

No. 625,579.

Patented May 23, 1899.

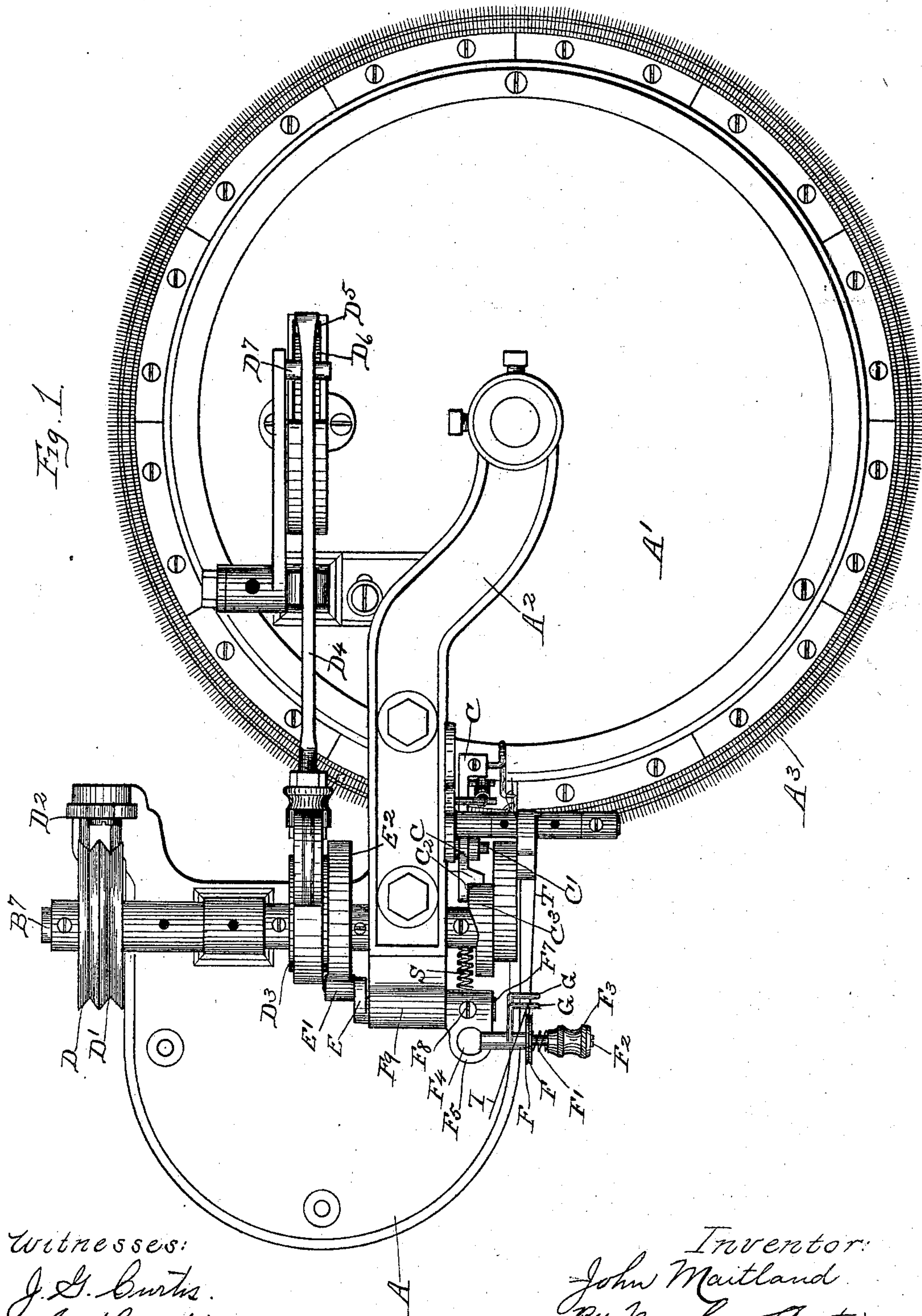
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COMBINED TENSION MECHANISM AND SLACK THREAD CONTROLLER.

(Application filed Apr. 15, 1898.)

No Model.)

2 Sheets—Sheet 1.



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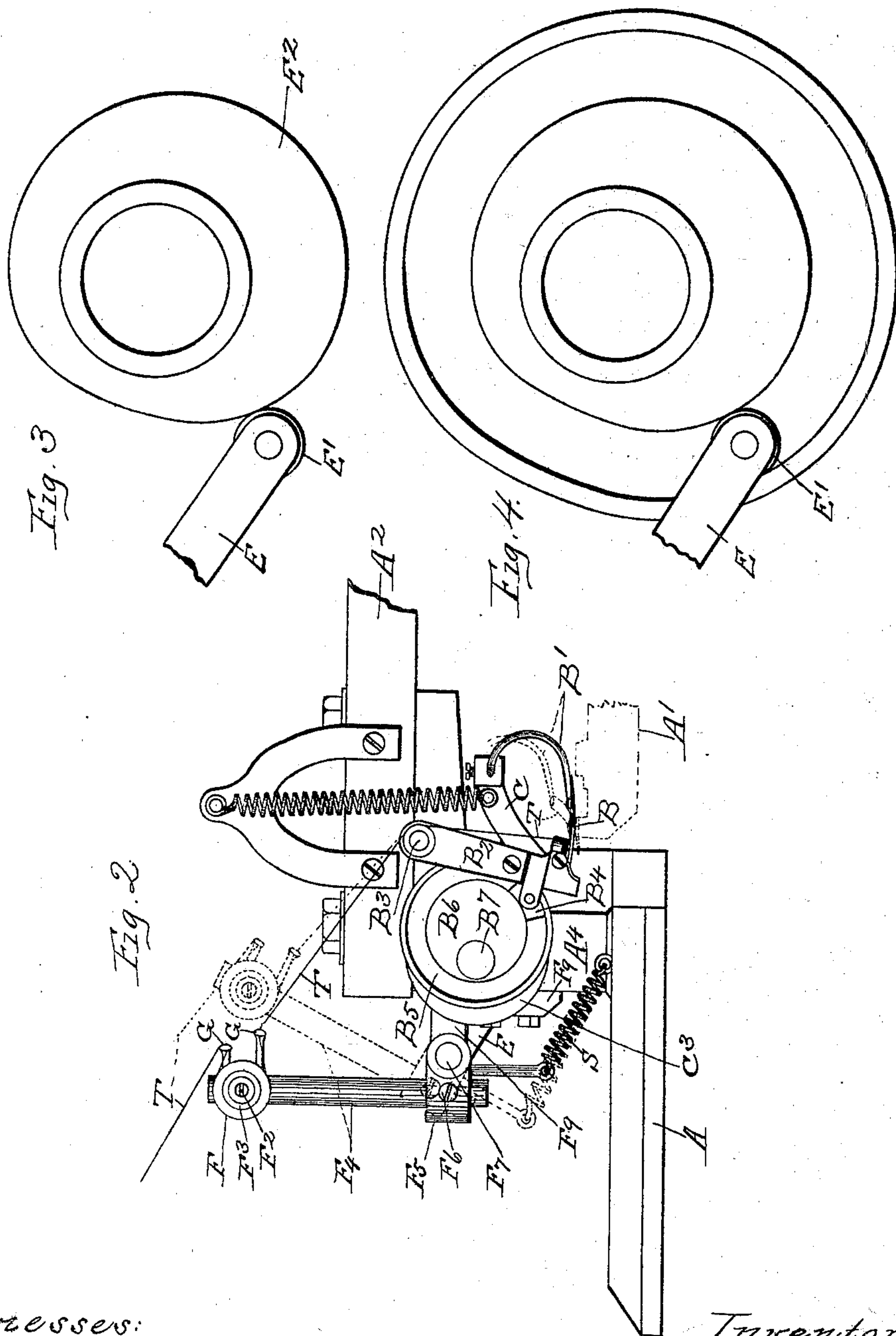
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2 Sheets—Sheet 2



Witnesses:
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UNITED STATES PATENT OFFICE.

JOHN MAITLAND, OF COHOES, NEW YORK, ASSIGNOR OF ONE-HALF TO
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COMBINED TENSION MECHANISM AND SLACK-THREAD CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 625,579, dated May 23, 1899.

Application filed April 15, 1898. Serial No. 677,661. (No model.)

To all whom it may concern:

Be it known that I, JOHN MAITLAND, a citizen of the United States, residing at Cohoes, county of Albany, and State of New York, have invented certain new and useful Improvements in a Combined Tension Mechanism and Slack-Thread Controller, of which the following is a specification.

The invention relates to such improvements; and it consists of the novel construction and combination of parts hereinafter described and subsequently claimed.

Reference may be had to the accompanying drawings, and the letters of reference marked thereon, which form a part of this specification.

Similar letters refer to similar parts in the several figures.

Figure 1 of the drawings is a top plan view of a machine for sewing looped fabrics embodying my invention. Fig. 2 is a view in side elevation of the same without the pin-plate, the latter being indicated by dotted lines. Fig. 3 is a view in side elevation of the cam for operating the movable tension and the follower-roller adapted to engage said cam. Fig. 4 is a similar view showing a form of cam adapted to operate the tension without the use of a retracting-spring.

My invention relates more particularly to improvements in machines for uniting the edges of looped fabrics used in the manufacture of undergarments from knitted fabric, wherein the work is supported in a vertical plane upon a series of points or pins projecting horizontally from the edge of a rotary supporting-plate; but the invention is equally applicable to other forms of sewing-machines.

In the styles of looping-machines now commonly employed the stitch-forming mechanism comprises a needle and a looper coöperative therewith operated by cams on the shaft which operates the pin-plate, and the supply of thread to the needle is controlled in part by means of a tension similar to that used on other forms of sewing-machines. It is found in practice that in operating such machines wherein the thread passes from the tension directly to the needle or indirectly thereto over rigid guides the action of the looper in

drawing out a sufficient supply of thread to form its loop draws only partly from the un-looped thread supplied through the eye of the needle, the remainder of the thread for such loop being drawn from one or more of the loops previously formed with a tension approximately the same as that upon the un-looped thread. In consequence thereof the several loops are tightly drawn around one another, producing a tight inelastic seam. It is also found in operating such machines that at each return movement of the needle the latter is withdrawn from the fabric and retreats a considerable distance beyond the same, thereby drawing from the tension mechanism a considerable supply of thread, which is left slack upon the succeeding forward movement of the needle and tends to interfere with the successful operation of the machine.

As a means for overcoming the defects above pointed out, it has been proposed to provide a yielding guide for the thread between the tension mechanism and the needle, such guide being usually in the form of a spring provided with an eye to receive the thread.

In operating such machines provided with a yielding spring-guide for the thread the spring contracts or bends under the pulling strain exerted upon the thread by the looper, as above described, and the force of the spring is substituted for the normal force of the tension in resisting the pulling action of the looper and exerting a strain or tension upon the previously-formed loops. It is therefore found that when a spring is used sufficiently strong to quickly take up the slack thread left by the forward movement of the needle the tightening effect upon the previously-formed loops above referred to is the same, but to a less degree, as in the construction wherein the thread passes directly from the tension to the needle.

The object of my invention is to positively and accurately control the tension upon the thread at all times; and my invention comprises tension mechanism movable toward and from the work-support and stitch-forming mechanism, with means for controlling the movements of the tension mechanism,

whereby the supply of thread to the needle and looper is at all times under perfect control.

Referring to the drawings, A represents the bed-plate of the machine, and A' is the work-supporting pin-plate rotatively supported by the overhanging bracket-arm A², erected from the bed-plate. The pin-plate is provided with the pins or points A³, projecting radially from its periphery and adapted to receive and support the fabric to be operated upon.

The stitch-forming mechanism comprises the needle B and the looper B'. The needle is fixed upon the end of the oscillatory arm B², rotatively supported upon the horizontal shaft or stud B³, projecting from the post A⁴, erected from the base-plate. The arm B² is provided with a cam-follower B⁴, located in a cam-groove B⁵ in the cam B⁶, fixed upon and rotary with the drive-shaft B⁷, whereby reciprocating movements are imparted to the needle toward and from the fabric supported by the work-plate and toward and from the looper in a line radial to the work-plate. The looper is supported upon one end of a lever C, adapted to rock upon and slide longitudinally of a shaft or stud C', projecting from the bed-plate. The other end of the lever is provided with cam-followers C², adapted to engage both the periphery and inner face of the cam C³, fixed upon the drive-shaft, whereby the proper movements are imparted to the looper to enable it to cooperate with the needle in the stitch-forming operation.

The drive-shaft is provided with the fixed and loose pulleys D D', adapted to receive a driving-belt, (not shown,) and adjacent to such pulleys is located the belt-shipper D².

The work-plate is rotated by means of the cam D³ on the drive-shaft in the form of an eccentric connected with the pitman D⁴, provided at its end with a hook D⁵, adapted to engage and intermittently operate the work-plate-operating ratchet-wheel D⁶, controlled by the dog D⁷.

The cam-followers on the looper-lever are held in engagement with their operating-cams by suitable springs.

The parts above referred to by letters of reference are all old and well known and may be of any known form, and their construction and operation will be fully understood by those skilled in the art without further description.

As a means for controlling the supply of thread to the stitch-forming mechanism I provide a tension mechanism comprising the two disks F F', yieldingly held in engagement with each other by means of the coil-spring F', surrounding the stud or spindle F², upon which said disks are loosely mounted. The force of the spring is regulated by means of the adjusting-nut F³ in the usual manner. The disks are adapted to receive between them the thread T on its way to the needle. The spindle F², which supports the tension,

projects laterally from the upper end of an upright arm or spindle F⁴, the lower end of which passes through a socket-sleeve F⁵ and is secured therein by the set-screw F⁶. The socket-sleeve is fixed upon the rock-shaft F⁷ by means of the set-screw F⁸. The rock-shaft is supported in bearings in the bracket F⁹, projecting from the bed-plate post A⁴, and is provided on its inner end with a crank-arm E, which carries a follower-roll E', engageable with the cam E², fixed on the drive-shaft. The spring S tends to hold the follower in engagement with the cam, whereby the rotary movements of the cam impart to the tension-support and tension mechanism movements toward and from the stitch-forming mechanism and work-plate, and the movements of the tension mechanism are regulated and controlled by the cam. The surface of the cam is so shaped that as the machine is operated the tension mechanism will be moved toward the work-plate and looper to leave the thread slack between the tension and looper at the same time that the looper is drawing or pulling the thread from the needle to form its loop. It will be readily seen that by giving the proper shape to the cam I can leave the thread absolutely free from the effect of the tension during the operation of forming such loop, if desired, and thereby entirely relieve the previously-formed loops from the pulling strain exerted by the looper, and can positively and accurately regulate the force of the tension, as well as the time of its application relatively to the movements of the parts of the stitch-forming mechanism. The cam is so shaped that at the time the looper is pulling the thread from the needle to form its loop the tension mechanism is moving toward the needle, looper, and work-plate to leave the thread slack, and during the time that the needle is moving toward the work the tension mechanism is moving in the opposite direction to take up the slack thread left by the needle, as above described, said slack being considerable in a machine for sewing looped fabrics, due to the fact that the needle at each operation must retreat sufficiently to clear the points on the pin-plate. It will thus be seen that the needle and tension are each reciprocatory independently of the other, and during their reciprocating movements they move in the same direction simultaneously during a part of their respective reciprocating movements and in opposite directions during a part of such movements.

By using a cam shaped to impart to the tension a movement whereby it takes up the slack thread left by the movement of the needle, as well as a movement whereby it relieves the thread from the effect of the tension while the looper is forming its loop, I am able to dispense with the spring thread-guides heretofore employed, their function being positively performed by the movements of the tension.

The amplitude of the tension movement

can be varied as desired by varying the effective length of the upright spindle F^4 , which can be accomplished by sliding the spindle longitudinally in its socket and securing it in the desired position by means of the set-screw F^6 .

Any known means may be employed for moving the tension toward and from the stitch-forming mechanism and the work-plate.

I have shown the tension-support provided with thread-guides $G\ G$, fixed upon and movable with said support and adapted to guide the thread into and out of the tension and prevent its disarrangement by the reciprocating movements of the tension.

In Fig. 4 I have shown a cam provided with a cam-groove in its face adapted to receive the follower-roll E' and positively control the movements of the tension in both directions without the use of the spring S , which may be dispensed with, if desired.

By means of my improved machine above described I am able to unite the edges of two pieces of knitted fabric by a seam of any desired degree of elasticity, even to the degree of permitting said pieces of fabric to be drawn entirely out of contact with each other while joined by the stitches of the seam.

In referring to the tension mechanism as moving toward and from the needle, pin-plate, or looper I wish to be understood as referring to the equivalent or effective movement of the tension—that is, its movement along the path traversed by the thread.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for sewing looped fabrics and in combination, a pin-plate, and a needle

and tension mechanism each capable of independent reciprocating movement; means for reciprocating the needle toward and from the pin-plate; and means for moving the tension mechanism away from the pin-plate to take up the slack thread left by the needle, simultaneously with the movement of the needle toward the pin-plate, substantially as described.

2. In a machine for sewing looped fabrics, and in combination, a pin-plate, looper, and a needle and tension mechanism each capable of independent reciprocating movement, means for operating the looper, means for reciprocating the needle toward and from the looper, and means for reciprocating the tension mechanism in unison with the needle movement during a part, and in opposition to the needle movement during a part, of the stitch-forming operation, substantially as described.

3. In a machine for sewing looped fabrics, and in combination, a pin-plate, a looper, and means for operating the pin-plate and looper; of a needle and tension mechanism each separately oscillatory; a drive-shaft; two cams on said drive-shaft; a connection between one of said cams and the needle; and a connection between the other of said cams and the tension mechanism whereby alternate taut and loose conditions of the thread may be produced independently of the movement of the needle, substantially as described.

In testimony whereof I have hereunto set my hand this 9th day of April, 1898.

JOHN MAITLAND.

Witnesses:

GEO. A. MOSHER,
FRANK C. CURTIS.