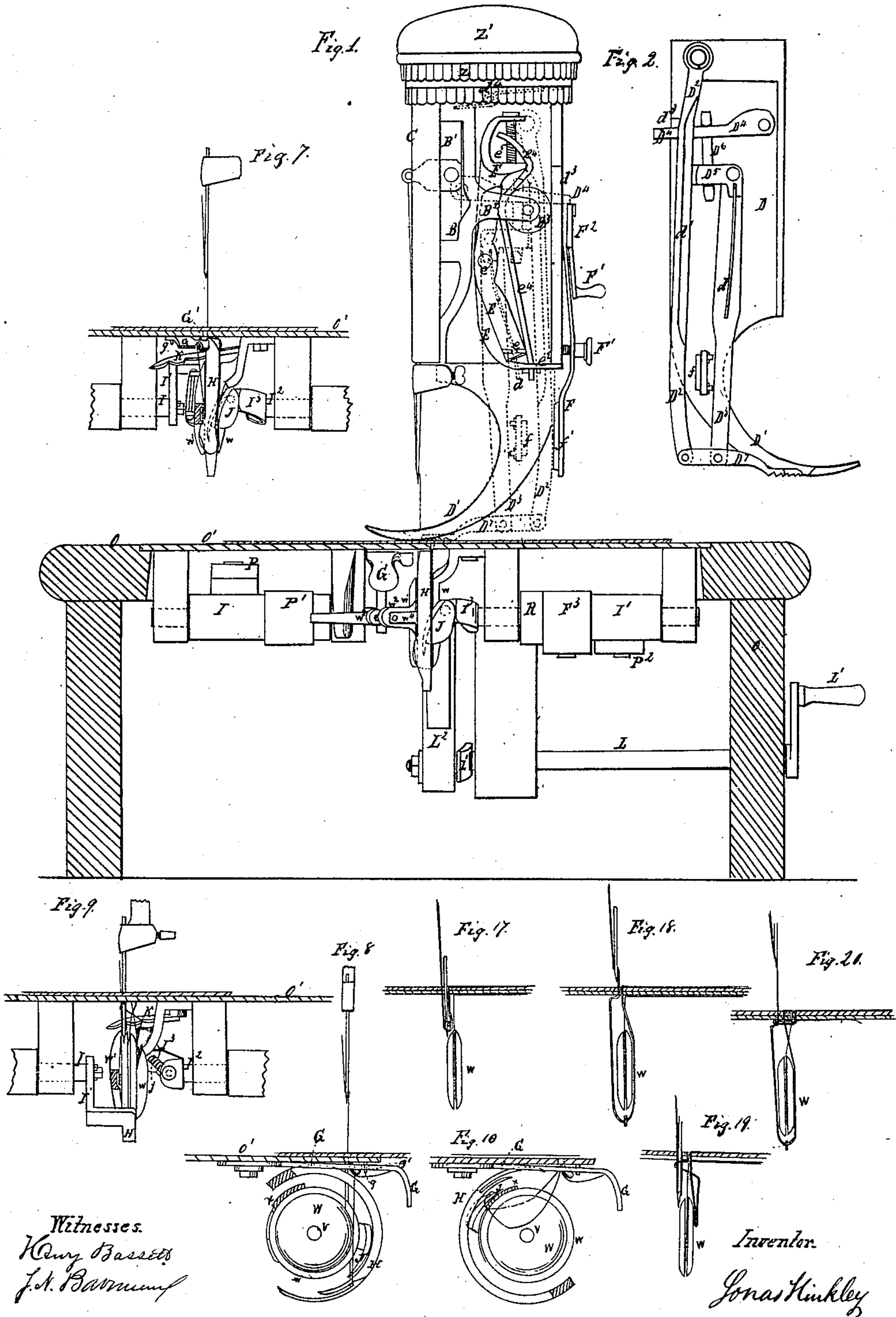


J. HINKLEY.
SEWING MACHINE.

No. 25,231.

Patented Aug. 23, 1859.



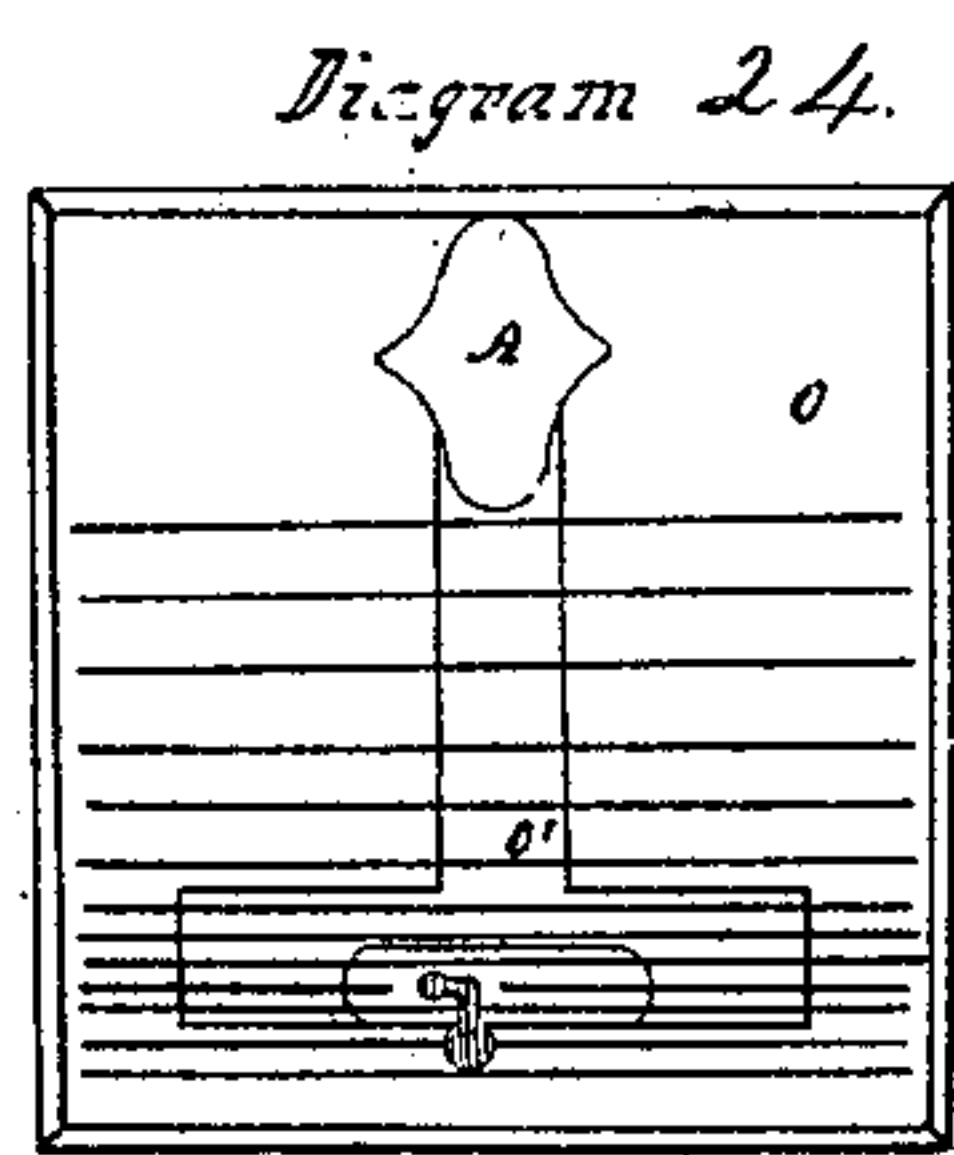
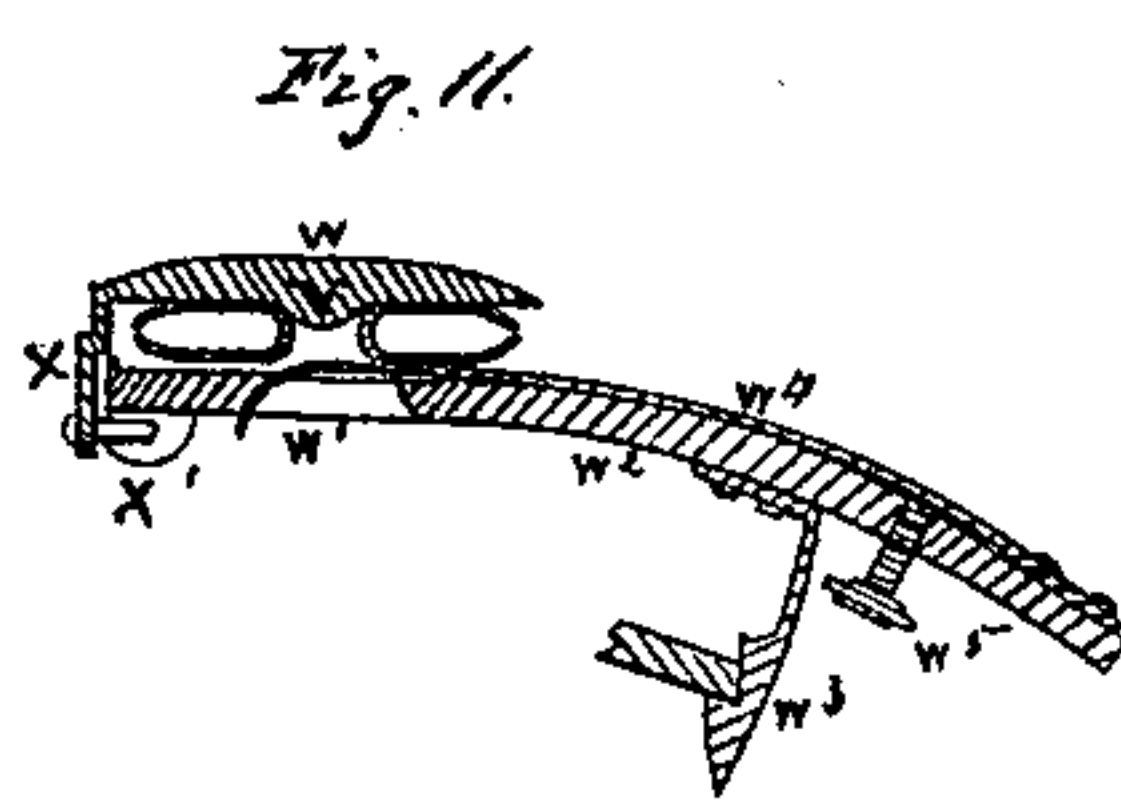
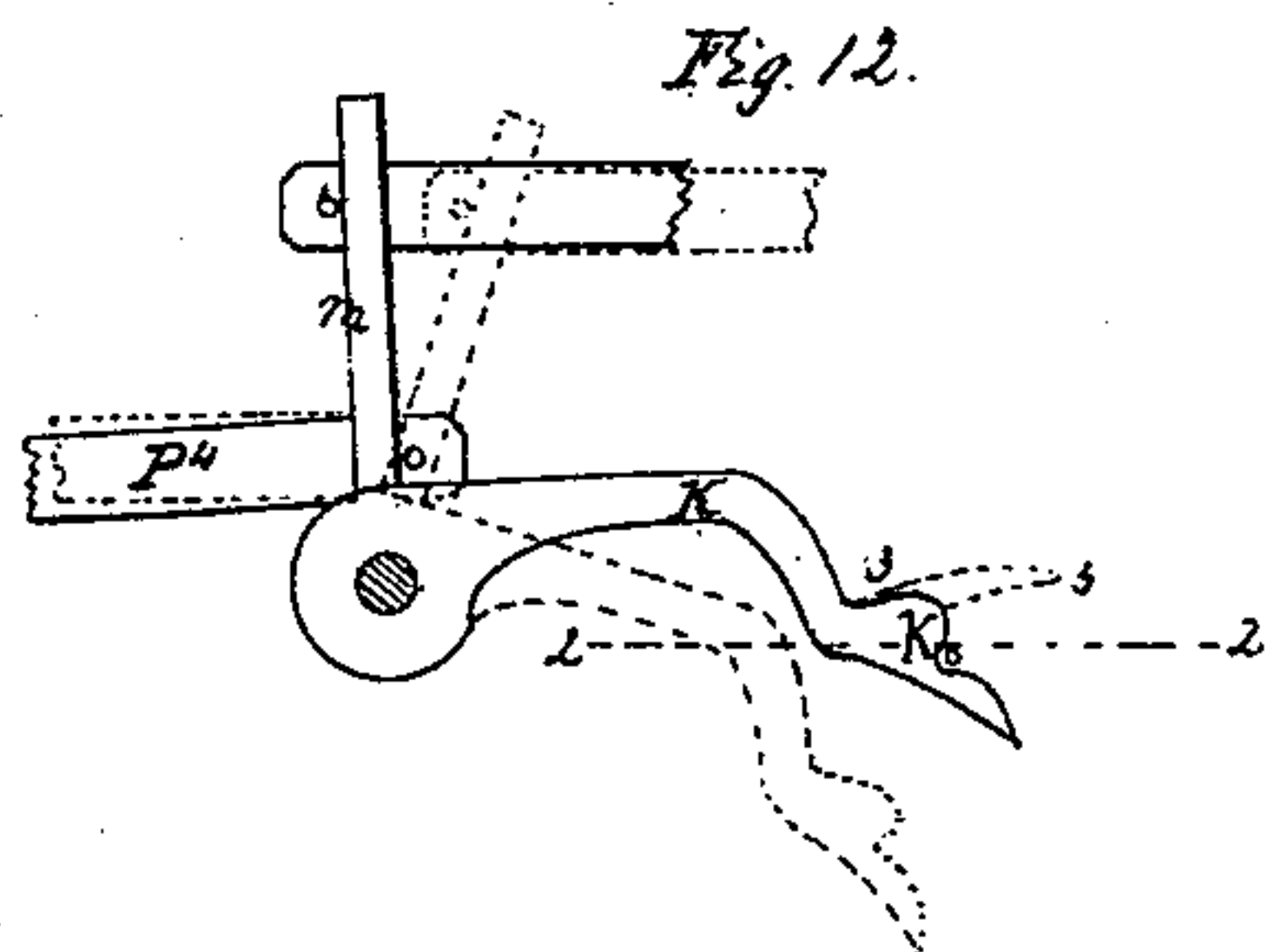
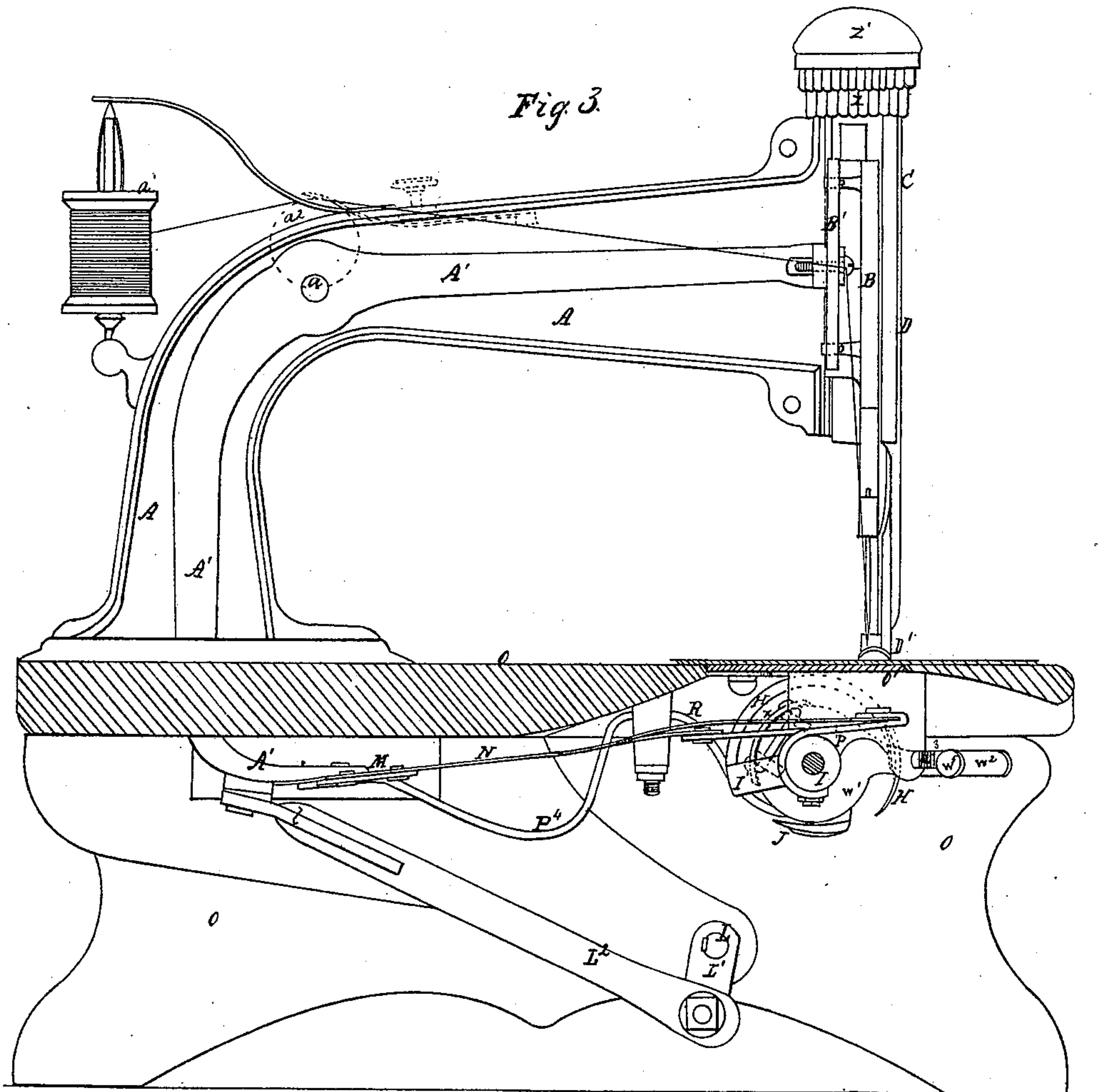
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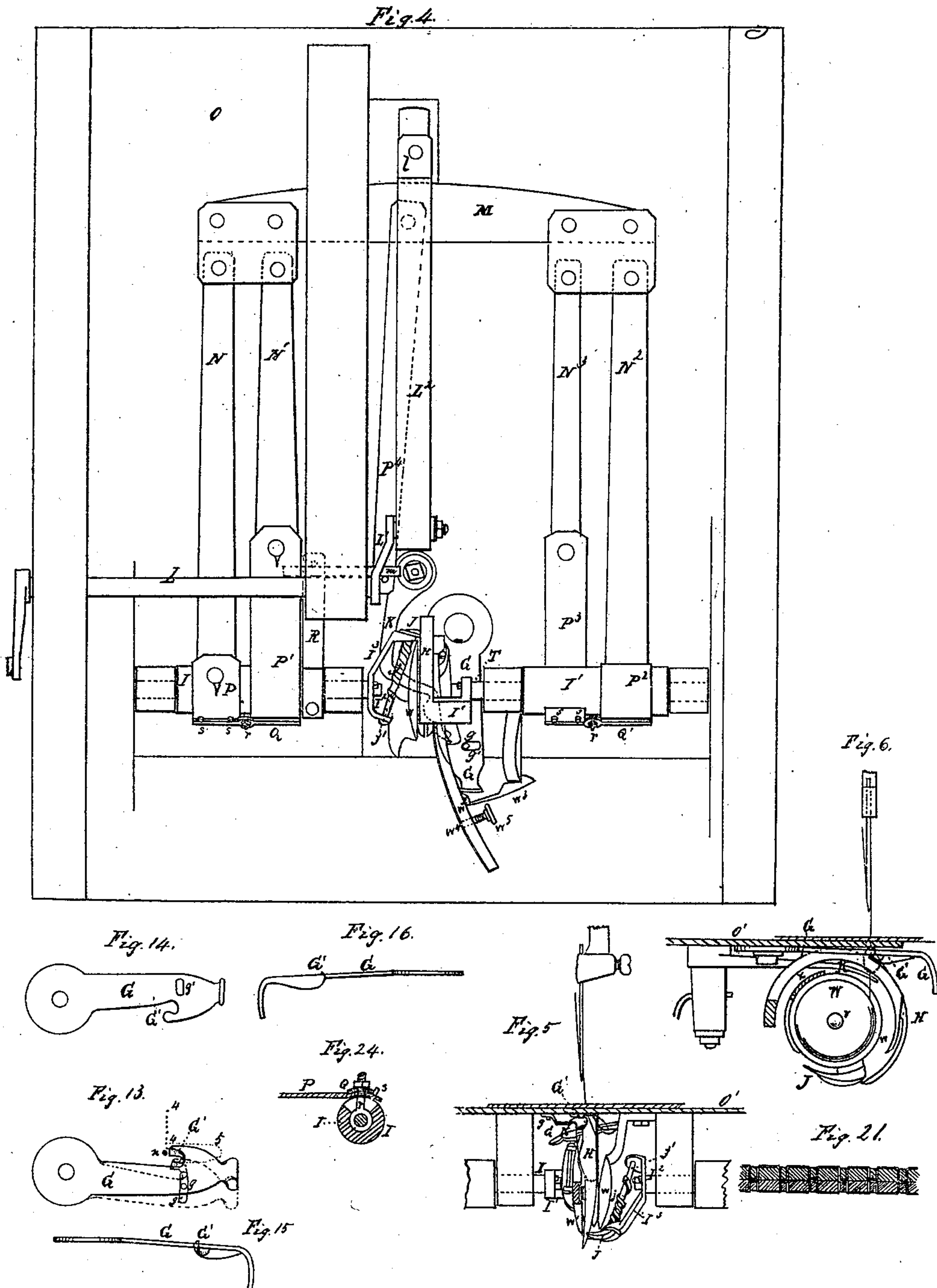


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Inventor:
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UNITED STATES PATENT OFFICE.

JONAS HINKLEY, OF CLARKSFIELD, OHIO, ASSIGNOR TO HIMSELF AND
FREDK. A. WILDMAN, OF SAME PLACE.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. 25,231, dated August 23, 1859.

To all whom it may concern:

Be it known that I, JONAS HINKLEY, of Clarksfield, in the county of Huron and State of Ohio, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a full and clear description, reference being had to the accompanying drawings, which form part of this specification, and in which—

Figure 1 represents a front elevation of a machine embracing my improvements, the bed-plate and table being shown in section, and the front plate of the needle-arm case, with its holding-foot and feeding-hand, being shown by red lines, in order to exhibit more clearly by black lines the needle-arm and mechanism for feeding the material being sewed. Fig. 2 represents an elevation of the inner side of the front plate of the needle-arm case, together with the holding-foot and feeding-hand which are carried by said plate. Fig. 3 represents a side elevation of the machine, the table and bed-plate being shown in section, and the side of the casing which incloses the bent lever for operating the needle-arm being removed. Fig. 4 represents a view of the under side of the machine. Fig. 5 represents a front elevation of the hook for forming the loop and the hook for receiving the loop and carrying it around the bobbin; also the hook for changing the character of the stitches and the finger for lifting the loop out of the way when delivered by the receiving-hook, together with the needle, a section of the bed-plate, and the hangers for supporting the journals of the loop forming and receiving hooks, the parts being shown in the position they occupy when the forming-hook has caught and opened the loop and brought it partially down to the receiving-hook during the ascent of the needle. Fig. 6 represents a side elevation of the parts shown in Fig. 5, and occupying the same position, the hanger and one side of the bobbin-case being removed. Fig. 7 represents a similar view to that shown in Fig. 5, the forming-hook having brought the loop to the point at which it is delivered to the receiving-hook, and the latter having been brought to the position in which it is when in the act of passing over one side of the loop to receive it as the needle completes its ascent. Fig. 8 represents a side ele-

vation of the parts shown in Fig. 6, (the lifting-finger excepted,) but occupying the position shown in Fig. 7. In this view the loop is shown as having been brought down to the receiving-hook, and also hanging upon and deflected by the changing-hook. Fig. 9 represents a similar view to that shown in Fig. 5, the receiving-hook having caught and carried the loop around the bobbin and needle and off the deflecting-hook, and the lifting-finger having raised the loop out of the way of the forming-hook just before it catches the next loop. In this figure the deflecting-hook is removed to show the loop around the needle. Fig. 10 represents a side view of the parts shown in Fig. 8, but occupying the position shown in Fig. 9, with the exception that the loop is shown in the position just before it is acted upon by the lifting-finger. Fig. 11 represents a horizontal section through the axis of the bobbin and through its holding-case detached from the machine. Fig. 12 represents a top view of the lifting-finger detached from the machine, the black lines showing the finger in the position it occupies relatively to the needle when lifting that side of the loop thrown around the needle by the deflecting-hook to remove it from the path of the forming-hook as the latter advances to make the next loop, the red lines showing the position of the finger when retracted, and the blue dotted lines 2 2 representing the path of the forming-hook, and 3 3 the loop as it hangs from the seam, and pushed aside, as hereinafter described. Fig. 13 represents a top view of the deflecting-hook and the plate to which it is attached detached from the machine, the black lines showing the position of the hook in relation to the needle when operating, and the blue lines its position when moved out of the way and performing no function, and the red dots 4 4 the seam, and 5 the loop partly drawn down and hanging over and upon the deflecting-hook. Fig. 14 represents a view of the under side, Fig. 15 a view of the left side, and Fig. 16 a view of the right side, of the deflecting-hook and plate. Fig. 17 represents a view of the front or edge of the bobbin and a section of the material being sewed, the forming-hook being in the act of taking the first loop from the needle. Fig. 18 represents a

similar view to that of Fig. 17, but showing the loop carried beneath the bobbin by the receiving-hook, the thread at the same time having been carried to the left of the needle by the deflecting-hook, so that the needle, on its descent, will pass into the loop. Fig. 19 represents a similar view to that of Fig. 17, the needle having descended and the loop thrown around its left side and lifted angularly by the lifting-finger (shown in Fig. 12) to the right side of the needle and loop-forming hook. Fig. 20 represents a view similar to that of Fig. 17, the first loop having been drawn up and the second one brought down. Fig. 21 represents a section through the seam, showing the ordinary lock-stitch; Fig. 22, a similar view, showing the ordinary chain-stitch; and Fig. 23 a similar view, showing my improved self-bound elastic stitch. Fig. 24 represents a vertical transverse section through one of the drums which give motion to the forming and receiving hooks, showing the means of adjusting the movements of the same.

That side of the machine which would be at the right of a person facing the front I call the "right" side, the opposite the "left" side.

My invention consists in the employment of certain mechanism, essentially as hereinafter described, by which I am enabled to accomplish the following objects, namely: First, the forming of a lock-stitch for sewing by machinery, by passing the second or lower thread around one side of the loop of the common loop-stitch, so that it will lie, when the stitch is completed, in a spiral or undulating form, which allows the thread to yield when the seam is stretched, thus avoiding the breaking of the thread, while at the same time it locks the stitch so that it cannot be unraveled; second, forming an elastic lock-stitch by causing the needle in its downward movement to pass through the loop of the upper thread as the latter is being thrown round the lower or bobbin-thread, which action whips the bobbin-thread around one side of the loop of the needle-thread, thereby forming an elastic stitch, which would not be the case if the bobbin-thread lay straight or passed through the loop of the upper loop above where the preceding loop passes around it; third, raising the loop while still inclosing the needle, in order that the forming-hook may pass beneath it to catch the next loop, and also for the purpose of preventing the loop so raised from becoming entangled with or riding forward on the forming-hook; fourth, so combining and arranging the various parts of a machine that it shall be capable of forming two or more different kinds of stitches, so that the stitch may be changed at the will of the operator without stopping or reversing the machine or reversing the feed, whereby the beginning and end of a seam may be formed of the lock-stitch, while the intermediate portion may be of a different stitch; fifth, passing the loop around the bobbin-thread by

the combined action of the forming and receiving hooks, reciprocating simultaneously in opposite directions; sixth, drawing the loop around the needle and above the forming-hook, when the deflecting-hook is performing its function, by the combined action of the receiving-hook and deflecting-finger, whereby the loop is left, on the return of the receiving-hook and the ascent of the needle, entirely free from strain or friction, which is essential to the formation of the stitches, as the loop will not pass freely around the needle if it is restrained or held.

My invention further consists in the arrangement and combination of certain devices connected with the feed and hold of the cloth, substantially as hereinafter specified.

To more clearly describe my invention I now refer to the accompanying drawings.

The mechanism may be mounted on a suitable frame or table, O, having a bed-plate, O', inserted in it. A channel or slot is made in the bed-plate for the passage of the needle and the threads. A curved case, A, is secured to and rises from the table, and carries at its outer or front end the needle-arm and feeding mechanism. This case incloses the bent lever A', which oscillates on a fulcrum-pin, a, and gives motion to the needle-arm and feeding mechanism. The lower end of the bent lever A' passes through the table, and is connected to the operating mechanism underneath, as represented in Fig. 3. The spool a' of the upper thread is attached to the rear of the curved case A, and a tension-pulley, a², is also secured to it near the fulcrum-pin a of the lever. A case, C, attached to the front end of the curved case A, contains the mechanism for operating the needle-arm and feed-motion. The head or top z of this case is removable for the purpose of oiling, and so forth, and a cushion, z', is formed on its upper surface to contain pins, needles, and so forth.

The needle-arm B is secured to the end of the oscillating lever A' by means of a leather strap, B', and slides up and down in guides in the case C. A bracket, B², projecting from this arm, carries a friction-roller, B³, which plays or moves on and against the band or cord e² of the rocking bow E, which gives motion to the feeding mechanism, the bow being pivoted at its center e' and caused to vibrate by the upward and downward motion of the needle-arm. The front plate, D, of the case C slides up and down in guides for the purpose of raising and lowering the cloth-presser D' in inserting and removing the material to be sewed, the cloth-presser being formed by curving and extending the lower end of the plate D down to the table, as shown by the red lines in Fig. 1 and black lines in Fig. 2.

The feeding mechanism is attached to the inner side of the front plate, D, as shown in Fig. 2, and it consists of a pendulum lever or bar, D², pivoted at its upper end to the top of

the front plate, D, and having the feeding-hand D' pivoted to its lower end. This feeding-hand projects horizontally from the lever D², and works by the side of the cloth-presser D', which is recessed on its side for that purpose. An oscillating lever, D³, pivoted to the feeding-hand near its center, extends up parallel to but not as high as the pendulum-lever D², and is also pivoted at its upper end to the plate D. An arm, D⁵, extends at right angles from the top of the lever D³, and is connected by means of a link, D⁶, to a lifting-arm, D⁴, so that when the handle F of a crank, F², is turned up it lifts the feed-hand and holding-foot and holds them out of the way in putting in and removing the material. A spring, d, secured to the upper end of the oscillating lever D³, takes into a notch, e, in a boss on the lower end of a rocking lever, E', which is secured to the oscillating bow E by means of a pivot, e', which is common to both. The motion imparted to the spring d by the oscillation of the bow causes the lever D³ to vibrate, which movement causes the feeding-hand to be alternately pressed upon and withdrawn from the material being sewed. The feeding-hand receives its horizontal reciprocating movements in the following manner: A portion of the pendulum-lever D² is cut away, leaving a rib, d', on its side next to the bow. This rib plays in a notch, e², in the lower end of the oscillating bow E. By thus connecting the bow and pendulum-lever the feeding-hand is reciprocated horizontally by the oscillation of the bow, while at the same time it is moved up and down by the vibration of the spring d, being elevated as the pendulum-lever is carrying it forward toward the left in order to pass over the material without touching it, and being depressed when moving backward in order to draw the material with it. In order that the feeding-hand may rise slightly before commencing its advance stroke toward the left, and thus avoid dragging the cloth the wrong way, the rocking lever E' is curved, so that its upper end is released from the action of the roller B³ before the bow E begins to oscillate, by which action the foot is lifted before beginning to move forward to make the next feed.

In Fig. 1 it will be seen that the roller B³ is at the limit of its upward movement and has vibrated the upper end of the bow E toward the left, and consequently the pendulum-lever D², which is connected to the lower end of the bow, has been vibrated to the right, and with it the feeding-hand. In this position of the roller B³ the upper end of the oscillating lever E' bears against it with considerable force, and its lower end has deflected the spring d to the right, thus depressing the feeding-hand and holding it upon the material. Now, when the friction-roller commences to descend it releases the upper end of the lever E', and thus allows the spring d to draw its lower end to the left, and with it the vibrating lever D³, and lift the feeding-hand D' above the material before the

friction-roller B³ passes below the pivot e' of the bow, and consequently before the latter carries the feeding-hand horizontally to the left to make the next feed.

A spring-arm, F, adjusted by a set-screw, F', regulates the length of the stitches by limiting the backward stroke of the pendulum-lever D². This lever plays between pads f and f', fitted on the end of the spring-arm F and on the inside of the front plate, D. The front plate, and with it the feeding mechanism, is lifted from the cloth by means of a bar, D⁴, pivoted to the inside of said plate D, as shown in Fig. 2, the said bar D⁴ being raised by a cam, F², attached to the side of the case, and having a winch-handle by which to work it. This bar D⁴ is connected to the oscillating lever D³ by a link or strap, D⁶, by which means the feeding-foot is lifted from the cloth before the bar D⁴ comes in contact with the upper edge of the notch d³ in the front plate, and consequently before the front plate and cloth-presser are lifted. The cloth-presser D' is held down upon the table by a spring, d⁴, coiled on a pin extending across the top of the case, so that it tends constantly to press downward, as shown by dotted red lines in Fig. 1.

The bow E (shown by black lines in Fig. 1) is made of metal, and a leather strap, e⁴, extends from one of its extremities to the other, the upper end of the strap being secured to a screw, e³, by which its tension may be regulated. This bow oscillates on a pivot, e', and receives its motion from the friction-roller B³, which is attached to the needle-arm B, traversing said strap, and this oscillation of the bow operates the feeding mechanism.

The bobbin or lower thread-holder, W, is held in a case consisting of two side plates, w and w', one of which is hinged to the other and fitted with an arm, w², projecting in front, by which the case may be opened to remove the bobbin, when required. A spring-detent, w³, holds the case closed; and the arm w² is also fitted with a spring, w⁴, the inner end of which bears against the face of the bobbin, and thus regulates, by means of a set-screw, w⁵, the tension of the lower thread. The plate or projection x, which joins the sides of the case at its hinge x', serves for the loop to strike against as it is being carried up by the receiving-hook, by which and the joint action of the lifting-finger the loop is drawn past the nipple v, as seen in Fig. 10, and thus left free from further friction during the ascent of the needle. This is very important in order to make all the stitches, as drag on the loop would interfere with the proper formation of the stitches.

The mechanism for forming the different stitches is located beneath the table, and consists chiefly of three hooks, one of which is stationary while performing its function. The first of these is the forming-hook or looper H, which is secured on the end of a horizontal shaft, I, by means of a radial arm, I', and

composes about two-thirds of a circle. It encircles the lower bobbin and has a semi-rotative or reciprocating motion given to it by mechanism hereinafter described. This hook is shown in various positions in Figs. 5, 6, 7, 8, 9, and 10 of the drawings, by which it will be seen that its function consists simply in taking the loop from the needle, opening it and carrying it to a position nearly beneath the bobbin, where it is delivered.

The receiving-hook J is secured to a horizontal shaft, I², by means of a bent arm, I³. Its point traverses in the same vertical plane, or nearly so, as the looper or forming-hook, but within the circle traversed by the latter; and it has a semi-rotative movement with its shaft, in the same manner as the looper H, and to about the same extent, but on the opposite side of the bobbin, and moves in a different direction to it at each reversal of its motion. Besides this semi-rotary motion the receiving-hook has another motion on an axis inclined to that of its semi-rotation, so that when it reaches a certain position in relation to the looper, as shown in Figs. 1, 7, and 8, it strikes against the right side of the loop, which has been brought down in front of the bobbin by the forming-hook, and is turned by said loop on its inclined axis slightly to the right until its point has passed the side of the loop, when it is instantly thrown inward toward the left into the loop by means of a spring, j, coiled on the inclined axis j', so that the point of the hook catches in the loop, and on the change of motion of the two hooks, which takes place almost instantly, strips it off the hook of the looper and carries it around beneath and back of the bobbin and past the nipple, and in retreating leaves it to be drawn up into the seam.

The hook for deflecting one side of the loop consists of a plate, G, pivoted at its rear end to the under side of the bed-plate o', with a hook, G', formed thereon, near its front end, by means of a lateral projection from said plate. The hooked end of this plate is moved toward the needle to bring it into action to throw one side of the loop around the needle, and from the needle when it is intended to have no agency in the formation of the stitches, or when the machine is merely making the lock-stitch. This play is regulated by a pin, g, projecting from the bed-plate into and through a slot, g², in the front end of the plate G. Said pivoted plate and its deflecting-hook are shown in detail in Figs. 13, 14, 15, and 16 of the drawings. The hook G' is formed of a point projecting a short distance above the plate G, and is curved, so as to hold the loop when the latter is being drawn forward, and allow it to slip off when being carried back. Its position is in front of and directly across the path of the needle when in action, as will be seen by reference to Fig. 13, in which the black lines show it in the position in which it catches one side of the loop as it is being brought forward and

down by the forming-hook, and causes it to slide upon and over the said hook, where it hangs in the cavity between it and the inner edge of the plate until the receiving-hook carries the loop back and slides it off and around the needle. When the loop has been drawn off the deflecting-hook and delivered in the rear of the bobbin by the receiving-hook, that side of it thrown around the needle is also on that side of the bobbin around which it passes, and if allowed to remain there would catch in the forming-hook as it advanced to take the next loop from the needle, and either break the thread or stop the operation of the machine. To prevent this difficulty, therefore, is the object of the lifting-finger above mentioned, and shown more clearly in Fig. 12 of the drawings. It consists of an arm, K, of a peculiar shape, pivoted at its rear end to the under side of the bed-plate, in the rear of the needle, and projecting forward toward the latter, and has a motion laterally toward and from it. Its front end is made with a swell or curved projection, k, and operates in such manner, when moving toward the needle, as to lift that side of the loop round the left side of the needle in an angular direction and press it to the other side of the needle and bobbin, entirely out of the way of the path of the forming-hook, so that the next loop formed by the ascent of the needle may open and be caught by the hook below the loop so pushed aside. This action of the lifting-finger, in pushing the loop to one side, also keeps it from riding forward on the hook and catching under the last loop as it is being drawn forward.

The machine is operated in the following manner: Rotary motion is communicated to a shaft, L, in any suitable way. A crank, L', gives a reciprocating motion to a connecting-rod, L², which is attached to and vibrates the bent lever A', that carries the needle-arm, by means of a strap, l, of leather or other flexible material. The lower end of said bent lever is curved and carried beneath the table, beyond the point at which the connecting-rod L² is attached to it, and to this curved end a cross-head, M, is attached, to which four connecting-rods, N, N', N², and N³, are united. These rods are connected at their other ends to straps P P' P² P³, attached to the drums I I', which they operate. These straps are secured by clamps Q Q', that consist of a plate sufficiently long to extend over both ends of the straps and held in contact with the straps by a screw, r, pivoted on the shaft I of the drum, and having a nut on its outer end, by which the pressure of the clamp-plate upon the straps may be tightened or loosened. The screw r plays in a transverse slot in the drum, and by moving it back and forth in this slot the tension of the straps, and consequently the range of motion of the hooks which they operate, may be adjusted as desired. The straps are prevented from slipping from under the clamps by means of pins s s, inserted into the

straps against the edge of the clamp-plates, as shown in Fig. 24. This adjustment of the straps is very important, for without it the straps cannot be used, as the range of motion of the semi-rotative hooks would become irregular, and the hooks thereby be uncertain in their action. Moreover, I prefer to make the connection of these and all the other working joints of my machine of leather, as the parts thus united run with much less jar and friction, and consequently much more silently, than when formed in the usual manner. The lifting-finger K is vibrated toward the needle by a strap, P¹, attached at one end to the cross-head M, and by the other to an arm, m, projecting from the pivot of the lifting-finger, and is vibrated from the needle by a strap, R, extending from the end of the arm m, and connected to the oscillating drum I, which operates the receiving-hook.

The operation of the machine is as follows: The mechanism being properly adjusted, the deflecting-hook G' moved to the right to bring its point close to and directly in front of the path of the needle n, as shown by black lines in Fig. 13, and motion being communicated to the shaft L, the latter reciprocates the pitman L², which vibrates the bent lever A', carrying the needle-arm B on its front end. The descent of the needle-arm carries the needle, with its thread, through the cloth. The ascent of the needle slackens the thread, so as to open it, as shown in Fig. 17. As the forming-hook H advances it catches the thread thus opened, as shown in Figs. 5, 6, and 17, and draws it forward and down on each side of the bobbin, a little below the bobbin. During the commencement of this motion the left side of the loop catches over the point of the deflecting-hook G', which is so shaped as to deflect it a distance sufficient to carry it to the left of the path in which the needle descends, as shown in Figs. 7, 8, 18, 19, and 20, the loop being held taut in this position by the joint action of the forming-hook, in carrying it down, and feed of the material, which takes place simultaneously with the bringing down of the loop. At this moment the receiving-hook J, which has been moving in a direction opposite to that in which the looper was traversing, rises in front of the bobbin in such manner as to come in contact with the right side of the loop, which, being held taut, causes the point of the hook to yield laterally by turning on its inclined axis, as seen in Fig. 7, until its point passes the thread against which it rises, when it is instantly thrown inward, so as to bring its point into the loop, as shown by the dotted lines in Fig. 7, by the expansion of the spring j, coiled upon its axis. The motion of the two hooks now changes, the forming-hook retreating, while the receiving-hook moves down beneath and back of the bobbin, carrying with it the loop on each side of the bobbin, until the loop strikes the projection or plate x, which connects the two sides of the bobbin-

case, and thus draws the left side of the loop past the nipple v and leaves it in the space between the bobbin and its case, entirely free from further friction, as shown in Fig. 10. The loop in thus being carried back is also carried entirely off the deflecting-hook, as also seen in Fig. 10. At this stage in the formation of the loop, and just before the needle descends to make the next loop, the lifting-finger K is vibrated toward the needle, so as to strike against the left side of the loop and carry it around the needle (as the latter descends) from its left to its right side, and also carry it to the right of the path of the forming-hook H, where it is held out of the way until the next loop has been brought forward a short distance, and thereby prevent its entanglement with the hook and the loop, which is at this moment being formed, and the formation of which draws up the other loop and completes the stitch, as shown in Fig. 20. This action of the lifting-finger on the loop is clearly shown in Figs. 9, 12, and 19. It will thus be seen that the carrying of the loop around the needle locks it with the succeeding loop as well as with the bobbin-thread, and thus makes the elastic lock-stitch shown in Fig. 23. As the succeeding loop is being formed, as shown in Fig. 20, the lifting-finger K is retracted out of the way, as shown by the red lines in Fig. 12, to be in a position to act on it in the same manner as on the first loop. This method of locking the loops around and with each other also locks the lower thread around one side only of each loop, as shown in Figs. 19 and 20, in such a manner that it will lie in a spiral or undulating form at one side of the seam, whereby it is caused to yield to a strain, thus preventing it from breaking, and yet as effectually locking the stitch as if it were straight, as heretofore, but avoiding the disadvantage of being straight.

I have only described the formation of what I denominate the "elastic lock-stitch;" but among other advantages of my improved sewing-machine is that of its being capable of making three different varieties of stitches. For instance, if the deflecting-hook G' be turned aside, away from the path of the needle, so as to perform no duty, as shown in Fig. 1, and by the blue lines in Fig. 12, the stitch shown in Fig. 21 will be formed. This is the common lock-stitch. If the deflecting-hook be changed so as to bring it in front of the needle to perform its duty, and the lower or bobbin thread be removed, the stitch shown in Fig. 22 will be formed. This is the single-thread or chain stitch. If, now, the two threads be used, the other parts being in the position last stated, my new self-bound elastic stitch will be formed, as shown in Fig. 23. When making the lock-stitch, the loop of course does not pass around the needle, but is all on one side of it in the ordinary manner. In this last case the lifting-finger nearly moves the loop off sideways, out of the way of the forming-hook.

A more particular description of the means

employed to effect the several movements of the various parts of the mechanism herein described is unnecessary, as they form no part of the subject-matter of my claims in this application for Letters Patent, and may be readily varied, without affecting the principle of my invention, by persons skilled in the manufacture of sewing-machines. In the table-top (see diagram 24) is a scale of different-colored or otherwise distinguishable stripes or lines parallel with the feed, to serve as a permanent guide in directing the work, and presenting no obstruction to the cloth in its passage over the table.

Having thus fully described my improved sewing-machine, what I claim therein as new, and desire to secure by Letters Patent, is—

1. The combination of the looper H and receiving spring-hook J, when arranged so as to operate in the manner and for the purpose set forth.

2. The combination of the deflecting-hook G', the looper H, and the receiving-hook J, essentially as specified.

3. The lifting-finger K, or its equivalent, operating substantially as herein set forth.

4. The combination of the lifting-finger K with the looper H and receiving-hook J, substantially as described.

5. The combination of the lifting-finger, the deflecting-hook G', the looper, and the receiving-hook, arranged and operating substantially as described.

6. The combination of the arm D⁵, link D⁶, and lifting-bar D⁴ with the vibrating bar D³, and feeding-hand D⁷, for the purpose described.

In testimony whereof I have hereunto subscribed my name,

JONAS HINKLEY.

Witnesses:

HENRY BASSETT,
J. N. BARNUM.