No. 644,988. Patented Mar. 6, 1900.

J. MAJOR.

APPARATUS FOR DYEING.

(Application filed Feb. 28, 1899.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.

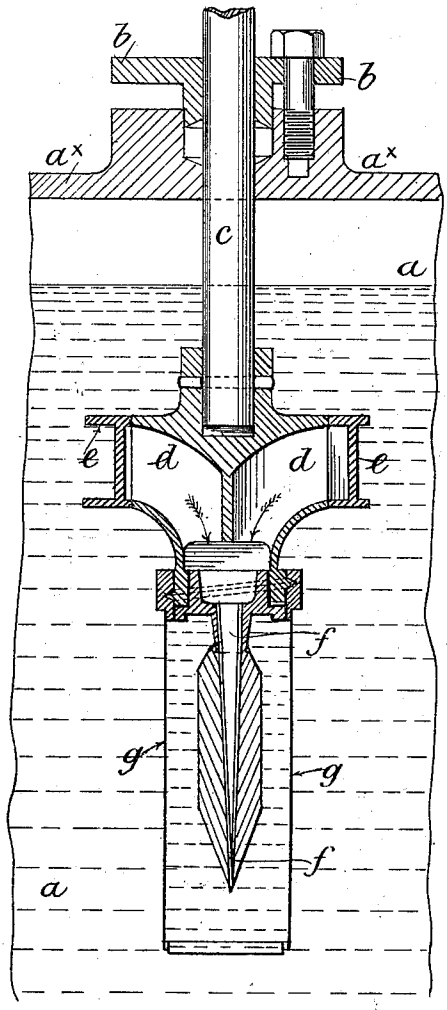


FIG. 2.

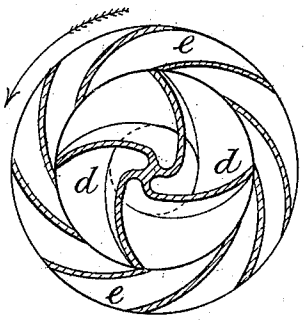
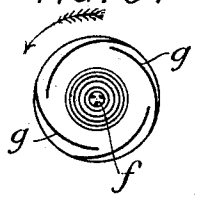


FIG. 6.



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A. C. Connor

INVENTOR

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FIG. 3.

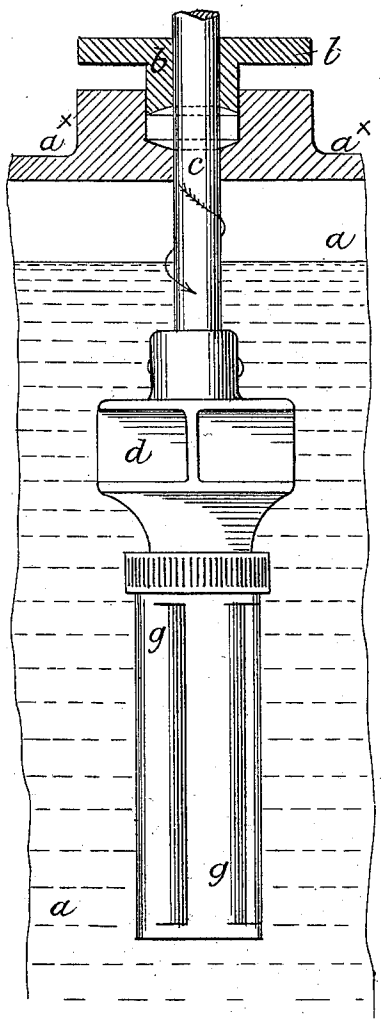


FIG. 4.

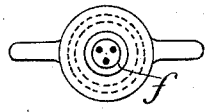
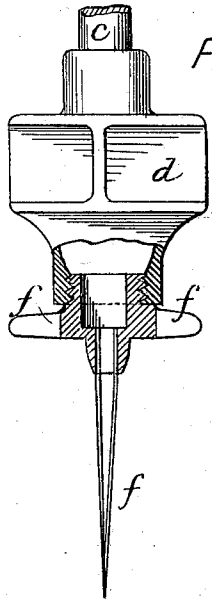


FIG. 5.



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JAMES MAJOR, OF ECCLES, ENGLAND.

APPARATUS FOR DYEING.

SPECIFICATION forming part of Letters Patent No. 644,988, dated March 6, 1900.

Application filed February 28, 1899. Serial No. 707,174. (No model.)

To all whom it may concern:

Be it known that I, JAMES MAJOR, a subject of the Queen of Great Britain, residing at Eccles, in the county of Lancaster, England, have invented new and useful Improvements in Apparatus for Dyeing, Bleaching, or otherwise Treating with Liquids Cops of Yarn and the Like, of which the following is a specification.

The principal novel features of my invention are that each individual cop is mounted separately upon a vertical revolving spindle through which the dye or liquor is admitted to the center of the cop and is caused by the centrifugal force to be driven outward through the body of the cop, dyeing or bleaching the yarn thoroughly and evenly all through the cop in its progress, and at the same time the centrifugal force loosens or opens out the yarn itself, so as to facilitate the access of the dye or liquor equally to all the fibers thereof, the combined result of which is that the whole of the yarn becomes thoroughly and evenly dyed (or bleached, as the case may be) throughout the cop, thereby producing an evenness and uniformity of effect not hitherto obtained. The exact arrangement of apparatus which can be used for this purpose may be varied to a considerable extent so long as the above conditions are maintained; but for example I have annexed hereunto two sheets of drawings illustrating one particular arrangement of apparatus which I have invented for the purposes of my improvements and have marked the same with letters of reference corresponding with those in the following explanation thereof:

Of the drawings, Figure 1, Sheet 1, is a partial vertical section, Fig. 2, Sheet 1, a horizontal section, and Fig. 3, Sheet 2, an elevation, of my improved appliance. Figs. 4 and 5, Sheet 2, and Fig. 6, Sheet 1, are detached views hereinafter more particularly referred to.

The apparatus consists generally of a tank or cistern containing the dye or bleaching or other liquor, which is provided with means for supplying the liquor thereto and of exhausting the liquor and air therefrom, which may be of any suitable construction. This tank or cistern is provided with an air-tight lid, a portion of which is represented at *a* on Figs. 1 and 3. The tank or cistern may be of any convenient form, either circular, square, or otherwise, and its lid $a^{\times}$ is provided with any convenient number of stuffing-boxes *b*, each supporting a vertical shaft or spindle *c*, the upper part of which, above the stuffing-box, is provided with a band-pulley, toothed pinion, or other suitable means for causing the spindle to revolve rapidly when required. To this spindle *c*, below the surface of the liquor in the tank *a*, is fixed a curved-bladed fan, turbine, or centripetal pump *d*, the blades of which are so curved or inclined (see Fig. 2) that when the spindle *c* is caused to revolve in the direction of the arrow the said blades will draw the liquor inward toward the center and force it downward, as shown by the arrows on Fig. 1, the liquor in the tank being preferably prevented from swirling around with the fan *d* by surrounding the latter with a fixed circular casing *e*, attached to the tank and provided with similarly-curved blades, which assist the action of the fan.

To the lower part of the fan or turbine *d* is attached, by a quick-threaded screw or otherwise, so as to be readily removable, a cop-carrier *f*. (Shown in plan view detached at Fig. 4 and vertical section at Fig. 5.) This cop-carrier may be made in the form of a slightly-conical perforated tube; but I prefer to make it of, say, three wires inclining together at the lower end, as shown at Fig. 5, the space between the wires being open, so that when the revolving action of the fan or turbine *d* forces the dye or liquor downward through the center of the cop-carrier it passes at once into contact with the interior of the cop of yarn, and it will be evident that by the rapid revolution of the spindle and cop-carrier a centrifugal action will be created which will force the said liquid outward through the body of the cop into the tank *a* again and that this centrifugal action will at the same time open out and separate the threads of the yarn, so as to facilitate the passage of the dye or liquor therethrough, and thus the liquor will be constantly kept in circulation from the center outwardly through the yarn or fibers.

In some cases it may be desirable to surround the cop with a cylindrical guard or envelop, as shown at *g* on Fig. 1 and in horizontal section at Fig. 6, so as to prevent un-

due friction of the dye or liquor against the exterior of the cop; but in most cases I find this unnecessary.

It will be noted that whether or not I use guard *g* I always leave the yarn in an unconfined state, so that when rapidly revolving the cop the yarn can become loosened and opened out to facilitate the access of the dye or liquor equally to all the fibers thereof.

It will be understood that this invention is only applicable to yarn wound in the form known as "cops" as used in the shuttles of looms for weaving and also to such spun yarn as is wound upon tubular spools or bobbins without flanges or heads, so that it can be removed endwise and placed upon the carriers attached to the revolving spindles *c*.

I claim as my invention—

1. Apparatus for dyeing or otherwise treating with liquor cops of spun yarn, consisting of means for rapidly revolving each individual cop on its own axis, and means for admitting liquor to the interior of the cop, whereby the liquor is forced by centrifugal force from the inside to the outside of the cop and the yarn is loosened or opened, substantially as described.

2. Apparatus for dyeing or otherwise treating with liquor cops of spun yarn consisting of means for rapidly revolving each individual cop on its own axis in a vertical and inverted position and means for admitting liquor to the interior of the cop from above, whereby the liquor is forced by gravity and centrifugal pressure from the inside to the outside of the cop and the yarn of the cop is loosened or opened, substantially as described.

3. Apparatus for dyeing or otherwise treating with liquor cops of spun yarn, consisting of means for rapidly revolving each individual cop on its own axis, with the yarn of the cop unconfined, and means for admitting liquor to the interior of the cop, whereby the liquor is forced by centrifugal force from the inside to the outside of the cop and the yarn is loosened or opened, substantially as described.

4. Apparatus for dyeing, &c., cops of yarn or the like, consisting of inverted rotatable vertical cop-carriers on which the cops are individually mounted, a vessel containing the liquor, means for admitting the liquor from above to the interior of the individual cops and means for centrifugally forcing the dye liquor through the cops, as and for the purpose set forth.

5. Apparatus for dyeing cops of yarn or the like, consisting of vertical inverted cop-carriers on which the cops are mounted, a vessel containing the liquor, means for admitting the liquor from above through the inverted vertical cop-carriers to the interior of the cop and means for revolving each cop-carrier on its own individual axis substantially as described.

6. Apparatus for dyeing, &c., cops or spools of spun yarn consisting of a centrifugal spindle, a tank in which it revolves said spindle having at its lower end a cop-carrier, in combination with a centripetal fan or turbine adapted to introduce the dye liquor into the interior of the cop, substantially as described.

7. Apparatus for dyeing, &c., cops or spools of spun yarn consisting of a centrifugal spindle, a tank in which it revolves, said spindle having at its lower end a cop-carrier, in combination with a centripetal fan or turbine adapted to introduce the dye liquor into the interior of the cop and a casing *e* surrounding the fan, as and for the purpose set forth.

8. Apparatus for dyeing, bleaching, or otherwise treating with liquids "cops" or "spools" of spun yarn, comprising a separate vertical spindle for each individual cop or spool, a tank with a cover, in which each spindle is mounted so as to be capable of revolving, each spindle being provided above the tank with means for rotating the same, and at its lower end inside the tank, provided with an open or perforated cop or spool carrier through which liquor is admitted to the interior thereof and is driven by the centrifugal force developed by its revolution outward through the cop.

9. Apparatus for dyeing, &c., cops or spools of spun yarn consisting of a vertical centrifugal spindle, a tank in which it revolves said spindle having at its lower end a perforated cop-carrier, in combination with a centripetal fan or turbine adapted to introduce the dye liquor from above downward into the interior of the cop, substantially as described.

10. Apparatus for dyeing, &c., cops or spools of spun yarn consisting of a vertical centrifugal spindle, a tank in which it revolves, said spindle having at its lower end a perforated cop-carrier, in combination with a centripetal fan or turbine adapted to introduce the dye liquor from above into the interior of the cop and a casing *e* surrounding the fan, as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES MAJOR.

Witnesses:
JNO. HUGHES,
J. ERNEST HUGHES.