4 Sheets—Sheet 1.

C. F. BOSWORTH.

Machine for Sewing Shoes.

No. 226,481. **Patented April 13, 1880.**

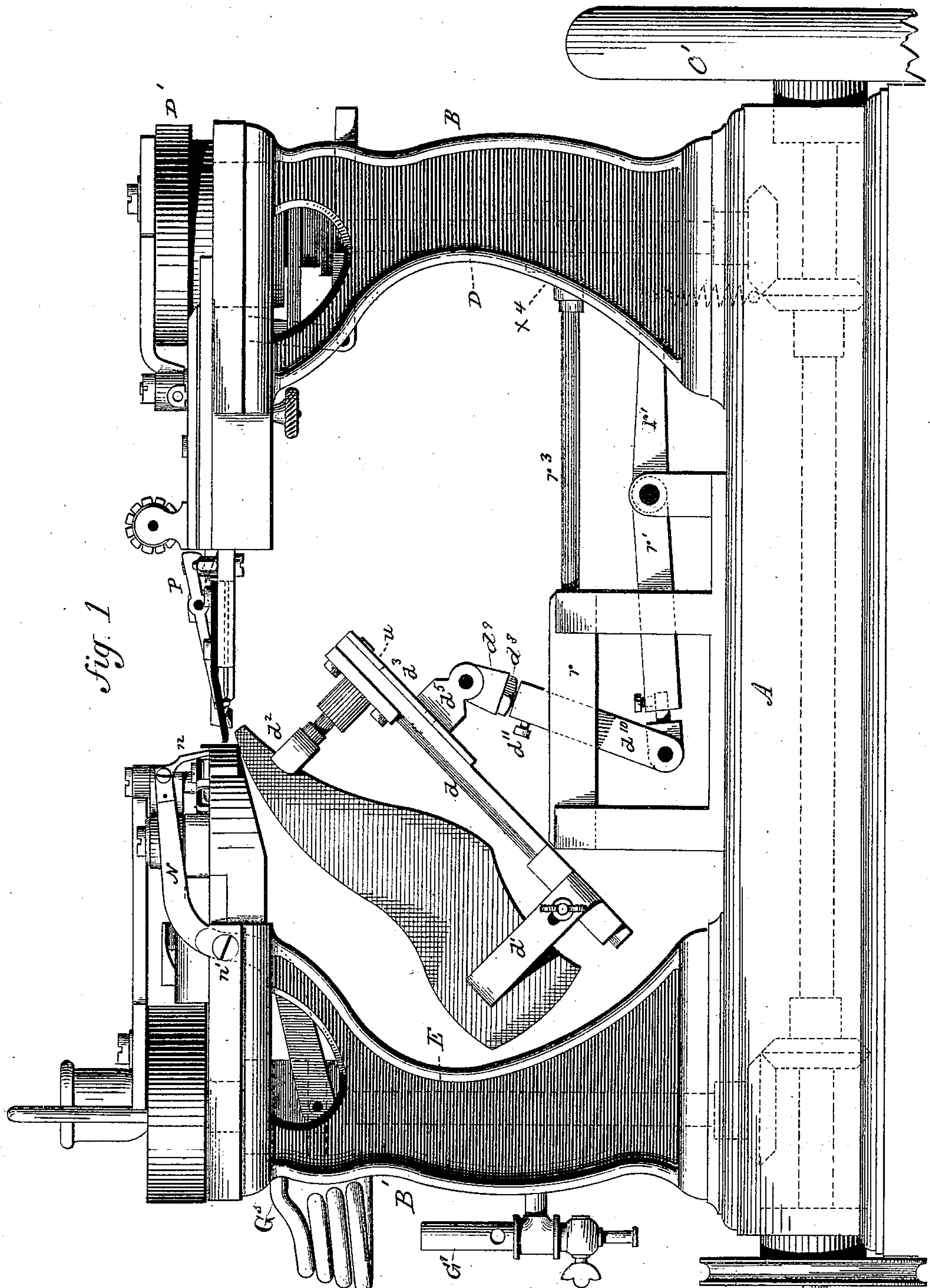

fig. 1

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4 Sheets—Sheet 2.

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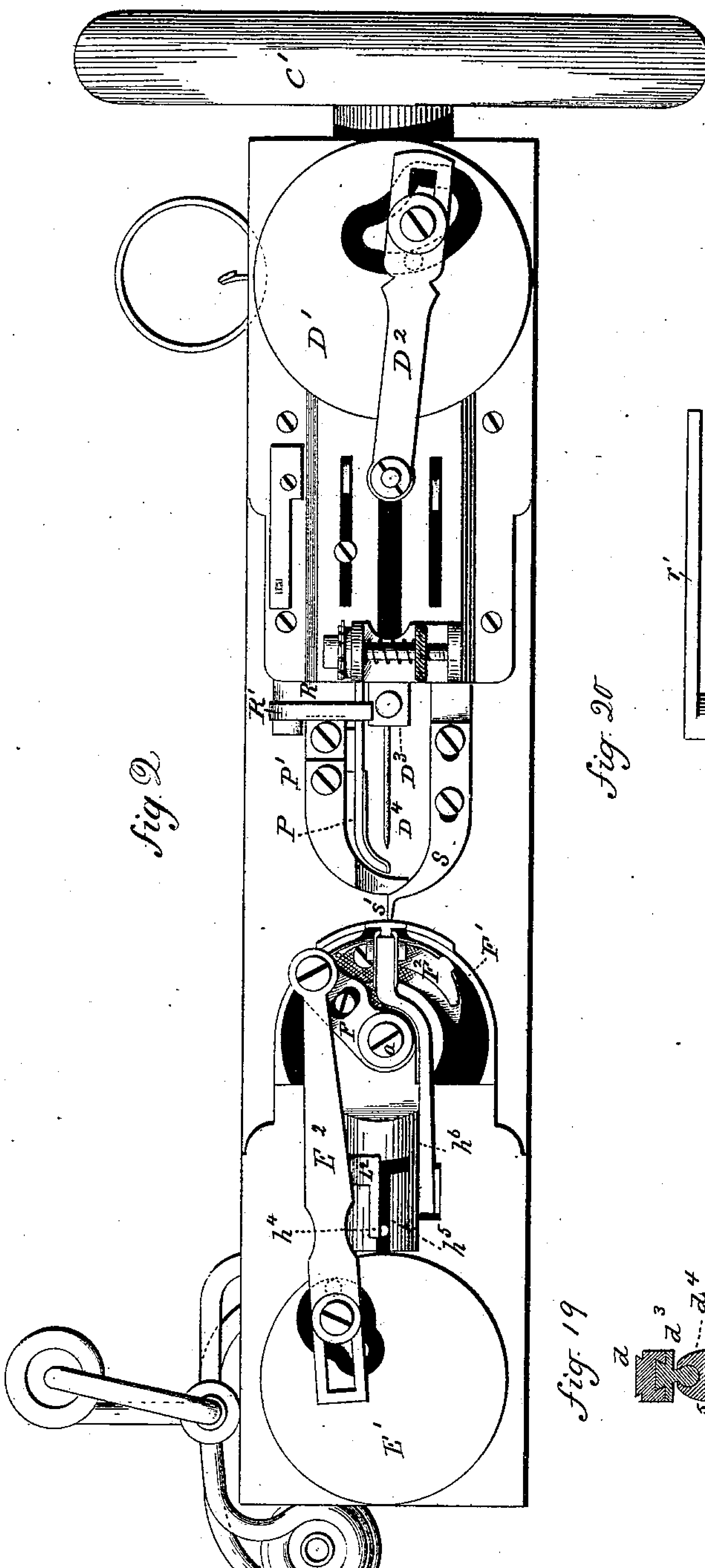

fig. 2

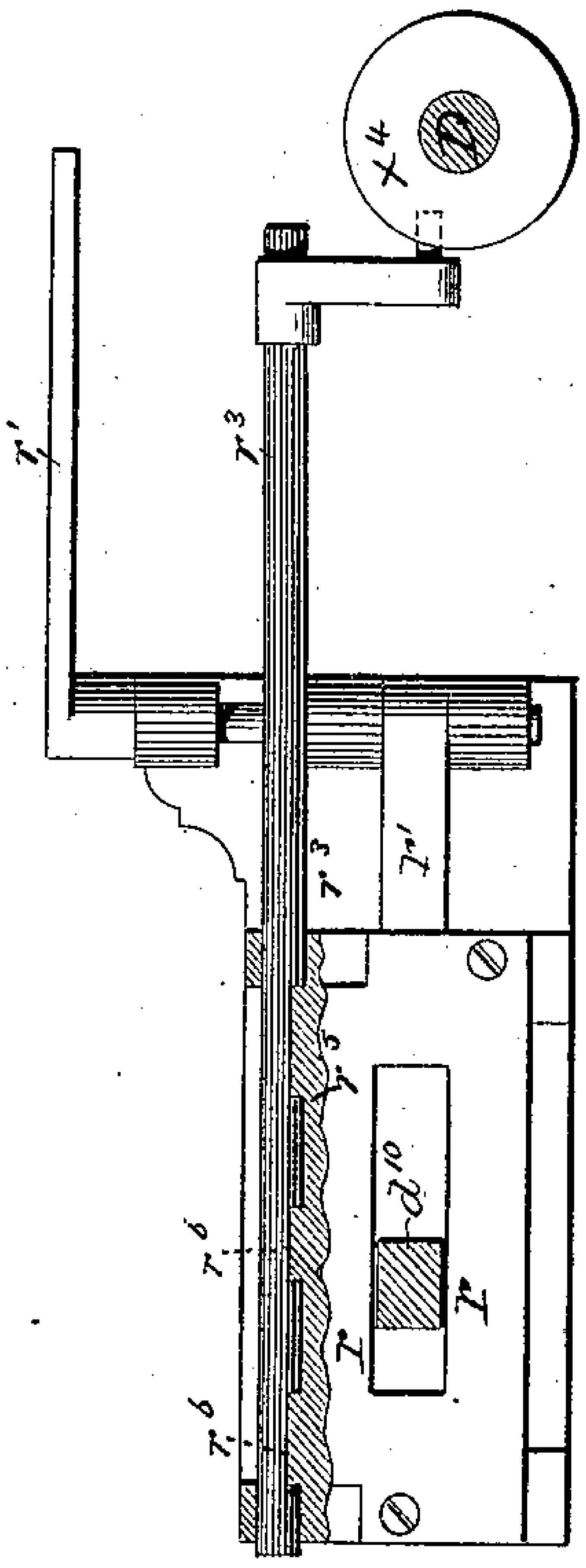

fig. 20

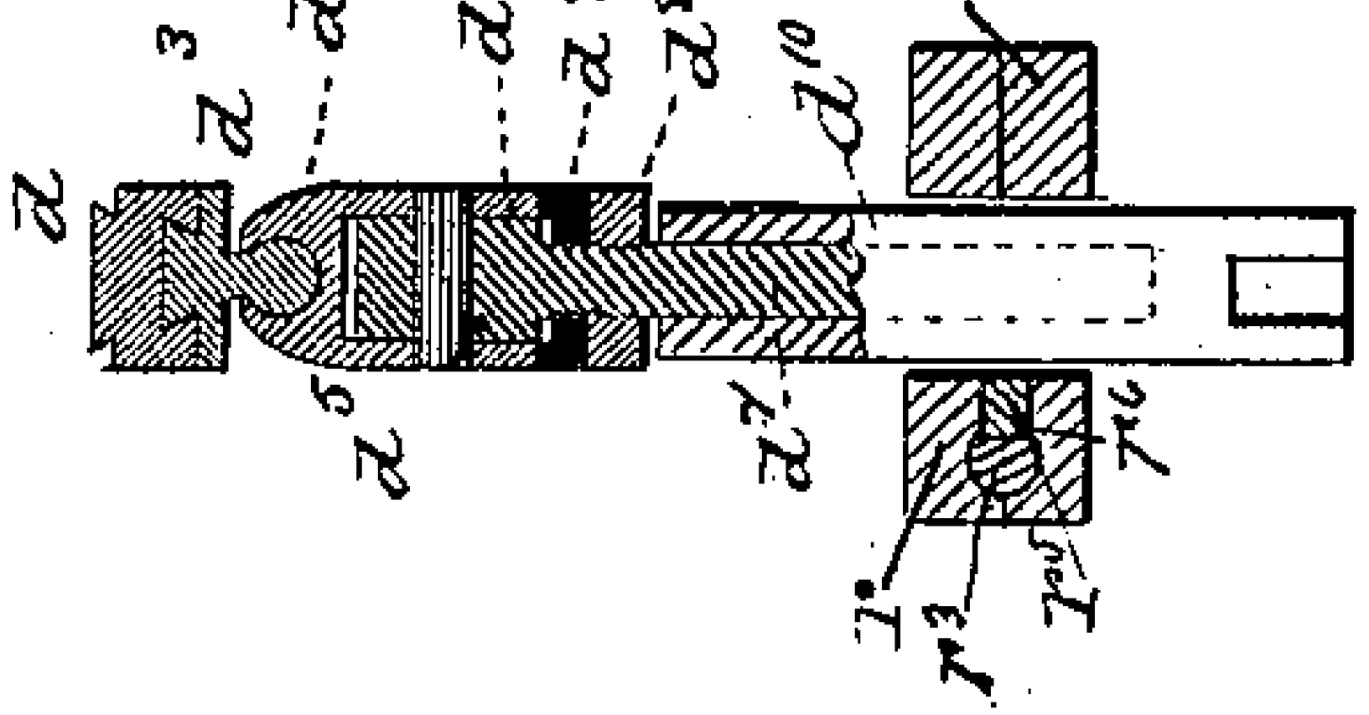

fig. 19

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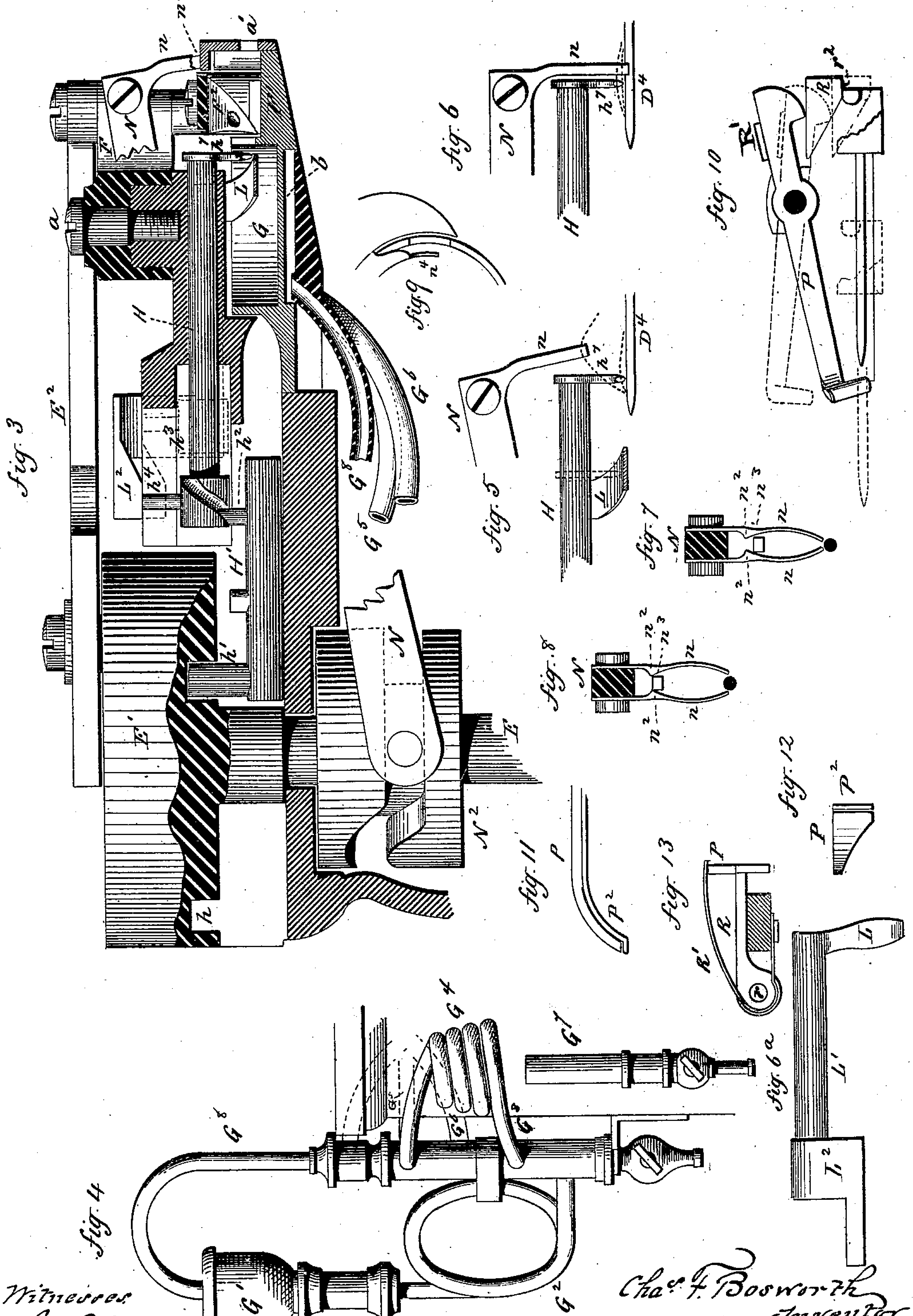

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4 Sheets—Sheet 4.

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Machine for Sewing Shoes.

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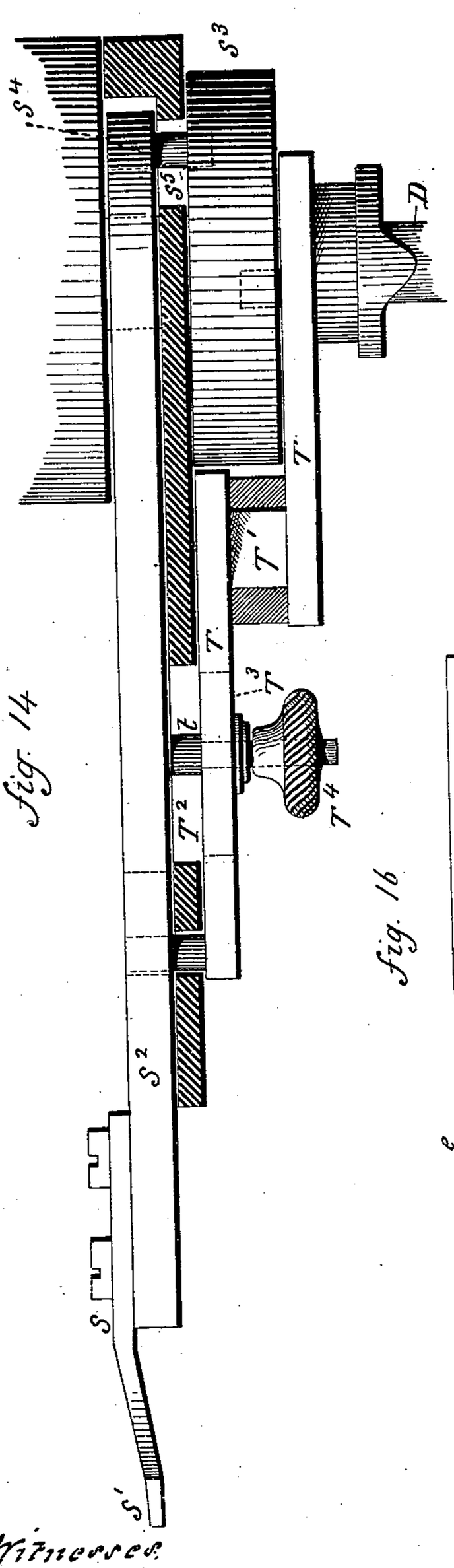

Fig. 14

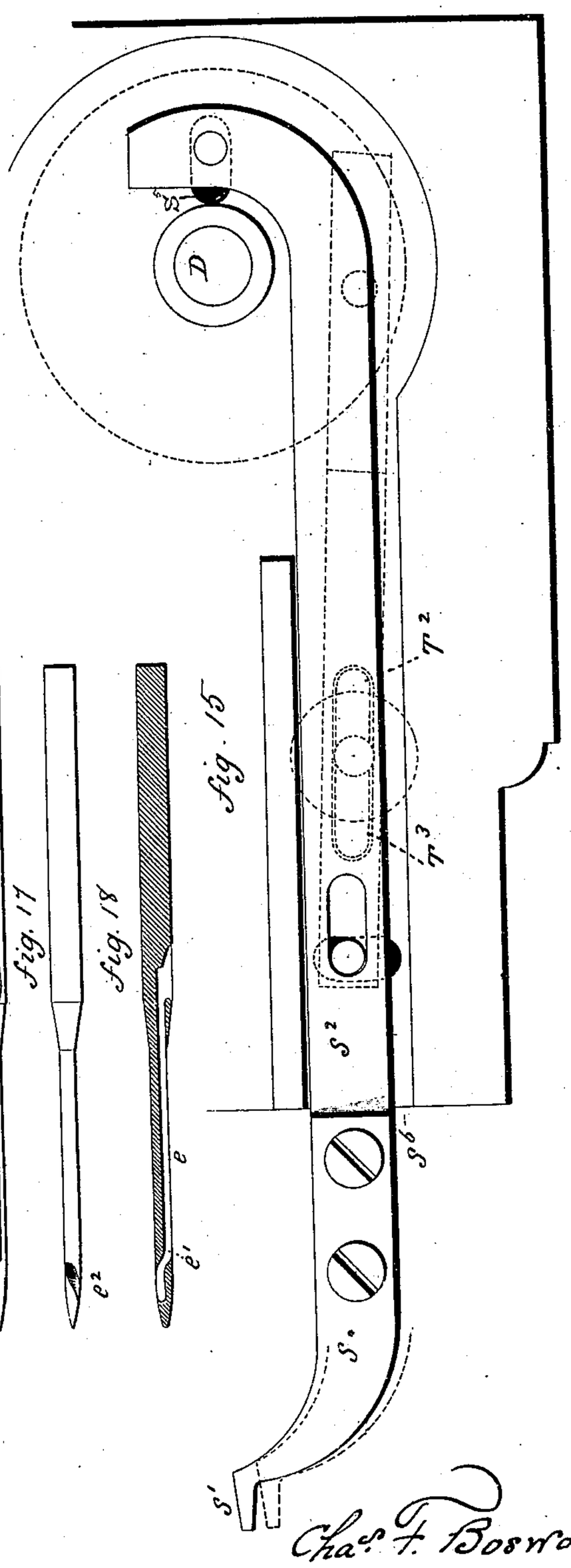

Fig. 15

Fig. 16 Fig. 17 Fig. 18

Witnesses:

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C. B. Stetson.

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UNITED STATES PATENT OFFICE.

CHARLES F. BOSWORTH, OF MILFORD, CONNECTICUT.

MACHINE FOR SEWING SHOES.

SPECIFICATION forming part of Letters Patent No. 226,481, dated April 13, 1880.

Application filed October 26, 1878.

To all whom it may concern:

Be it known that I, CHAS. F. BOSWORTH, of Milford, in the county of New Haven and State of Connecticut, have invented a new Improvement in Machines for Sewing Shoes; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a side view of a machine embodying my invention; Fig. 2, a top or plan view of the same; Figs. 3 to 20, inclusive, detached views.

This invention relates to an improvement in that class of sewing-machines designed to use waxed thread, and with special reference to machines for sewing boots and shoes; and the invention consists in the construction and combination of parts, as hereinafter described, and more particularly recited in the claims.

In the construction shown the needle is arranged to move in a horizontal plane.

A is the bed of the machine; B, an upright at one end, on which the needle and feeding mechanism are arranged; B′, an upright at the other end, on which the second thread-carrier and waxing mechanism are arranged.

The driving-shaft is arranged longitudinally within the bed, as indicated in broken lines, Fig. 1, to which shaft power is applied through a pulley, C, or otherwise, and the shaft can also be provided with a fly-wheel, C′.

Through the upright B a vertical shaft, D, (seen in broken lines, Fig. 1,) is arranged, to which shaft a rotary movement is imparted by means of beveled gears, as also seen in broken lines, Fig. 1.

On the upper end of the shaft D a rotary plate, D′, is arranged, and from this a pitman, D^2, connects with the needle-bar D^3, so that as the plate D′ revolves a reciprocating movement is imparted to the needle. The needle movement here shown is of a peculiar character, but constitutes no part of this invention, having already been described and claimed by me in Letters Patent of the United States, dated September 17, 1867, No. 68,835.

At the opposite end and through the upright B′ a shaft, E, similar to shaft D, is arranged, and receives rotary movement by means of beveled gears from the driving-shaft, as seen in broken lines, and on the upper end of the shaft E is a plate, E′, revolving with the shaft, from which plate movement is imparted to the shuttle-carrier F by a connecting-rod, E^2. The shuttle-carrier oscillates on a fixed center, *a*. The shuttle-race F′ is circular in form, and in it the shuttle F^2 is arranged, so that the full rotation of the plate E′ imparts an oscillating or reciprocating movement to the shuttle in a circular path, the needle entering the shuttle-race below the shuttle through an opening, *a*′, in the side of the race, as seen in Fig. 3, the operation of the needle and shuttle being similar to that of common needle and shuttle movements, so that the thread of the shuttle interlaces with the thread of the needle.

Adjacent to the shuttle-race is the wax-reservoir G. (See Fig. 3.) Beneath this reservoir is the heating-chamber *b*. The apparatus for supplying heat to the chamber *b* is seen in Figs. 3 and 4.

G′ is the reservoir or fountain supplied with water. From this a tube, G^2, leads the water downward. It then passes through the pipe G^3 to a coil, G^4, thence continuing through the pipe G^5 to the heating-chamber *b*. From the said chamber *b* a returning-tube, G^6, leads the water back to the fountain. Beneath the coil a gas-burner or other heater, G^7, is arranged, so that the heat is applied to the coil to warm the water to any desired degree, causing it to circulate from the fount to the heating-chamber and return, thus keeping a constant circulation of hot water beneath the wax-reservoir G.

To allow the escape of steam from the chamber, should any be generated, a tube, G^8, leads from the chamber outward and upward, and turns into the reservoir, as seen in Fig. 4.

The wax is supplied to the reservoir G, and when in use is heated so as to be always in a melted condition.

Above the reservoir G is a longitudinal shaft, H, to which longitudinal and rotary reciprocating movements are imparted by means as follows: An eccentric or cam-shaped groove, *h*, is provided on the under face of the plate

E′. To this groove a stud, h', extends from a longitudinal slide, H′, which is coupled with the shaft H by means of a stud, h^2, in a spiral groove, h^3.

From the shaft H a stud, h^4, extends upward through a slot, h^5, in the guide above. (See Fig. 2.) The slot h^5 terminates at the forward end in a transverse slot, h^6. The result of this arrangement is, that as the slide H′ is moved forward it carries with it the shaft H until said shaft H comes to the end of the longitudinal slot h^5, Fig. 2; then the shaft H will be arrested, but the slide H′ continues to move forward, and, because of the spiral-shaped groove h^3, Fig. 3, the stud h^2 will at that point impart a partial rotation to the shaft H, and on its return movement the slide H′ will first turn back the shaft H until the stud h^4 leaves the transverse groove h^6. It will then bring the said shaft H back to its first position, as seen in Fig. 3. The extreme advanced position of the shaft H is shown in Fig. 6, the extreme rear position shown in Fig. 3, and an intermediate position in Fig. 5. On the outer end of the shaft H is a hook, h^7.

The forward movement of the shaft H occurs before the advance of the shuttle and while the needle is at its most advanced position. The needle D^4 is shown in this position in Fig. 6. In this position the hook h^7 enters between the thread and the needle on the upper side and engages the thread, so that when said hook retreats it carries the loop of the needle-thread with it over the wax-reservoir. The shuttle then passes through the loop thus held by the hook h^7, and while it is thus held wax from the reservoir is applied to the thread held by the hook h^7 by means of a spoon or lifter, L, which, when the shaft H advances, drops into the wax, and as it returns rises to meet the hook, taking wax from the reservoir and applying it to the thread. The operation of this spoon is best produced by the movement of a shaft, and to this end a rock-shaft, L′, Fig. 6ª, is arranged parallel with the shaft H, and from it an arm, L^2, extends partially over the slot h^5, through which the stud h^4 passes. The under side of this arm L^2 is clearly seen in Fig. 3, and rests on the stud h^4, so that when the shaft H is in its rear position the arm L^2 will be elevated, as will also the spoon L; but as the shaft H advances the arm L^2 falls off from the stud, because of the incline upon its under side, as seen in Fig. 3, thus leaving the rock-shaft L′ free to turn and depress the spoon L into the wax, this depression being produced by a spring applied to the rock-shaft.

To insure the engagement of the hook h^7 with the loop, a pair of fingers, n n, are arranged upon a lever, N, the said lever being pivoted at n'. (See Fig. 1.) This lever N extends to the rear and receives a vibrating movement from a cam, N^2, Fig. 3, which lowers and raises the fingers—say as from the position shown in Fig. 5 to that seen in Fig. 6, and this depression occurs while the needle is in its most advanced position. (See Fig. 6.) These fingers in their normal condition are closed, as seen in Fig. 7, sufficient to take the thread, as seen in Fig. 5, and are made with inclines n^2 upon their inner surface. Between these fingers a projection, n^3, extends and lies stationary in the path of the inclines n^2. As the fingers descend from the position shown in Fig. 7 to that shown in Fig. 8 the inclines n^2 pass onto the projection n^3, thus forcing the lower end of the fingers apart, as seen in Fig. 8, one each side the needle. Then the fingers rise before the hook h^7 begins to turn, and in rising grasp the thread that lies upon the top of the needle and raise it, as seen in Fig. 5, so that the hook h^7 is sure to pass within the loop and take the thread. This raising of the loop is also advantageous in that it insures the passage of the shuttle through it, whereas if the thread were not thus raised the shuttle might not pass through the loop.

After the thread has been waxed the shuttle, advancing, naturally takes the loop from the hook; but to insure the proper removal of the loop from the hook a finger, n^4, is attached to the shuttle-carrier, as seen in Fig. 9, which runs in close proximity to the hook and forces the loop from the hook before the shuttle shall have passed fully through the loop.

After drawing up the stitch, and before the needle begins to advance, or while it is advancing, it is desirable to take the thread between the needle and the shuttle out of the way to prevent possibility of its looping around the needle or otherwise obstructing the work. To this end a lever, P, is hung, preferably, on the presser-bar P′, and to this lever a vertical vibratory movement is imparted by the needle-arm to turn it down from the position seen in broken lines, Fig. 10, to the position seen in solid lines, and return. The forward end of this arm forms substantially a pair of nippers—that is to say, on the side of the lever P there is a thin plate-spring, P^2, and the ends of both the lever and spring turn downward, as seen in Figs. 11 and 12, Fig. 11 showing a top view of the lever, and Fig. 12 an end view. The space between the spring P^2 and the end of the lever is directly over the thread when drawn taut. As the needle-arm returns and draws the thread taut the end of the lever is turned down, as seen in Fig. 10, striking the thread between the needle and shuttle, forcing the spring away from the lever, thus causing the spring and end of the lever to embrace the thread like a pair of nippers; then, as the needle advances, the lever returns and raises the thread within the grasp of the nippers until the advancing needle forces it from their grasp again.

It is preferable to arrange the lever P on the presser-foot, in order that it may move to and from the work with it; but the time for the operation of the lever P or its nippers must always be the same relative to the movement of the needle. To accomplish this object a lever, R, is hung to the end of the bed,

supporting the needle mechanism, as seen in Figs. 2 and 13. This lever extends from its pivot r to beneath the lever P, and forms a long surface, on which the rear end of the said lever P may ride. The end of the lever R is inclined to the path of the needle, as seen in Fig. 10, and on the needle-bar is a stud or projection, r^2, on which the end of the lever R rests, as also seen in Fig. 10; and so soon as the needle begins to move forward, the incline on the lever R rides down, as indicated in broken lines in Fig. 10, permitting the forward end of the lever P to rise by the force of the spring R′ bearing on the rear arm of said lever P, and when the needle-bar returns the stud r^2 will strike the incline on the lever R and cause it to rise, raising the rear end and depressing the forward end of the lever P, as and for the purpose before described. The top or surface of the lever R is long enough to allow the lever P to be moved forward or back with the presser-foot, and so that the lever R always acts upon the lever P irrespective of its position.

S is the feed-dog, which terminates in a point or awl, S′. (See Fig. 2.) This feed-dog has imparted to it a movement to and from the work, and also forward and back, so that, advancing to the work, the point enters the work sufficiently far to make its hold firm, and may partially or entirely puncture the work for the entrance of the needle, and then, advancing, takes the work with it. The means for imparting these movements to the feed-bar are shown enlarged in Fig. 14, side view, and Fig. 15, plan view.

The feed-dog S is attached to the feed-bar S^2, and this bar extends back and turns in rear of the shaft D, and there engages with a cam-groove in the side of the cam-disk S^3 by means of the stud S^4. This stud, working through a slot, S^5, in the frame, receives at that point a reciprocating movement only, and that in a radial line from the shaft.

The feed-bar lies in a groove, S^6, in the frame. This groove is wider than the bar, so as to allow of a horizontal or transverse movement of said bar, the groove in the upper face of the cam-disk S^3 only imparting the longitudinal movement to the bar which carries the point S′ to and from the work.

To impart the transverse or forward-and-back movement, and to regulate the same, a lever, T, is arranged below the groove S^6, and extends back, engaging with a groove in the under side of the cam-disk S^3 at a point at the side of the shaft D, so that the cam-groove, by engaging a stud on lever T, will move the said lever T at that point transversely toward and from the shaft. To retain this lever in its position and prevent longitudinal movement the lever is offset, so as to form an angular portion, T′. This part T′ lies in a transverse slot in the frame, which allows of its free movement transversely, but confines it longitudinally. This is necessitated because the fulcrum t is adjustable longitudinally. The other end of the lever T engages with the feed-bar S^2, as shown in Figs. 14 and 15. The lever T, therefore, turning on its fulcrum t, will, with its connection with the feed-bar S^2, impart to the said bar a vibratory or forward-and-back movement necessary to produce the feed.

The fulcrum t consists of a bolt the head of which forms said fulcrum t and lies freely in a slot, T^2, in the frame, and extends down through a longitudinal slot, T^3, in the lever T, and on the under side of the lever is a nut, T^4, which binds the fulcrum or head t fast to the lever T.

It will be evident that moving the fulcrum nearer to or farther from the point where the lever T engages with the feed-bar S^2 will proportionately shorten or lengthen the movement of the feed. In such adjustment it is necessary that the feed-bar should at all times reach the same point forward—that is, so that the puncture made by the point will always be moved to a position coincident with the path of the needle, and a variation be made only in the extent of its rear movement. It is therefore necessary that the slot T^2 in the frame and the slot T^3 in the lever should be in the same line when the feed is in its most forward position, as seen in Fig. 15, the two slots being there shown in broken lines, and the line of the slot at that point must be parallel with the line drawn from the point where the lever engages with the cam to the point where it engages with the feed-bar. As here shown, the slot T^2 in the frame is inclined to the central line of the feed-bar, and this is generally preferable, because it enables the arrangement of the parts in a more compact or narrow space, and also makes the action more direct.

In Fig. 16 is shown a view of the needle on the under side, in Fig. 17 a view on the upper side, and in Fig. 18 a longitudinal section. On the under side of the needle is a longitudinal groove, e, through which the thread passes to the eye e'. This eye, instead of being at right angles, as is the usual construction, is diagonal, as seen in Fig. 18, and produces substantially a tubular eye running from the groove e in rear of the eye to a spiral groove, e^2, forward of the eye, as seen in Fig. 17. This diagonal or tubular eye renders the needle stronger than when made at right angles, as in the usual construction, in addition to the advantage of very much reducing the cutting-strain upon the thread at the eye.

The object of making the groove forward of the eye in a spiral form instead of longitudinal, as in the usual construction, is to prevent cutting the thread in the passage of the needle through the leather.

The thread being necessarily large, the groove must be of corresponding size. In the use of a needle having a longitudinal groove it is found that, in piercing the leather and on the return of the needle, that portion of the leather over the groove will press down into the groove and upon the thread, creating

an increased strain upon the thread, and consequently the liability of cutting or breaking. By making the groove spiral, as seen in Fig. 17, this difficulty is avoided, because the spiral line of the groove will force outward that portion of the leather which would naturally fall into the groove, and thus produces a round hole, instead of a hole with a "tongue," as in a straight groove. This construction also allows the thread to draw in nearly a straight line to the axis of the needle.

Instead of the shuttle, it will be understood that other devices may be applied—as, for instance, a looper—to produce a chain-stitch, using only the needle-thread; but in that case the same relative position of the wax-reservoir must be maintained.

It will be understood that the parts of the machine are made adjustable, and that it is provided with the usual thread-tension.

The jack for holding the shoe is shown in Fig. 1, and in detail Figs. 19 and 20. This consists of a carriage, d, on which clamping devices d' and d^2 are arranged to securely grasp and hold the boot or shoe. This carriage is made to move longitudinally on a guide, d^3, (see Fig. 19,) and this guide is hung by a ball-joint, d^4, to a head, d^5. This head is rounded upon its face next the guide d^3, but is longitudinally straight. This allows the carriage d to be rocked on the said head in a direction transverse to the said head, and the ball-joint allows the carriage to be turned in a horizontal plane entirely round, if necessary, and at the same time it may be rocked over the head. This head is adjustable to different inclinations by being hung to a block, d^6, from which a spindle, d^7, extends downward, and is provided with a set-nut, d^8, between which and the head d^5 is a socket, d^9, so that the nut, bearing against the socket, forces it hard against the head, so as to clamp it at any angle to which it may be set, and this angle defines the position at which the sole of the shoe shall be presented to the needle, and maintains the same angle at all points around the sole.

The spindle d^7 is arranged in a socketed bar, d^{10}, provided with a set-screw, d^{11}, by means of which the elevation of the head may be adjusted or the head set at any desirable elevation, to adapt the jack to various sizes and classes of work; and that the jack may be always held up to its work, the socketed bar d^{10} passes between longitudinal guides $r\,r$, and is supported on one end by a lever, r', to the other end of which a spring or weight is applied, the tendency of which is to force the jack upward, so that if the shoe is moved to different points in the sole, those points will be held with the same force against the presser-foot.

At the time the stitch is to be taken it is desirable that the jack should be firmly held. To this end a shaft, r^3, is arranged parallel with the guides r, to which shaft a rocking movement is imparted by means of a cam, r^4, on the shaft D. In the guide r, next the shaft r^3, is a slide, r^5, and on the shaft r^3 are cams r^6, (represented as flat surfaces on the shaft and corresponding projections for the slide,) which, as the shaft rocks in one direction, force the slide r^5 (seen in Fig. 20, which is a horizontal section through the guides r, showing the slotted plate which forms the clamp r^5) against the socketed bar d^{10} and clamp said bar immovably against the opposite guide, and on returning the shaft releases the slide, leaving the socketed bar free. This clamping movement occurs just before the needle enters the work and the releasing immediately after the needle leaves the work, so that during the time the needle is in the work the head is securely held, except as for its rocking position, that being governed by the hand of the operator.

It will be observed that the pressure which holds the shoe up to the work is, because of the rocking and sliding movement of the jack, always directly or nearly in line with the upward pressure—that is, over the point of connection between the lever r' and the socketed bar d^{10}. This direction of pressure remains constant at all points around the shoe as presented to the needle. Consequently the indirect strain upon the jack or shoe found in the usual construction is avoided, and the operator has nothing to do but simply guide the shoe, the holding and the proper relative position being produced by the movement of the jack.

At the toe end of the jack a stop, u, is arranged, so that when the toe is reached the said stop will bring up against the end of the guide d^3; then the stitching around the toe is done by simply turning the jack on its joint d^4, and with a slight rocking motion the stitching around the toe is produced, as if the jack were hung upon substantially a fixed center, producing more perfect work than when the guides at the needle are relied upon, as in the usual arrangement of holding-jacks.

I claim—

1. The combination of a reciprocating thread-carrying needle, devices adapted to operate in connection therewith to form a stitch, a heated wax-pan, and a reciprocating hook, which advances to take the needle-thread and carry it to the wax-pan, with mechanism for connecting and operating the parts specified, substantially as described.

2. The combination of a reciprocating thread-carrying needle, devices adapted to operate in connection therewith to form a stitch, a heated wax-pan, a reciprocating hook which advances to take the needle-thread and carry it to the wax-pan, and a pair of nippers to raise the needle-thread to facilitate engagement of the said hook, with mechanism for connecting and operating the parts specified, substantially as described.

3. The combination of a reciprocating thread-carrying needle, devices adapted to operate in

connection therewith to form a stitch, a heated wax-pan, a reciprocating hook which advances to take the needle-thread and carry it to the wax-pan, and a lifter to take the wax from the pan to the thread, with mechanism for connecting and operating the parts specified, substantially as described.

4. The combination of a reciprocating thread-carrying needle, devices adapted to operate in connection therewith to form a stitch, a heated wax-pan, a reciprocating hook which advances to take the needle-thread and carry it to the wax-pan, and a cast-off moving with the shuttle-carrier to take the thread from the hook after waxing, with mechanism for connecting and operating the parts specified, substantially as described.

5. The combination of a reciprocating thread-carrying needle, devices adapted to operate in connection therewith to form a stitch, a heated wax-pan, a reciprocating hook which advances to take the needle-thread and carry it to the wax-pan, and a pair of nippers arranged to take the needle-thread forward of the needle when drawn taut and raise it from the path of the needle as the needle advances, with mechanism for connecting and operating the parts specified, substantially as described.

6. The combination of a stitch-making mechanism, a carriage to support the boot or shoe, said carriage being adapted to slide longitudinally, an adjustable guide, an adjustable head to support said guide, its surface rounded transversely to allow the rocking movement of the carriage, and a support for said head, substantially as described.

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