

UNITED STATES PATENT OFFICE.

HERMAN EPSTEIN, OF NEW YORK, N. Y.

SPOT-DYEING PROCESS FOR TEXTILE FIBERS.

No Drawing.

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To all whom it may concern:

Be it known that I, HERMAN EPSTEIN, residing at New York, in the county of New York and State of New York, United States of America, having invented certain new and useful Improvements in Spot-Dyeing Processes for Textile Fibers, do hereby declare that the following is a full, clear, and exact description of the same.

10 This invention relates to a new and improved process of dyeing textile fibers and more particularly to a process of producing vary-colored effects in textile fibers by a novel process of "spot dyeing."

15 Textile fibers may be "spot-dyed," i. e. different sections of a fiber dyed in different colors, by the well known printing process. However, this process is costly and is not adapted for certain fibers, such as artificial or wood silk, because of the character of the dyes and inherent weakness of such fibers. To overcome this difficulty, it has been suggested to dye textile fibers in bunches or skeins and prevent the dyeing liquor from affecting certain sections thereof.

25 As heretofore practiced, the dyeing processes of the latter type were objectionable on several grounds. The protection of certain sections of the skein or bunches against the dye bath was often ineffective or of a nature to cause injury to the fiber, particularly when applied to cellulose fibers. The skein was usually tied at a plurality of points and covered with a round rubber hose or the like to protect certain sections of the skein against the dyeing liquor. This gave a substantially round rope-like bunch of fibers not all of which were equally exposed to the dye. The fibers in the core of the rope or bunch were hardly reached by the dye. To overcome this, the skeins were left and worked in the dye bath for a long time resulting, particularly in the case of artificial silk, in injury to the fibers.

40 The object of the present invention is a process of "spot dyeing" textile fibers in which injury to the fibers is prevented and the fibers are uniformly dyed in sections or spots of predetermined extent.

50 With this object in view, I have devised a simple, efficient and inexpensive process, which, while particularly well adapted for use with artificial or wood silk, cellulose fibers, and the like, is applicable to textile fibers of substantially all kinds and grades. The manner in which the process is practised

will be clear to those skilled in the art from the following detailed description of a preferred exemplification thereof which, however, is not intended to limit the scope of the invention defined in the appended claims.

The skein or other bunch of textile fibers, such as artificial silk, is first moistened, preferably by being dipped in water and wrung out. This is a usual step in the dyeing of artificial silk to prepare the fiber for taking the dye.

The skein is now in condition for protecting parts thereof from coming into contact with the dyeing liquor. Preferably, this is accomplished by holding sections of the skein in clamps like the ones disclosed in my Patent No. 1,461,822 or in a co-pending application of A. H. Adams Ser. No. 615,890, filed Jan. 30, 1923. However, clamps or other tying, sewing or holding means of any other suitable type may be employed and sections of the skein protected against contact with the dye by other means without departing from the spirit of the invention. However, the following directions must be carefully observed in this operation:

The material of which the clamp, tie, cover or the like is made must not harmfully react on the dye to be used. No dye must penetrate into the lengths of the fibers held within the clamps or covers or the like. Rubber pads or other flexible medium firmly held against sections of the skein will be suitable for this purpose. However, other expedients may be resorted to with good results.

The skein must be so arranged that the fibers exposed to the dye between the adjacent covers, i. e. the lengths of the fibers to be dyed, are exposed to the dyeing liquid. This is best accomplished by laying the skein thin and preferably also flat within the covers or the like. If the fibers exposed to the dye are compacted into a thick bundle of any form, the central fibers will be dyed light and not so far as the outer ones. This was the main shortcoming of prior spot dyeing processes. I have found that with skeins of the usual commercial size, best results are obtained by spreading the skein in the clamp or the like to occupy a space of about two inches. When the skein is thus held, the exposed lengths of the fibers will of course also be correspondingly thinned and

spread insuring a proper separation of the exposed lengths of fibers to be dyed and therefore the penetration of the dyeing liquor to all the exposed fibers.

As many coverages or the like may be applied to the skein as are necessary for producing the desired color effect. Furthermore, the clamps or the like may be arranged to hold one or more skeins adjacent to each other.

After the above described covering or protecting operation, the skeins are ready for dyeing. The whole assembly is immersed in a dye bath preferably by suspending it with strings. The composition and temperature of the dyeing liquor will of course vary depending on the character of the fibers and the result desired. I prefer to bring the dyeing liquor to the desired temperature by injecting steam into the dyeing tank. The steam not only heats the dyeing liquor but causes also the agitation thereof. By this means or by other means such as mechanical stirring devices, the dyeing liquor is kept in agitation and to a certain extent in circulation in the dyeing tank for the purpose of insuring its penetration to all the exposed fibers.

For the purpose of further insuring the thorough and uniform dyeing of the exposed lengths of fiber, the skein is moved up and down and the adjacent covers are moved to and from each other. Due to the last mentioned operation of moving adjacent covered sections of the skein to and from each other, the textile fibers exposed between adjacent covers will be spread or looped out further separating from each other the individual fibers and thus insuring the thorough and uniform dyeing thereof to substantially the margin line of the coverage. Such uniform lengths of dyed spots could not be obtained with fibers compacted in relatively thick bundles.

The clamps with the skein may now be removed from the dye bath. The clamps or covers are removed, whereupon the skein is dipped in a solution of double or triple sulphonated castor oil and water or other suitable solution to supple the fibers. The skein is then hung up to dry, the "spot dyeing" process being completed.

The above process, with the exception of the last mentioned dipping, may be repeated a plurality of times to produce more than two color effects.

What I claim is:

1. The process of spot dyeing textile fibers consisting in: spreading the exposed fibers thin, covering lengths of the fibers to protect them against the dye, immersing the fibers in a dye bath, and finally drying the fibers.

2. The process of spot dyeing textile fibers consisting in: covering lengths of the fibers to protect them against the dye, spreading the exposed fiber lengths thin and flat, immersing the fibers in a dyeing liquor, moving the covered lengths to and from each other in the liquor further to spread the exposed fibers, and finally, drying the fibers.

3. The process of spot dyeing a mass of textile fibers consisting in: first, spreading the fibers thin and flat; second covering lengths of the fibers against the dye; third immersing the mass of fibers in a dyeing liquor; fourth moving the covered portions of the fibers to and from each other in the liquor to spread the exposed lengths of fibers; and fifth drying the fibers.

4. The process of spot dyeing a skein of artificial silk fibers consisting in: first, spreading the skein thin and flat; second, pressing sections of the flattened skein between flat surfaces to protect them against the dye; third immersing the skein in a dyeing liquor maintained in agitation; fourth, moving the protected sections of the skein to and from each other in the liquor to spread the exposed lengths of fibers; and fifth drying the skein.

5. The process of spot dyeing a skein of artificial silk fibers consisting in: first, moistening the fibers; second spreading the skein thin and flat; third pressing and clamping sections of the flattened skein between substantially flat surfaces to protect them against the dye, and to maintain thin and flat the exposed lengths of the fibers; fourth, immersing the clamped skein in a dyeing liquor maintained in agitation; fifth moving the skein in the liquor; sixth, moving the clamped sections of the skeins to and from each other in the liquor to spread the exposed lengths of fibers; seventh, removing the skein from the dyeing liquor and the clamps; eighth, dipping the skein in a solution of sulphonated castor oil and water; and ninth, drying the skein.

In witness whereof, I hereunto subscribe my name this 25th day of October, 1922.

HERMAN EPSTEIN.