No. 693,446. Patented Feb. 18, 1902.

J. A. SACKVILLE.

APPARATUS FOR DYEING, &c.

(Application filed Sept. 24, 1901.)

(No Model.) 2 Sheets—Sheet 1.

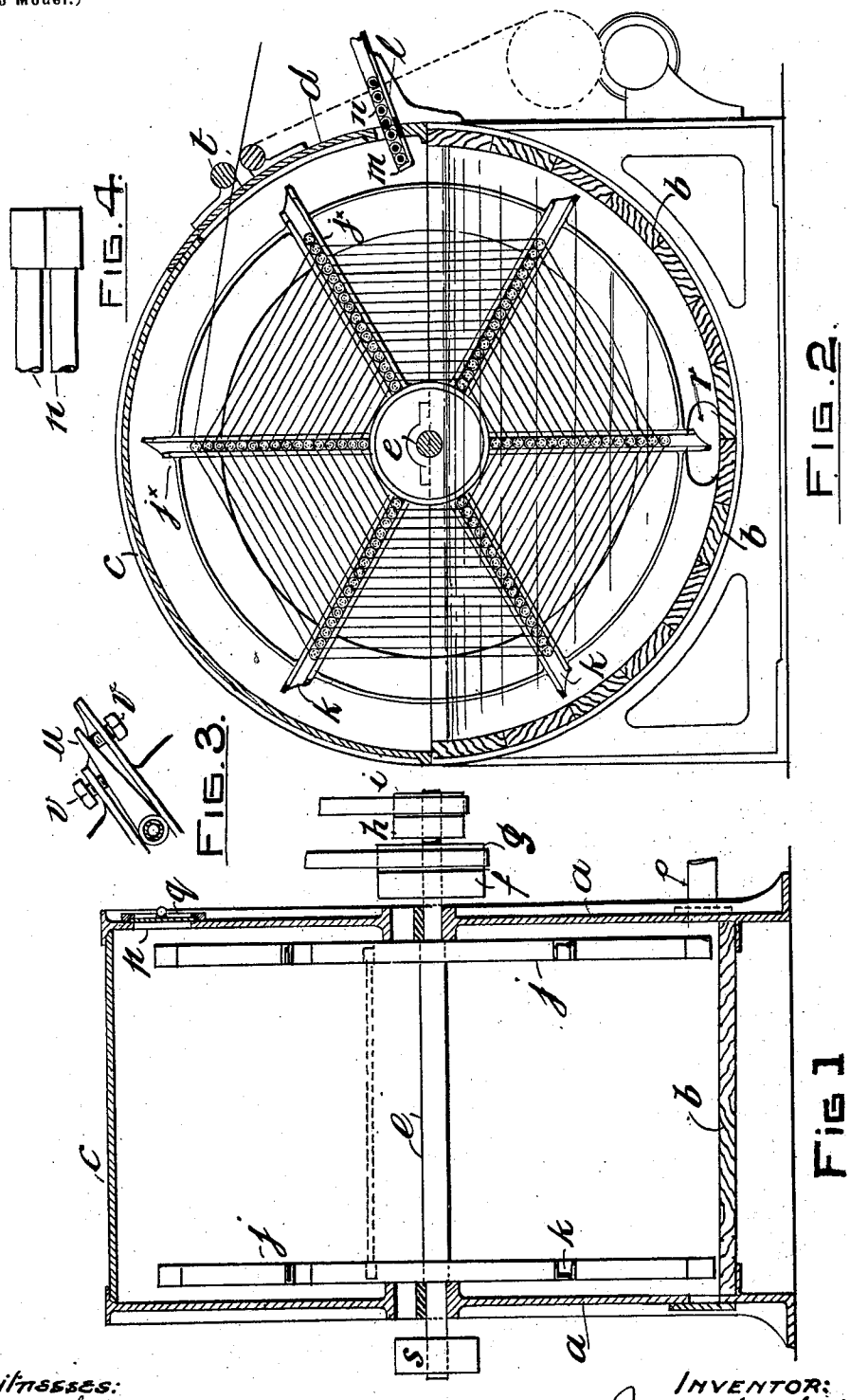


FIG. 4.

FIG. 2.

FIG. 3.

FIG 1

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By his Attorneys Richards & Co

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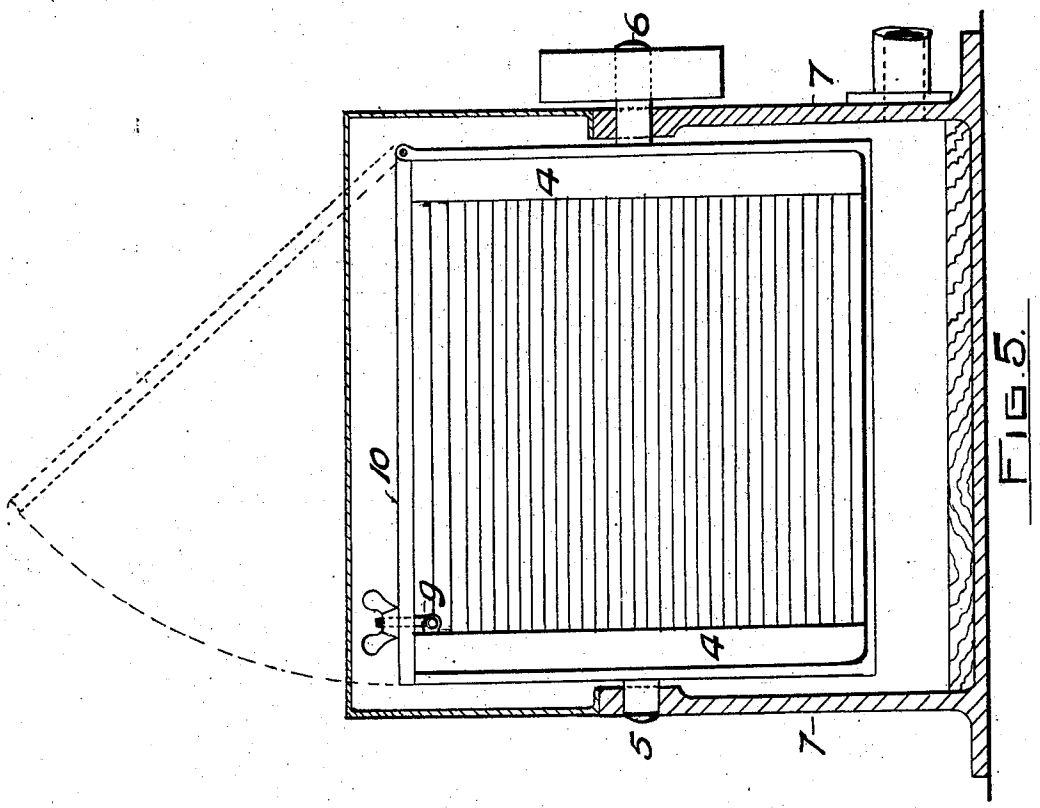


FIG. 5.

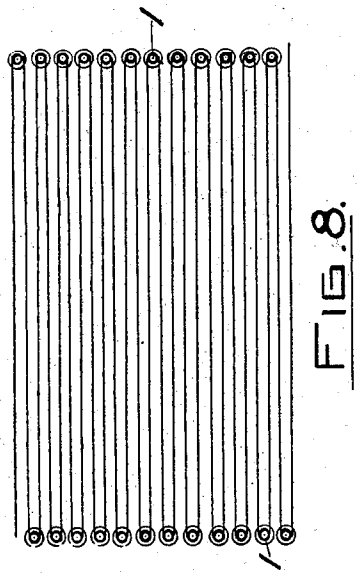


FIG. 8.

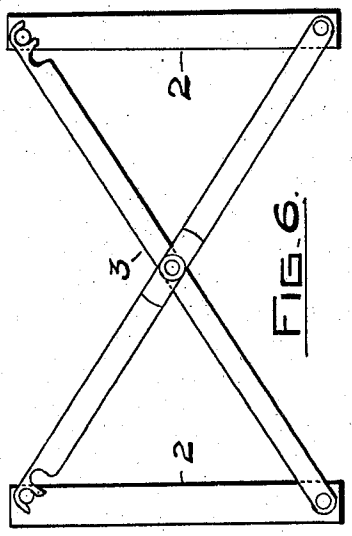


FIG. 6.

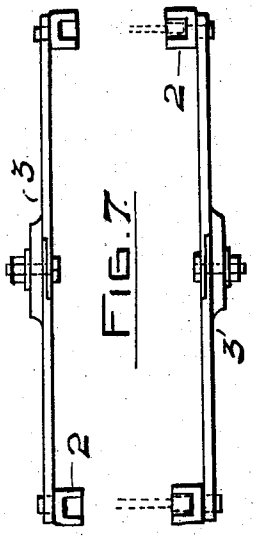


FIG. 7.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JAMES ALLAN SACKVILLE, OF PENDLETON, MANCHESTER, ENGLAND.

APPARATUS FOR DYEING, &c.

SPECIFICATION forming part of Letters Patent No. 693,446, dated February 18, 1902.

Application filed September 24, 1901. Serial No. 76,339. (No model.)

To all whom it may concern:

Be it known that I, JAMES ALLAN SACKVILLE, a subject of the King of Great Britain and Ireland, and a resident of Pendleton, Manchester, England, have invented certain new and useful Improvements in Apparatus for Use in the Bleaching, Dyeing, Drying, and Like Treatment of Textile Fabrics, especially Fabrics having a Pile, of which the following is a specification.

This invention relates chiefly to the bleaching, dyeing, finishing, and like treatment of piled fabrics—such as velvets, plushes, moleskins, and corduroys—and has for its object to avoid the waste of bleaching or dyeing liquors heretofore prevalent, to expedite the said operations, and generally to improve the means and method of handling the fabrics.

A further object is to so arrange the fabric that the bleaching, dyeing, or finishing liquors shall be imparted to all parts of the piece and to so hold it as to keep it tight and the pile or face of the cloth from being injured by contact with itself or with any part of the machine while being treated.

Heretofore the fabrics have been run through vats containing the bleaching or dyeing liquors and after leaving the vats have been placed in a heap, with the excess liquors allowed to run to waste. In passing through the vats no provision has been made for protecting the pile or of keeping the fabric in an open condition. Consequently there has been considerable damage done to the fabrics. Moreover, a waste of time and labor has also been incurred by the frequent handling of the fabrics in passing them through the several vats and in finally placing them in the machine for drying.

By my invention the fabrics are or may be dyed, bleached, finished, (stiffened,) and dried in the one machine or vat. There is no waste of liquor, and the pile is in no way injured.

The accompanying drawings illustrate one construction of machine embodying my invention.

Figure 1 is a front sectional elevation, and Fig. 2 a side sectional elevation. Figs. 3 and 4 illustrate details. Figs. 5, 6, 7, and 8 illustrate another construction and use of machine embodying my invention.

According to my invention I employ a casing or vat, constructed in any suitable manner and of any suitable materials, but preferably composed of two cast-iron sides *a*, a curved floor of wooden lags *b*, a fixed metal cover *c*, and a loose segmental cover *d*, adapted to slide over the fixed cover in like manner to roll-top desk. Within the said casing I mount a shaft or axle *e*, and such axle takes its bearings in the casing sides *a*, and its ends extend outside the casing a sufficient extent to receive fast and loose pulleys *f g* and *h i*. Upon the said shaft and within the casing I provide two wheels *j*, one near one side of the casing and the other near the other side, as illustrated. The arms $j^{\times}$ of such wheels I arrange directly opposite each other, and in their opposite faces I form grooves *k*. At the extremities of the arms I also form one side of the grooves slightly longer than the other side, as shown more clearly in Fig. 2. Adjacent to the front of the casing I arrange an inclined cradle or frame *l*, and the lower parts of such frame I form or provide with upturned portions *m*. The purpose of this sloping frame is to carry a number of loose rods *n*, lying one against the other and with the lowermost rod resting against the upturned portions *m*, as shown. Each rod has a cap or enlargement at both ends, and such caps hold the rods apart, as shown more clearly in Fig. 4. The use of these rods is as follows: Rotary motion being imparted to the axle *e* and wheels *j*, the longer side of each arm-groove *k* comes below the lowermost rod on the frame or cradle *l* and picks up such rod. Such rod being loose then slides down the grooves *k* of the two arms, by which it has been lifted, until it reaches the bottom of the grooves, or, if it has been preceded by other rods, until it reaches the last rod, the rods being picked up one by one by the arms until the grooves are filled. This arrangement of rods I use to hold the cloth or piece of fabric to be bleached, dyed, finished, or dried, the end of the piece at the start being looped to the first rod, and as the piece is wound into the machine the rods come automatically between the several coils or convolutions, as shown. Due to the caps on the ends of the rods *n* no two parts of the cloth come against each other, and due to the piece being fed into the machine with

the pile farthest from the axle *e* the pile-face of the entire piece is perfectly free from contact with any part of the machine. With the piece thus introduced and held and with the vat supplied with bleaching, dyeing, or finishing liquor up to, say, the level of the axle *e* the axle and its arms, also the piece, are then set in rotary motion and caused to rotate the piece in the liquor until the piece is fully bleached or dyed.

In practice I prefer to use the same machine for bleaching, dyeing, finishing, and drying, and for that purpose I provide an orifice or branch *o*, and above the machine I arrange a set of tanks, connected with the said orifice, and containing, respectively, the bleaching, dyeing, and finishing liquors, which are run into the machine by gravity when required and pumped back again when not required. Thus the bleaching liquor is first let into the machine, then used, and pumped back into its tank. The dyeing liquor is then let into the machine, then used, and pumped back into its tank, and so on for each liquor used.

For drying the piece the machine is emptied of liquor and the piece is rapidly rotated in the air contained within the casing, the bulk of the surplus moisture being removed by centrifugal force. To aid in the drying, I may use hot air forced into or drawn through the machine by a fan, a suitable outlet-grating *p* being provided, controlled by a grid-shutter *q* to close the grating when dyeing and bleaching is going on and uncover and regulate the openings when drying.

To drive the piece at a high speed when drying, I use the smaller fast and loose pulleys *h i*, and I may use the same pulleys for unwinding the piece from the rods, so as to allow of the quick removal of the piece.

To remove the rods *n* from the machine, they are allowed to gravitate to the bottom of the vat, from whence they are withdrawn through a small trap door or opening *r* in the machine side, as shown by dotted lines in Fig. 2.

In lieu of using the one machine for the several processes or treatments I may use separate machines for each treatment or I may employ a series of casings and transfer the axle and its arms, the rods, and the piece from one casing to another. To supply the requisite number of rods for wheels having a large number of arms, the frame *l* may be extended, or the attendant feeds them on the frame by hand as he sees the rods being taken up.

To guide the piece into and out of the machine, I provide rolls *t*, and to receive the piece as it is withdrawn I provide an ordinary cloth-beam and tension-roller driven from a pulley *s* on the shaft *e*.

The rods *n* are composed of brass tubing or any suitable material. To further reduce the amount of surface in contact with the fabric, such rods may be fluted. To compensate for any stretch of the fabric, I may provide springs to force the rods outward and up the grooves. To prevent the rods leaving the grooves *k*, especially when drying, I provide wedge-like pieces *u*, one for each groove and varying in length, according to the number of rods to be held, and each wedge fits against the outermost rod and is held by set-screws *v*. (See Fig. 3.)

While chiefly for the treatment of piled fabrics, it will be obvious that I may apply my invention to the treatment of other fabrics, and it will also be seen that by widening the casing and providing, say, three or more wheels and set of rods, or one set of rods passing through the intermediate arms, I may provide for the simultaneous treatment of three or more pieces of fabric. Also by dividing the casing into compartments different operations may be effected in each compartment.

For finishing the cloth I may previous to passing it into the machine pass it through a sizing or slop-padding machine.

In Figs. 4 to 6 I show an alternative method of placing the fabric in the machine, which consists in placing loose rods 1 in the loops of the fabric when in batch form, (see Fig. 8,) then transferring the fabric and rods to a frame 2, into the grooves of which the ends of the rods 1 project and by which and the adjustment of cross-bars 3 the piece is held and tightly distended. The frame is then placed into grooved holders 4, mounted on or connected to axes 5 6 in the sides of the vat 7. Upon the axis 6 is fast belt-pulley 8, and with the frame 2 held and locked in the holders 4 by screw 9 and hinged lever 10 the whole is rotated in the vat 7, and thus bleached, dyed, or finished, according to the liquor in the vat for the time being. The vat is emptied and filled in like manner to the vat *a*, and the fabric is dried in the same way as the piece shown in Fig. 2.

What I claim is—

1. A shaft, means for rotating such shaft, wheels thereon having grooves and a frame in such relation thereto as to allow the spokes to pick up loose rods on the said frame, as and for the purposes set forth.

2. In apparatus for use in the treatment of textile fabrics a rotary shaft, means for driving such shaft, wheels thereon, having grooves or recesses and the grooves of one wheel directly opposite the grooves of the other wheel; a series of rods with enlarged ends adapted to fit into the grooves of the said wheels and an inclined frame, upon which the said rods are placed and by gravitation fed to the lower ends thereof, substantially as and for the purposes herein set forth.

3. An inclosed casing, a shaft and set of grooved wheels therein, means for rotating the shaft and wheels, loose rods with enlarged ends supported by the wheels, a piece of fabric in spiral form upon the said rods; an opening in the casing side; a set of tanks and a pump for supplying liquors to the said casing

and returning such liquors to their respective tanks, substantially as set forth.

4. In combination, a casing, a rotary structure therein and a frame for holding bars, said rotary structure being arranged to pick up the said bars in the rotation of the structure, said bars being superposed in radial rows on said structure, substantially as described.

5. In combination, a casing and a rotary body having grooves and bars having enlarged heads fitted to the said grooves, said bars being spaced apart by the enlarged heads resting against each other, substantially as described.

6. A length of fabric in batch form, rods with enlarged ends in each fold or lap, a frame with grooves into which the ends of the said rods project, means for holding the fabric taut while in the frame, a holder for receiving the said frame an inclosed casing within which the said holder is axially mounted and means for rotating the holder, admitting and withdrawing liquor substantially as set forth.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

JAMES ALLAN SACKVILLE.

Witnesses:

WALTER GUNN,

JOHN CAMP.