

No. 645,698.

Patented Mar. 20, 1900.

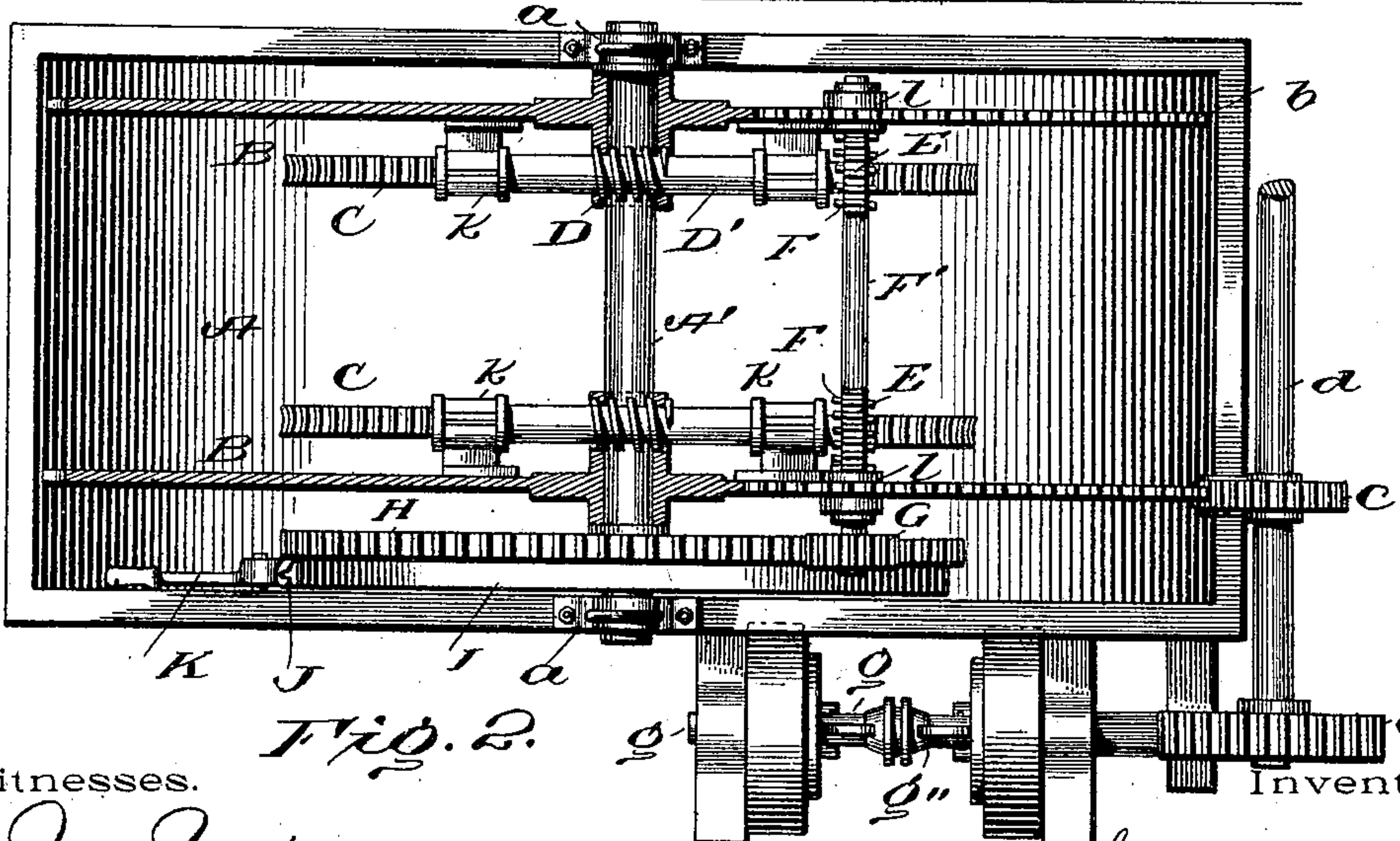
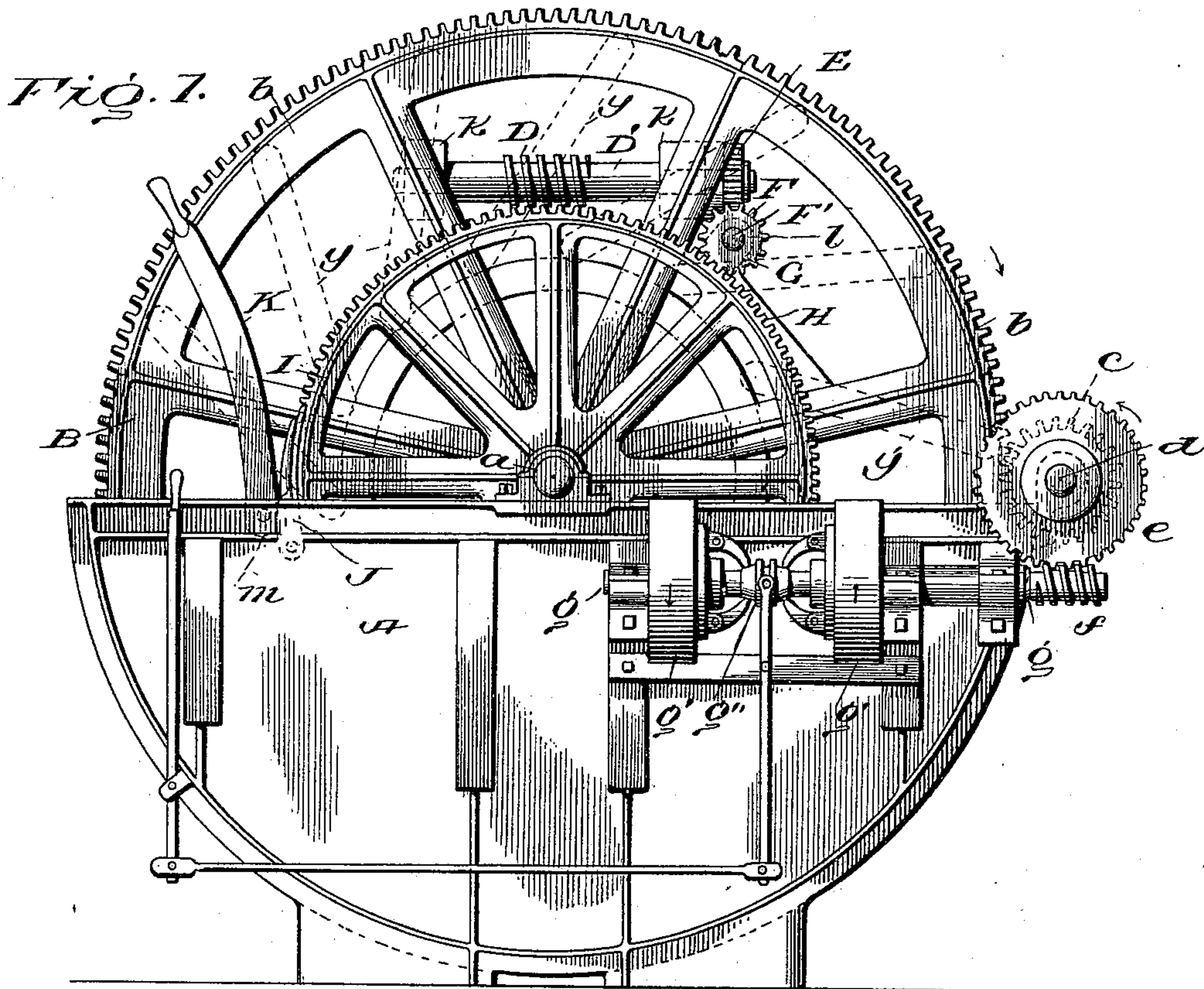
L. WELDON.

APPARATUS FOR MERCERIZING, &c.

(Application filed Sept. 18, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses.

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2 Sheets—Sheet 2.

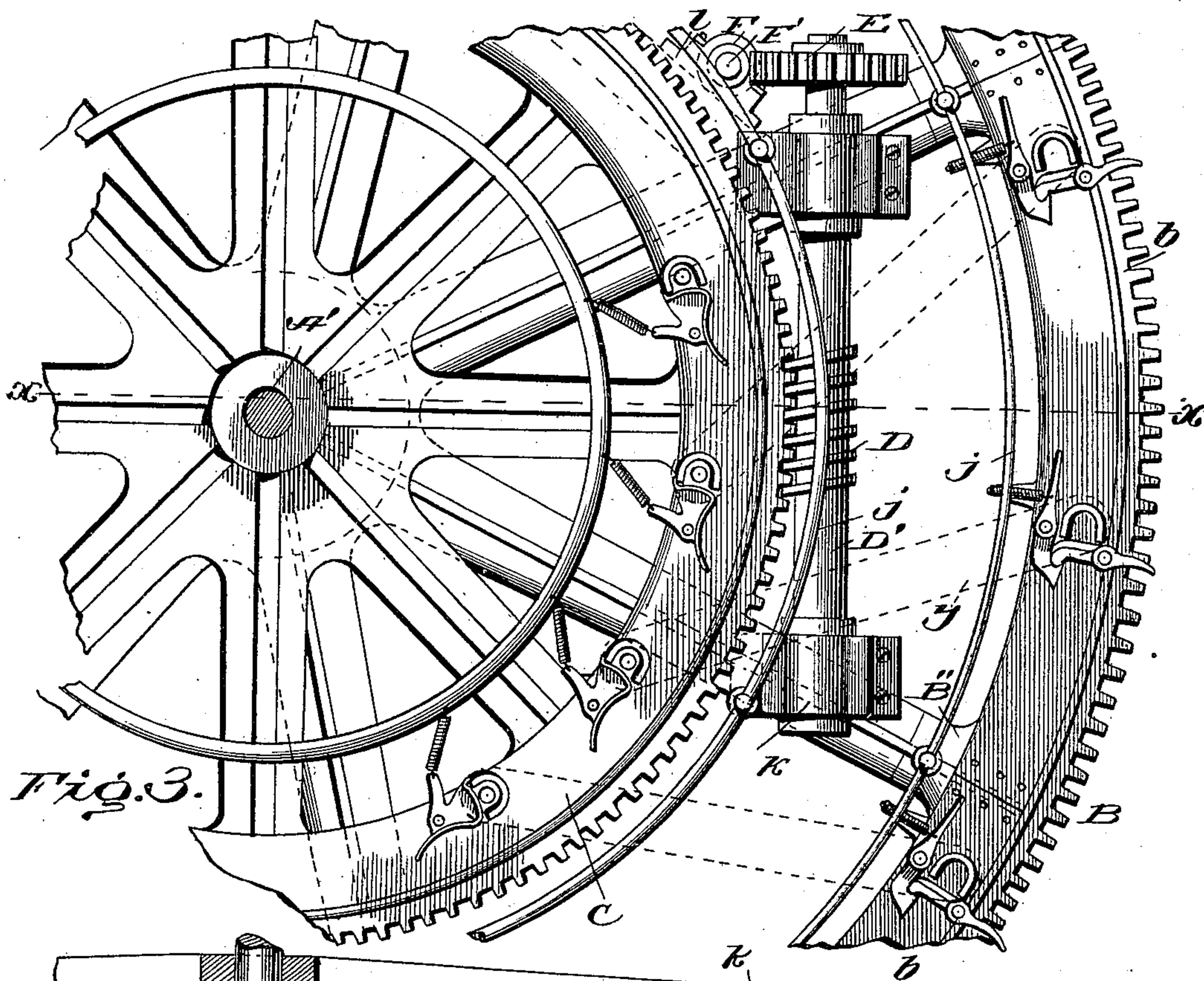


Fig. 3.

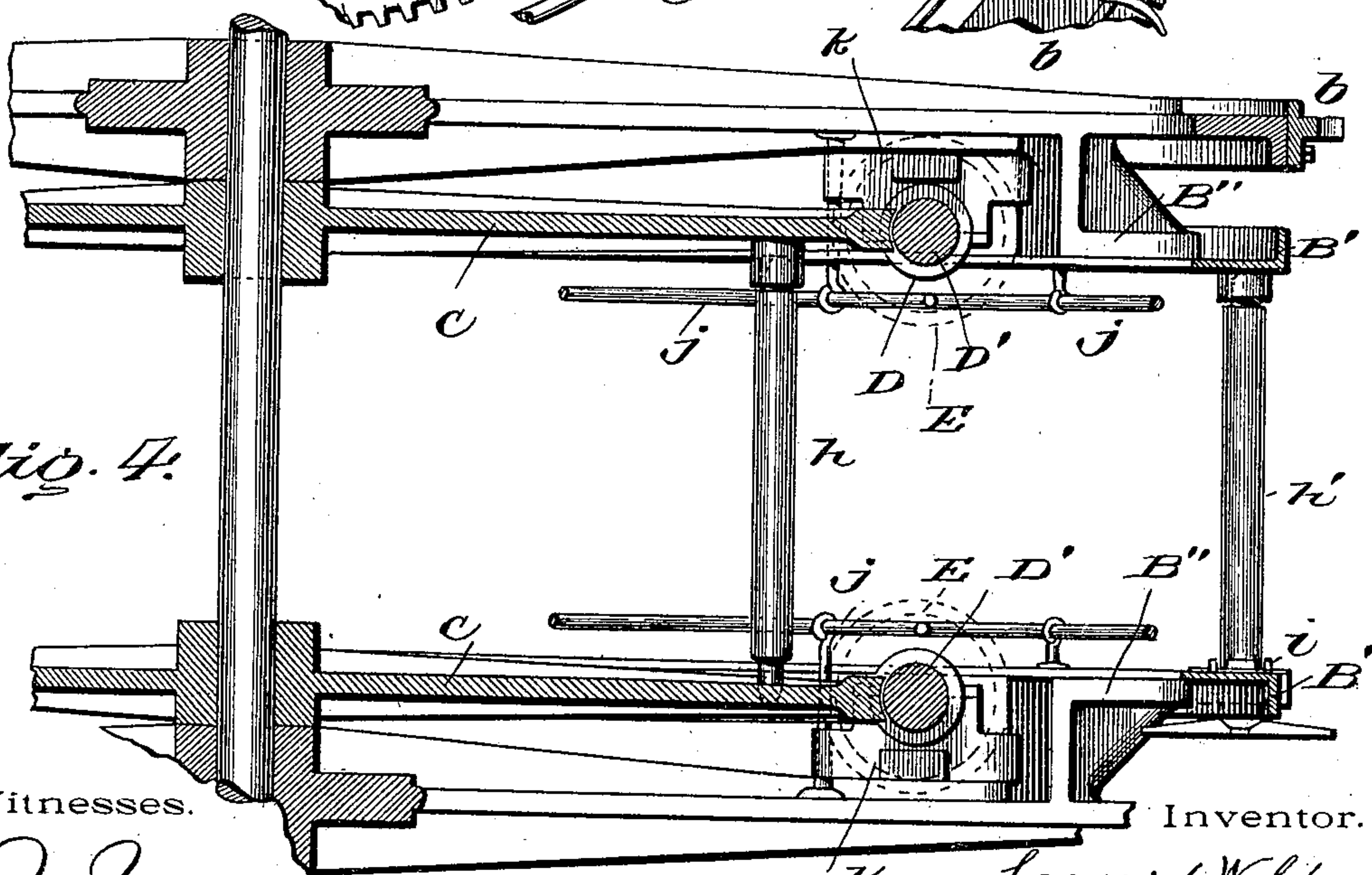


Fig. 4.

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# UNITED STATES PATENT OFFICE.

LEONARD WELDON, OF AMSTERDAM, NEW YORK.

## APPARATUS FOR MERCERIZING, &c.

SPECIFICATION forming part of Letters Patent No. 645,698, dated March 20, 1900.

Application filed September 18, 1899. Serial No. 730,835. (No model.)

*To all whom it may concern:*

Be it known that I, LEONARD WELDON, of Amsterdam, in the county of Montgomery, in the State of New York, have invented new and useful Improvements in Yarn-Dyeing Machines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to yarn-dyeing machines; and the object is to provide yarn-dyeing machines by which yarn is dyed in skeins and in large quantities with means whereby the skeins may be subjected to great tension or a great stretching operation for the purpose of mercerizing cotton yarn or treating cotton yarn with caustic lye and washes to strengthen the fibers and increase its luster. Mercerization being well known, it will be unnecessary to describe the process at length. Heretofore the stretching operation necessary in the process could only be applied to small quantities of yarn at a time although various devices have been used, all of which rendered the process expensive, thereby increasing the cost of the yarn.

To this end my invention consists in the combination, with the dye-tub, of a reel constituted by a pair of large wheels fixed on a revoluble shaft, revoluble removable sticks between the outer rims of the wheels, a pair of smaller wheels loosely mounted on the said shaft between the large wheels, revoluble removable sticks between the outer rims of the small wheels, means to rotate the said reel, gearing mounted on the large wheels and adapted to rotate the small wheels relatively to the large wheels when the large wheels are rotated, and suitable means to regulate or control said relative movement of the parts; and my invention consists in certain other combinations of parts hereinafter described, and specifically set forth in the claims.

In the drawings hereto annexed and forming a part of this specification, Figure 1 is a right-hand side elevation of my improved dyeing-machine. Fig. 2 is a plan view, partly in section, of the machine and somewhat simplified to more clearly show the construction and designed working of the parts, both views having the cover of the tub removed to exhibit the reel or skein-carrying devices. Fig. 3 is a partial enlarged view of the inner

sides of the right-hand wheels, showing the gearing mounted thereon; and Fig. 4 is a horizontal central transverse sectional view of portions of the opposite pairs of wheels on the shaft with a pair of yarn-sticks between them, taken on line *x x*, Fig. 3.

Referring specifically to the drawings, A is the tub, preferably made of cast-iron and having a curved lower side to correspond to the curvature of the periphery of the wheels within.

A' is the shaft for the wheels, journaled in bearings *a a*, mounted on the top of the tub.

B B are the large wheels, mounted rigidly upon the shaft near the opposite sides of the tub and having each, preferably, a rim integral with the spokes and provided with gear-teeth, preferably on segments *b b*, suitably secured upon the periphery of the rim. The segments *b b*, &c., are in mesh with a pinion *c* on a shaft *d*, to the right of Figs. 1 and 2 of the drawings. When both large wheels are provided with toothed segments, the shaft *d* may have a pinion *c* for each wheel. One end of the shaft *d* is provided with a worm-wheel *e*, which engages a worm *f* on the end of a horizontal shaft *g*, journaled in bearings on one of the vertical sides of the tub. A pair of driving-pulleys *g' g'* are on the shaft *g* for revolving the same in either direction, said pulleys having the well-known friction-clutches and sliding means *g''* for operating the same on the shaft between the pulleys, suitable levers and a connecting-bar being shown for operating the sliding means.

Mounted loosely upon the shaft A' between but near the large wheels are a pair of large worm-wheels C C, said worm-wheels carrying the inner circular series of yarn-sticks, the outer series of yarn-sticks *h'* being carried by the large wheels B B. In order that both series of sticks may be of the same length, the large wheels have each a second rim B', mounted on angular arms B'', preferably integral with the spokes of the wheel. The bearings for the yarn-sticks are mounted and carried on the inner sides of the rims B'' of the wheels. The bearings for the yarn-sticks on one of the large wheels are adapted to receive the round spindles on the ends of the sticks *h'*, and the bearings *i* on the opposite wheel are adapted to receive the square ends



of the sticks. The latter bearings are adapted to be rotated periodically, as usual, and by the usual and well-known means not necessary to be described herein, as this feature forms no part of my present invention.

*j j* are the circular rails mounted on the ends of arms projecting from the inner sides of the large wheels to prevent the skeins from working into the bearings of the sticks.

Each of the large worm-wheels *C C* is engaged by a worm *D* on the central portion of a short shaft *D'*, journaled near its ends in bearings *k k* on a pair of spokes of one of the large wheels *B*. Each shaft *D'* has a small worm-wheel *E* on one end, and said worm-wheel is in mesh with a worm *F* on a cross-shaft *F'*, also journaled in bearings *l l* on the large wheels. This shaft *F'*, carrying the two worms, has one end projecting through one of the outer or larger wheels *B* and is provided with a pinion *G* on its outer end. This pinion *G* engages with a large spur-gear *H*, loosely journaled on the shaft *A'* outside the large wheel *B* or between the same and the side of the tub. The spur-gear *H* has a large friction-pulley *I*, preferably cast upon its side, and a heavy brake consisting of a brake-shoe *J*, pivoted at its lower end to the side of the tub, and a lever *K*, provided with a cam-face *m* at its lower pivoted end to engage the shoe to bear on the friction-pulley, so as to enable the operator to entirely or partially stop the spur-gear when the rest of the machine is in motion.

The operation is as follows: The skeins of yarn *y* (indicated in several of the figures of the drawings by broken lines) are placed in position, as usual, upon the two series of yarn-sticks *h* and *h'*. The sticks having square ends are placed in the bearings provided on the rims of the large or outer wheels and the sticks having only round ends or spindles are placed in the bearings upon the two worm-gears *C C*. After the series of bearings are filled with sticks motion is imparted to the reel or to the large wheels *B B* through the segments *b b*, pinions *c c*, shaft *d*, worm-wheel *e*, worm *f*, shaft *g*, and either of the pulleys *g'*, depending upon the direction it is desired to revolve the reel. When the reel is revolved in the direction of the unfeathered arrow near it, the direction in which it is moved when stretching the skeins, the right-hand pulley is connected by the clutch to the shaft *g*. During the revolution of the reel the brake-lever *K* is pulled down and the brake-shoe thereby strongly applied to the friction-pulley *I*, stopping the pulley and the large spur-gear *H*, that are loosely journaled on the shaft *A'*. As soon as this spur-gear is stopped or sufficiently retarded in its revolution the pinion *G* on the cross-shaft *E* revolves around the spur-gear, thereby driving the two worm-gears that rotate the worms *D D*, that in turn revolve the large worm-wheels *C C*, carrying the inner series of yarn-sticks, revolving them in the opposite direction or relatively to the

revolution of the large wheels *B B*. By this operation the sticks are forced a greater distance apart, thus stretching the yarn that is upon the sticks. After the tension is sufficiently great alkali is entered into the tub or vat for a few minutes, after which time it is pumped out and wash-water admitted to wash out the alkali. Then acid is admitted to completely neutralize all trace of the alkali, after which the movement of the reel is reversed by the movement of the clutch and the brake again applied to remove the strain from the skeins and to loosen them enough to allow them to be removed from the machine.

I do not wish to be limited to the precise form of construction herein shown and described, inasmuch as the shape of the various parts and the style of gearing may be varied without departing from my invention.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with the dye-tub, of a shaft, a pair of large wheels on the shaft carrying a series of yarn-sticks, a pair of smaller wheels on the shaft between the large wheels carrying the second series of yarn-sticks, and means for revolving the said small wheels simultaneously in one direction and relatively to the revolution of the large wheels, as set forth.

2. The combination with the dye-tub, of a shaft, a pair of large wheels on the shaft carrying a series of yarn-sticks, a pair of smaller wheels on the shaft between the large wheels carrying the second series of yarn-sticks, means for revolving the said small wheels simultaneously in one direction while the large wheels are rotated in the opposite direction, and means to arrest the relative movement of the wheels during the continued revolution of said wheels, as set forth.

3. The combination with the dye-tub, of a shaft mounted to turn in bearings on said tub, a pair of large wheels within the tub and secured to the shaft to turn therewith, a series of yarn-sticks carried by the said wheels, a pair of smaller wheels loosely mounted on the shaft between the large wheels, a series of yarn-sticks carried by the small wheels, gearing to rotate the large wheels in one direction, and gearing between the large wheels and the smaller wheels for rotating the latter wheels simultaneously and relatively to the large wheels, and means to arrest the relative movement of the wheels during the continued revolution of said wheels in one direction, as set forth.

4. The combination with the dye-tub, of a shaft mounted to turn in bearings on said tub, a pair of large wheels within the tub and secured to the shaft to turn therewith, a series of yarn-sticks carried by the said wheels, a pair of smaller wheels loosely mounted on the shaft between the large wheels, a series of yarn-sticks carried by the small wheels, gearing to rotate the large wheels in one direction



and gearing between the large wheels and the smaller wheels for rotating the latter wheels simultaneously and relatively to the large wheels, a large spur-gear on the shaft in mesh with the gearing between the large and small wheels, and suitable braking devices to arrest the rotation of the said spur-gear to cause the relative movement of the large and small wheels, substantially as and for the purpose described.

5. The combination with the dye-tub, of a reel constituted by a pair of large wheels fixed on a revoluble shaft mounted in bearings on the tub, revoluble removable yarn-sticks between the outer rims of the wheels, a pair of smaller wheels loosely mounted on the said shaft between the large wheels, revoluble removable yarn-sticks between the outer rims of the small wheels, means to rotate the said reel, gearing mounted on the large wheels and adapted to rotate the small wheels relatively to the large wheels when the large wheels are rotated, and suitable means to regulate or control said relative movement of the wheels, substantially as described.

6. The combination with the dye-tub, of a shaft mounted to turn in bearings on said tub, a pair of large wheels within the tub and secured to the shaft to turn therewith, a series of yarn-sticks carried by the said wheels, a pair of smaller wheels loosely mounted on the shaft between the large wheels, a series of yarn-sticks carried by the small wheels, gearing to rotate the large wheels in either and both directions, said smaller wheels having teeth on their peripheries to engage worms, worms on shafts journaled in bearings mounted on the large wheels, worm-gears on the worm-shafts, a cross-shaft having worms engaging said worm-gears, said cross-shaft also journaled in bearings on the large wheels, and means to operate the gearing between the two wheels when the large wheels are driven in either direction to cause the relative movement of the large and small wheels, as and for the purpose described.

7. The combination with the dye-tub, of a shaft mounted to turn in bearings on said tub, a pair of large wheels within the tub and secured to the shaft to turn therewith, a series of yarn-sticks carried by the said wheels, a pair of smaller wheels loosely mounted on the shaft between the large wheels, a series of yarn-sticks carried by the small wheels, gearing to rotate the large wheels in either and both directions, said smaller wheels having teeth on their peripheries to engage worms, worms on shafts journaled in bearings mounted on the large wheels, worm-gears on the worm-shafts, a cross-shaft having worms engaging said worm-gears, said cross-shaft also

journaled in bearings on the large wheels, a spur-gear loosely mounted on the first-mentioned shaft near one end, a friction-wheel on one side of the said spur-gear, and a brake to engage the friction-wheel, substantially as and for the purpose described.

8. The combination with the dye-tub, of a shaft mounted to turn in bearings on said tub, a pair of large wheels within the tub and secured to the shaft to turn therewith, a series of yarn-sticks carried by the said wheels, a pair of smaller wheels loosely mounted on the shaft between the large wheels, a series of yarn-sticks carried by the small wheels, gearing to rotate the large wheels in either and both directions, said smaller wheels having teeth on their peripheries to engage worms, worms on shafts journaled in bearings mounted on the large wheels, worm-gears on the worm-shafts, a cross-shaft having worms engaging said worm-gears, said cross-shaft also journaled in bearings on the large wheels, a spur-gear loosely mounted on the first-mentioned shaft near one end, a friction-wheel on one side of the said spur-gear, a pivoted brake-shoe to engage the periphery of the friction-wheel, and a pivoted lever having a cam-shaped surface to engage the brake-shoe, substantially as and for the purpose described.

9. The combination with the dye-tub, of a shaft mounted to turn in bearings on said tub, a pair of large wheels within the tub and secured to the shaft to turn therewith, a series of yarn-sticks carried by the said wheels, a pair of smaller wheels loosely mounted on the shaft between the large wheels, a series of yarn-sticks carried by the small wheels, gearing to rotate the large wheels in either and both directions, segments having gear-teeth secured on the periphery of one or both of said large wheels to form part of the gearing to rotate the large wheels, said smaller wheels having teeth on their peripheries to engage worms, worms on shafts journaled in bearings mounted on the large wheels, worm-gears on the worm-shafts, a cross-shaft having worms engaging said worm-gears, said cross-shaft also journaled in bearings on the large wheels, and means to operate the gearing between the two wheels when the large wheels are driven in either direction to cause the relative movement of the large and small wheels, as and for the purpose described.

In testimony whereof I, LEONARD WELDON, have hereunto signed my name.

LEONARD WELDON. [L. S.]

Witnesses:

H. V. BURKE,

GEORGE G. WALDRON.