

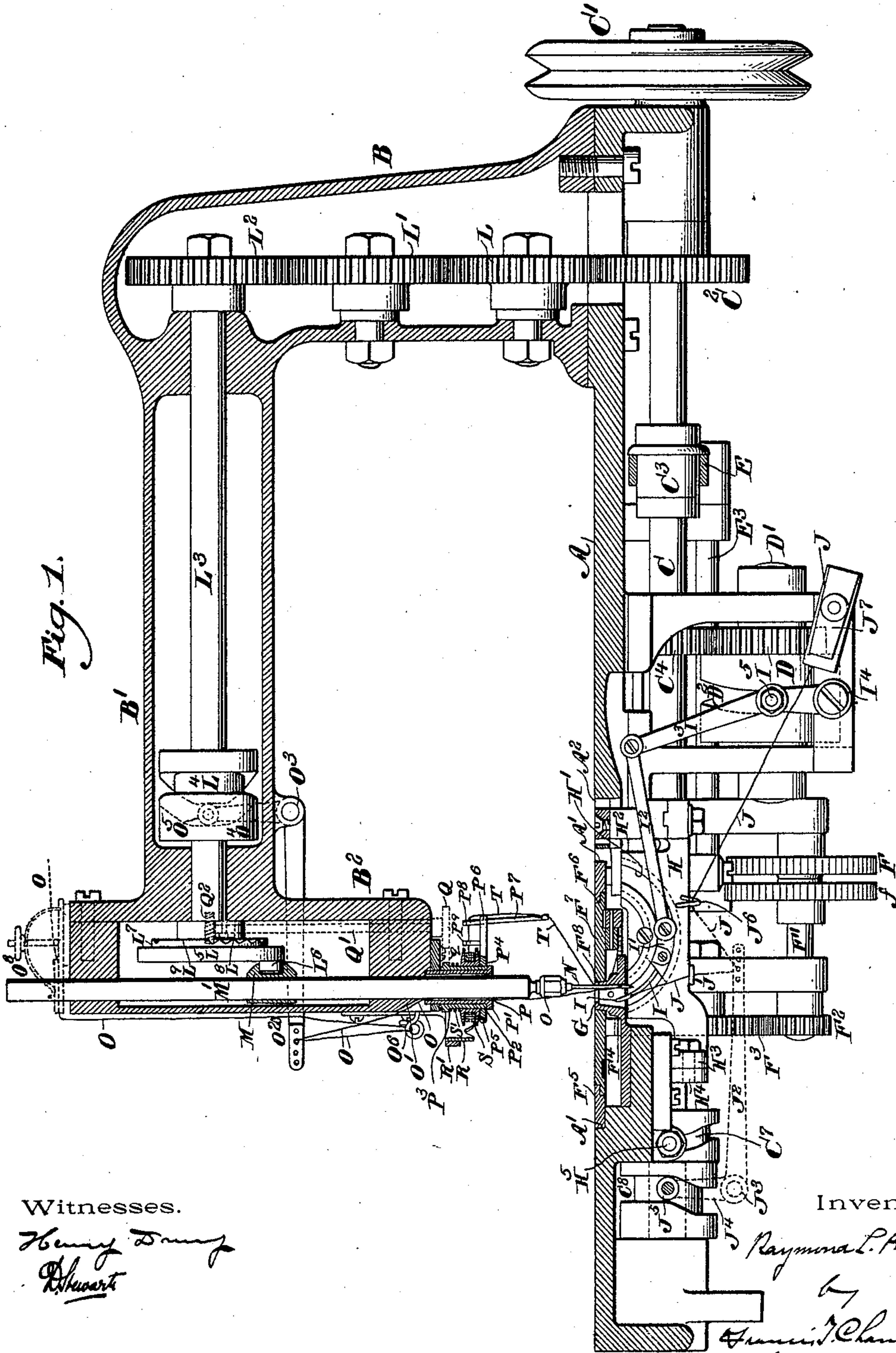
(No Model.)

4 Sheets—Sheet 1.

R. L. PLUMLEY.  
BUTTONHOLE SEWING MACHINE.

No. 582,314.

Patented May 11, 1897.



Witnesses.

Henry D. Dwyer  
Arthur

Inventor.

Raymond L. Plumley

Francis J. Chambers  
his Attorney.

(No Model.)

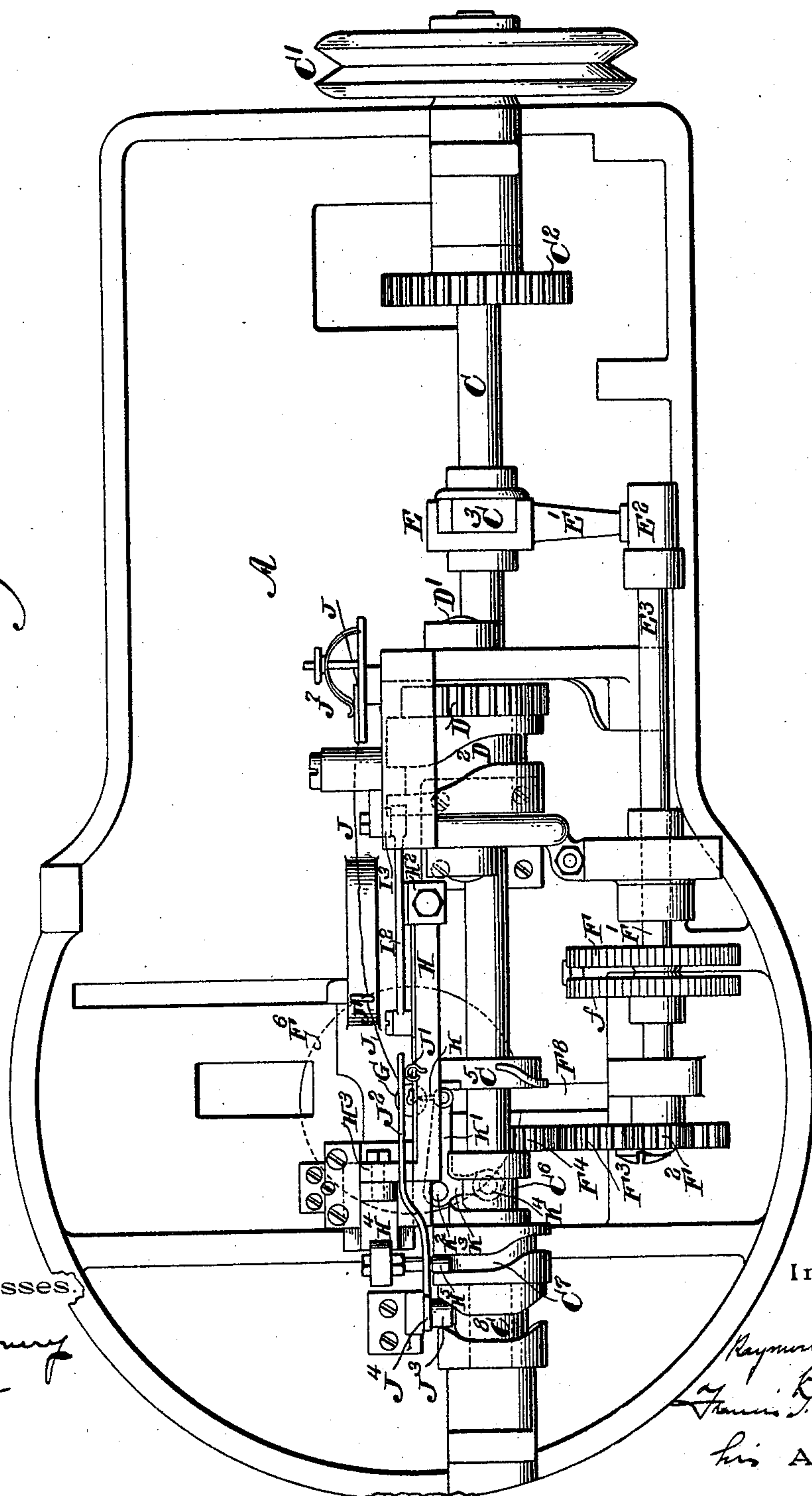
4 Sheets—Sheet 2.

R. L. PLUMLEY.  
BUTTONHOLE SEWING MACHINE.

No. 582,314.

Patented May 11, 1897.

Fig. 2.



Witnesses.

*Henry D. Smith*  
*Edmund*

Inventor.

*Raymond L. Plumley*  
*James T. Chambers*  
his Attorney.



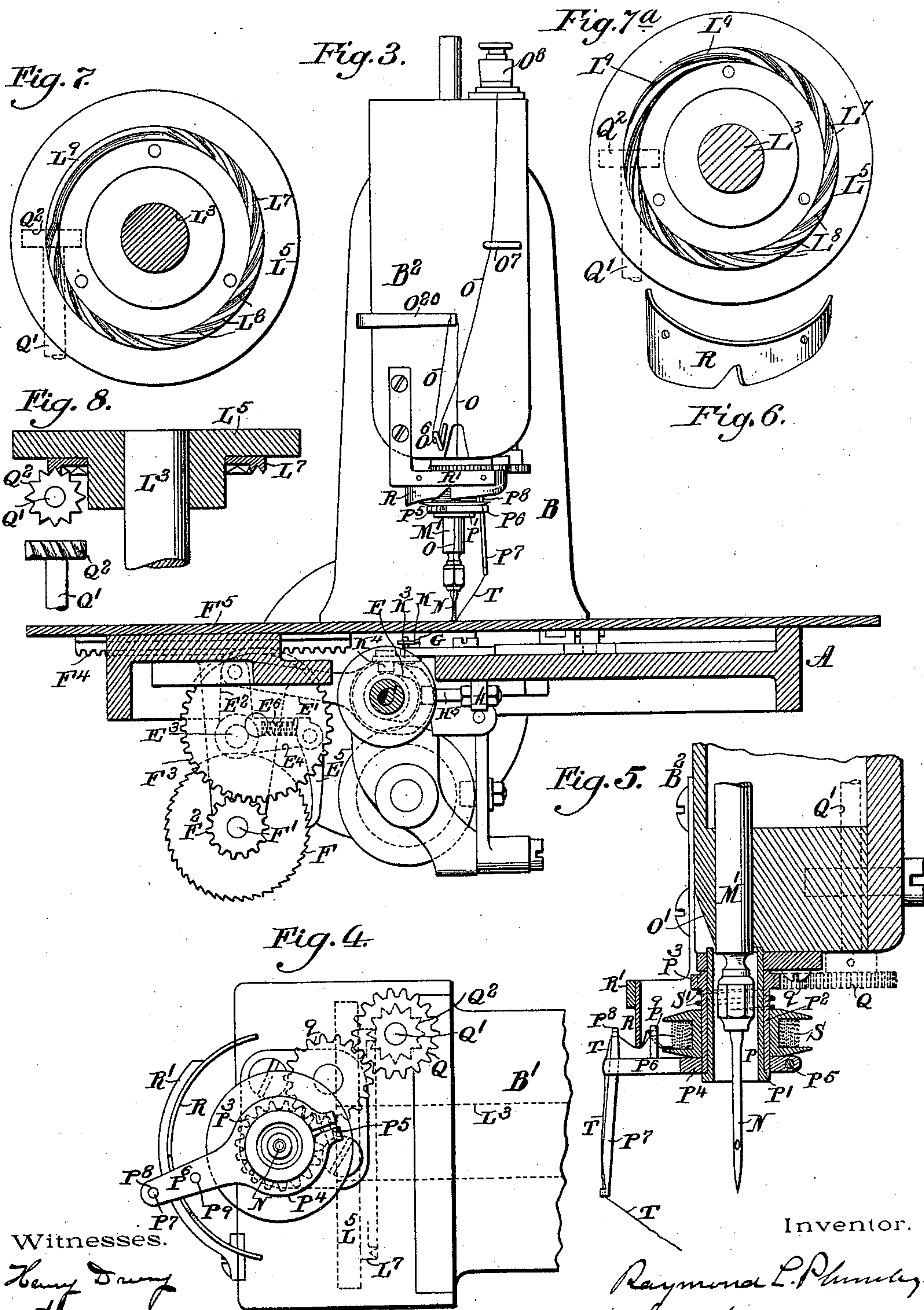
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4 Sheets—Sheet 3.

R. L. PLUMLEY.  
BUTTONHOLE SEWING MACHINE.

No. 582,314.

Patented May 11, 1897.



Witnesses.  
Henry Dwyer  
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Inventor.  
Raymond L. Plumley  
by  
Frank J. Chambers  
his Attorney.

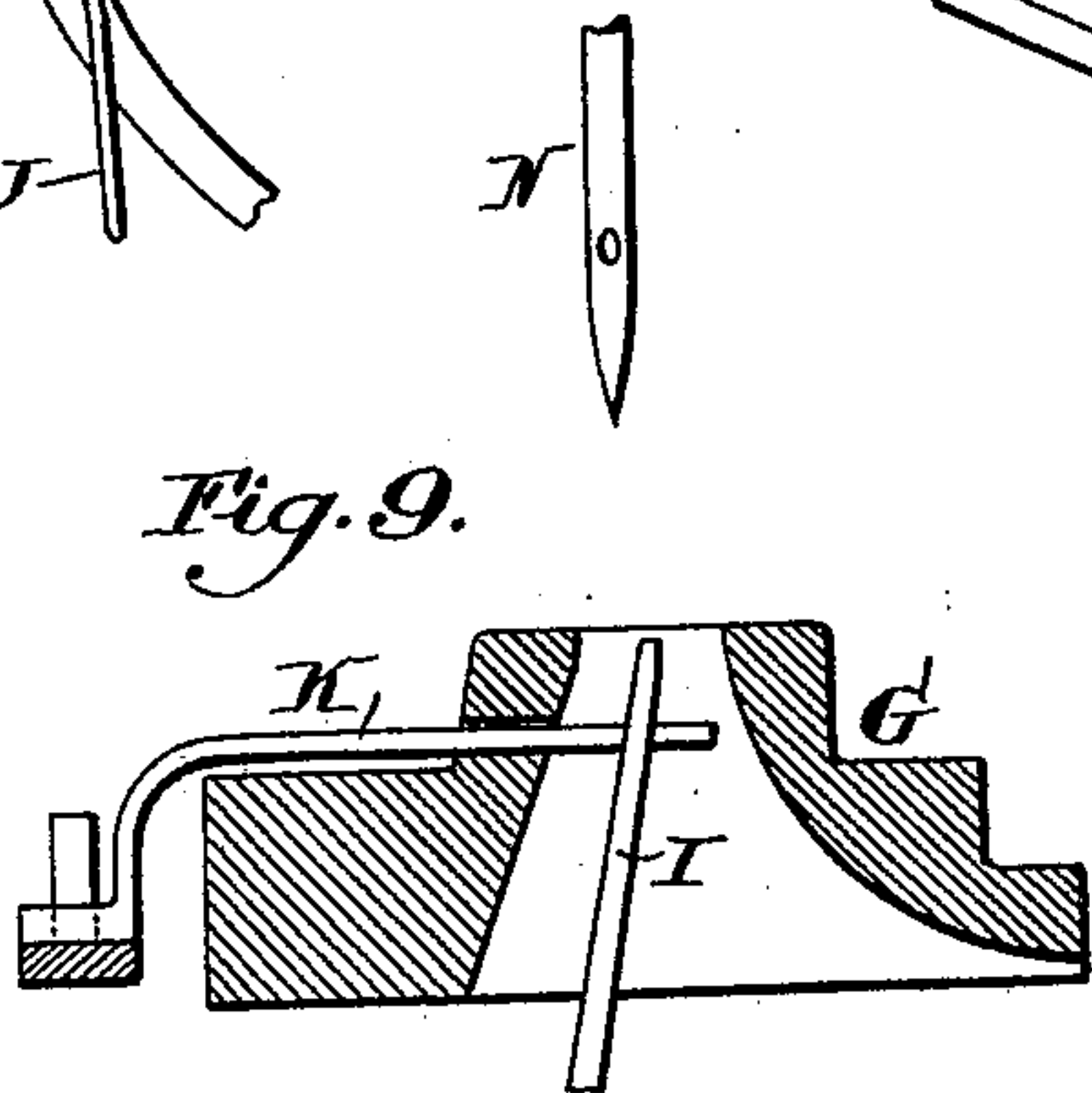
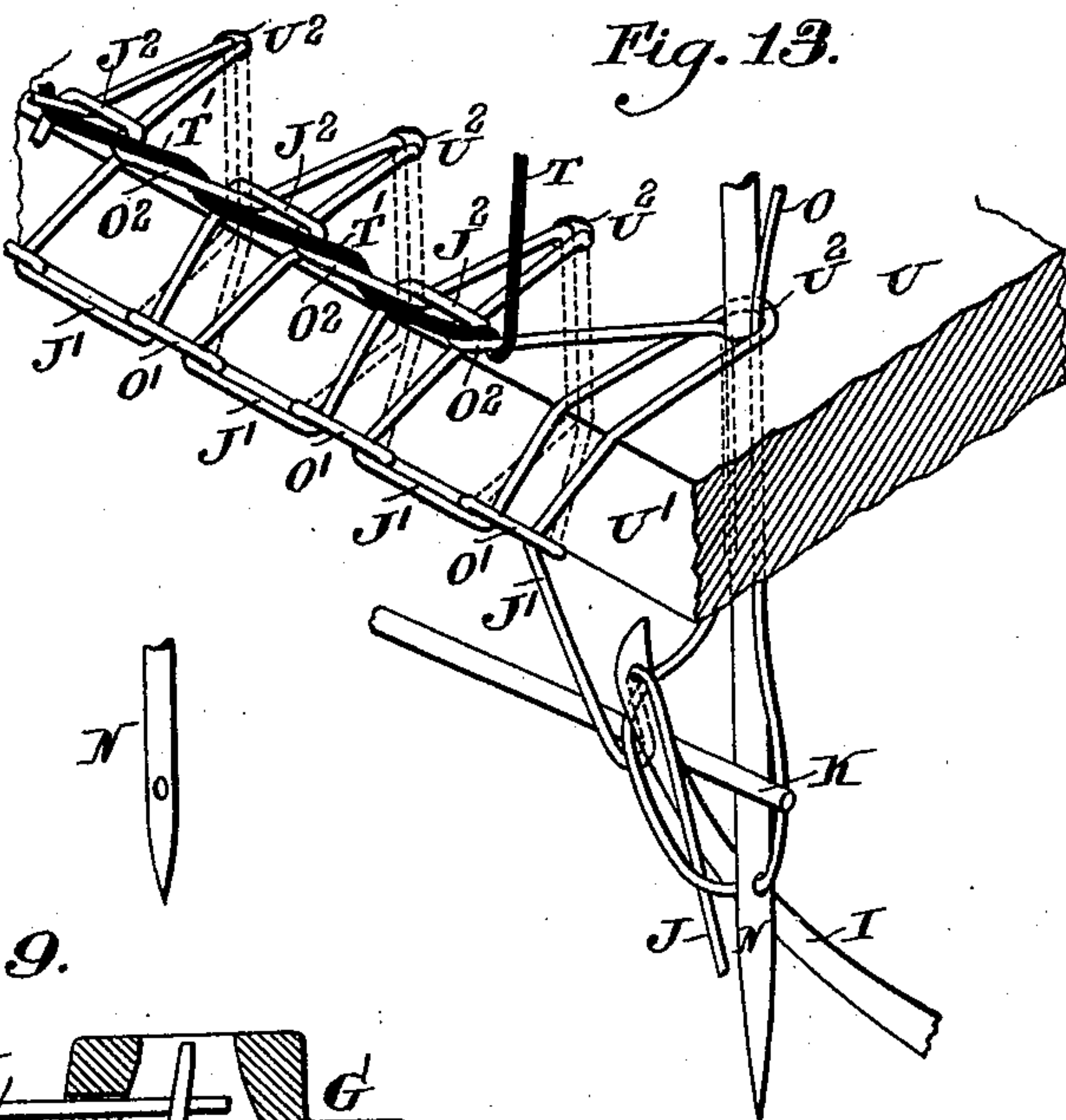
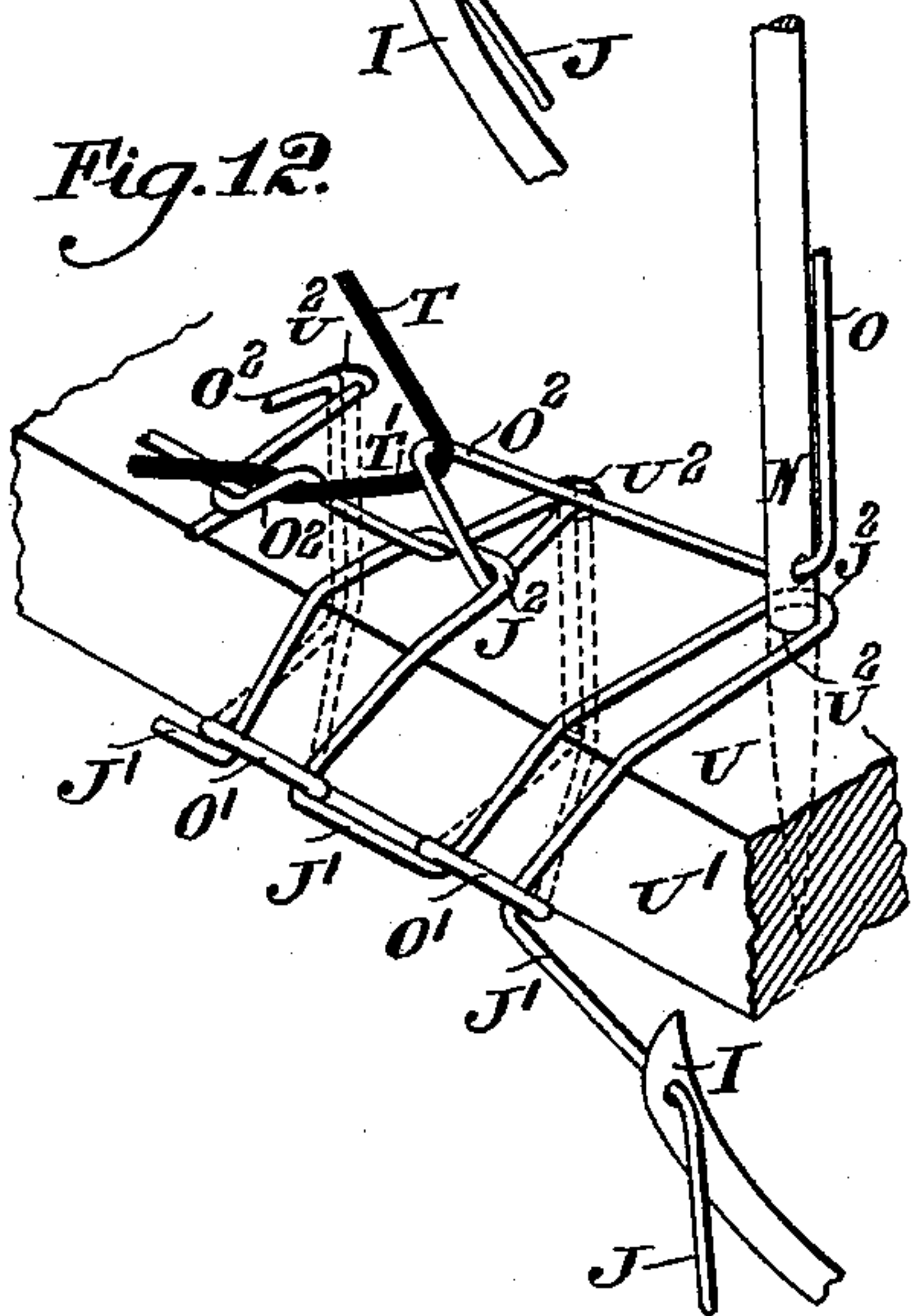
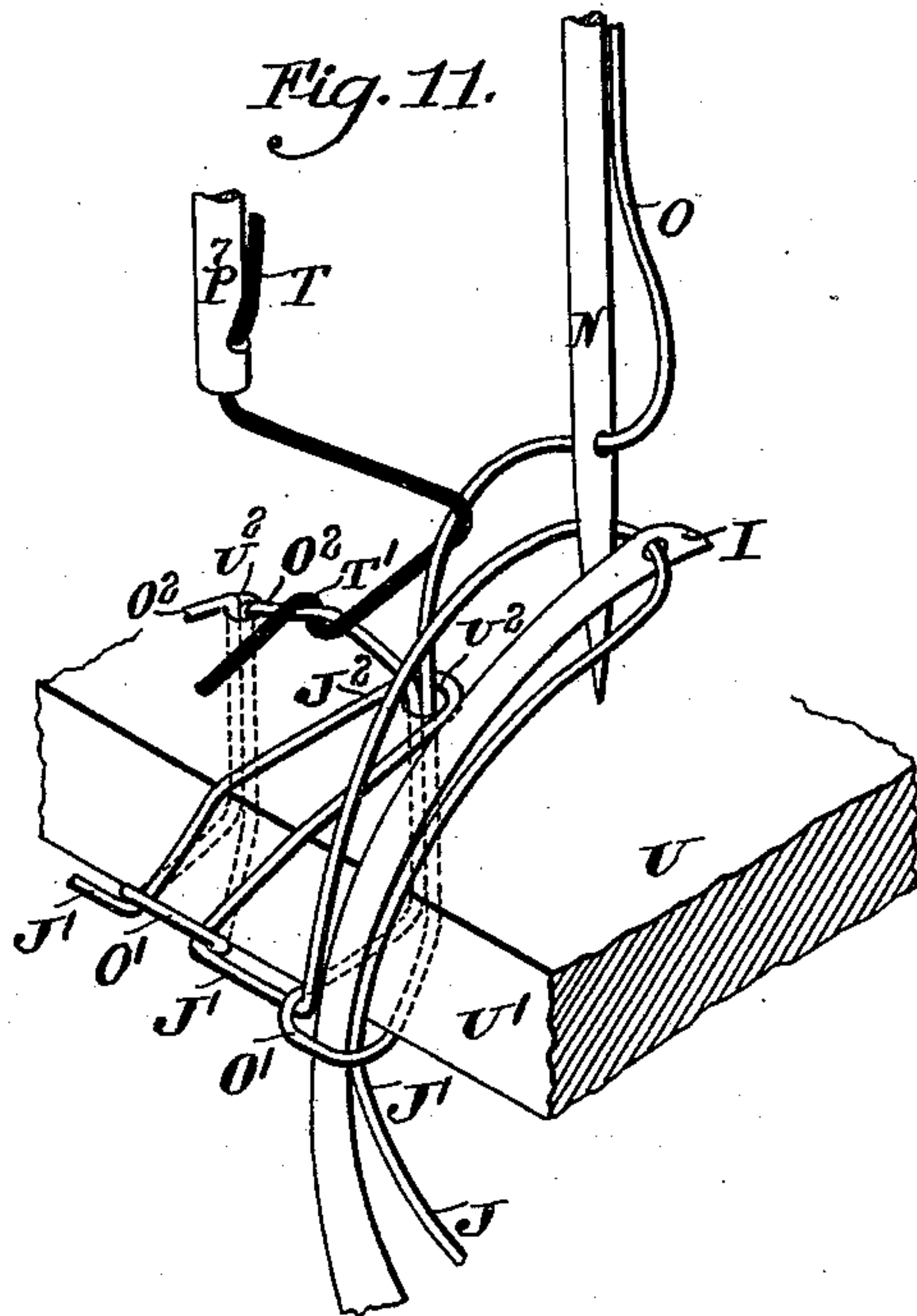
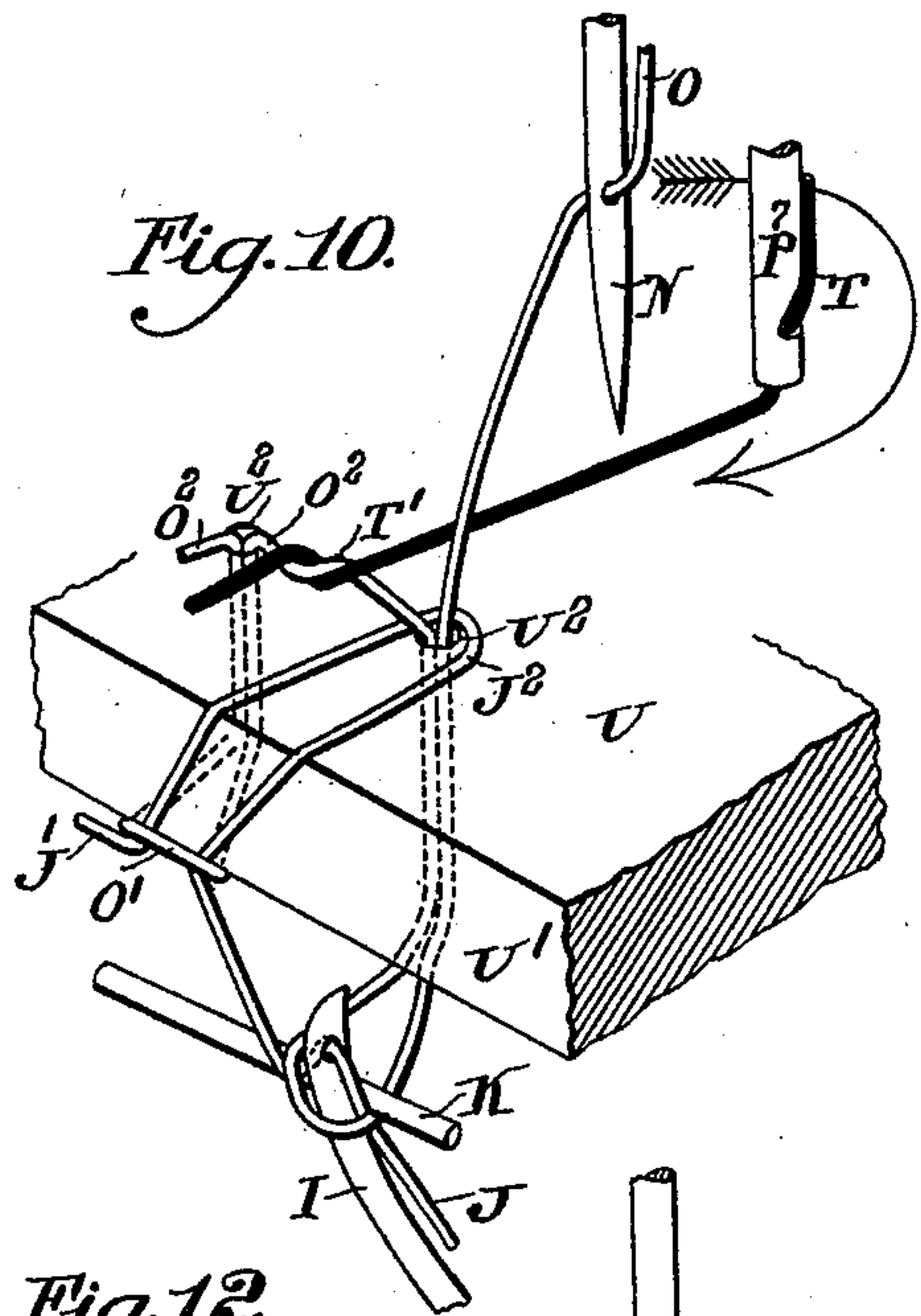
(No Model.)

4 Sheets—Sheet 4.

R. L. PLUMLEY.  
BUTTONHOLE SEWING MACHINE.

No. 582,314.

Patented May 11, 1897.



Witnesses.

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Inventor.

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Francis F. Chambers  
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# UNITED STATES PATENT OFFICE.

RAYMOND L. PLUMLEY, OF WILMINGTON, DELAWARE, ASSIGNOR TO THE TRUMP BROTHERS MACHINE COMPANY, OF SAME PLACE.

## BUTTONHOLE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 582,314, dated May 11, 1897.

Application filed August 18, 1896. Serial No. 603,140. (No model.)

*To all whom it may concern:*

Be it known that I, RAYMOND L. PLUMLEY, a citizen of the United States, residing in Wilmington, in the county of New Castle, in the State of Delaware, have invented a certain new and useful Improvement in Overseaming or Buttonhole-Sewing Machines, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to the construction of overseaming or buttonhole-sewing machines, and has for its object to provide improved mechanism whereby, in addition to forming the usual "pearl" on the right side of the seam or buttonhole, a similar pearl effect will also be formed upon the wrong side of the seam instead of the usual whip-stitch effect which is generally produced upon the wrong side of the goods by the overseaming-machines in common use.

The nature of my improvements will be best understood as described in connection with the drawings, in which they are illustrated, and in which—

Figure 1 is a sectional side elevation of a buttonhole-machine provided with my improvements, Fig. 2 being a plan view of the under side of the machine; Fig. 3, a front elevation, partly in section; Fig. 4, a plan view, on an enlarged scale, of the under side of the head of the machine; Fig. 5, a sectional elevation on the section-line of Fig. 4; Fig. 6, a perspective view of a tension device used in connection with my improvement; Fig. 7, a front view of the gear-wheels by which motion is transmitted from the shaft driving the upper needle to the improved devices which I have added to the machine. Fig. 7<sup>a</sup> is a similar view showing the tooth L<sup>9</sup> as having a lower pitch than the ones L<sup>8</sup> and not giving the wheel Q<sup>2</sup> a stop, as the tooth in Fig. 7 would do, but only causing a decrease in its movement. Fig. 8 is a side elevation of the same gears. Fig. 9 is a sectional view of the head through which the needles of the machine operate; and Figs. 10, 11, 12, and 13 are perspective diagrammatic views illustrating the operation of sewing as performed by my improved machine.

A is the bed-plate of the machine, B and B' a hollow standard secured to the bed-plate and supporting the power-transmitting mechanism which actuates the upper needle and the supplemental mechanism which I add to the machine, B<sup>2</sup> being the head in which operates the needle-bar of the upper needle.

C is the main shaft of the machine, to which motion may be imparted by any convenient mechanism.

In machines of this class automatic clutch mechanism is conveniently used for starting and stopping the shaft at proper times, but I have thought it unnecessary to illustrate any such mechanism and have simply shown a pulley-wheel C' secured to the shaft.

C<sup>2</sup> is a gear-wheel secured to the shaft C and by which power is transmitted to actuate the needle-bar through gear-wheels L, L', and L<sup>2</sup>, shaft L<sup>3</sup>, crank-disk L<sup>5</sup>, the pin L<sup>6</sup> of which works in a cam M, secured to the vertically-reciprocating needle-bar M<sup>8</sup>, to the end of which is attached the upper needle N of the machine.

C<sup>3</sup> is a cam or eccentric the function of which is to operate the feed of the machine. It acts directly upon a yoke E, a rod E' of which (see Figs. 2 and 3) connects with a lever-arm E<sup>2</sup>, secured to a rock-shaft E<sup>3</sup>, from which shaft extends a lever-arm E<sup>4</sup>, to the end of which is pivotally attached a pawl E<sup>5</sup>, pressed inward by the action of a spring E<sup>6</sup>, held in the lever-arm E<sup>4</sup>. The pawl E<sup>5</sup> acts upon either one of two ratchet-wheels F and f, these ratchet-wheels being attached to a shaft F', to which shaft is also attached a gear-wheel F<sup>2</sup>, engaging with and actuating a gear-wheel F<sup>3</sup>, which in turn engages a rack F<sup>4</sup> on a sliding table or plate, to which table or plate the work is clamped by mechanism of familiar construction. (Not shown in the drawings.)

C<sup>4</sup> is a gear-wheel attached to the shaft C and engaging a gear-wheel D, journaled in supports extending out from the bottom of the bed-plate A and to which shaft is secured a cam D<sup>2</sup>. In the groove of the cam D<sup>2</sup> is engaged the cam-roll I<sup>5</sup>, secured to a lever I<sup>3</sup>, pivoted at I<sup>4</sup> and having pivoted to its other end a connecting-rod I<sup>2</sup>, which is attached to a slide-block I', which carries the lower nee-



dle I and runs in the curved slot H' of a raceway H, which raceway is attached at one end to a slide-standard H<sup>2</sup>, moving in a slot A<sup>2</sup> in the table A and at its other end by means of a flange H<sup>3</sup> to a connecting-bar H<sup>4</sup>, to which bar is attached the cam-roller H<sup>5</sup>, which lies in the groove of the cam C<sup>7</sup>, attached to the shaft C.

It will be seen that by the construction described the movement imparted to the lower needle I is to compound motion made up of that imparted to the needle-carrying block I' by means of the cam D<sup>2</sup> and the motion imparted to the raceway H by means of the cam C<sup>7</sup>. This motion and the mechanical devices by which it is produced form a part of the subject-matter of an application for Letters Patent filed by Christian Frederick and myself on the 29th of May, 1896, Serial No. 593,544.

C<sup>5</sup> is a cam-wheel the function of which is to rotate the revoluble table supported upon the sliding table F<sup>5</sup> and by means of which the necessary rotation is given to the goods for the formation of the eye of the buttonhole.

The construction of this table, which is indicated at F<sup>6</sup>, and the mechanism for operating it I have not shown in detail, as it is of a familiar character and would simply serve to complicate the present drawings.

C<sup>6</sup> is a cam secured to the shaft C and operating upon a cam-roller K<sup>4</sup>, secured to one end of a bell-crank lever K<sup>3</sup> K', pivoted to the frame at K<sup>2</sup> and carrying at its end the loop-engaging device K.

C<sup>8</sup> is a cam secured on the shaft C, in the groove of which is engaged a cam-roller J<sup>3</sup>, secured on the arm J<sup>4</sup> of the lever J<sup>4</sup> J<sup>2</sup>, said lever being pivoted and having at the end of its arm J<sup>2</sup> holes or other engaging devices by which it engages the thread J of the lower needle I, the thread passing from the lower needle through a guide J', (see Fig. 1,) thence through a perforation in the lever J<sup>2</sup>, thence through a guide J<sup>6</sup>, thence through an adjustable tension device J<sup>7</sup> to a bobbin. (Not shown.)

O is the thread of the upper needle N. As shown, it passes from the needle through a cylinder P, thence through a slot O', formed in the end of the head B<sup>2</sup>, thence through a hole in the end of the arm O<sup>20</sup> of the lever O<sup>20</sup> O<sup>4</sup>, pivoted at O<sup>3</sup>, and actuated by means of a cam L<sup>4</sup>, secured on the shaft L<sup>3</sup>, and the groove of which is engaged with a cam-roller O<sup>5</sup> on the lever-arm O<sup>4</sup>. From the end of the lever O<sup>2</sup> the thread O passes down through a guide O<sup>6</sup>, thence through a guide O<sup>7</sup>, to an adjustable tension device O<sup>8</sup>, to a bobbin. (Not shown.)

In all of the features hereinabove described the machine is, speaking with regard to the subject-matter of my present application for a patent, old, although in some features, notably the mechanism acting upon the lower needle, the machine is of an improved type.

As in other machines of this type, the upper needle passes through the goods, while the

lower needle I moves up and down in front of the edge around which the overseam is formed. The needles pass alternately through the loops thrown off by the other, forming a stitch of the usual well-known character. The function of the rod or finger K is fully expressed in the patent to Chabot and others, No. 439,109, of October 28, 1890. It is a characteristic of machines of the type shown that while they form what is known as the "pearl" from the under or right side of the goods they form no pearl upon the upper or wrong side, the seam or buttonhole stitched by such machines presenting on the wrong side the appearance of a simple whip-stitching, and, as already stated, the object of my invention is to overcome this difficulty and produce a pearl effect upon the wrong side as well as upon the right side of the seam, and this result I accomplish by drawing the loops formed by the upper thread O on the upper side of the goods forward toward the edge to be overseamed instead of permitting them, as heretofore, to extend in a direct line from one hole formed by the upper needle to the next. In short, I draw the upper loops (indicated at O<sup>2</sup>, Figs. 10 to 13) toward the edge of the goods, just as in the former operation of the machine the lower loops (indicated at O') of this thread are drawn toward the edge of the goods, and of course I shorten the upper loops J<sup>2</sup> of the thread J, so that instead of extending, as heretofore, back to the needle-holes (indicated at U<sup>2</sup>) they simply reach to such position as enables them to engage with the loops O<sup>2</sup> when drawn to proper tightness, and this result I accomplish in the machine illustrated in the drawings by means of a third thread (indicated at T) and which through the action of a thread-carrying device (indicated at P<sup>7</sup>) is twisted around the thread O once for each complete movement of the needle N, the thread-carrier P<sup>7</sup> being so actuated and the tensions upon the threads being so regulated that the thread T engages each loop O<sup>2</sup> as it is formed and draws and holds it out at or close to the edge of the fabric, (indicated at U' in the drawings,) U indicating the fabric itself and U<sup>2</sup> the needle-holes made by the needle N. The action of the thread T upon the thread O and its indirect action upon the thread J is well illustrated in Figs. 10 to 13, and the complete stitch is clearly shown in diagrammatical form at the left hand of Fig. 13.

Referring now to the novel mechanism by which the thread T is made to perform its function in the formation of my new seam, P is a cylindrical bearing which is secured to the bottom of the head B<sup>2</sup> in such position that the needle-bar M' and needle N can pass freely through it. This cylindrical bearing is preferably formed, as shown, with a slight outwardly-extending flange P' at its lower end, upon which flange rests the lower end of a sleeve P<sup>2</sup>, having a gear-wheel P<sup>3</sup> formed upon or firmly secured to it.

P<sup>4</sup> is a clamp-ring which by the action of



a screw P<sup>5</sup> can be firmly secured to the lower end of the sleeve P<sup>2</sup>, and P<sup>6</sup> is an arm extending out from the ring P<sup>4</sup> and carrying at its outer end the thread-carrier P<sup>7</sup>, which extends downward from it. P<sup>8</sup> and P<sup>9</sup> are thread-carrying posts secured to the upper side of the arm P<sup>6</sup>.

Q is a gear-wheel which, as shown, drives the gear-wheel P<sup>3</sup>, and thus rotates the sleeve P<sup>2</sup> and the thread-carrier P<sup>7</sup> around the cylindrical bearing P, the motion of the gear Q being transmitted to the gear P<sup>3</sup> through an intervening gear-wheel q. The gear Q is secured to the lower end of vertical shaft Q', to the upper end of which is secured a gear-wheel Q<sup>2</sup>, preferably having spiral teeth, as shown, said teeth being engaged with the teeth of a gear L<sup>7</sup>, which, as I prefer to make it and as shown in the drawings, is provided with a laterally-extending flange cut into gear-teeth L<sup>8</sup> L<sup>9</sup>. The number of teeth in the construction shown corresponds with the number of teeth in the gear-wheel Q<sup>2</sup>, and they are of course shaped to properly engage said gear-teeth, having a spiral conformation. As, however, it is desirable that there should be a dwell in the action of the thread-carrier P<sup>7</sup>, I form the gear-teeth of the wheel L<sup>7</sup> of a series L<sup>8</sup> of preferably uniform and sharp pitch, intermitted by one or more teeth L<sup>9</sup> of lower pitch, or no pitch at all. The action then is of course to rotate the gear Q<sup>2</sup> and the parts connected therewith at considerable speed over a portion of the revolution of the shaft L<sup>3</sup>, and then to effect a dwell in the transmitted motion, the desired action being such as will carry the thread sharply beneath the needle N when it is above the goods and then hold the thread T stationary or nearly so while the needle N is passing downward through the goods, as indicated in Figs. 11, 12, and 13. Then as the needle N moves upward the thread-carrier resumes its rotative movement, carrying the thread T again beneath the needle N when said needle reaches the position indicated in Fig. 10.

As will be understood from the above, especially when taken in connection with Figs. 7 and 7<sup>a</sup>, what I call a "dwell," or a "substantial dwell," in the motion of the thread-carrier may amount to a complete stop, or only to a slowing down of the motion, and when I use this or an equivalent term I wish to be understood as covering either a temporary cessation of motion or only a diminution thereof.

R is a tension device the object of which is to greatly increase the tension upon the thread T when said thread under the influence of the carrier P<sup>7</sup> is performing its function of drawing the loop of the upper thread out over the top of the goods, and also of putting a strong tension on said thread T to insure that it shall be tightly twisted without slack around the loops O<sup>2</sup> as they are drawn to place. The tension device, a form of which is satisfactorily indicated in Fig. 6,

is of segmental shape and is secured to an arm R', in turn firmly secured to the head of the machine, the position of the segmental tension device R being such that its lower edge will pass between the posts P<sup>8</sup> and P<sup>9</sup> as the arm P<sup>6</sup> revolves, pressing the thread T down into a bight, as indicated in Fig. 5 of the drawings, the extent of the depression of the thread regulating the tension and being regulated of course by the form of the lower edge of the tension device R.

S is a bobbin which is journaled upon the sleeve P<sup>2</sup> and rests upon the clamp-ring P<sup>4</sup>. As best shown in Fig. 5, proper tension is given to the bobbin by a friction device of simple and satisfactory form, the form of which is a spiral spring, as indicated at S' in Fig. 5.

It will be noticed that the thread O of the upper needle N passes through the hollow bearing P and thence upward through the slot O' above the bar and the rotating parts which control the movement of the thread T.

Of course a proper adjustment of the various tension devices acting upon the three threads is made with respect to obtaining the best results, but any one skilled in the art and having in view the formation of the stitch, as shown in Figs. 10 to 13, will be enabled to adjust the various tension devices or any others which may be preferred so as to cause the formation of the stitch in a workmanlike manner.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an overseaming-machine having upper and lower needles N and I and mechanism for actuating said needles so as to pass them alternately each through the loops formed by the other, a thread-carrier as P<sup>7</sup> rotatable around the upper needle N and mechanism for moving said thread-carrier as described and so as to twist its thread across the path of the upper needle and between it and the lower one and around the upper thread-loops formed by said needle and draw said loops away from the needle toward the edge of the seam.

2. In an overseaming-machine having needles N and I and mechanism for actuating said needles as described, a thread-carrier as P<sup>7</sup> rotatable around the upper needle N and mechanism for rotating said thread-carrier around the needle N once for each complete upward-and-downward movement of said needle, said mechanism being arranged as described to rotate the carrier rapidly while the needle N is raised and to effect a substantial dwell in its movement while the needle is depressed.

3. In an overseaming-machine having needles N and I and mechanism for actuating said needles as described, a rotating arm as P<sup>6</sup> arranged to move about needle N, a thread-carrier as P<sup>7</sup> secured to said arm, thread-guid-



ing posts as  $P^8 P^9$  also secured to said arm and a segmental tension-plate R arranged to come between the posts  $P^8 P^9$  as the arm  $P^6$  revolves and to act upon the thread between said posts as specified.

4. In an overseaming-machine having upper and lower needles N and I and mechanism for actuating said needles so as to pass them alternately each through the loops formed by the other, a rotating thread-carrier as  $P^7$  arranged to move about needle N and carry its thread across the path of the upper needle and between it and the lower one so as to twist it around the loops made by the upper needle, and an annular bobbin-support surrounding said needle adapted to support the bobbin for the thread-carrier and to give passage to the thread of needle N.

5. In an overseaming-machine having upper and lower needles N and I and mechanism for actuating said needles so as to pass them alternately each through the loops formed by the other, an annular sleeve  $P^2$  surrounding needle N and supported from the head of the machine, a thread-carrier secured to said sleeve, mechanism for rotating the sleeve and causing the carrier to lay its thread across the path of the upper needle and between it and the lower one so as to twist it around the loops made by the upper needle, a bobbin journaled on the sleeve and a frictional resistance device, as spring S to regulate the tension on the bobbin.

6. In an overseaming-machine, a rotatable sleeve surrounding the needle N and having bearings secured to the head of the machine, a thread-carrier and a gear-wheel as  $P^3$  secured to said sleeve, a shaft as  $Q'$  secured to the head of the machine, gear-wheels for transmitting motion from said shaft to the rotatable sleeve aforesaid, a gear  $Q^2$  at the head of the shaft  $Q'$ , a gear-wheel  $L^7$  adapted to drive gear  $Q^2$  and driven by a moving part of the machine, said gear-wheel having a series of teeth, as  $L^8$ , of uniform pitch intermitted by one or more teeth also adapted to

engage gear-wheel  $Q^2$  and effect periodically a substantial dwell in its movement.

7. In an overseaming-machine having needles N and I and mechanism for actuating the same as described, a rotatable sleeve surrounding the needle N and having bearings secured to the head of the machine, a thread-carrier and gearing substantially as described to rotate the carrier rapidly while the needle is raised and to effect a substantial dwell in its movement when the needle is down.

8. In an overseaming-machine, a rotatable sleeve surrounding the needle N and having bearings secured to the head of the machine, a thread-carrier and a gear-wheel as  $P^3$  secured to said sleeve, a shaft as  $Q'$  secured to the head of the machine, gear-wheels for transmitting motion from said shaft to the rotatable sleeve aforesaid, a gear  $Q^2$  at the head of the shaft  $Q'$ , a gear-wheel  $L^7$  adapted to drive gear  $Q^2$  and driven by a moving part of the machine, said gear-wheel having a laterally-extending flange cut into spiral teeth and making up a series as  $L^8$  of uniform pitch intermitted by one or more teeth also adapted to engage the wheel  $Q^2$  and effect periodically a substantial dwell in its motion.

9. In an overseaming-machine having upper and lower needles N and I and mechanism for actuating the same so as to pass them alternately each through the loops formed by the other, a tubular bearing P secured to the head of the machine and adapted to give passage to needle N and its thread, a sleeve  $P^2$  rotatably supported on said tubular bearing, a thread-carrier as  $P^7$  secured to said sleeve and mechanism for rotating said sleeve and thread-carrier so as to lay the thread across the path of the upper needle and between it and the lower one and thus twist it around the loops made by said upper needle.

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Witnesses:

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EDWARD G. COOK.