mixed with the alkali discharge, together with a sufficient quantity of albumen to fix them on the cloth. For instance, if chrome-yellow pigment is employed, the following proportions will give good results: One pound of chrome-yellow, one pound albumen solution,

one pound gum solution, one-half pound acetate of soda; stir and mix thoroughly. After the discharge, white or colored, is printed on the cloth I then expose it to steam under pressure in the steam-box or steamer. By passing the cloth through a continuous steamer, or putting it into a steaming-box under pressure, I complete the development of the aniline color rapidly and fix the pigment colors when used at one and the same time. I finally soap and wash the cloth, and the operation is complete.

In the formulas insoluble chromates or chlorate of alumina may be used instead of ferro-cyanide to produce the steam aniline-blacks. Ferri-cyanide of soda may also be used, and thus reduce the amount of chlorate of potash used. The equivalents of ferri-cyanide of potash and ferro-cyanide of potash may be used in place of the soda, and any equivalent chlorate can be used in place of chlorate of potash. It should be observed, however, that it is preferable that the proportion of chlorate to the ferro-cyanide should not be greatly increased above that given, as it is advantageous both in retarding the oxidation and steaming.

The proportions of ingredients forming the above aniline-black color are also the subject of another application for patent filed contemporaneously herewith.

What I claim as new and of my invention is—

1. The described process of forming printed patterns on aniline-black grounds—that is to say, first printing, padding, or dyeing on the cloth the aniline-black ground color, then printing thereon a discharge mixture before oxidation of the ground color in the desired pattern, and finally fixing and developing the aniline-black and the discharge mixture simultaneously by the application of steam thereto under pressure, substantially as described.

2. The described process of forming printed colored patterns on aniline-black grounds—that is to say, first printing, padding, or dyeing on the cloth the aniline-black ground color, then printing thereon in the desired pattern a discharge mixture compounded with a pigment before oxidation of the ground color, and finally fixing and developing the ground and pattern colors and completing the action of the discharge mixture simultaneously by the application of steam thereto under pressure, substantially as described.

JOHN BRACEWELL.

Witnesses:

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