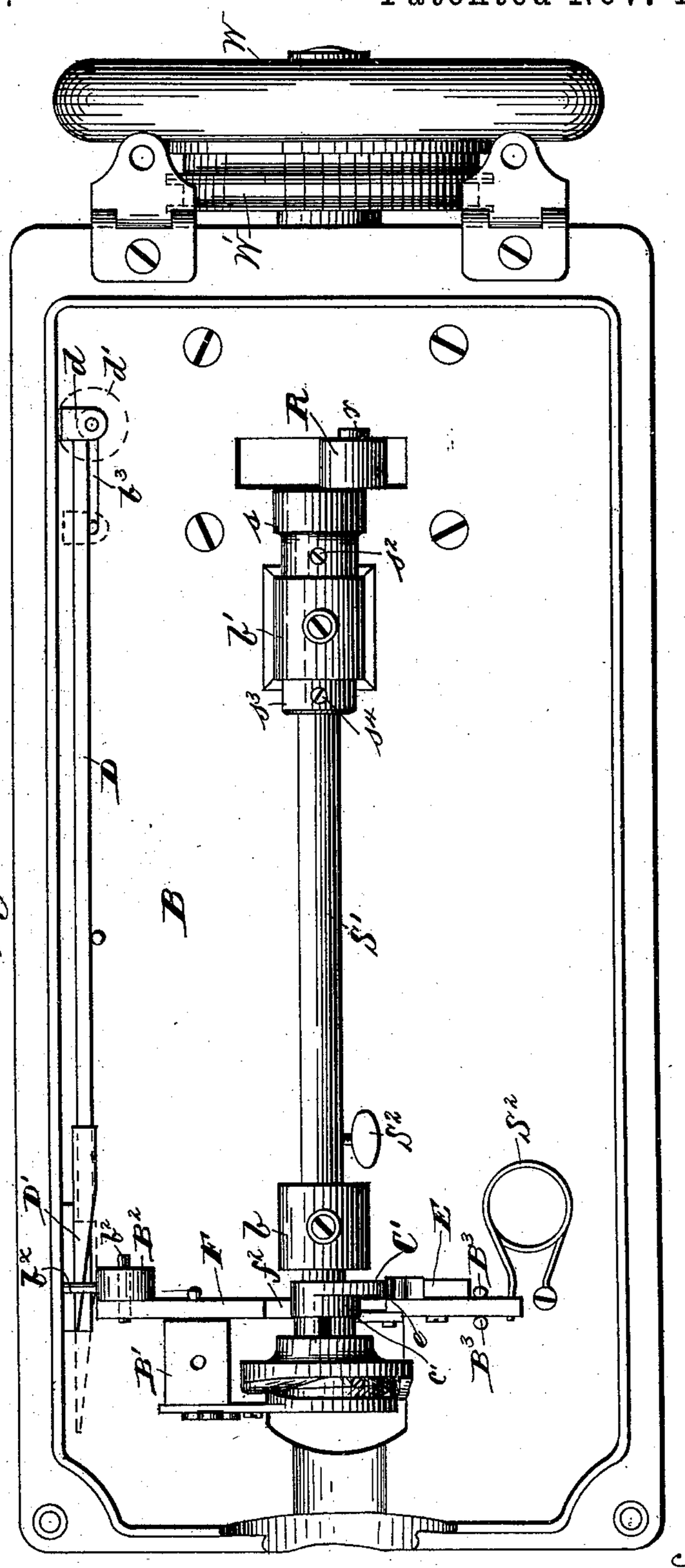
(Model.) 4 Sheets—Sheet 1.

J. W. FOSTER.

TENSION DEVICE FOR SEWING MACHINES.

No. 373,179. Patented Nov. 15, 1887.



Attest:
W. E. Boulter
M. Knobloch.

Inventor:
John W. Foster,
per Henry Orth
his atty

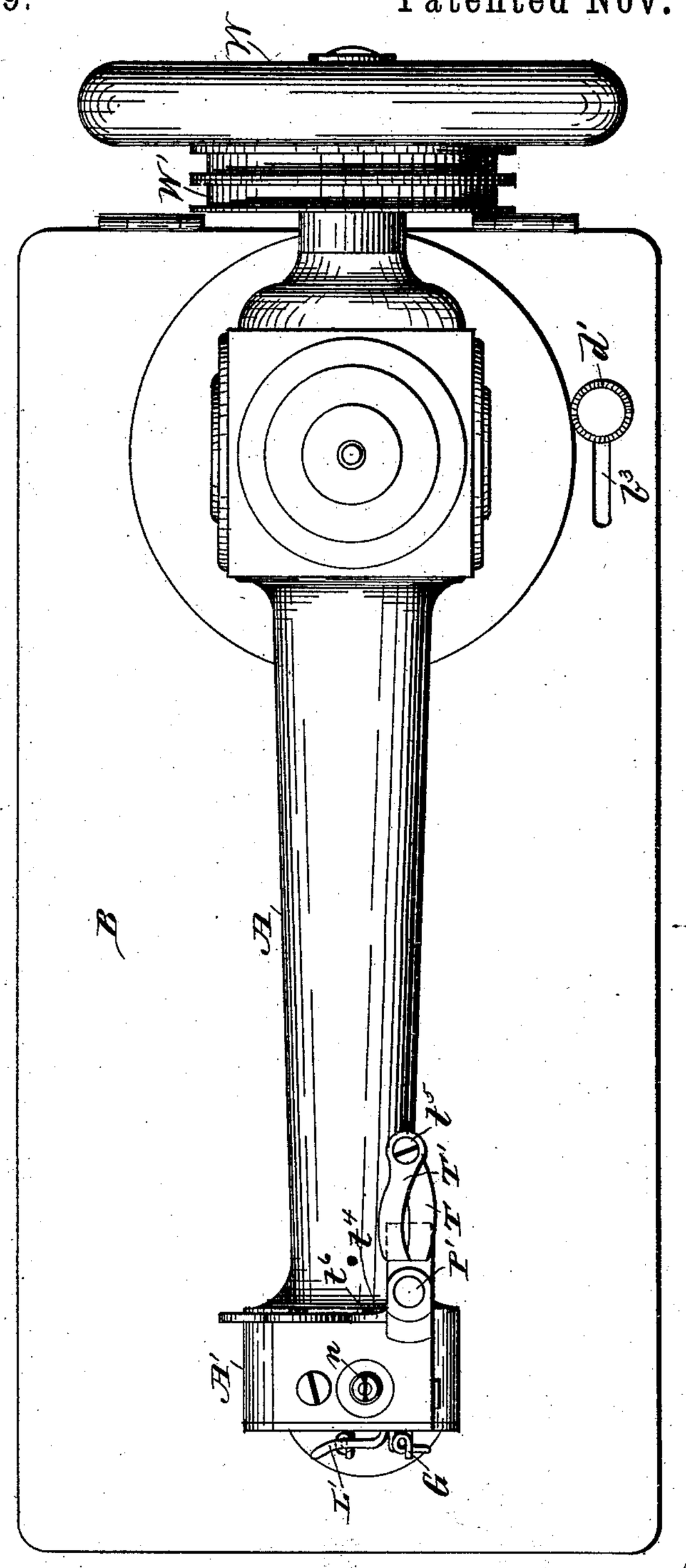
(Model.)

4 Sheets—Sheet 2.

J. W. FOSTER.

TENSION DEVICE FOR SEWING MACHINES.

No. 373,179. Patented Nov. 15, 1887.



Attest:
W. E. Coulter
P. M. Knobloch.

Inventor
John W. Foster,
per Henry Orth
his atty

(Model.) 4 Sheets—Sheet 3.

J. W. FOSTER.

TENSION DEVICE FOR SEWING MACHINES.

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Fig. 5

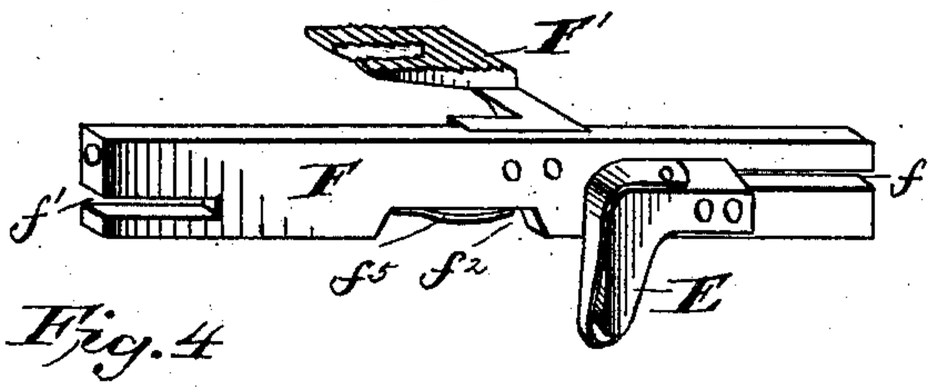


Fig. 6

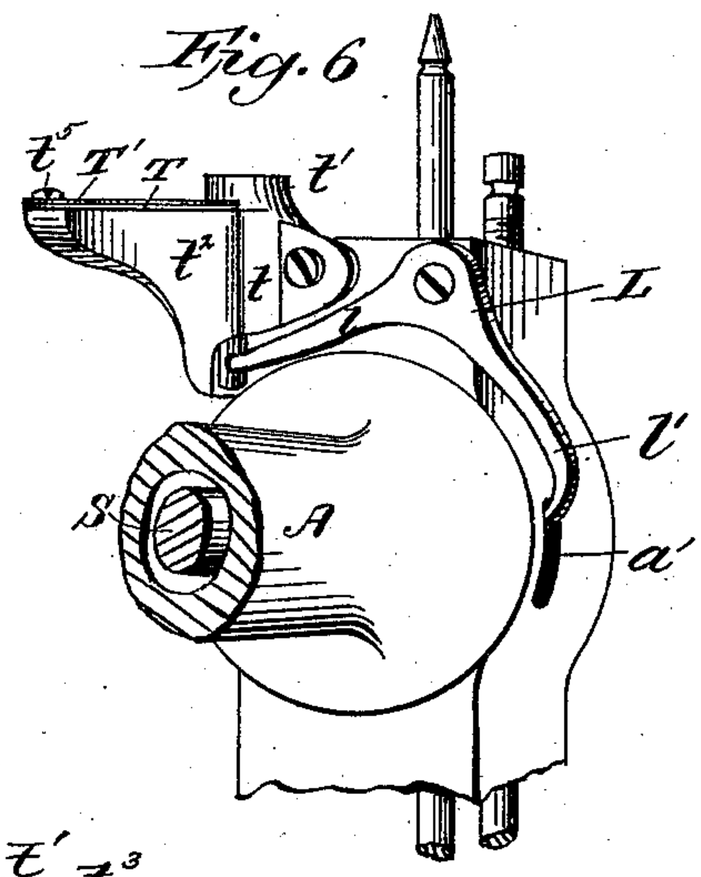


Fig. 4

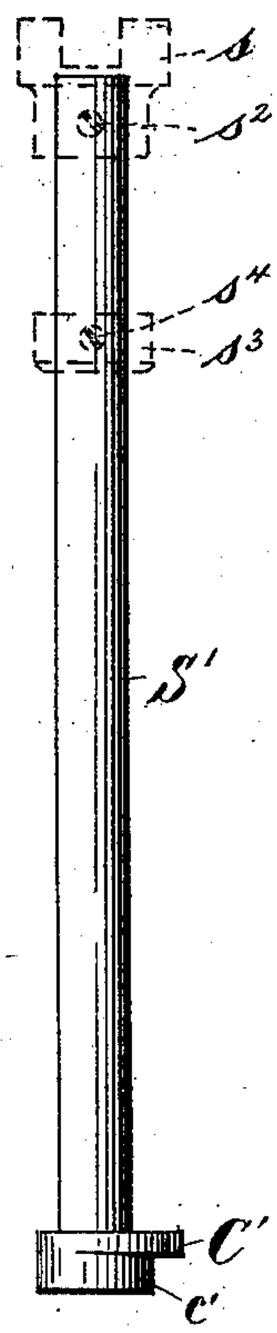
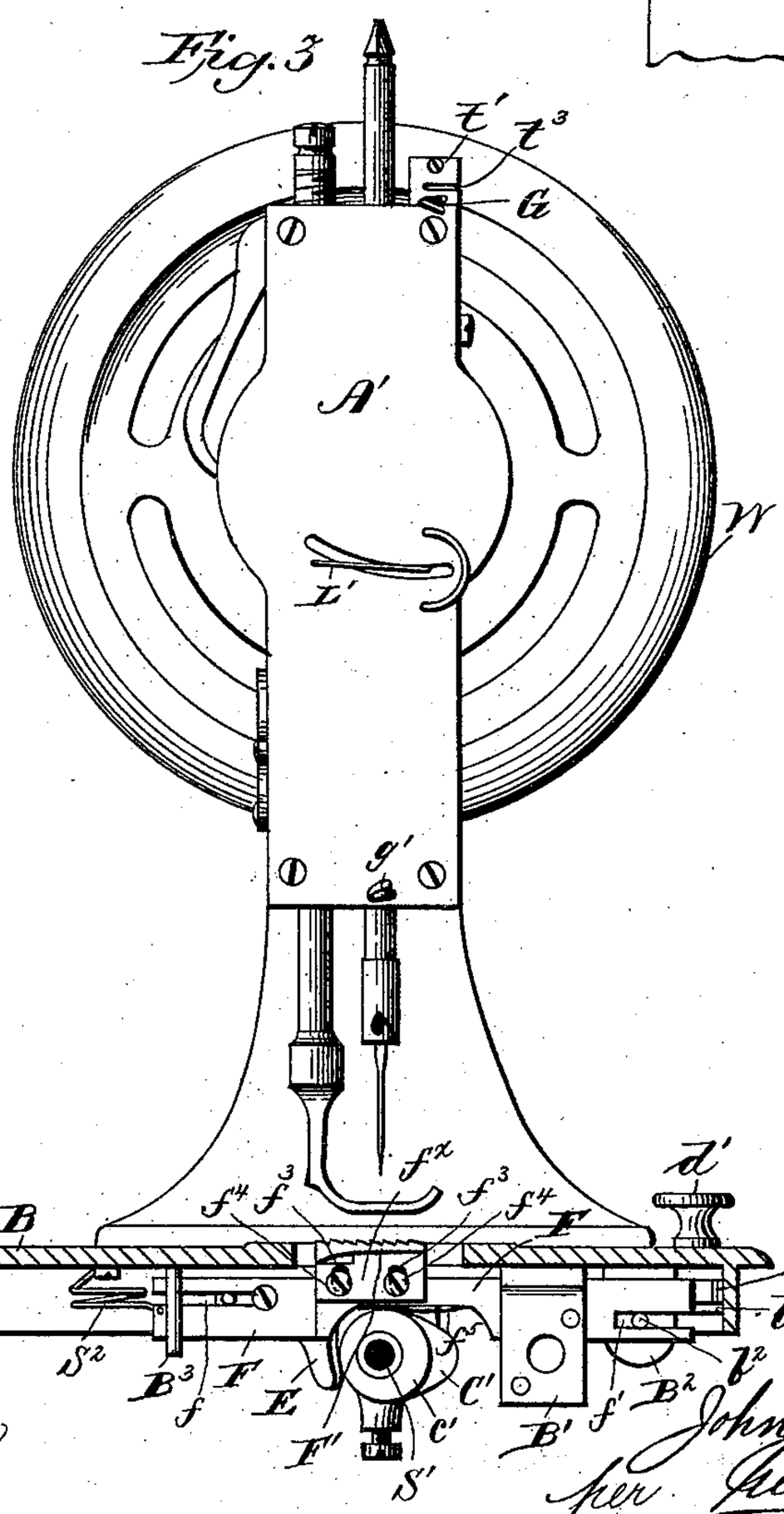


Fig. 3



Attest:
W. E. Coulter
P. M. Knobloch.

Inventor,
John W. Foster,
per Henry A. Wise
his atty

N. PETERS, Photo-Lithographer, Washington, D. C.

(Model.)

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J. W. FOSTER.

TENSION DEVICE FOR SEWING MACHINES.

No. 373,179. Patented Nov. 15, 1887.

Fig. 8

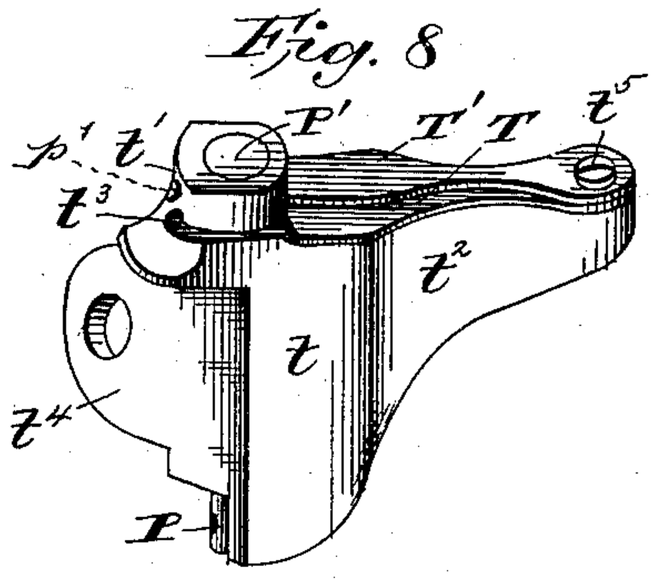


Fig. 9

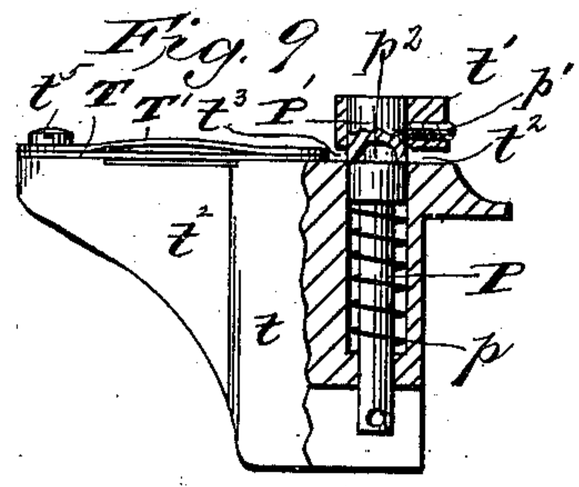


Fig. 7

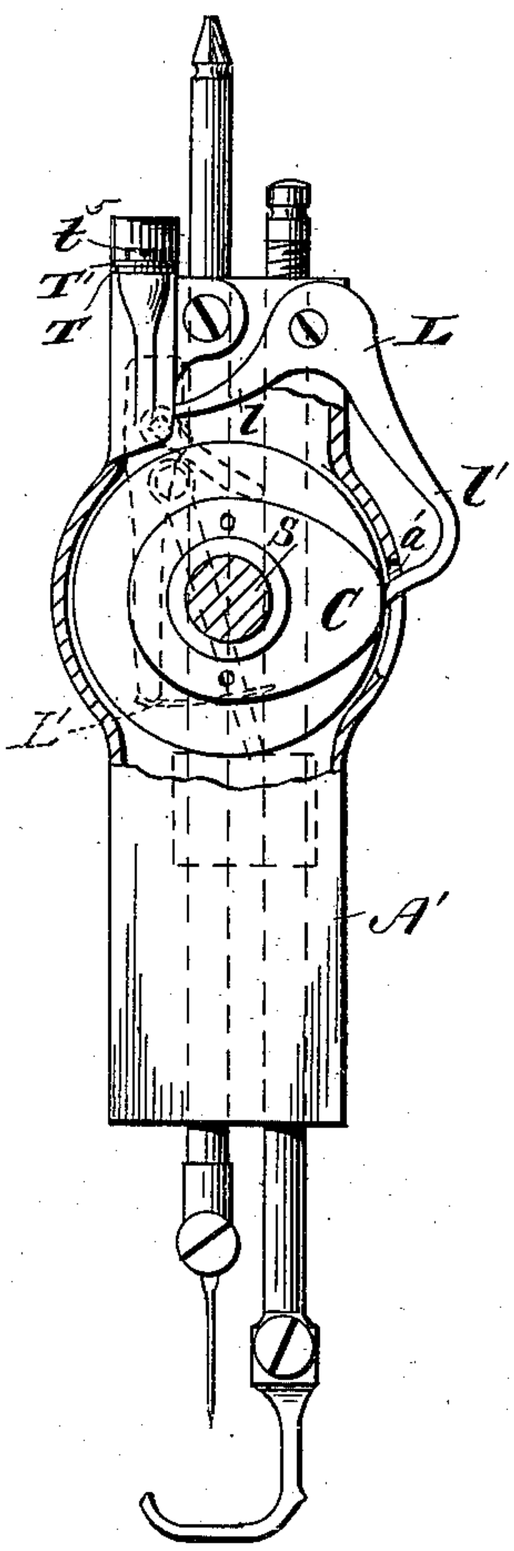
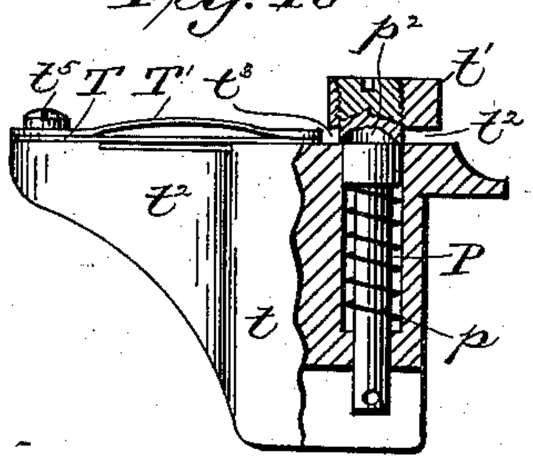


Fig. 10



Attest:
W. E. Coulter
P. M. Knobloch.

Inventor:
John W. Foster,
per Henry Orth
his atty.

UNITED STATES PATENT OFFICE.

JOHN W. FOSTER, OF WASHINGTON, DISTRICT OF COLUMBIA.

TENSION DEVICE FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 373,179, dated November 15, 1887.

Application filed June 28, 1886. Serial No. 206,508. (Model.)

To all whom it may concern:

Be it known that I, JOHN W. FOSTER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Sewing-Machines; and I do 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, and to the letters and figures of reference marked thereon, which form a part of this specification.

Referring to the drawings, Figure 1 is an under side view of the bed-plate of a sewing-machine head in which the loopers are interchangeable, showing the lock-stitch looper in position on the driving-shaft. Fig. 2 is a top plan view of the sewing-machine. Fig. 3 is a front end view of the machine, the bed-plate being shown in section and the looper removed from the driving-shaft. Fig. 4 is a detached view of the lower driving-shaft, the slotted sleeve and collar connected therewith being shown in dotted lines. Fig. 5 is a detached isometric rear view of the feed-bar. Fig. 6 is an isometric rear view of a portion of the overhanging arm and head of a sewing-machine, showing the automatic tension for the upper thread. Fig. 7 is a sectional view of the head of the overhanging arm. Fig. 8 is an isometric view of the upper tension attachment, and Fig. 9 is a sectional elevation of the same. Fig. 10 is a like view showing a modification in the construction of the means for adjusting the block P'.

This invention has for its object to provide for sewing-machines an automatic tension for the needle-thread operated from the cam or other devices that operate the take-up mechanism or the needle-bar, applicable as an attachment to almost all styles of sewing machines now in use.

To these ends the invention consists in an automatic tension device as an attachment to sewing-machines.

In the drawings I have given as an example a sewing-machine capable of producing either a lock or a chain stitch by means of interchangeable loopers secured to the lower driving-shaft, which shaft also operates the feeding devices.

B indicates the bed-plate, A the overhanging arm, and A' the head thereof. In said overhanging arm is, as usual, arranged the upper driving-shaft, S, that carries the fly-wheel W and idle-wheel W' at one end, and at the other end said shaft carries the eccentric E, for operating the needle-bar, and a cam, C, for operating the take-up lever, said cam forming a part of or being secured to the rear face of said eccentric E. The upper shaft is connected with the lower shaft, S', as usual, by a connecting-rod, R, that carries at its lower end a crank-pin, *r*, which plays in a transverse slot, *s'*, of a sleeve, *s*. The lower shaft, S', has its bearings in pendent brackets *b b'*, formed on the under side of the bed-plate B, and said shaft extends into the slotted sleeve *s*, to which sleeve the shaft is detachably connected by means of a binding-screw, s^2. The shaft S' is held against endwise movement in its bearings *b b'* by means of the slotted sleeve *s* on one side of the bearing-bracket *b'* and by means of a collar, s^3, on the opposite side of said bearing, said collar being detachably secured to the shaft S' by means of a set or binding screw, s^4.

The forward end of the shaft S' is hollow for the reception of the shanks of the interchangeable loopers, which are secured to the shaft by means of a thumb screw, S^2, and at said forward end the shaft S' carries a cam, C', that operates the feed-bar. It is obvious that by loosening the binding-screws s^2 s^4, that connect said shaft with the slotted sleeve *s* and collar s^3, and by removing the thumb-screw S^2, that secures the looper-shank to the shaft, said shaft may be drawn out of its bearings without detaching any other portions of the machine. This is of great advantage, inasmuch as it saves a great deal of labor when the lower driving-shaft is to be removed for any purpose, which in most constructions of sewing-machines cannot be done except by stripping the machine-head—that is to say, by disconnecting most of the operative parts.

A further advantage derived from the described construction is that it materially simplifies the connection of the shaft with the driving mechanism thereof, such connection being simply a transversely-slotted sleeve, *s*, in which the crank-pin *r* of the connecting-rod R plays.

F is the feed-bar, that has in one end a lon-

gitudinal slot, *f*, and a guide-slot, *f'*, in the other end, the under side of the bar being recessed or cut out, as at f^2, to allow free play for the eccentric-cam boss *c'*, on which said bar rests, and by which it is partially supported and reciprocated vertically.

B' is a bearing-block in front of the feed-bar on one side and end thereof, to which the latch that holds the bobbin in the lock-stitch looper is secured, and B^2 is a bearing on the opposite side and at the same end of the feed-bar, between which and the depending lugs or brackets B^3, on the opposite end of the feed-bar, the latter is guided.

In machines where the bearing bracket or block B' is not used, a pin or lug or a projection cast on the under side of the machine will take the place thereof.

The bearing-bracket B^2 has a pin, b^2, that projects into the guide-slot *f'* in one end of the feed-bar, and a pin, $b^\times$, that serves to guide the stitch-regulating bar D, by means of which bar D the throw of the feed-bar, and consequently the length of the stitch, is regulated. The bar D extends rearwardly or to the right of the machine-head on the under side of the bed-plate B, and is secured to a slide block, *d*, in which operates the usual thumb-screw, *d'*, the shank of which screw passes through an elongated slot, b^3, in said bed-plate. The forward end of the regulating-bar carries a wedge-shaped block, D', that lies at one end of the feed-bar F and regulates the amplitude of the throw thereof, as is well understood.

In Fig. 1 I have shown in full lines the stitch-regulating wedge D' of the bar D in its position when the feed-bar has its greatest throw—that is to say, in the position for forming the longest stitch—and in said figure I have shown said wedge-shaped block in dotted lines in its position for forming the shortest stitch, the length of stitch varying from four or a little more than four to the inch—a range, I believe, never before attained in any sewing-machine.

F' is the feed-dog, of usual construction, connected with and adjustable vertically on the feed-bar, said feed-dog having in its foot $f^\times$ elongated openings f^3 for the screws f^4, so that its position relatively to the material or the upper face of the feed-plate may be adjusted with great nicety. This feature is of especial advantage in compensating for the wear of the feed-bar.

E is a shoe (adjustable along the slot *f* of the feed-bar) upon which the cam C' operates to impart to the feed-bar F its forward movement. By making the shoe adjustable along the slot the wear of the parts may be compensated.

S^2 is the spring that serves to return the feed-bar F into its normal position. I have found that in operation there is more or less noise produced by the impact of the cam upon the shoe E and that of the bar upon the eccentric-cam boss *c'*. To avoid this I face the shoe E with a piece of rawhide or other flexible material, or, as shown, with a flat spring, *e*; and I also face the recess f^2 with rawhide or other flexible material, or secure to the face thereof a flat spring, f^5, by which means I obtain an almost noiseless operation of the parts, while said parts are protected from wear. The rawhide or other flexible material or the springs, being detachably connected with the face of the shoe and recess, may be readily renewed when worn and replaced at a trifling expense. The recess f^2 in the under side of the feed-bar is of such length as to allow the cam to pass through when the nose of said cam lies in a horizontal position, so that when the shaft S' is removed the feed-bar and feed-dog may also be removed without disturbing any other part of the machine.

My improved tension consists of a bracket, *t*, that has a projecting boss, *t'*, through which and the bracket is formed an opening that contains a piston or headed pin, P, the tendency of which, under the action of a coiled spring, *p*, is to move upwardly against a bearing-block, P', that is detachably secured in the upper end of the vertical opening t^2 of the bracket by means of a set-screw, *p'*. The boss *t'* has a slit, t^3, into which the needle-thread is passed, said slit corresponding with the lower face of the bearing-block P', so that the thread may be passed between the bearing-block and the upper face of the piston or head of the pin P. The lower end of the pin P is connected with an arm, *l*, of an angle-lever, L, pivoted to the face of the head of the overhanging arm of the machine. The arm *l'* of said lever passes through a slot, *a'*, into said head and lies on the cam C, that operates the take-up lever.

The relative arrangement of the piston or headed pin P, the cam C, the needle-bar-driving eccentric, and the take-up lever is such that when the needle-bar is about to reach or has reached the limit of its downward movement the needle-thread will be clamped between the piston-head and bearing-block P', and said thread prevented from being drawn out from under the tension-spring hereinafter to be described. The needle-thread is thus held between the piston P and block P' until the cam has operated the take-up lever to take up the slack in said thread and until the needle-bar is about to reach or has reached the limit of its upward motion. At this time the cam C will move the arm *l'* of lever L outwardly, thereby depressing the arm *l* of said lever, which arm *l* draws the piston P downward to release the needle-thread.

In the described construction of tension the slack in the thread is much less than in machines provided with the usual tension devices, as the thread cannot be drawn through the tension devices after the needle has reached the limit of its downward movement.

The bracket *t* has a rearwardly-extending arm, t^2, to the upper face of which arm are secured, by means of a screw, t^5, two tension-

springs, T and T′, that overlap each other and between which the needle-thread is clamped and kept at a normally uniform tension. This tension device has the advantage over all tensions heretofore used that when once adjusted it requires no further adjustment, whether the lock or the chain stitch is produced, and in sewing-machines in which the chain and lock stitches are produced by the substitution of a revolving hook and bobbin for the looper, or vice versa, no adjustment of the tension is required further than the change of the thread from one spring to the other; nor is there any adjustment of the tension required by a change from one fabric to another, as practical experience has demonstrated that without changing the tension a perfect chain or lock stitch may be produced either in cambric or in felt or heavy cloth; nor is any adjustment of the tension required by a change of the needle and bobbin threads from a fine to a coarser number, or vice versa.

In machines that produce both the lock and chain stitches, when it is desired to produce the lock-stitch the thread passes from the spool under the tension-spring T, thence into the slit t^3 of the bracket and between the piston or bolt or pin-head and the bearing-block P′, and thence through the curl G, around the guide and take-up lever to the curl g', and, finally, to the needle. When, on the other hand, the chain-stitch is to be produced, the thread passes from the spool under the spring T′, and between the piston and block, thence through slot n in the upper end of the needle-bar to curl G, &c.

In practice I prefer to form in the lower face of the bearing-block a recess, p^2, to decrease the bearing area thereof. The edges of the bearing-faces of both block and piston or pin are rounded off to prevent the cutting of the thread when inserted, and the slit t^3 in the side of the boss may be made flaring outwardly to facilitate the insertion of the thread.

The bearing-block P′, instead of being secured to the boss by means of a set-screw, may be screw-threaded and screwed into said boss to facilitate the adjustment thereof, as shown in Fig. 10.

Of course it will be understood that for sewing-machines that produce one particular form of stitch only but one tension-spring will be required; but for sewing-machines of the class herein referred to the two springs are necessary to impart to the needle-thread the required tension in the formation of the two kinds of stitches, the tension required for one kind of stitch being slightly greater than that required for the other kind of stitch.

The tension-bracket has a laterally-projecting perforated lug, t^4, by means of which and a screw it is attached to the head of the overhanging arm of a sewing-machine.

It is not absolutely necessary that the springs T and T′ should be arranged to overlap each other, as they may lie side by side on the top of the bracket arm q and the same good results obtained.

Having now described my invention, what I claim is—

1. The combination, in a sewing-machine having a reciprocating needle, a needle-thread tension, a take-up device, and a cam for operating said take-up device, of a clamp interposed between the tension and take-up device and a lever controlled by the cam that operates the take-up device, said lever operating the clamp to positively hold the needle-thread against motion during the action of said take-up device and to release the same after such action, substantially as and for the purpose specified.

2. The combination, in a sewing-machine having a reciprocating needle, a needle-thread-tension spring, a take-up device, and a cam for operating said take-up device, of a clamp consisting of a piston or headed pin, a block or abutment for said piston, and a lever connected with the piston and operated by the cam which operates the take-up device to positively clamp the needle-thread during the action of the take-up device and release said thread after such action, substantially as and for the purpose specified.

3. The herein-described tension for the needle-thread of sewing-machines, consisting of a tension spring or springs, and a clamping device for clamping the thread after it leaves said spring, consisting of the block or anvil P′, the spring-actuated piston or headed pin P, and bracket t, having the slitted boss t' and perforated lug t^4, and lever L, constructed for attachment to the head of the overhanging arm of a sewing-machine, substantially as and for the purpose specified.

4. The herein-described tension for the needle-thread of sewing-machines, consisting of two springs, T T′, the free ends of which overlap each other, and a clamping device for clamping the thread after it leaves said springs, consisting of the block or anvil P′, the spring-actuated piston or headed pin P, and bracket t, and the lever L, constructed for attachment to the head of the overhanging arm of a sewing-machine, substantially as and for the purpose specified.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN W. FOSTER.

Witnesses:
HENRY ORTH,
H. B. LITTLEPAGE.