No. 684,101. Patented Oct. 8, 1901.

W. H. RICKEY.

STARCHING MACHINE.

(Application filed Nov. 14, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1

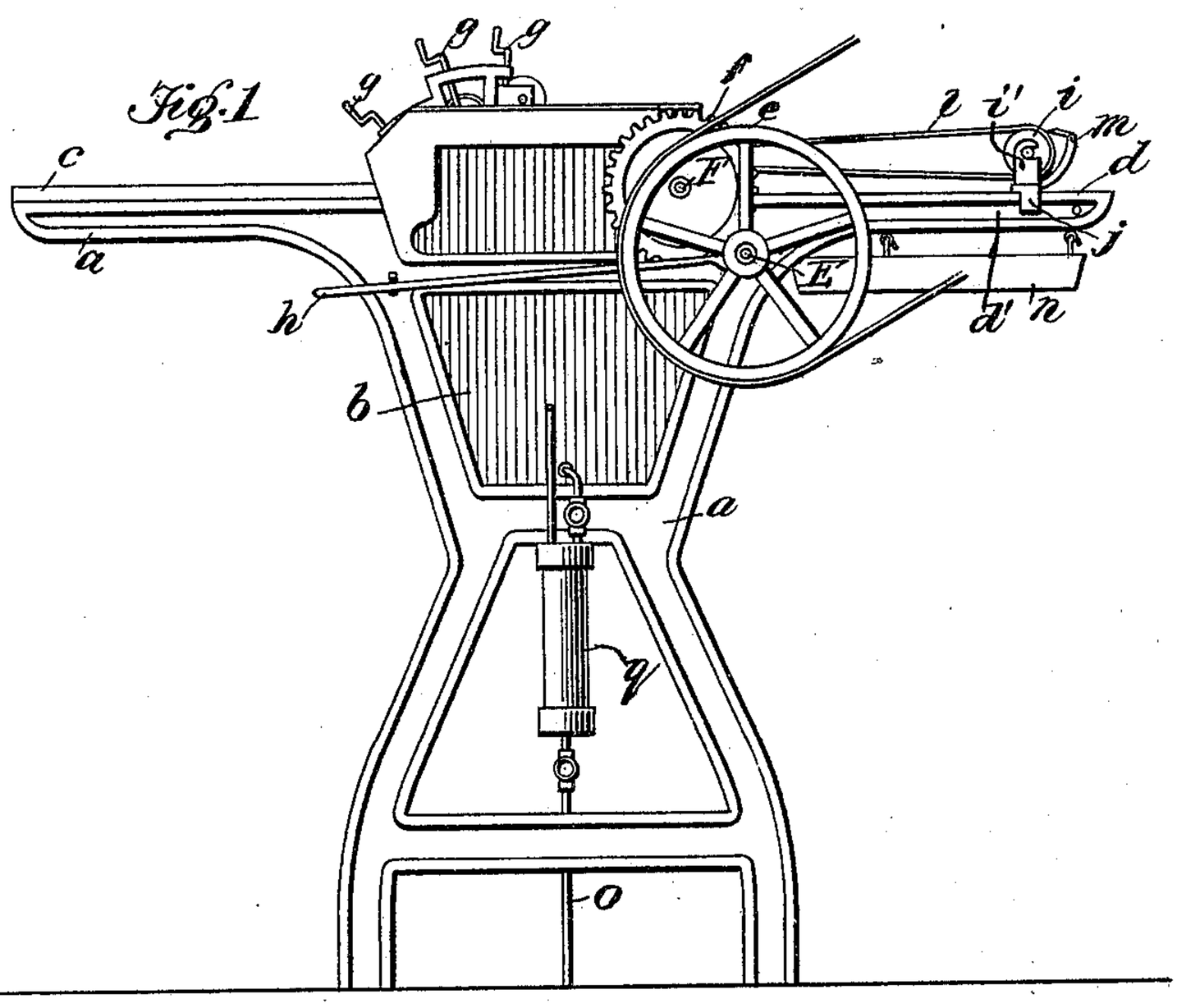
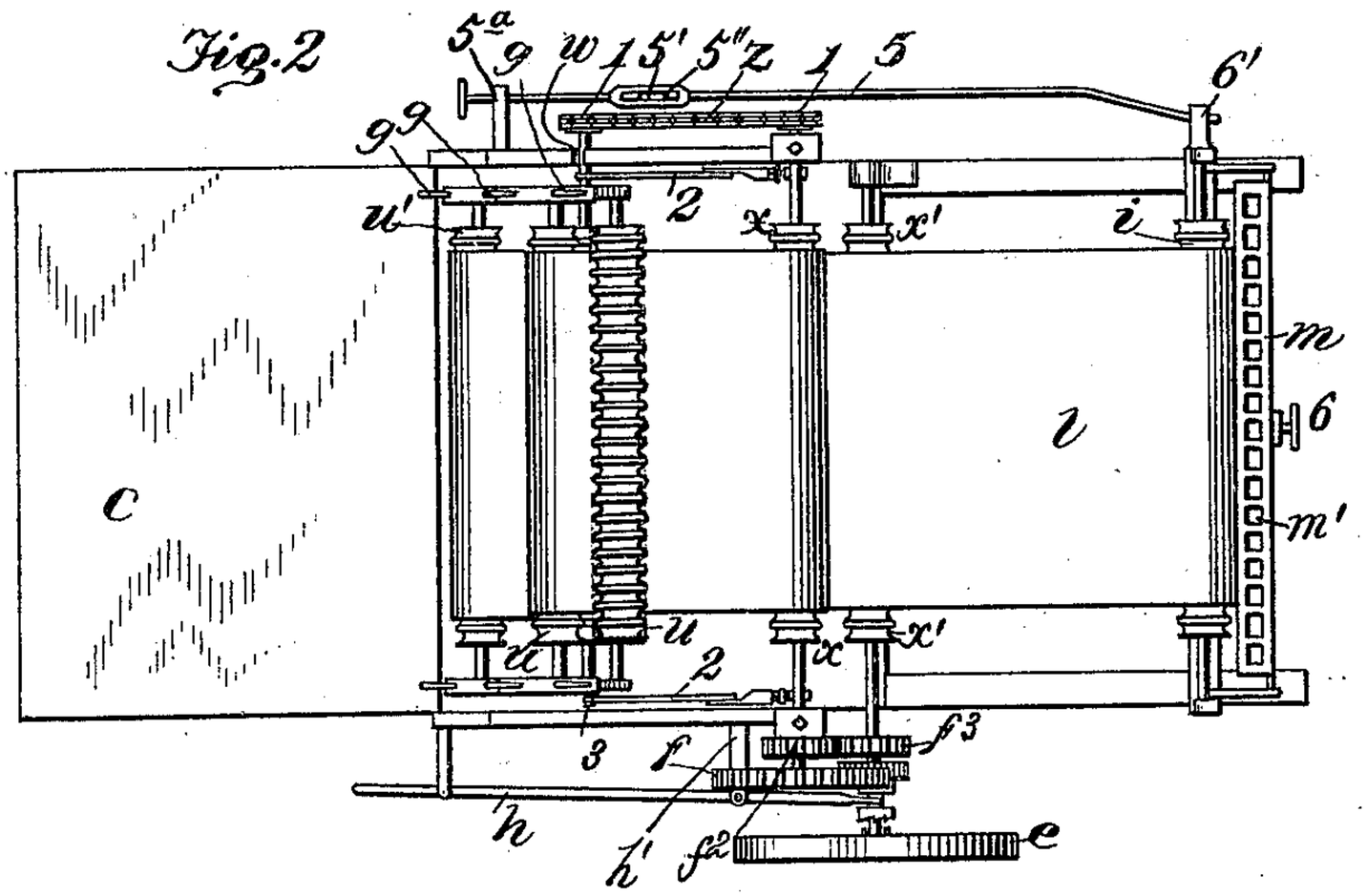


Fig. 2



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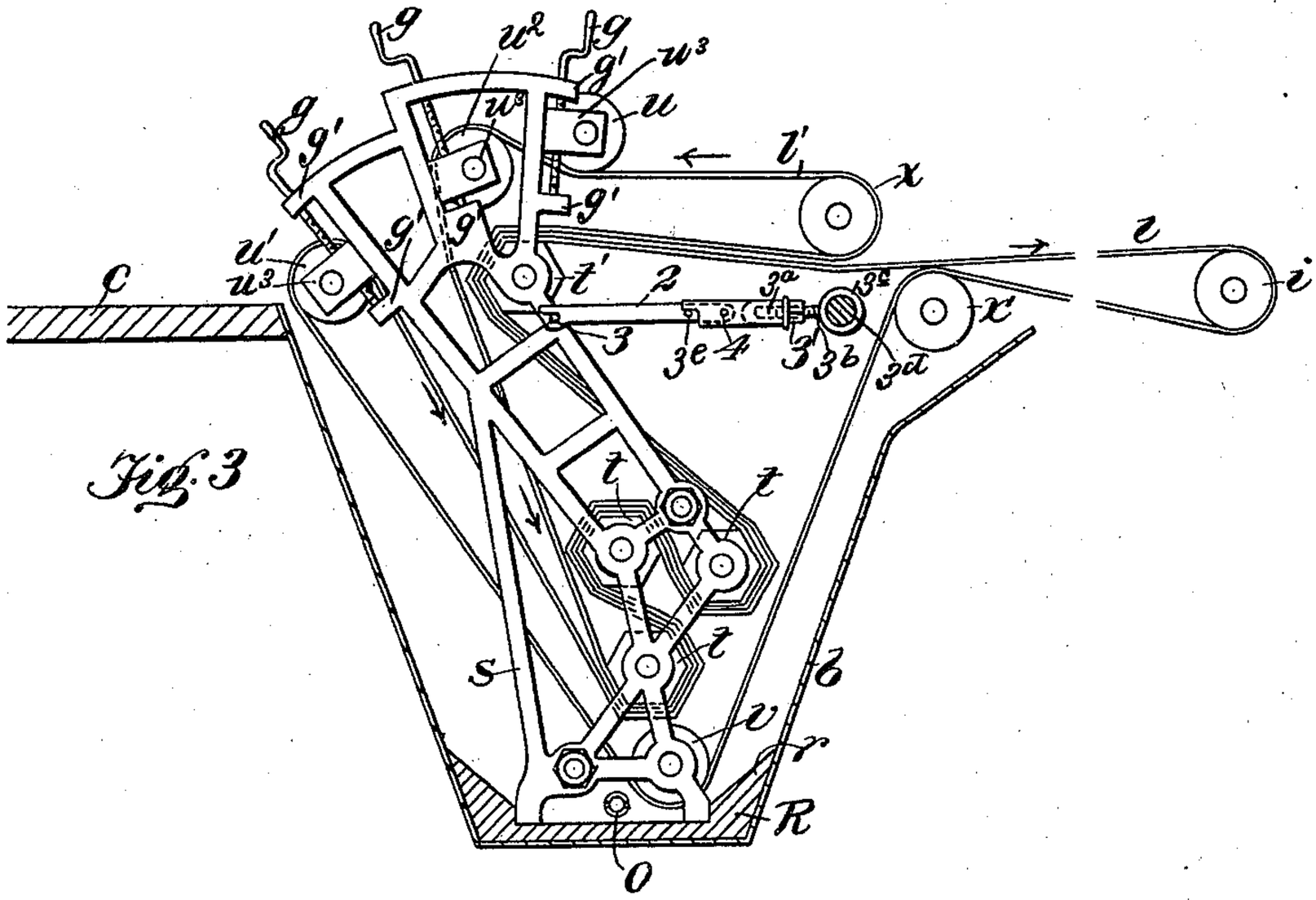


Fig. 3

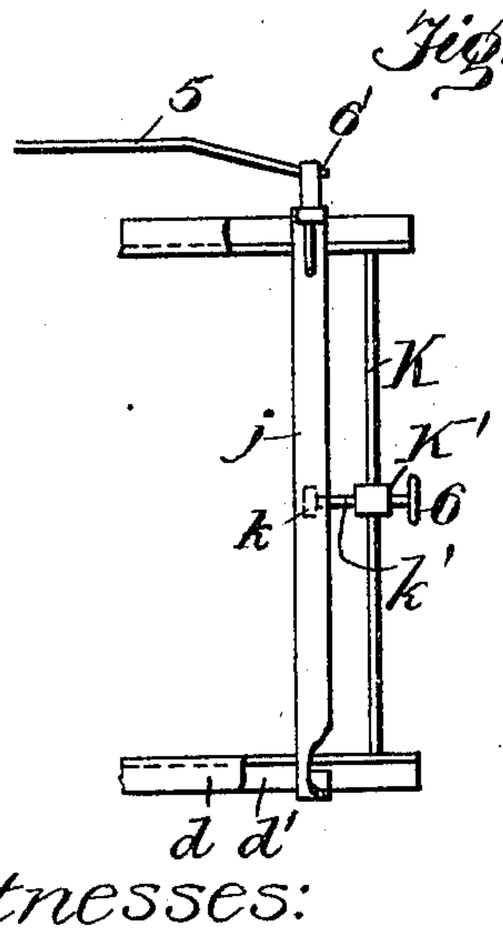
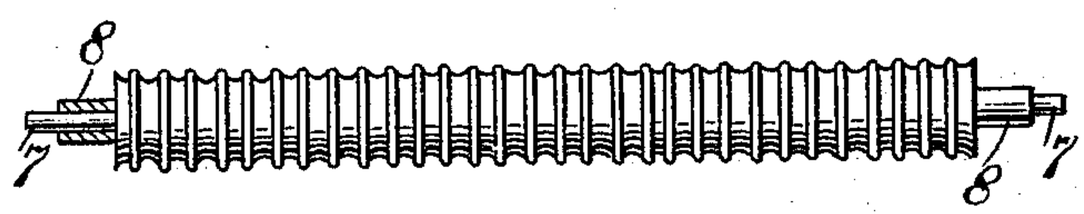


Fig. 4

Fig. 5



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(Application filed Nov. 14, 1899.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 6.

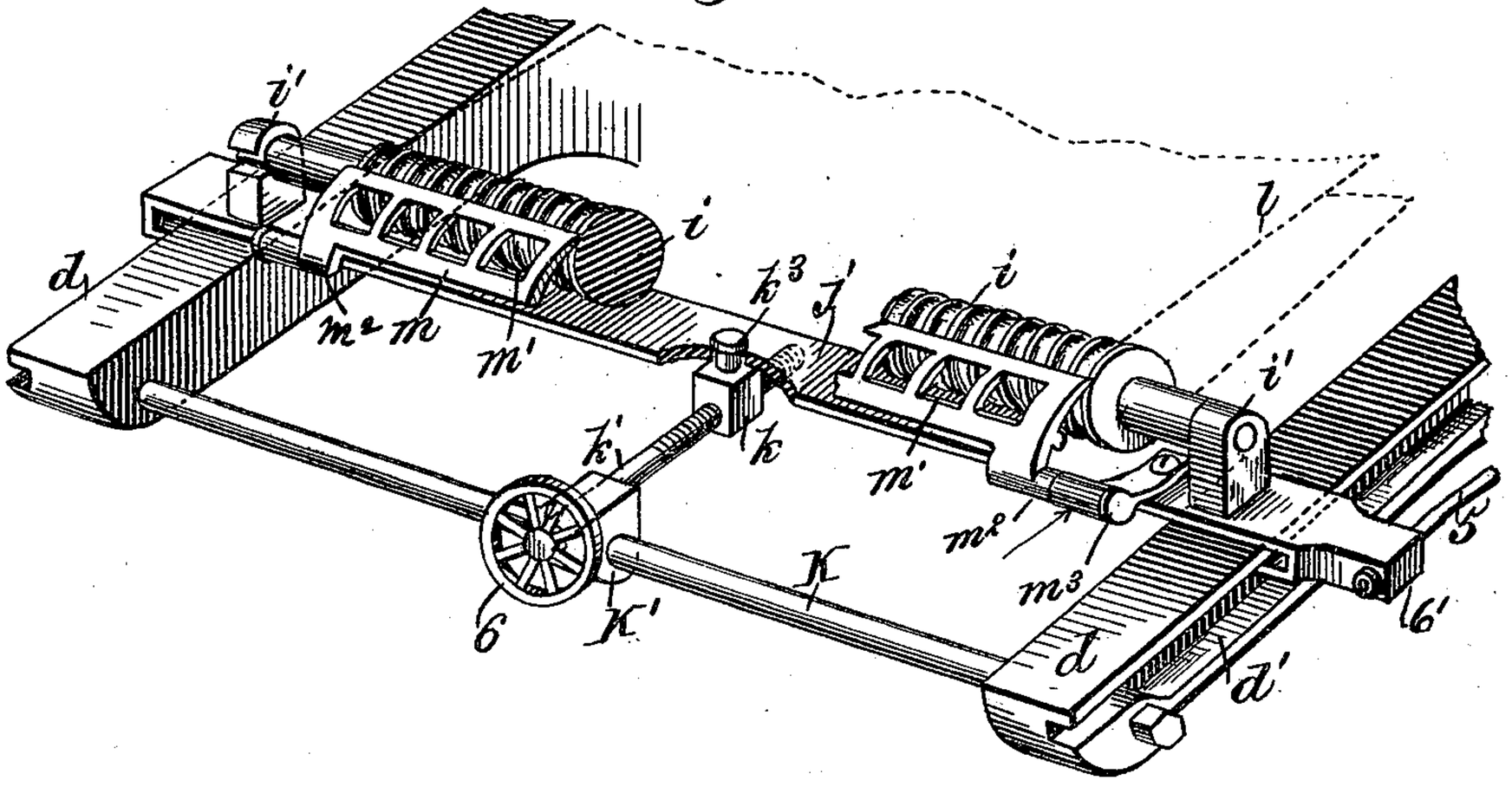
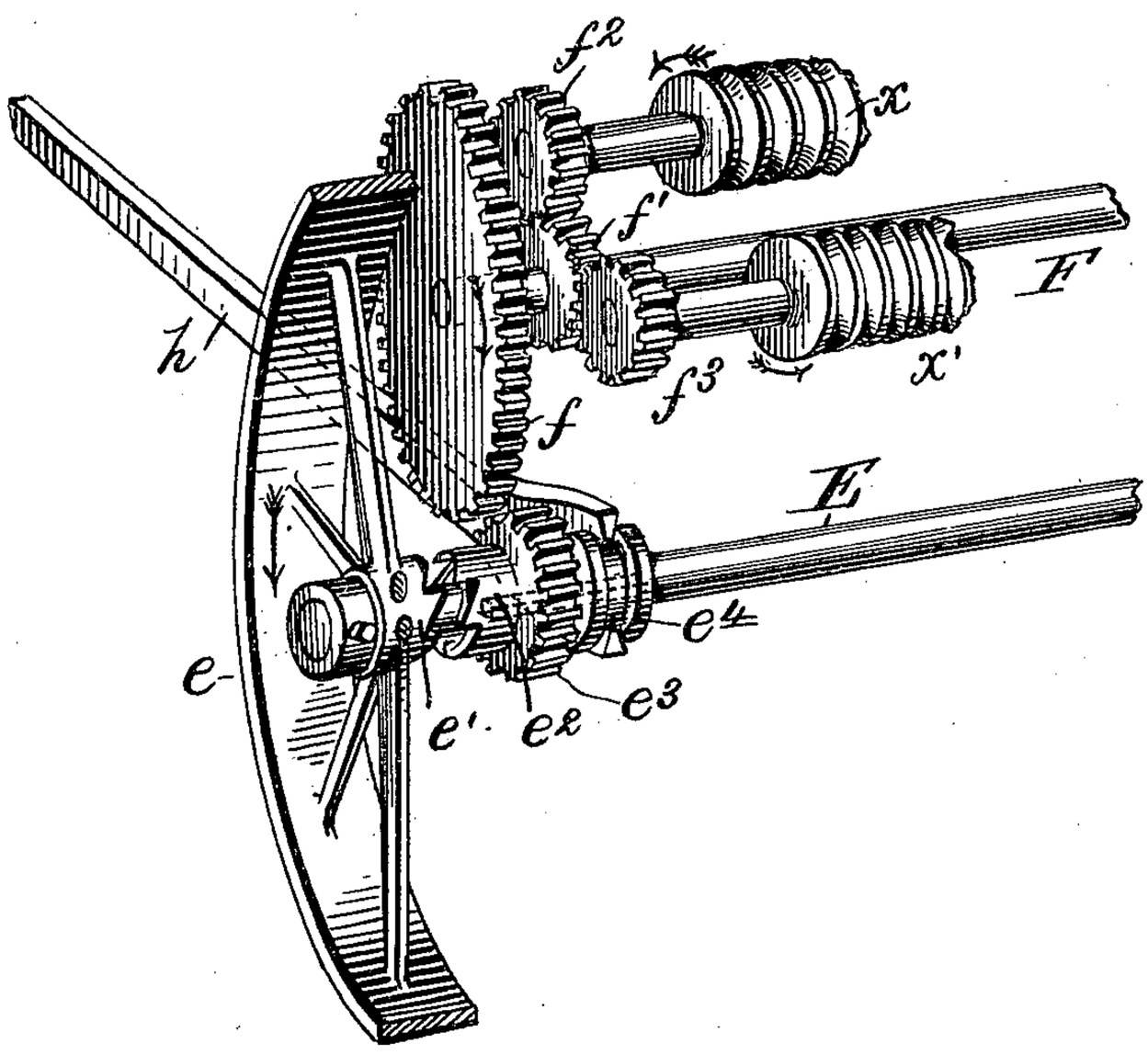


Fig. 7.



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UNITED STATES PATENT OFFICE.

WILLIAM HENRY RICKEY, OF EAST ORANGE, NEW JERSEY.

STARCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 684,101, dated October 8, 1901.

Application filed November 14, 1899. Serial No. 736,933. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HENRY RICKEY, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Starching-Machines, of which the following is a specification.

This invention relates to machines for starching collars, cuffs, and similar articles, and has for its object to provide a machine of the character referred to which will be simple, inexpensive, and durable in construction and efficient and rapid in operation.

To these ends my invention consists in the features and in the construction, combination, and arrangement of parts hereinafter described, and particularly pointed out in the claims following the description, reference being had to the accompanying drawings, forming a part of this specification, wherein—

Figure 1 is a view in side elevation of my improved machine. Fig. 2 is a top plan view thereof. Fig. 3 is a vertical sectional view of the starching-vat and its contained mechanism. Fig. 4 is a detail view illustrating the adjustable support for the delivery-roller. Fig. 5 is a detail view of one of the guide-rollers, one of the journals thereof being shown in section. Fig. 6 is a perspective view of a part of the delivery-frame, showing the delivery-roller, its adjustable support, the delivery-blade, and the means for adjusting the delivery-roller; and Fig. 7 is a detail perspective view of the gearing for driving the starching mechanism.

Referring to the drawings, the reference-letter *a* indicates the frame of the machine, which may be of any approved construction, and centrally supported between the sides of the frame is a starch-tank *b*. Extending horizontally from the upper end of the frame in front of the starch-tank is a feed-table *c*, and extending in like manner in rear of the starch-tank is a delivery-frame consisting of two horizontal parallel arms *d*, longitudinally grooved on their outer sides, as at *d'*, as most clearly shown in Fig. 6 of the drawings. The starch-tank is preferably formed with inclined converging sides, as shown in Fig. 3, and fitted in the bottom thereof is a rest R for supporting a frame presently to be described, said rest having inwardly-sloping sides *r*, which serve to guide the feet of the frame to their seat on the support and hold them in place therein. Seated on said support is a roller-supporting frame *s*, consisting of two metallic skeleton sides rigidly connected together. Journaled in said frame are four saturating-rollers *t t t t'*, each polygonal in cross-section, the axes of the rollers *t t t* being arranged at the apices of a triangle, as shown, and said rollers being arranged in relatively close proximity and below the normal level of the starch, so that said rollers will at all times be submerged in the starch contained in the tank. The roller *t'* is journaled in the frame above the level of the starch and preferably in the same approximate horizontal plane with the delivery-roller *i*. Journaled in the frame *s*, below the lowermost saturating-roller *t*, is a guide-roller *v*, and disposed between the upper ends of said frame *s* are three guide-rollers *u u' u²*, each journaled at its ends in two vertically-movable bearings *u³*, adapted to slide on the sides of the frame and adjustable vertically by set-screws *g*, rotatably mounted in lugs *g'*, formed on the frame, the central screws being also supported in an upper longitudinally-connecting bar of the frame. It will be obvious that by turning the set-screws *g* in one direction or the other the bearings *u³*, and with them the guide-rollers, will be adjusted up or down. Journaled in the sides of the frame *a*, over the rear end of the starch-tank, are two guide-rollers *x x'*, and in rear of the said rollers is disposed the delivery-roller *i*, to be hereinafter more fully referred to.

Passing about the guide-roller *u'*, the saturating-rollers *t*, *t*, *t*, and *t'*, around the delivery-roller *i*, over the guide-roller *x'*, and under the guide-roller *v* is an endless apron *l*, which I term a "feed and delivery apron," and passing around the guide-roller *x*, beneath the guide-roller *u*, about the guide-roller *u²*, and about the saturating-rollers *t*, *t*, *t*, and *t'* is an endless apron *l'*, which I term a "pressing-apron," said aprons traveling in the direction indicated by the arrows in Fig. 3.

The delivery-roller *i* is journaled at its opposite ends in bearings *i'*, projecting upward from the opposite ends of a transverse bar or support *j*, which rests on the delivery-

frame *d*. The ends of the bar *j* are bent under and inward and engage the grooves *d'*, formed in the sides of the delivery-frame, and are free to travel therein, the ends of said bar projecting sufficiently beyond the sides of the delivery-frame to permit said bar to have a limited oscillating movement in a horizontal plane. A transverse rod K is fixed in the ends of the delivery-frame, and fixed centrally on said rod is a bearing-block K', in which is journaled the unthreaded end of an adjusting-screw *k'*, provided on its rear end with a hand-wheel 6. The forward threaded end of the adjusting-screw works in a nut *k*, provided on its upper side with a pivot k^3, which loosely passes through the center of the bar *j*, whereby the latter is capable of being oscillated in a horizontal plane about said pivot for the purpose hereinafter explained. For the purpose of oscillating the bar *j* about its pivot I provide a rod 5 at one side of the machine, the rear end of said rod being attached to an extension 6' on one end of the bar *j*, the other end of said rod being slotted, as at 5', and straddling a fixed projection 5'', which serves as a guide for the rod. The front end of the rod is movably supported in a bracket 5^a, projecting laterally from the side of the frame *a*. The slot 5' and fixed projection 5'' may, if desired, be dispensed with. It will be obvious that by moving said rod forward or backward the bar *j* will be oscillated about its pivot, and any suitable means may be provided for holding the rod stationary to hold the bar *j* in its adjusted position.

Disposed in rear of the delivery-roller *i* is a delivery or take-off blade consisting of a metallic blade *m*, segment-shaped in cross-section and tapering off to a knife-edge at its upper front portion. Said blade is provided with numerous square apertures *m'*, and at its opposite ends is provided with trunnions m^2, which are journaled in bearings m^3, fixed to the roller-supporting bar *j*. By forming the apertures in the delivery-blade as shown the friction between said blade and the collars and cuffs is reduced, and the weight of the blade is also reduced. A steam-pipe O leads from any suitable source of steam-supply and delivers steam in the lower portion of the starch-tank to keep the starch warm, a steam-trap *q* being interposed between sections of the steam-pipe to collect the water of condensation and prevent the latter from entering the starch-tank.

Journaled in the frame of the machine is a transverse shaft E, on one end of which is fixed a pulley *e*, which may be driven from any suitable source of power, or a crank may be provided for driving the shaft by hand. On the hub of the pulley *e* is formed one member *e'* of a ratchet-clutch, the other member e^2 of which is formed on the hub of a small gear-wheel e^3, the hub and gear-wheel being splined on the shaft E, as shown in dotted lines in Fig. 7. A circumferentially-grooved collar e^4 is also formed on or attached to the hub of the gear-wheel e^3, and engaging said grooved collar is the forked end of a shifting-lever *h*, which is pivoted intermediate its ends to a bracket *h'* on one side of the frame *a*. Also journaled in the sides of the frame *a* is a transverse shaft F, on one end of which is fixed a relatively large gear-wheel *f*, which is adapted to gear with the gear-wheel e^3, and also fixed on the shaft F is a small gear-wheel *f'*, which gears with two similar gear-wheels f^2 and f^3, respectively, fixed on the shafts of the guide-rollers *x* and *x'*. It will be obvious that when the members *e'* and e^2 of the clutch are in engagement and the pulley *e* is rotated the gears f^2 and f^3, and consequently the guide-rollers *x* and *x'*, will be rotated in the same directions through the medium of the gears e^3, *f*, and *f'* and will tend to move the aprons *l* and *l'* in the direction indicated by the arrows in Fig. 3. The ends of the guide-roller *x* and of the shaft on which the saturating-roller *t'* is mounted project beyond the side of the frame that is opposite to the side on which is mounted the gearing before referred to, and fixed on the projecting ends of said shafts are sprocket-wheels 1 1, which are geared together by a chain Z. It will be readily seen that as the guide-rollers *x* and *x'* are rotated by the gearing in the manner described the saturating-roller *t'* will also be rotated by the sprocket wheels and chain, and by the rotation of the rollers *x*, *x'*, and *t'* the belts *l* and *l'* will be driven.

The frame *s* is removably seated in the starch-tank, a slot *w* being formed in one side of said tank for the reception of the extended end of the shaft carrying the saturating-roller *t'* and to permit of said shaft being lifted in and out of the tank with the frame *s* and the other rollers carried by said frame. In order to rigidly hold the frame *s* to its seat in the tank and to adjust the tension of the aprons, two jointed braces 2 are provided on opposite sides of the starch-tank, each of said braces comprising two metallic bars pivoted together at their contiguous ends, as at 4, the outer end of one of said jointed members being notched or forked, as shown, to engage a pin or projection 3 on the side of the removable frame, and the outer end of the other member being provided with a recess 3^a, in which loosely fits the threaded end of a screw 3^b. A nut 3' is rotatably secured on the recessed end of the jointed member and engages the screw 3^b, and the latter is provided with an eye 3^c, which loosely encircles a transverse rod 3^d, fixed in a frame *a*. It will be understood that there are two such braces, one on each side of the starch-tank. To remove the frame *s*, the elbow-braces are broken at their joints—that is to say, the two members of each brace are raised upward about the pivot 4—causing the forked end to be disengaged from the pin 3. The frame *s* and its rollers may then be freely lifted out

of the starch-tank. When the frame is replaced in the tank, the forked ends of the braces are engaged with the pins on the frame and said braces are straightened out, thus firmly bracing the frame against the drawing action of the aprons. When it becomes necessary, the tension of the aprons can be adjusted by turning the nuts 3′, thereby lengthening or shortening the braces. When the braces are straightened out, stop-pins 3ᵉ operate to prevent the braces from being depressed beyond a horizontal position.

The endless aprons are made of stout linen or similar material practically impervious to starch. In order to facilitate the proper operation of the guide-rollers and prevent drawing superfluous starch between the guide-rollers and the aprons which, would have a tendency to cause bunching and uneven running of the aprons, I corrugate the guide and delivery rollers, as shown in Figs. 2 and 7. The corrugations are formed circumferentially on the rollers and are parallel with one another, so that no scraping or scratching effect is produced on the aprons. As shown in Fig. 5, the guide-rollers are each mounted on a copper-plated steel shaft 7, provided at its ends with brass ferrules or collars 8, which constitute journals. By this means I avoid steel journals running in brass bearings, which, as is well known, is objectionable.

The operation of my improved machine is as follows: To introduce the starch into the tank the frame *s*, with its rollers, is raised out of the tank, the starch is placed in the latter, the frame is replaced and braced in position, and steam admitted through the pipe O. The machine is put into operation by the described driving mechanism, causing the aprons to travel about their rollers in the manner described and in the direction indicated by the arrows. The operator places the collars, cuffs, or other articles to be starched between the two aprons as they pass around between the guide-rollers u' u^2. These aprons operate to draw the articles down into and through the starch, and as they pass around the polygonal rollers *t t t* the latter operate to press the starch into the articles. After they emerge from the starch they are submitted to a further and final compression between the two aprons by the polygonal roller *t′*. After the articles pass under the guide-roller *x* they are carried by the apron *l* to the delivery-roller *i*, and as the apron passes around this roller the delivery-blade engages the under sides of the articles and strips them from off the apron and discharges them into any suitable receptacle provided for their reception. The surplus starch dropped from the apron *l* drops into a tray *n*, suspended beneath the delivery-frame. If the apron *l* should run unevenly from any cause—as, for example, when the apron stretches more at one edge than the other—it may be remedied by oscillating or turning the bar *j* about its pivot, so as to present the delivery-roller at a greater or less angle to the delivery-frame, and thus prevent the tendency of the apron running to one side. In other words, the apron is thus slackened on one side and simultaneously tightened on the other. The tension of the apron *l* can also be regulated in an obvious manner by turning the set-screw *k′*.

Having described my invention, what I claim is—

1. In a starching-machine, the combination with a starch-tank, of a roller-frame removably seated in said tank, rollers in said frame, aprons passing around said rollers and jointed braces for said frame, the sections of which are pivoted to each other and respectively to a stationary part and to said frame, substantially as described.

2. In a starching-machine, the combination with a delivery-roller and an apron passing around the same, of a transversely-extending bar on which said roller is journaled, the said bar being pivotally mounted at a point intermediate its ends, a transversely-extending delivery-blade hinged upon said bar and having a sharp edge lying in close relation to said apron as it passes around said roller, and means for oscillating said bar, substantially as described.

3. In a starching-machine, the combination with a starch-tank, of a roller-frame removably seated in the starch-tank, a pair of endless aprons, suitable feeding, guiding and saturating rollers carrying the aprons and journaled in the frame, guide-rollers and a delivery-roller mounted on the machine-frame the delivery-roller being in rear of the starch-tank, jointed braces each pivoted at its rear end to a fixture carried by the machine-frame and engaging a projection on the side of the roller-frame, and adapted to be folded to disengage said projections, and stops for holding the jointed braces in their straightened positions, substantially as described.

4. In a starching-machine, the combination with a starch-tank, of a roller-frame removably seated in said tank, rollers in said frame, aprons passing around said rollers, and jointed braces for said frame, the sections of which are pivoted to each other, one section of each brace being pivoted to said frame and the other section thereof being adjustably and pivotally connected to a stationary part, whereby the braces may be lengthened or shortened to vary the tension of the aprons, substantially as described.

5. In a starching-machine, the combination with the frame of the machine, of a starch-tank supported thereon, a pair of endless aprons, suitable guiding, feeding and saturating rollers carrying the aprons, means for driving the rollers and aprons, a delivery-frame in rear of the tank provided with grooves in its outer sides, a supporting-bar provided with bearings and having inwardly-turned ends engaging and traveling in said grooves, said bar being mounted centrally on

a pivot, means for oscillating the bar about its pivot, and a delivery-roller journaled in the bearings carried by the said bar, and about which the delivery-apron passes, substantially as described.

6. In a starching-machine, the combination with the frame of the machine, of a starch-tank supported thereon, a pair of endless aprons, suitable guiding, feeding and saturating rollers carrying the aprons, means for driving the rollers and aprons, a delivery-frame in rear of the starch-tank provided with grooves in its outer sides, a supporting-bar provided with bearings and having inwardly-turned ends engaging and traveling in said grooves, a block arranged centrally beneath the supporting-bar and provided with a pivot about which the supporting-bar is arranged to oscillate, a set-screw for moving said block and bar toward and from the starch-tank, and a delivery-roller about which the delivery-apron passes, said roller being journaled in the bearings carried by the supporting-bar, substantially as described.

Signed at New York, in the county of New York and State of New York, this 13th day of November, A. D. 1899.

WILLIAM HENRY RICKEY.

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