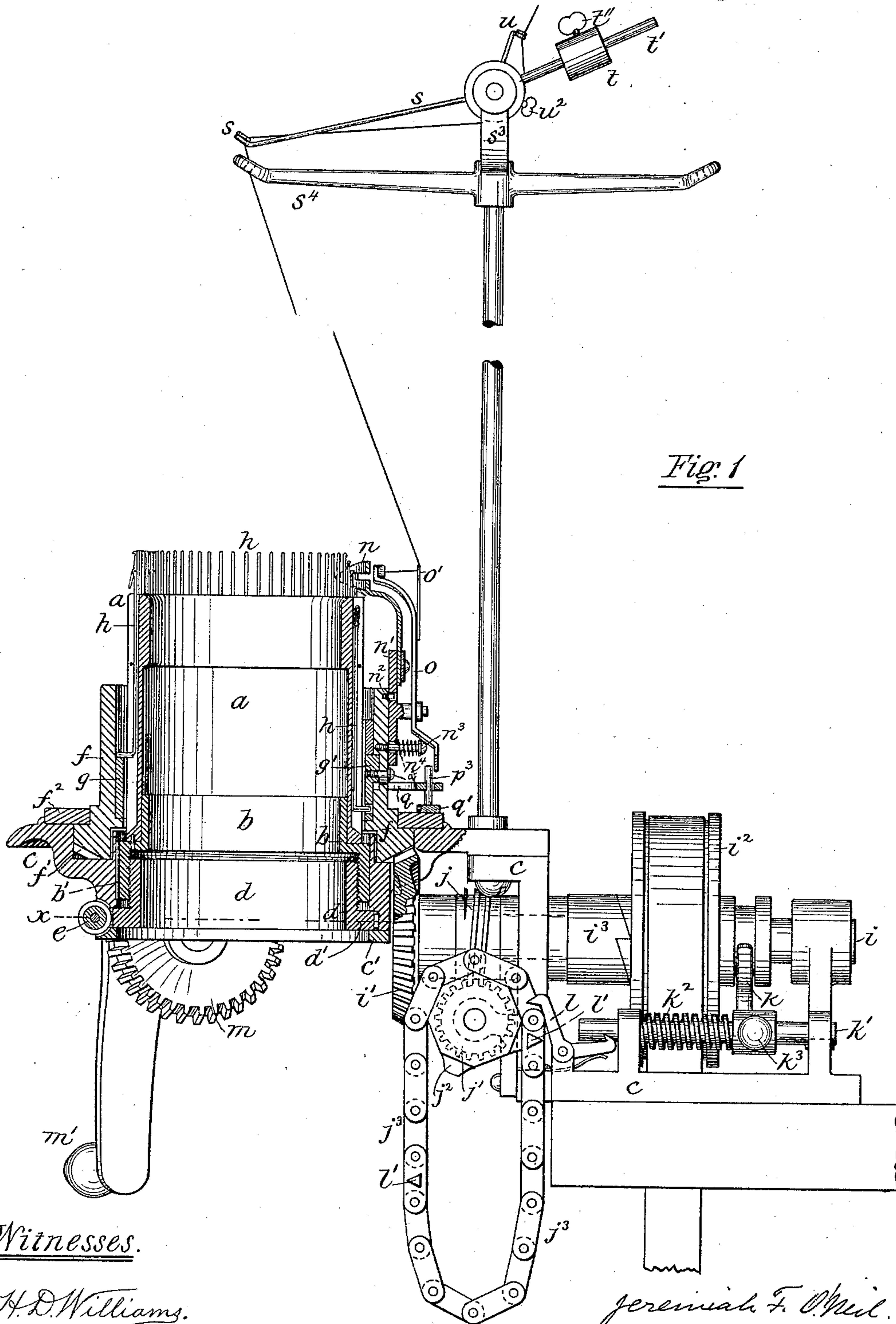


J. F. O'NEIL.
CIRCULAR KNITTING MACHINE.

No. 387,251.

Patented Aug. 7, 1888.



Witnesses.

H. D. Williams.
W. H. Mersman.

Jeremiah F. O'Neil.
Inventor
per Alfred Hedlock.
Atty.

(No Model.)

4 Sheets—Sheet 2.

J. F. O'NEIL.
CIRCULAR KNITTING MACHINE.

No. 387,251.

Patented Aug. 7, 1888.

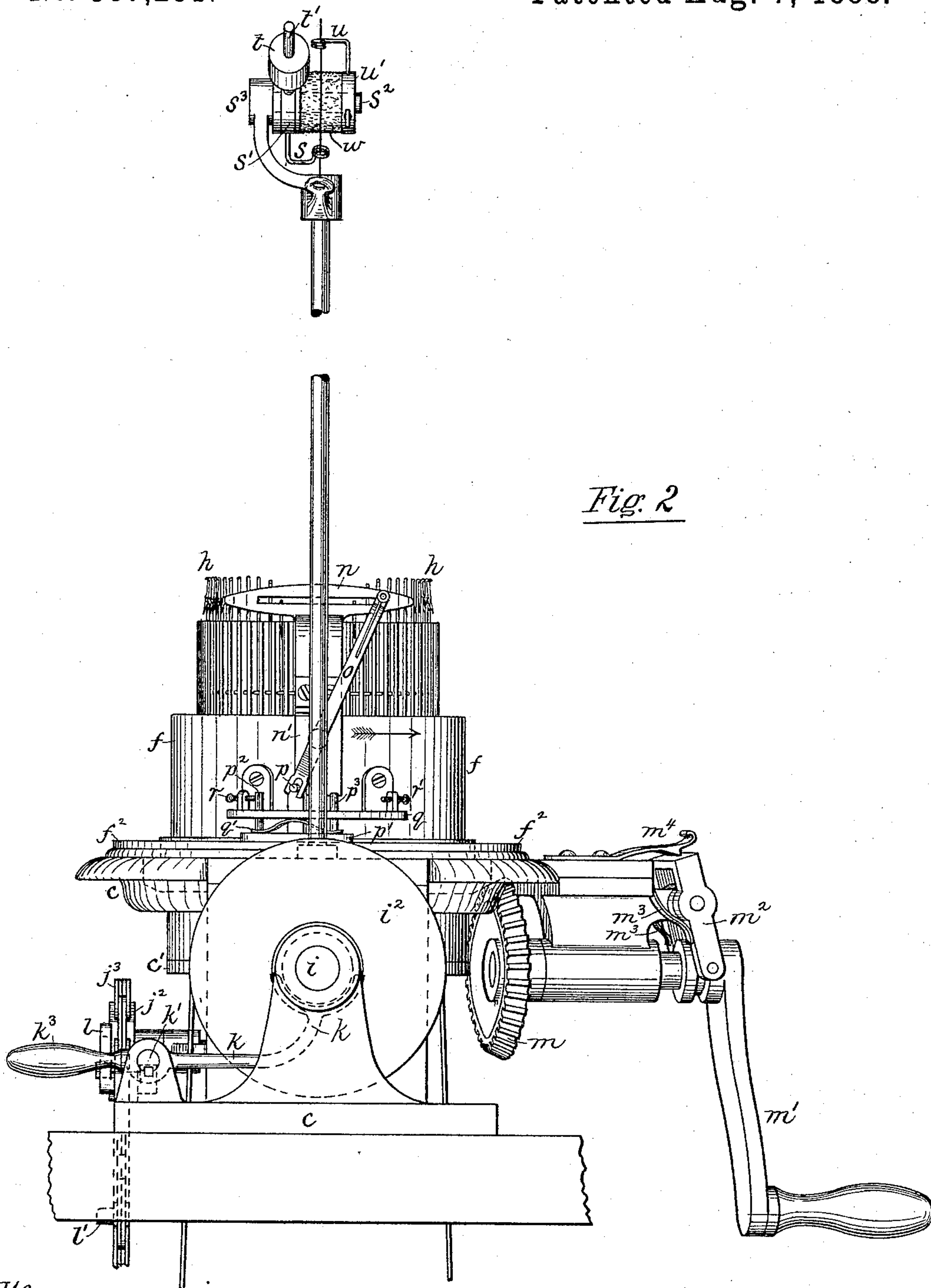


Fig. 2

Witnesses.

H. D. Williams.
Wm. H. Merriam.

Jeremiah F. O'Neil.
Inventor
per Alfred Skedlock.
att'y.

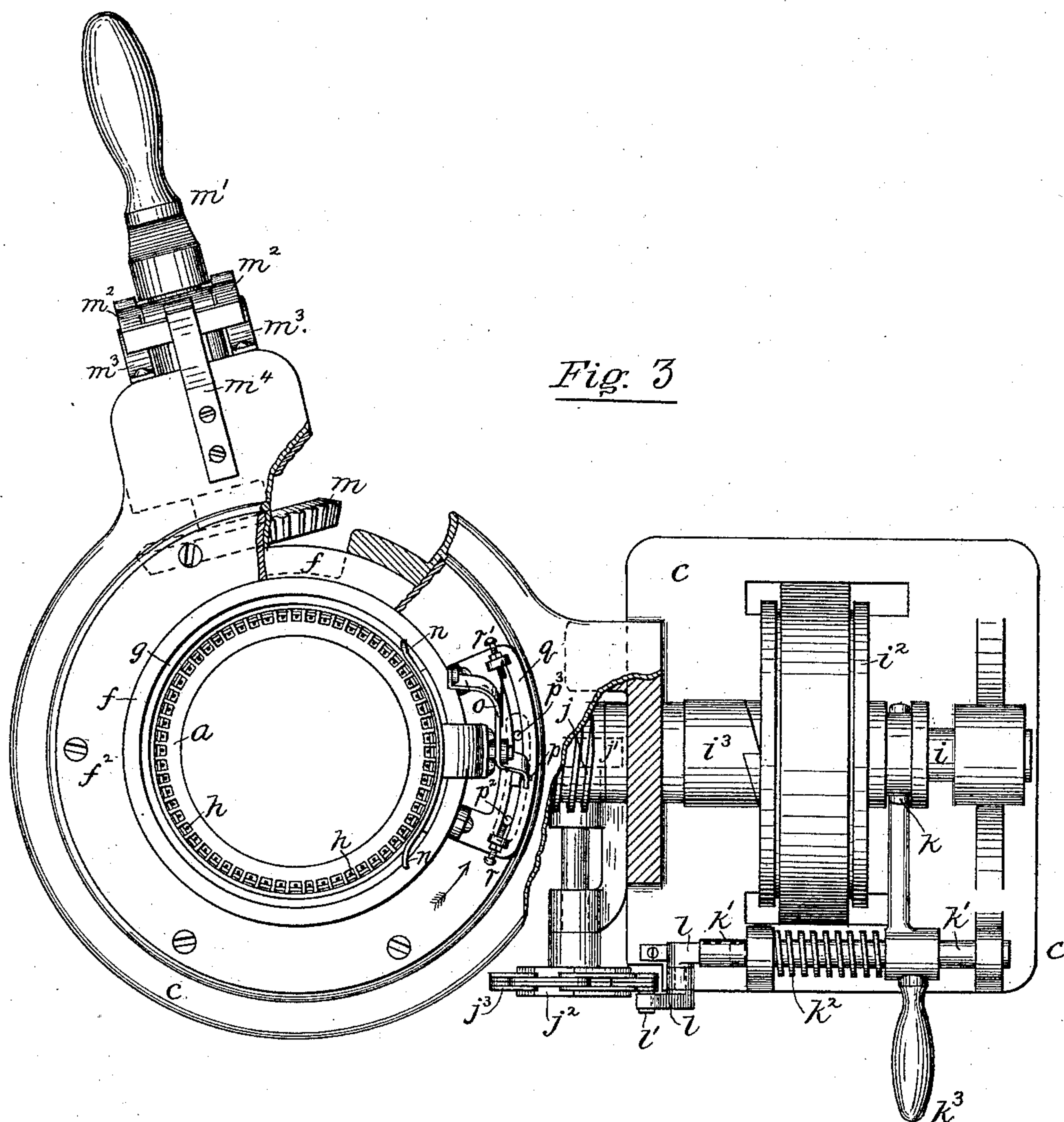
(No Model.)

4 Sheets—Sheet 3.

J. F. O'NEIL.
CIRCULAR KNITTING MACHINE.

No. 387,251.

Patented Aug. 7, 1888.



Witnesses.

H. D. Williams.
W. H. Mercereau.

Jeremiah F. O'Neil.

Inventor.

per Alfred Sherlock.
Atty.

J. F. O'NEIL.
CIRCULAR KNITTING MACHINE.

No. 387,251.

Patented Aug. 7, 1888.

Fig. 5

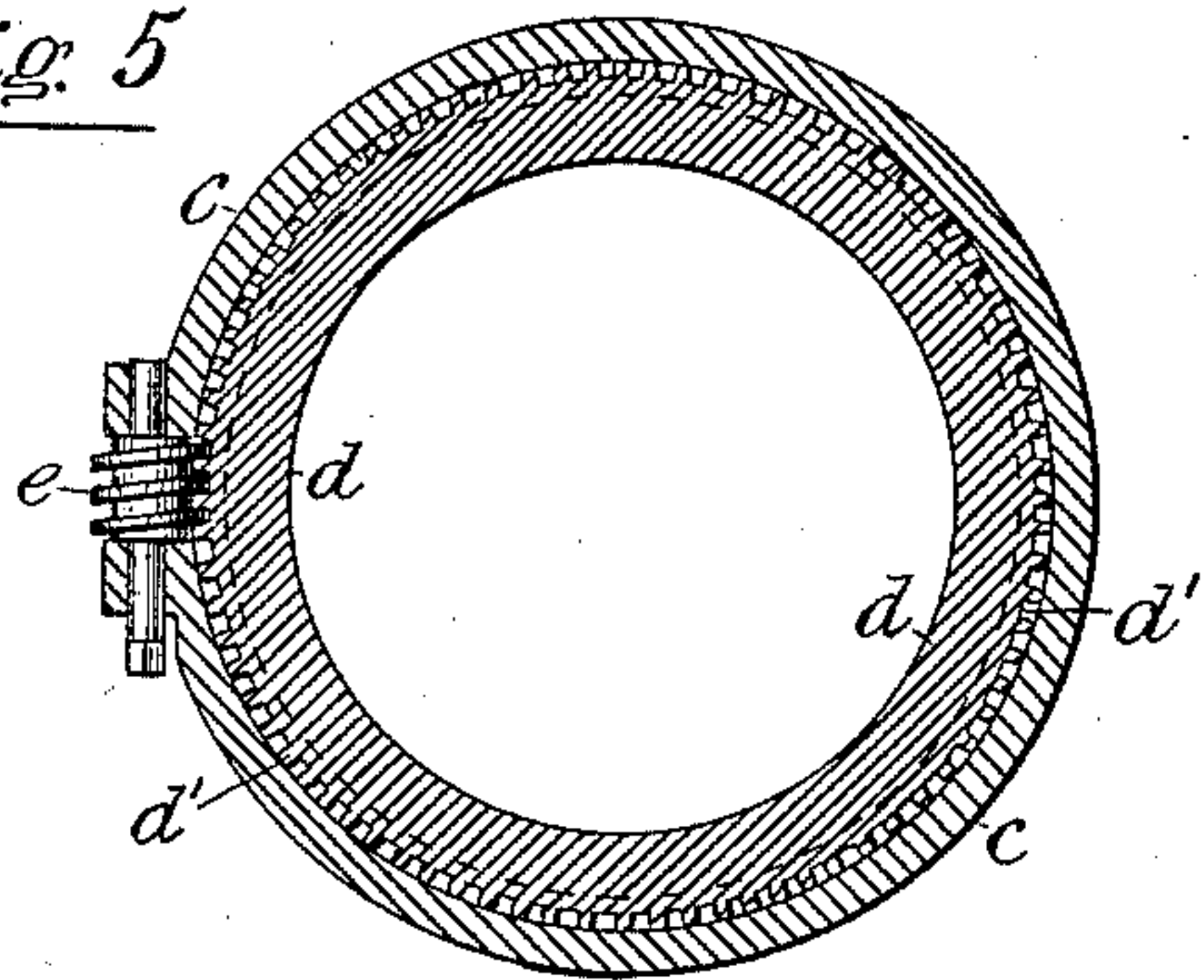


Fig. 4

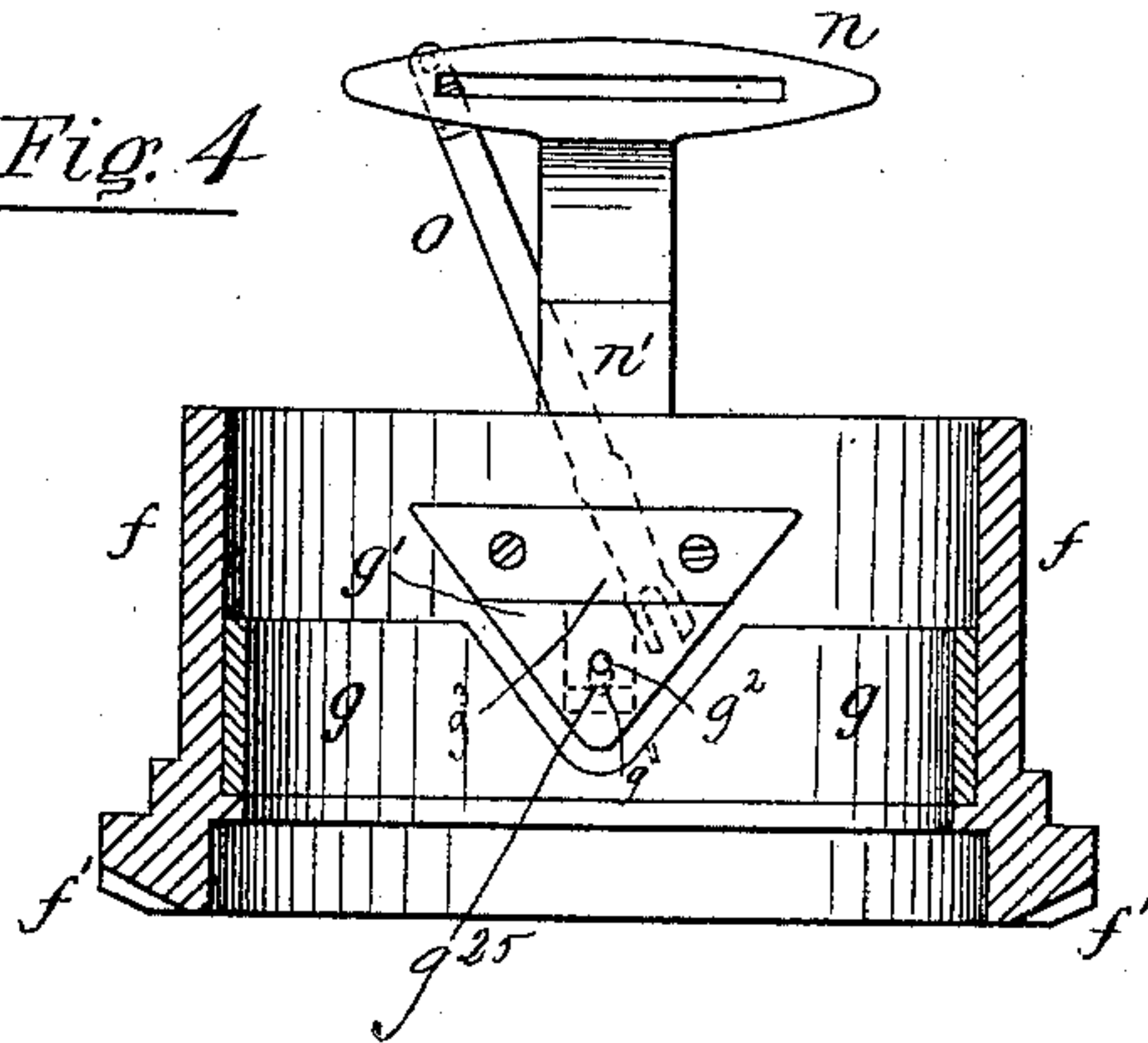


Fig. 6

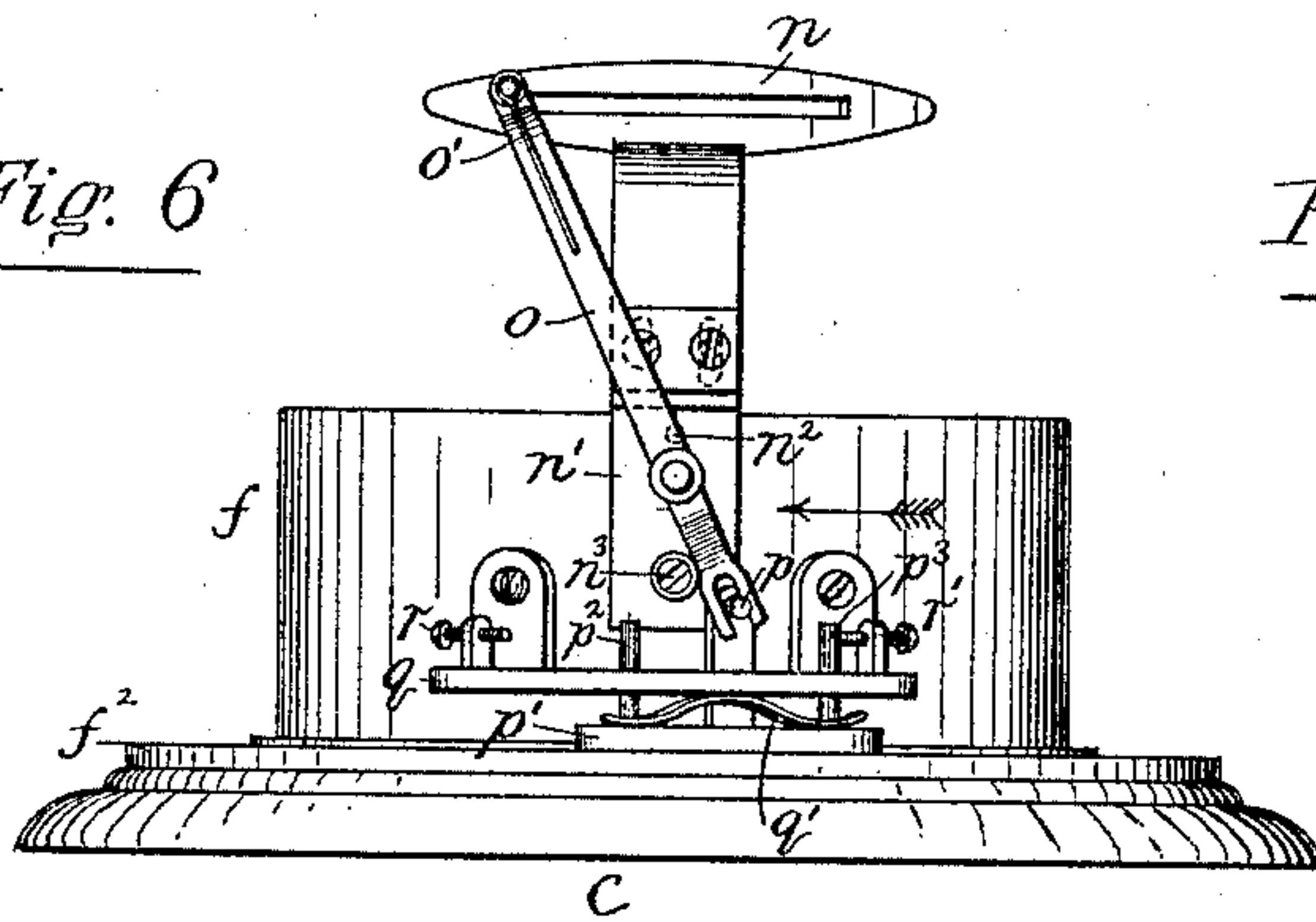
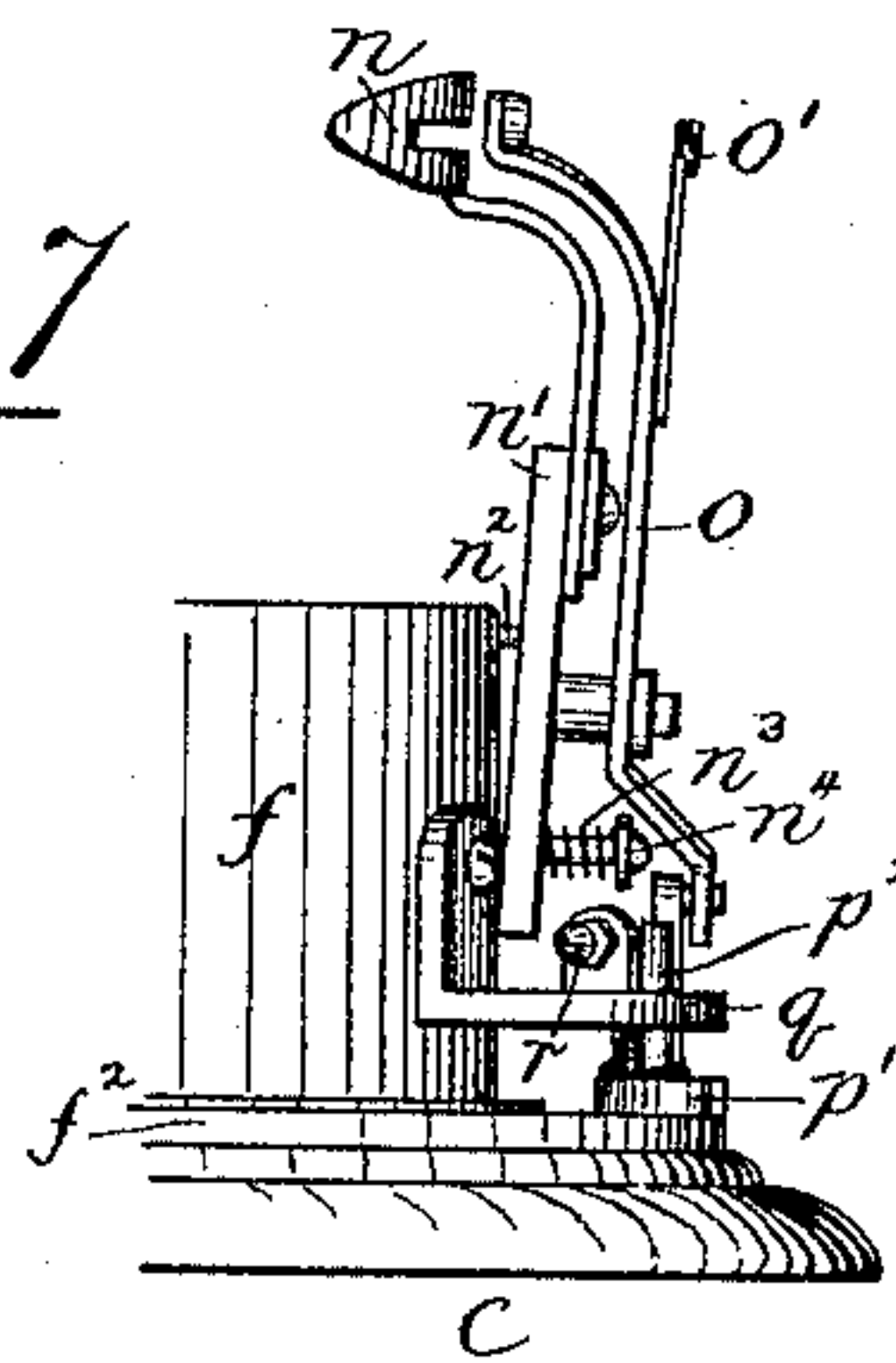


Fig. 7



Witnesses.

H. D. Williams,
Wm. H. Mercereau.

Jeremiah F. O'Neil.

Inventor.

per Alfred Sheelock,
Atty.

UNITED STATES PATENT OFFICE.

JEREMIAH F. O'NEIL, OF NEW YORK, N. Y.

CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 387,251, dated August 7, 1888.

Application filed April 20, 1887. Serial No. 235,451. (No model.)

To all whom it may concern:

Be it known that I, JEREMIAH F. O'NEIL, a citizen of the United States, residing at New York, county and State of New York, have
5 invented certain new and useful Improvements in Circular-Knitting Machines, of which the following is a specification.

The improvements in circular-knitting machines forming the subject-matter of this in-
10 vention comprise an automatic stop-motion, whereby the continuous driving device is disconnected at certain determined intervals when given lengths of circular knitting have been performed, to allow of a reciprocating
15 movement being imparted to the cam-cylinder by means of a crank-handle provided with a driving-gear held out of action during the knitting of the continuous circular parts of the goods; a movable yarn guide or carrier in
20 conjunction with a single V-shaped cam for operating the needles, said yarn-guide being controlled and held in leading position to the cam in whatever direction it is rotated by means of a friction plate or shoe held in con-
25 tact with the fixed frame of the machine, and improvements in the stitch-regulating device shown in Letters Patent No. 349,448, dated September 21, 1886.

By reference to the accompanying drawings
30 and the following description thereof a full understanding of my present improvements in knitting-machines will be had.

Figure 1, Sheet 1, is a side elevation of my improvements in knitting-machines, showing
35 the cylinders and parts adjacent thereto in section. Fig. 2, Sheet 2, is a rear elevation of the machine. Fig. 3, Sheet 3, is a plan view of the same with the frame partly broken away and a portion of the machine removed.
40 Fig. 4, Sheet 4, is a central sectional view of the cam-cylinder, also showing the yarn-guide. Fig. 5, Sheet 4, is a section on the line $x x$, Fig. 1, partly in elevation. Fig. 6, Sheet 4, is a detached view of the cam-cylinder and
45 part of the frame and yarn-guide; and Fig. 7, Sheet 4, is a side elevation of a portion of the same.

The improvements by which variations in the length of the stitches may be readily made
50 embrace features of construction similar to those found in the before-mentioned Letters Patent No. 349,448—viz., a rotary nut fitted

into the lower end of the base-ring, to which the needle-cylinder is attached, by the manipulation of which the needle-cylinder is raised 55 and lowered. In said patent these parts, together with the cam-ring, are fitted into the under side of the base plate or frame of the machine, which necessitates removing the machine from its support when it is desired to change 60 the needle-cylinder, &c.

My present invention embraces new features of construction, whereby such changes may be made without removing the machine, and a finer adjustment of the needle-cylinder is 65 obtained.

The needle-cylinder a is secured by steady-pins to the base-ring b , which fits into a cylindrical opening in the frame c , but is prevented from rotating therein by the key b' . 70 The inside of the base-ring b is threaded, and into it is fitted the hollow nut d , having a flange, d' , by which it is held in a recess formed in the lower end of the cylindrical opening in the frame by means of the ring c' , secured to 75 the frame c .

On the periphery of the flange d' of the nut d are formed worm-teeth, into which meshes the worm e , held in bearings on the frame c , as shown in Figs. 1 and 5. This worm e is 80 rotated by means of a suitable key set over the square end of its shaft, thereby causing the nut d to rotate and act on the base-ring b to raise or lower the needle-cylinder a , according to the direction of rotation of the worm e . 85 By this means the needle-cylinder may be adjusted to a nicety and the desired length of stitch formed with precision.

In an annular recess formed in the upper face of the frame is located the cam-cylinder 90 f , having the bevel-teeth f' formed on its lower edge and held in place by the ring f^2 , secured by screws to the frame c .

On the inside of the cam-cylinder f is secured the cam g , having a V-shaped fall and rise, 95 which acts on the feet of the needles h to draw them down and raise them up during the formation of the stitches. The part g' of the cam, which constitutes the upper portion of the V-shaped depression, is held by a screw, g^2 , passing 100 through a vertical slot, g^{25} , in the cylinder f , as shown in Figs. 1 and 4, and is adapted to be moved down, so as to fill the V-shaped depression and open a path for the feet of the

needles between its upper surface and the lower surface of the fixed piece g^3 in line with the other parts of the cam, thus allowing the cam-cylinder to be rotated without actuating any of the needles, which condition is required in working the machine when a piece of goods is to be picked on or set over the needles. The inclined faces of the piece g^3 form continuations of the inclined faces of the movable part g' when this part is in its upper position, and insure proper guidance of the needles.

By avoiding the use of springs and latches in the cam, such as are used in other machines of this class, the breakage of the needles is thereby greatly reduced. The use of a single V-shaped positive-acting cam in rotary-knitting machines calls for a yarn carrier or guide adapted to present the yarn to the needles at the right angle when the cam changes its direction of rotation. Such a device will be hereinafter described.

On the end of the shaft i , fitted to rotate in bearings on the frame c , is secured the bevel-pinion i' , which meshes into the bevel-wheel f' , and behind the pinion i' is located the worm j , working into the worm-wheel j' , secured to a shaft carrying the sprocket-wheel j^2 , over which runs the controlling-chain j^3 . The shaft i is driven by a belt passing over the pulley i^2 , connected to the shaft by the clutch i^3 . This pulley i^2 rotates freely on the shaft when the clutch i^3 is disconnected, and is controlled by a shifter composed of a fork, k , fitting into a circumferential groove formed in the hub of the pulley i^2 and carried by the sliding bar k' , fitted to slide in standards on the frame c and provided with a spring, k^2 , which normally acts thereon to disengage the clutch i^3 . When the pulley i^2 is moved by manipulating the handle k^3 , projecting from the bar k' , so as to engage the clutch i^3 , the hooked end of the spring-actuated bell-crank lever l catches into a notch formed in the bar k' and holds it back against the action of the spring k^2 . The other end of the bell-crank lever l is bill-shaped, and is arranged so as to be in close proximity to the chain j^3 , which is provided with projecting lugs l' , adapted to act on the lever l as they move past its bill-shaped end and turn its hooked end away from the bar k' , thus allowing the spring k^2 to act to throw the pulley i^2 laterally and disengage the clutch i^3 . By the use of this automatic stop-motion each article made of a certain kind contains a given number of stitches, determined by the length of the chain j^3 , and the machine is stopped during the process of making an article at certain parts thereof, determined by the number and position of the lugs l' on the chain j^3 —as, for instance, in stockings or socks the leg portion is formed by a continuous rotation of the machine, and when the part where the heel is to be formed is reached the machine stops, the formation of the heel then being performed by turning the machine backward and forward. This is accomplished by means of the bevel-pinion m , secured to the shaft of the

crank-handle m' , which is located in convenient position to be actuated by the left hand of the operator. This bevel-pinion m is normally out of gear with the bevel-wheel f' of the cam-cylinder, it being so held by the double lever m^2 , having pins fitting into a circular groove formed in the hub of the handle m' and actuated by the springs m^3 . A spring-catch, m^4 , slips over the top edge of the lever m^2 and holds the bevel-pinion m in gear with the bevel-wheel f' when the handle m' is pressed in by the operator after the automatic stop-motion has acted. As soon as the manual part of the work is performed, the bevel-pinion m is thrown out of gear by simply raising the spring-catch m^4 . The spring m^3 , then acting on the lever m^2 , causes the shaft of the bevel-pinion m and handle m' to slide in its bearings. To again start the machine for circular knitting, the members of the clutch i^3 are disengaged by moving back the handle k^3 of the bar k' until the notch in the bar comes over the hooked end of the bell-crank lever l , so as to be held thereby. The machine is now rotated continuously in one direction until the next lug l' on the chain j^3 disengages the lever l from the bar k' .

The improved yarn guide or carrier devised by me, adapted to co-operate with the positive-acting V-shaped cam and other parts of the machine, consists of the guard n , located, in close proximity to the needles h , over the V-shaped part g' of the cam, and having a long slot, through which the yarn passes, as shown at Figs. 2, 4, and 6. It is secured to the plate n' , which is attached to the cam-cylinder f by the steady-pin n^2 and screw n^3 , between the head of which and the plate n' is placed the spiral spring n^4 . This allows the guard n and attached parts to be set back, when it is desired to remove the needle-cylinder from the machine, by pressing the plate n' off the steady-pin n^2 against the action of the spring n^4 and turning the plate sidewise on the screw n^3 as a center, so that its face will rest against the end of the steady-pin n^2 , as shown at Fig. 7.

On a stud projecting from the plate n' is pivoted the yarn-guide o , having an eye in its upper end located behind the slot in the guard n , and through which the yarn passes. It is necessary that this yarn guide o shall lead the cam g' in either of its directions of rotation, so as to present the yarn properly to the needles, as shown in Figs. 2, 4, and 6, the arrows thereon indicating the direction of rotation of the cam-cylinder. To cause the eye end of the guide o to shift from one end of the guard n to the other when the direction of movement of the cam-cylinder f is changed, the lower end of the yarn-guide o is slotted and fits over the pin p , carried by a lug projecting up from the friction-shoe p' . This friction-shoe p' rests on the ring f^2 , and is controlled by two pins, p^2 p^3 , projecting up therefrom through a segmental slot in the plate q , secured to the cam-cylinder f , the pressure of the shoe p' on the ring f^2 being determined by the spring q' ,

placed between the shoe p' and the plate q , and held in position by fitting over the lug which carries the pin p . Stop-screws rr' pass through lugs at the ends of the plate q , and determine the position of the eye end of the yarn-guide o by acting as adjustable stops for the pins $p^2 p^3$ of the shoe p' .

The operation of this yarn-guide will be readily understood by referring to Figs. 2 and 6, the pivotal center of the guide o being in the same vertical line with the part g' of the cam, as clearly shown in Fig. 4 by dotted lines. In Fig. 2 the cylinder f is rotated toward the right hand, as indicated by the arrow, the friction-shoe p' now being carried around on the ring f^2 by the stop-screw r acting against the pin p^2 . Now, when the cylinder f is stopped and rotated in the opposite direction, the screw r moves away from the pin p^2 , the shoe p' remaining stationary on the ring f^2 until the screw r' strikes the pin p^3 , when the shoe again moves with the cylinder f , the eye end of the yarn-guide o being then at the other end of the guard n , leading the cam g' , as shown at Fig. 6.

The guide o is provided with a rear eye, o' , for holding the yarn away from the needles and preventing it from catching in the needles, which are moved up out of active position when the cam-cylinder is reciprocated, and during such use of the machine it is necessary to take up the slack of the yarn. For this purpose the take-up and tension regulating device at the upper part of the machine is employed; and it consists of the arm s , provided with a hole at its end and projecting from the collar s' , fitted loosely on the stud s^2 , secured to the standard s^3 , a counter-weight, t , adjustably held by means of a set-screw, t' , on the rod t' , projecting from the other side of the collar s' , a loop or eye, u , carried by the sleeve u' , secured to the stud s^2 by a set-screw, u^2 , and a felt or other suitable covering, w , placed on the sleeve u' . The eye u extends over the felt w , so as to guide the yarn thereto, said felt offering a certain amount of frictional resistance to the yarn as it is drawn over the surface of the felt, the extent of this surface being regulated by the position in which the eye u is set. The yarn is passed through the eye u , around the felt surface w , through the pivoted arm s , the stationary arm s^4 , to the rear eye, o' , of the guide and to the needles h through the guide o and the slot in the guard n .

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

1. In a circular-knitting machine, in combination, the main frame provided with a cylindrical opening, a base-ring fitted to slide longitudinally therein and provided with an internal screw-thread, a needle-cylinder attached to the base-ring, a hollow nut fitting into the screw-thread of the base-ring and having a flange provided with worm-teeth, and a worm fitted to rotate in bearings on the

frame and meshing into the worm-teeth of the nut, substantially as and for the purpose set forth.

2. In a circular-knitting machine, the combination of a cam-cylinder provided with bevel-teeth, a driving-shaft provided with a pinion working therein, a worm on the driving-shaft, a shaft provided with a sprocket-wheel arranged in bearings at right angles to the driving-shaft, a worm-wheel secured to this shaft, a pattern-chain provided with projecting lugs carried by the sprocket-wheel, a driving-pulley and a clutch on the driving-shaft, a spring-actuated sliding shifter, and a bell-crank spring-actuated catch locking the shifter to hold the clutch and pulley in gear and actuated by the lugs on the pattern-chain to release the shifter, substantially as and for the purpose set forth.

3. In a circular-knitting machine, in combination, a cam-cylinder provided with bevel-teeth, two bevel-pinions arranged to act thereon, a crank-handle shaft carrying one of the bevel-pinions, a spring-actuated lever normally holding this pinion out of gear, a driving-shaft carrying the other bevel-pinion, which is always held in gear with the wheel, and means, substantially as described, for automatically stopping the driving-shaft.

4. In a circular-knitting machine, in combination, a cam-cylinder provided with bevel-teeth, a crank-handle and shaft provided with a bevel-pinion, a spring-actuated lever for holding the pinion away from the bevel-wheel, and a spring-catch acting on the lever to hold the pinion in gear with the bevel-wheel, substantially as set forth.

5. In a circular-knitting machine, in combination, a needle-cylinder, needles carried thereby, a cam-cylinder provided with a single V-shaped cam and surrounding the needle-cylinder, a guard having a long slot carried by the cam-cylinder, a yarn-guide pivoted behind the guard, a fixed frame in which the cam-cylinder is held, and a friction-shoe held in contact with the fixed frame and arranged to act on the lower end of the pivoted yarn-guide, so as to throw its upper end into position to lead the cam on the cam-cylinder, substantially as and for the purpose set forth.

6. In a circular-knitting machine, in combination, a rotating cam-cylinder, a single V-shaped cam in the interior thereof, a guard having a long slot and a pivoted yarn-guide carried by the cam cylinder, a fixed frame in which the cam-cylinder is held, a friction-shoe resting on the fixed frame, a pin connecting the friction-shoe to the lower end of the yarn-guide, a plate fastened to the cam-cylinder and having a circular slot, and a spring between the shoe and the plate, substantially as set forth.

7. In a circular-knitting machine, in combination, a fixed frame, a cam-cylinder fitted to rotate therein, a pivoted yarn guide carried by the cam-cylinder, having an eye at its upper end and a slot in its lower end, a friction-shoe

having a pin engaging in the slot in the guide, a driving-plate having a circular slot and two adjustable stops, located above the shoe, a spring located between the driver and the shoe, and two pins projecting from the shoe through the slot in the driver, against which the adjustable stops on the driver act, substantially as set forth.

8. In a circular-knitting machine, in combination, the needle-cylinder *a*, the needles *h*, held therein, the cam-cylinder *f*, the cam-ring *g*, secured thereto, having the single V-shaped depression, the piece *g'*, and the V-shaped part

g', adjustably secured to the cam-cylinder by the screw *g''*, passing through a slot in the cam-cylinder and fitted to slide down to open a straight path for the feet of the needles, whereby all the needles are held up in one plane, substantially as and for the purpose set forth. 15

Signed at New York, county and State of New York, this 4th day of April, 1887. 20

JEREMIAH F. O'NEIL.

Witnesses:

ALFRED SHEDLOCK,
H. D. WILLIAMS.