

No. 646,336.

Patented Mar. 27, 1900.

L. N. D. WILLIAMS.  
KNITTING MACHINE.

(Application filed Mar. 27, 1896.)

(No Model.)

2 Sheets—Sheet 1

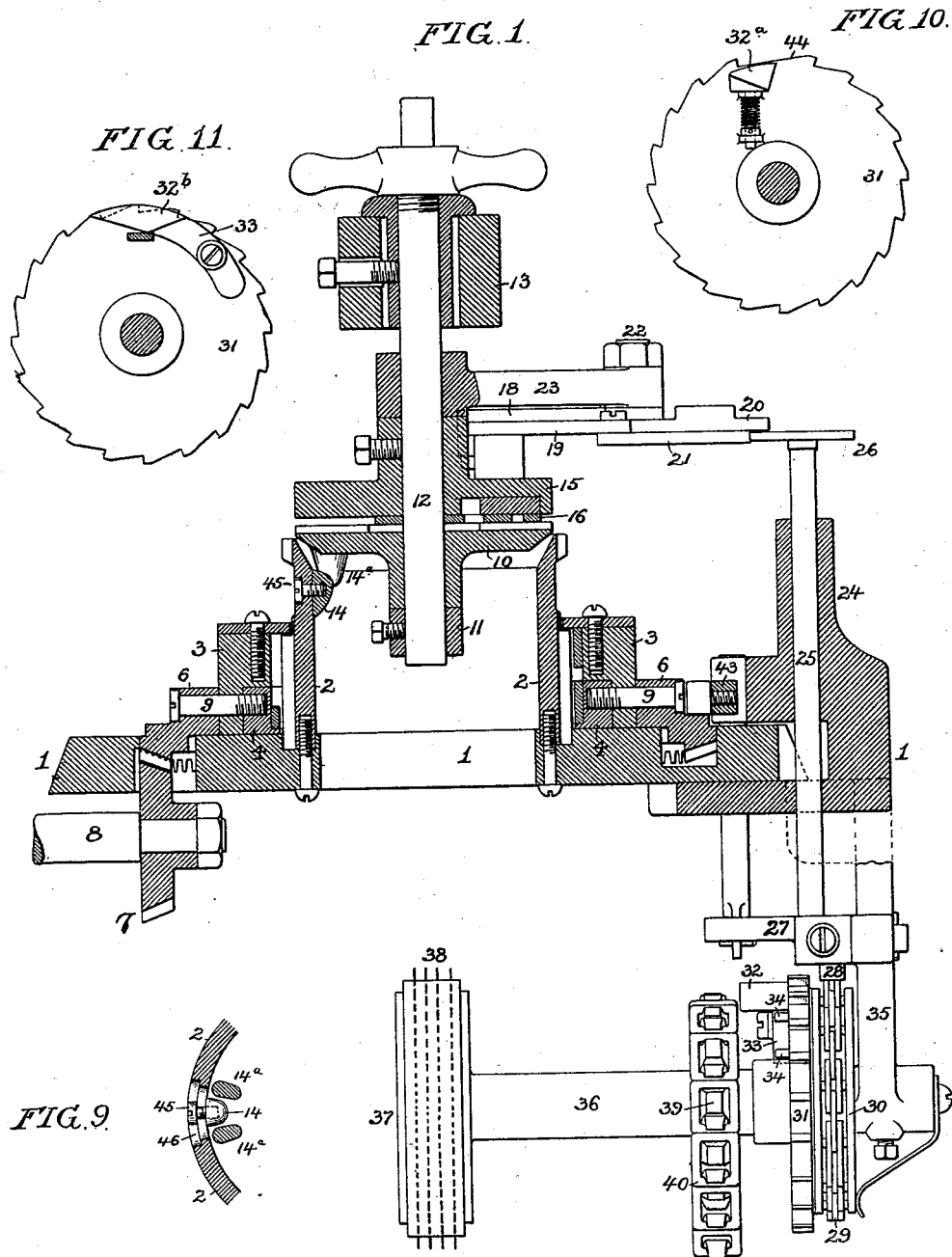


FIG. 9.

FIG. 1.

FIG. 10.

FIG. 11.

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FIG. 2.

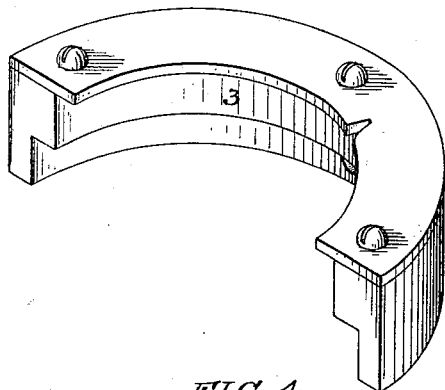


FIG. 3.

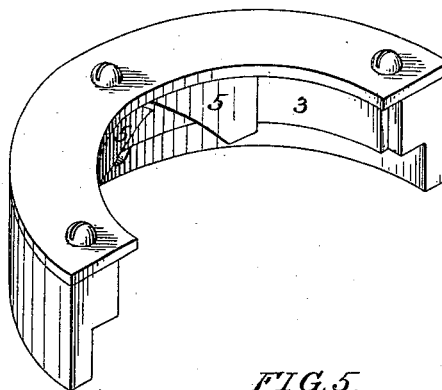


FIG. 4.

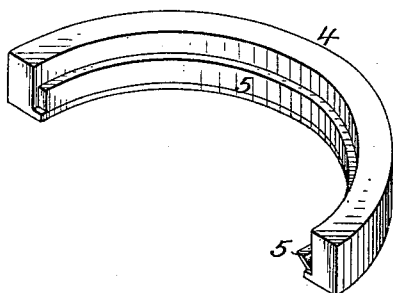


FIG. 5.

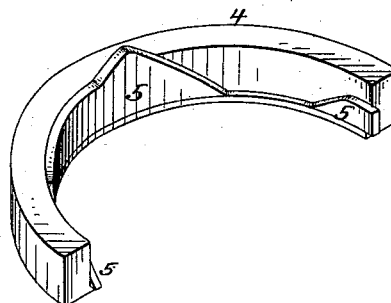


FIG. 6.

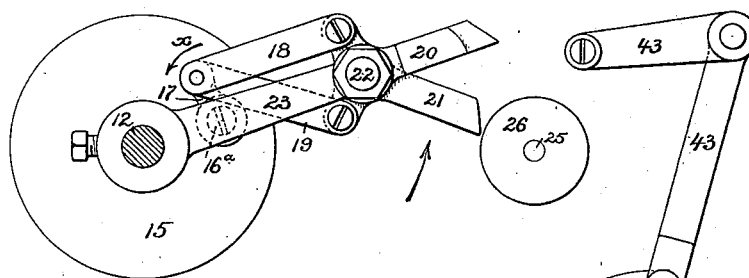


FIG. 7.

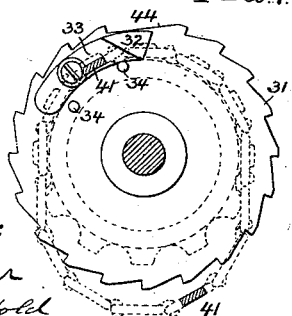
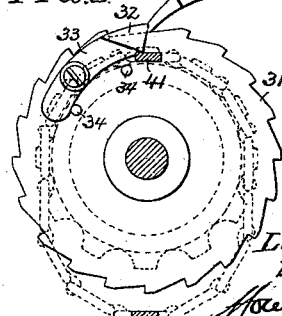


FIG. 8.



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# UNITED STATES PATENT OFFICE.

LOUIS N. D. WILLIAMS, OF ASHBOURNE, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO ROBERT W. SCOTT, OF PHILADELPHIA, PENNSYLVANIA.

## KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 646,336, dated March 27, 1900.

Application filed March 27, 1896. Serial No. 585,119. (No model.)

*To all whom it may concern:*

Be it known that I, LOUIS N. D. WILLIAMS, a citizen of the United States, and a resident of Ashbourne, Montgomery county, Pennsylvania, have invented certain Improvements in Knitting-Machines, of which the following is a specification.

My invention consists of improvements especially intended for application to machines for knitting ribbed fabric, although some of the improvements are applicable to other machines.

One object of my invention is to provide for the secure confinement to the rotating wheel, whereby they are operated, of the segments of the ring carrying the cams which actuate the needles of the cylinder, a further object being to simplify the construction of the devices employed for moving the cams of the dial cam-plate so as to provide for the formation of tuck or welt stitches. These objects I 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 embodying my improvements, the needles, thread-guides, &c., being omitted. Figs. 2, 3, 4, and 5 are perspective views of the different segments of the cam-ring. Fig. 6 is a plan view of the lever mechanism, whereby the adjustment of the movable cam of the dial cam-plate is effected. Figs. 7 and 8 are views representing a ratchet-wheel with movable tooth and operating devices therefor constituting one of the features of my invention. Fig. 9 is a sectional plan view of the means whereby the needle-cylinder and dial are adjusted one in respect to the other, and Figs. 10 and 11 are views illustrating modifications of one feature of my invention.

The fixed frame or bed of the machine is shown at 1, Fig. 1, and to said bed is fixedly secured the vertical needle-cylinder 2, the latter being surrounded by an annular cam-box provided with outer segments 3 and inner segments 4, each of these segments carrying cams 5, whereby the operation of the needles of the cylinder 2 is effected.

Surrounding the annular cam structure is an annular bevel-wheel 6, which meshes with

a bevel-pinion 7 on a driving-shaft 8 beneath the table or bed 1, each segment of the cam structure being secured to said annular bevel-wheel by means of bolts 9 passing through the outer segments 3 and into the inner segments 4, the latter having threaded openings for the reception of the threaded inner ends of the bolts.

By the use of the inner segments 4 in addition to the outer segments 3 the necessity of forming threaded openings in the cams 5 for the reception of the securing-bolts 9 is obviated and said bolts have a much firmer hold than would be possible if they engaged simply with the cams, the latter being usually thin and made of hardened steel, so that they have a tendency to strip the threads from the bolts 9 when the latter are screwed up tightly. The bolts 9 might, without departing from the essential features of this part of my invention, screw into the cams 5 as well as into the segments 4; but this is not necessary, as said inner segments are of sufficient thickness to afford ample hold for the bolts and insure the secure and rigid confinement of the cams in their proper position. The cams can, however, be readily removed from the machine upon withdrawing the bolts 9, so that both cams and needles are easily accessible for inspection or repairs.

The horizontal dial 10 of the machine is mounted upon a collar 11 at the lower end of a spindle 12, depending from a frame 13, which is mounted, as usual, so as to rotate with the annular bevel-wheel 6, a suitable lug 14 on the needle-cylinder 2 projecting between lugs 14<sup>a</sup> on the under side of the dial 10 and preventing the rotation of the latter with the spindle 12. The dial cam-plate 15 is secured to and rotates with the depending spindle 12, and this dial cam-plate is provided with the usual cams for effecting the reciprocation of the needles of the dial. These cams may be similar to any of those ordinarily used and need not be specifically described, save that one of them is a swinging cam 16 and has a spindle 16<sup>a</sup> projecting through the dial cam-plate and provided above the same with an arm 17, to which are connected two links 18 and 19, the link 18 being connected to the short arm of a bell-crank lever 20 and the link

19 being connected to the short arm of a bell-crank lever 21, both of these levers being hung by a stud 22 to the outer end of an arm 23, which is secured to and rotates with the spindle 12. The levers 20 and 21 are in different horizontal planes, and in a bearing 24 at one side of the table 1 is guided a vertical stem or spindle 25, which carries at the upper end a disk 26. Hence by the vertical adjustment of said stem 25 this disk can be brought into the path of either of the levers 20 or 21 or can be moved so as to clear both of said levers. The levers 20 and 21 are reversely arranged, so that, supposing them to be moving in the direction of the arrow, Fig. 6, contact of the disk 26 with the lever 21 will move the arm 17 in the direction of the arrow *x*, Fig. 6, while contact of the disk 26 with the lever 20 will cause movement of said arm in a direction the reverse of that indicated by the arrow *x*. Hence by proper vertical adjustment of the disk 26 the swinging cam of the dial cam-plate 10 can be moved in either direction. The lower end of the stem 25 is acted upon by a lever 27, which has a stud 28, acted upon by a pattern-chain 29 on a drum 30, to which is secured a ratchet-wheel 31, the latter having a movable tooth 32, which is in the present instance carried by a lever 33, hung to one side of the ratchet-wheel, vibration of said lever being limited by pins 34, projecting from the inner face of the ratchet-wheel, as shown in Figs. 7 and 8. The ratchet-wheel 31 and pattern-chain drum 30 are free to turn on a stud carried by the depending bracket 35, and upon the same stud is mounted, so as to be free to turn, a sleeve 36, which has at the inner end a wheel or disk 37, provided with projecting spurs or teeth 38, adapted to engage with the web of fabric which is passing downward from the needle-cylinder 2. The outer end of the sleeve 36 has a pattern-chain wheel 39, which carries a pattern-chain 40, and upon the latter are lugs or projections 41, adapted to come into contact with the beveled under side of the tooth 32, so as to lift the same from the position shown in Fig. 7 to that shown in Fig. 8.

A pawl 42 is carried by a lever 43, to which vibrating movement is imparted by any available portion of the machine—for instance, by a cam on the flange of the annular cam-box—and said pawl acts upon the teeth of the ratchet-wheel 31 in order to rotate the same and cause movement of the pattern-chain 29; but normally the tooth 32 of the ratchet-wheel 31 is depressed, as shown in Fig. 7, and the pawl plays upon the blank space 44, so as to fail to impart movement to the ratchet-wheel 31. When, however, a proper length of fabric has been woven, the pattern-chain 40 will, through the medium of the toothed wheel 37, sleeve 36, and chain-wheel 39, have been turned so as to lift the tooth 32 into position for being engaged by the pawl 42, and the ratchet-wheel 31 will consequently be started, the movement then continuing by reason of the

engagement of the pawl 42 with the fixed teeth of said wheel, so as to bring into action the pattern-chain 29 and effect such adjustment of the stem 25 and disk 26 as will cause the formation of the tucks, welts, or other forms of knitting for which the adjustment of said disk 26 is intended. As the ratchet-wheel 31 continues to move its tooth 32 is withdrawn from contact with the lug 41 and is permitted to again drop to the position shown in Fig. 7, thus insuring the stoppage of the ratchet-wheel 31 after it has made a complete turn, the lug 41 having meantime been moved forward by the pattern-chain 40, so as to be cut of the way. Heretofore in machines of this class the lug upon the pattern-chain 40 strikes a lug or projection on the ratchet-wheel 31 and moves the latter wheel bodily, so as to carry the blank space of the same from beneath the operating-pawl; but this requires the exercise of considerable force, which I render unnecessary by the provision of the movable tooth.

Although I prefer to use the pivoted lever carrying the movable tooth, it will be evident that other forms of movable tooth can be used within the scope of my invention. For instance, the tooth may be mounted upon the side of the wheel 31, so as to slide into and out of position, as shown at 32<sup>a</sup> in Fig. 10, a spring being employed, if desired, for retaining it in the inoperative position, or instead of using a movable tooth to be projected into a blank space of the wheel 31 the latter may, if desired, be toothed throughout, and the movable tooth may be in the nature of a guard or shield to be projected adjacent to one of the teeth of said wheel 31 to prevent engagement of the pawl 42 therewith, as shown, for instance, at 32<sup>b</sup> in Fig. 11, the pattern-chain 40 having lugs for supporting the tooth 32<sup>b</sup> as long as the ratchet-wheel 31 is to remain inactive, but permitting said tooth to drop when the movement of the ratchet-wheel is to be resumed, the tooth remaining down during the time that the ratchet-wheel is to remain in action.

The lug 14 of the needle-cylinder, which by engagement with the lugs 14<sup>a</sup> of the dial serves to retain these two elements of the machine in proper relation to each other, is secured to the needle-cylinder by means of a screw 45, which is adapted to a segmental slot 46 in the cylinder. Hence the lug 14 can be adjusted on the cylinder in order to effect any desired change in the circumferential relation of the cylinder and dial.

While I prefer to use the toothed wheel 37 as a means of operating the pattern-chain drum 39, any other means of imparting to said drum movement in accordance with the rate of production of the fabric may be adopted, the means for moving the said drum constituting no essential part of my invention.

When the construction of movable tooth shown in Fig. 11 is adopted, said tooth need not necessarily be carried by the ratchet-

wheel 31, but may be hung to a fixed support alongside of said ratchet-wheel.

In my Patent No. 491,911, dated February 14, 1893, I have shown a dial cam-plate having a swinging cam with shaft or spindle, from which project in opposite directions two arms, one connected by means of a link to a swinging arm hung to a stud on the rotating frame of the machine and the other connected by another link to a second arm hung to the same stud, whereas in the present case I use but a single arm on the shaft or spindle of the swinging cam of the dial cam-plate and connect said single arm to two reversely-arranged levers pivoted on the rotating frame of the machine. This is a more compact construction than the one formerly patented, and it provides for an easier operation of the swinging cam, owing to the increase of power due to the use of the levers instead of the swinging arms.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. A cam structure for knitting-machines, comprising inner and outer segments each carrying portions of the cams, an outer rotating structure, and bolts whereby the segments are confined to said outer rotating structure.

2. The combination of the dial cam-plate, and its swinging cam, with an arm on the spindle of said swinging cam, a pair of reversely-disposed bell-crank levers, and links whereby said arm is connected to each of said levers.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LOUIS N. D. WILLIAMS.

Witnesses:

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