

(No Model.)

2 Sheets—Sheet 1.

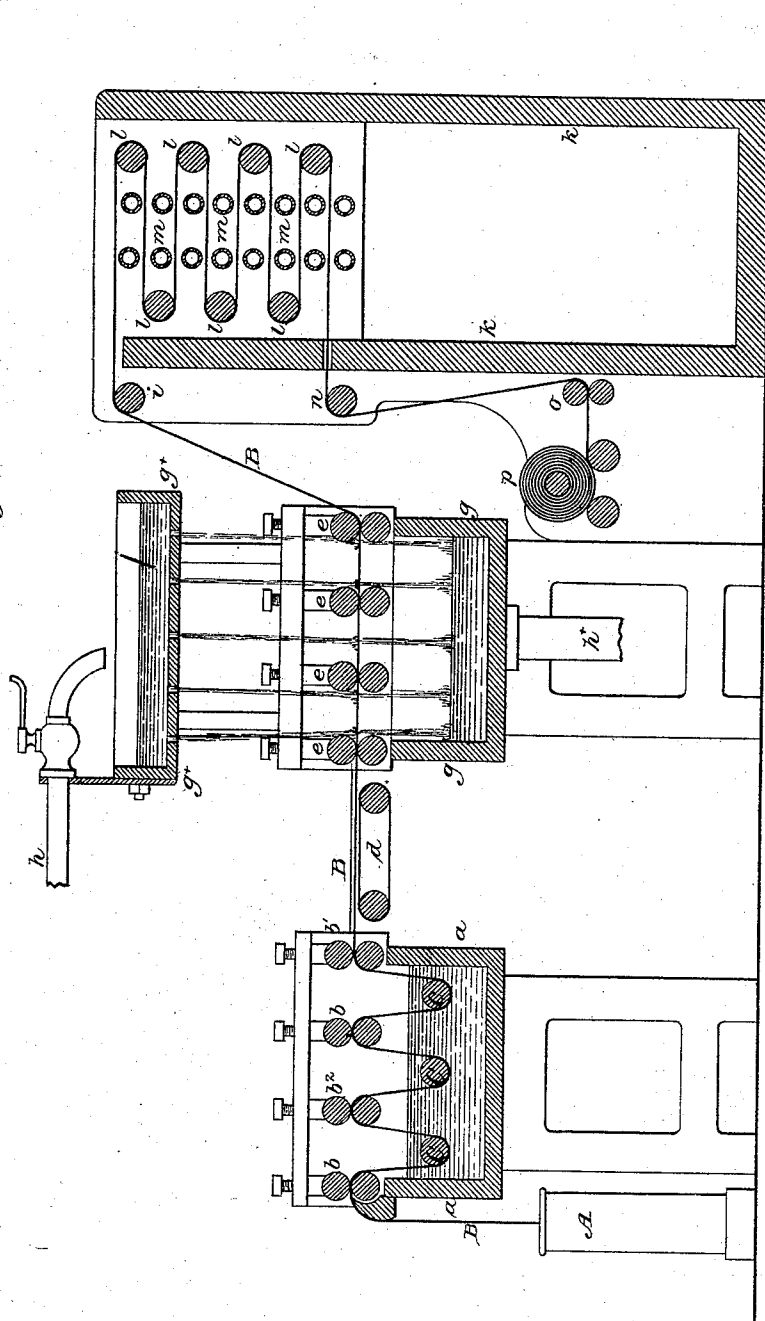
F. WILKINSON.

Process of and Apparatus for Bleaching and
Dyeing Cotton.

No. 241,464.

Patented May 10, 1881.

Fig 1.



WITNESSES

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Baldwin, Hopkins, & Peyton.

(No Model.)

2 Sheets—Sheet 2.

F. WILKINSON.

Process of and Apparatus for Bleaching and
Dyeing Cotton.

No. 241,464.

Patented May 10, 1881.

Fig. 3,

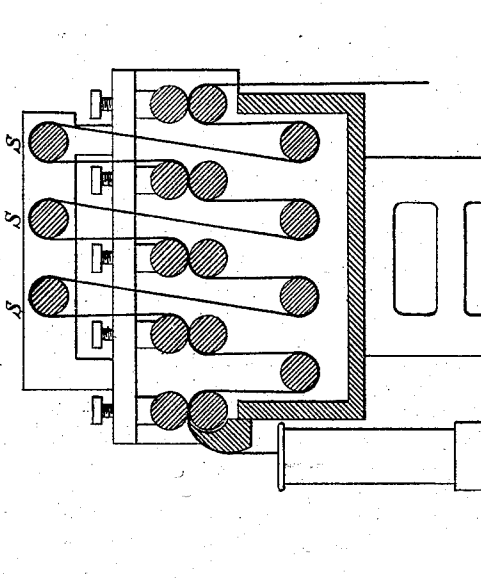


Fig. 5,

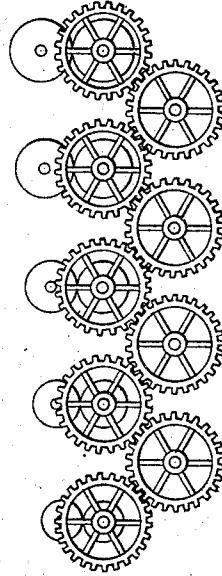


Fig. 2,

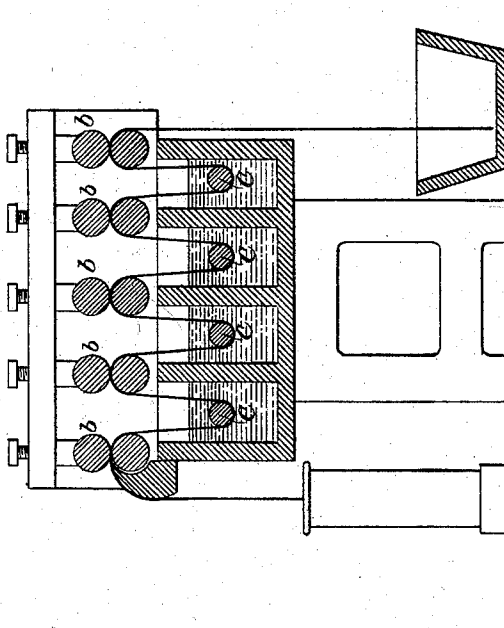
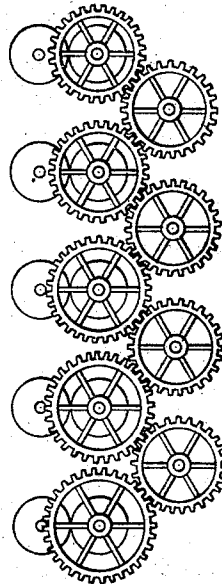


Fig. 4,



WITNESSES

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UNITED STATES PATENT OFFICE.

FREDERICK WILKINSON, OF MANCHESTER, COUNTY OF LANCASTER,
ENGLAND.

PROCESS OF AND APPARATUS FOR BLEACHING AND DYEING COTTON.

SPECIFICATION forming part of Letters Patent No. 241,464, dated May 10, 1881.

Application filed March 7, 1881. (No model.) Patented in England December 20, 1878.

To all whom it may concern:

Be it known that I, FREDERICK WILKINSON, of Manchester, in the county of Lancaster, Great Britain, have invented certain Improvements in the Art of Bleaching and Dyeing Cotton and in Mechanism Therefor, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part hereof.

10 In the drawings, Figure 1 is a vertical section of the apparatus for bleaching, washing, and drying. Fig. 2 is a vertical section of one form of apparatus for dyeing, and Fig. 3 a vertical section of another form of apparatus for dyeing. Figs. 4 and 5 are illustrations of well-known ways of speeding rollers. Fig. 4 represents a side elevation of a series of rollers of uniform diameters, adapted to revolve with different velocities by means of varying-sized gear-wheels; and Fig. 5 represents a side elevation of rollers of different diameters, which may be made to revolve with uniform velocity by any ordinary gearing. These two figures are not drawn to a scale, but are exaggerated

25 in their respective variations of gear-wheels and of diameters for better illustration.

Heretofore the dyeing and bleaching of cotton and similar short non-felting fibrous substances, preparatory to the manufacture of yarn, thread, or cloth fabrics, has been accomplished by immersion in liquids in masses and subsequent treatment well known to those skilled in the art, involving the employment of skilled labor, and many devices and processes have been invented and practiced for the purpose; but dyeing and bleaching of sliver formed in sheets or bats by feeding the sheets continuously through liquids under increasing tension by means of machinery has

40 not been practiced, or deemed practicable, on account of the flimsy nature of such bats.

The object of my invention is to introduce this radically new automatic process of dyeing and bleaching such fiber, whereby skilled labor can be dispensed with, a peculiar continuous automatic operation can be substituted for the ones now in vogue, uniformly excellent work can be done, and great economy can be secured.

50 Accordingly my invention, stated in general terms, relates to bleaching and dyeing cotton

and other fibrous materials which are capable of being reduced to the form of a narrow puffy sheet of great length and of substantially uniform thickness, commonly called a "lap" or "bat" in the manufacture of cotton; and it consists, mainly, in alternately saturating this long narrow puffy sheet with the bleaching or dyeing liquor, and then squeezing out the liquor, so that the sheet of fibers is first saturated in the bleaching or dyeing liquor, then the liquor is squeezed out of it, then the sheet of fibers is resaturated and resqueezed, every part of the sheet being saturated with the liquor and the liquor squeezed from it several times as the sheet is fed along through the apparatus.

Another feature of my invention consists in bleaching and washing the cotton or other fibrous material capable of being reduced to the form of a lap or bat by bleaching, as above described, and then carrying the sheet to a series of squeezing-rollers and a water-supply, where the sheet is alternately saturated with water and squeezed as it travels through the apparatus.

Another feature of my invention consists in first immersing the sheet of fibers in the dyeing-liquor, then squeezing the liquor out of it, then causing it to travel for a distance through the air in order that the oxygen may act upon it, and repeating this operation several times as the sheet travels through the apparatus.

Proceeding, now, to describe my invention more in detail by reference to the letters on the accompanying drawings, *a* is a vat containing, in Fig. 1, any of the usual bleaching-liquors. *b* are pairs of rollers situated above the said vat, supported in any convenient manner and caused to revolve by a line-shaft by any usual means. Beneath this series of rollers are other single rollers, *c*, immersed in the bleaching-liquid—not driven, but simply acting as guide-rollers, although they might be driven in any ordinary manner by the adoption of suitable materials for preventing chemical action on the axes. The sheet is best formed, in practice, of a large number of slivers—say seventy or eighty—as they come from the carding-engine or other preparation machine. As in practice these slivers are usually deposited in cans, it is convenient to form the sheet by placing a number of these cans near trough *a*

and passing the ends of the slivers through the first set of rollers, *b*, so as to form a sheet, B. A single sliver will be, of course, much too tender to be treated by my process, but a sheet
 5 formed of a large number of these slivers or in any other manner (too well known to need description here) will be abundantly strong. The end of sheet B is then carried under the first roller, *c*, and then up between the second pair
 10 of squeezing-rollers, *b'*, and so on, and delivered by the last pair of squeezing-rollers, *b'*. The operation of this apparatus, as will be seen, is to pass sheet B into the bleaching-liquor and through squeezing-rollers alternately, thereby
 15 immersing it in the liquor and squeezing the liquor from it several times, and insuring not only the thorough contact of the liquor with every fiber composing the sheet, but also doing this by a continuous process and with a
 20 uniformity hitherto unknown.

It will be seen that by my process only a very small portion of the fiber is treated at a time and each portion is treated several times in succession. This would, of course, be a serious waste of time, although very effective,
 25 were not the operation continuous, but, being continuous, I am enabled to bleach a given amount of fiber in less than one-tenth the time required by any other process known to me, and with a uniformity which is not attained
 30 by any other process, unless conducted by skilled labor and with the utmost care.

When an acid bath is desirable a second trough and series of rollers are used, the operation being the same.

At *d* is a creeper, into which the sheet of fiber B is deposited by the last pair of rollers, *b'*, and by this creeper the sheet is conducted to a series of rollers, *e*, and by these rollers *e*
 40 it is carried over tank *g* and under tank *g'*, into which water is delivered at will through a pipe, *h*. This second tank is provided at bottom with a number of perforations, and through these the water flows, impinging upon the fibers and
 45 washing out the bleaching-liquor, the waste flowing out through a pipe, *h'*, and the same squeezing action takes place as that above described. After this the bleached and washed sheet is conducted, by a guide-roller, *i*, into an
 50 ordinary drying-chamber, *k*, where it passes over rollers *l*, driven in any suitable manner as usual, and over supporting rollers or rods *m*, the said chamber being heated by steam-pipes, hot air, or by any other means well known in
 55 drying textile materials; or in place of the hot chamber the sheet may pass over steam-heated cylinders, as is well known as applied to such purposes, or the supporting rollers or rods *m* might themselves be steam-pipes, as shown in
 60 the drawings. The sheet is thus dried, and is then conducted by rollers *n* o to be formed into a roll, as at *p*, or it may be delivered into any suitable receptacle; and this concludes the operation of bleaching and drying, and leaves the
 65 fiber in substantially its original fluffy condition, ready for manufacturing.

The creeper *d* has been described as conveying the sheet from one set of rollers to another; but it may be used to afford time for the saturated fiber to become thoroughly bleached
 70 before being washed by regulating the length of the said creeper to an extent which experience will readily teach; or instead of delivering the sheet direct to the creeper it may be deposited by the rollers *b'* into a skip or other
 75 receptacle, there to remain for the necessary time and then fed to the rollers *e*.

What has been said of bleaching applies to dyeing; but in some cases two or more liquors are required, and consequently the trough *a*
 80 should be divided into compartments, as shown in Fig. 2. In some cases dyeing can take place without bleaching, and then the bleaching process is omitted; but in other cases bleaching is essential before the proper tints can be
 85 obtained by dyeing, and both processes are then practiced by one continuous operation in accordance with my invention with great convenience.

In some dyeing—that with indigo, for instance—it is well known that the material should be exposed for a period of time to the action of air, and I have applied my new principle to this kind of dyeing by thus exposing the sheet after each immersion and squeezing. To effect
 90 this the sheet is passed over another series of rollers, *S*, as shown in Fig. 3, the distance of the rollers *S* from the squeezing-rollers being sufficient, in view of the rate of motion of the sheet, to give the necessary exposure to the air.

In the drawings, Figs. 2 and 3, it is assumed that the sheet of fibers is made up of slivers passing from cans, as in Fig. 1; but, of course, the lap may be formed in any other usual way.

In passing the bats between the squeezing-rollers in the operation of dyeing and of bleaching they will be compressed, compacted, and greatly reduced in thickness, and at the same time materially elongated. The result is that
 110 each succeeding pair of squeezing-rollers after the first pair should be slightly speeded in any ordinary way, in order to take up the slack. Another object of speeding the succeeding pairs of rollers is to slightly strain or pull the traveling bats in order to improve the action of the dyeing or bleaching liquor by causing it to more perfectly permeate the bats. Therefore the speeding should be slightly more than
 115 sufficient to merely take up the slack. The texture of the bats is such that they will yield a little to strain without injury, and on this account there might be slight variations in the speeding of the rollers in different machines without danger to successful working; but the
 120 speeding of the succeeding rollers after the second pair should not be in the same ratio as that of the second pair to the first pair, because the first pair will effect more compression and elongation than the second, the second more than the third, and so on.

In practice I have found that the second

pair of rollers may be speeded as much as one inch to thirty with good effect—that is to say, so that the traverse of the bat will be thirty-one inches between the second pair of rollers, while only thirty inches between the first pair. The remaining pairs of rollers should be successively speeded somewhat less, the third, for instance, about thirty-one and a half inches, the fourth about thirty-one and three-fourths, and so on, slightly increasing by a diminishing ratio. These figures, however, need not necessarily be followed exactly, because of the yielding texture of the bats above mentioned, but they will serve as a guide in the construction of suitable machinery for practicing my invention.

I am aware of the British patent to Russell and Peters, No. 10,454, of 1845, and of the United States patent to Fossard, of November 7, 1835, the first of which describes the continuous dyeing and spinning of a sliver of flax or other fibrous substance intended to be spun, and the latter of which describes a method of dyeing cloth in the piece; and I disclaim all that is shown in these patents. I also disclaim all that is shown in English Patent No. 2,942 of 1858, for improvements in dyeing wool and other fibers, because the dyeing of wool and other like feltable fibers is an entirely different art, involving entirely different conditions from the art of dyeing cotton and other short non-feltable fibers. I also disclaim all that is shown in English Patent No. 468 of 1866, for "improvements in bleaching, dyeing, printing, and sizing cotton and other yarns or threads," because the bleaching and dyeing of yarns or threads is a totally different art from that of bleaching and dyeing loose cotton fiber.

What I claim as my invention is—

1. The process of treating cotton or other like fiber by first forming it into a long narrow lap or bat, and then conducting such lap or bat through a series of pairs of squeezing and feeding rollers and saturating it between these pairs of rollers with a suitable fluid, so that the lap is alternately saturated and squeezed several times in succession as it is fed along by the squeezing-rollers, substantially as and for the purpose specified.

2. The process of bleaching and washing cotton or like fiber by first forming it into a long narrow lap or bat, then conducting such lap or bat through a series of pairs of squeezing and feeding rollers and saturating it between these pairs of rollers with the bleaching-liquor, and then conducting the same lap or bat between a second series of pairs of squeezing and feeding rollers and saturating it with water between the pairs of this second series of pairs of rollers, substantially as and for the purpose specified.

3. The process of bleaching, washing, and dyeing cotton or like fiber by first forming it into a long narrow lap or bat, then conducting such lap or bat through a series of pairs of squeezing and feeding rollers and saturating it between these pairs of rollers with the bleaching-liquor, then conducting the same lap or bat between a second series of pairs of squeezing and feeding rollers and saturating it with water between the pairs of this second series of pairs of rollers, and then conducting the same lap or bat between a third series of pairs of squeezing and feeding rollers and saturating it with the dyeing-liquor between the pairs of this third series of pairs of rollers, substantially as and for the purpose specified.

4. The process of dyeing cotton or like fiber consisting in forming it into a long narrow lap or bat, and then conducting such lap or bat between a pair of squeezing or feeding rollers, then saturating it with the dye-liquor, and conducting it through a second pair of squeezing-rollers, then conducting it off to a distance in order to give a proper exposure to the air, and afterward repeating this operation as the lap or bat is fed along by the series of squeezing and feeding rollers, substantially as described.

5. In combination, trough *a*, its rollers *b* *c*, creeper *d*, rollers *e*, water-supply tank *g*^{*}, and receiving-tank *g*, substantially as described.

FREDK. WILKINSON.

Witnesses:

MARCUS S. HOPKINS,
CHAS. E. UPPERMAN.