

# UNITED STATES PATENT OFFICE.

JOHN BRACEWELL, OF NORTH ADAMS, MASSACHUSETTS.

## PROCESS OF PRINTING DARK BLUE COLORS.

SPECIFICATION forming part of Letters Patent No. 409,906, dated August 27, 1889.

Application filed June 16, 1884. Serial No. 135,048. (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 new and useful Improvement in the Process of Printing Dark Blue Colors, of which the following is a specification.

My invention relates to the process of printing dark blue indigo fast colors upon cotton fabrics, as described in my Letters Patent No. 301,475, granted July 8, 1884; and it consists in certain modifications in the said process, whereby the same is rendered more certain and produces better and firmer shades of color, substantially as hereinafter described and claimed.

In carrying out my invention I first prepare the blue pulp of indigo and caustic soda and form it into a color for printing by mixing it with British gum, maize-starch, water, and a solution of caustic soda, all substantially as described in my said Letters Patent. I next prepare the cloth to be printed on by applying a solution of glucose with water made very strong, or, in other words, with a large proportion of glucose, to the side of the cloth upon which it is intended to print the blue color, as hereinafter described, by means of a printing machine and rollers, instead of soaking the cloth in the glucose solution, as has heretofore been practiced. By this means I am enabled to apply the glucose more evenly and only where it is needed to act upon the blue colors afterward printed upon it, and I effect a saving in the amount of glucose used and in the drying process to prepare it to receive the blue color, and produce a dark blue print cloth with no color on the back to soil undergarments when it is worn. I also preserve the fiber of the cloth from too great effect of the caustic soda and leave it stronger after it is finished. I next dry the glucose on the surface of the cloth and break down its crystals by the use of steam, and print the blue color upon the side of it to which the glucose has been applied with rollers constructed of metal, the salts of which do not act to impair the blue color ultimately produced, as herein- after described. By the bringing together of

only one side or face of the goods to produce the reaction between them necessary to produce the dark blue color, I prevent that irregularity of this reaction in different parts of the thickness of the fabric which has heretofore produced streaks or different shades of color in the goods. It must be understood that this reaction is very rapid and proceeds fastest on the face where the caustic and indigo mixture first comes in contact with the glucose, and slower where it penetrates later through the goods to the other side. By having little or no glucose on this other side I avoid this later reaction taking place with it, and the consequent presence in the material of a resultant color of a different shade from that produced on the face of the goods.

Heretofore great difficulty has been experienced in obtaining certain and even results in the process of printing dark indigo blue colors, as described in my said application, the printed goods appearing, when finished, streaked and uneven in color; and the expedient of inclosing the entire printing apparatus in close compartments to exclude the external air has been resorted to.

I have discovered that the difficulty is also in a great degree due to the action of the free caustic soda which exists in the printing color in great strength, and is not in a neutralized state as in ordinary colors, the reducing of the indigo only occurring from the reaction of the caustic soda and glucose as the color is being laid upon the cloth by the printing-roller and in the immediate presence of the latter, upon which it consequently acts. This free caustic soda and indigo color, when undergoing reaction under the roller-surface, which it does instantaneously, act with great vigor upon the surface of printing-rolls composed of copper or a composition of metal of which copper is an ingredient and so rapidly as to totally destroy them in a very short time, and to the effect of the salts of the metal thus mingled with this color I attribute in part the variations in the process of decomposing the indigo after the color is printed upon the glucosed surface of the fabric.

By using a printing-roller with this preparation of blue color having its surface formed of a metal or substance which cannot form



salts that impair the indigo color I am enabled to produce more uniform results in the prints when finished. For this purpose I have found aluminum and the vitreous surface, commonly known as "porcelain," and nickel to not form salts affecting said coloring-matter and the surface of the printing-roller made of one of these substances will produce uniform results, as above set forth. In other printing processes the reaction of the ingredients used to form the color takes place before it is printed upon the cloth by the roller, and this difficulty arising from the action of the free caustic soda does not occur. After the cloth is printed, it is dried and exposed to steam, as described in my said former application, and instead of passing it through water alone to oxidize the indigo, as has heretofore been practiced, immediately after it comes from the steam-chest I expose it alternately to water and air rapidly for some minutes, as I find that the color is greatly improved by so doing. This may be effected by a machine which alternately dips the printed fabric into and raises it above the surface of the water; or it may be done by hand.

What I claim as new and of my invention is—

1. The described process of printing dark blue indigo colors upon the fabric, which consists in applying the glucose solution upon only one side or face of the fabric and after drying the same applying to said side or face an aqueous mixture of indigo and caustic soda and steaming and washing the fabric, substantially as described.

2. The described process of printing indigo colors upon the fabric, which consists in applying an aqueous mixture of indigo and free caustic soda to the glucose-covered surface of the fabric and producing a reaction between them in such a manner as to be free from the presence of injurious salts of copper or other like metals by means and in the presence of a roller-surface incapable of forming salts injurious to said reaction from the effect of the free caustic soda, indigo, or glucose while undergoing the said reaction in its presence, substantially as described.

JOHN BRACEWELL.

Witnesses:

DAVID HALL RICE,  
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