

UNITED STATES PATENT OFFICE.

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PROCESS OF DYEING INDIGO RESISTS.

No. 803,855.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JULIUS RIBBERT, manufacturer and royal trade counselor, a subject of the King of Prussia, German Emperor, residing at Haus Hünenpforte at Holthausen, Hagen, Province of Westphalia, Kingdom of Prussia, and German Empire, have invented a certain new and useful Process for Manufacturing White and Colored Indigo-Resist Articles, of which the following is a specification.

This invention has reference to a process for manufacturing fabrics in indigo colors according to which the back side of the fabric may assume any suitable lighter shade than the face side of the fabric. I have ascertained that paste resists such as are commonly used and generally known for printing blue on fabrics can also be employed in the indigo-printing process, inasmuch as they are also acting as a resist in the latter process, the said resists after having accomplished their resisting action in the printing process still retaining their resisting action and in particular also in the so-called "continuous" vat.

It has been the generally-accepted opinion heretofore that only sulfur could be used as a resist in the indigo-printing process. I have, however, found out that even the ordinary paste resists yield better results and clearer and sharper outlines of the patterns than sulfur resists. As a result of these researches I am enabled not only to effect a considerable simplification of the processes for the manufacture of indigo goods as generally practiced, but also to produce a superior fabric of greater resistibility against rubbing and the back side of which may have any lighter shade desired imparted to it independently of the coloration of the face side of the fabric.

I will proceed to explain my process by describing the following forms of execution of the same.

Indigo-printing process by using paste resists.—As in the ordinary indigo-printing process, I impregnate the fabric with an agent acting as a reducer on indigo, such as a solution of glucose or dextrose of about 8° Baumé, and I then dry the fabric. I now apply a resist paste of the following composition to the roller printing-machine or the perrotine, this paste being usually employed in the blue-printing process—that is to say: forty-eight pounds verdigris compound, (one part verdigris, one part water,) twenty-four pounds blue-stone, (sulfate of copper,) 2.2 imperial gallons water,

thirty-two pounds pipe-clay, ninety-two pounds sulfate of lead, twenty-eight pounds burnt starch, sixty-four pounds nitrate of lead, forty pounds sugar of lead, eighty pounds solution of mucilage 1:1, ten pounds nitrate of copper, four pounds alum—or in case white is to be produced beside multicolor resists, for producing white a resist which is free from lead salts and has the following composition is used: twenty-four pounds verdigris compound, (one part verdigris, one part water,) twelve pounds blue-stone, (sulfate of copper,) four pounds zinc vitriol, four pounds acetate of copper, one liter (0.22 imperial gallons) acetic acid, five liters water, thirty-two pounds china-clay, ten pounds burnt starch, forty pounds solution of mucilage 1:1, six pounds nitrate of copper.

It should be observed that the process is not by any means conditional on the composition of the resist, as above stated.

The composition of the resists may be changed, and I may also use other salts—such as manganese, nickel, and other salts of this kind—for preparing the resist.

After the goods have been treated with the resist they are dried and the imprinted face side is padded with an alkaline indigo-print color or partly covered with such compound, which may, for instance, be composed as follows: two pounds corn-starch, four pounds British gum, five pounds water, thirty-seven pounds caustic-soda solution, 37° Baumé, twenty-four pounds indigo compound. This indigo compound is made up as follows: one hundred and seventy-four pounds indigo, twenty-per-cent. paste; one hundred and thirty-six pounds caustic-soda solution, 37° Baumé; one hundred and sixteen pounds caustic-soda solid. Make up the entire compound to five hundred pounds.

The composition of the indigo-print dye as regards the percentage of indigo constituents is of course changed in accordance with the shade desired in the particular case.

After the printing or covering with the indigo-print dye the goods are well dried, and they are then steamed for twenty to thirty seconds in a suitable continuous steamer in order to effect the reduction of the indigo printed upon the fabric. The goods are then developed by washing them with water or with acid, respectively, whereby on the side on which the printing has been done the genuine indigo color with very sharply outlined patterns is produced. The goods are then

ready for use, or they may be subjected to any suitable further treatment, or they may be printed with indigo or other dyestuffs or be covered with patterns, respectively.

5 It has been ascertained that this paste resist after the covering of the indigo and after having been subjected to the steaming process has still retained its resisting properties, which enables me to carry on my process with
10 a further improvement by which I am enabled to produce and accomplish results which were heretofore entirely unknown. Thus I am enabled to carry the dyeing of the goods farther in the continuous vat. It is to be understood that this dyeing may be effected in
15 any other kind of vat also. Thus instead of the continuous vat I may use the plunging-vat, for instance. Inasmuch, however, as the use of the continuous vat presents various advantages, the said vat requiring no further special preparations, the continuous vat will
20 of course be preferable.

In carrying out my process I may proceed as follows: After the goods have been treated
25 as outlined in the first example and after treating them with glucose, printing with the ordinary resist, covering with indigo, and steaming the goods they are introduced directly into the continuous vat without the
30 necessity of previous washing. In the vat they are subjected to as many liftings as are required to produce the desired shade. After the goods have left the continuous vat the indigo which has been laid on and reduced according to the indigo process has become oxidized and the back side of the goods is also
35 dyed. By means of the steaming during the indigo-printing process the resists have acquired an additional fastness. If the goods are now treated with acid and washed, the
40 resist-paste is taken off and the goods show the patterns, the face side being darkly tinted, while the back shows a light shade.

It is obvious that by this process I am enabled to dye the back side of a lighter or
45 darker shade, as desired, and independently of the coloration of the face side of the fabric. The employment of a sulfur resist would not allow of this subsequent treatment in the
50 continuous vat, inasmuch as this resist has been found to be unable to stand the action of the continuous vat, so that the patterns do not remain white, but are destroyed and become colored.

55 It is also evident that any suitable pattern or design may be produced on the back side, provided resist has also been printed upon the back side before the goods are treated. Generally speaking, it may be stated that
60 without deviating from the essential features of my invention the ordinary modifications in the colorations, by using acid resists or the like, may be produced, and I may also add sulfur resist to the paste resist.

65 Heretofore it was not possible to produce

differences as regards the coloration of the face and of the back side in the continuous vat on goods printed with paste reserves. It was only possible on the continuous vat to produce goods of uniform coloration on the
70 face and on the back sides. In the plunging-vat, on the other hand, while being able to give a lighter shade to the back side than to the face side it was only possible to accomplish this result by putting the goods back
75 to back and by fastening them in this condition in the star-frame, a method which it was not possible to employ when using the continuous vat. When dyeing in the plunging-vat, however, in the manner indicated, the
80 back side always became considerably spotted. Besides at the edges of such goods the so-called "hook stains" were of very frequent occurrence, and it was also impossible to give any light shade desired to the back side as compared
85 with the coloration of the face side. Furthermore, a patterned back could not be obtained, because the unavoidable stains on the back of the fabric spoiled the same entirely. My process, however, makes it possible to
90 produce the most striking differences in shade on both sides of the fabric under any condition, which means a considerable improvement in the art of producing print in blue colors. I am therefore enabled to dye any
95 kind of indigo articles, which heretofore could only be treated in the plunging-vat, in the continuous vat also. Besides the advantages mentioned above the process presents the further advantage that manual labor is reduced
100 to a minimum when working with the continuous vat. Then the colorations obtained by the printing process and by the indigo-vat are of superior brilliancy and proof against rubbing.

105 What I claim, and desire to secure by Letters Patent of the United States, is—

1. The process herein described for producing indigo goods, which consists in impregnating the goods with an agent acting as
110 a reducer, printing with an ordinary paste resist commonly used for printing blue, applying indigo color, reducing said color, and then washing the goods, substantially as set forth.

115 2. The process herein described for producing indigo goods, which consists in impregnating the goods with an agent acting as a reducer, printing with an ordinary paste resist commonly used for printing blue, applying indigo color, reducing said color, then
120 dyeing said goods, and then washing the goods, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing
125 witnesses.

JULIUS RIBBERT.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.