957,954.

J. J. HEYS.

SHOE SEWING MACHINE.

APPLICATION FILED SEPT. 8, 1903.

Patented May 17, 1910.

6 SHEETS—SHEET 1.

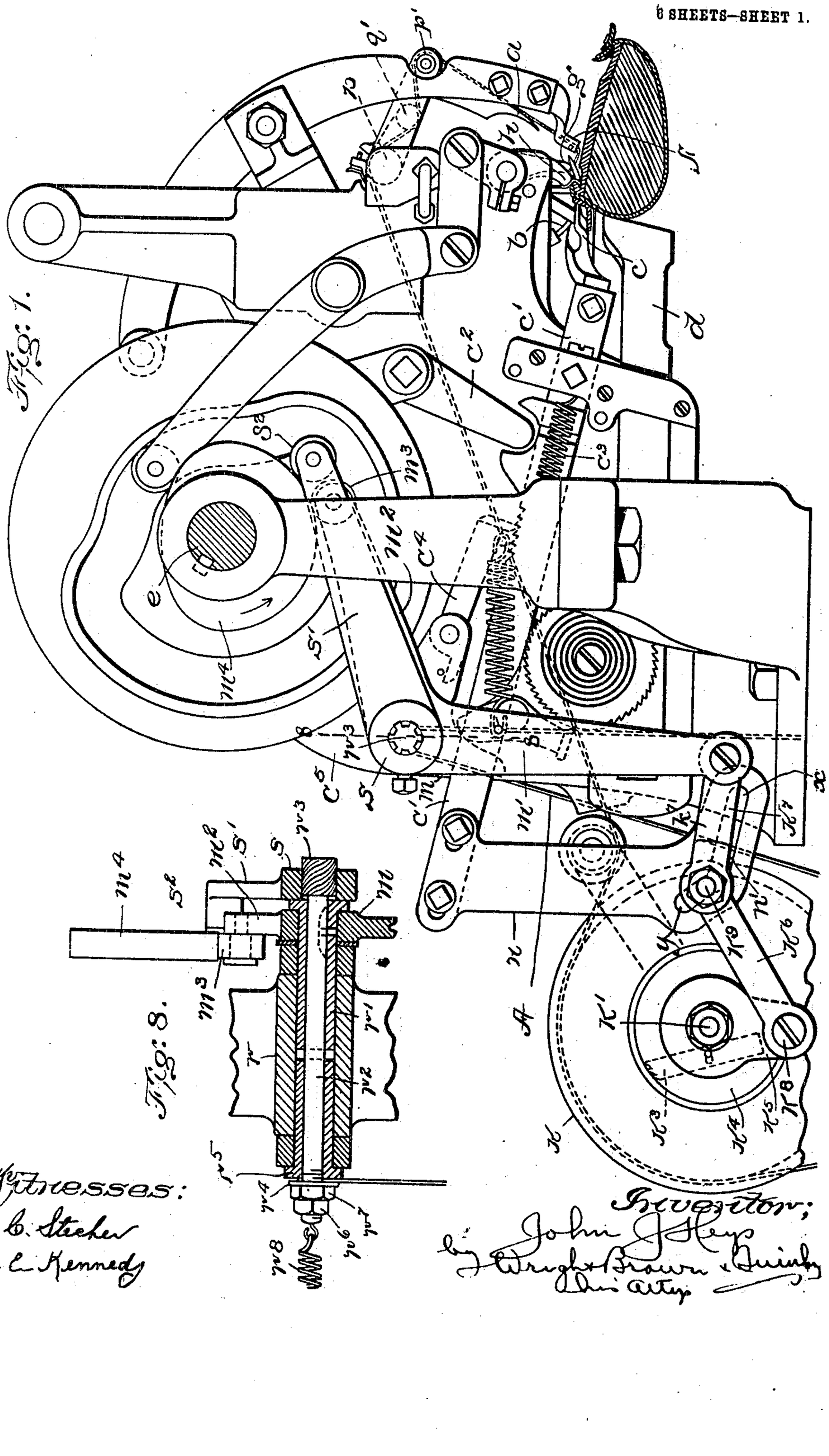


Fig: 1.

Fig: 8.

Witnesses:
C. C. Steiner
L. E. Kennedy

Inventor:
John J. Heys
by Wright Brown & Quinby
his attys

957,954.

J. J. HEYS.

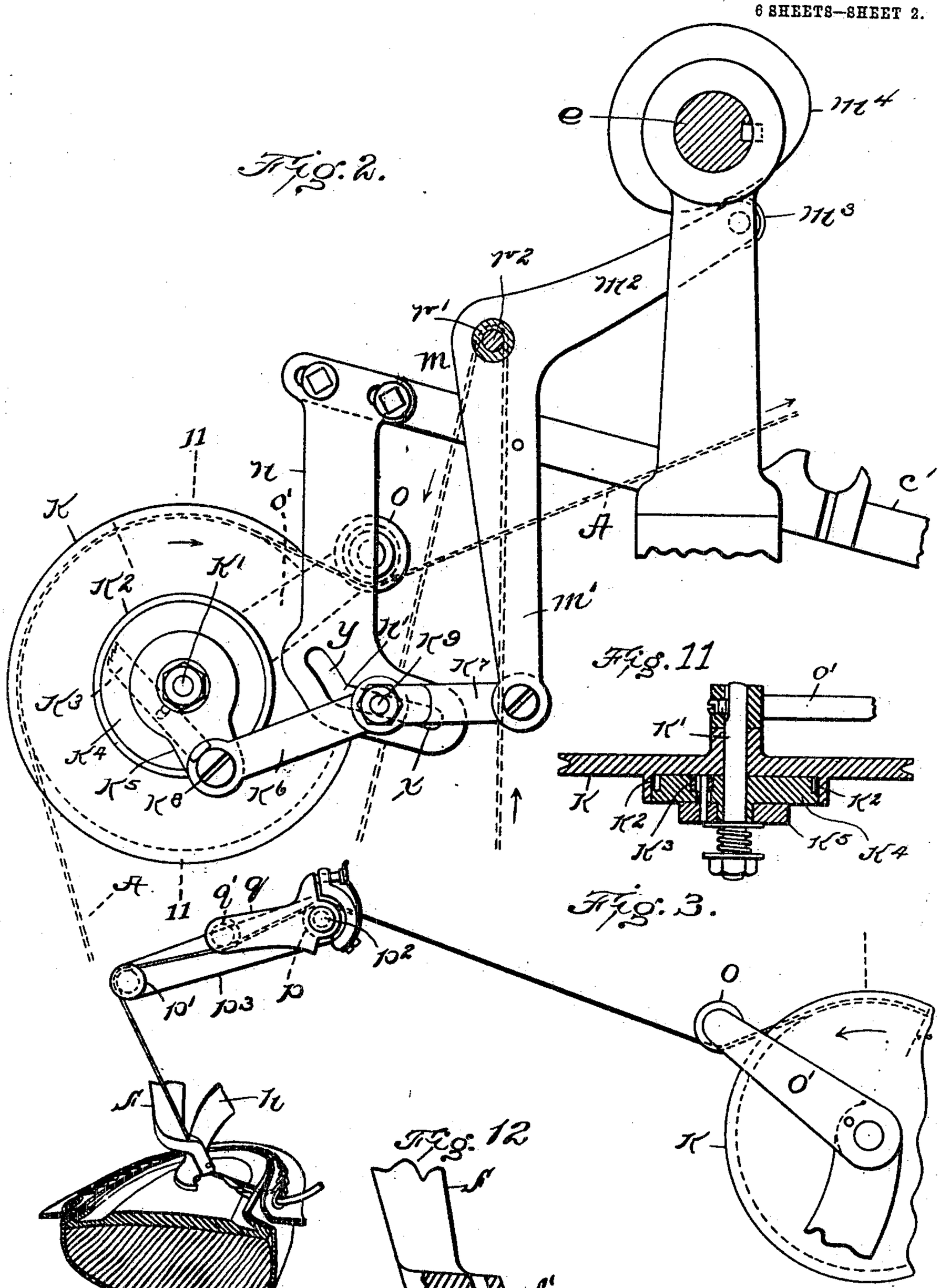
SHOE SEWING MACHINE.

APPLICATION FILED SEPT. 8, 1903.

Patented May 17, 1910.

6 SHEETS—SHEET 2.

Fig. 2.



Witnesses,
C. B. Stocker
L. C. Kennedy

Inventor:
John J. Heys
by Strong & Brown & Lunday

J. J. HEYS.

SHOE SEWING MACHINE.

APPLICATION FILED SEPT. 8, 1903.

957,954.

Patented May 17, 1910.

6 SHEETS—SHEET 3.

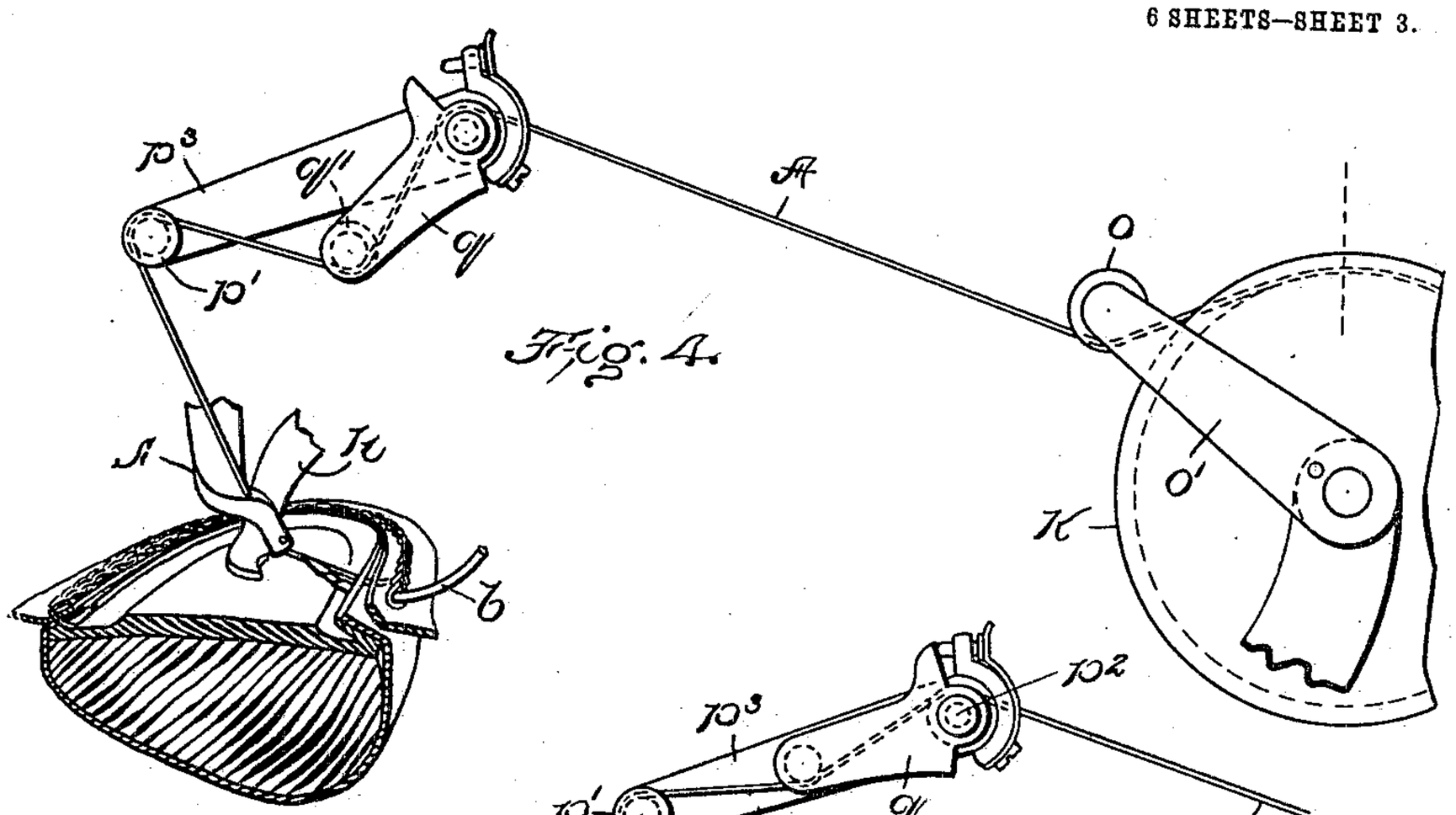
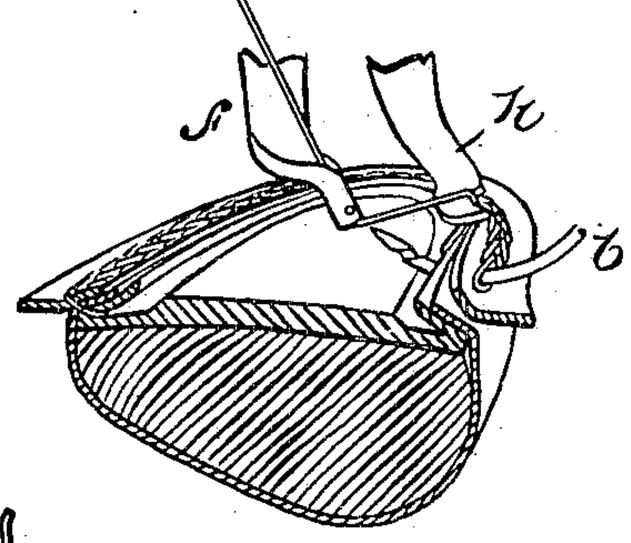


Fig. 4.

Fig. 5.



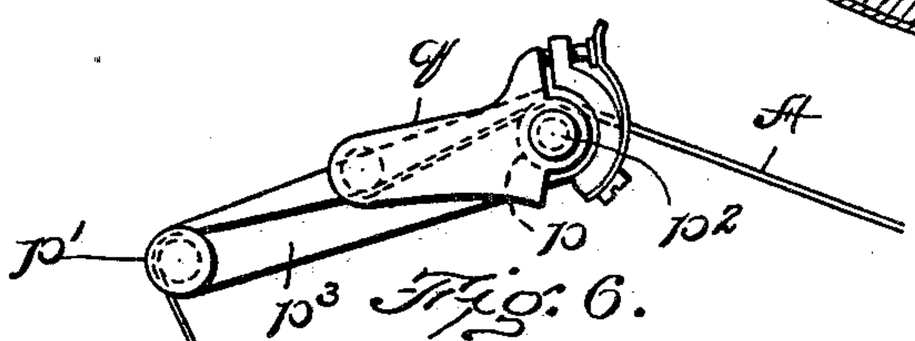


Fig. 6.

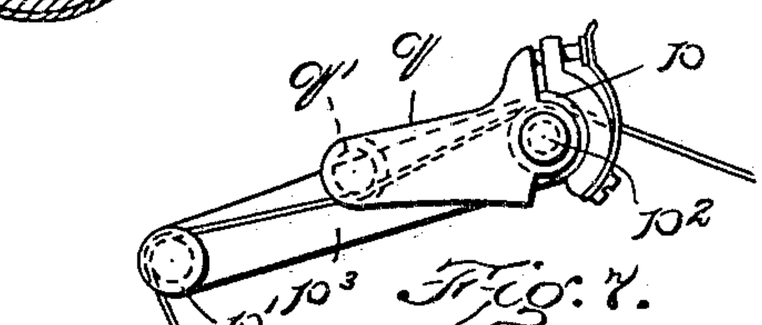
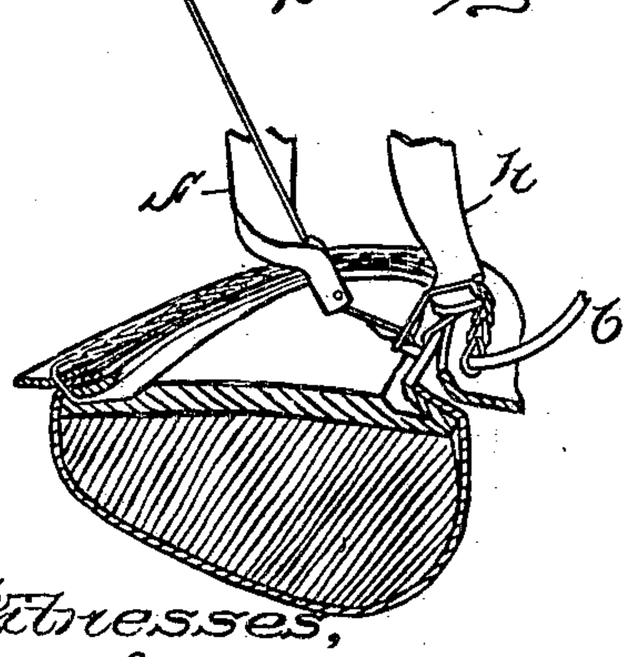
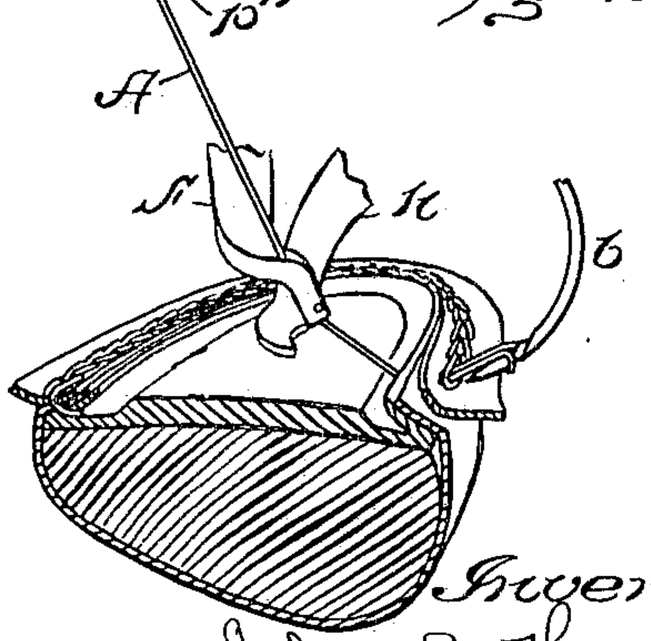


Fig. 7.





Witnesses,
C. B. Stocker
L. E. Kennedy.

Inventor;
John J. Heys
by Albright Brown & Dunlap
his attys

J. J. HEYS.

SHOE SEWING MACHINE.

APPLICATION FILED SEPT. 8, 1903.

957,954.

Patented May 17, 1910.

6 SHEETS—SHEET 4.

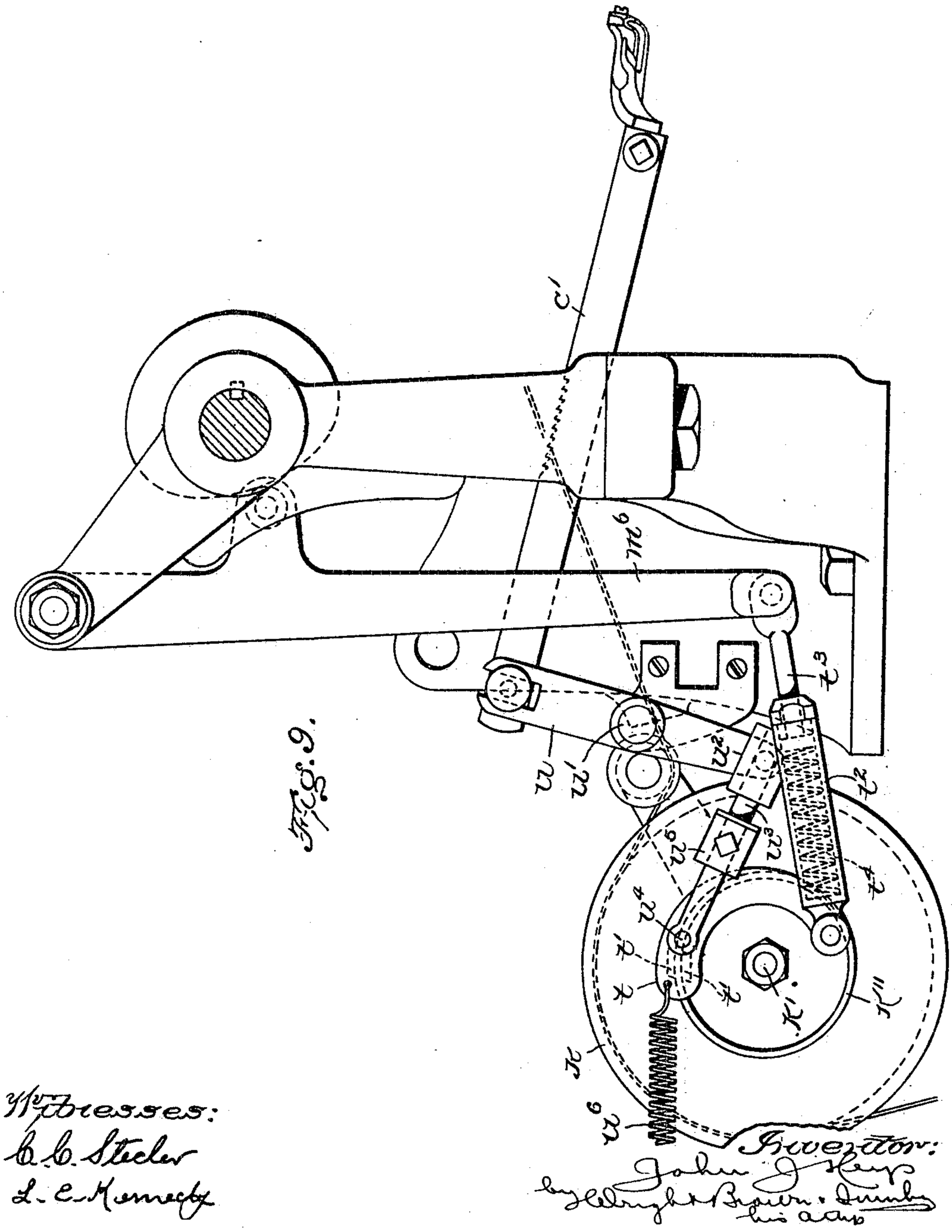


Fig. 9.

Witnesses:
C. C. Steele
L. E. Kennedy

Inventor:
John J. Heys
by Albright Brown Dunlap
his attys

J. J. HEYS.

SHOE SEWING MACHINE.

APPLICATION FILED SEPT. 8, 1903.

957,954. Patented May 17, 1910.

6 SHEETS—SHEET 5.

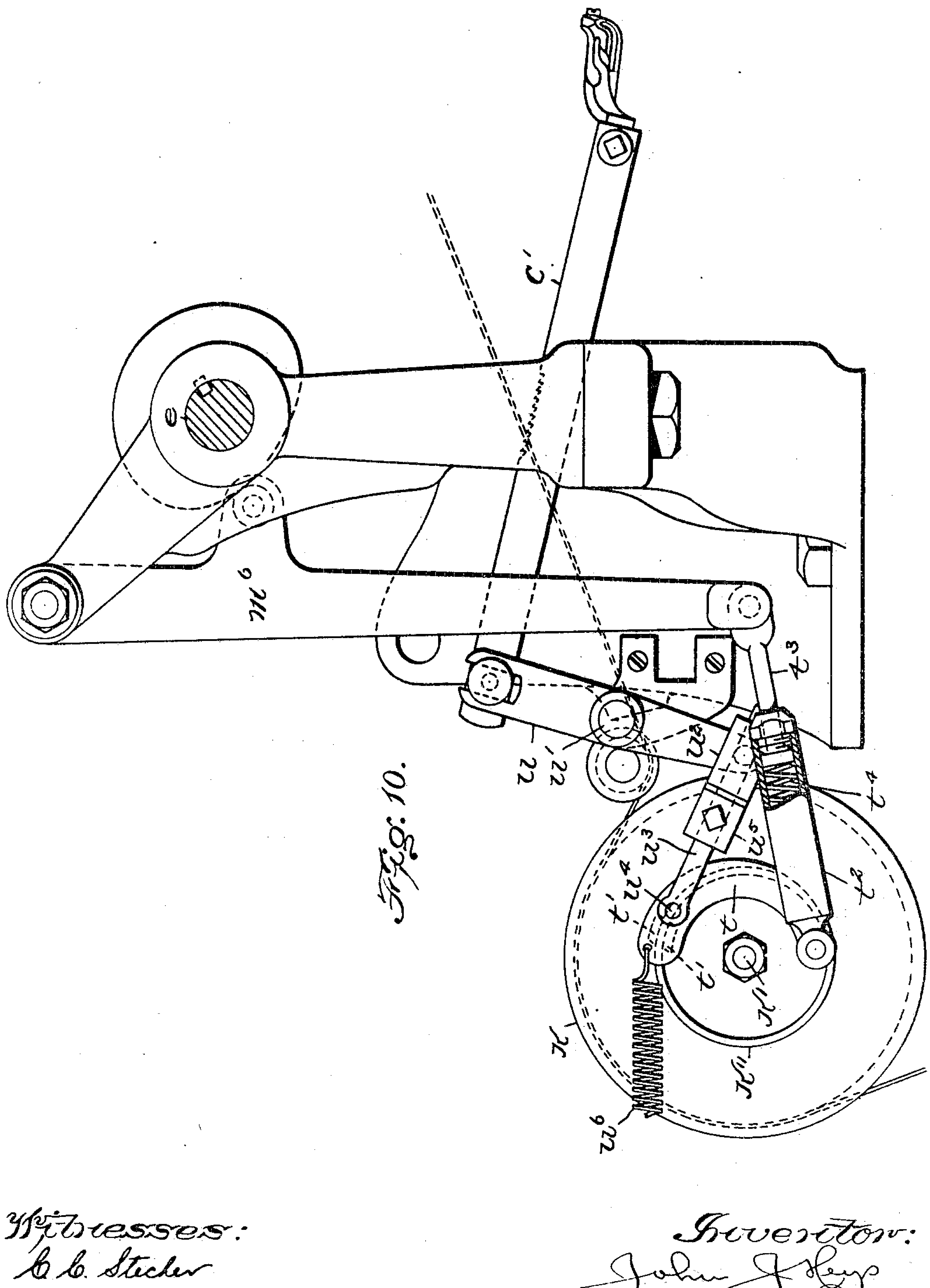


Fig. 10.

Witnesses:
C. C. Stecher
L. E. Kennedy.

Inventor:
John J. Heys
by Emery Booth Brown + Quinby
his attys

957,954.

J. J. HEYS.

SHOE SEWING MACHINE.

APPLICATION FILED SEPT. 8, 1903.

Patented May 17, 1910.

6 SHEETS—SHEET 6.

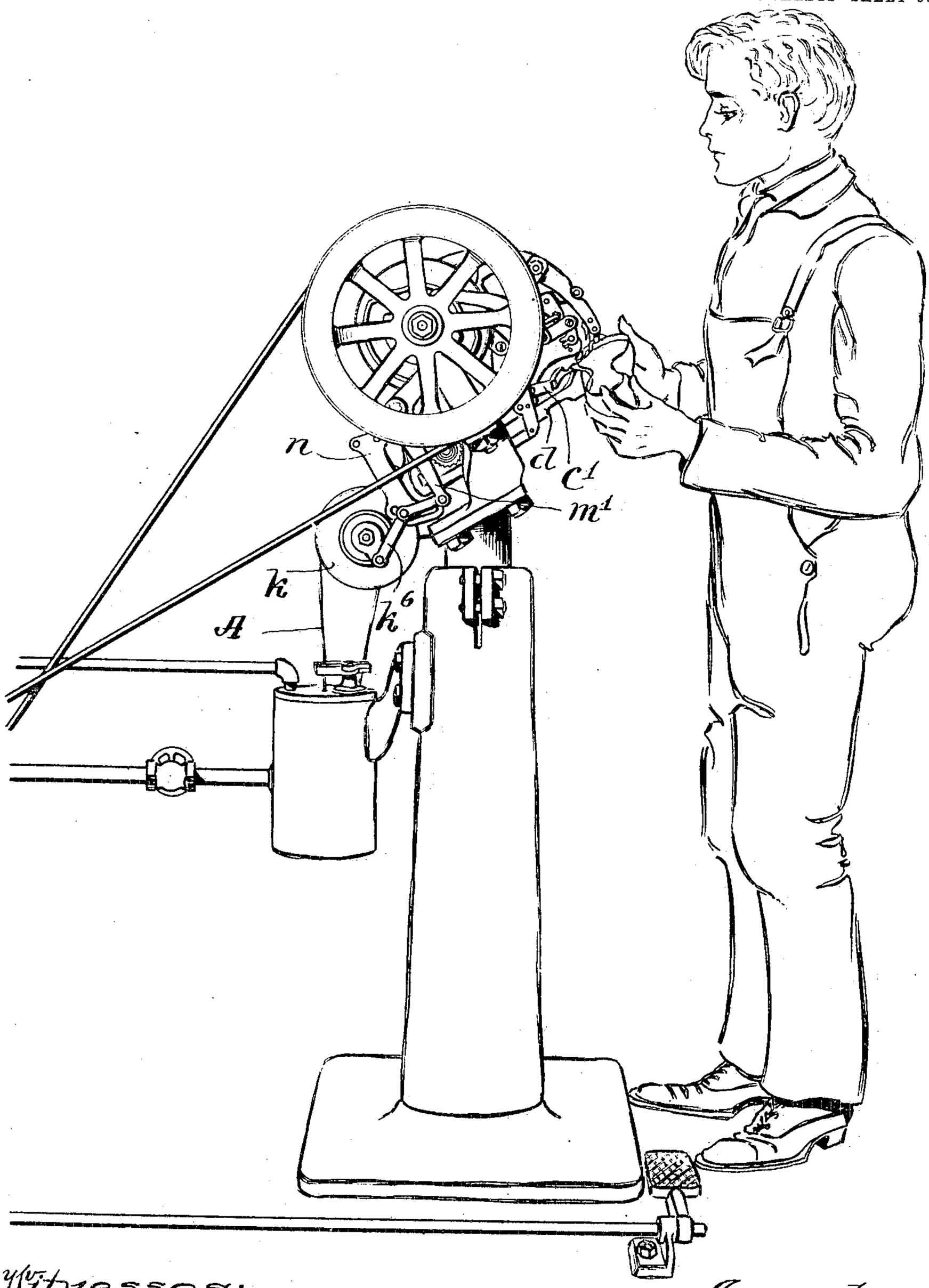


Fig. 13.

Witnesses:
C. C. Stecher
L. E. Kennedy.

Inventor:
John J. Heys
by Albright Brown & Dunby
his Attys

UNITED STATES PATENT OFFICE.

JOHN J. HEYS, OF LYNN, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO BRESNAHAN SHOE MACHINERY COMPANY, OF LYNN, MASSACHUSETTS, A CORPORATION OF MAINE.

SHOE-SEWING MACHINE.

957,954. Specification of Letters Patent. Patented May 17, 1910.

Application filed September 8, 1903. Serial No. 172,352.

To all whom it may concern:

Be it known that I, JOHN J. HEYS, of Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Shoe-Sewing Machines, of which the following is a specification.

This invention has relation to wax-thread chain-stitch shoe-sewing machines, of which a machine for stitching the welt and upper to the insole of a shoe is one of the general class. Hitherto it has been customary in such machines for the needle to draw from the wax-pot the amount of thread necessary for forming the stitch while the thread is under tension; but as the movement of the needle is uniform, it is necessary to provide a take-up, which also draws from the wax-pot more or less thread necessary for the complete formation of the stitch. In some instances mechanism has been provided for locking the thread after a certain amount had been withdrawn, so that the take-up or other contrivance may operate to set the stitch, this being accomplished in some machines when the needle is in the work.

According to my present invention it is my object to dispense with such take-up devices, and also to obviate the necessity of setting the stitch with the needle in the work, by the provision of mechanism controlled by the welt-guide, or other member bearing against the work, for automatically measuring to the needle the exact amount of thread necessary for the formation of the stitch, irrespective of the thickness of the work at the particular point where the needle is to enter it.

A further object of the invention is the provision of mechanism to lock the thread after it has been measured to the needle, this locking taking place, if desirable, prior to any movement of the needle or other mechanism used in the formation or setting of the stitch.

According to the illustrated embodiment of the invention, I depend upon the needle to set the stitch as it moves away from the work, but it will be readily understood however, that this entails no severe strain upon the needle since the proper amount of thread has been already delivered to the needle, prior to its withdrawal through the work with the loop laid in its barb.

By a contrivance common to many sewing machines the loop is so laid in the barb that when the thread is drawn through the work it is not chafed.

Referring to the drawings:—Figure 1 represents a portion of a wax-thread, chain-stitch shoe-sewing machine embodying features of the invention. Fig. 2 represents the automatic thread delivering mechanism controlled by the welt-guide. Fig. 3 represents part of a shoe with the needle in the work and the loops in the act of passing around the needle, and also illustrates the yielding tension device and the truck. Figs. 4, 5, 6 and 7 are views representing the steps taken in the formation of a stitch. Fig. 8, Sheet 1, represents a section on the line 8—8 of Fig. 1. Figs. 9 and 10 represent another embodiment of the invention, which will be subsequently explained. Fig. 11 is a section through the line 11—11 of Fig. 2. Fig. 12 is a detail sectional view of the looper showing means for preventing abrasion of the thread passing through the looper. Fig. 13 is a side elevation of the machine showing the operating or sewing mechanism thereof mounted upon its support at an angle to a horizontal plane.

On the drawings a sewing machine has not been illustrated in its entirety, but only those parts which coöperate with the present invention have been shown.

Before proceeding with a detailed description of the parts constituting the machine, it will be noted that in Fig. 1 the operating or sewing mechanism of the machine is shown as occupying a substantially horizontal plane for the reason that it was necessary to so show the said mechanism in order to fully show the various parts constituting the mechanism embodying features of my invention upon a single sheet of drawings.

The awl *a* and the needle *b* are mounted and actuated by mechanism which is well known, any suitable means being provided for effecting the automatic feed of the work at the proper time. The welt-guide is indicated at *c*, being adjustably mounted in the end of a sliding bar *c'*. The said bar is actuated as ordinarily by a lever c^2 operated by a cam on the cam shaft *e*. The exact construction of the welt-guide itself is not shown, but any of the usual forms may be employed for this purpose. The bar *c'* is

moved rearward by the lever c^2 at the proper time, and is held yieldingly forward by a spring c^3 so that the end of the guide bears against the work and holds the welt in proper position with relation to the upper and the insole, on the last.

d indicates the sliding gage against which the upper on the last is pressed, and against which it rests while the stitch is being made. Both the gage *d* and the bar *c'* are automatically locked during the formation and setting of the stitch, by pawl and ratchet mechanism, such as has been used heretofore in machines of this type. The locking pawl for the bar *c'* is indicated at c^4, and it and the pawl for locking the gage *d* are released by the lever c^5 actuated by a cam on the shaft *e*.

f indicates the looper which lays the thread around the needle and in the barb thereof, said looper being operated by any suitable mechanism such as ordinarily employed for this purpose.

f' designates an aperture through the looper through which the thread passes.

f^2 designates a roller mounted in the lower end of said looper, the periphery of the said roller occupying a position adjacent to the said aperture. The thread is conducted through the aperture of the looper and passes around the roller f^2, and as it is fed forward causes the said roller to rotate whereby chafing of the thread is prevented.

g indicates the channel-guide which enters the channel, and against which the work is outwardly drawn to position it with relation to the stitch mechanism, any suitable mechanism being employed for actuating said channel-guide. In the actual operation the work is held as shown in Fig. 1, by the hands of the operator, with the channel-guide in the channel, and the work resting against the gage *d*. The said guide *g* furnishes an abutment for the work, and is an important factor in positioning the welt-guide, as will be explained.

h indicates a finger which engages the thread as it is being laid against the barb so that substantially the middle of the loop of the thread is laid in the barb, as shown in Figs. 4 to 6 inclusive. This device is well known, and is operated by any suitable mechanism.

As thus far explained the mechanism does not differ essentially from machines which have been on the market for a great many years, except in the construction of the looper, as above described.

For the purpose of automatically delivering to the stitch forming mechanism a quantity of thread predetermined as to its length according to the thickness of the work, the following differential mechanism is employed:—In the rear of the machine, or any other suitable location, is a supply of thread A, which is caused to be treated by any suitable waxing device, of which a well-known form is shown in Fig. 13. The thread is passed through the waxing device, and thence to a wheel or truck *k*, whose periphery is grooved for the reception thereof. This truck is relatively large in diameter, and it is journaled upon a shaft *k'* mounted in a suitable support. It is adapted to loosely rotate about its shaft and is actuated with a step by step movement, the length of which is variable, by suitable clutch mechanism. The said truck to this end is formed with a series of ratchet teeth k^2, with which may be engaged the toothed end of a sliding pawl k^3 mounted upon a rotary member k^4 having attached thereto an arm k^5, said member being journaled upon a shaft *k'*. The arm k^5 is connected by two pivoted links k^6 k^7 with the arm *m'* of a bell-crank lever *m*, the other arm m^2 of which is provided with a roller m^3 resting against a cam m^4 on the shaft *e* as shown in Fig. 1. When the lever *m* is actuated, as will be explained, the member k^4 is actuated to cause a partial rotation of the truck *k*.

Secured to the bar *c'* is a depending arm *n* which is adjustable longitudinally with relation to the bar *c'*. The said arm *n* is formed or provided at its lower end with a cam slot *n'*, said slot being in the form of an obtuse angle as shown. The longer straight portion of the slot is indicated at *x* and the upwardly curved shorter portion of the slot is indicated at *y*, as clearly shown in Figs. 1 and 2. The portion *x* of the slot extends substantially parallel to the line of movement of the lower end of the arm *m'* of the lever *m*, whereas the portion *y* of the slot is substantially concentric to the stud k^8 which connects the link k^6 with the arm k^5. The stud k^9 which connects the links k^6 k^7, extends into the slot *n'* so that it is guided in its movements by said slot. When the arm *m'* of the lever *m* is traveling rearward the arm k^5 will be rotated in the direction of the arrow 2 in Fig. 2 so long as the stud k^9 travels in the effective portion *x* of said slot *n'*; but as soon as the stud enters the portion *y* of said slot the movement of the arm k^5 will cease, since the stud k^9 in traveling through said portion of the slot will swing about an arc substantially concentric with the stud k^8, thus rendering ineffective or idle, or converting into "lost motion" the movement of the said stud k^9 while traveling in the portion *y* of said slot. Now from this description it will be apparent that the position of the bar *c'* and the arm *n*, and therefore the slot *n'*, will determine the length of the partial rotation of the truck *k*. The portion *x* of the slot *n'* is naturally of such length that the stud k^9 never travels from end to end thereof. The ratio of the truck *k* to the ratchet or clutch carried there-

by, is two to one,—consequently if the position of the arm n is one eighth of an inch in the rear of its preceding position, the truck will deliver two eighths of an inch of thread more than was previously delivered. Assuming for instance, that the end of the welt-guide be held by the work one eighth of an inch away from the end of the channel-guide, (which is the stationary abutment against which the work is pressed,) the stud k^9 will move but an eighth of an inch in the portion x of the slot n' before it enters the portion y so as to impart one eighth of an inch rotation to the clutch k^3 and therefore cause the truck to rotate two eighths of an inch and deliver two eighths of an inch of thread. As will further be apparent from the foregoing, the operative connection between the thread-truck clutch or pawl k^3 and its actuating lever m is permanent and positive, so that said clutch or pawl is at all times connected to and under the control of said lever, which control is modified by the slot n'. Moreover, the angle between the portions x and y of the slot n' provides for limiting the effectual travel of the pawl k^3 and consequently the rotative action of the truck k.

From the truck or wheel k the thread A passes under an idler truck o journaled on an arm o' suitably supported, and thence over two trucks at the front portion of the machine as indicated at p p'. The truck p is on a shaft or stud p^2 which carries the spring tensioned arm q on the end of which is a truck q' resting upon the length of thread between the trucks p and p'. The arm p^3 which carries the truck p' is immovable at all times. From the truck p' the thread passes to the looper f as illustrated.

In the operation of the machine the operator holds a shoe in position with the end of the channel-guide resting in the bottom of the channel. To place it in this position the gage d and the welt-guide are forced rearwardly and then are allowed to move forward, being locked in position after they reach the forward end of their movement. As soon as the positions of the welt-guide and the arm n are determined by the work the lever m is actuated to partially rotate the truck k and deliver therefrom a length of thread which is required for the stitch, said length being substantially equal to twice the distance between the end of the channel-guide and the end of the welt-guide, or twice the thickness of the work plus about three times the distance between the centers of the holes in the work through which the needle passes. Then the needle is passed through the work in the position shown in Fig. 1 and the thread is laid in the barb by the looper, the needle then moves rearward and draws the loop taut through the work. The needle has a uniform movement as usual, and since the exact length of thread required by the thickness of the work is delivered, the stitch is set taut by the rearward movement of the needle.

As will be appreciated by those skilled in the art, the control of the thread measuring means by the light and work feeling action of the welt guide will give that delicacy and uniformity of control desirable in determining the amount of thread that is to be supplied to the needle action. Such sensitive control is not possible in a thread measuring means operatively joined to a part that must be held with considerable pressure against the work, as, for instance, a back gage.

For the purpose of locking the thread to prevent the truck from delivering more than is necessary, there is interposed between said truck and the spool, a lock which is operated before any thread is taken by any mechanism. Said lock is constructed as follows:—In a suitable bearing r is a sleeve r' upon which is pivoted, or fulcrumed the lever m, this sleeve is held against rotation and also against longitudinal or axial movement, by suitable means. Passing through the sleeve and keyed thereto so as to hold it from rotation, is a shaft r^2 having on its end a coarse thread r^3. At its other end the shaft is provided with a washer r^4 which forms one member of a clamp, the other member of which is formed by the headed side r^5 of the sleeve r', said sleeve being formed in two parts if desired as shown. The washer is held adjustably in place by nuts r^6 r^7. A spring r^8 is also attached to the end of the shaft r^2 so as to draw it firmly in the direction shown, to make sure of releasing the thread for the next feeding operation.

s indicates the hub of a lever s' the free end of which has a roller bearing against the cam m^4. The said hub s is internally tapped so as to form a nut complemental to the screw r^3. The shaft r^2 is held against rotation but is free to move to a limited extent longitudinally, so that when the arm or lever s' is rocked it acts as a nut to move the shaft r^2 relatively thereto to open or close the clamp members r^4 r^5, the spring r^8 serving to maintain the hub s against a flange on the sleeve r'. It will be observed that the roller m^3 on the arm m^2 is in rear of the roller s^2 on the arm s', this is to time the parts so that the thread will be measured to the needle before it is locked. This locking device is interposed between the spool and the wax-pot as indicated by the course of the thread in Fig. 1. The wax-pot and the spool are not illustrated upon the drawings, but their relative location will be understood from the foregoing description.

In this machine there is no need of a positive take-up, for the reason, as stated, that a predetermined quantity of thread auto-

matically measured out according to the thickness of the work is delivered to the needle.

One result as achieved by the construction as previously described, is that when the needle is out of the work the gages are unlocked, the tension truck is free to rotate and the thread is unlocked so that the operator may draw out from the wax-pot as much thread as may be desired. A machine possessing the characteristics previously described has many advantages over machines of the chain stitch type as previously constructed.

The mechanism is simple and not likely to get out of order, and the seam is uniform throughout, the mechanism for imparting a differential rotation to the truck serving to deliver only the thread that is needed according to the thickness of the work, so that no stitch is drawn tighter or is looser than the preceding stitch.

It is quite apparent that the invention is not limited to the details of construction which I have seen fit to illustrate and describe, as many and various changes may be made in the measuring and thread-locking mechanism without departing from the spirit and scope of the invention. For instance, in Figs. 9 and 10 another form of mechanism for actuating the truck or imparting a differential rotation thereto, is shown. In this case the truck k is provided with a laterally projecting annular flange k^{11} which is half the diameter of the truck. To coact with this flange is a friction clutch member t which is segmental in shape and is provided with two clutch members t' t' which straddle the flange k^{11}. The lower end of the segmental clutch t is connected to the lever m^6, corresponding to the lever m in Fig. 1, by a link consisting of a tube t^2 and a headed rod t^3 extending thereinto and bearing against a spring t^4. The spring t^4 is strong enough so that when the lever m^6 is moved to the left the lower end of the clutch t will be moved to the left so as to cause the clutch members t' t' to grip the flange k^{11} and partially rotate the truck k, but when the rotation of the truck is stopped the spring will yield to permit the lever m^6 to continue its movement without breakage. To stop the rotation of the truck when the proper quantity of thread has been delivered, a lever u is fulcrumed on a stud u'. The upper end of said lever has a pin and slot connection with the sliding welt-guide carrier c'. The lower end of said lever has pivoted thereto a block u^2 through which a bar u^3 is adapted to slide, the end of the said bar u^3 is connected to the upper end of the clutch t by a stud u^4. Adjustably secured to said rod is a stop u^5 the end of which is adapted to engage the block u^2. A spring u^6 is connected to the upper end of the clutch t to hold it yieldingly to the left and to return it to its position after it has been caused to partially rotate the truck. With this construction the location of the block u^2 determines the length of movement of the clutch t and permits the truck to deliver the exact amount of thread required by reason of the thickness of the work for the next stitch.

I desire to have it understood that the phraseology which is employed is simply for the purpose of description and not for limitation, and that in lieu of the particular stitch forming mechanism which has been illustrated and described, other forms may be used with equal facility.

Having thus explained the nature of the invention, and described a way of constructing and using the same, although without attempting to set forth all of the forms in which it may be made, or all of the modes of its use, I declare that what I claim is:—

1. In a shoe sewing machine, the combination of stitch forming mechanism, a movable thread delivering device, an actuating lever, means for imparting to said lever uniform movements, operating means for the thread delivering device, jointed connections pivoted to said means and to the actuating lever, and guiding means for changing the direction of travel of the joint in said jointed connection for the purpose of delivering variable lengths or quantities of thread to the needle.

2. In a shoe sewing machine, the combination of stitch forming mechanism, a movable thread delivering device, an actuating lever, means for imparting to said lever uniform movements, operating means for the thread delivering device, jointed connections pivoted to said means and to the actuating lever, a sliding bar carrying the welt guide, and an arm connected thereto provided with a deflecting guide for changing the direction of travel of the joint in said jointed connection for the purpose of delivering variable lengths or quantities of thread to the needle.

3. In a shoe sewing machine, the combination of stitch forming mechanism, a movable thread delivering device, an actuating lever, means for imparting to said lever uniform movements, operating means for the thread delivering device, permanent and flexible jointed connections pivoted to said means and to the actuating lever, a sliding bar carrying the welt guide, and an arm having an angular slot connected to said sliding bar, said slot being engaged by the joint of said jointed connection for changing the direction of travel of the joint of said connection for the purpose of actuating the thread delivering device variable distances.

4. In a shoe sewing machine, the combination of stitch forming mechanism, a mov-

able thread delivering device, an actuating lever, means for imparting to said lever uniform movements, operating means for the thread delivering device, permanent and flexible jointed connections pivoted to said means and to the actuating lever, and means including a guide having a cam slot for changing the path of travel of the joint in said jointed connection for the purpose of delivering variable lengths or quantities of thread to the needle.

5. In a shoe sewing machine, the combination of stitch forming mechanism, a rotative thread delivering truck, an actuating lever, means for imparting to said lever uniform movements, a welt guide, a welt guide carrier, jointed connections pivoted to the actuating lever and to the thread delivering truck for operating the latter from the former, and means including a cam slot engaged by the joint in said connection controlled by the welt guide carrier for rendering more or less of the uniform movement of the actuating lever effective in causing rotative movement of the truck.

6. In a shoe sewing machine, the combination of stitch forming mechanism, a rotative thread delivering truck, an actuating lever, means for imparting uniform movements to said lever, a welt guide, a welt guide carrier, an arm having an angular slot and controlled by the welt guide carrier, and connections pivoted to the actuating lever and to the truck, the joint in said connections engaging the said angular slot and being deflected thereby whereby more or less of the uniform movement of the actuating lever is made effective in rotating the truck.

7. In a shoe sewing machine, the combination of stitch forming mechanism, a rotative thread delivering truck, an actuating lever, means for imparting uniform movements to said lever, a welt guide, a welt guide carrier, an arm having an angular slot and controlled by the welt guide carrier, connections between the actuating lever and truck, said connections engaging the said angular slot whereby more or less of the uniform movement of the actuating lever is made effective in rotating the truck, and an automatic thread locking device which prevents thread from being drawn from the truck during the stitch setting operation.

8. In a sewing machine, the combination with stitch-forming mechanism, of a movable thread-delivering device, an actuator for said device having a constant movement, a jointed connector pivoted to said actuator and to said device and having provision for lost motion, a work contacting member, and means including an angular guide controlled by said member and arranged to engage said connector and deflect the joint thereof to limit the effective movement of the connector.

9. In a sewing machine, the combination, with stitch forming mechanism, of a movable thread-delivering device, an actuator for said device having a constant movement, a connector between said actuator and device and having provision for lost motion, a work contacting member, and means including an angular guide adjustably connected with said member and arranged to engage said connector to limit the effective movement thereof.

10. In a sewing machine, the combination, with stitch forming mechanism, of a movable thread-delivering device, an actuator for said device having a constant movement, means for positively and permanently connecting said device and actuator, said means having provision for lost motion, said parts being constructed and arranged to cause movement of said thread-delivering device during the first part of the movement of said actuator, and means controlled by the work for engaging said connecting means to prevent movement of said thread-delivering device during the latter part of the movement of said actuator.

11. In a sewing machine, the combination, with stitch forming mechanism, of the thread truck k, the actuating lever m, the links k^6, k^7 operatively connecting said thread truck and lever, the arm n controlled as to its position by the work and provided with the cam slot n', and the stud k^9 connecting said links and engaging said cam slot.

In testimony whereof I have affixed my signature, in presence of two witnesses.

JOHN J. HEYS.

Witnesses:
M. B. MAY,
J. P. IDE.