

(No Model.)

3 Sheets—Sheet 1.

J. H. OSBORNE.
CIRCULAR KNITTING MACHINE.

No. 277,603.

Patented May 15, 1883.

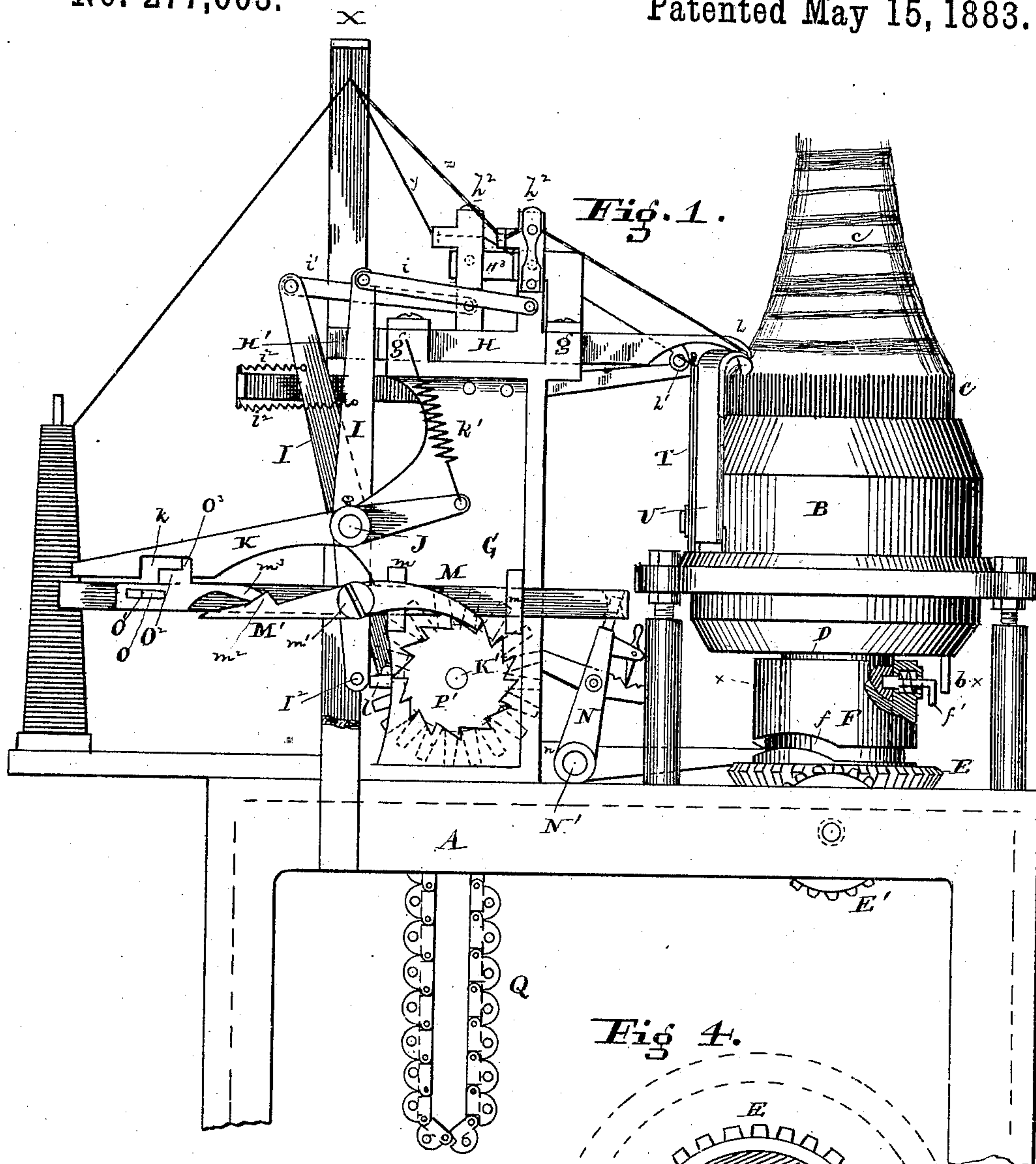


Fig. 3.

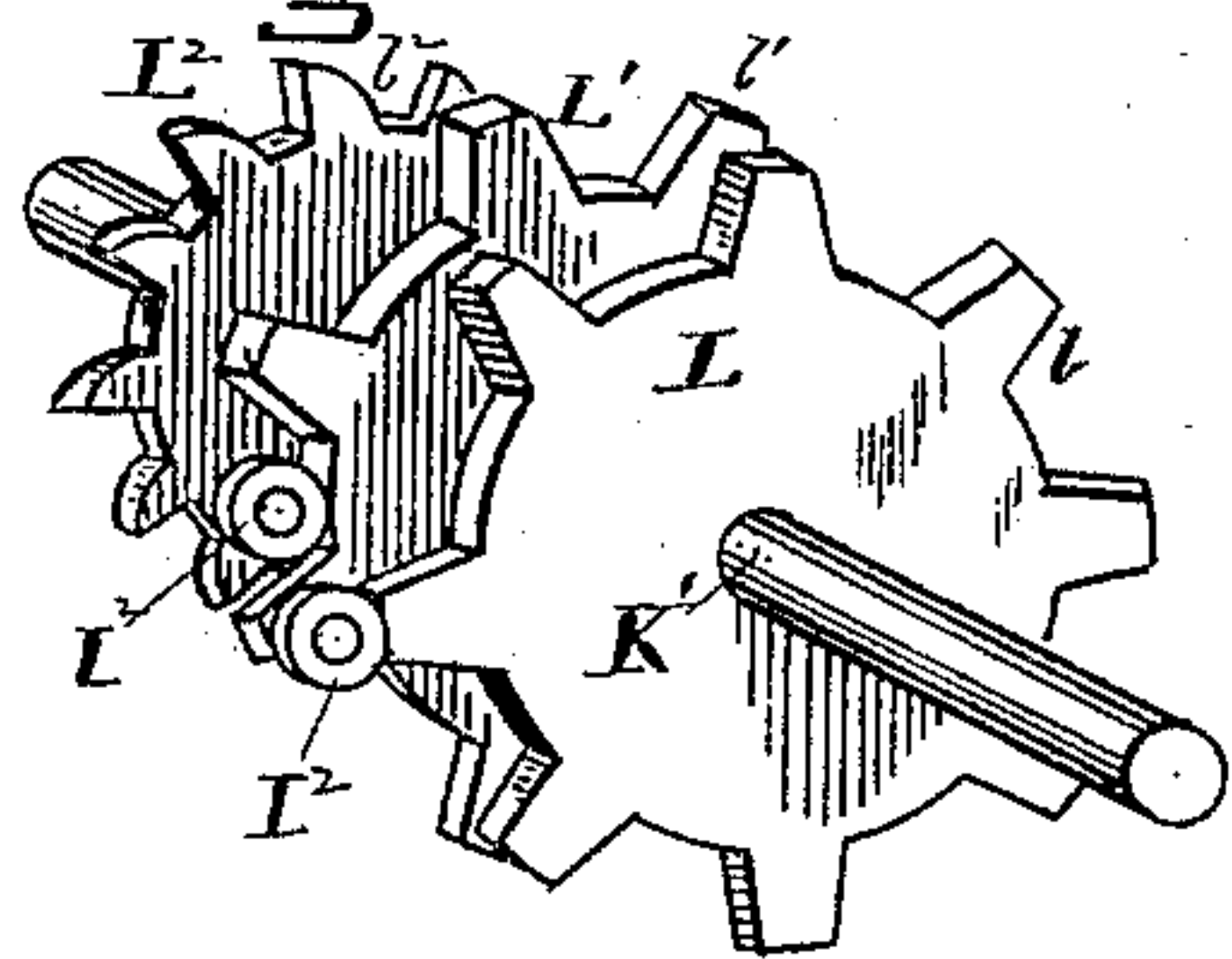
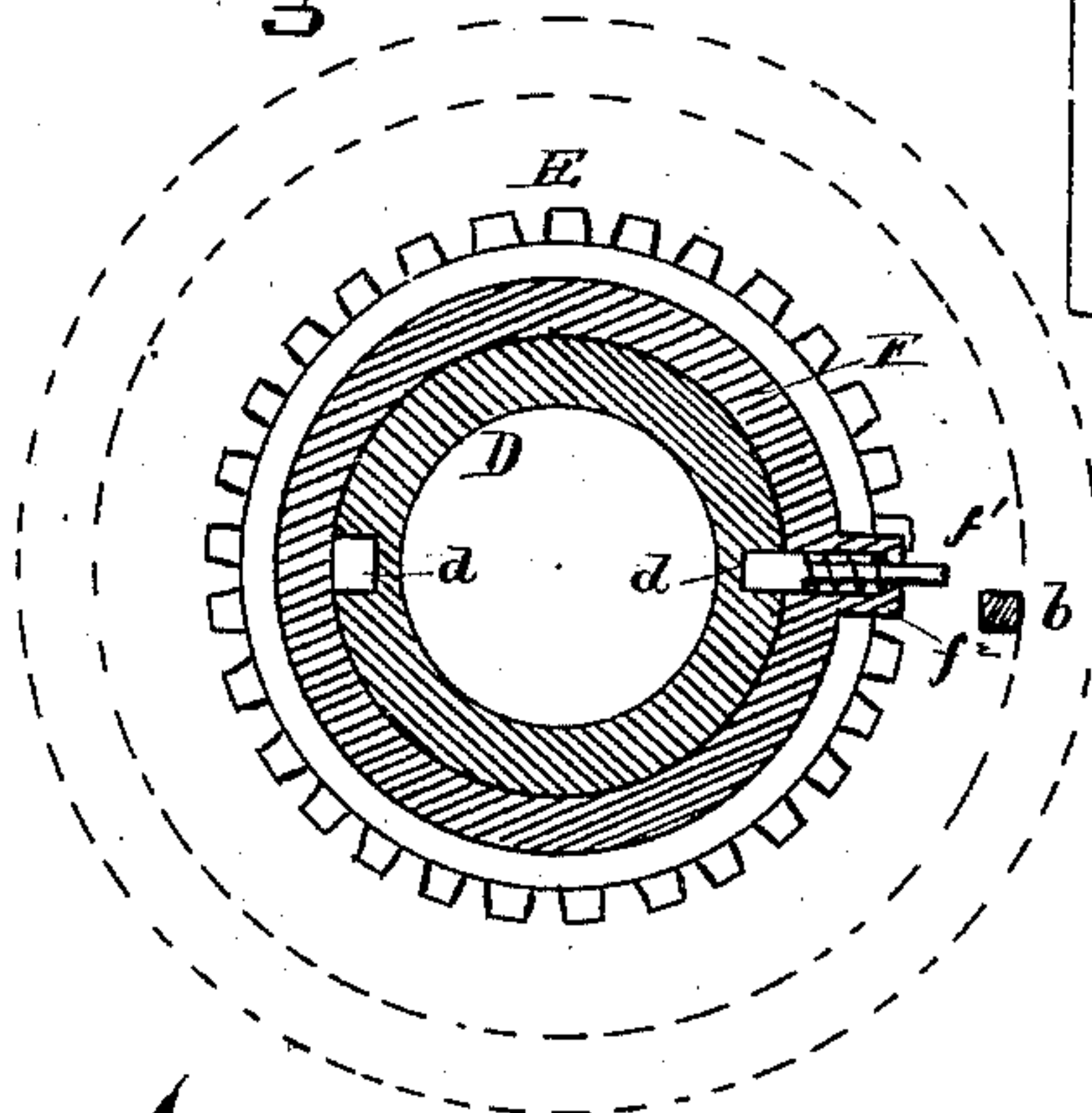


Fig. 4.



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3 Sheets—Sheet 2.

CIRCULAR KNITTING MACHINE.

Patented May 15, 1883.

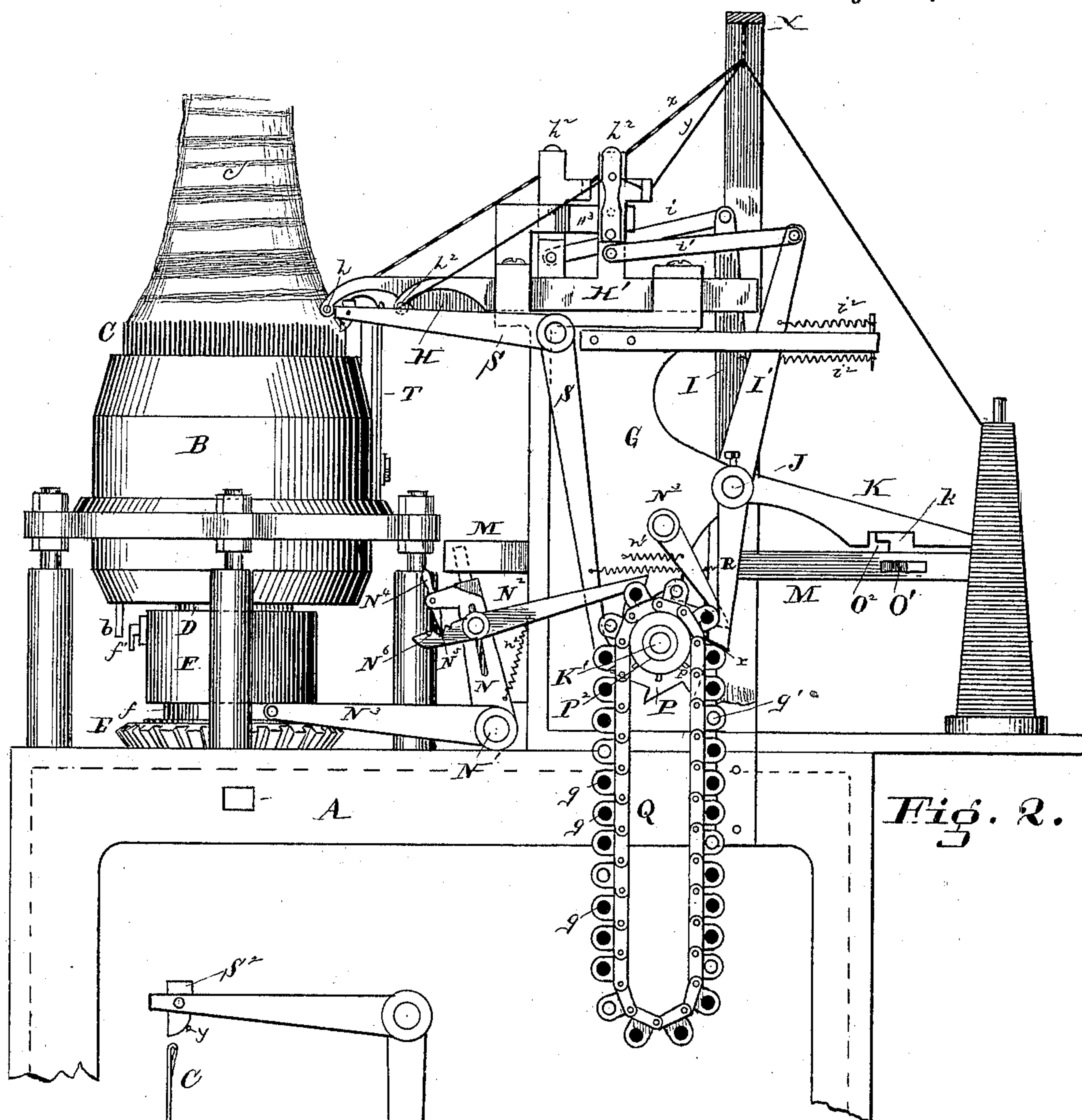


Fig. 2.

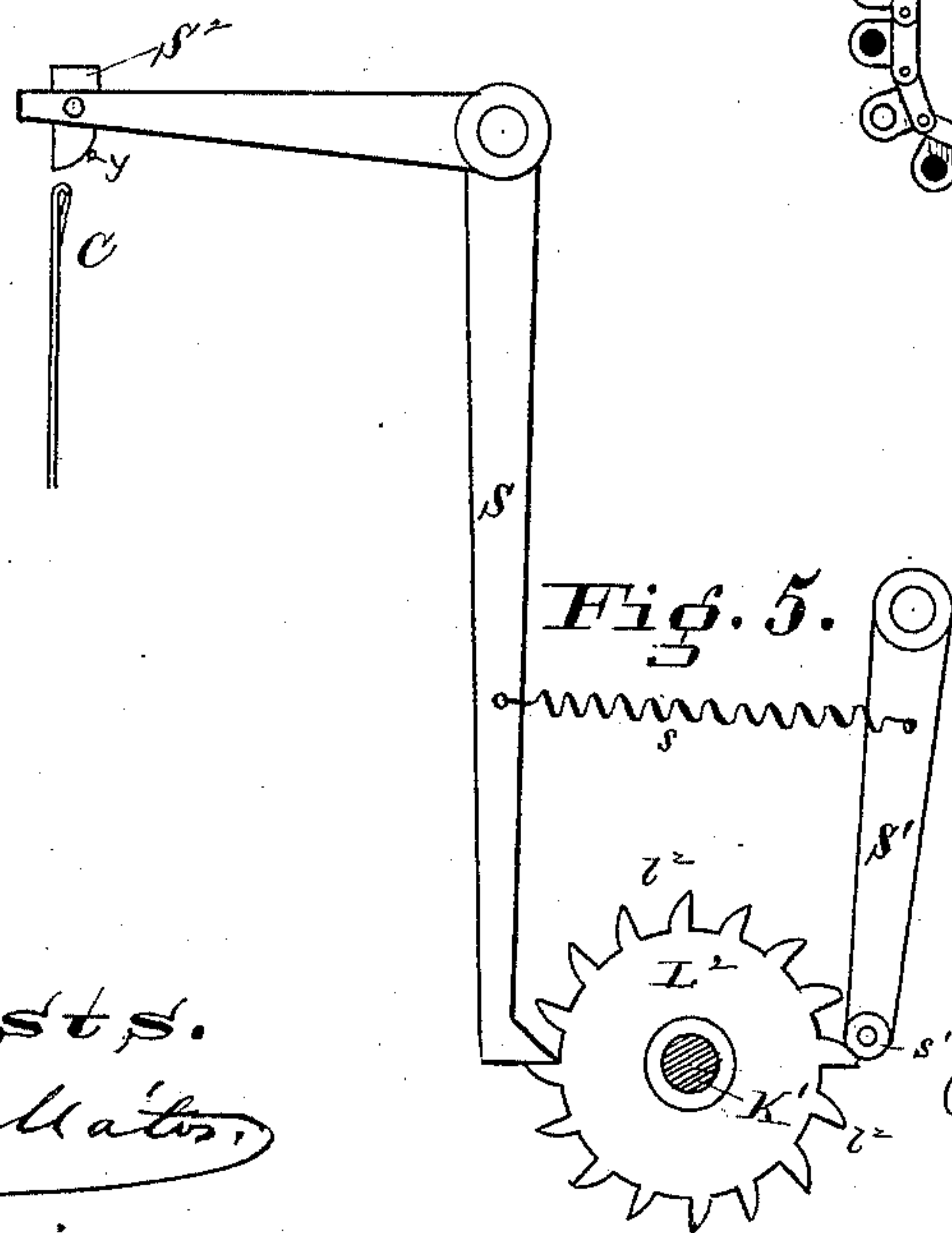


Fig. 5.

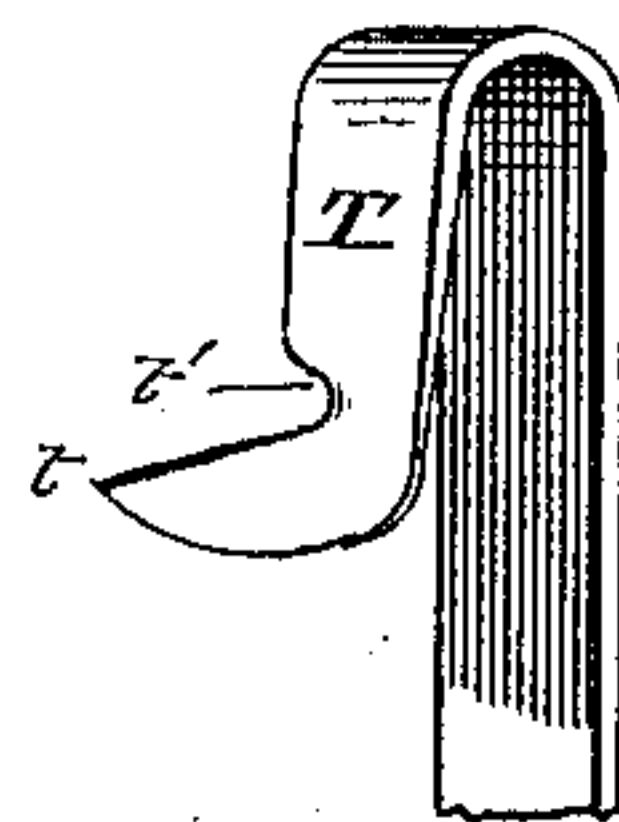


Fig. 6.

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(No Model.)

3 Sheets—Sheet 3.

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CIRCULAR KNITTING MACHINE.

No. 277,603.

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Fig. 7.

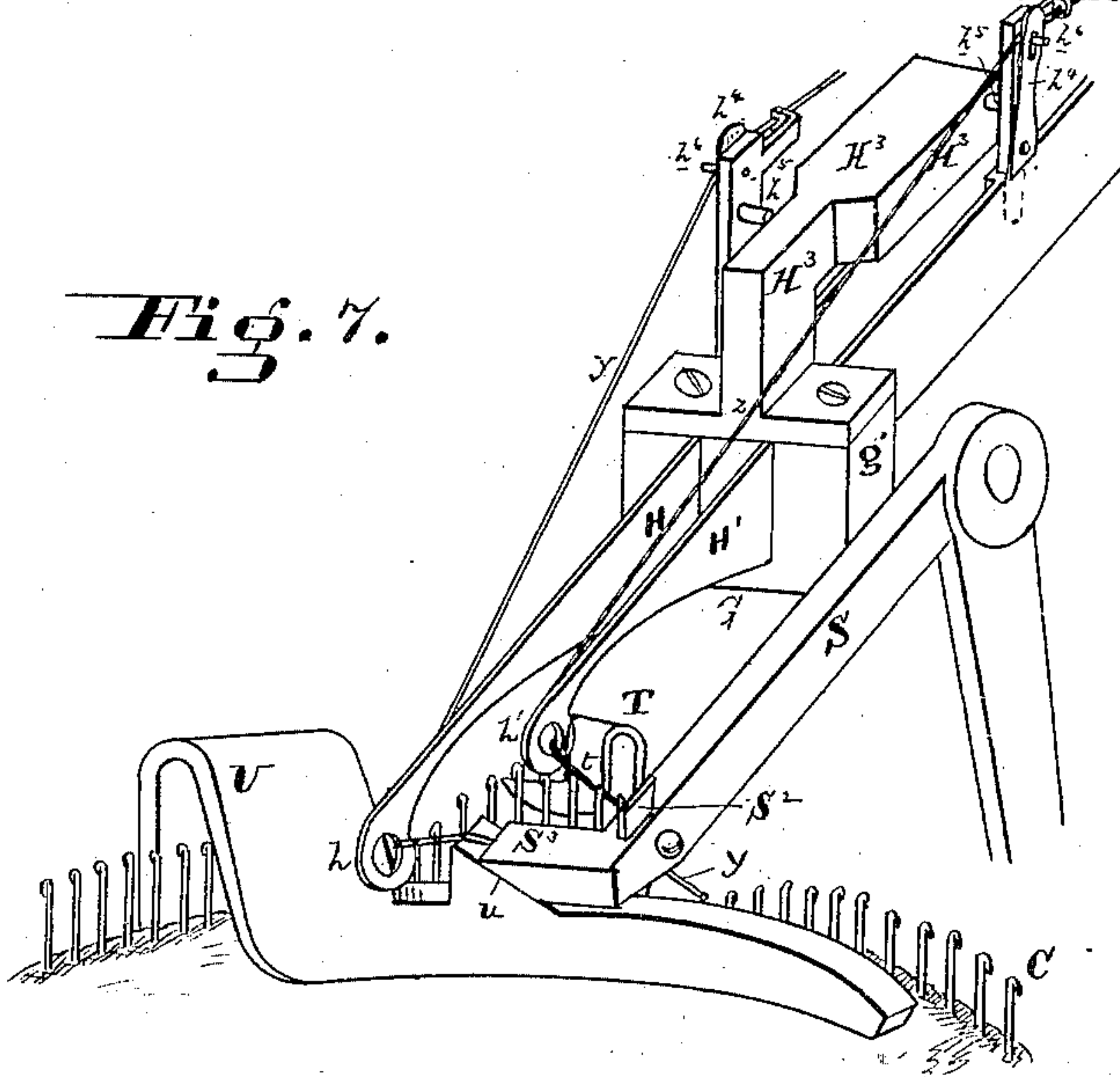


Fig. 8.

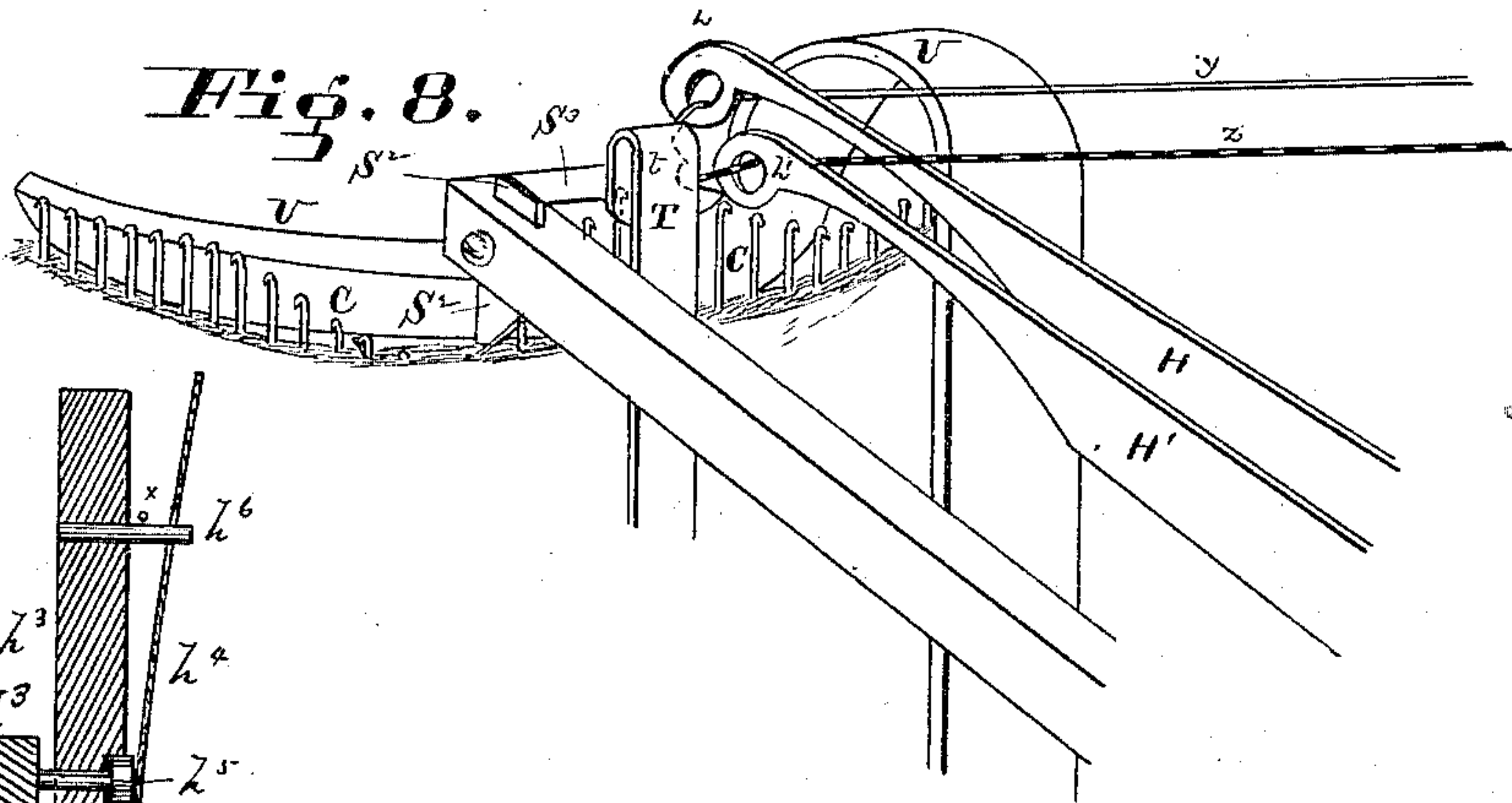
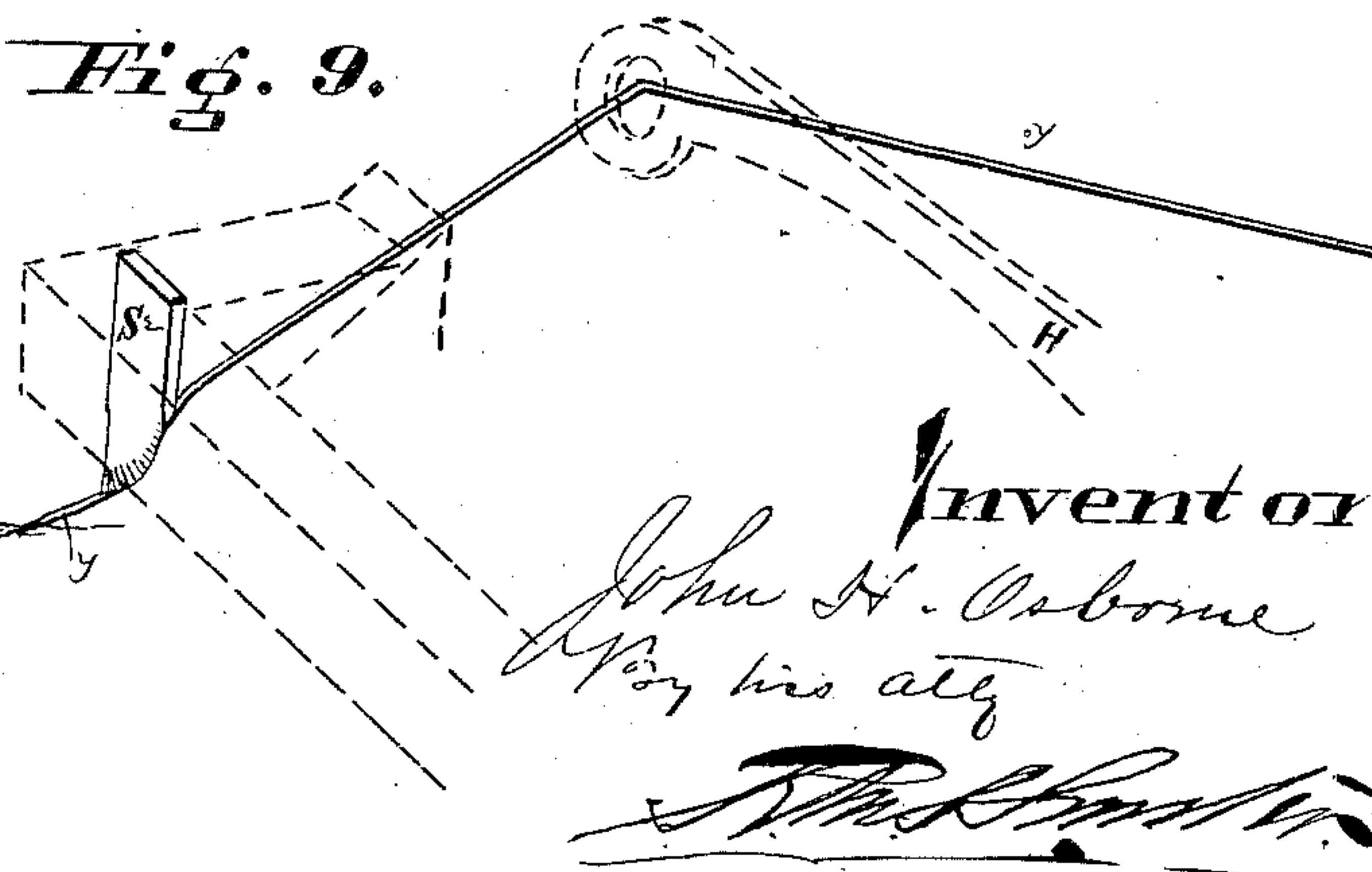


Fig. 9.



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UNITED STATES PATENT OFFICE.

JOHN H. OSBORNE, OF PHILADELPHIA, PENNSYLVANIA.

CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 277,603, dated May 15, 1883.

Application filed September 25, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. OSBORNE, of the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Circular-Knitting Machines, of which the following is a specification.

My invention has reference to automatic circular-knitting machines; and it consists in the mechanism hereinafter described, and particularly pointed out in the claims.

Heretofore in knitting-machines employing two or more reciprocating yarn-guides for the purpose of knitting a striped or variously-colored fabric, in the act of changing the colored yarns it has been found that in some cases the yarn supplied to the needles misses one or more of the said needles, causing defective spots or places in the knitted tube.

The object of my invention is to provide means which shall insure the ready and rapid passage of the fresh yarn to the needles and without missing said needles, thereby insuring a perfect product.

In the drawings, Figure 1 is a side elevation of my improved knitting-machine. Fig. 2 is also a side elevation of same, but looking from the opposite side thereof. Fig. 3 is a perspective view of the operating toothed wheels for the yarn-carriers. Fig. 4 is a cross-section of part of Fig. 1 on line *xx*. Fig. 5 is a skeleton view, showing the mechanism for changing the yarn and severing the same. Fig. 6 is a perspective view of the guide for guiding the yarn to the needles. Figs. 7 and 8 are perspective views of part of the machine to show more clearly the action of the mechanism associated with the needles. Fig. 9 is a detail view, showing the yarn and its relation to the severing-knife and other adjacent parts. Fig. 10 is an elevation of my improved tension device, and Fig. 11 is a sectional elevation of same.

A is the frame proper.

B is the knitting-machine cylinder, which is supported upon frame A.

C are the knitting-needles, which are carried in the usual manner in a head, D, to the bottom of which is secured a bevel-gear wheel, E, which meshes with the driving bevel-gear wheel E'.

Encircling the head D, and above wheel E, is the cam-cylinder F, provided with the cam *f*, grooved in its face. This cam-cylinder is provided with a spring-catch, which may consist of the bolt or pin *f'*, pressed in toward the head D by a spring, *f''*, and adapted to catch in holes *d d* in the said head D, and on diametrically opposite sides thereof. When the pin *f'* is drawn out of the hole *d* and the head D slightly turned, the pin rests against the lug *b*, secured to or forming part of the cylinder B, and the cam-cylinder is held stationary until the head D has made a semi-revolution, when it catches in the other hole *d* and is freed from lug *b*, and consequently rotates with the head D and its needles C. By this means the cam-groove *f* is changed with relation to the needles. This enables the cam-cylinder F to be turned so as to cause the defective spots, due to the changing of the yarns, to come on diametrically-opposite sides of the knitted tube.

G is a frame, which is secured to frame A, and carries at top in bearings or guides *g* the yarn-carriers H H', carrying yarn-guides *h² h²*, and provided on their ends with yarn loops or holes *h h'*. With the yarn-guides are also combined the tension devices, which consist of the uprights *h³*, which are secured to the yarn-carriers H H'. Secured to said uprights *h³* are springs *h⁴*, provided near the top with holes *h⁷*, through which a pin, *h⁶*, projects, and over which and between the uprights and springs the yarn is guided. Working through the part *h³* is a pin, *h⁵*, provided with a head arranged between spring *h⁴* and upright *h³*, the body of which pin projects through said upright and presses the head against the spring to press it away and free the yarn when the said pin is brought in contact with the cam H³.

h⁸ is a guide to bring the yarn in a proper position to be fed over the pin *h⁶*.

The carriers H H' are connected by rods *i i* to levers I I', carrying on their lower ends rollers I² and loosely pivoted on shaft J, and are drawn back by springs *i²* and pressed at their lower ends against the toothed or cam wheels L L', having teeth *l l'*, and which wheels are secured to the shaft K', supported in frame G.

To the end of shaft K' is secured a ratchet-wheel, P', having twice as many teeth as the

wheels L and L', respectively. A sliding bar, M, is guided in bearings *m* in frame G, and is reciprocated by a lever or arm, N, secured to a rock-shaft, N', working in bearings *n*, and
 5 rocked by lever N³, which is operated by cam-groove *f*.

Pivoted at *m'* to bar M is a pawl, M', one end of which works with the ratchet-wheel P, and the other is provided with an inverted-V-shaped lug, *m*², as shown.
 10

Working with the lug *m*² on pawl M' is an arm, M³, secured to or forming part of a sliding block, O, guided at O' in bar M, and provided on top with lug O², having an extension,
 15 O³. Working over this lug is a lever, K, provided with a notch, *k*, in which said lug works, this lever K being secured fast to shaft J and kept pressed down by a spring, *k'*.

The wheels L and L' have their teeth set
 20 alternately, so that when an *l* tooth presses out lever I the *l'* tooth allows lever I' to come in, or vice versa.

To the end opposite the ratchet-wheel P', and on shaft K', is a toothed wheel, L², having
 25 teeth *l*, curved on one side, said teeth being in number equal to those on the ratchet-wheel and double the number of those on the wheels L and L', respectively.

Arm S', loosely pivoted to the frame or shaft
 30 J, is provided on the bottom with a friction-roller, *s'*, which presses upon the rounded sides of the teeth *l*², and forces the straight sides of the tooth opposite against the ends of a bell-crank lever, S, pivoted to the frame G,
 35 and carrying on its horizontal arm a cutter or knife, S², and an incline clamp, S³. The lower end of lever S and arm S' are pressed toward the toothed wheel L² by spring *s*, and said mechanism, while it operates the clamp and
 40 knife, also locks the cam-wheels L L' after a portion of a revolution.

Loosely secured on the end of shaft K', or upon another pin, is a wheel, P², provided with
 45 teeth or sprockets *p*, which catch in the chain Q and positively move it. To this wheel P² is secured a ratchet-wheel, P, which is rotated by a pawl, N², operated by rock-shaft N', and pressed against the teeth of the ratchet-wheel by a spring, *n*², or simple gravity. If desired,
 50 the chain may be dispensed with and the wheel P be provided with the actuating-pins *q*. The pawl N² may be thrown out of contact with ratchet-wheel P by means of a pivoted finger, N⁴, which, when its lower end is resting
 55 in the deep notch N⁵ in the pawl, allows it to engage the ratchet-wheel, but which, when turned so as to catch in the shallow notches N⁶, causes the pawl to be raised clear of the ratchet-wheel. This is done when the tube is
 60 to be knitted all of one color, or when the pattern is to change to a length of one color and when the yarn-carriers will not be required to shift. A pawl, N³, and spring N' hold said ratchet-wheel P in a stationary position while
 65 the pawl N² is being reciprocated to catch another tooth. The teeth on the ratchet-wheel

and the sprocket-teeth *p* are equal in number; consequently the movement of each ratchet-tooth moves the chain one link.

The pattern is made by varying the number of
 70 pins between any two links without pins, as *q'*.

Secured to shaft J is an arm, R, provided at the bottom with an inclined face, *r*, in the path of the chain-pins.

Secured to the cylinder B is the cloth-presser
 75 U, which is provided with an inclined clamp-surface, *u*, which corresponds to the part S³ on lever S, and directly opposite to said clamp-surface and on the other side of the needle C is the yarn-guide T, which is secured rigidly
 80 to the frame or cylinder B at the bottom, and is provided at the top with open guide-notches *t* and inclined prong or foot *t'*. This guide for the yarn insures its being caught by the needles which rise and fall at this place.
 85

Briefly the operation is as follows: The machine being set to knit with white and blue yarn, and the said yarns being passed from the bobbins or spools through the tension-guides *h*³ and through the holes *h* *h'*, respectively, of the yarn-carriers H H', and the white
 90 yarn *y* being held by the clamp S³ *u*, and the blue yarn *z* being caught by the needles C, the machine is set in motion by the bevel-wheel E'. The head D and its needles C, as well as
 95 the cam-cylinder F, rotates, causing the needles to knit with the blue yarn as they move around with the head, drawing the said blue yarn through the hole *h'*, around the guide-notch *t*, and under the hooks of the needles, as
 100 shown in Fig. 7. The shifting mechanism shown, but forming subject-matter of a previous patent granted to me, the number of which is 258,593, and date May 30, 1882, being actuated to shift the yarn-carriers H H', it lifts
 105 the clamp S³ and raises knife S² and reciprocates yarn-carriers H H', throwing the latter forward and the former back, throwing the blue yarn into the clamp and the white yarn
 110 into the needles and guide *t*. Upon this action being accomplished the levers I I' once more remain stationary. In the act of throwing the white yarn into the needles and the blue yarn out, or vice versa, both yarns, for a
 115 short space of time and while several needles are passing, are being knitted together; but just as soon as the blue yarn is thrown out it is caught by the clamp S³ *u*, and as the needles draw the knitted tube around it is pressed
 120 against the knife S² and cut. This is shown in Figs. 8 and 9. When the yarn-carrier is drawn back the tension on the yarn is removed after it has been drawn through the needles, and is then fed freely. The yarn of the yarn-carrier which is forward is under tension, and
 125 remains so until the carrier is drawn back. In either direction of movement the yarn is put under tension immediately after leaving its feeding-position to be drawn quickly between the needles.
 130

The mechanism for actuating the yarn-carriers referred to above as patented to me is

also combined with knitting mechanism, and forms in such combination subject-matter of a pending application filed April 11, 1882. Therefore in this application I make no claim to such devices, broadly.

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

1. The needles of a knitting-machine and their actuating mechanism, in combination with mechanism to guide the different colored yarns into or out of the needles, mechanism to cause the latter to throw one colored yarn into the needles and another colored yarn out of the needles, and tension devices adapted to put the yarns under tension while changing the color, but which allows the yarn to be fed freely to the needles after the shifting operation, substantially as and for the purpose specified.

2. The needles of a knitting-machine and their actuating mechanism, in combination with mechanism to guide the different colored yarns into or out of the needles, mechanism to intermittently actuate said guide mechanism to cause the latter to throw one colored yarn into the needles and another colored yarn out of the needles, a clamp to hold the end of the yarn which is thrown out of the needles, and a tension device which puts the yarn under tension while being passed from one side of the needles to the other, but which frees the yarn as soon as the yarn carrier or guide is in position to feed the yarn to the needles, substantially as and for the purpose specified.

3. The needles of a knitting-machine and their actuating mechanism, in combination with mechanism to guide the different colored yarns into or out of the needles, mechanism to intermittently actuate said guide mechanism to cause the latter to throw one colored yarn into the needles and another colored yarn out of the needles, a clamp to hold the end of the yarn which is thrown out of the needles, a knife or cutter to sever said clamped yarn between the clamp and knit tube, and a tension device which puts the yarn under tension while being passed from one side of the needles to the other, but which frees the yarn as soon as the yarn-guide is in position to feed the yarn to the needles, substantially as and for the purpose specified.

4. The needles of a knitting-machine and their actuating mechanism, in combination with mechanism to guide the different colored yarns into or out of the needles, mechanism to

intermittently actuate said guide mechanism to cause the latter to throw one colored yarn into the needles and another colored yarn out of the needles, means to control said automatic mechanism and change its time of action on said guide mechanism, and an intermittent tension device which puts the yarn under tension while being passed from one side of the needles to the other, but which frees the yarn as soon as the yarn guide or carrier is in position to feed the yarn to the needles, substantially as and for the purpose specified.

5. The needles of a knitting-machine and its actuating mechanism, in combination with mechanism to guide the different colored yarns into or out of the needles, mechanism to intermittently actuate said guide mechanism to cause the latter to throw one colored yarn into the needles and another colored yarn out of the needles, automatic pattern mechanism to control and govern the intermittent actions of said automatic mechanism upon said guide mechanism, and tension devices which act intermittently to put the yarn under tension while being passed from one side of the needles to the other, but which frees the yarn as soon as the yarn guide or carrier is in position to feed the yarn to the needles, substantially as and for the purpose specified.

6. The combination of rotating head D, carrying knitting-needles C, and cam-groove *f* with reciprocating yarn-carriers H H', cam-wheels L L', intermediate mechanism, automatic mechanism to intermittently rotate said cam-wheels, and tension devices *h*², adapted to act intermittently, substantially as and for the purpose specified.

7. The combination of the needles of a knitting-machine and their actuating mechanism with yarn-carriers H H', tension devices *h*², adapted to act intermittently, clamp S³ *u*, and knife S², substantially as set forth.

8. The combination of the needle-bed and needles, yarn-carriers, pattern mechanism provided with ratchet-wheel, a cam, a bell-crank provided with a pivoted piece, N⁴, and a pawl to actuate said ratchet-wheel, having deep notch N⁵ and shallow notch N⁶, substantially as set forth.

In testimony of which invention I hereunto set my hand.

JOHN H. OSBORNE.

Witnesses:

LOUIS J. MATOX,
JOSEPH NOLAN.