

No. 681,161.

Patented Aug. 20, 1901.

L. N. D. WILLIAMS & H. SWINGLEHURST.
CIRCULAR RIB KNITTING MACHINE.

(No Model.)

(Application filed Feb. 8, 1901.)

3 Sheets—Sheet 1.

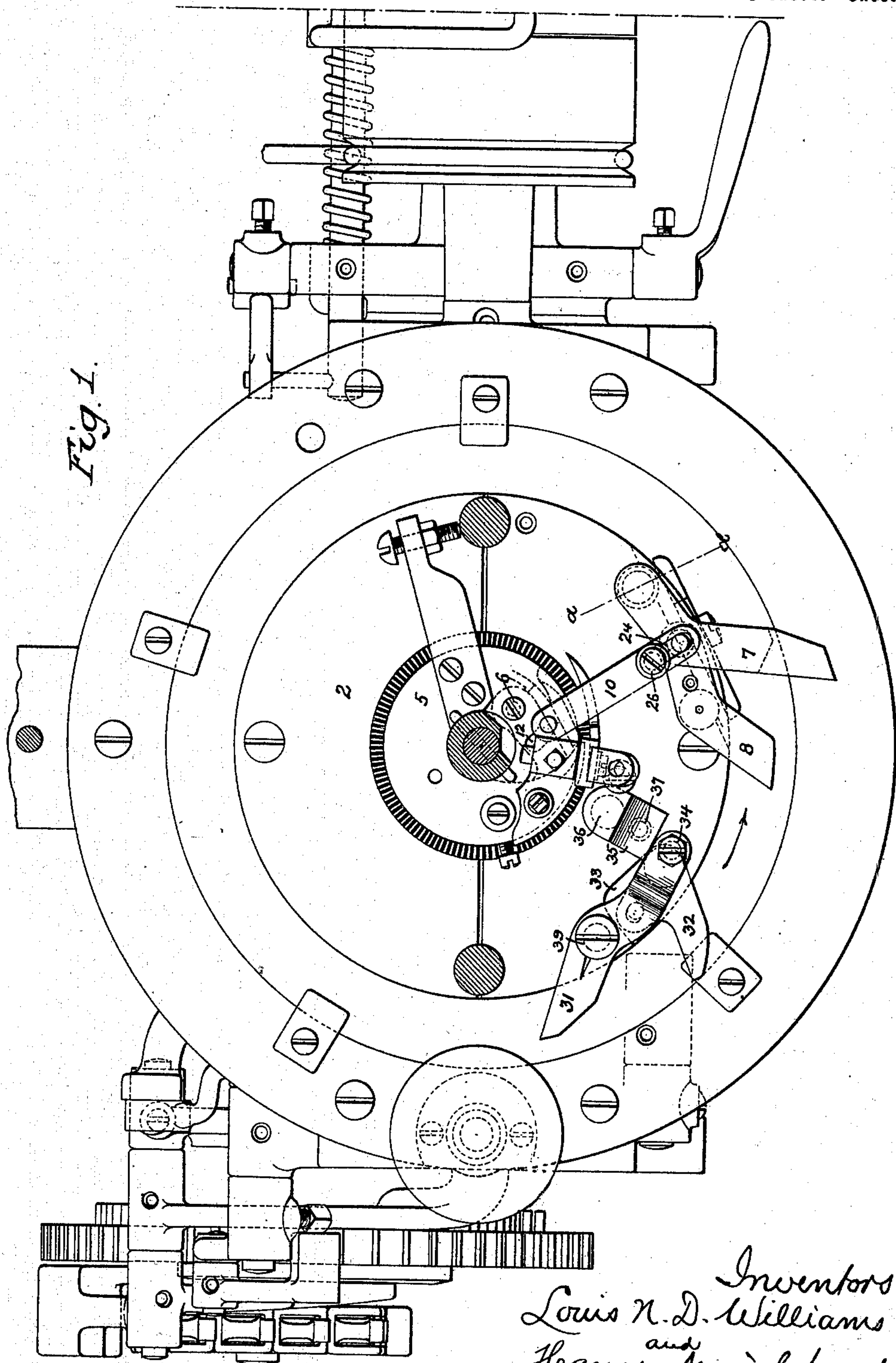


Fig. 1.

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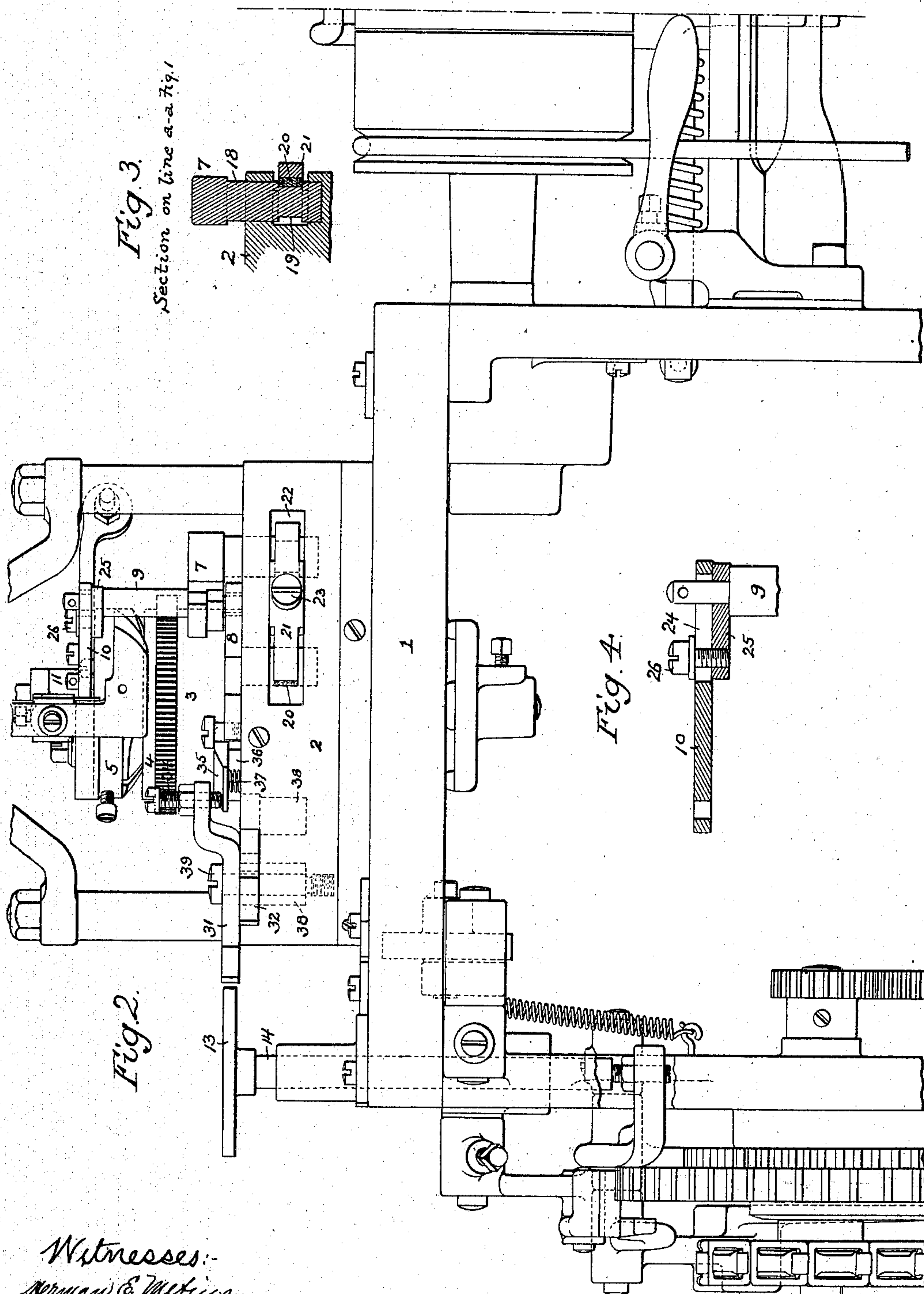
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3 Sheets—Sheet 2.



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3 Sheets—Sheet 3.

Fig. 5.

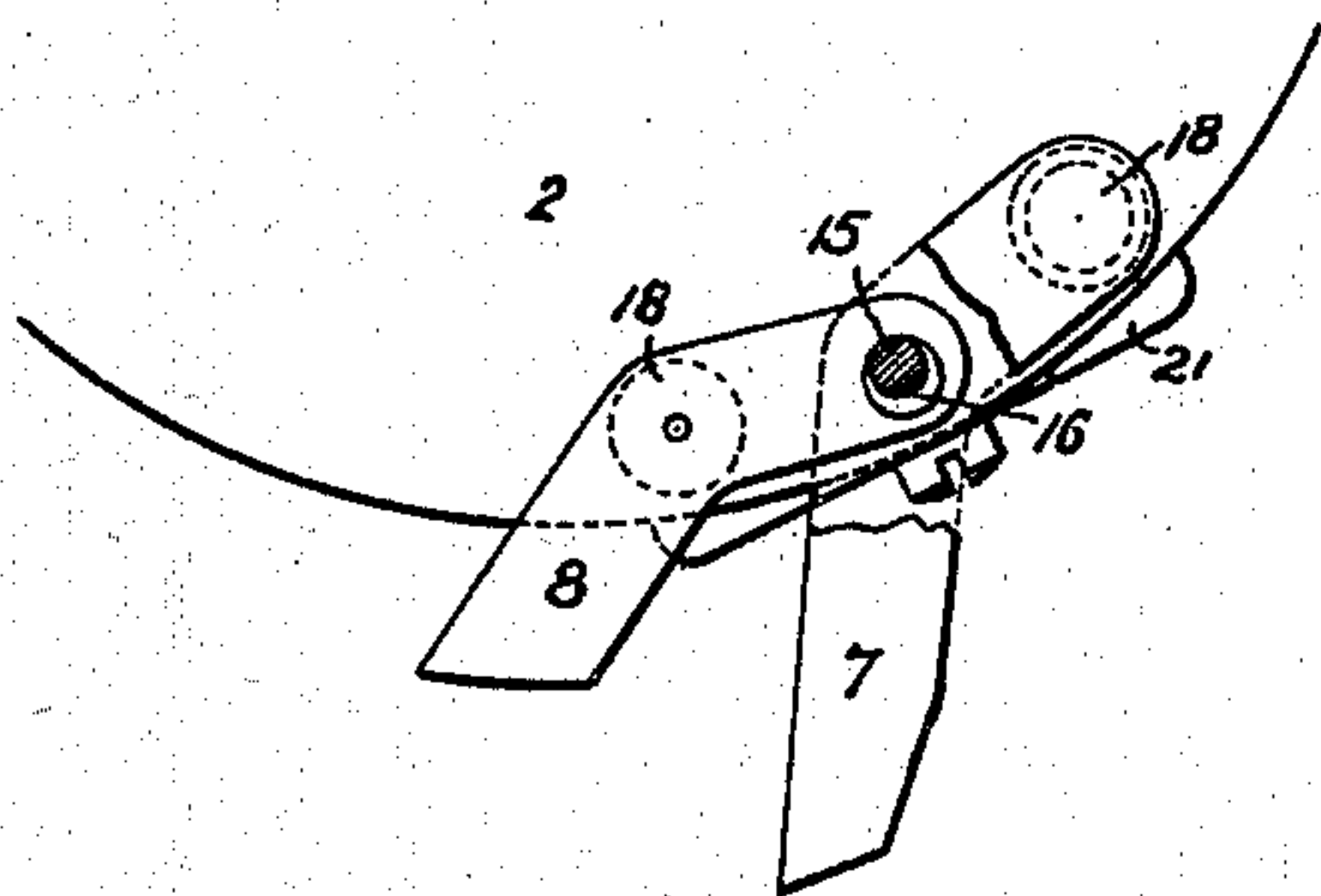


Fig. 6.

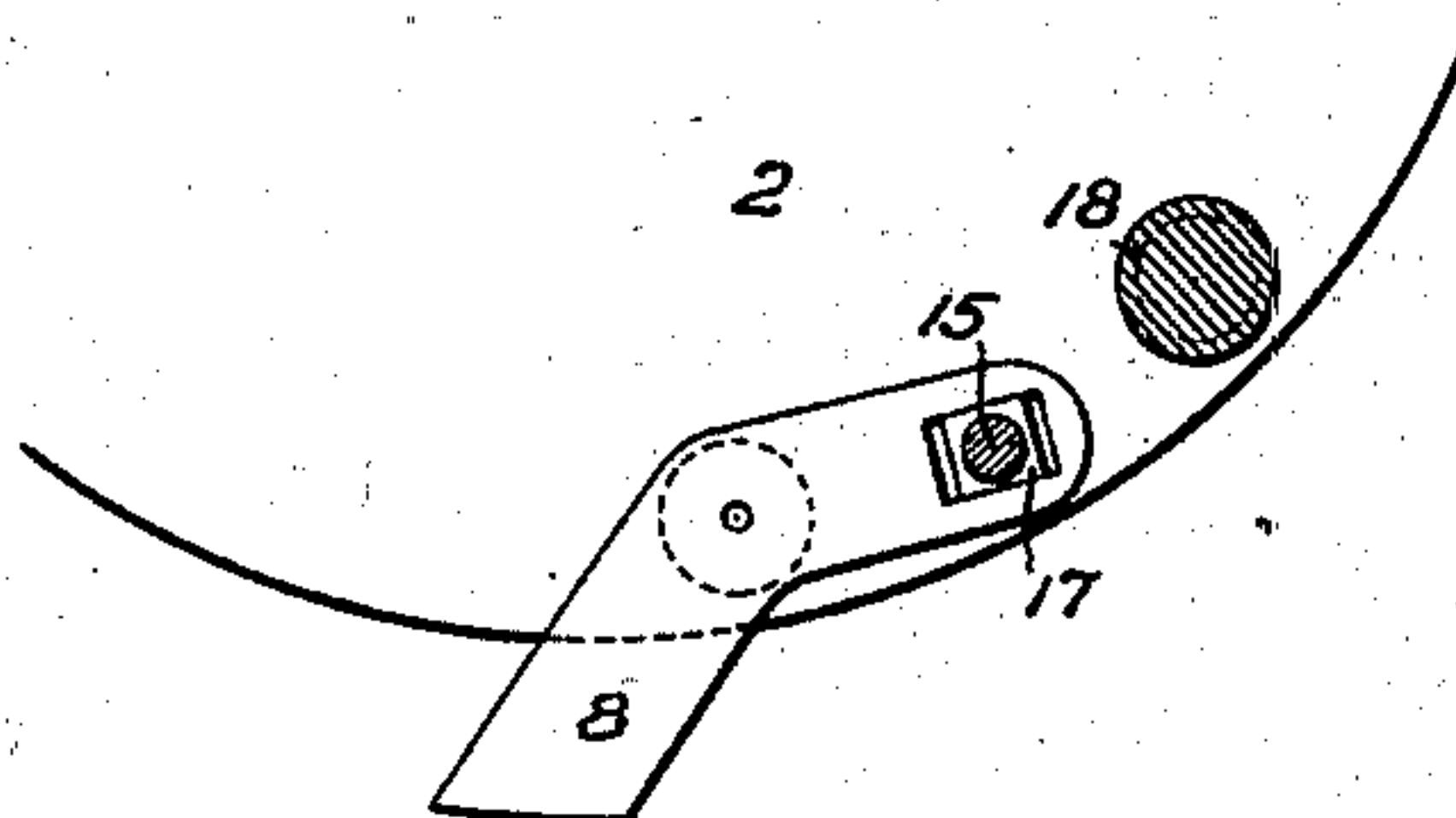


Fig. 7.

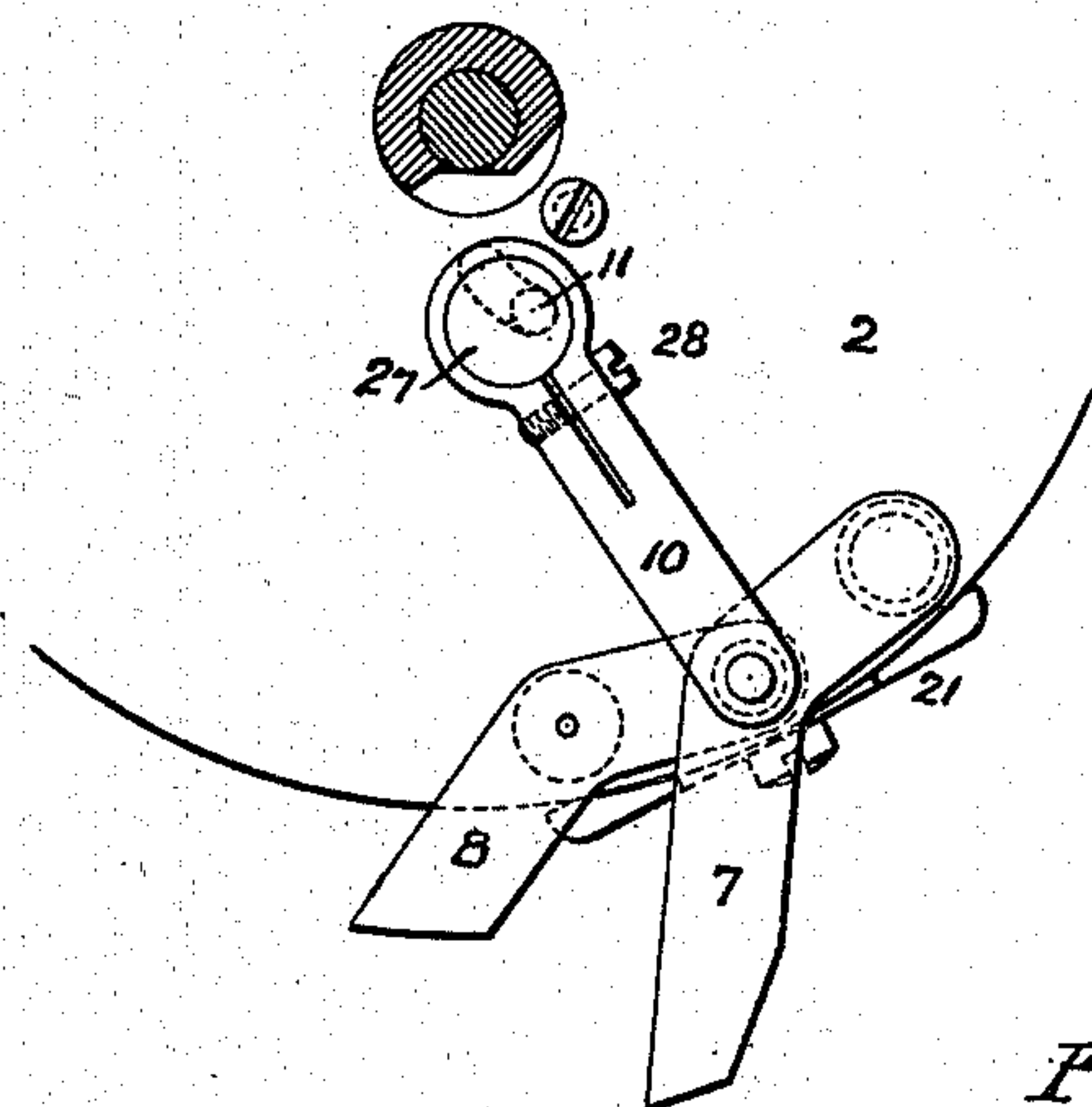


Fig. 8.

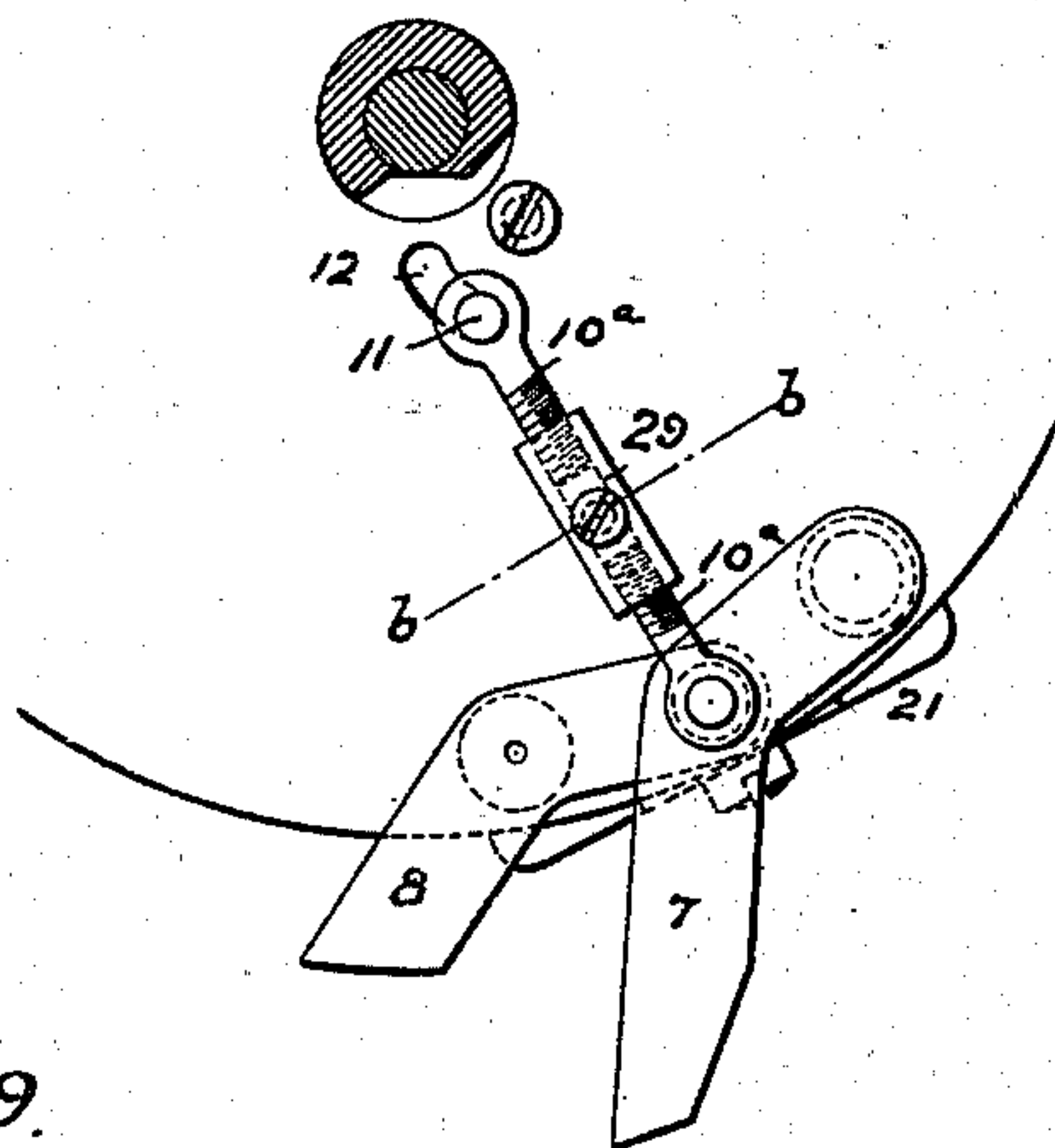
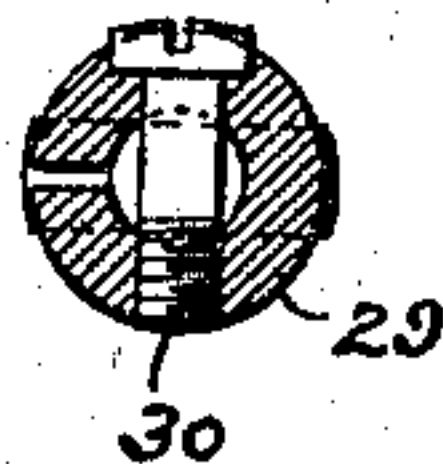


Fig. 9.
Section on line b-b Fig. 8.



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UNITED STATES PATENT OFFICE.

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CIRCULAR RIB-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 681,161, dated August 20, 1901.

Application filed February 8, 1901. Serial No. 46,555. (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, a resident of Philadelphia, Pennsylvania, citizens of the United States, have invented certain Improvements in Circular Rib-Knitting Machines, of which the following is a specification.

Our invention relates to devices for automatically controlling the movable cams of the dial-cam cap and needle-cam cylinder of a rib-knitting machine, the invention comprising certain improvements of the device shown in Joseph Heginbothom's patent, No. 286,003, dated October 2, 1883, the objects of the present improvements being to insure the firm mounting of the various levers constituting parts of the cam-moving mechanism, to provide for the ready application of said levers to and their removal from the machine, to permit ready adjustment of the connections between the levers or between the levers and cams, to prevent access of dust and dirt to the connections, to reduce to a minimum the number of parts employed, and generally to increase the durability and efficiency of the cam-operating mechanism. These objects we attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a sectional plan or top view of sufficient of a rib-knitting machine to illustrate our invention. Fig. 2 is a side elevation of the same. Figs. 3, 4, and 5 are sectional views of parts of the mechanism; and Figs. 6, 7, 8, and 9 are views illustrating other constructions which may be adopted for the purpose of obtaining certain results aimed at by our invention.

The Heginbothom patent, No. 286,003, before referred to, shows and describes a cam-changing device for the dial-cam cap of a rib-knitting machine, said device comprising two levers, one attached directly to the stem of the swinging cam and both connected so that movement imparted in the same direction to the outer or free ends of the levers, first to one and then to the other, results in the swinging of the cam first in one direction and

then in the reverse direction. The patented device was objectionable, however, owing to the fact that no provision was made for adjusting, altering, or limiting the movement of the cam, and also because the arrangement of the levers employed necessitated the use of a lug extending beyond the periphery of the dial-cam cap, thus making this member of the machine awkward in appearance and expensive to manufacture. The pivots about which the levers swung were, moreover, screw-bolts or pins, which were expensive and liable to work loose when the device was in action, and the fact that the levers were carried by the dial-cam cap was also open to serious objection, for the reason that as said cap is suspended by a comparatively small spindle it was liable to be sprung out of its proper position by the pressure to which it was subjected by the lever-operating mechanism. It will be understood that the devices for operating the cams of the dial-cam cap should be attached to a rotatable member of the machine, and experience has demonstrated that the ring which carries the cams for operating the cylinder-needles is the preferable carriage for these devices, since this cylinder-cam ring is firmly seated on or in the bed-plate and is therefore capable of withstanding any ordinary thrust to which it is likely to be subjected by the cam-operating devices.

Prior to our invention devices carried by the cylinder-cam ring and connected to the cams of the dial-cam cap have been devised; but such devices have been more or less objectionable either because of inefficiency of the operating mechanism or expense of construction due to multiplicity of parts and the difficulty of assembling the same or taking them apart.

Our invention has therefore been devised with the view of overcoming the various objections to these prior devices, and the manner in which we accomplish this result will be understood on reference to the drawings, in which—

1 represents the fixed bed-plate of the machine; 2, the rotating cylinder-cam ring; 3,

the needle-cylinder; 4, the horizontal needle-dial, and 5 the dial-cam cap, which is provided with swinging cams (shown by dotted lines in Fig. 1) and mounted upon a pivot-pin 6.

In the drawings are shown two sets of lever mechanism, one set for operating these swinging cams of the dial-cam cap and the other set for operating the vertically-movable stitch-cam of the cylinder-cam ring.

We will first describe the mechanism for operating the swinging cams of the dial-cam cap. There are two levers 7 and 8, which may for convenience be termed, respectively, the "primary" and "secondary" levers, the lever 7 being a lever of the first order and having a projecting post 9, which is connected in the manner described hereinafter to a link 10, the latter being also connected to a pin 11, which projects through a slot 12 in the dial-cam cap 5 and is secured to the swinging cam structure thereof. The lever 8 is a lever of the second order, having its fulcrum between its ends, the inner end of the lever extending beneath the lever 7 and being connected thereto in the manner described hereinafter. The free ends of both of the levers 7 and 8 project beyond the cam-ring 2, so that as said ring rotates the levers may be acted upon by a disk 13 at the upper end of a rod 14, to which vertical movement can be imparted by suitable pattern-chain mechanism, as in other machines of this class. As the projecting ends of the levers 7 and 8 are in different horizontal planes, they can be operated independently and successively by proper vertical adjustment of the disk 13. Thus, supposing the cam-ring 2 to be rotating in the direction of the arrow, Fig. 1, and the disk 13 to be elevated so as to strike the projecting end of the lever 7, the latter will be moved rearwardly and the swinging cam of the dial-cam cap will be moved inwardly, and at the same time the outer end of the lever 8 will be swing outwardly, so as to be in the path of the disk 13 when the same has been lowered, contact of the disk 13 with the outer end of the lever 8 moving the same rearwardly and again projecting the lever 7, so as to swing the cam of the dial-cam cap outwardly. The free end of the lever 7 is recessed, as shown in Fig. 2 and by dotted lines in Fig. 1, so as to present two portions in different planes, one projecting to a greater extent than the other. Hence provision is afforded for moving the lever 7, and consequently the dial-cam, to two different positions—for instance, to what is known as the "tuck" position or to a "welt" position—by so adjusting the disk 13 that it will contact with the recessed portion of the lever or with the full projecting portion of the same. The levers 7 and 8 are connected for joint action, and owing to the different arcs in which the connected portions of the levers necessarily swing a certain play in this connection becomes necessary. Thus in Fig. 5 a pin 15

projects downwardly from the lever 7 and passes through an eccentric 16, mounted so as to rotate in an opening in the lever 8, while in the construction shown in Fig. 6 the pin on the lever 7 engages with a block 17, free to slide in a longitudinal slot in the inner arm of the lever 8. In both cases, however, the pin is on the upper lever and the slot or enlarged opening in the lower lever, so that the projecting upper lever protects the connection from dirt or dust, the accumulation of which might otherwise interfere with the proper operation of the levers. This construction also facilitates the fitting together of the parts, as no means for retaining the eccentric 16 or block 17 in position vertically are required, the lower portion of the block resting on the top of the cam-ring 2 and the upper portion being confined vertically by the overhanging portion of the lever 7.

Each of the levers 7 and 8 has a depending pivot-stud 18, fitted to a vertical opening in the cam-ring 2, as shown in Fig. 3, and upon each of these pivot-studs bears a pad 20, of leather, rawhide, or other frictional material, carried by one of the arms of a bar 21, which is contained within a slot 22 in the cam-ring 2 and is secured to said ring by means of a confining-screw 23, as shown in Fig. 2, the friction-pads exercising such control over the fulcrum-studs as to retain the levers in the positions to which they have been adjusted by contact with the disk 13 and prevent excessive movement of either lever due to momentum. The pivot-stud of the lever 7 is recessed, as shown at 19 in Fig. 3, so as to form shoulders for engagement with the friction-pad 20, whereby the latter performs the additional function of preventing vertical displacement of the said lever 7.

The connecting-rod 10, whereby movement is transmitted from the lever 7 to the swinging dial-cam, has at the outer end a slot 24, which receives the reduced upper end of the post 9, and on the underside of said connecting-rod 10 is a block 25, which has an opening for the reception of said reduced upper end of the post, this block 25 being secured to the block 10 by means of a screw 26, adapted to the slot 24, as shown in Fig. 4, so that the block 25 can be adjusted longitudinally on the connecting-rod, and the distance between the opening in the rod which receives the pin 11 of the dial-cam structure and the opening in the block 25, which receives the reduced upper end of the post 9, can thus be increased or diminished to accord with the desired adjustment of the swinging dial-cam. Various other means of accomplishing this result may be adopted within the scope of our invention. For instance, in Fig. 7 we have shown a construction in which the inner end of the connecting-rod is split and expanded, so as to form a strap for embracing an eccentric 27, forming the head of the pin 11, the split and expanded end of the connecting-rod being clamped upon this eccentric by means of a

clamp-screw 28 when the desired adjustment has been effected.

In the construction shown in Fig. 8 the connecting-rod is made in two parts 10^a, one provided with a right-hand thread and the other with a left-hand thread adapted to the correspondingly-threaded ends of a split nut 29, which can be tightened after adjustment by means of a clamp-screw 30.

The mechanism shown in Figs. 1 and 2 has been designed with especial reference to the ready fitting together or taking apart of the elements composing the same. Thus all that is necessary in order to separate the parts is to first lift off the connecting-rod 10, then remove the bar 21, and then lift out the levers 7 and 8, application of the parts being effected by a reversal of these operations. The levers 31 and 32 for effecting adjustment of the stitch-cam of the cam-ring 2 are substantially similar to the levers 7 and 8, with the exception that the primary lever 31 of the combination is a lever of the second order and the secondary lever 32 is a bell-crank lever, so that the action of the cam-disk 13 upon either of the levers will cause the inner end of the lever 31 to move in a substantially radial line, the lever 32 playing in a recess 33 in the top of the cam-ring 2, and connection between the two levers being effected by means of a depending pin on the upper lever 31 engaging with an elongated slot in the portion of the lever 32 which said lever 31 overlaps. The inner end of the lever 31 carries a set-screw 34, the lower end of which acts upon a beveled block 35 at the upper end of the vertically-guided stem 36, to which the stitch-cam of the ring 2 is attached, a coiled spring 37, inserted beneath the projecting portion of the beveled block or head 35, serving to lift the latter, so as to maintain it constantly in contact with the lower end of the set-screw 34. Each of the levers 31 and 32 has a depending pivot-stud 38, adapted to an opening in the cam-ring 2, vertical displacement of the lower lever 32 being prevented by the overlapping portion of the lever 31 and the vertical retention of the latter being effected by means of a confining-screw 39, which passes through the hollow fulcrum-stud 38 of said lever 31 and is adapted at its lower end to a threaded opening in the cam-ring 2, as shown by dotted lines in Fig. 2. Upon withdrawing this screw 39, therefore, the levers 31 and 32 can be withdrawn successively from their bearings in the cam-ring.

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

1. In a cam-changing device for knitting-machines, lever mechanism comprising primary and secondary members pivotally mounted upon the cylinder-cam ring by means of depending studs adapted to openings in said cam-ring, substantially as specified.

2. In a cam-changing device for knitting-machines, lever mechanism comprising primary and secondary members having depend-

ing pivot studs or shafts one of said members overlapping the other so as to retain it vertically in place, substantially as specified.

3. In a cam-changing device for knitting-machines, lever mechanism comprising primary and secondary members having depending pivot studs or shafts, one of which is shouldered, and a retainer engaging with said shouldered stud or shaft to prevent vertical displacement thereof, substantially as specified.

4. In a cam-changing device for knitting-machines, lever mechanism comprising primary and secondary members having depending pivot studs or shafts, and friction-brake devices acting upon said pivot studs or shafts, substantially as specified.

5. In a cam-changing device for knitting-machines, lever mechanism comprising primary and secondary members having depending pivot studs or shafts one of which is shouldered and friction-brake devices bearing upon said studs or shafts, that which engages with the shouldered shaft also preventing vertical displacement thereof, substantially as specified.

6. In a cam-changing device for knitting-machines, the combination of the cam, lever mechanism comprising primary and secondary members, and a connection between one of said members and the cam, said connection being adjustable so as to vary the relation of lever member and cam, substantially as specified.

7. In a cam-changing device for knitting-machines, the combination of the cam, lever mechanism for operating the same, a connecting rod or link having at one end a longitudinal slot, and at the other end a vertical pin connection with the cam, a plate or block having a clamp-screw adapted to the slot in the link, and a vertical pin connection with the lever independent of said clamp-screw.

8. In a cam-changing device for knitting-machines, lever mechanism comprising primary and secondary members, and a pivotal connection between said members comprising a pin on one member and an eccentric on the other member whereby the pivotal connection can be shifted, substantially as specified.

9. In a cam-changing device for knitting-machines, lever mechanism comprising primary and secondary members one arranged above the other, a pin or pivot in the top member, and an opening for the reception of the same in the lower member whereby said pivotal connection is covered and protected by said upper member, substantially as specified.

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

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HARRY SWINGLEHURST.

Witnesses:

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