

No. 668,025.

Patented Feb. 12, 1901.

D. F. SULLIVAN.

STRIPING ATTACHMENT FOR KNITTING MACHINES.

(Application filed Sept. 25, 1900.)

(No Model.)

4 Sheets—Sheet 1.

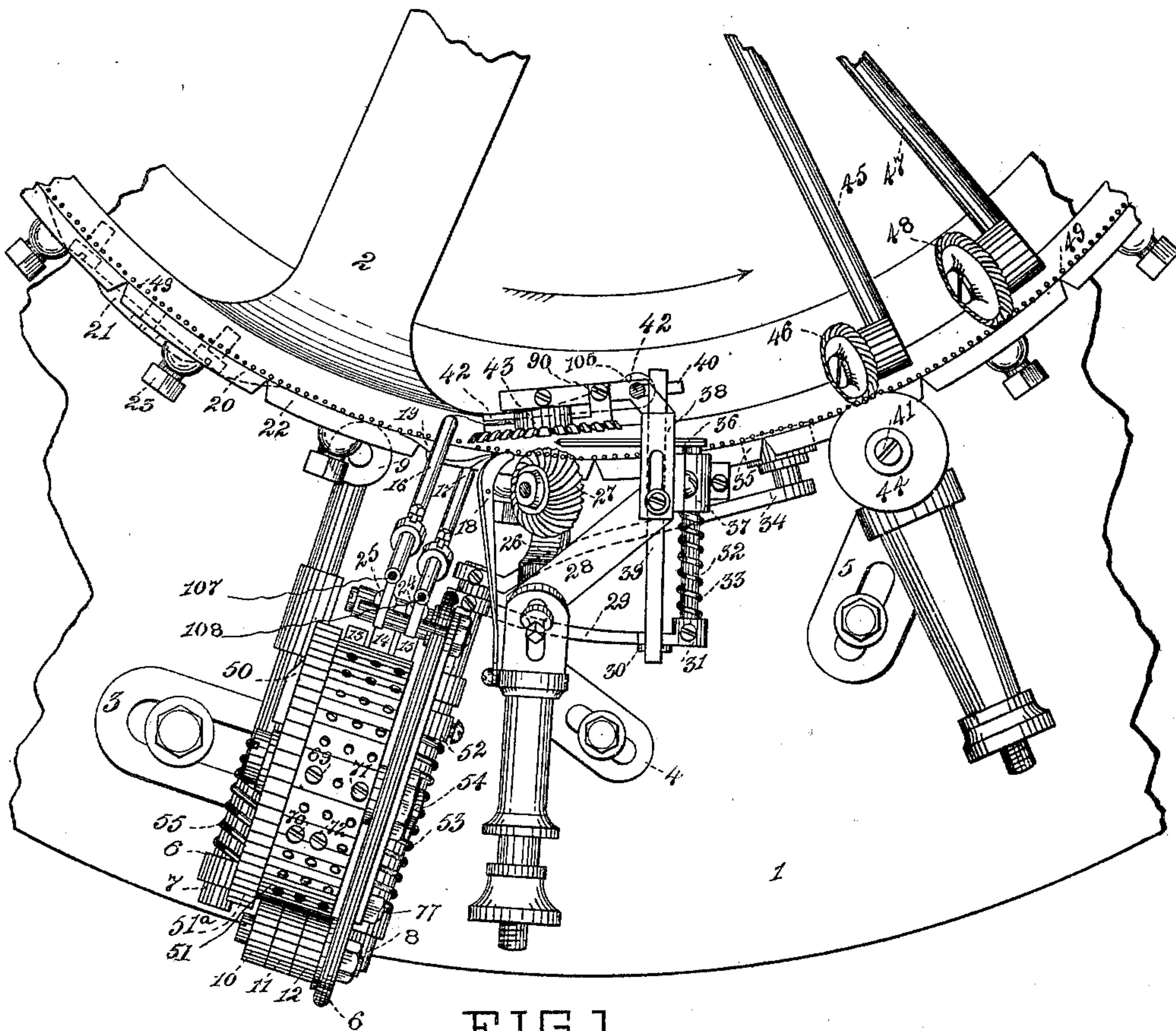


FIG. 1.

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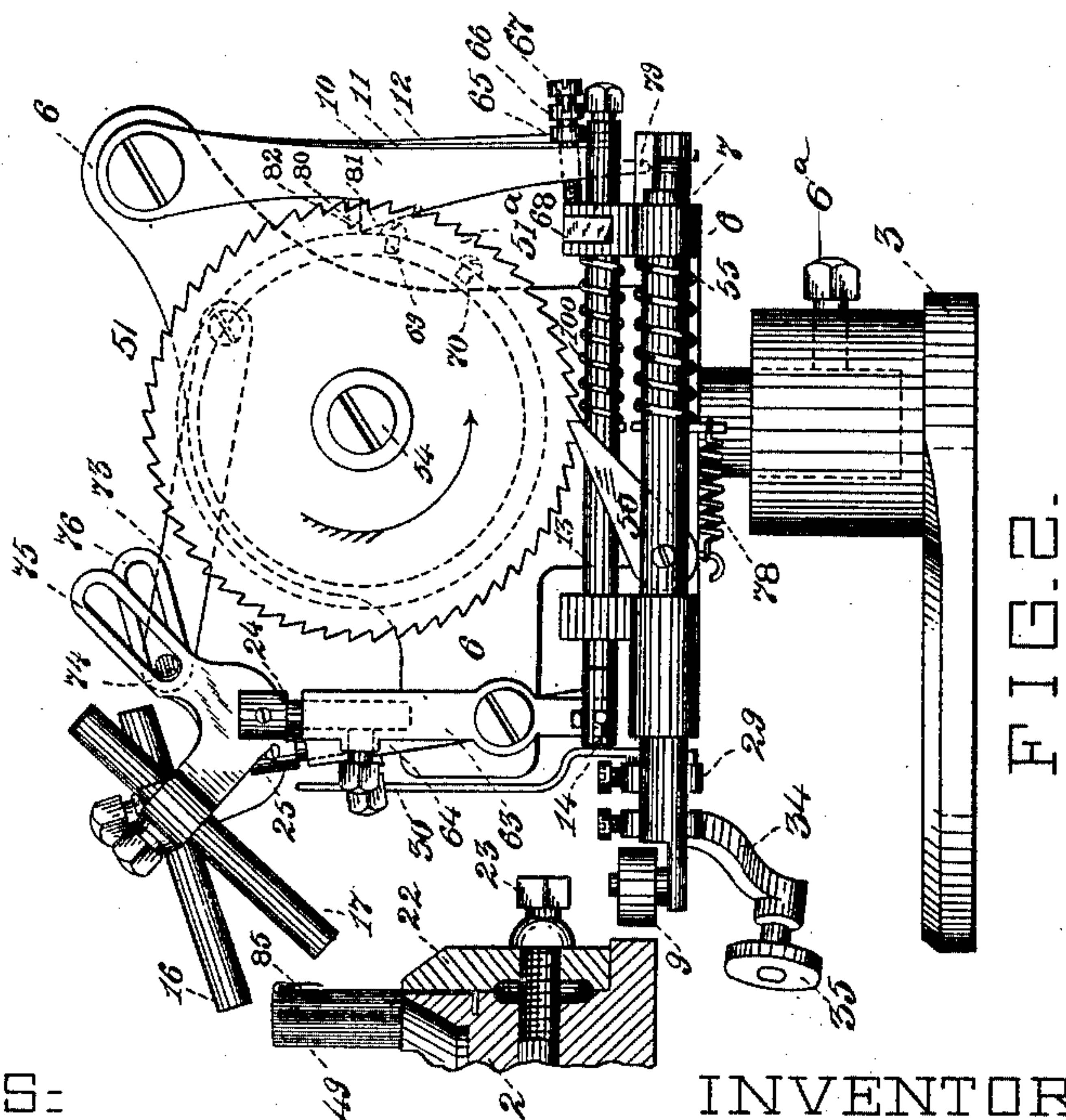
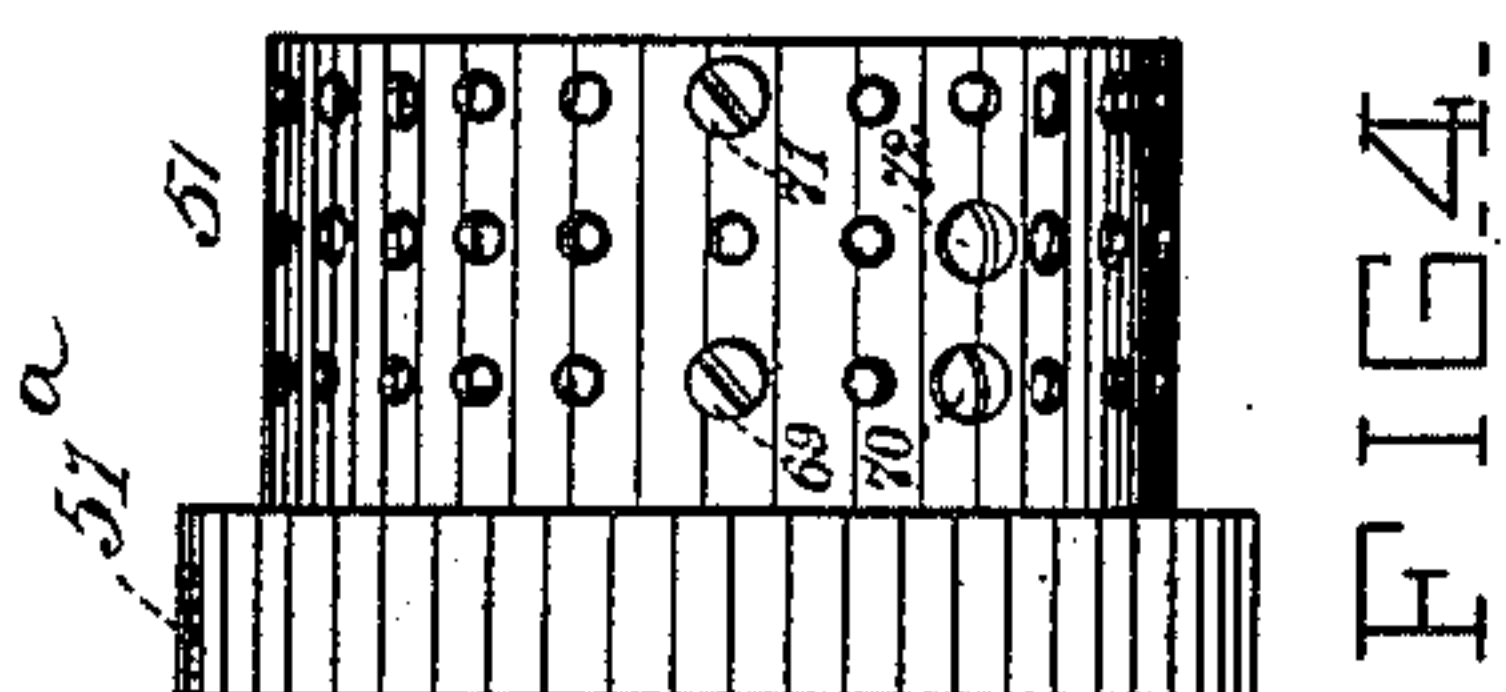
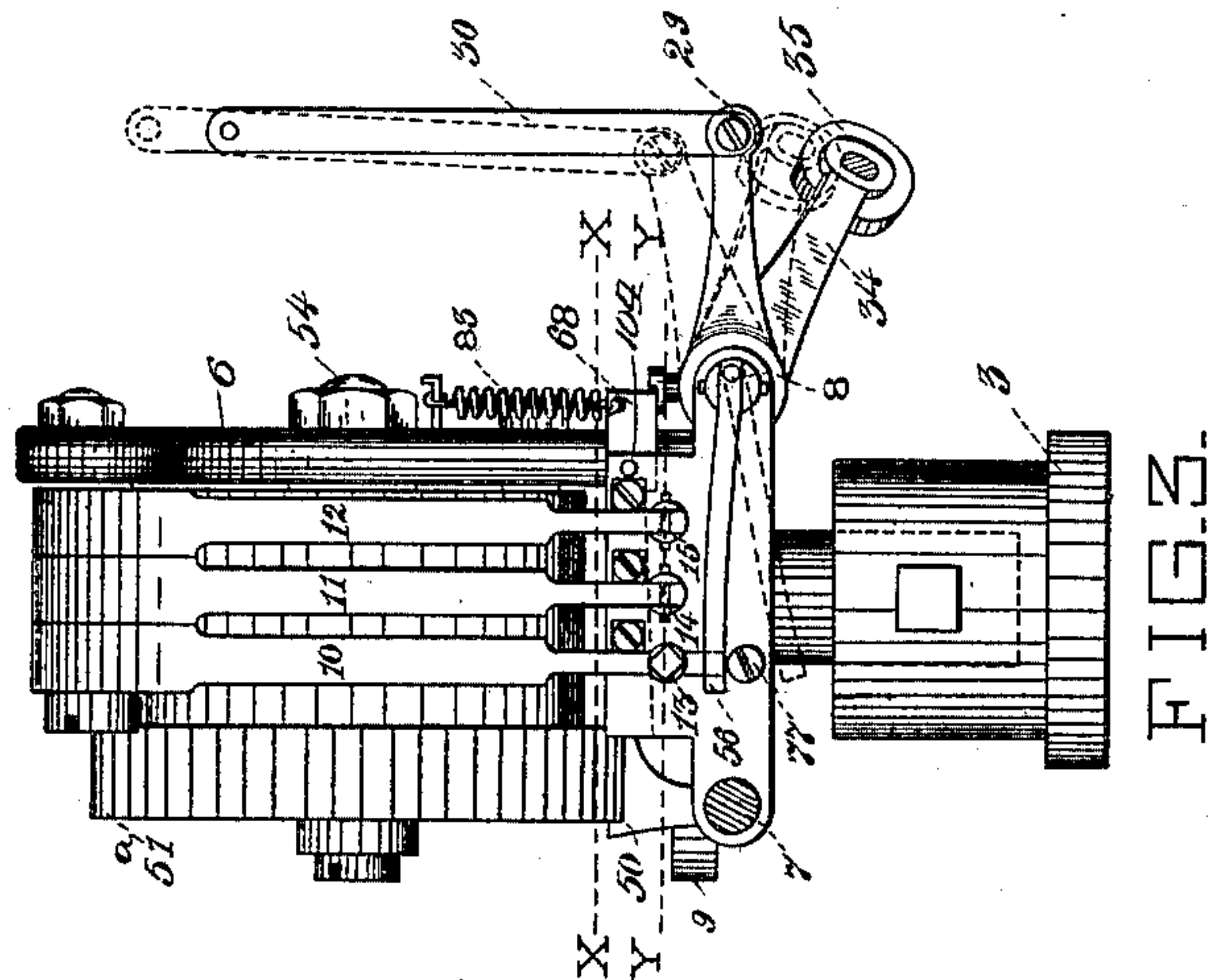
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(Application filed Sept. 25, 1900.)

(No Model.)

4 Sheets—Sheet 2.



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Patented Feb. 12, 1901.

STRIPING ATTACHMENT FOR KNITTING MACHINES.

(No Model.)

4 Sheets—Sheet 3.

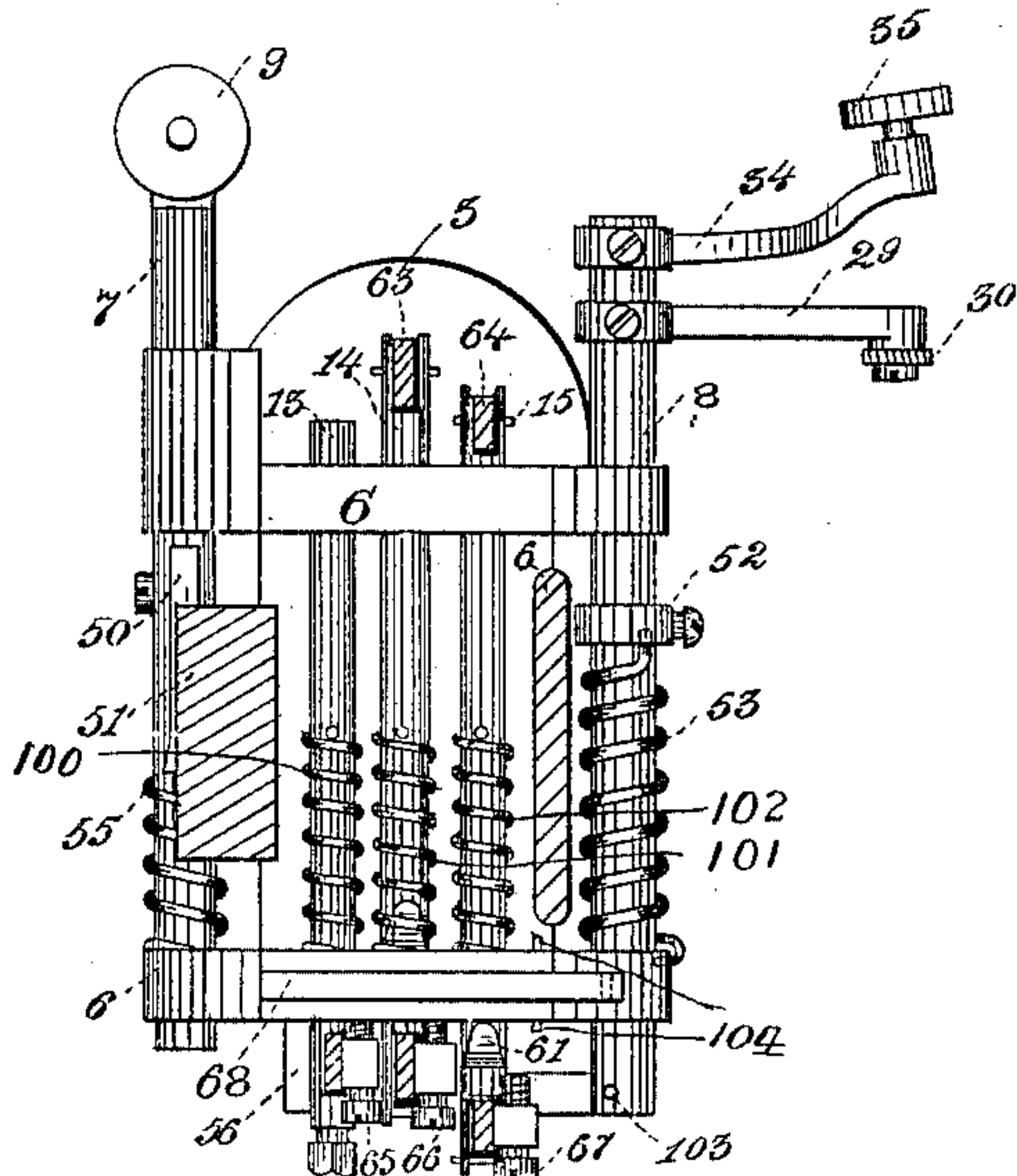


FIG. 5.

FIG. 6.

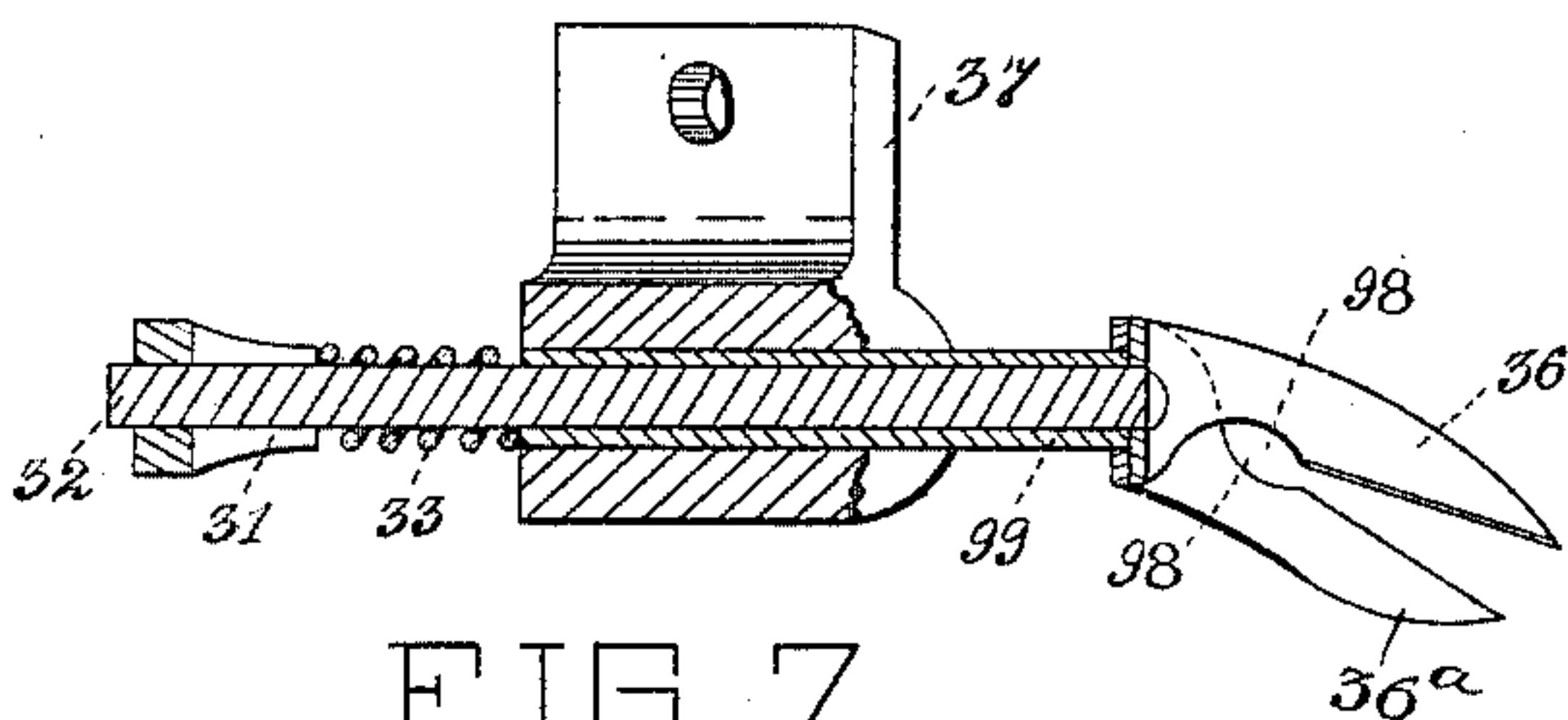


FIG. 7.

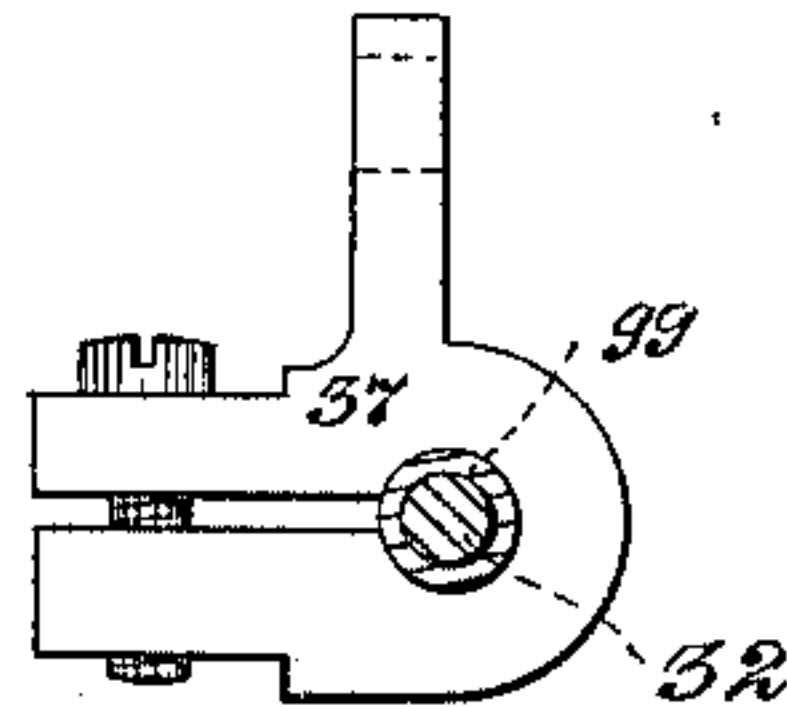


FIG. 10.

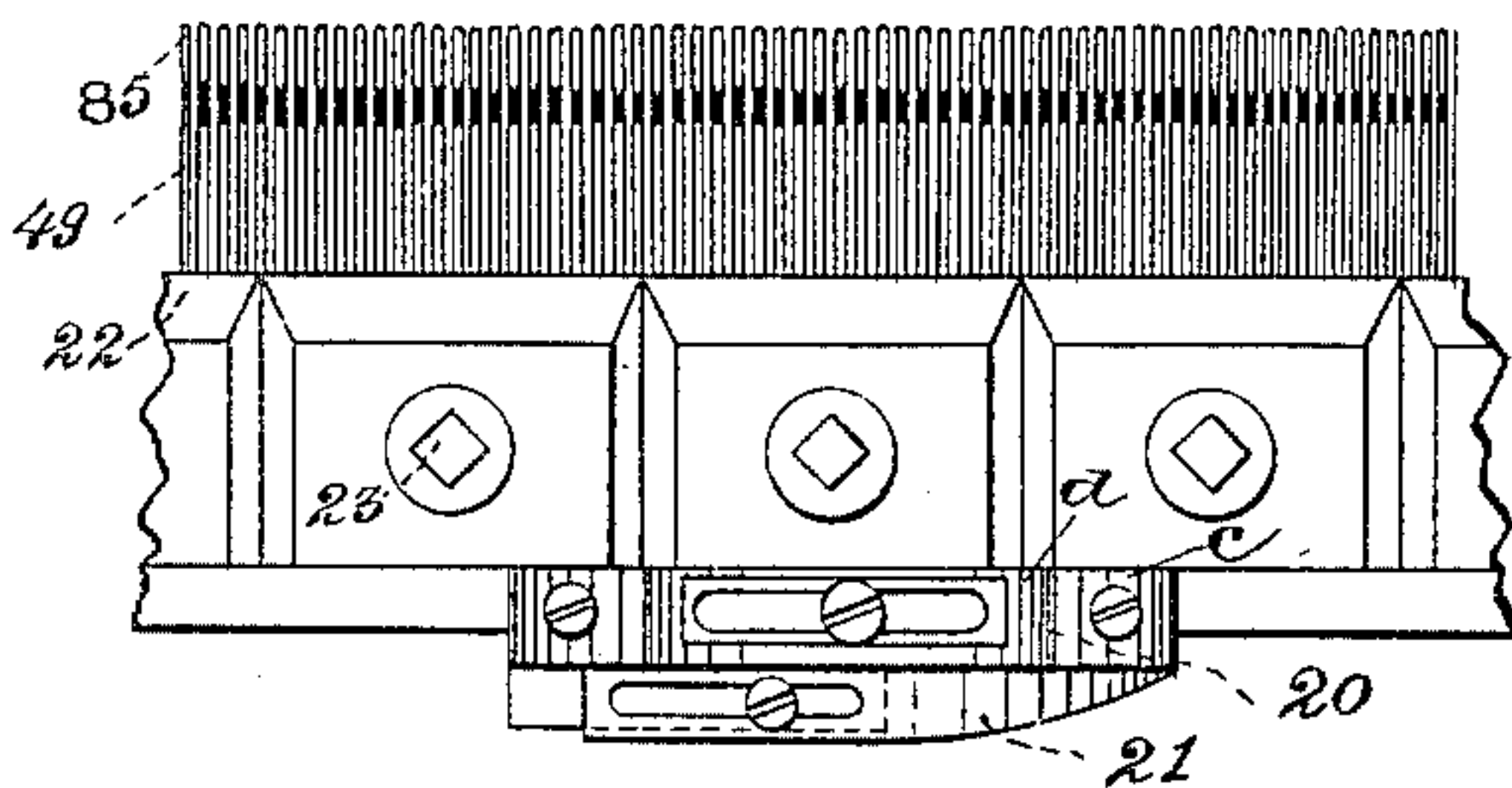


FIG. 9.

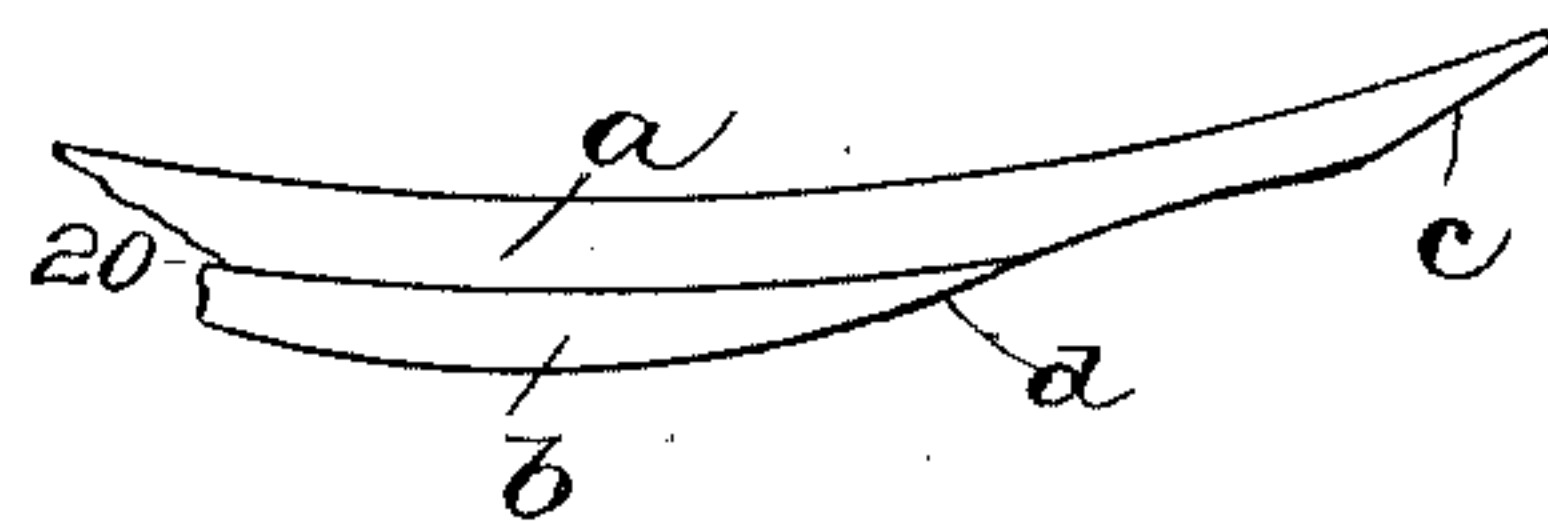


FIG.10.

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(Application filed Sept. 25, 1900.)

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4 Sheets—Sheet 4.

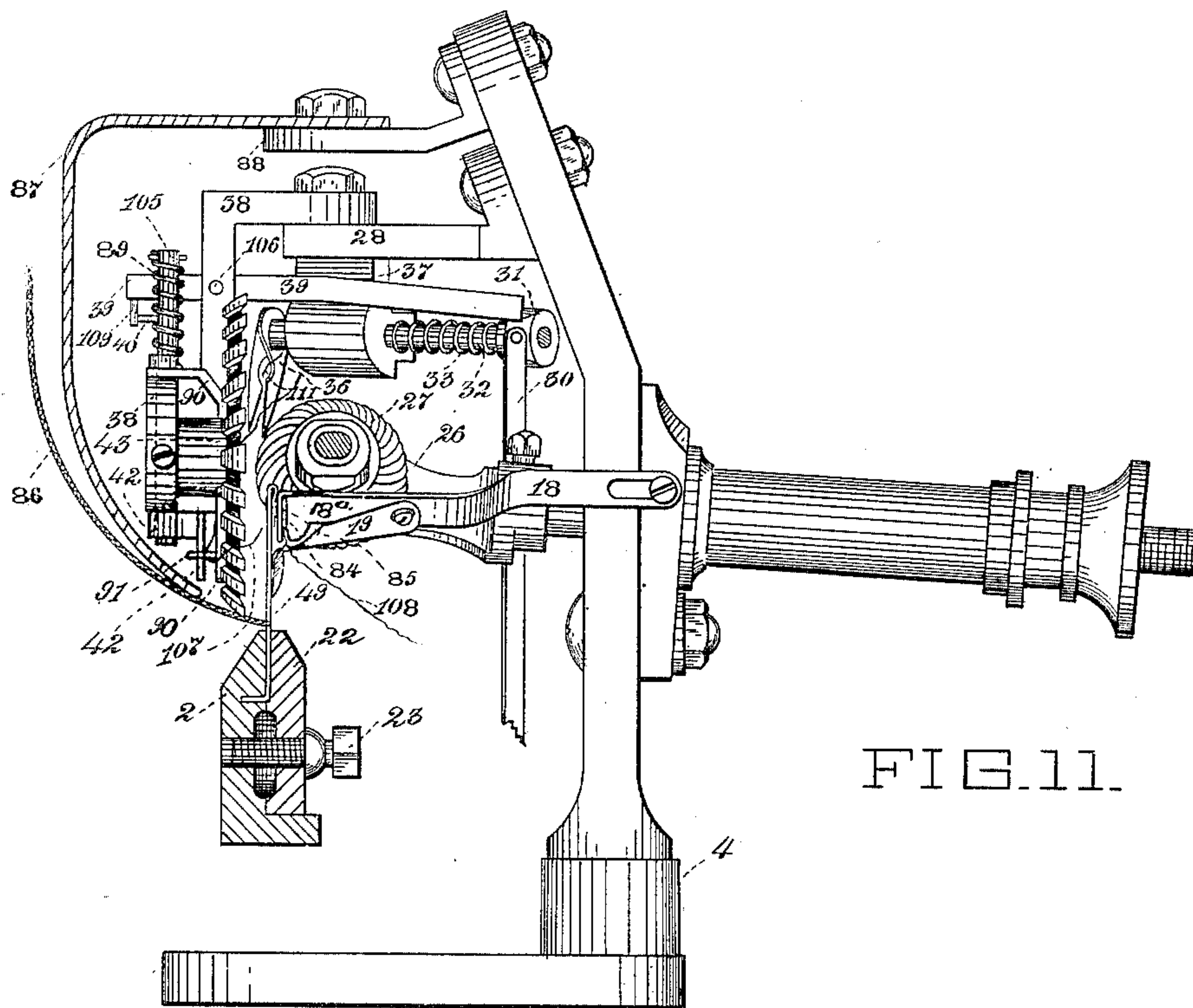
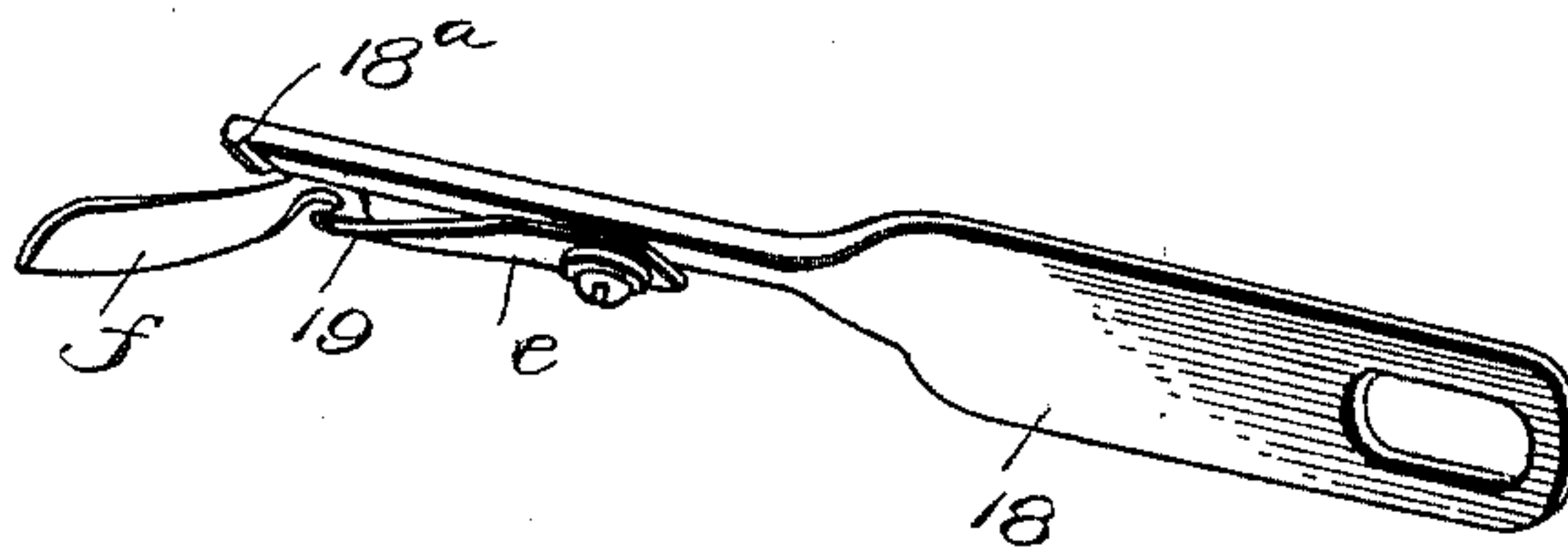


FIG. 11.

FIG. 12.



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UNITED STATES PATENT OFFICE.

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STRIPING ATTACHMENT FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 668,025, dated February 12, 1901.

Application filed September 25, 1900. Serial No. 31,076. (No model.)

To all whom it may concern:

Be it known that I, DANIEL F. SULLIVAN, a citizen of the United States, residing at Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Striping Attachments for Knitting-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form part of this specification.

This invention relates to striping attachments for cylinder knitting-machines, its object being to improve the structure of such devices, whereby they are rendered more efficient and certain in their action and whereby there will be no short pieces of yarn cut off, which might result in interfering with the operation of the machine.

The invention will be fully described hereinafter, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of a striping attachment constructed according to my invention. Fig. 2 is a side elevation of the pattern-wheel, the yarn-fingers, and the devices for operating them, the needle-cylinders being shown in section and the needles in elevation in proper relation to the striping attachment. Fig. 3 is a rear elevation of Fig. 2. Fig. 4 is an elevation of the pattern-wheel. Fig. 5 is a section on the line *yy* of Fig. 3. Fig. 6 is a similar view on the line *xx* of Fig. 3. Fig. 7 is a sectional view of the shear and its supporting-bracket. Fig. 8 is a side view of the shear-supporting bracket. Fig. 9 is a side elevation of a portion of the needle-cylinder and its needles, showing the actuating-cams secured thereon. Fig. 10 is a top plan view of the cam 20, which actuates the mechanism which controls the yarn-fingers, the shears, and the yarn-holders. Fig. 11 is a side elevation, partly in section, of the guide-wheel, shears, stitch-wheel, needles, and needle-cylinder in their proper relation to each other. Fig. 12 is a perspective view of the yarn-guide detached.

1 indicates the bed-plate of a single-cylin-

der knitting-machine, and 2 the cylinder carrying the needles 49.

4 indicates the stitch-wheel stand adjustably supported upon the bed-plate and carrying the stitch-wheel stud 26, on which the stitch-wheel 27 revolves. 5 is the presser-wheel stand, also adjustably secured to the bed-plate 1 and carrying a stud 41, upon which the presser-wheel 44 revolves.

45 indicates a bracket upon which the landing-wheel 46 is mounted, and 47 is a similar bracket upon which the cast-off wheel 48 is mounted.

All the above parts are old and well known in this art and need not be particularly described.

3 is a pattern-wheel stand in which a casting 6 is supported to be adjusted vertically and locked in the desired position by a set-screw 6^a. A stud 54 is carried by the casting 6, and upon this stud the pattern-wheel 51 is mounted to revolve. The pattern-wheel is provided at one end with a ratchet-wheel 51^a, with which a pawl 50 engages to rotate the pattern-wheel, as will be referred to hereinafter.

7 indicates a rod supported to slide in suitable bearings formed on the casting 6, and this rod carries a truck 9 at its inner end, adapted to be engaged by cam 20, secured to the face of the cylinder 2. This cam is made in two sections, (indicated by *a* and *b*,) the former being secured rigidly to the cylinder and the latter adjustably secured to the section *a*. Two lifting-faces *c* and *d* are thus formed for a purpose to be hereinafter referred to. The pawl 50 is pivoted to the rod 7, and a spring 78 holds the pawl 50 in engagement with the ratchet-wheel. A spring 55, surrounding the rod, tends normally to hold the rod in its forward position, so that the truck 9 may be engaged by the cam 20. The pattern-wheel is provided with three rows of tapped holes to receive screws or pins, (indicated by 69, 70, 71, and 72 in Figs. 1 and 4.) I have only shown three rows of holes in the pattern-wheel, because the machine as illustrated is designed to use two colors. It is, however, to be understood that additional rows of holes will be provided when more

than two yarns of different colors are to be used. The pins 69 and 70, which are in the rows of holes nearest the ratchet-wheel, are designed to actuate a tripping-lever 10, pivotally mounted at its upper end upon a stud projecting from a casting 6. The inner face of this lever is provided with a cam-surface 81, with which the pins will engage when the pattern-wheel is rotated. The lower end of the tripping-lever 10 extends through a slot in the end of a rod 13, which is supported to slide in suitable bearings on the casting 6. A spiral spring 100 surrounds the rod 13 and tends normally to push its inner end toward the needle-cylinder. The rod 13 is provided with a notch 58, with which a snap-catch 68 is adapted to engage, as will be referred to more fully hereinafter.

16 and 17 indicate the yarn-fingers. These are short tubes, through which the yarn passes from the bobbins to the needles. These fingers are adjustably secured, respectively, in one of the arms of angle-levers 75 and 76, and the other arms of these levers are slotted to receive a pin 74, projecting from a bracket 73, adjustably secured to the casting 6. The levers 75 and 76 are pivoted, respectively, at their angles to levers 63 and 64, and these latter levers are pivoted intermediate their ends on a stud projecting from the casting 6. The lower ends of the levers 63 and 64 have a slot-and-pin connection, respectively, with rods 14 and 15, supported to slide in suitable bearings on the casting 6. (See Figs. 5 and 6.) Spiral springs 101 and 102 surround these rods and tend normally to move them toward the needle-cylinder. There are two levers 11 and 12, pivoted at their upper ends upon the same stud which carries the lever 10, and the lower ends of these levers extend through slots in the outer ends of the rods 14 and 15. The levers 11 and 12 have cam-surfaces 80 and 82, respectively, on their inner faces, which are adapted to be engaged by pins 72 and 71 in the pattern-wheel. The cam-surface 81 on the lever 10 is lower down than the cam-surfaces on the levers 11 and 12, and consequently when the pins which actuate the respective levers are in line with each other the lever 10 will be actuated slightly in advance of either of the other levers. The rods 14 and 15 are each provided with two notches similar to the notch 58 on the rod 13. The notches on the rod 14 are indicated by 59 and 60 and those on the rod 15 by 61 and 62. When the rods 13, 14, and 15 are in their normal positions, the notches 58, 59, and 61 will be in alinement and the snap-catch 68 will lie in them. The snap-catch 68 is pivoted at one end on a pin 104, secured in the casting 6, and its lower edge is beveled, as shown in Fig. 2 of the drawings. When the lever 10 is actuated by a pin on the pattern-wheel, the rod 13 will be moved and the catch 68 thereby lifted out of engagement with the notches in the rods 14 and 15. Assuming the rods 13, 14, and 15 to

be in the position shown in Fig. 5, both the yarn-fingers 16 and 17 would occupy the position in which 17 is shown in Fig. 2. If now the pattern-wheel be revolved and the pin 69 engages the cam-surface on the lever 10, the rod 13 will be moved and lift the catch 68 out of engagement with the notches 58, 59, and 61. Shortly thereafter the pin 71 will engage the cam-surface of the lever 12 and move the rod 15 to the position shown in Fig. 6. During the movement of the rod 15 the pin 69 will have passed out of engagement with the cam-surface 81 and the spring 100 will return the rod 13 to its normal position, and the locking-catch 68 will then fall into engagement with the notches 58, 59, and 62, and the yarn-finger 16 will be locked in the position shown in Fig. 2, and the yarn carried thereby will be held out of action for knitting. After the cylinder has completed two courses the pattern-wheel will have been revolved sufficiently to bring the pins 70 and 72 into position to act on the levers 10 and 11. The lever 10 will be first moved, as already described, and thereby lift catch 68, which will release the rod 15 and permit its spring 102 to return it to its normal position, and the yarn-finger 16 will be thrown down into a position similar to that occupied by the yarn-finger 17 in Fig. 2. The pin 72 will next act on the lever 11, and thereby move the rod 14 and throw the yarn-finger 17 into a position similar to that occupied by the yarn-finger 16 in Fig. 2. By setting the pins in the pattern-wheel the desired distance apart any number of courses may be knitted with one color and then the yarn-fingers 16 and 17 changed to knit any desired number of courses of another color. The pattern-wheel receives its movement to actuate the lever 10 while the truck 9 is engaged by the lifting-surface *c* of the cam. Between the surfaces *c* and *d* the truck 9 will not operate to move the rod 7, and consequently the pattern-wheel will be at rest for a short period of time, and during this short period both the yarn-fingers 16 and 17 will be in operative positions to deliver the yarn to the needles to form the splice or joining. This splice will be very short and may be regulated by adjusting the section *b* of the cam 20 on the section *a* thereof, and so increase or diminish the space between *c* and *d*. When the cam-surface *d* engages the truck 9, the pattern-wheel will be still further revolved and bring the pin 71 or 72, as the case may be, into engagement with the levers 11 or 12 to throw one of the yarn-fingers out of action.

28 indicates a casting, which is secured to the upper portion of the stitch-wheel stand 4, and this casting supports a bracket 38, which is adjustably connected thereto. A guide-wheel 43 is mounted to revolve on a stud secured to the bracket 38, and when the machine is in operation this wheel will be in engagement with the cloth 86, as indicated in Fig. 11, and when the cylinder is revolving

this contact between the cloth and wheel will keep the said wheel constantly revolving.

105 indicates a vertical shaft extending loosely through the bracket 38, and to the lower end of this pin is attached a plate 42, adapted to coöperate with another plate 90, which is secured to the bracket 38 and lies in close proximity to the inner face of the guide-wheel 43. These plates 42 and 90 form a yarn-holder and serve to keep all of the yarns out of action which are not being knitted. A spiral spring 89 surrounds the shaft 105 and tends normally to throw the plate 42 against the plate 90.

8 indicates a shaft which is journaled in bearings upon the casting 6, and to the inner end of this shaft an arm 34 is secured, which arm carries a truck 35, arranged in close proximity to the needle-cylinder 2. A spiral spring 53 surrounds the shaft 8 and tends normally to turn the shaft in a direction to elevate the arm 34 and truck 35. Another arm 29 is secured to the shaft 8 and is connected at its outer end to a link 30, and the latter is connected at its upper end to an arm 31, projecting from a shaft 32, which is supported in a bracket 37, secured to the side of the casting 28. A lever 39 is pivoted intermediate its ends at 106 to the bracket 38, and one end of this lever rests upon the arm 31, while the other end is provided with a pin 109, which contacts with a short arm 40, projecting from the shaft 105. When the arm 31 is lifted, the lever 39 will be rocked and the shaft 105 turned in its bearings to move the plate 42 out of contact with the plate 90. A sleeve 99 is secured in the bracket 37, and the shaft 32 is journaled in and extends through the sleeve and carries at its inner end a blade 36, extending at substantially a right angle to the shaft. Another blade 36^a is secured to the sleeve 99, and this latter blade is fixed, while the blade 36 moves with the shaft 32 to coöperate with the blade 36^a for severing the yarn. To the outer end of the shaft 8 a latch-lever 56 is pivoted, as indicated at 103 in Figs. 5 and 6. The end of the shaft 8 is bored out to receive a spring 57, which engages the lever 56 on one side of its pivot and tends normally to throw the outer end of said lever against the face of the casting 6. This end of the lever rests upon a pin 77 and holds the shaft 8 against the tension of the spring 53 to keep the arms 29 and 34 in their lowest position, and thereby lock the shears in their closed position and also the yarn-holder in its closed position. The lower end 79 of the lever 10 extends across the latch-lever 56, and when this lever 10 is swung outwardly by the pattern-wheel the latch-lever 56 is moved out of engagement with the pin 77, and the spring 53 will then act upon the shaft 8 and turn it in its bearings, thereby elevating the arms 29 and 34, and the elevation of the arm 29 will result in opening the shears and also the yarn-holder. The arms 29 and 34 are returned to their lowest position by means of a cam 21,

which is secured to the needle-cylinder immediately below the cam 20, said cam 21 engaging the truck 35, and thereby depressing the arm 34. The depression of the arm 34 will rotate the shaft 38 and elevate the outer end of the latch-lever 56. The face of the pin 77 is inclined, so that the latch-lever will slide up over it, and as soon as said lever passes above the pin the spring 57 will again force the outer end of the lever 56 toward the casting 6, and the pin 77 will again lock the shaft 8 against movement under the action of its spring 53.

Referring again to the shears, there is a spiral spring 33, surrounding the shaft 32 and bearing at one end against the arm 31 and at its other end against the bracket 37. The function of this spring is to keep the shear-blades in cutting contact and compensate for wear. Each of the shear-blades is provided with a cut-away portion 98, which is for the purpose of allowing the yarn that has just gone into action to pass through the blade of the shears without being severed, as will be more fully referred to hereinafter.

In order to properly guide the yarn which is being knitted to the stitch-wheel, I have provided a yarn-guide, consisting of two parts 18 and 19. The part 18 is a flat bar adjustably secured at its outer end to the stitch-wheel stand 4. This bar is spirally twisted about midway its length to give its forward portion an oblique position, and at its inner end it is provided on its lower face with a groove 18^a, and the yarn that is being knitted will run through this groove to the stitch-wheel, and be thus always kept in proper position to be knitted. The part 19 is adjustably secured to the oblique portion of the part 18, and consists of a flat bar spirally twisted and bent about midway its length to bring one arm at substantially a right angle to the other. One arm *e* lies immediately below the oblique portion of the part 18, a sufficient space being left between them to allow the yarn to pass through to the stitch-wheel. The other arm *f* extends in front of the needles, and the function of this latter arm is to hold the yarn in such position that when it is carried along by the needles it will be in the proper position to be acted on by the stitch-wheel.

The levers 10, 11, and 12 are respectively provided at their lower ends with adjusting-screws 65, 66, and 67, which are adapted to contact with the front face of the casting 6, and by means of these screws the inward movement of the lower ends of these levers can be accurately adjusted to properly control the movement of the parts actuated by them.

In the operation of the machine and assuming that only two different-colored yarns are being used in the machine, as illustrated, it will be seen by reference to Fig. 1 that the yarn 108, which runs through the yarn-finger 17, is being knitted, while the yarn 107, which

runs through the yarn-finger 16, is held in the yarn-holder 42 90. Assuming now that the pins on the pattern-wheel are set to change the yarn, when the lifting-surface *c* of the cam 20 engages the truck 9 the lever 10 will be actuated sufficiently to release the sliding rod 14 and throw the yarn-finger 16 down to a position similar to that occupied by the yarn-finger 17. This will result in bringing the yarn 107 between the needles and on the top of the arm *f* of the yarn-guide, and this yarn 107 will be carried along by the needles to the stitch-wheel and knitted conjointly with the yarn 108, thereby forming the splice. This joint knitting will only be accomplished by three or four needles. The lifting-surface *d* of the cam 20 will now engage the truck 9 and still further rotate the cam-wheel, which will result in lifting the yarn-finger 17 to throw the yarn 108 out of action and inside the cylinder, and the guide-wheel 43 will then engage this yarn 108 and by its rotation will guide it into the holder and between the blades of the shears. It must be here stated that the movement of the pattern-wheel, which results in throwing down the yarn-finger 16, does not move the lever 10 outwardly to its full extent; but when the surface *d* engages the truck 9 the pattern-wheel by its further rotation moves the lever 10 out to its extreme limit, and this results in releasing the snap-catch 56, thereby permitting the spring 53 to turn the shaft 8 and elevate the link 30, which elevation will open the shear and also the yarn-holder, and these opening movements occur simultaneously with the lifting of the yarn-finger 17. When the yarn-finger 16 is thrown down, the yarn 107 will also be brought into position to be engaged by the guide-wheel 43, and this yarn will also be guided by the wheel between the blades of the shear, the several parts being so arranged that this yarn will reach the shears just as they are opened. The yarn 107 will therefore enter between the blades of the shear in advance of the yarn 108, and yarn 107, which by this time will have been released from the holder 42 90, will pass up the blades of the shear into the recesses 98. The continued revolution of the cylinder will now bring the cam 21 into position to act on the truck 35, which will result in depressing the arm 34 and rotating the shaft 8 to bring the snap-catch 56 back into locking position. The arm 29 will likewise be depressed, which will result in pulling on the link 30, and thereby rotating the shaft 32 to close the blades of the shear and sever the yarn 108, while the yarn 107, by reason of its lying in the recesses 98, will not be cut. Simultaneously with the cutting action the outer end of the lever 39 will be free to drop and the spring 89 free to exert its power to move the plate 42 toward the plate 90, and thereby close the yarn-holder and clamp the thread 108. As the cylinder continues its movement the loose end of the yarn 107 will be drawn out from the recesses 98 in the shear.

In order to prevent the yarn between the plates 42 and 90 from winding around the hub of the guide-wheel 43, I provide a pin 91, which projects from the plate 90 through an opening or slot in the plate 42.

In order to keep the knitted cloth 86 out of contact with the bracket which supports the guide-wheel and yarn-holder, I provide a shield 87, which is adjustably supported on a bracket 88, secured to the upper end of the stitch-wheel stand 4.

Without limiting myself to the precise details of construction illustrated and described, I claim—

1. In a striping attachment for circular-knitting machines, a yarn-holder comprising two parts one of which is movable, and means actuated by the cylinder to open and close said holder, combined with a guide-wheel to carry the yarn into said holder, said guide-wheel being mounted inside the needles and rotated by frictional engagement with the finished work, substantially as set forth.

2. In a striping attachment for circular-knitting machines, a yarn-holder comprising a fixed plate and a movable plate, means actuated by the needle-cylinder for moving said movable plate to and from the fixed plate, combined with a guide-wheel in close proximity to the fixed plate, said wheel being in frictional engagement with the finished work and movable to carry the yarn into the said holder substantially as set forth.

3. In a striping attachment for circular-knitting machines, a combination of a plurality of yarn-fingers means for throwing said yarn-fingers into and out of operative position, a yarn-holder, and a guide-wheel interposed between the yarn-holder and the yarn-fingers and movable by frictional engagement with the finished work to carry the yarn from the inoperative fingers into the holder substantially as set forth.

4. In a striping attachment for circular-knitting machines, a shear comprising two blades one of which is movable, mechanism controlled by the cylinder to actuate the movable blade, and a guide-wheel movable by frictional engagement with the finished work to carry the yarn between the blades of the shears, substantially as set forth.

5. In a striping attachment for circular-knitting machines, a shear comprising two blades one of which is movable, each blade having a recess in its cutting edge substantially as and for the purpose set forth.

6. In a striping attachment for circular-knitting machines, the combination of a yarn-holder consisting of two parts one of which is movable, a shear consisting of two blades one of which is movable, a guide-wheel rotatable by frictional engagement with the finished work to carry the yarn into the holder and also between the blades of the shear, and mechanism controlled by the movement of the cylinder to simultaneously actuate the movable blade of the shear and the movable

part of the yarn-holder, substantially as set forth.

7. In a striping attachment for circular-knitting machines, the combination with a pair of yarn-fingers, of a shear comprising two blades one of which is movable, a guide-wheel adapted to carry the yarns from said fingers between the blades of said shear one yarn being in advance of the other, said blades being provided with registering recesses in their cutting edges to receive the yarn which is in advance, and means to actuate the movable blade to sever the rearmost yarn, substantially as set forth.

8. In a striping attachment for circular-knitting machines, a guide-wheel supported to be engaged on its periphery by the finished cloth, whereby the wheel is rotated, and a thread-holder supported adjacent to the inner face of the guide-wheel combined with a shield interposed between the finished cloth and the thread-holder and the guide-wheel and its support, substantially as set forth.

9. In a striping attachment for circular-knitting machines, the combination of a yarn-holder comprising two parts one of which is movable, mechanism to actuate the movable part, a locking device to hold the movable part in its closed position, a pattern-wheel, and means actuated by the pattern-wheel to release the locking device and permit said holder to be opened, substantially as set forth.

10. In a striping attachment for circular-knitting machines, the combination of a yarn-holder consisting of two parts one of which is movable, a shear consisting of two blades one of which is movable, mechanism to actu-

ate the movable parts of the holder and the shear simultaneously, a locking device to maintain the holder and shear in closed position, a pattern-wheel to release the locking device and permit the holder and shear to be opened simultaneously, substantially as set forth.

11. In a striping attachment for circular-knitting machines, a yarn-holder comprising two parts one of which is movable, mechanism to actuate the movable part, a locking device controlling said mechanism to maintain the holder in closed position, a pattern-wheel, means actuated by the pattern-wheel to release the locking device to permit the holder to be opened, and a cam on the cylinder to actuate the mechanism to close the holder and restore the locking device to its locking position, substantially as set forth.

12. In a striping attachment for circular-knitting machines, a shear comprising two blades one of which is movable, mechanism to actuate the movable blade, a locking device controlling said mechanism to maintain the blades in closed position, a pattern-wheel, means actuated by the pattern-wheel to release the locking device to permit the shear to be opened, and a cam on the cylinder to actuate the mechanism to close the shear and return the locking device to its locking position, substantially as set forth.

In testimony whereof I have signed my name in presence of two witnesses.

DANIEL F. SULLIVAN.

Witnesses:

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EDWIN CRUSE.