Nov. 23, 1926. 1,607,821

J. P. GAREY

METHOD OF SPOT DYEING YARN

Filed April 8, 1926

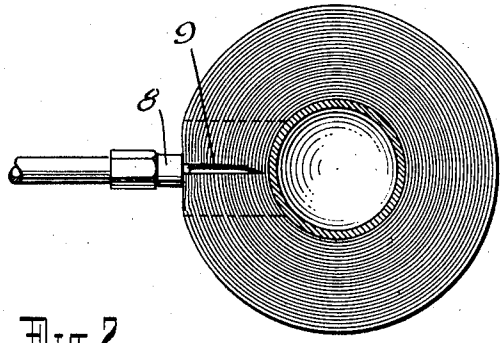


Fig. 1.

Fig. 2.

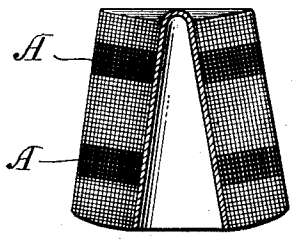


Fig. 2a.

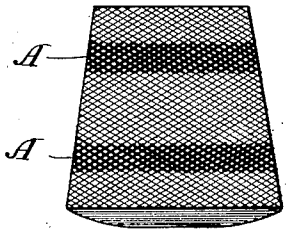


Fig. 3.

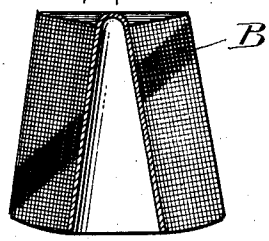


Fig. 3a.

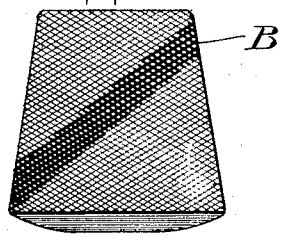


Fig. 4.

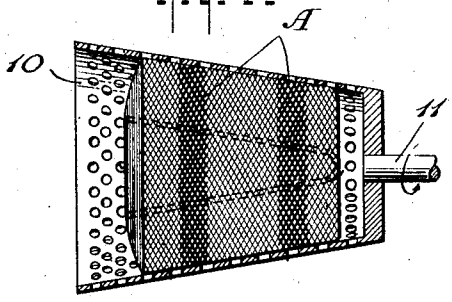
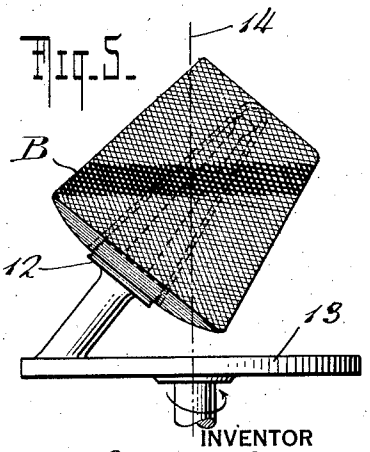


Fig. 5.



INVENTOR

John P. Garey

BY

Robert W Byerly

ATTORNEY

Patented Nov. 23, 1926. 1,607,821

UNITED STATES PATENT OFFICE.

JOHN P. GAREY, OF ELMIRA HEIGHTS, NEW YORK.

METHOD OF SPOT-DYEING YARN.

Application filed April 8, 1926. Serial No. 100,487.

This invention relates to a method of spot-dyeing yarn and aims to produce a spot-dyed yarn at an expense much less than that involved in the methods heretofore used for producing such yarn.

In methods of spot-dyeing yarn heretofore used, including both those which operate upon a running thread of yarn and those which operate upon a wound mass of yarn, it has been found necessary to use alcohol as the vehicle for carrying the coloring matter or dye into the yarn. The dyeing solutions used have contained from 33% to 97% of alcohol. The alcohol vehicle has been found necessary both to cause a spreading of the dye and to stop the spreading at the desired point so as to leave portions of the yarn uncolored. It accomplishes the latter result because of the rapidity with which it evaporates or dries. All the alcohol used is thus lost, and the cost of the alcohol has proved to be the largest item of expense in carrying out these methods of spotting.

In accordance with the present invention, the liquid vehicle by means of which the dye is carried into predetermined parts of the mass of yarn is removed from the mass of yarn without removing the dye from the predetermined parts to be colored, and consequently without coloring the parts of the yarn which are to be left uncolored. The removal of the vehicle makes it unnecessary to use a vehicle which evaporates rapidly. The invention, therefore, makes it possible to spot yarn by means of a water solution of the dye, the expense of which is negligible in comparison with that of the alcohol solutions heretofore used. Furthermore, since many sorts of coloring matter are soluble in water but not in alcohol, the invention for the first time makes possible the use of such coloring matters in yarn spotting.

The method which I have invented involves the following steps:—First, causing a liquid vehicle, such as water containing a dye, to penetrate into a wound mass of yarn, bringing the dye into contact with predetermined portions of the mass and leaving the remainder of the mass uncolored, and second, the removal of the liquid vehicle, or the greater part of it, from the mass by means of centrifugal force without bringing the dye into contact with the portions of the mass which are to be left uncolored.

In order that the invention may be clearly understood, I will describe specific methods embodying it, and in such description I shall refer to the accompanying drawings, which show diagrammatically various steps in these specific methods. In the drawings:—

Fig. 1 illustrates the introduction of the dyeing solution into a cone of yarn in accordance with the method described in Van Ness Patent No. 1,456,344;

Figs. 2, 2^a and 3, 3^a indicate the parts of the mass which may be dyed in carrying out the present method, Figs. 2 and 3 being axial sections, and Figs. 2^a and 3^a being side views of a cone of yarn; and

Figs. 4 and 5 illustrate the extraction of the liquid vehicle from the mass.

In carrying out the method in the manner which I now believe to be most desirable, the coloring matter or dye is suspended, or more desirably dissolved, in a liquid vehicle, such as hot water. It is desirable, for reasons hereinafter explained, that the dyeing solution should contain also a chemical of the type known as an assistant to aid the dye in entering the pores of the yarn. A number of assistants are in use for this purpose in various sorts of yarn dyeing, and the exact nature of the assistant used is immaterial so far as the present invention is concerned. The assistant may consist of a water-soluble oil, such as Turkey-red oil, amounting to about 20% of the water present in the solution.

The dyeing solution is then caused to penetrate into a wound mass of yarn, such as a cone of yarn, so as to color a band-like portion of the mass lying between two approximately parallel, approximately plane surfaces extending through the mass. If desired, more than one portion of the mass so bounded may be colored. The penetration of the dyeing solution is best secured by means of the method and apparatus described in Van Ness Patent No. 1,456,344, and diagrammatically illustrated in Fig. 1, which shows an injector including a nozzle and a grooved needle 9, to which a dyeing solution is supplied under pressure, in operating relation with a cone of yarn shown in transverse section. When this method of penetration is used, the water solution is injected while hot and a larger quantity of the solution is introduced than has heretofore been customary in injecting alcohol dye solutions owing to the fact that the water vehicle does not spread as readily

within the mass. For the same reason, injections are made at closely spaced points within the above defined band-like portion of the mass to be dyed, until such portion of the mass has been thoroughly soaked with the dyeing solution. It is usually desirable that several such injections be made simultaneously. The result of the first step is to leave portions of the mass, such as the darker portions A, A, B illustrated in Figs. 2, 2^a and 3, 3^a thoroughly soaked with the dyeing solution. If a water vehicle is used, the amount of solution injected into the small portions of the cone of yarn illustrated in Figs. 2, 2^a is about equal in weight to the entire cone of yarn.

If the injection of the dyeing solution has proceeded rapidly so that the portions A, A, or B illustrated in Figs. 2, 2^a, or Figs. 3, 3^a, have been saturated with the dyeing solution within a period of a minute or less, it is desirable to wait a short time, for example, about three minutes before carrying out the next step of the method. This permits the assistant to open the pores of the yarn and allows the dye to enter these pores.

The next step of the method consists in extracting from the mass the greater proportion of the liquid vehicle, that is, the water. This is accomplished by rotating the mass rapidly about an axis perpendicular to the surfaces bounding the portions of the mass which have been dyed. When these portions are bounded by approximately plane surfaces approximately perpendicular to the axis of the core of the cone as shown in Fig. 2, the extraction is accomplished by rotating the cone about the axis of its core, for example, by inserting it in a perforated conical casing 10 mounted on a rotary shaft 11, as shown in Fig. 4. The shaft and cone are preferably rotated at a speed of about two thousand revolutions per minute. If the colored portion lies between two planes extending obliquely across the cone, as shown in Fig. 3, the extraction is accomplished by rotating the cone about an axis perpendicular to these planes, for example, by seating the core of the cone on an inclined support 12 mounted on a rotary plate 13. The inclination and position of the support 12 is such that the planes bounding the colored portion of the cone are perpendicular to the axis of rotation 14 of the plate 13.

The extraction is continued until the rotating cone ceases to throw off liquid or mist. This results in leaving the cone substantially dry.

No coloring of the portions of the cone lying outside the predetermined parts into which the dye was introduced in the first step of the method takes place during the extraction. This is for two reasons: One is that, because of the position of the axis on which the cone is rotated, the liquid vehicle, in passing out of the cone, travels through the portions of the cone which have been dyed and, therefore, does not carry any of the coloring matter which may be removed with it into other parts of the cone. The other reason is that because of the use of the assistant and the lapse of time permitting the dye to enter the pores of the yarn, very little coloring matter is contained in the water which is thrown off in the extraction. While I find it most desirable to effect the extraction as described so as to make use of both of these factors in preventing the coloring of the uncolored portions of the cone, this result may in practice be accomplished with the use of either of these factors alone.

What I claim is:—

1. The method of spotting yarn, which comprises causing a water solution of dye to penetrate into predetermined portions of a wound mass of the yarn, and removing the greater part of the water of the solution from the mass by centrifugal force.

2. The method of spotting yarn, which comprises causing a liquid vehicle carrying a dye to penetrate into a wound mass of yarn bringing the dye into contact with a predetermined portion of the mass, and removing the greater portion of the liquid vehicle, leaving said predetermined portion colored by the dye and the remainder of the mass uncolored.

3. The method of spotting yarn, which comprises causing a liquid vehicle containing dye to penetrate the portion of a wound mass of yarn included between two approximately parallel approximately plane surfaces, and thereafter rotating the mass about an axis perpendicular to said surfaces to extract from the mass the greater part of the liquid vehicle.

4. The method of spotting yarn, which comprises causing a water dyeing solution containing an assistant adapted to open the pores of the yarn to penetrate into predetermined portions of a wound mass of yarn, permitting the assistant to open the pores of the yarn and the dye to enter the pores, and thereafter removing the greater part of the water from the mass by centrifugal force.

5. The method of spotting yarn, which comprises injecting a hot water dyeing solution into a zone of a wound mass of yarn extending inwardly to the core of the mass and thereafter extracting the greater part of the water injected by rotating the mass about the axis of its core.

In testimony whereof I have hereunto set my hand.

JOHN P. GAREY.