(No Model.) 2 Sheets—Sheet 1.

T. A. CLOUGH & T. J. BIGGER.

DYEING MACHINE.

No. 491,336. Patented Feb. 7, 1893.

FIG. 1.

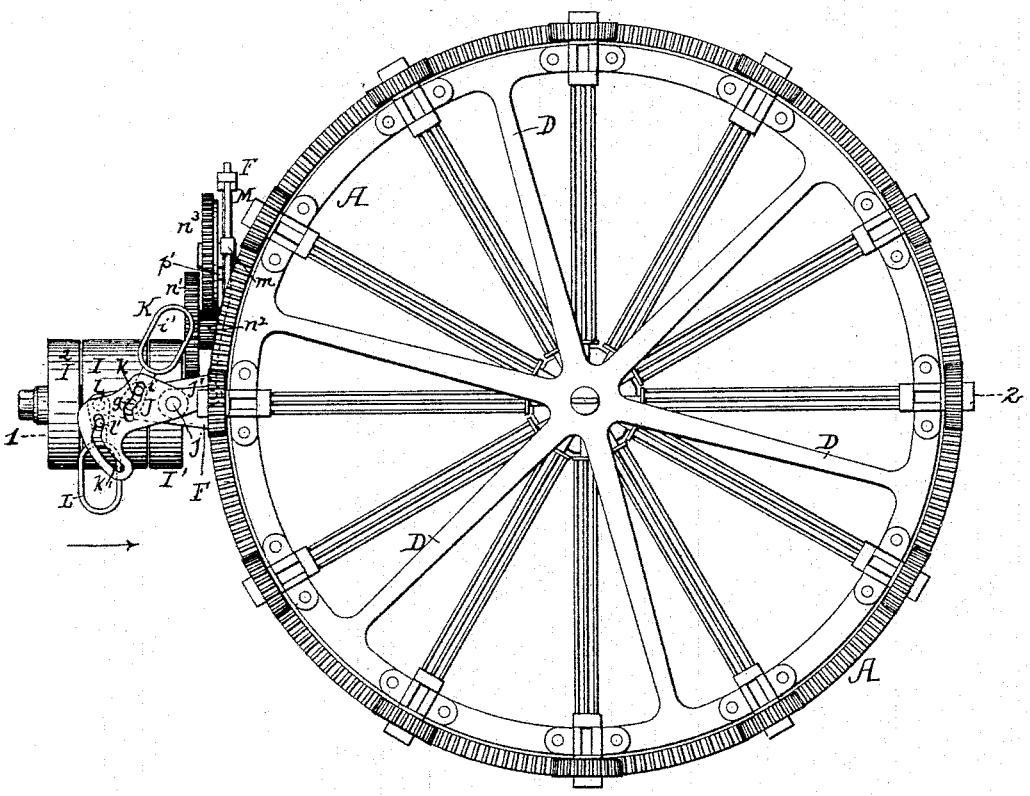


FIG. 4.

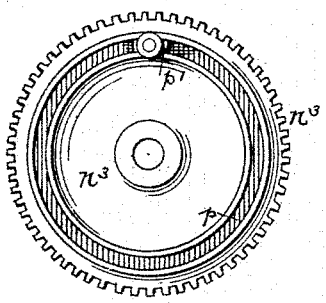
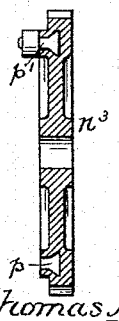


FIG. 5.



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(No Model.) 2 Sheets—Sheet 2.

T. A. CLOUGH & T. J. BIGGER.

DYEING MACHINE.

No. 491,336. Patented Feb. 7, 1893.

FIG. 2,

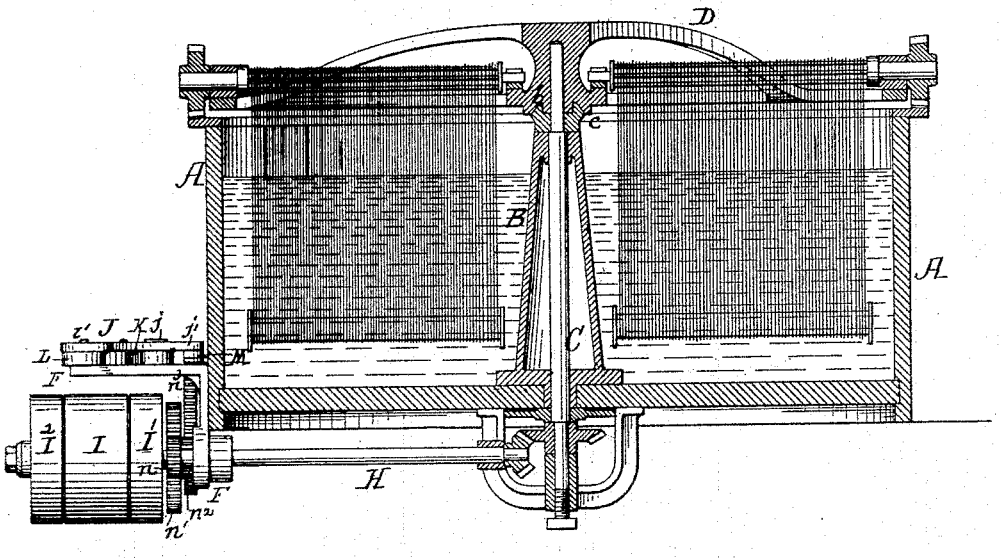
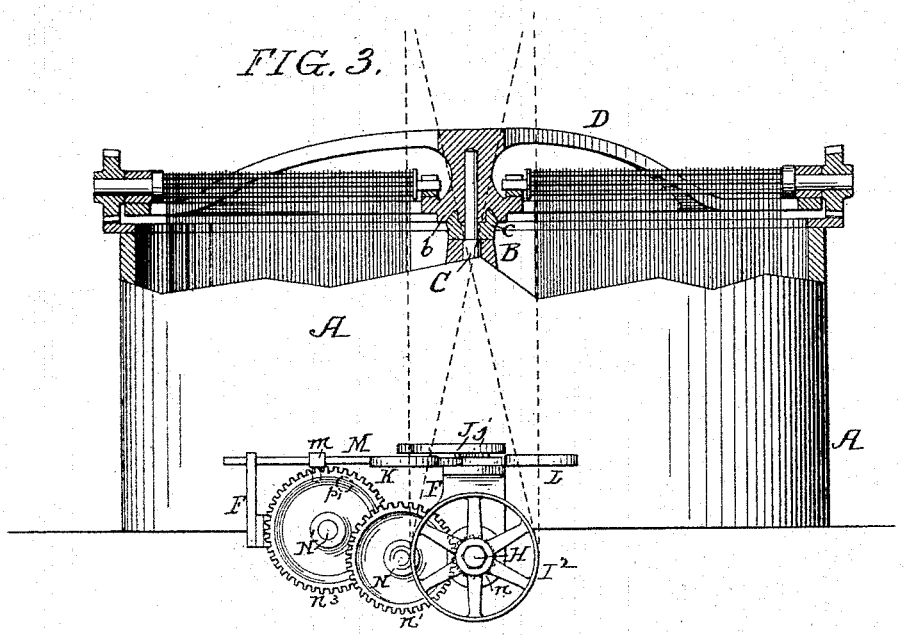


FIG. 3.



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UNITED STATES PATENT OFFICE.

THOMAS A. CLOUGH AND THOMAS J. BIGGER, OF PHILADELPHIA, PENNSYLVANIA.

DYEING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 491,336, dated February 7, 1893.

Application filed April 6, 1891. Serial No. 387,781. (No model.)

To all whom it may concern:

Be it known that we, THOMAS A. CLOUGH and THOMAS J. BIGGER, both citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Dyeing-Machines, of which the following is a specification.

The object of our invention is to construct an improved rotary dyeing machine in which the liquor will not raise and overflow the edge of the tank, owing to the continuous rotary motion of the yarn carrier, and at the same time to more thoroughly agitate and mix the liquor and dye and all parts of the yarn alike, and to prevent the tangling of the yarn on the reels in the machine.

In the accompanying drawings:—Figure 1, is a plan view of our improved dyeing machine; Fig. 2, is a section on the line 1—2, Fig. 1; Fig. 3, is a side view looking in the direction of the arrow, Fig. 1; and Figs. 4 and 5, are side and sectional views respectively of the shifting wheel.

In rotary dyeing machines as now constructed the great trouble is in preventing the water whirling as the yarn travels in a circular path in the machine and overflowing the sides, and consequently the machine has to be speeded very slow, and oftentimes devices are placed in the tank to prevent this movement of the liquid, and we also find that in rotary dyeing machines there is another great objection, that is, the tangling of the yarn, owing to the fact that the carriers are turned only one way.

The machine illustrated in the accompanying drawings is an improvement on the machine for which Letters Patent were applied for by Thomas A. Clough on April 19, 1889, Serial No. 307,652, therefore we will describe the tank portion of the machine briefly.

A is a cylindrical tank, and projecting from the bottom of this tank is a standard B through which passes the vertical shaft C carrying at its upper end a clutch *c* engaging with a clutch *b* on the carrying frame D. This carrying frame has a series of open boxes at its periphery and near its center, the outer boxes being carried by a ring connected to the center by spindles. Adapted to these open boxes are the yarn spindles or sticks on which are suspended the hanks of yarn to be dyed, on the outer end of each stick is a pinion which meshes with an annular rack on the edge of the tank A so that as the frame B turns, the spindles or sticks revolve in their bearings. We have shown an annular rack and pinion but friction wheels may be used in their place if necessary.

Suspended in each hank of yarn is a loose roller which tends to keep the hank straight while in the liquor.

The frame D can be readily lifted off its bearings in the tub and a second frame can be placed thereon, which has been previously charged with yarn to be dyed, so that it will be seen that while one frame is on the tank, the dyed yarn on the other can be removed and the frame re-charged, so as to be ready as soon as the yarn in the tank has been dyed.

Geared to the vertical shaft C is a horizontal shaft H on which is a fast pulley I and two loose pulleys I′ I^2, one on each side of the fast pulley.

Situated above the pulleys is a belt shifting device consisting of a lever J pivoted at *j* to a bracket F on the side of the tank in the present instance; in one arm of this lever are two cam slots *k k′*, to the cam slot *k* is adapted a pin *i* of a lever K which is pivoted at *g* on the bracket F; this lever K has a loop *i′* through which passes the driving belt for turning the shaft in one direction, the belt being adapted to the pulleys I I′.

L is a shifter lever pivoted at *l* and provided with a pin *l′* adapted to the slot *k′* in the lever J. The lever L has a loop through which passes a belt which is adapted to the belt pulleys I I^2 and which turns the shaft H in the direction opposite that described in connection with the belt adapted to the pulleys I′ and I. The arm *j′* of the lever J is connected to a rod M having a pin *m* thereon, preferably adjustable, this rod is adapted to bearings in the bracket F.

On the shaft H is a pinion *n* which gears with a wheel *n′* on a stud N, fast to the wheel *n′* is a pinion n^2 which meshes with a wheel n^3 on a stud N′. An annular undercut groove *p* is formed in the face of the wheel n^3 and adapted to this groove is a T-headed block *p′*

having a pin which strikes the pin *m* at certain points, as the pin *m* projects into the path of the block. This block can be adjusted to any point on the wheel and two blocks may be used in some instances, which can be so adjusted in respect to each other and the pin *m* that the motion of the yarn carrier will be reversed at each single revolution of the carriage, as it will be understood that the block striking the pin *m* shifts the belts, reversing the movement of the yarn carrier.

The operation of the machine is as follows:—Yarn is placed on the sticks and the sticks set in their respective places on the frame which is then placed in the tub so that a greater portion of the yarn is submerged in the liquor. Motion is then applied to the vertical shaft through the gearing described above and the yarn carrier rotated in one direction, so that about five turns are required and then the block will strike the pin on the shifter and shift the belts so as to reverse the movement of the carrier at the same time, and the rotary motion of the hanks of the yarn will be reversed as will be readily understood on referring to the drawings, thus it will be seen that all portions of the yarn will be thorougly dyed and the liquor thoroughly mixed, and owing to the reversing of the rotary motion at short intervals the liquor is prevented from swashing over the sides, consequently more liquor can be carried in the tank than in rotary dyeing machines, and the speed of the carrier can be increased.

Having thus described our invention we claim and desire to secure by Letters Patent:—

1. The combination in a machine for dyeing yarn, of the tank, the pivoted yarn carrying frame, with mechanism for driving said frame first in one direction and then in the reverse direction, and means for automatically shifting said mechanism, substantially as and for the purpose set forth.

2. In a machine for dyeing yarn, the combination of the tank, a carrying frame, spindles mounted on said frame, mechanism substantially as described for driving the spindles independently of the carrying frame, mechanism for driving the carrying frame first in one direction and then in the opposite direction, mechanism for automatically shifting said driving mechanism, whereby the yarn is first carried through the liquid in one direction, while the yarn is moved on its spindle in one direction, and then carried through the liquid in the reverse direction and the direction of the movement of the yarn on the spindles reversed, substantially as described.

3. The combination in a rotary yarn dyeing machine, of the tank, a carrying frame, spindles on said frame, said spindles being driven in their bearings, from the periphery of the tank, a vertical shaft clutched to the carrying frame, mechanism for driving said shaft, reversing mechanism, and means for automatically acting on the reversing mechanism, whereby the carrying frame and yarn rollers are first turned in one direction, and then reversed and turned in the opposite direction, substantially as and for the purpose set forth.

4. The combination of the tank, the yarn carrier, spindles thereon on which the yarn is mounted, a vertical shaft passing through the center of the tank, said shaft being clutched to the carrier, a horizontal shaft, fast and loose pulleys thereon, a shifting lever having cam slots therein, looped levers having pins adapted to said cam slots, belts passing through the loop of each of the looped levers, a rod connected to the shifting levers and a projecting pin on said rod, a wheel geared to the horizontal shaft, and a pin on said wheel adapted to strike the pin on the shifter rod, to effect the reversal of the direction of travel of the yarn carrier and the yarn, substantially as described.

5. The combination, in a yarn dyeing machine, of the tank, the yarn carrier, a driving shaft for the carrier, fast and loose pulleys on said shaft, belt shifting lever, shifting rod connected thereto having a projection, and a wheel geared to the driving shaft, with one or more pins adjustable on said wheel, whereby the reversing of the yarn carrier may be regulated, substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

THOMAS A. CLOUGH.
THOMAS J. BIGGER.

Witnesses:
HENRY HOWSON,
EUGENE ELTERICH.