UNITED STATES PATENT OFFICE.

LEMUEL W. WRIGHT, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN PROCESSES FOR BLEACHING OR DYEING FABRICS IN BULK.

Specification forming part of Letters Patent No. **207,334**, dated August 20, 1878; application filed July 26, 1878.

To all whom it may concern:

Be it known that I, LEMUEL W. WRIGHT, of Brooklyn, New York, have invented a new and useful Mode of Bleaching or Dyeing Woven Fabrics in Bulk, of which the following is a specification:

It is the object of my invention to convert the process of bleaching or dyeing woven fabrics in bulk into an exact method, whereby all portions of the fabric under treatment will be simultaneously acted upon by the treating-liquor.

It has heretofore been proposed to bleach or dye woven fabrics by discharging the bleaching or dyeing liquor from a perforated pipe, upon which it was suggested the fabric should be wound in the form of a roll; but in such case the treating-liquor, pursuing the paths of lesser resistance, makes its way out at the ends of the roll, and, the central portion of the roll being therefore less energetically acted upon than the ends, the effect produced is not uniform.

My invention consists in so confining the ends of a suitably-prepared roll of fabric as to insure the passage of treating-liquor through the roll radially in parallel planes at right angles to the axis of the roll.

I have been granted a patent for the combination of a perforated pipe with detachable and adjustable heads or disks for closing the ends of a roll of fabric wound upon the perforated pipe; but in order to make such heads effective as a means of preventing the escape of treating-liquor from the ends of the roll, it is necessary to so wind the fabric upon the pipe as to make it form a perfectly compact, solid mass, capable of resisting the impact of the heads and of making a tight joint therewith. This constitutes the preliminary step in my process, and I accomplish it by wetting the fabric with water, and then stretching it laterally and winding it tightly upon the perforated pipe or drum.

The wetting of the fabric may be effected in any convenient way, as, for example, by passing it through a system of guide-rollers immersed in a body of water contained in a suitable tank. Devices for this purpose, and also mechanism for laterally stretching and winding woven fabric, have heretofore been separately used, and hence do not need special description herein. I have, however, invented a combination of instrumentalities for wetting, stretching, and winding woven fabric, which I intend to make the subject of a separate application for a patent.

By wetting the fabric, and then immediately stretching it laterally and winding it excessively tightly upon the perforated pipe, and shielding the ends of the roll, the mass of fabric is brought into a condition of uniform density and of symmetrical presentation and exposure to the action of a treating-liquor injected into it from the perforations in the pipe. The whole of the liquor so injected is forced to pass transversely through every fold of which the roll is composed, and all portions of the soluble matter contained in the fabric are thus dissolved, and by mechanical action carried out of the roll by the shortest and most direct paths.

Instead of employing the adjustable heads to which I have referred, the fabric, tightly wound in the form of a roll upon a perforated drum or pipe, may be placed on end in the bottom of the basket of a centrifugal machine, and the escape of liquor from the ends of the roll may be prevented by forcibly clamping a centrally perforated cap upon the upper end of the roll, and thereby tightly pressing the lower end against the bottom of the basket. In such case the bottom of the basket may be centrally-perforated to receive the end of the pipe upon which the roll is wound, or the fabric may be wound flush with one end of the perforated pipe, the conditions precedent to the successful conduct of my improved process being merely that the fabric shall be so tightly wound as to make a compact solid mass, and that the ends of a roll so wound shall be closed by an instrumentality adapted to prevent the escape of liquor therefrom.

The treating-liquor injected from the perforated pipe may be forced through the roll in various ways, as, for example, by the rapid rotation of the roll in a centrifugal machine, when arranged as I have described, or by forcing the treating-fluid into the perforated pipe with great pressure and conducting the operation *in vacuo*, and thus enlisting atmospheric pressure into action, for the purpose of facil-

itating the passage through the roll of liquor injected from the perforated pipe.

I have found it convenient to wind the fabric upon a perforated pipe four inches in diameter and to make the roll three feet in diameter. These dimensions are, of course, not arbitrary, but may be varied at will.

In continuing my process, I treat the fabric first with steam injected from the perforated pipe at a pressure of, say, forty pounds to the square inch. After the proper saturation of the fabric with steam, which will be indicated by the escape of steam from the exterior of the roll, I next rinse the fabric with boiling water injected from the perforated pipe under like pressure. The rinsing operation is continued until the water discharged from the exterior of the roll ceases to be discolored.

When the operation is conducted in a centrifugal machine the passage of fluid through the roll may be regulated by its speed of rotation. When the operation is conducted *in vacuo* the roll is placed in a chamber from which the air is exhausted, and the perforated pipe is provided with an exterior connection with a steam-generator and with a reservoir of treating-liquor.

I have found that a pressure of forty pounds to the inch on the liquor injected into the perforated pipe, in conjunction with the atmospheric pressure upon the exterior of the roll due to the exhaustion of air from the chamber, is amply sufficient to force the treating-liquor through the roll.

After the rinsing is completed I introduce a bleaching-fluid into the perforated pipe, and force that through the roll under like conditions of pressure. I preferably use for this purpose a hot solution of caustic alkali, and I continue the treatment with caustic alkali until the proper effect is produced.

I have found that about six pounds of caustic alkali will answer to bleach one hundred pounds of cotton fabric, if the alkali, after passing through the roll, is collected and reinjected, and the operation repeated until the alkali is spent. Linen fabrics require about twice as much of the alkali as cotton does. In practical operation it will be easy to proportion the quantities of alkali used to the requirements of the particular fabrics treated.

After concluding the treatment with the caustic alkali I again rinse the fabric by forcing boiling water through it by a like process of injection from the central perforated pipe, and finally I introduce dry steam into the perforated pipe, and force that through the roll until the fabric is sufficiently dry for the subsequent operation of finishing, which is conducted in the ordinary manner.

By my process the operation of bleaching woven fabrics is effected in about one-tenth of the time heretofore required.

It will, of course, be seen that the fabric may be treated with any fluid which it may be desired to use, whether for bleaching or dyeing purposes, and that the useful result effected by my process is due to the uniformity with which the treating-fluid is made to act, the entire roll, from one end to the other, being subjected in a like degree to the mechanical action of the streams or currents of treating-fluid forcibly injected into and through the roll.

I claim as my invention—

The process of bleaching or dyeing woven fabrics in bulk herein described, which consists in laterally stretching and tightly winding the fabric while wet upon a perforated pipe or drum in the form of a compact roll, and in closely confining the ends of the roll to prevent the escape of the treating-fluid therefrom, and in then injecting the treating-fluid radially from the perforated pipe into the roll, whereby such fluid is forced to pass transversely through every fold of which the roll is composed in parallel planes at substantially right angles to the axis of the roll.

LEMUEL W. WRIGHT.

Witnesses:

JOHN S. KING,

S. B. TISDALE.