UNITED STATES PATENT OFFICE.

HENRY W. VAUGHAN, OF PROVIDENCE, ASSIGNOR TO ORRAY A. TAFT, JR., OF SAME PLACE, S. EUGENE WOOD, OF LINCOLN, AND EDWARD THAYER, OF PAWTUCKET, RHODE ISLAND.

IMPROVEMENT IN METHODS OF COLORING FIBROUS MATERIAL.

Specification forming part of Letters Patent No. **223,019**, dated December 30, 1879; application filed October 6, 1879.

To all whom it may concern:

Be it known that I, HENRY W. VAUGHAN, of the city and county of Providence, in the State of Rhode Island, have invented a new and useful Method or Process of Coloring Fibrous Material used in the Manufacture of Yarn for Knit or Woven Fabrics; and I do hereby declare that the following specification is a full, true, and exact description thereof.

My process consists generally, first, in charging infusorial earth or other proper vehicle with coloring-matter—as, for example, with the aniline colors derivable from hydrocarbon oils—in the manner hereinafter explained; secondly, in applying such color-charged vehicle in a dry state to cotton, wool, or other fibrous material, when such fibrous material has been sorted from the bales and is ready to go to the first or earlier sets of machinery which are to be employed for the manufacture of the same into yarns; thirdly, in causing the fibrous material so supplied with the coloring agent in the form above stated to be subjected to the ordinary machinery—such, for example, as pickers, breakers, carders, combers, lappers, roving-machines, drawing-frames, doublers, twisters, and spinning-frames employed in the manufacture of cotton, wool, or other vegetable or animal fiber into yarns.

The result obtained from my process is that the color-charged vehicle becomes mechanically incorporated with the fiber of the cotton or wool; is evenly and uniformly distributed in any desired variety or shade of color; is adherent thereto throughout the processes of manufacture, and the manufactured product has a delicacy of expression of color which, to the same extent for all the different shades of tints, is not attainable by the process of dyeing. Moreover, the cost of manufacture of colored yarn is greatly reduced, both from the circumstance that the expense of a dye-house is avoided, and also because a stock of dyed yarn is not required to be kept on hand, and only such quantities of yarn of any given color need be manufactured as the immediate demand therefor requires. Besides, too, the ordinary percentage of shrinkage, as the result of dyeing, is saved.

To instruct others how my invention may be practically conducted, I will take, for illustration, one hundred pounds of cotton that has been taken from the bale and is ready to be put to the first or any of the series of pickers or first carding-machines. It is desired to manufacture this quantity of material into yarn, and have the same colored with, for example, a medium shade of magenta.

I take, say, six (6) pounds of infusorial earth, which I consider the best vehicle for my purpose, because it is found in large quantities, is inexpensive, is readily reducible to an impalpable powder, and, being composed of the silicious remains of low forms of animal life, its molecules, when viewed under highly-magnifying lenses, show sharp angles and indentations, which fit the material to combine mechanically with fibrous matter. To the infusorial earth I add, say, four hundred grains of aniline color dissolved in water or alcohol, and thoroughly mix the same with the earth, whereby the whole mass becomes a uniform color. The colored powder is then dried. In this condition, however, it would not be suitable to apply it to the fibrous matter. Accordingly, to render it tenacious when mixed with the cotton, I add to each pound of the mass, say, two (2) ounces of paraffine or other non-saponifiable oil dissolved with benzine or other solvent, my purpose being to moisten the whole mass of colored powder to such an extent that it will readily adhere to cotton-fiber when applied to it, as the result of the presence of the oil.

In addition to the value of the oil as an adhesive agent, it gives to the colored powder brightness of effect, and, being a non-saponifiable oil, the color will not wash out of the yarn when manufactured.

The mass treated as above is again dried, and the volatile constituents of the oil evaporate, leaving an oleaginous residuum envel-oping each molecule of the powder. If necessary, the mass is thoroughly pulverized. It

is now ready to be applied to the cotton, and this is done by distributing it among the supposed one hundred pounds of cotton selected by dusting it, as evenly and uniformly as convenient, over the cotton, or in a general way mixing it therewith.

The fibrous material so treated is next put through all the operations involved in manufacturing it into spun yarn, precisely the same as it would be treated if my process for imparting a color to it had not been employed.

The mechanical treatment which the fibrous material receives in the course of its manufacture into yarn causes the color-charged powder to become thoroughly incorporated with the fiber and uniformly distributed, and the result is a product which is equal in appearance to the best dyed yarns, while colors and shades can be obtained with a certainty that cannot be assured from the ordinary process of dyeing.

Incidentally it is the fact that my process renders the yarn softer and more supple or pliant than dyed yarns, so that it can be worked to much greater advantage by machinery which is to be used to convert the yarns into knitted or woven fabrics. This result I suppose to be due, mainly, to the oil which is mixed with the color.

The proportions which I have above given need not be strictly followed. The same are stated as proper to be employed; but the nature of the process involves, of necessity, a wide range for the exercise of judgment, skill, and experience as to the best proportions of the vehicle, the coloring agent, and the oil to each other and to the fibrous material for producing the best effects in obtaining different varieties or shades of color.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The herein-described process of coloring fibrous material, consisting in mechanically incorporating into its fibers by the ordinary processes of manufacturing fibrous material into yarn a dry powder, as infusorial earth or other suitable vehicle charged with coloring-matter and with an oleaginous constituent, as specified.

2. As a new manufacture, colored yarns having incorporated into the fibers a dry powder, as infusorial earth, charged with coloring-matter and with an oleaginous constituent, substantially as specified.

HENRY W. VAUGHAN.

Witnesses:

GEORGE FULLER,

ALEXANDER MCCAUGHIN.