

No. 656,319.

Patented Aug. 21, 1900.

J. F. COPLEY, P. S. MARSHALL & R. HEATON.

MERCERIZING APPARATUS.

(Application filed Dec. 5, 1899.)

(No Model.)

2 Sheets—Sheet 1.

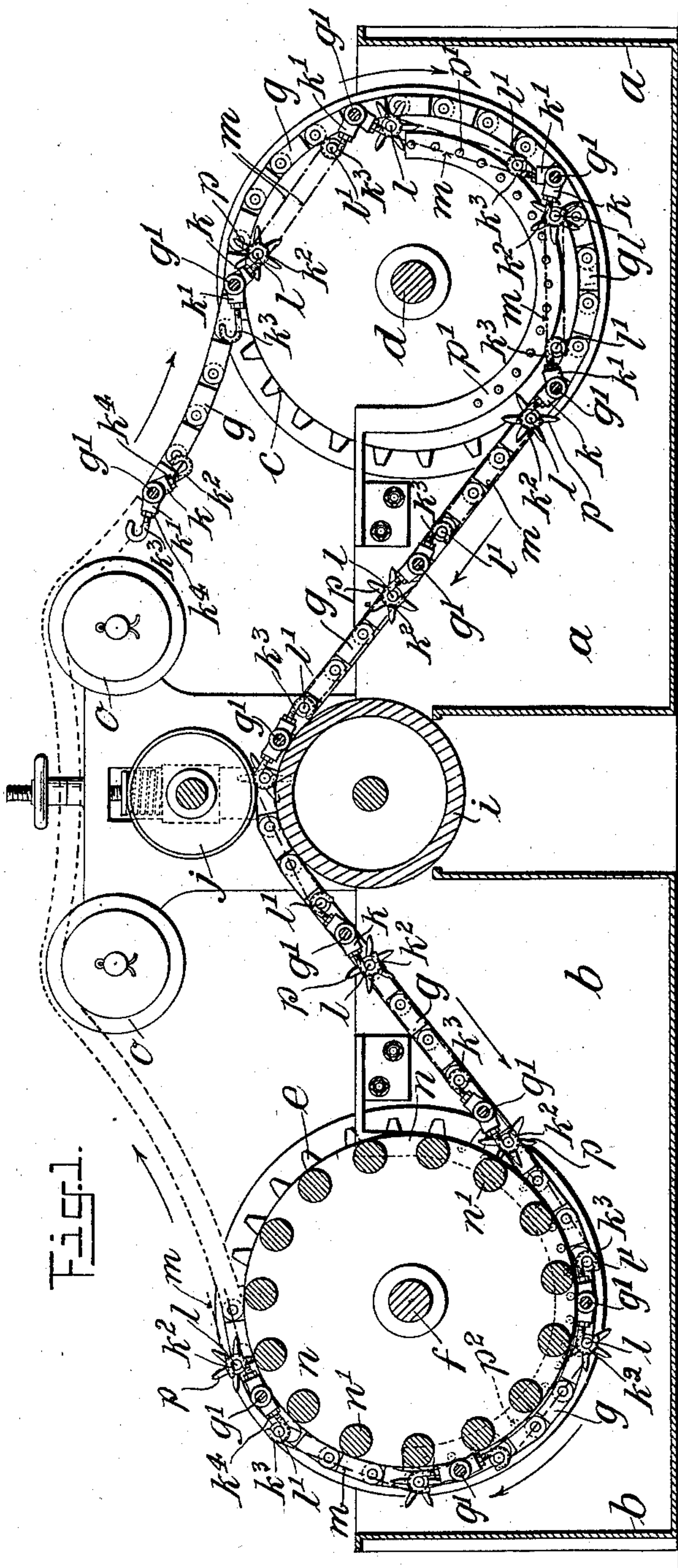


Fig. 1.

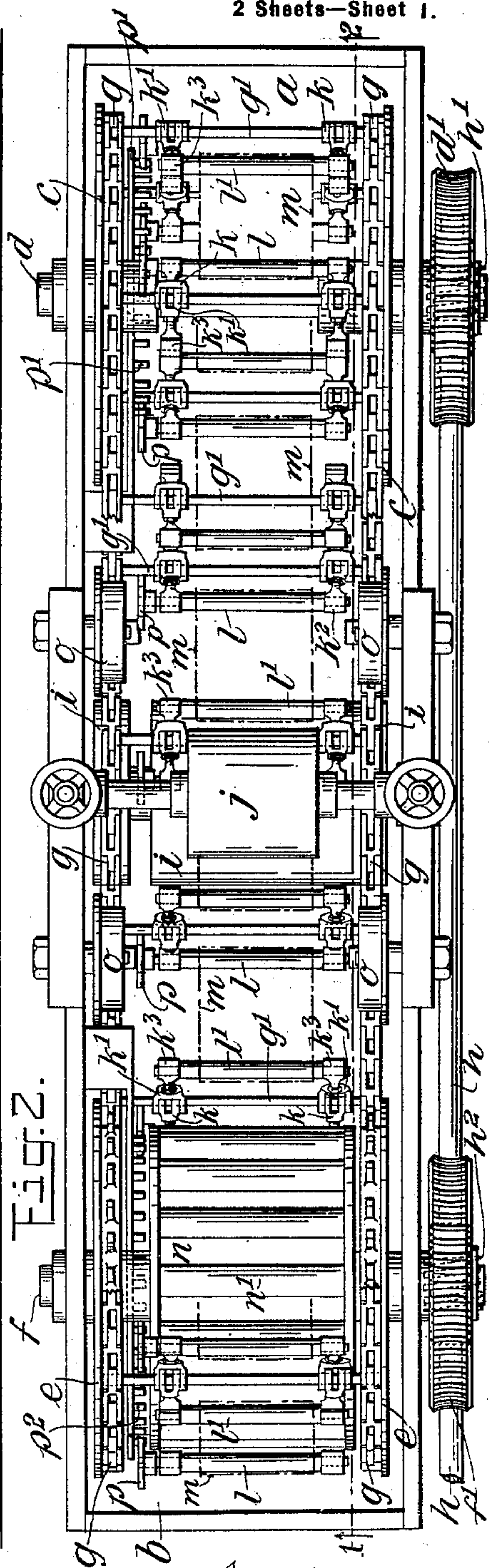


Fig. 2.

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Fig. 3.

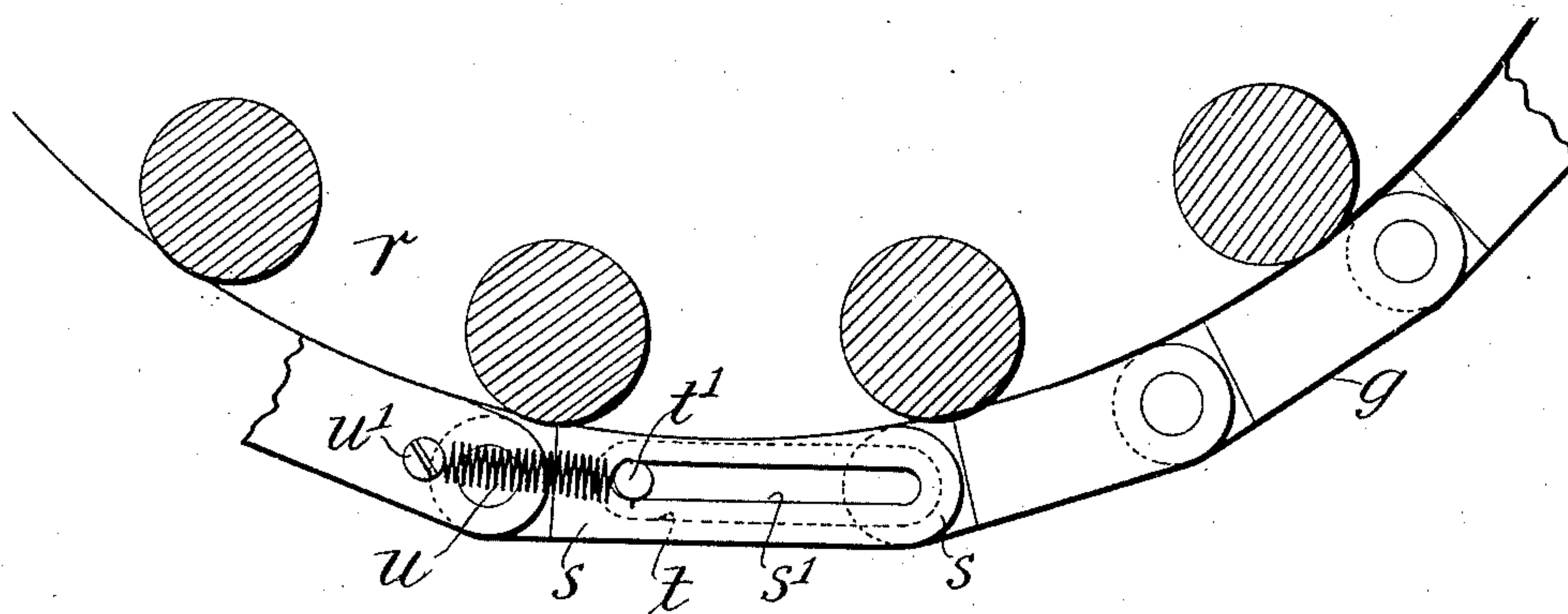
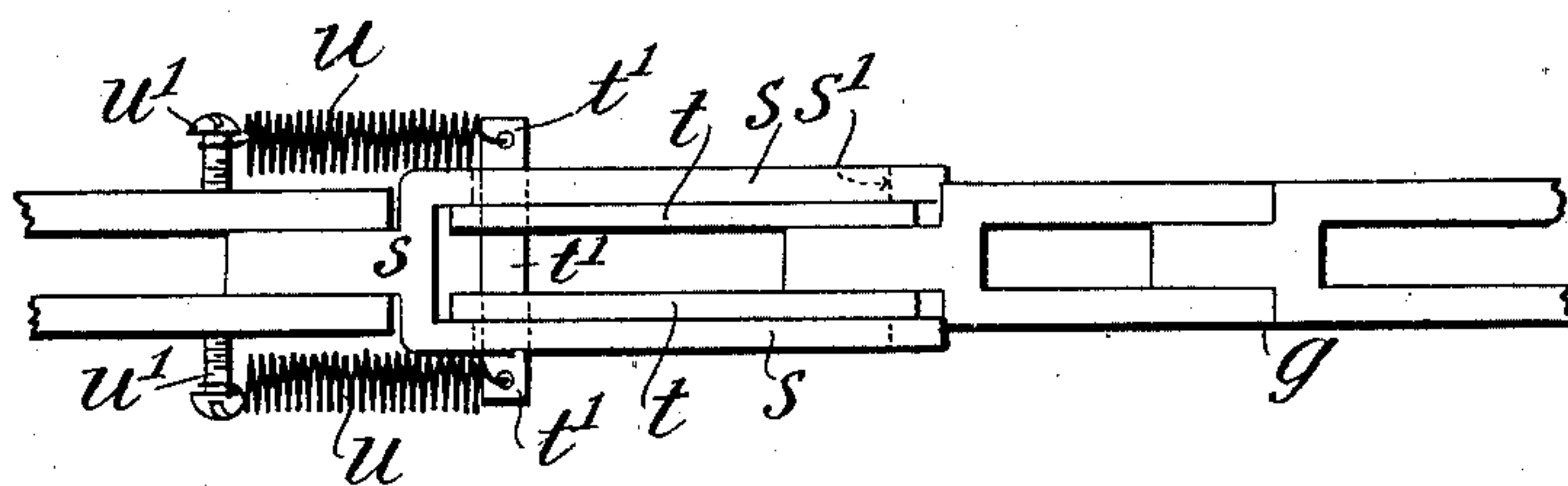


Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES F. COPLEY, PERCY S. MARSHALL, AND RICHARD HEATON, OF
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MERCERIZING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 656,319, dated August 21, 1900.

Application filed December 5, 1899. Serial No. 739,229. (No model.)

To all whom it may concern:

Be it known that we, JAMES FREDERICK COPLEY, PERCY SYKES MARSHALL, and RICHARD HEATON, subjects of the Queen of Great Britain and Ireland, residing at Huddersfield, in the county of York, England, have invented certain new and useful Improvements in Machines for Mercerizing Hanks of Yarn; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to an improved machine for mercerizing and stretching hanks of yarn.

The object of our invention is to provide means for conveying hanks of yarn through a vessel or tank containing the alkaline or acid mercerizing solution and then through a second tank for washing the yarn to free it of the mercerizing solution and for stretching said hanks one or more times during their traverse through the machine, the operations of mercerizing, stretching, and washing off being accomplished self-actingly and the loading and unloading of the hanks effected without hoisting the apparatus out of the tanks or stopping the machine, whereby we are enabled to pass a continuous supply of hanks through the machine when in operation, no time being lost in making the changes, and a much larger quantity of fiber being capable of treatment than is at present possible in the same time.

Our invention consists in certain novel features of construction and operation of mechanism for the purpose above stated, as will be hereinafter fully described.

Referring to the drawings, Figure 1 is a sectional elevation of the hank-mercerizing machine, taken on line 1 2 of Fig. 2. Fig. 2 is a plan view of Fig. 1, the upper or dotted portion of the endless chain being omitted. Figs. 3 and 4 show in elevation and plan view, respectively, of a section of the endless chain, a modification of the means for stretching the hanks.

In the drawings, *a b* are two tanks or vessels, the former to contain the mercerizing liquid and the latter to contain water for washing-off purposes.

c c are two chain-wheels located near to each inner side of tank *a* at the front or right hand thereof and partly submerged in the same, said chain-wheels being mounted on an axle *d*, journaled in bearings on the sides of tank *a*. *e e* are two similar chain-wheels located at the rear end of tank *b* in line with the chain-wheels *c c* and mounted on an axle *f*, journaled in bearings on the sides of tank *b*, and *g g* are two endless chains passing around and being driven or traversed in the direction of the arrows by the two pairs of chain-wheels *c c* and *e e*. The axles *d f* receive motion from the longitudinal shaft *h*, Fig. 2, through worms *h' h²*, fast thereon, and worm-wheels *d' f'*, secured on the outer ends of the axles *d f* and meshing with the worms *h' h²*.

i is a guide-roller situated between the tanks *a b*, over which the endless chains *g g* are guided from tank *a* into tank *b*, and *j* is a pressure or squeezing roller resting normally on the periphery of roller *i*.

The endless chains *g g* have secured thereto at equal distances apart a series of cross rods or bars *g'*, near each end of which are loosely mounted yokes or links *k k'*, arranged in pairs set to right and left of the cross-rods *g'*, these said yokes or links being provided with screw-threaded openings into which are screwed fingers *k² k³* to attach them to the yokes *k k'*, respectively. The extremities of the fingers *k² k³* are hook-shaped or provided with open bearings adapted to receive the turned-down ends of hank-carrying rollers *l l'* and to support said rollers at the requisite distances apart. The said hooked fingers can be adjusted nearer to or farther from the cross-bars *g'* by screwing them farther into or partly unscrewing them from the yokes or links *k k'* to the extent required to increase or reduce the distance between opposing hooked fingers *k² k³* on adjacent cross-rods *g'* to suit the length of the hanks which are to be mercerized. When adjusted, the fingers *k² k³* are secured by lock-nuts *k⁴*.

The hanks, which are indicated by strong broken lines marked *m*, are threaded on pairs of hank-carrying rods *l l'*, whose turned-down ends are placed by the workman into the hooked ends of the pairs of fingers *k² k³*, respectively, on adjacent cross-rods *g'*, said

hank-rods being held firmly therein and supporting the hanks at their full normal length between adjacent cross-bars g' , one set of hanks thus following upon another set of hanks on the chains $g g$ in constant succession when the machine is at work.

The hanks are loaded on the chains as they travel toward the first pair of chain-wheels $c c$ and while said chains are slack. In engaging and traveling around with the chain-wheels $c c$ the chains must perforce keep to the circumferences thereof, but the adjustable hooked fingers $k^2 k^3$ being free to turn upon their respective cross-rods g' allow the hanks m to take their own path or course by adapting themselves to any angular position assumed by said hanks. The positions which are assumed by the sets of hanks in passing around with the chain-wheels $c c$ form chords to the arcs described by the sections of chains lying between each cross-bar g' , and they consequently remain in their normal condition or unextended until they leave the chain-wheels $c c$, the difference between the chords or length of the hanks and the arcs of the chains between each cross-bar depending on and being determined by the diameter of the chain-wheels $c c$ and increasing in inverse ratio as the diameter of said wheels is reduced. Thus the smaller the chain-wheels the greater will be the difference between the chords and the arcs of the chains in traveling around with same.

As the chain-wheels $c c$ are partially submerged in the mercerizing liquid in tank a , the hanks are thoroughly saturated with the liquid while in their slack or unextended condition; but when the chains $g g$ leave the chain-wheels $c c$ and enter a straight path on their way to and over the roller i the hanks, which up to this point have had a shorter path than the chains, are now constrained to take the same path as the chains, and these chains being maintained perfectly tight or fully extended by the two pairs of chain-wheels $c c$ and $e e$ it follows that the hanks will be stretched to an extent corresponding to the difference between the length of the chords and the arcs to said chords formed by the sections of the chains in passing around with the chain-wheels $c c$. In passing over the roller i from the tank a into tank b the hanks are squeezed between said roller i and squeezing-roller j and the excess liquid contained in the hanks expressed. From the roller i the chains carrying the hanks pass direct to and around the second pair of chain-wheels $e e$, the hanks in passing around with same being kept lineable with the path of the chains, and therefore maintained in their stretched condition, by a winch or lantern-roller n , having its periphery composed or formed of a number of rods or rollers n' free to revolve in their bearings in the end disks of said winch.

The winch n is secured on shaft f , intermediate of the chain-wheels $e e$. In passing

through the tank b the hanks are washed and freed of the mercerizing agent. The endless chains $g g$, with the mercerized and stretched hanks of yarn, are guided from the chain-wheels $e e$ back to the first pair of chain-wheels $c c$ by guide-rollers $o o$, occupying positions somewhat as shown in full line, or one or more of said guide-rollers may be placed at a considerable height above the machine, as indicated in dotted line, as found most convenient, to present a sufficient length of slack chain to admit of the workman detaching the pairs of hank-carrying rods with their complement of mercerized hanks from the traveling chains and introducing in their place fresh pairs of hank-rods charged with fresh supplies of hanks. The hanks are preferably wetted before being applied to the chains in order that they may more readily absorb the mercerizing liquid.

Secured on the end of one rod in each pair of hank-carrying rods $l l'$ is a spider or star wheel p , which is adapted to mesh with fixed segmental racks $p^1 p^2$ in passing around with the chain-wheels $c c$ and $e e$, said star-wheels thus being rotated and turning the hanks on the rods $l l'$ as they travel through the liquids in said tanks, whereby the position of the hanks around said rods is changed and uniform action on the yarn insured.

Should it be desired to contract the hanks after stretching them, as above, and to again expand them, a second or third pair of chain-wheels similar to the chain-wheels $c c$ could be mounted in any suitable position intermediate of the chain-wheels $c c$ and the guide-roller i and the chains $g g$ caused to travel partly around with same to slacken the hanks by their assuming chords to the arcs of the circles, the said hanks being stretched again on leaving the chain-wheels and entering the straight paths.

The processes of mercerizing, stretching, and washing off might be repeated by causing the endless chains to enter other tanks following the tanks $a b$ and fitted up in the same way with chain and guide wheels.

Instead of the hanks forming chords to the arcs of the chains in passing around with the chain-wheels $c c$ the same result can be obtained by means of expanding links introduced into the chains $g g$ at equal distances apart to serve each set of hanks. In this case the hanks would follow the circular path of the chains around the chain-wheels, being supported level with the circumferences thereof by a winch r , Fig. 3, similar to the winch n in tank b , mounted on the axle d . This modification is shown at Figs. 3 and 4. s is a link provided in each arm with a slot s' , equal in length to an ordinary link of the chain g or any multiple thereof. Between the arms or fork of the link s is inserted a pair of links t , provided at one end with a pin t' , which extends through the longitudinal slots s' and has attached to its outer ends strong spiral springs u , whose opposite ends

are attached to studs *u'* on the adjacent ordinary link of the chain to which link *s* is hinged. The right-hand or outer end of links *t* are hinged to the adjacent ordinary link of the chain. When the chains *g g* are slack, the springs *u* draw the links *t* up to the inner ends of links *s* and contract the length of the chains, which pass around with the chain-wheels *c c* in such contracted condition and hold the hanks at their normal length between the pairs of hank-carrying rods; but immediately the chains leave the teeth of said chain-wheels the tension thereon causes the links *t* to be drawn out within the limits of slots *s'* away from the links *s*, thus expanding each section of the chains carrying the hanks and stretching the latter to the required extent, the second pair of disks or chain-wheels in this case containing more teeth or revolving more quickly than the first pair of chain-wheels *c c*.

We claim—

1. The combination, in machines for mercerizing hanks of yarn, of a set of chain-wheels dipping into, or partly submerged in a tank containing mercerizing liquid, endless chains taking onto the teeth of said chain-wheels and traveling part way around therewith, hooked adjustable fingers carried by cross-rods attached at suitable distances apart to said endless chains and adapted to receive and hold hank-carrying rods in pairs one following the other the hanks being threaded on said pairs of hank-rollers and being held slack or at their normal length as they travel around with the chain-wheels and being stretched or extended on leaving the chain-wheels, and taking the straight path traversed by the chains, a second pair of chain-wheels dipping into or partly submerged in a second tank containing liquid for washing-off purposes, a guide-roller intermediate of the two tanks for guiding the endless chains from the first into the second tank, a squeezing-roller pressing upon the periphery of the said guide-roller to express the liquid out of the hanks and the means described for turning the hanks on the hank-rods as they travel around with the chain-wheels, substantially as set forth.

2. In a machine for mercerizing hanks of yarn, the combination of tanks *a b*, sets of chain-wheels *c c e e* dipping into or partly submerged in said tanks, a winch or lantern-roller *n* intermediate of the set of chain-wheels *e e* and fast on the axle *f* carrying same, endless chains *g g* passing around and driven by the two sets of chain-wheels and traversed through tanks *a b* in succession, cross-rods *g'* secured to the endless chains at suitable distances apart, right and left hand adjustable fingers hinged to said cross-rods and pairing with opposing fingers on adjacent cross-rods, said fingers having their extremities hook-shaped or provided with open bearings, hank-carrying rods adapted to be reg-

istered and held in said bearings at the ends of the adjustable fingers one of each pair of said rods having a star-wheel on one end thereof for turning the hank-rod in its bearings and changing the position of the hanks about each pair of rods, fixed segmental racks concentric with the axles *d f* and lying in the path of the star-wheels for rotating same, rollers *i j* for guiding the endless chains from tank *a* to tank *b* and expressing excess liquid out of the hanks, and guide-rollers for guiding the endless chains back over the machine from the second to the first pair or set of chain-wheels, substantially as set forth.

3. The combination, with a tank for mercerizing liquid, and a tank for water; of carrier-wheels in the said tanks, driving-shafts journaled in the sides of the tanks and having the said wheels secured on them, means for revolving the said driving-shafts simultaneously, an endless carrier passing over the said wheels, guides for supporting the said carrier between the tanks, and means for supporting the hanks of yarn attached to the said carrier, substantially as set forth.

4. The combination, with a tank for mercerizing liquid, and a tank for water; of carrier-wheels in the said tanks, means for revolving the said wheels simultaneously, an endless carrier passing over the said wheels, guides for supporting the said carrier between the tanks, fingers pivoted to the carrier and provided with cross-rods for supporting the hanks of yarn, said fingers being free to move toward the center of the carrier-wheels in the mercerizing-tank while passing around them, and means for preventing the said fingers from moving toward the center of the carrier-wheels in the water-tank while passing around them thereby holding the hanks stretched, substantially as set forth.

5. The combination, with a tank for mercerizing liquid, and a tank for water; of carrier-wheels in the said tanks, means for revolving the said wheels simultaneously, an endless carrier passing over the said wheels, guides for supporting the said carrier between the tanks, cross-rods for the hanks of yarn supported from the said carrier, toothed wheels secured on certain of the said rods, and a stationary toothed rack supported in the mercerizing-tank for the said toothed wheels to engage with as they pass under the carrier-wheels in it, whereby the said rods are revolved and the positions of the hanks are changed, substantially as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

JAMES F. COPLEY.
PERCY S. MARSHALL.
RICHARD HEATON.

Witnesses:

ARTHUR CROSSLEY,
THOMAS H. BARRON.