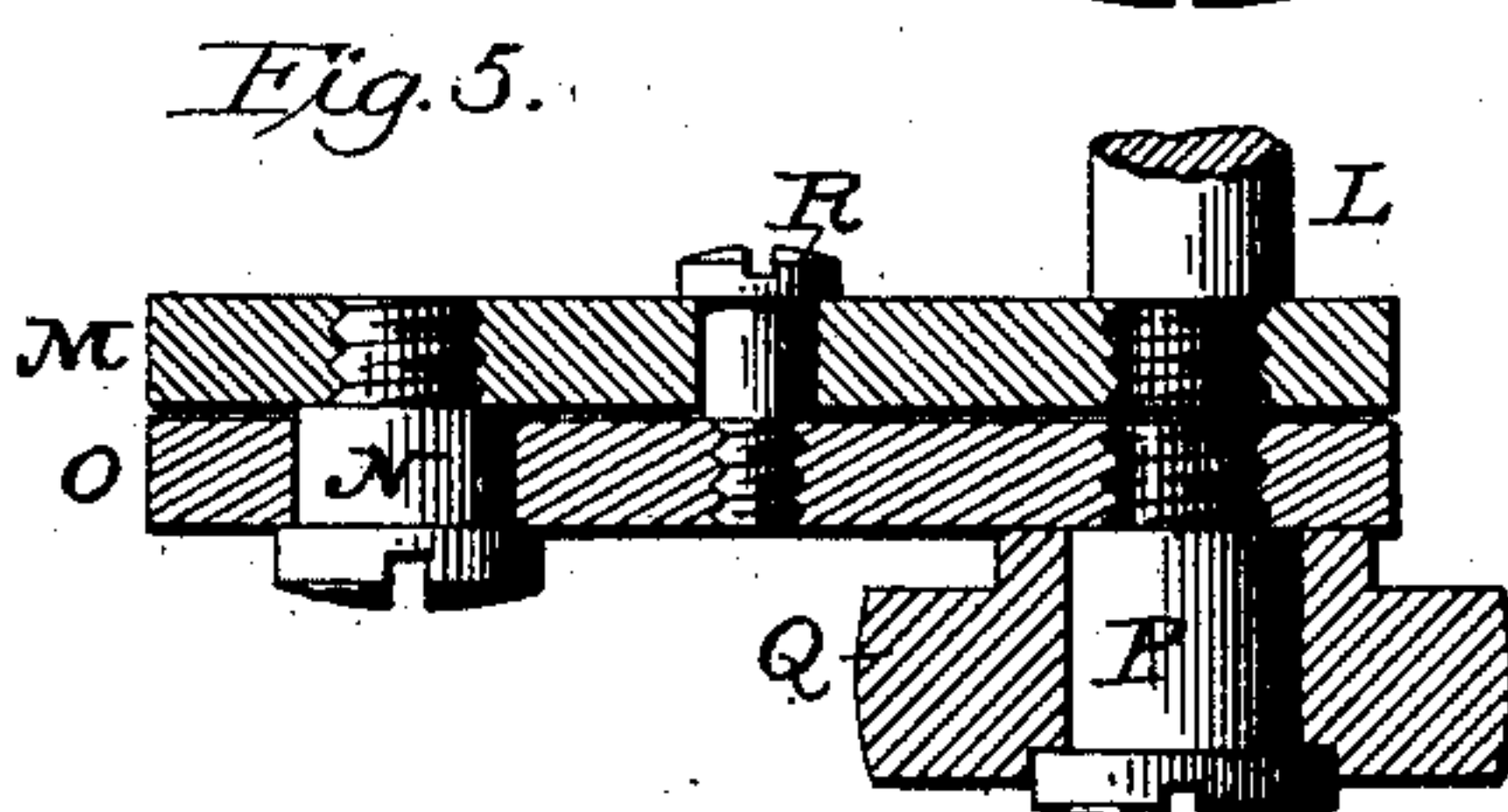
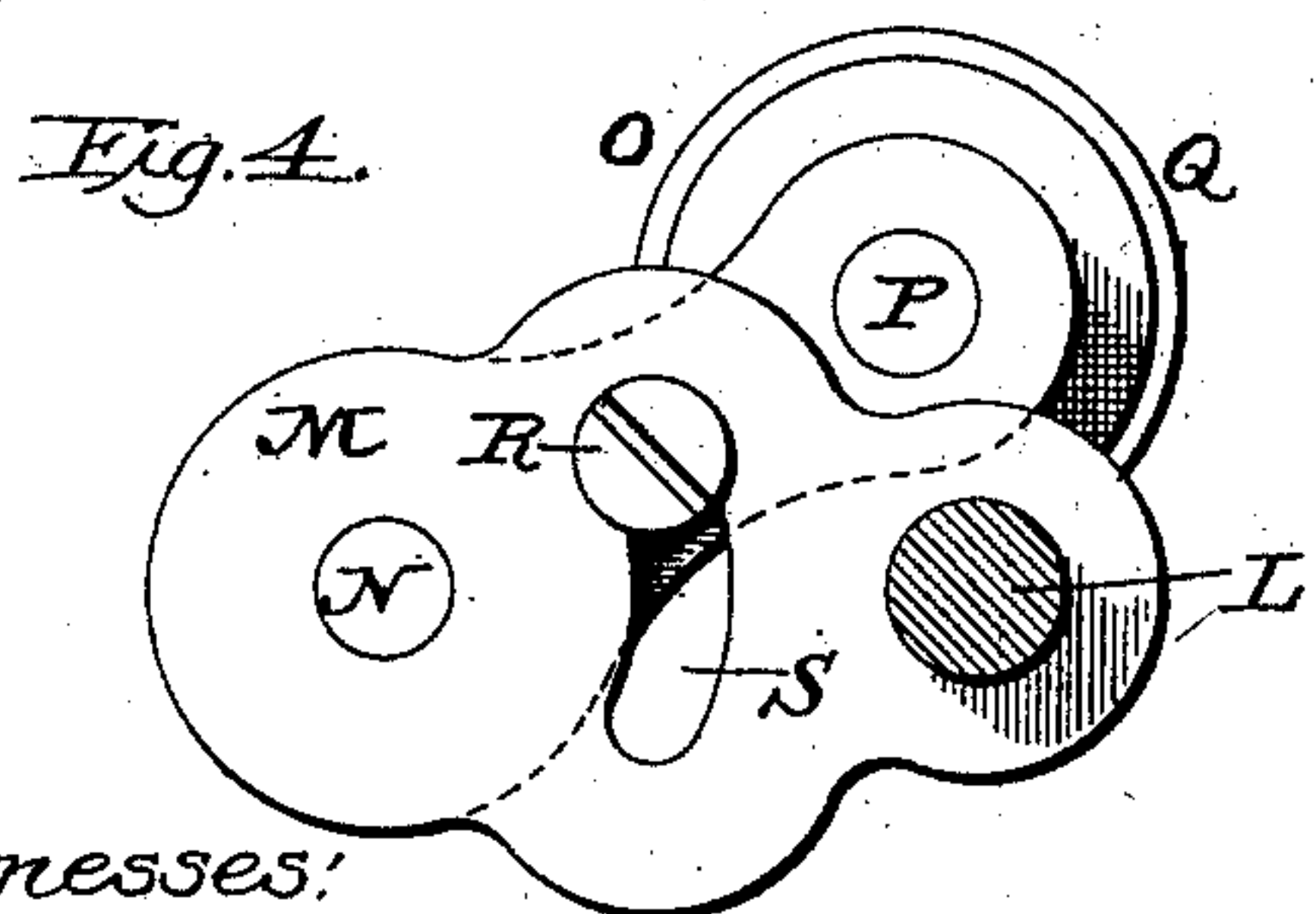
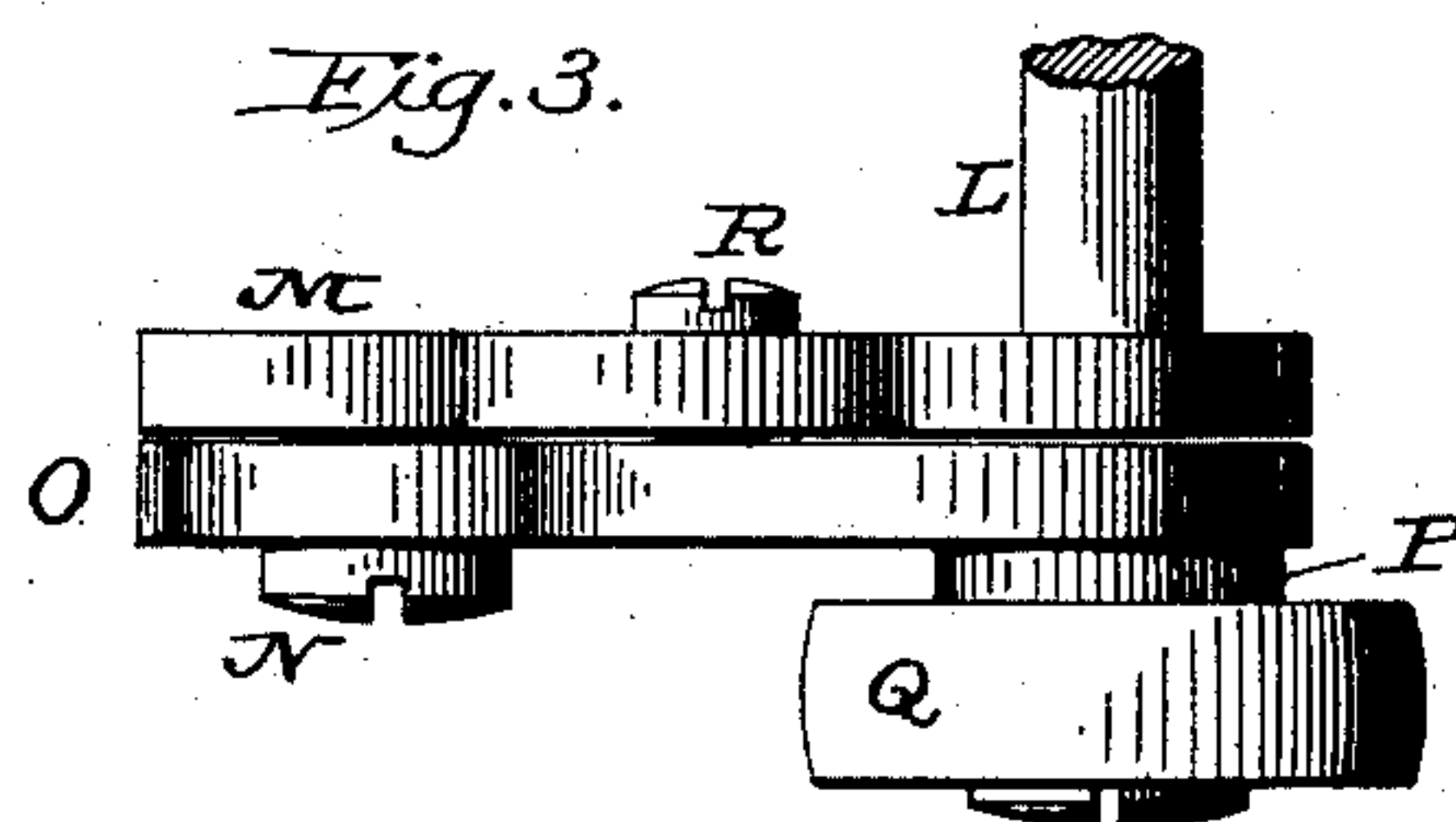
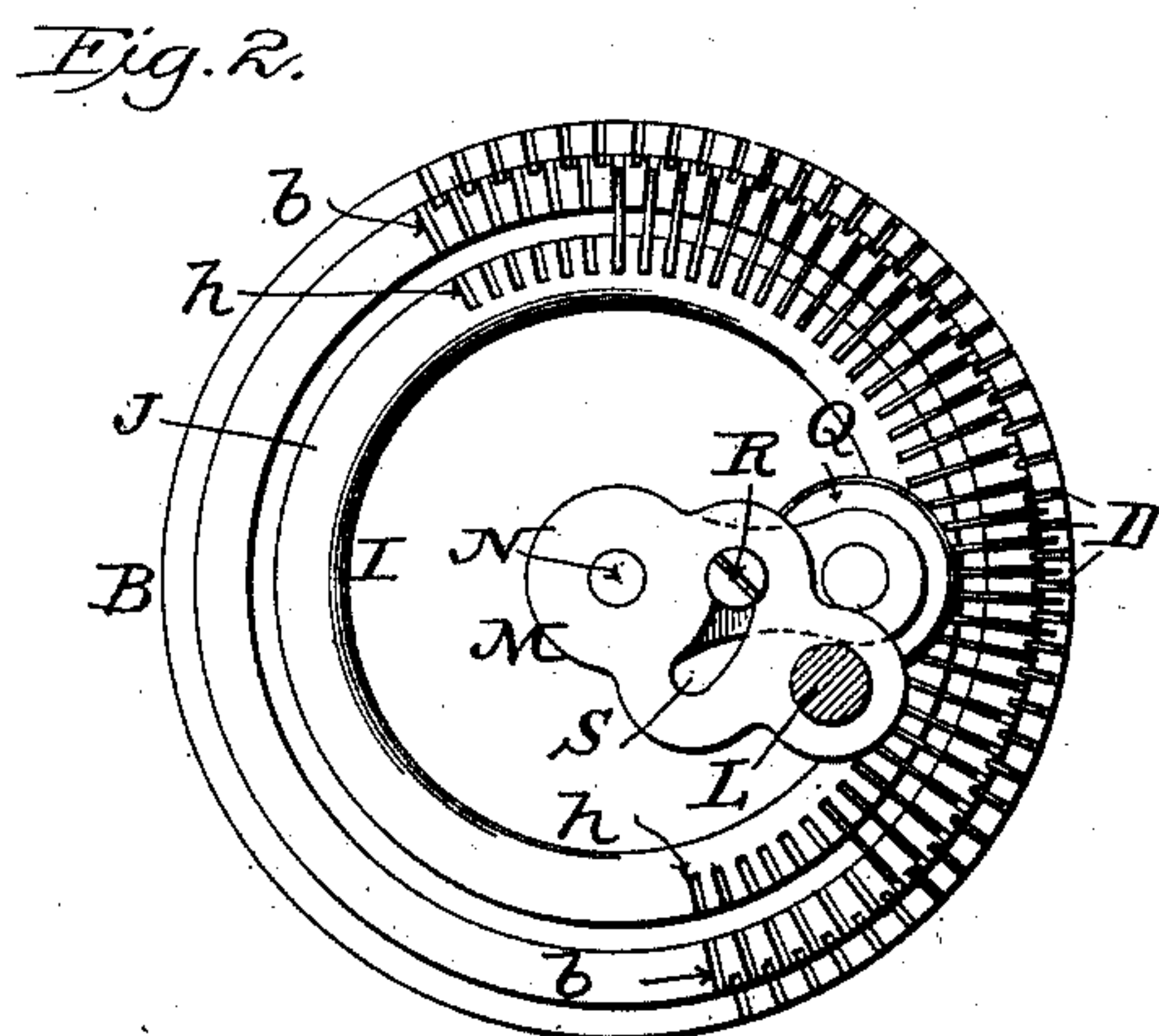
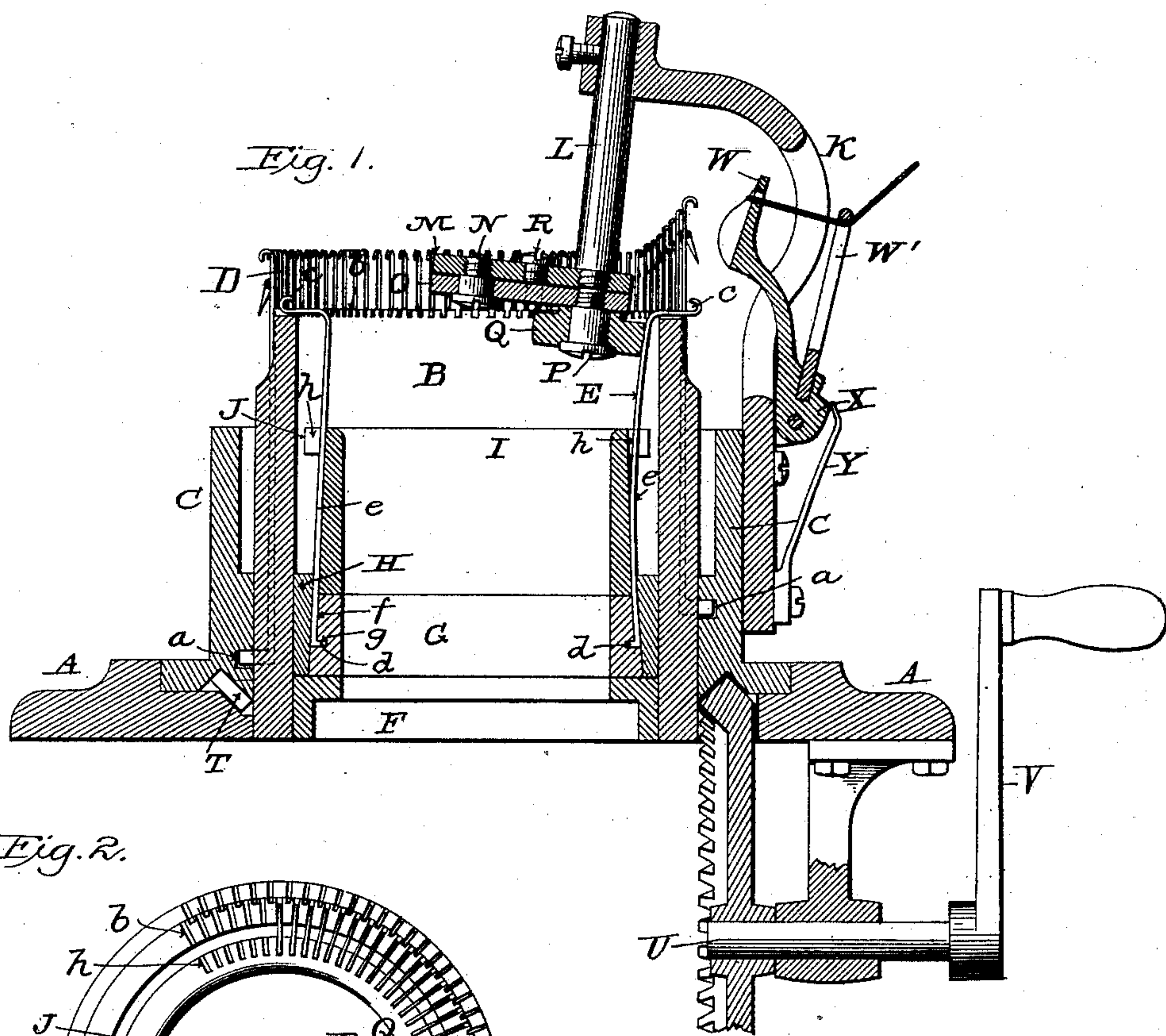


(No Model.)

M. MARSHALL.
CIRCULAR KNITTING MACHINE.

No. 374,196.

Patented Dec. 6, 1887.



Witnesses:
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UNITED STATES PATENT OFFICE.

MOSES MARSHALL, OF CHICOPEE FALLS, MASSACHUSETTS.

CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 374,196, dated December 6, 1887.

Application filed August 7, 1886. Serial No. 210,232. (No model.)

To all whom it may concern:

Be it known that I, MOSES MARSHALL, of Chicopee Falls, in the county of Hampden and State of Massachusetts, have invented certain
5 new and useful Improvements in Knitting-Machines, of which the following is a specification.

My invention relates to circular-knitting machines; and it consists in a novel construction of the parts, hereinafter set forth, whereby
10 the assembling of said parts is facilitated and their retention in proper relation and working position insured, in a novel arrangement of spring-jacks which produce an automatic
15 tension, and in a jack operating or controlling device which automatically shifts its position and reverses its action when the rotation of the cam-cylinder is reversed.

In the accompanying drawings, Figure 1 is
20 a vertical central section of so much of a circular-knitting machine as is necessary to show my invention applied thereto; Fig. 2, a top plan view of a portion of the same, and Figs. 3, 4, and 5 enlarged detail views.

25 In its general construction and operation the machine resembles those now in use, except as hereinafter pointed out.

A indicates the base of the machine, with a large central circular opening within which
30 fit the needle-cylinder B and the cam-cylinder C, the latter surrounding the needle-cylinder and being provided with a lateral flange or base which fits into a socket in the upper face of the plate A.

35 The cam-groove *a*, which is formed within the cylinder C to actuate the needles D, is shown in Fig. 1, and is of usual form and furnished with the ordinary adjustable parts to vary the action of the needles.

40 The needle-cylinder B has a series of vertical slots in its exterior face for the reception of the needles, as is usual, and its upper edge is also provided with a series of radial notches, *b*, in which the upper laterally-extending
45 hooks of the spring-jacks E move radially to and from the center of the cylinder, as indicated in Figs. 1 and 2. The slots *b* across the top edge of cylinder B extend in between or alternate with the needle-slots, as clearly
50 shown in Fig. 2.

The spring-jacks E have their upper ends bent out over the edge of the cylinder B (ra-

dial to the axis of the cylinder) and have hooks *c* formed upon the outer ends of such lateral portion, as shown in Fig. 1. They extend downward inside the needle-cylinder and have their lower ends bent inward toward the center of the cylinder to form a foot, *d*, the shank or body *e* of the jacks being elastic and of such shape that when secured in position
60 the upper ends or hooks, *c*, tend to move inward toward the center of the cylinder.

Secured to the interior of the needle-cylinder B at its base is a ring, F, of inverted-L shape in cross-section, upon which rests a
55 ring, G, whose outer face is beveled or inclined, as shown in Fig. 1. The inner face of ring G is flush with the inner face of the inwardly-projecting flange of ring F, and its outer face is provided with a series of slots, *f*, and sockets
70 *g*, to receive the lower ends of the spring-jacks.

It will be noticed that the diameter of the ring G is less than the internal diameter of the needle-cylinder B, so that when the jacks are placed in position within the cylinder, with
75 their lower ends inserted into the ring G, sufficient space is left for the insertion of a ring, H, between the cylinder B and the ring G. The outer face of ring H is straight or vertical to conform to the interior wall of the
80 cylinder B, while its inner face is beveled or inclined to conform to the exterior face of ring G.

It will be seen that by means of the beveled ring H the spring-jacks E are held firmly to
85 their seats in the ring G, and the necessity of other securing devices is avoided.

Upon the ring G rests a third ring, I, with a lateral flange, J, at its upper end, said flange being provided with a series of vertical radial
90 notches, *h*, as shown in Fig. 1, which notches receive the stems *e* of the spring-jacks and prevent side movement thereof when in operation. The top of the ring I is about on a line with the top of cam-cylinder C, and said ring
95 rests loosely upon the ring G, as shown.

The rings G H I, with the jacks carried thereby, are inserted into the needle-cylinder through the top and rest upon the flanged collar or ring F at the base thereof.

Bolted or otherwise secured to the rotating cam-cylinder C is an arm, K, which extends up above and projects inwardly over the needle-cylinder and carries a downwardly-ex-

tending stem, L, which is provided at its lower end with a plate, M, as shown in all the figures. At one end the plate M is rigidly secured upon the fixed stem L, and at its other end it is provided with a stud or pivot, N, upon which is mounted a plate or flat arm, O. The plate O carries at its opposite end a stud, P, upon which is loosely journaled a roller, Q, and said plate is also provided with a stud, R, which projects through a slot, S, in the plate M, as shown in Figs. 3, 4, and 5. The slot S is concentric with pivot N and serves to limit the movement of the plate O upon its pivot. It will be seen that the plate O, with its roller Q, may be swung or moved horizontally upon its pivot N.

In Fig. 1 the wheel Q is shown pressing the jacks outward, as in operation, and it will be observed that the wheel Q (or, more properly, the plate O, carrying the wheel) may swing automatically to one or the other side of its pivot N as the motion of the machine is reversed, the wheel Q at the same time being capable of rotation upon its stud or axle P. The jacks are thrown outward by the roller Q just previous to the descent of the coating needles, so that the hooked ends of the jacks receive the yarn or thread thus drawn down by the needles, and as the roller rides by or out of contact with the jacks said jacks draw the yarn or thread inward toward the center of the cylinder and hold it, while the needles continue to descend to form the loop or stitch, the operation of the needles being common and well understood, and hence will not be further described.

The cam-cylinder C is provided with gear-teeth T and receives motion from a gear-wheel carried by a shaft, U, provided with a crank or handle, V, as in other machines of this class.

The yarn is drawn from a spool or reel and carried to the needles by a guide composed of two arms, W and W', the guide being pivoted upon a pin, X, secured to the arm K, as shown in Fig. 1. A spring, Y, secured at its lower end to the arm K, bears at its upper end upon a shoulder formed upon the guide, and serves to hold the latter in proper position. The yarn passes under the top horizontal cross-bar of arm W' and through a perforation in the arm W.

The machine, being thus constructed and supplied with yarn or equivalent material, operates as follows: Motion is imparted to the cam-cylinder by turning the crank V, and as this cylinder rotates the needles are caused to rise successively above the needle-cylinder and into position to receive the yarn, the latches falling down as usual. The roller Q is so located with reference to the cam which elevates the needles as to bear against those spring-jacks which occupy positions between the elevated needles; hence said jacks are thrown outward between the needles while the latter are elevated and receiving the yarn or thread, and while thus thrown out they support the

thread or yarn between the needles, and as the needles descend the jacks spring inward toward the center, at once supporting the thread between the loops formed by the descent of the needles and applying to the thread a suitable tension. This tension is wholly automatic and adapts itself to the nature of the stitch for which the machine is adjusted, dispensing with the necessity of weights, springs, and tension devices other than the jacks.

When it becomes necessary to reverse the motion of the machine—as, for instance, in making heels or like work—no preparation is necessary, the crank simply being turned back or in a reverse direction, and the roller Q, with its supporting-arm, swinging back automatically to proper position to cause the jacks to work between the needles as the latter are elevated.

I am aware that a circular knitting machine has been patented in which a rotating cylinder provided with needles and jacks has been combined with a fixed cam for actuating the needles and with a cam for positively moving the jacks both in and out, said latter cam being arranged to move a limited distance upon reversal of the direction of rotation, in order to reverse its action and to cause the jacks to act in proper order. This I do not claim. My purpose is to secure elastic action of the jacks, so that in case of slight unusual strain or drag upon the yarn the jack or jacks may yield, and thus avoid breaking the yarn.

Having thus described my invention, what I claim is—

1. In a circular-knitting machine, the combination of the base-plate A, cam-cylinder C, needle-cylinder B, needles D, a ring, G, within the needle-cylinder, a series of spring-jacks seated at their lower ends in the ring G, and an exterior ring, H, within and independent of the needle-cylinder, closely encircling ring G, and serving to retain the jacks in place therein, whereby rings G and H may be removed with the jacks and replaced without releasing the jacks.

2. In a circular-knitting machine, the combination, with base A, cam-cylinder C, and needle-cylinder B, of needles D, jacks E, a ring, G, within the needle-cylinder, adapted to receive the lower ends of the jacks, and having its outer end beveled, and a ring, H, adapted to fit upon the outer face of ring G and hold the jacks in place, substantially as described and shown.

3. In a circular-knitting machine, the combination, with the base-plate A, needle-cylinder B, and cam-cylinder C, of needles D, jacks E, rings G and H, for securing the lower ends of the jacks, and a ring, I, provided with a flange, J, having notches *h*, all arranged and operating substantially as set forth.

4. In a circular-knitting machine, the combination, with the base-plate A, needle-cylinder B, cam-cylinder C, needles D, and spring-jacks E, of the devices herein described for holding and sustaining said jacks, consisting

of the flanged ring F, the beveled-faced rings G H thereupon, and the flanged ring I, provided at its upper end with notches *h* and placed loosely upon the ring G, substantially as shown.

5 5. In a circular-knitting machine, the combination, with the base-plate A, cam-cylinder C, and open-ended needle-cylinder B, of needles D, spring-jacks E, and a roller, Q, arranged, substantially as shown, to rotate with
10 the cam-cylinder and act upon the jacks successively.

6. In a knitting-machine, the combination, with the open-ended needle-cylinder B, cam-
15 cylinder C, needles D, and spring-jacks E, of an arm projecting inward over the upper end of the cylinder and provided with a roller or its equivalent to force the jacks outward.

7. In a knitting-machine, the combination,
20 with the open-ended needle-cylinder B, cam-cylinder C, needles D, and spring-jacks E, of an arm secured to the cam-cylinder and projecting inwardly over the upper end of the needle-cylinder, and a movable plate, O, carried by said arm and provided with a wheel,
25 Q, to bear against the inner faces of the jacks.

8. In combination with a base-plate, A, needle-cylinder B, cam-cylinder C, needles D, and jacks E, an arm, K, secured to the cam-cylinder C, a plate, M, secured to said arm K above
30

the upper end of the needle-cylinder, and an arm or plate, O, pivoted to plate M at one end and provided with a wheel, Q, at the other end to bear against the jacks.

9. In a knitting-machine, the combination 35 of a stationary circular needle-cylinder, a series of vertically-movable needles mounted therein, a rotary cam-cylinder adapted to elevate and lower the needles, a series of spring-jacks having their upper hooked ends arranged
40 to alternate with the needles, and an arm carried by the cam-cylinder and serving to press the jacks outward between the needles as the latter are elevated.

10. The combination of a stationary cylinder 45 provided with needles and a rotary cam ring or cylinder with an automatic tension device consisting of a series of spring-jacks having hook-shaped ends arranged between the needles of the machine and an arm or roller carried
50 by the cam ring or cylinder and arranged to press against the jacks and force them outward between the needles into position to seize the thread or yarn preparatory to drawing upon the same after the action of the roller
55 or arm ceases.

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Witnesses:

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