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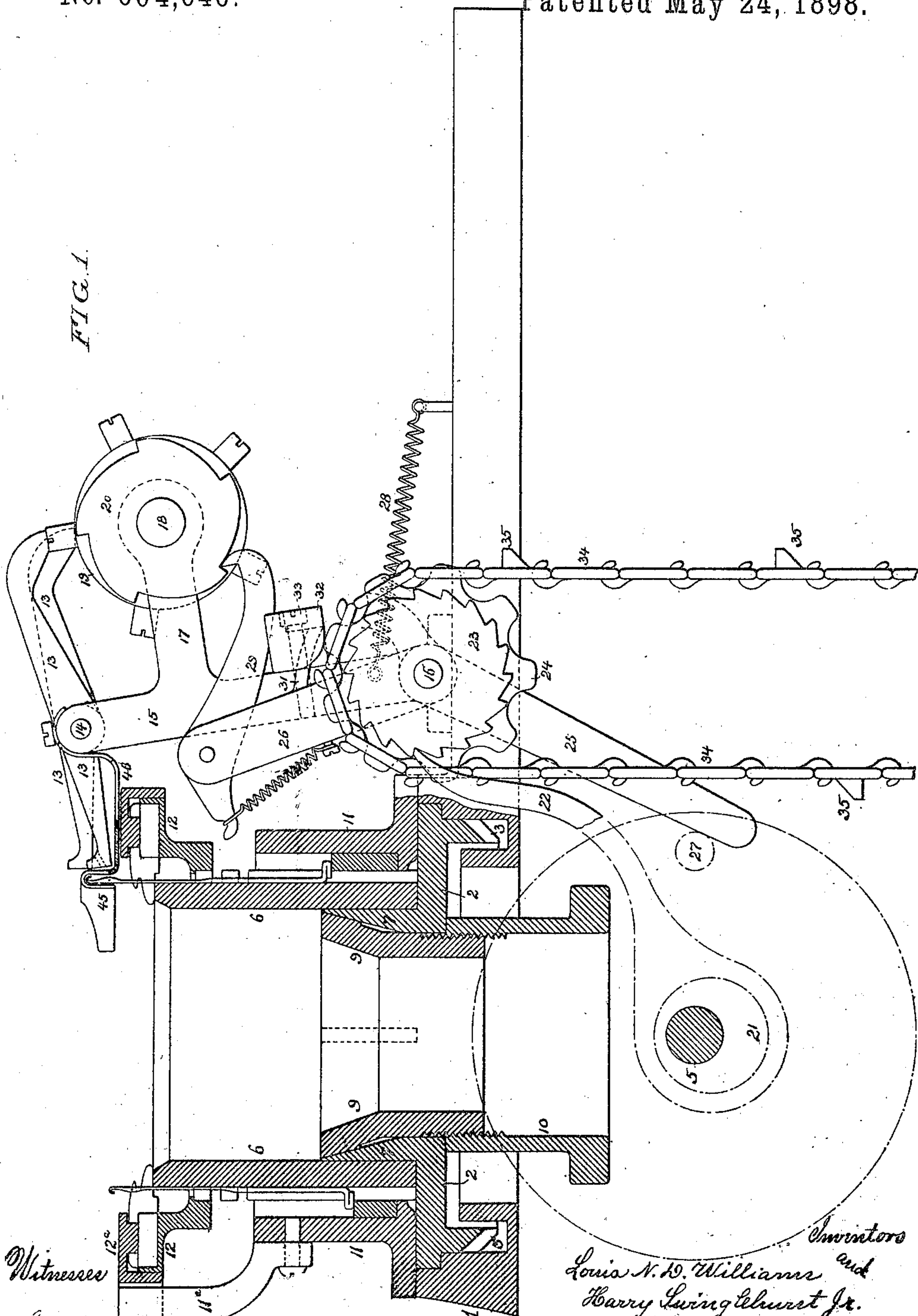
3 Sheets—Sheet 1.

L. N. D. WILLIAMS & H. SWINGLEHURST, Jr.
CIRCULAR KNITTING MACHINE.

No. 604,646.

Patented May 24, 1898.

FIG. 1.



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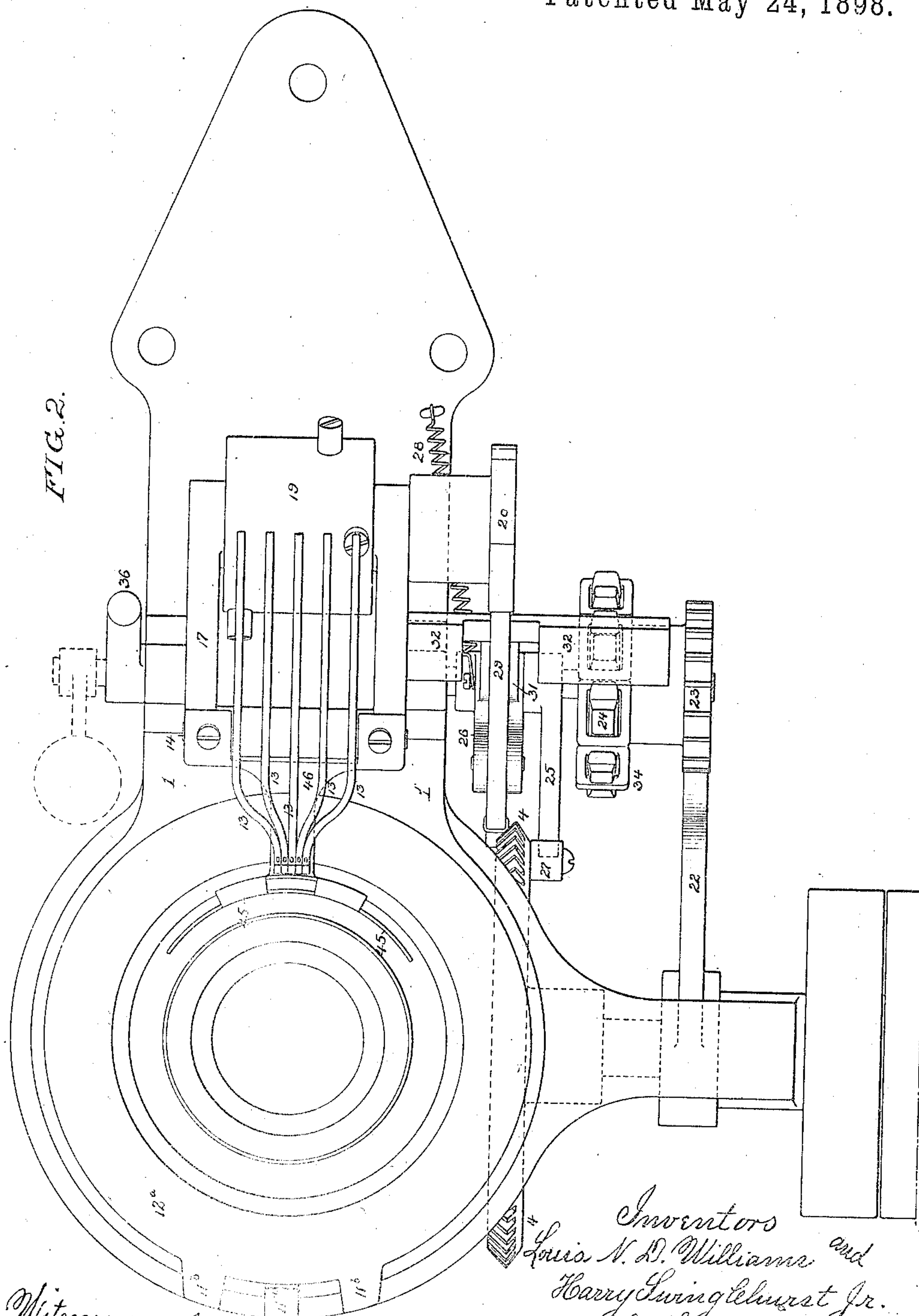
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CIRCULAR KNITTING MACHINE.

No. 604,646.

Patented May 24, 1898.



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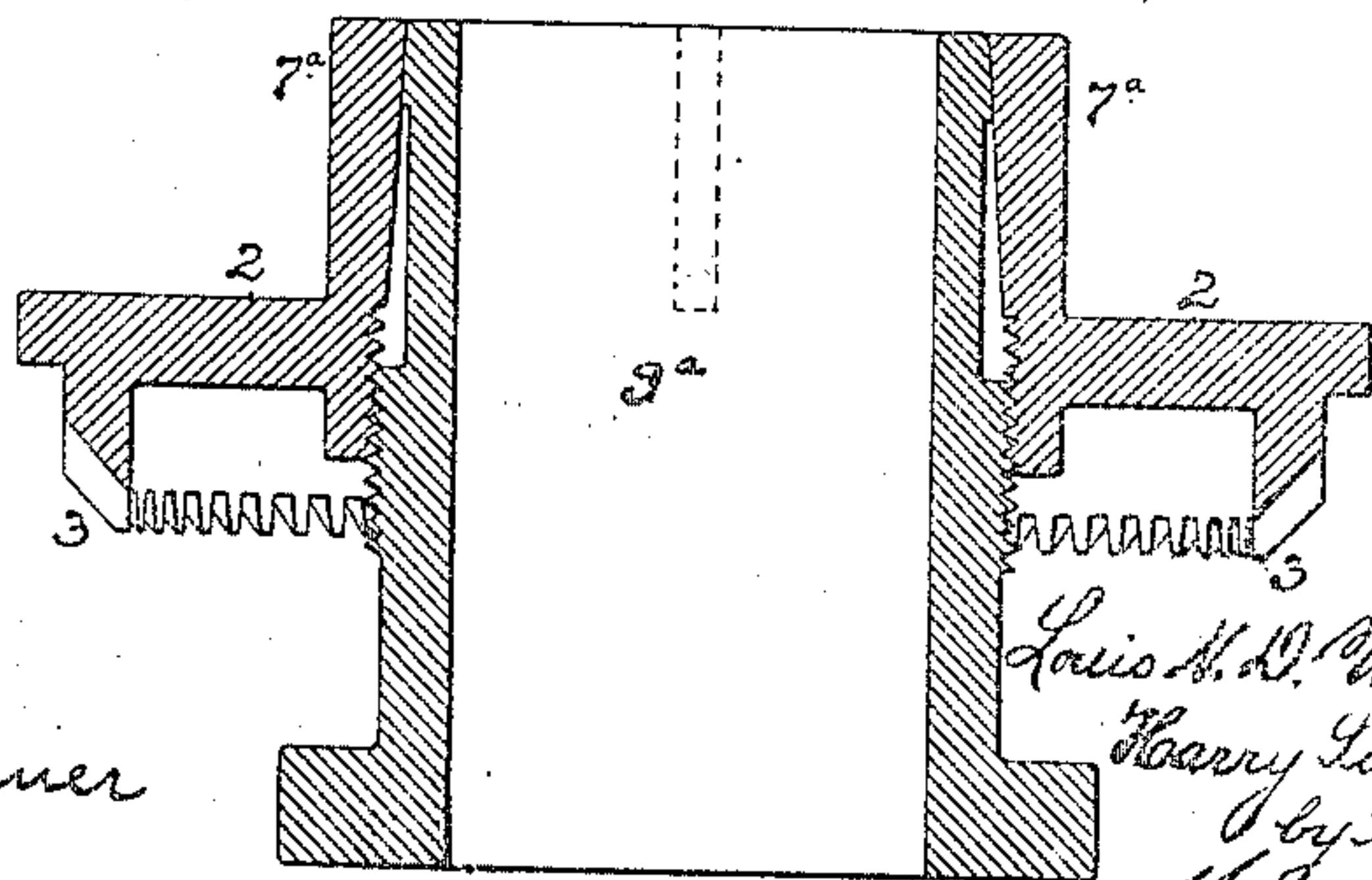
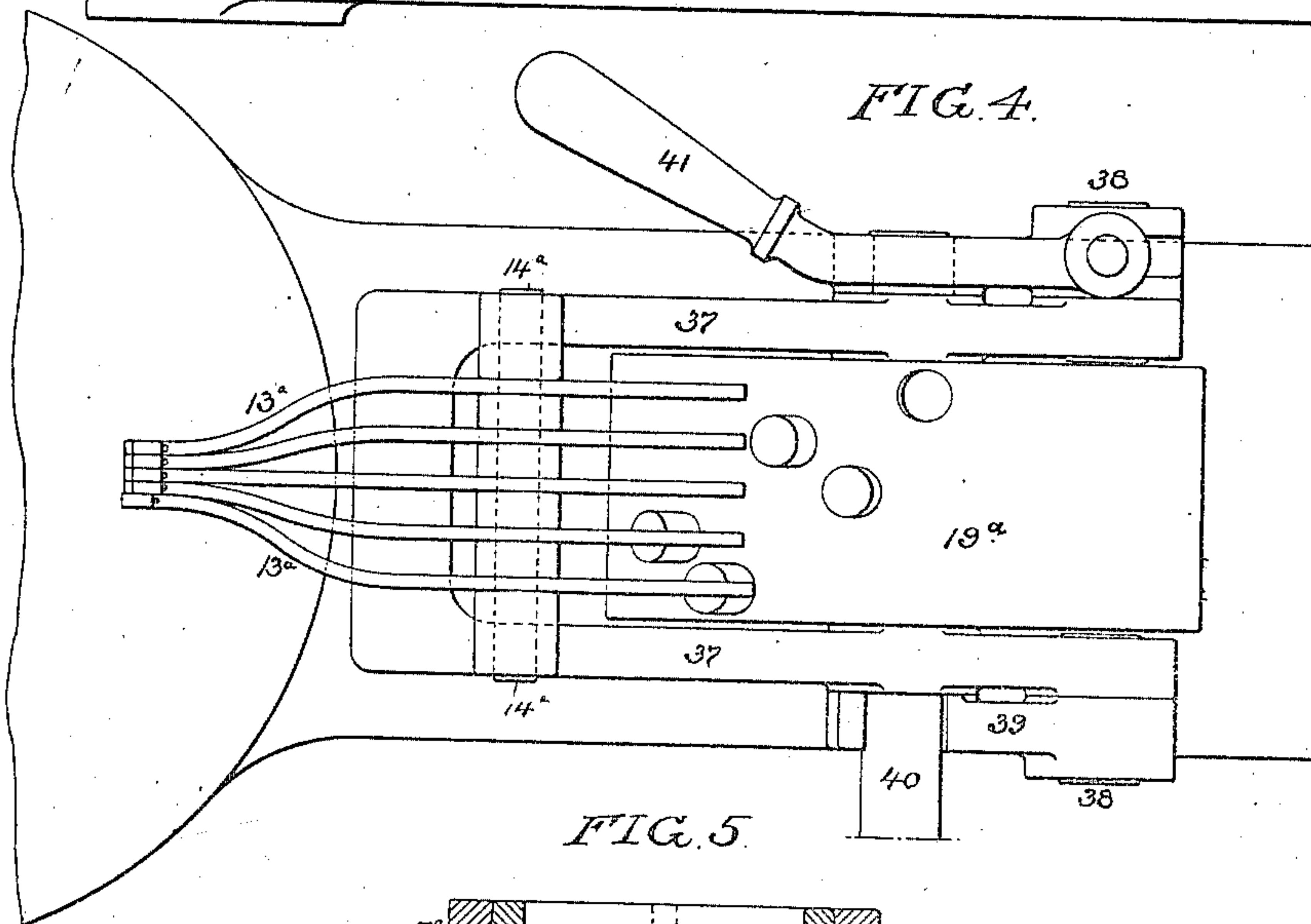
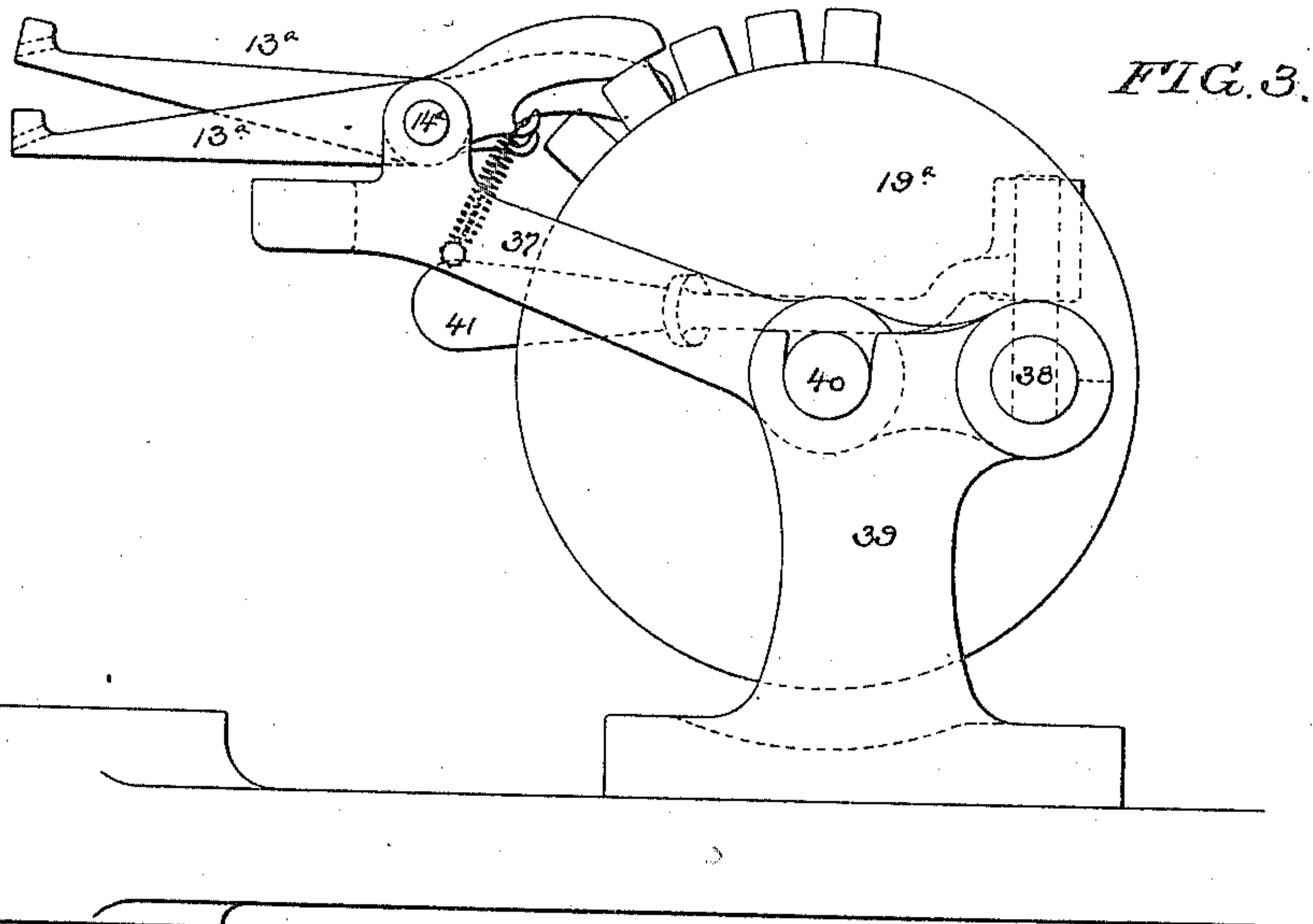
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3 Sheets—Sheet 3.

L. N. D. WILLIAMS & H. SWINGLEHURST, Jr.
CIRCULAR KNITTING MACHINE.

No. 604,646.

Patented May 24, 1898.



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UNITED STATES PATENT OFFICE.

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OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO SAID WILLIAMS AND
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CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 604,646, dated May 24, 1898

Application filed November 29, 1897. Serial No. 690,089. (No model.)

To all whom it may concern:

Be it known that we, LOUIS N. D. WILLIAMS, a resident of Ashbourne, Montgomery county, and HARRY SWINGLEHURST, Jr., a resident of Philadelphia, Pennsylvania, citizens of the United States, have invented certain Improvements in Circular-Knitting Machines, of which the following is a specification.

Our invention relates to that class of knitting-machines which are intended for the production of striped fabrics by the use of continuous knitting-threads, the thread or threads not in use floating on the inner side of the knitted tube from stripe to stripe. In such machines a series of thread-guides are employed, one for each of the threads used, and these guides are controlled by mechanism whereby the feed end of either guide may be moved into or out of range of the needles, so that any desired thread may be fed to the needles throughout as many courses as may be desired.

The objects of our invention are to provide simple and efficient means for operating the thread-guides, to prevent engagement of the floating thread or threads by the needles, and to provide for the removal of the needle-cylinder with the work thereupon from the machine, so that it can be applied to a different machine for the formation of the foot portion of a stocking. These objects we attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a view, partly in vertical section and partly in elevation, of a knitting-machine constructed in accordance with our invention. Fig. 2 is a plan or top view of the same with the needle-cylinder and web-holders removed, and Figs. 3, 4, and 5 are views illustrating modifications of our invention.

So far as the knitting-machine proper is concerned—that is to say, the needle-cylinder, cams, web-holders, and operating devices therefor—different methods of construction may be adopted so long as the needle-cylinder is capable of being rotated and is detachable from its rotating carrier.

In the drawings, 1 represents the fixed frame or bed of the machine, in which is suitably

mounted a ring 2, having a bevel gear-wheel 3, which meshes with a bevel-pinion 4 on the driving-shaft 5, the needle-cylinder 6 resting on said ring 2, which has a split and tapered flange 7 extending up inside of the needle-cylinder and adapted to be expanded against the same by means of an annular wedge 9, the lower portion of which projects beyond the ring 2 and is threaded for engagement with an annular nut 10, the upper edge of the latter bearing against the under side of said ring 2, so that by turning said annular nut 10 the annular wedge 9 will be drawn down inside of the split and tapered flange 7, so as to expand the latter firmly against the inside of the needle-cylinder and thereby properly retain the latter in place on the carrier-ring 2, movement of the nut in the other direction loosening the wedge 9 and permitting the split and tapered flange 7 to contract, so as to release the needle-cylinder and permit of the removal of the same. If desired, however, the construction shown in Fig. 1 may be reversed, as shown in Fig. 5—that is to say, the split flange 7^a may be constructed so as to be expanded by the upward movement of an annular wedge 9^a, the threaded portion of the latter being adapted directly to a thread formed in the ring 2 and power being applied directly to the wedge to turn the same and cause it to expand the flange 7^a or permit contraction of the same.

The circular cam-box 11 is fixedly secured to the bed-plate 1, and the web-holder ring 12 is mounted upon the needle-cylinder 6, the web-holder cam-ring 12^a having lugs 11^b, which by engagement with a projecting finger 11^a on the cam-box 11 prevent rotation of said cam-ring 12^a with the web-holder ring 12.

As the construction of the needle-operating cams, web-holders, and cams for operating the latter may be similar to many of the forms now in use, any specific description of the same will be unnecessary.

The thread-guides are in the form of levers 13, which are hung to a pin 14, carried by the upper ends of bars 15, which are secured at their lower ends to a shaft or spindle 16, mounted so as to be free to turn in suitable bearings on the bed-plate 1, each of the bars

15 having a projecting arm 17, and these arms carrying a shaft 18, to which is secured a pattern-drum 19 and a ratchet-wheel 20, the pattern-drum having pins or other pattern-surfaces adapted to act upon the outer ends of the levers 13, so that the inner or thread-guiding end of any one of the levers may be depressed in order to feed its thread to the needles at the knitting-point or may be elevated so as to direct its thread over the tops of said needles.

The desired movement of the pattern-drum 19 is effected in the following manner: On the shaft 5 is an eccentric 21, and the sleeve of this eccentric carries a pawl 22, which engages with a ratchet-wheel 23 on the hub of a pattern-chain wheel 24, said hub being mounted so as to be free to turn on the shaft or spindle 16. Also mounted so as to be free to turn on said shaft 16, but connected so as to have no movement independent of each other, are a pair of arms 25 and 26, the arm 25 projecting into the path of an anti-friction-roller 27, carried by the back of the bevel-pinion 4, and a spring 28 acting on the arm 26 in order to move the arm 25 into range of said anti-friction-roller. The arm 26 is forked and carries a hooked pawl 29, which is acted upon by a spring 30, so that its hooked end tends to move into engagement with the teeth of the ratchet-wheel 20. Projecting forwardly from the arm 26, however, is a finger 31, which is normally in contact with the reduced central portion of a stop-lug 32, the latter being pivoted, by means of a pin 33, to one of the bars 15 and being of such length as to project over the pattern-chain 34, which is mounted upon and actuated by the pattern-wheel 24. Normally, therefore—that is to say, when the parts are in the position shown in Figs. 1 and 2—the arm 26 is prevented from moving forwardly, so as to cause its pawl 29 to engage with the teeth of the ratchet 20; but when the stop-lug 32 is lifted by the action of any one of a number of projections 35 on the pattern-chain 34 the finger 31 will be released from the restraining influence of said stop-lug and the arm 26 will be at liberty to swing forwardly under the action of the spring 28, so that its pawl 29 will engage with a tooth of the ratchet-wheel 20, and upon the backward movement of said arm 26, caused by the action of the anti-friction-roller 27 on the arm 25, said pawl will move the ratchet-wheel 20 to the extent of one tooth and will thereby effect a change in the position of the pins of the pattern-drum 19, so as to move the operative thread-guiding lever into inoperative position and move an inoperative thread-guiding lever into operative position, the stop-lug 32 dropping in front of the finger 31 as soon as the support of the projection 35 is removed, so as to retain the parts in operative relation to each other until further change in the position of the thread-guides is desired.

Secured to the projecting end of the shaft or spindle 16 is a handle 36, by means of which

said shaft may be partially turned in its bearings, so as to cause the bars 15, with the levers 13 and other parts carried thereby, to be swung away from the needle-cylinder, in order to permit of the removal of said cylinder from the machine and the insertion of a new cylinder in its place.

A weighted arm, such as shown by dotted lines in Fig. 2, or some other available form of retainer may be employed for holding the bars 15 and the parts carried thereby in operative relation with the needle-cylinder.

Various means of mounting the thread-guides so as to permit of this movement of the same away from the needle-cylinder may be adopted which would be within the scope of our invention. For instance, in Figs. 3 and 4 we have illustrated one such modification in which the thread-guiding levers 13^a are hung to a pin 14^a, carried by a forked frame 37, which has pins 38, adapted to bearings in fixed standards or brackets 39 on the bed-plate 1, said frame also carrying the shaft or spindle 40 of the pattern-drum 19^a and having a handle 41, whereby it may be conveniently raised or lowered, so as to carry the thread-guides from or toward the needle-cylinder.

In order to prevent the threads running from those guides which are out of action from catching upon the needles, we use a needle shield or guard consisting of a bent plate 45, which incloses the needles on each side of the point at which they are raised by the knitting-cams in order to receive the knitting-thread, said bent plate 45 being cut away at that point, so as to permit thread to be fed to the needles from any one of the guides which is depressed, the thread from the elevated guides, however, as the needle-cylinder rotates being so directed by the shields or guards 45 as to pass over the tops of the raised needles, with which said threads are thus prevented from coming into engagement. The shield has a projecting stem 46, which may be mounted upon the bars 15, as shown in Figs. 1 and 2, or upon any other desired part of the movable thread-guide carrier, so as to be moved out of the way with the thread-guides when it is desired to remove or insert the needle-cylinder.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. The combination in a knitting-machine, of a rotatable and removable needle-cylinder, with thread-guides movable into and out of operative relation with the needles, and also movable from and toward the needles so as to permit of the insertion or removal of the needle-cylinder.

2. A knitting-machine in which are combined a rotatable and removable needle-cylinder, thread-guides movable into and out of operative relation with the needles of said cylinder and also movable to and from the needle-cylinder so as to permit of the inser-

tion and removal of the same, and a pattern device acting on said thread-guides and movable toward and from the needle-cylinder with the same.

5 3. A knitting-machine in which are combined a needle-cylinder, a rotatable carrier therefor having a split and tapered flange engaging with the inner side of the needle-cylinder and an annular wedge rotating with
10 said carrier and acting upon the split and tapered flange of the same.

4. A knitting-machine in which are combined a needle-cylinder, a rotatable carrier having a split and tapered flange adapted to
15 engage with the inner side of said cylinder, an annular wedge engaging with said split and tapered flange, and an annular nut engaging with said annular wedge and bearing upon said rotating carrier.

20 5. A knitting-machine in which are combined a rotatable and removable needle-cylinder, a series of thread-guides, a pattern-drum for acting thereupon, a pivoted structure carrying said thread-guides and drum,
25 and operating mechanism for said pattern-drum hung upon the same axis as the carrier therefor.

6. The combination in a knitting-machine, of a series of thread-guides, a pattern-drum
30 for acting thereupon, a ratchet-wheel connected to said drum, a swinging arm having a pawl for engaging with said ratchet-wheel, a movable stop-lug for arresting the movement of said pawl-carrying arm, a pattern-chain for moving said lug, and means for actuating said pattern-chain and swinging arm.
35 7. A knitting-machine in which are com-

bined a rotatable needle-cylinder, thread-guides movable vertically into and out of operative relation with the needles, and a needle shield or guard covering and protecting
40 the tops of the needles on each side of the knitting-point, whereby the thread from a raised guide will pass over said shield.

8. A knitting-machine in which are combined a rotatable needle-cylinder, thread-guides movable vertically into and out of operative relation with the needles, and a needle shield or guard covering and protecting
45 the tops of the needles on each side of the knitting-point, whereby the thread from a raised guide will pass over said shield, the latter being cut away so as to escape the needles when the latter rise to receive the thread from the operative guide.
50

9. A knitting-machine in which are combined a rotatable and removable needle-cylinder, thread-guides movable vertically into and out of operative relation with the needles, a needle shield or guard for preventing the
55 thread from a raised guide from engaging with the needles at the knitting-point, and a carrier for said thread-guides and needle-shield movable so as to carry them away from the cylinder in order to permit of the removal
60 of the same.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

LOUIS N. D. WILLIAMS.

HARRY SWINGLEHURST, JR.

Witnesses:

WM. BUCKLEY,
STOCKTON BATES.