(No Model.)

6 Sheets—Sheet 1.

A. H. PRENZEL.

SHOE SEWING MACHINE.

No. 589,949. Patented Sept. 14, 1897.

Fig. 1.

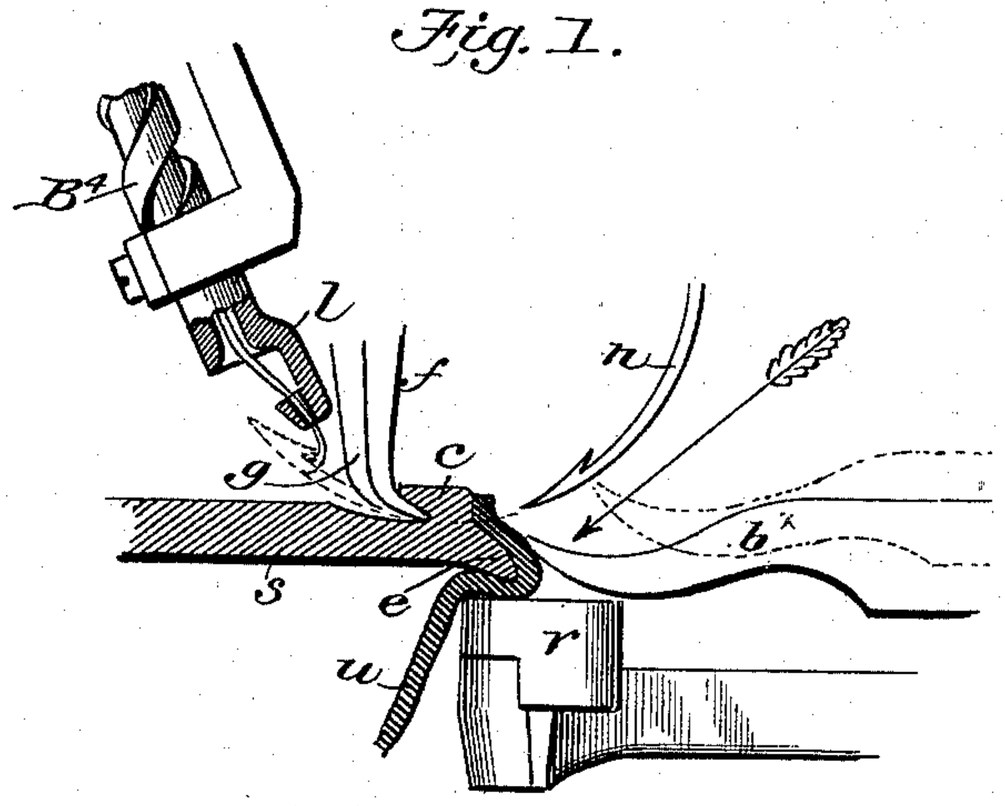


Fig. 2.

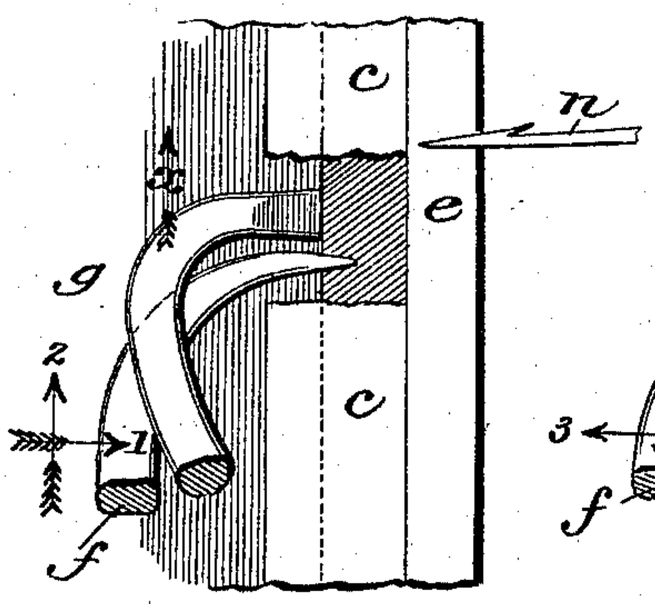
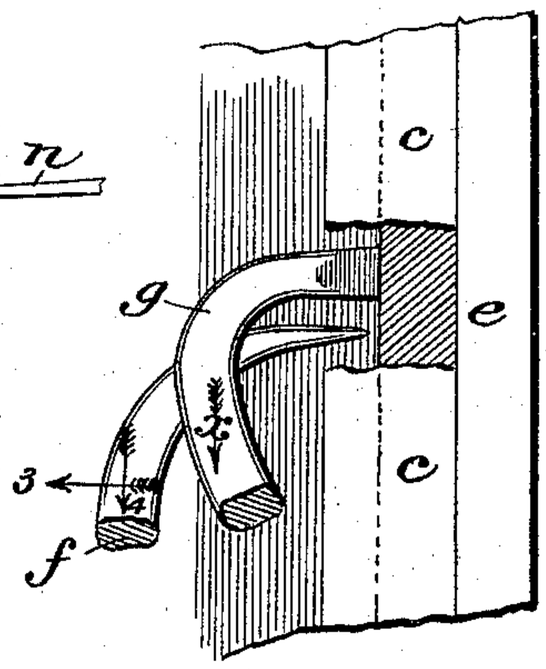


Fig. 3.



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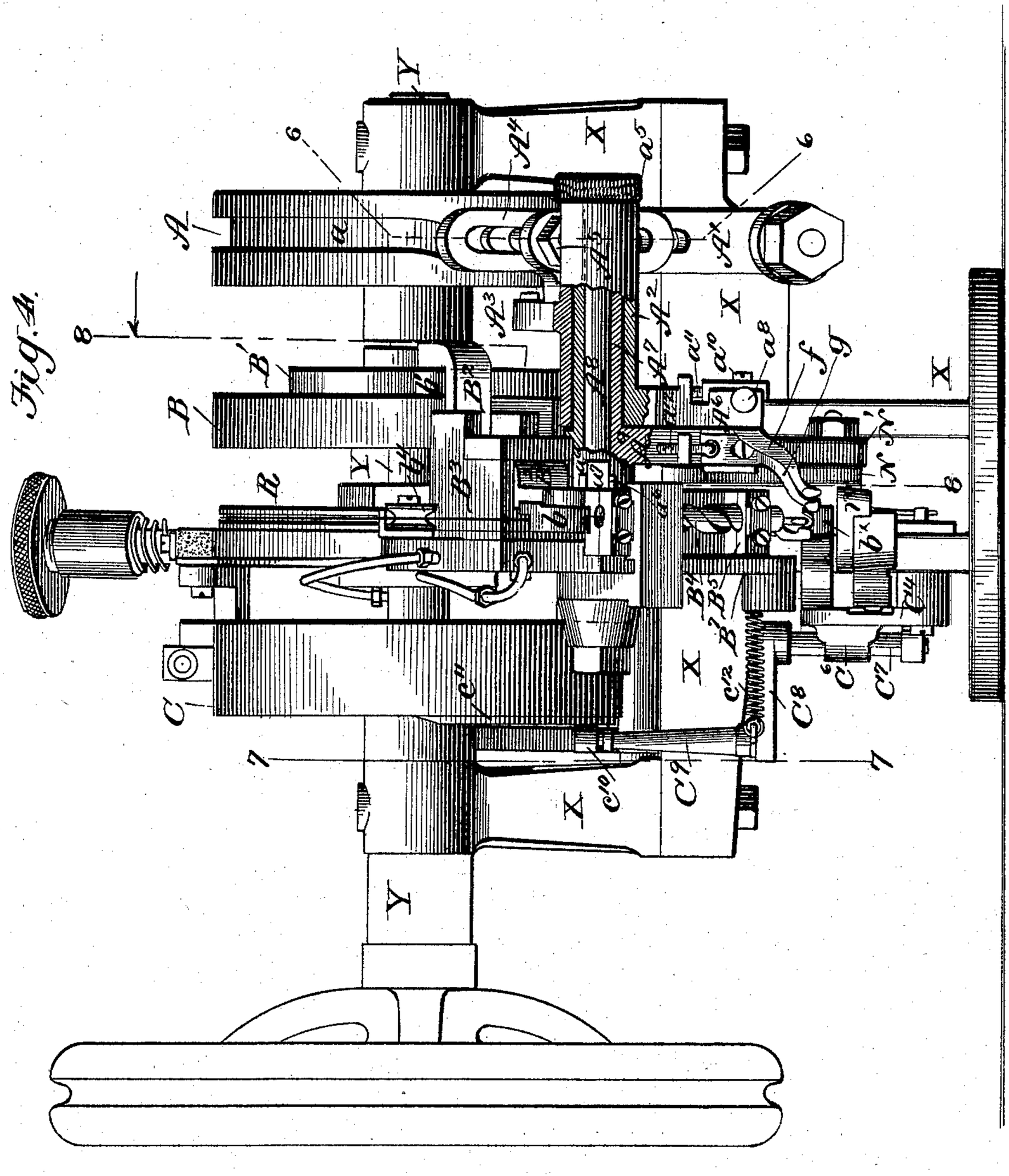
SHOE SEWING MACHINE.

No. 589,949. Patented Sept. 14, 1897.

Fig. 4.



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SHOE SEWING MACHINE.

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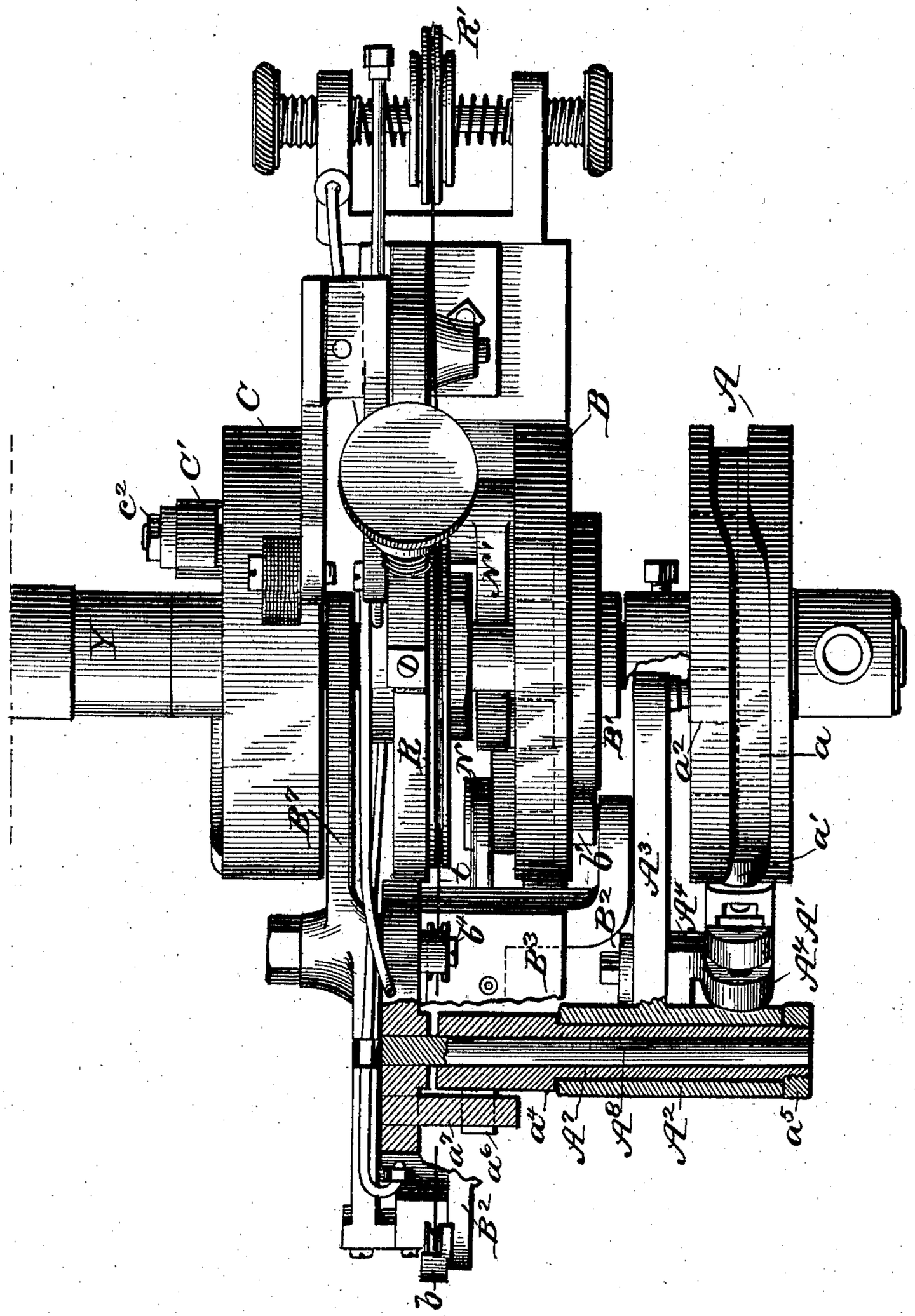
Fig. 5.



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SHOE SEWING MACHINE.

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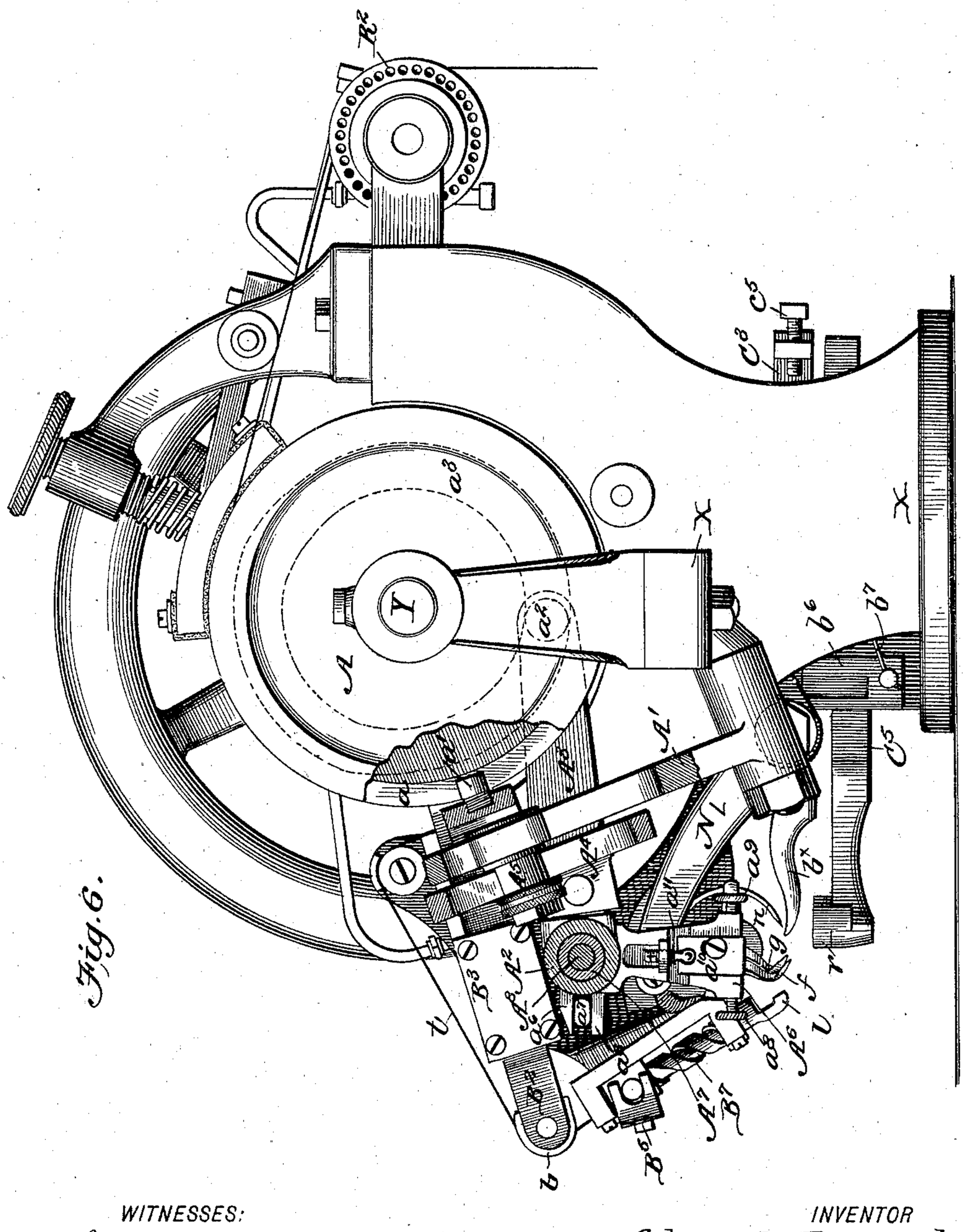

Fig. 6.

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Fig. 7.

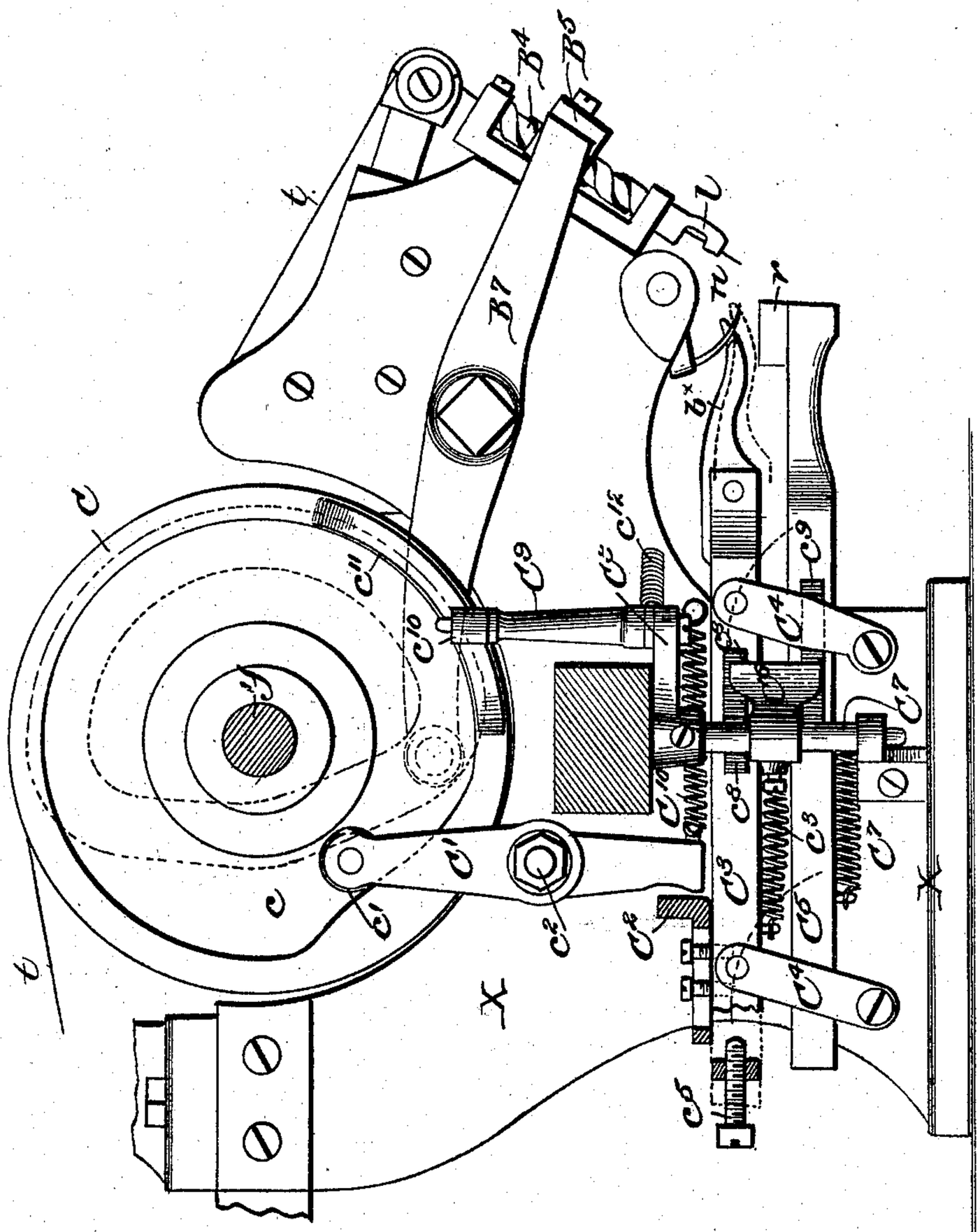

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Fig. 9.

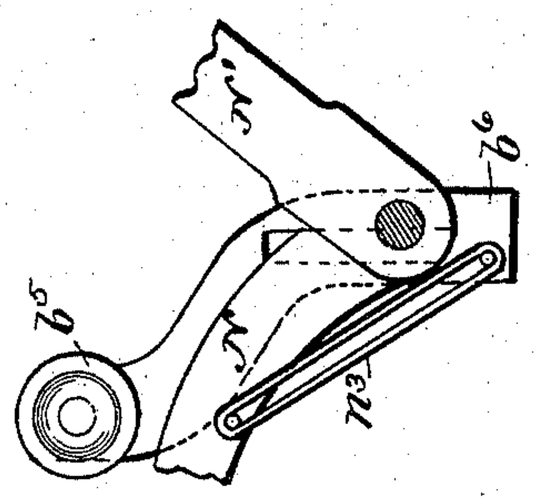


Fig. 10.

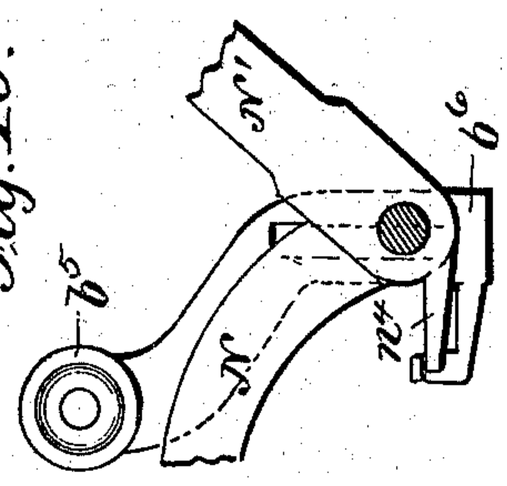
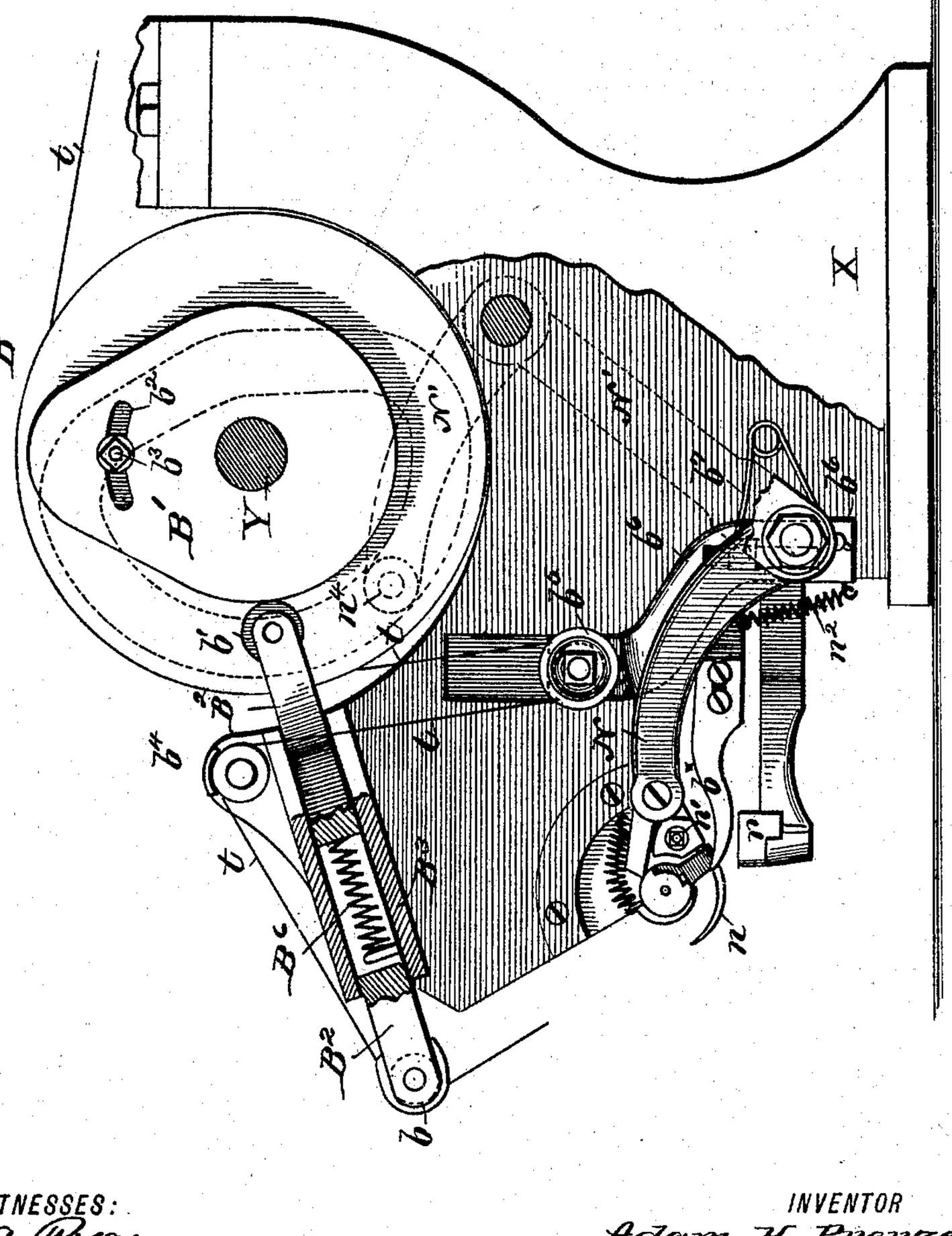


Fig. 8.



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UNITED STATES PATENT OFFICE.

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SHOE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 589,949, dated September 14, 1897.

Application filed December 2, 1895. Serial No. 570,784. (No model.)

To all whom it may concern:

Be it known that I, ADAM H. PRENZEL, of Landingville, in the county of Schuylkill and State of Pennsylvania, have invented a new and useful Improvement in Turn-Shoe-Sewing Machines, of which the following is a specification.

My invention is in the nature of a sewing-machine for stitching the soles upon that class of shoes known as "turns," in which the shoe is made wrong side out and is then turned. It relates more especially to the machine for which I have already applied for Letters Patent by application, dated March 29, 1895, Serial No. 543,720.

My present invention comprehends certain features of improvement upon that machine, which I briefly describe as follows: first, an improved means for feeding the shoe past the needle as the latter is made to stitch the upper to the sole; second, in improved means for bending down the outer edge of the sole to give more room for the curved needle to penetrate the channeled edge of the sole in stitching it to the upper.

Figure 1 is a view of the devices immediately operating upon the shoe, the latter being shown in section. Fig. 2 is a plan view, on an enlarged scale, of a part of the shoe-sole with parts of the feeding devices and needle shown in relation thereto, the parts being in position for the forward or advance movement of the shoe. Fig. 3 is a view similar to Fig. 2, but showing the position of parts during the backward movement of the feed devices. Fig. 4 is a front elevation of the entire machine with parts in section. Fig. 5 is a plan view with parts in section. Fig. 6 is a side elevation taken from the right-hand side of Fig. 4, being partly broken away and shown in section on line 6 6. Fig. 7 is a side elevation from the left-hand side of Fig. 4, being partly in section on line 7 7 of Fig. 4. Fig. 8 is a broken vertical section taken on two planes, as shown by line 8 8 of Fig. 4 and looking in the direction of the arrow on this line. Figs. 9 and 10 are details of modifications.

In the drawings, (see Fig. 4,) X represents the main frame of the machine, consisting of a base-plate, a cross-head, and two vertical standards carrying journal-bearings for a main shaft Y, arranged horizontally and driven by a pulley-wheel Z.

On the main shaft Y are rigidly mounted three main cams A, B, and C. The cam A actuates the feeding devices for feeding the work as the sewing progresses and will be designated as the "feed-cam." The cam B operates the needle and positive take-up and will be called the "needle-cam," and the cam C operates the break-down device for bending down the edge of the sole and giving clearance for the passage of the needle through the same, and also operates the looper for throwing a loop of thread around the projecting and barbed end of the needle after it has passed through the work.

That the function and operation of my machine may be better understood I will first describe the coaction of the direct instrumentalities which operate upon the shoe to effect the sewing and afterward describe the means for actuating these instrumentalities.

Thus, referring to Fig. 1, *s* is the sole of a turned shoe, and *u* its upper. The sole is channeled along its edge to form an overhanging lip *c*, of leather, which constitutes the attaching-point for the upper, and against the outer edge of which the edge of the upper and its lining lies to be attached by a row of stitching. The edge of the shoe is pressed against a rest *r*, and a breakdown bar $b^{\times}$ advances to bend down the edge *e* of the sole, so as to give more room for the curved needle *n* to enter. Then the needle passes through the edge of the upper and the channel-lip *c* of the sole, as indicated in dotted lines. Then a looper *l* throws a loop of thread around the barbed end of the needle and the needle, receding, draws the thread through the channel-lip *c* and upper, forming a stitch which firmly unites the two.

As so far described the operation is the same as that described in my former application. My improvement relating to this part of the machine comprises a new feeding device and an improved arrangement and action of the breakdown bar.

The feeding devices of the present machine

comprise two parts *g* and *f*. In the old machine there was but one, and it acted with a reciprocating action to feed the shoe-sole along past the needle as the sewing progressed, and it had the combined functions of a feed and a channel guide. This combination of functions in a single device I find will at times work badly, for if the leather be soft or flanky the feed is not positively effected.

In the present invention the part *g* (see Figs. 1, 2, and 3) forms the channel-guide, and its end lies on the bottom of the channel against the solid leather of the lip, while the part *f* forms the positive feed, and for this purpose it has a different construction, different motion, and different effect from the channel-guide. Thus, for instance, it is constructed as a sharp-pointed penetrating-awl, and it has a four-motioned feed which causes its point to describe a rectangular path.

Referring more particularly to Figs. 2 and 3, the channel-guide *g* lies with its broad edge against the solid leather under the channel-lip and moves back and forth, as indicated by the *x* arrows, and merely holds the channel-lip up to and against the thrust of the needle, but the positive feed-awl *f* has a compound motion. Thus before guide *g* advances in Fig. 2 the feed-awl *f* moves in the direction of its arrow 1 and penetrates the solid leather of the channel-lip. Then guide *g*, Fig. 2, moves in the direction of its *x* arrow, and feed-awl also moves with it in the direction of its arrow 2, and by having its point deeply embedded into the leather of the channel-lip it positively feeds the sole along. When it reaches the end of the forward movement, (now see Fig. 3,) the feed-awl moves outward in the direction of its arrow 3, which takes its point out of the leather and then *g* moves back in the direction of its *x* arrow and at the same time *f* returns in the direction of its arrow 4. It will thus be seen that while the work is firmly held up to the shoe-rest, break-bar, and needle by the guide *g* a very positive and certain feed is secured by the four-motioned awl-feed. An important and distinguishing feature of this part of my invention is that the channel-guide reciprocates only in the line of feed or in a plane parallel thereto and does not move sidewise at all, and hence does not at any time leave its bearing against the leather in the channel. This is necessary with a feed-awl in order to hold the sole while the awl is being pulled out of the leather, and, furthermore, by constantly holding the shoe up to place it does not allow the stitches to run out toward the edge of the sole, as they are liable to do in turning the toe with other constructions. These two devices, the awl-feed *f* and the channel-guide *g*, are actuated and controlled in their respective movements by the feed-cam A of the main shaft, whose connections with the said parts I will now more particularly describe.

Referring to Figs. 4, 5, and 6, A′ is an upright arm pivoted at its lower end upon a stud on the main frame and having at its upper end an adjustable friction-roller *a*′, that plays in a cam-groove *a*, formed on the external periphery of the main cam A. To this arm is attached an oscillating and rectilinearly-reciprocating sleeve A^2, having an arm A^3 running rearwardly into the machine below the main shaft and having a friction-roller a^2 (see dotted lines, Figs. 5 and 6) playing in a cam-groove a^3 in the side of the main cam-plate A. The arm A^3 of this oscillating and reciprocating sleeve A^2 is adjustably fastened to the actuating-arm A′ through the slotted bracket-piece A^4, through whose slot there passes a bolt A^5, which also passes through a slot in arm A′ (see Fig. 6) and permits the oscillating and reciprocating sleeve A^2 to be connected to the arm A′ at a point higher or lower or nearer to or farther from the center of oscillation of said arm, so that a greater or less throw in rectilinear reciprocation may be given to the sleeve A^2 in horizontal direction, and as this rectilinear reciprocation of the sleeve is the feed-motion it will be seen that this slotted bracket connection A^4 causes a longer or shorter feed, for as the cam A revolves its cam-groove *a* oscillates arm A′ and the latter, through this slotted bracket-piece A^4, is made to reciprocate the sleeve A^2 in a horizontal direction. This sleeve A^2 has a downwardly-projecting arm A^6, Figs. 4 and 6, which carries the feed-awl *f*, which, as before described, has not only a forward-and-backward movement, but a sidewise movement as well. This forward-and-backward movement is supplied by the longitudinal reciprocation of the sleeve A^2 as effected by arm A′ and the cam-groove *a*, while the sidewise movement is effected by the oscillation of the sleeve A^2 about its axial center as effected by arm A^3 and the cam-groove a^3 in the side of cam A. Inside the sleeve A^2 there is another sleeve A^7, which has a shoulder a^4, Fig. 5, at one end and a screw-ring a^5 at the other, between which the sleeve A^2 is held to cause both to have the same longitudinal reciprocation, while allowing sleeve A^2 to oscillate on the sleeve A^7. This sleeve A^7 is maintained upon a long axial pin A^8, secured at its inner end to the framework of the machine and on which pin the sleeves A^7 A^2 reciprocate. The sleeve A^7 is prevented from rotating or turning with sleeve A^2 by laterally-projecting lugs a^6 a^6, formed on sleeve A^7 and embracing a guide-pin a^7, projecting from the framework of the machine parallel to the long pin A^8. From the inner sleeve A^7 there is a downwardly-projecting arm A^9, Fig. 4, which bears the channel-guide *g*, whose action is described in connection with Figs. 1, 2, and 3. From this description it will be seen that the channel-guide *g* partakes of the motion of sleeve A^7 and has only a back-and-forth motion, while the feed-awl *f* partakes of the longitudinal reciprocation of sleeve A^2 and also its axial os-

cillation, which gives to said feed-awl both a backward-and-forward movement and a sidewise movement, forming the four-motioned feed described in connection with Figs. 2 and 3. The movements of the channel-guide *g* and feed-awl *f* are simultaneous on the backward-and-forward stroke, while the cam-groove a^3 is (see Fig. 6) so timed in relation to the other parts as to rock the sleeve A^2 and move the feed-awl sidewise at the ends of its backward-and-forward movements.

It may be necessary at times to cause the feed-awl to take a deeper hold in the leather, and for this purpose the awl is adjusted at right angles to the line of stitching by two set-screws a^8 a^9, Fig. 6, passing through the arm A^6 and bearing from opposite sides against the head of the feed-awl. By loosening one of these screws and tightening the other the point of the awl may be thrown farther into or farther out from the channel-lip of the sole. The head of the feed-awl is slotted and secured by a screw a^{10}, which permits the awl to be raised or lowered. To give this up-and-down adjustment, a screw-stem a^{11} is tapped in a lug of arm A^6 and its enlarged head below swivels in a socket in the top of the awl-head. This screw-stem has holes through it, into which a nail or pointed instrument may be inserted to turn it and adjust the awl-head up or down. A similar screw-stem a^{12}, Fig. 4, with enlarged head is made to turn in a lug of arm A^9, while its head swivels in a socket in the head of the channel-guide *g* to adjust it vertically in the same way.

I will now describe the second feature of improvement, which consists in a new combination and arrangement of the breakdown bar for bending the outer edge of the sole down, so as to give the needle full clearance in entering the sole. Referring to Fig. 1, $b^\times$ is this breakdown bar. In my previous application this breakdown bar had substantially the same shape but a different movement. In that case it advanced, to bend down the edge of the sole, in a straight horizontal line in the plane of the shoe-sole and in the line of its own longitudinal axis. In my improved machine said bar advances and moves downwardly at the same time, moving at an angle to its own longitudinal axis from the position shown in dotted lines to the position shown in full lines and causing a pressure upon the edge *e* of the shoe-sole in the direction of the arrow, which makes a more certain and positive bending down of the edge of the sole without risk of curling it up at the edge. The means for giving this motion to the breakdown bar $b^\times$ are best shown in Fig. 7.

C is the actuating-cam, which has a groove *c* on its side in which travels a friction-roller *c'* on the end of a lever C', which is fulcrumed on a pin c^2, attached to the framework. This lever extends downwardly past its fulcrum, is held by spring C^{10}, and is adapted to bear against a lug C^2, adjustably fastened to the shank C^3 of the breakdown bar $b^\times$. This shank is entirely disconnected from its operating-lever and is pressed forwardly by a helical spring c^3, one end of which is connected to the shank and the other to the framework, while it is drawn backward by the contact of lever C' against the lug C^2. The shank C^3 of this breakdown bar is arranged horizontally, but is pivotally mounted upon the upper ends of two swinging arms C^4 C^4, swinging radially about pins or axial screws at their lower ends fastened to the framework, so as to give to the breakdown bar a parallel motion, causing it to move forwardly and downwardly and rearwardly and upwardly to give the general direction of movement indicated by the arrow in Fig. 1.

To cause the lever C' to act sooner or later in its stroke upon the breakdown bar, the lug C^2 may be adjusted closer to or farther from the lever, and for this purpose said lug is slotted longitudinally and is secured to the shank of the breakdown bar by two screws c^4 c^4. To limit the forward projection of the breakdown bar, a stop-screw c^5, Figs. 6 and 7, is tapped through an offset at the rear end of its shank and is made to strike against the stationary frame sooner or later to vary the throw of the breakdown bar. By this construction it will be seen that the breakdown bar is not directly connected to its actuating-lever, and therefore does not have an equal and contemporaneous movement therewith, but is enabled to maintain its bearing against the edge of the sole for a greater or less time while the thread is being pulled through independently of the motion of the other parts of the machine.

Just below the shank of the breakdown bar is arranged in horizontal position the shank C^5 of the shoe-rest *r*, against which latter the shoe is supported while being sewed. This rest is made spring-seated through the agency of a helical spring c^7, but both this rest and the breakdown bar are rigidly locked when in their forward positions by a pawl or detent C^6, which engages ratchet-teeth c^8 and c^9 on the shanks of said parts. This pawl is arranged on a vertical rock-shaft C^7, which has a crank-arm C^8 and stem C^9, carrying a friction-roller c^{10}, that bears against the flanged edge c^{11} of cam C, which flanged edge is constructed as a cam designed to rock the shaft C^7 in one direction, while a spring c^{12} turns it in the opposite direction. This motion for throwing the pawl into and out of the ratchet-teeth of the shoe-rest and breakdown bar is timed to correspond with the movement of the coacting parts and is substantially the same as that shown in my previous application.

Referring to Figs. 4, 5, and 8, B^2 is the positive take-up, which consists of a bar sliding in a housing B^3, attached to the stationary framework and bearing on its outer end a thread-guide *b* and on its inner end a friction-roller *b'*, that bears against the outer periphery of an adjustable cam B', which is ad-

justably secured to the side of the cam-disk B, being formed with a curved slot b^2, Fig. 8, through which there passes a bolt b^3, that enters the cam-disk B and rigidly connects the adjustable cam B′ thereto in such a manner as to permit its relation to disk B to be changed to cause the cam to act sooner or later in the revolution of the cam-disk. This positive take-up bar B^2 carries on its thread-guide b the thread which slides through the guide and passes onto a central hole in the looper-screw B^4, Figs. 1 and 6, and thence to the looper below, which loops it around the needle, as described in my previous case, the looper being made to oscillate about its axial center by the reciprocation of a screw-nut B^5 longitudinally over its threads by means of lever B^7, as shown in Fig. 7. The take-up bar B^2 is forced outwardly to take up the thread by the adjustable cam B′ and is brought back again by a spring B^6, Fig. 8, contained within the take-up housing B^8. By varying the position of the adjustable cam B′ on the disk B the take-up may be made to act at any time to suit the requirements of the case. The thread t, extending upwardly from the guide b of this positive take-up, passes around a guide-roller b^4, and hence descends to and passes around a second take-up b^5, which is a small pulley attached to a sliding bar b^6, moving in guides on the web portion of the main frame and held down by a spring b^7. After the thread passes around the pulley it rises again and passes around the groove of a tension-ring R, Fig. 5, and thence to tension-disks R′, as described and shown in my previous case. It will thus be seen that the second take-up b^5 hangs in a loop or bight of the thread.

N, Fig. 8, is the needle-actuating arm, which is jointed to the lower end of an elbow-lever N′, whose other end carries a friction-roller n^4, that traverses a cam-groove in the side of cam-disk B, as shown in dotted lines in Fig. 8. This needle-actuating arm N is connected to the oscillating needle-carrier n', and is also connected by a spring n^2 with the sliding bar b^6 of the take-up b^5, so that when the needle-actuating arm N rises to draw back the needle and pull the thread through the work this upward movement of the needle-actuating arm will, through spring n^2, lift the take-up b^5 and relieve the thread of the strain of this take-up, allowing the thread to be pulled through the work by the needle with much less strain, and greatly reducing the liability to break the thread. This feature is especially related to a hooked needle whose function is to pull the heavy thread through the work from the looper and involving unusual strain. I do not confine myself to a spring n^2 for thus transmitting the lifting effect of the needle-arm to this take-up, as various other connections may be employed—as, for instance, as shown in Fig. 9, a link n^3 may be used, or, as shown in Fig. 10, a tappet-arm n^4 may be arranged on the needle-actuating arm or its lever to strike a lug or pin on the take-up, and thus transmit the same effect thereto.

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

1. The combination in a shoe-sewing machine, of a curved needle, a feeding device, means for causing said feed device to enter the channel in the sole and feed the work toward the path of the needle, and a channel-guide located in advance of the feeding device, and means for moving said channel-guide back and forth in the direction of the feed of the work in unison with the feed device as set forth.

2. In a machine for sewing the uppers to the soles of shoes, the combination with the needle and its actuating mechanism; of a channel-guide arranged upon the opposite side of the line of stitching from the needle, and a feeding-awl arranged beside the channel-guide and on the same side therewith, the channel-guide having only a back-and-forth reciprocating movement parallel to the line of feed so that it does not leave its bearing in the channel, and the feed-awl having both a back-and-forth movement and also a sidewise movement and means for actuating these parts substantially as shown and described.

3. The combination with the channel-guide, and the feed-awl arranged beside it; of a reciprocating and oscillating sleeve carrying the feed-awl, two cams one for reciprocating, and the other for oscillating this sleeve, a concentric sleeve carrying the channel-guide, and arranged within the first-named sleeve and connected to it for the same longitudinal reciprocation, a guide for preventing said channel-guide sleeve from oscillating, and a rigid central stem or pin for supporting said sleeves substantially as and for the purpose described.

4. The combination with the channel-guide g, and the feed-awl f; of an oscillating and reciprocating sleeve having rear arm A^3 bearing a friction-roller, and bottom arm A^6 bearing the feed-awl, a feed-cam A having cam-slots on its periphery and side, an upright arm A′ with friction-roller playing in the peripheral slot for reciprocating the sleeve, a friction-roller on the rear arm A^3 entering the side slot for oscillating the sleeve, a concentric inner sleeve A^7 bearing the channel-guide, guide-pin a^7 for preventing it from rotating, and the supporting pin or stem A^8 substantially as shown and described.

5. The combination of the feed-awl and the reciprocating and oscillating sleeve A^2 having downwardly-projecting arm A^6 provided with a seat for the feed-awl head, a screw arranged longitudinally to said arm and adjusting the feed-awl head vertically in said arm, and oppositely-arranged transverse screws carried by said arm and adjusting the feed-awl head laterally thereto substantially as shown and described.

6. In a sole-sewing machine, the combination with the needle and its actuating mechanism, and a channel-guide and means for reciprocating it in the channel exclusively in a direction parallel to the line of feed and preventing its movement in any other path; of a feed-awl having both a reciprocating motion in the direction of feed and a motion at right angles thereto, said awl being provided with means for adjusting it laterally to the direction of feed to cause it to penetrate the leather more or less according to the density of the same substantially as shown and described.

7. In a sole-sewing machine, the combination with the needle, the looper and the feeding and guiding devices; of a breakdown bar arranged on the same side with the needle, and means for imparting to it a movement equal and parallel throughout its length and in a direction at an angle to its own longitudinal axis forwardly and downwardly against the edge of the shoe substantially as shown and described.

8. In a sole-sewing machine, the breakdown bar $b^{\times}$ having a shank, two radially-moving arms supporting said shank, and means for oscillating it with a parallel motion substantially as shown and described.

9. In a sole-sewing machine, the breakdown bar $b^{\times}$ having an elongated shank with lug C^2 radial arms C^4 C^4 sustaining the said shank, a spring c^3 for advancing said bar, an actuating-lever C′, and a cam C operating upon said lever, substantially as shown and described.

10. In a sole-sewing machine, the breakdown bar having an adjustable stop to limit its forward movement, and an adjustable tappet-lug, a spring for moving the bar forward, and an actuating-lever for moving it back, said bar being detached from its actuating-lever and operated thereby with a tappet action substantially as shown and described.

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