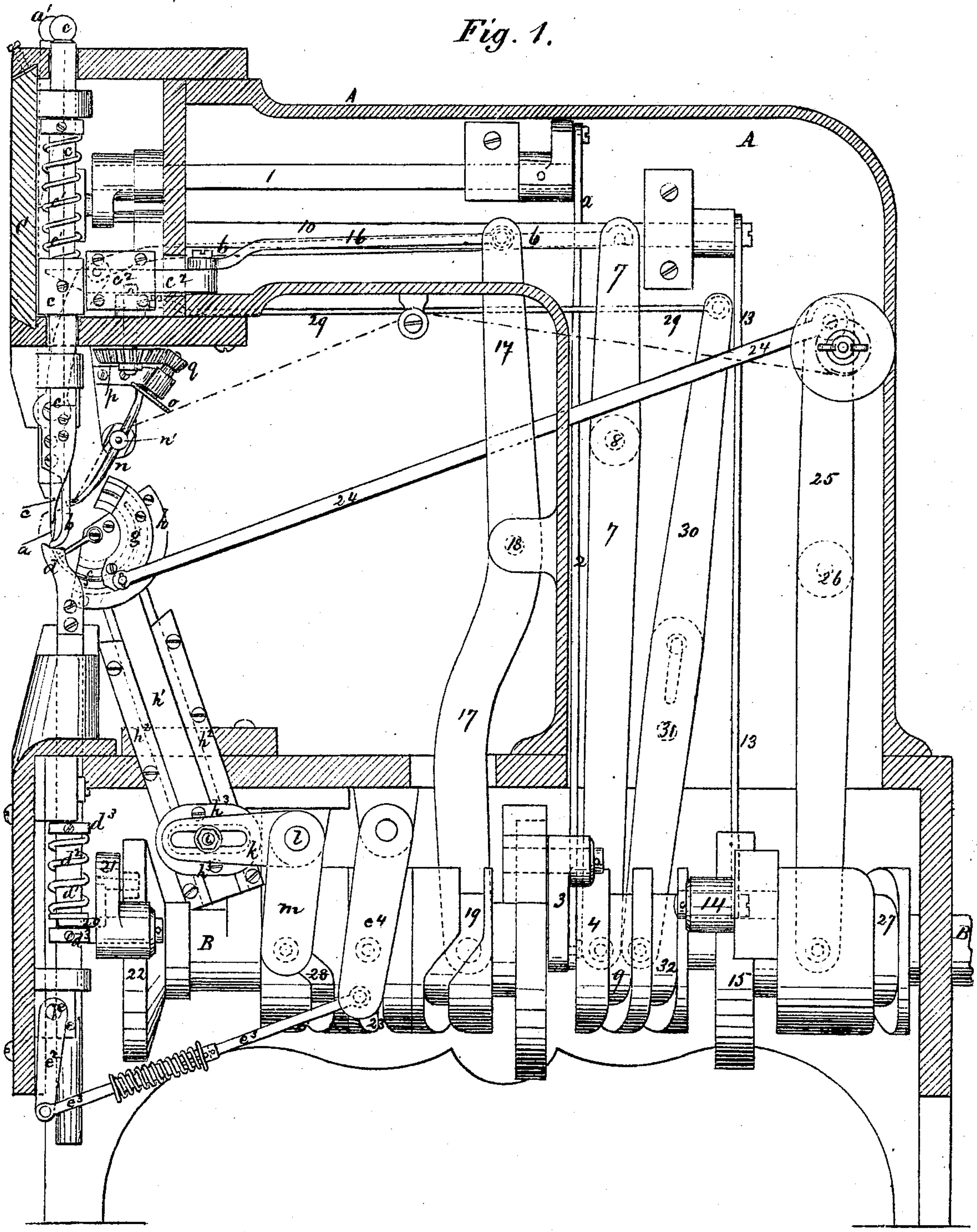
2 Sheets--Sheet 1.

M. J. STEIN.

Improvement in Machines for Sewing Boots and Shoes.

No. 124,393. Patented March 5, 1872.

Fig. 1.



Witnesses.

C. P. Nottingham

Thomas C. Smith

Inventor.

Michael J. Stein

by atty A Pollok

2 Sheets--Sheet 2.

M. J. STEIN.

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Fig. 2.

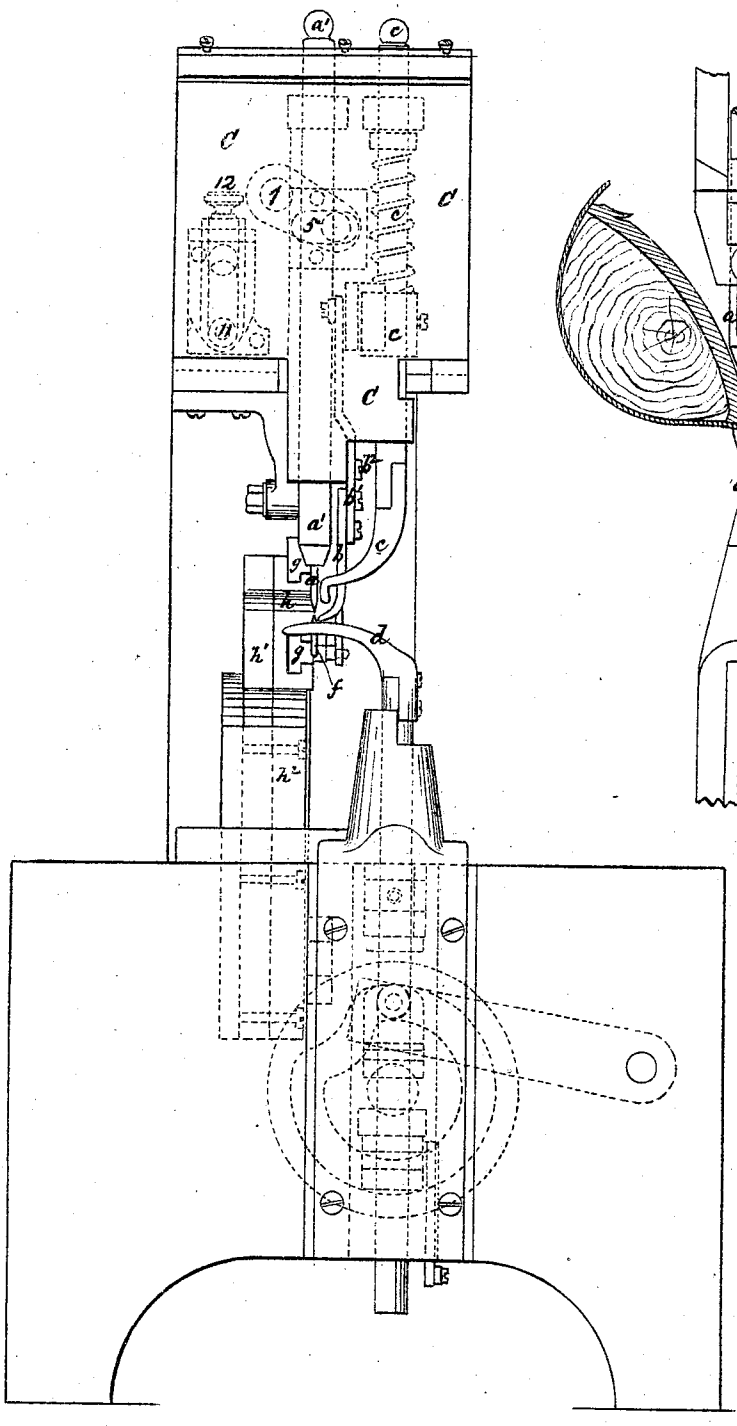
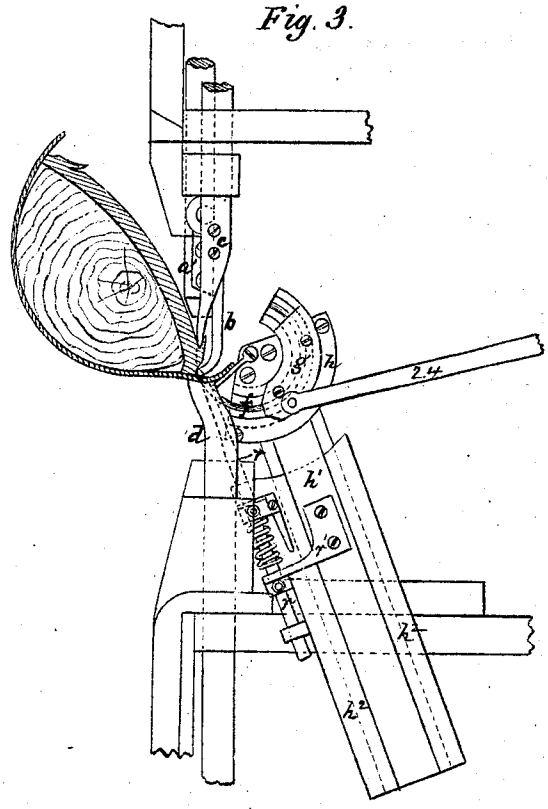


Fig. 3.



Witnesses.

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by atty Pollok

UNITED STATES PATENT OFFICE.

MICHAEL J. STEIN, OF NEW YORK, N. Y.

IMPROVEMENT IN MACHINES FOR SEWING BOOTS AND SHOES.

Specification forming part of Letters Patent No. 124,393, dated March 5, 1872.

To whom it may concern:

Be it known that I, MICHAEL J. STEIN, of the city, county, and State of New York, have invented certain new and useful Improvements in Machinery for Sewing Boots and Shoes, of which the following is a specification:

My invention is especially applicable to sewing what is known as "turned work;" but with some obvious modifications and the addition of a welt-gauge it may be used for welted work. The main features of the invention relate, first, to the feeding of the work; secondly, to the presenting of the work to the needle; and thirdly, to the combined operation of the awl and needle in punching and making the stitch. In order to effect the feed I make use of the awl in combination with an edge-bender, so arranged that the awl shall first enter the sole from the inside channel; the edge-bender shall then press upon the outside chamfer or edge of the sole, and the two, thus grasping the work between them, shall then move together to carry the work forward to the point where it is to be acted on by the needle. To present the work properly to the needle I dispense with all hooks, such as employed in the "Richardson" machine, or other supplementary mechanism for operating on the grain side of the sole in connection with an edge-bender to bend down the edge in order to enable the needle to pass through that portion of the flesh side of the sole between the outside chamfer and inside channel; and I employ for the purpose the awl, which is so arranged as to only partly puncture this portion of the sole, the edge-bender then bending that portion of the sole between the edge and the point of the awl, the latter thus serving as the point of resistance to prevent bending of any further part of the sole. To puncture the sole, in order to pass the needle through it for the purpose of making the stitch, the awl, with the sole, through which it partly penetrates, is carried forward by the feed until the point of the awl is brought immediately opposite the point of the needle, which then commences to penetrate the sole from the opposite direction until it meets the awl, and then passes through the remainder of the work in the aperture formed by the awl, which withdraws as the needle advances.

In the above-mentioned operations I can employ either a straight or curved needle. I prefer the latter, and have so represented it in the drawing, which will be presently referred to. I also prefer to give the curved needle a combined reciprocating sliding and rotary movement, the sliding rectilinear movement being continued until the needle penetrates the work as far as the point of the awl, when this movement ceases and the rotary movement begins.

Having indicated generally the main features of my invention, I will proceed to describe more particularly the nature of the said invention and the manner in which the same is or may be carried into effect by reference to the accompanying drawing, in which—

Figure 1 is a side elevation, partly in section, of a machine made in accordance with my invention. Fig. 2 is a front elevation of the same. Fig. 3 is a side view of the sewing, puncturing, bending, and feed devices detached, representing the manner in which the work is operated on.

I have represented the machine as adapted to the sewing of "turned work."

a is the awl, mounted in a stock, *a'*, which has an up-and-down movement imparted to it by suitable mechanism sufficient to allow the awl to penetrate the sole partly and to the proper extent. The actuating mechanism consists, in the present instance, of the crank-shaft 1, mounted in bearings in the goose-neck A of the machine, the connecting-rod 2, and the jointed arm 3, hinged at one end to the frame of the machine, at the other end to the rod 2, and provided at a point intermediate between its two ends with a roller-stud fitting in a cam-groove formed in the face of a disk, 4, on the shaft B, from which shaft all the varied movements of the machine are derived. The front crank-pin of shaft 1 fits in a horizontal slot, 5, in a box attached to the stock *a'*, indicated in dotted lines in Fig. 2, to admit of the lateral reciprocating movement of the awl for the purpose of effecting the feed. The edge-bender is represented at *b*, attached in an adjustable manner to its stock b^1, so that it may be set up or down as required by the work. The stock is hinged at b^2 to the front of the sliding reciprocating head C, which carries also the awl, and its upper end is jointed to the

front end of a horizontal connecting-rod, 6, which, at its rear, is hinged to a vertical arm, 7, vibrating upon a stud, 8, and provided at its lower end with a roller-stud working in the cam-groove 9, which rocks the arm 7 back and forth, and so, alternately and at proper intervals, pushes forward and draws back the edge-bender. The operation of these devices to prepare the sole so that it may be properly presented to the needle in sewing "turned work" will be understood by reference to Fig. 3. The several movements of the awl and edge-bender are so timed that the awl first descends, and, entering the sole from the inside channel, penetrates partly through to the outside chamfer. The edge-bender then advances and bends that portion of the sole below the point of the awl outward, thus enabling the needle, when it advances, to enter the sole at or near the bottom of the chamfer, and the point of the awl becomes the point at which the bend takes place, thus dispensing, as above mentioned, with all supplemental mechanism which has heretofore been employed to act on the opposite or grain side of the sole for this purpose. The awl and edge-bender, thus operating together, hold the work firmly, and are therefore available for effecting the feed. To this end they are arranged to move together in a horizontal path toward and away from the needle, the means of bringing about this movement being, in the present instance, the horizontally-sliding head C above named moving in ways on the front of the goose-neck A, as in Figs. 1 and 2. The connections of the awl and edge-bender are suitably arranged to permit of this reciprocating sliding motion. The head C is actuated by means of a crank-shaft, 10, provided at its front with a pin, 11, indicated in dotted lines in Fig. 2, moving in a vertical slot formed in the head, and adjustable nearer to or further from the center or axis of the shaft, in order to regulate the length of movement of head and consequently the length of feed. The adjustment of the pin, in the present instance, is effected by mounting it in a slide attached to the front of the crank-arm and connected with a set-screw, 12, (in dotted lines in Fig. 2,) by means of which the slide, and consequently the pin, may be raised or lowered. The shaft 10 is rocked at proper intervals by means of a connecting-rod, 13, hinged to its rear crank-arm and pivoted at its lower end to one end of a horizontal arm, 14, which, at its other end, is hinged to the frame of the machine, and, at a point intermediate between its two ends, is provided with a roller-stud working in a cam-groove in disk 15. The feed movement and the several motions of the awl and edge-bender are timed as follows: Supposing the awl and edge-bender to be at the point where they are furthest removed from the needle, the awl first descends and partly punctures the work, and the edge-bender then advances and bends the edge of the sole, which is thus held by the two, as above described. The sliding head then commences its movement toward the needle, carrying with it the awl and edge-bender, which advances the work grasped by them the proper distance for a stitch. The needle then commences its work and passes up through the sole, the awl receding as the needle advances. After the awl has withdrawn from the sole, and while the needle is still in the work, the edge-bender draws back, releases its pressure on the sole, and then the sliding head commences its backward movement, carrying with it the awl and edge-bender, which are again brought into position in order to take a fresh hold upon the work and effect the feed. For the purpose of guiding the work I prefer to have (although this is not indispensable) a channel-guide, shown at c, which is also mounted in the sliding head in line with the awl, and so shaped as to run in the inside channel of the sole in order to bring the channel directly under the awl. This guide, when moving back with the sliding head in order that the awl and edge-bender may take a fresh hold upon the work, is held down with a yielding pressure by means of a spring, c^1; but when the awl and edge-bender have fairly grasped the work it is also locked tightly by a wedge, c^2, which has a sliding back-and-forth movement imparted to it intermittently, and at the proper intervals, by means of a horizontal arm, 16, jointed to it, and connected at the rear with an upright rod, 17, hung on a pivot, 18, and provided with a roller-stud on its lower end working in the cam-groove 19. The movements of this locking device are so timed that it will hold the guide rigid when the awl and edge-bender take hold of the work, and will release the guide when they release the work. In order to support the work under the thrust of the awl, and for other purposes, I use a last-support, d, which is arranged to have an up-and-down movement at certain intervals, and at other intervals is held either with a yielding pressure or rigidly against the work, as hereinafter stated. The support d is mounted on a vertically-sliding rod, d^1, mounted in suitable bearings in the front of the frame of the machine. On the lower portion of the rod is a spiral spring, d^2, held between two collars, d^3 d^3. Between the lower collar d^3 and the lower end of the spring is a fork, 20, which is connected with a vibratory arm, 21, hinged at one end to the frame of the machine and at the other end provided with a roller-stud working in a cam-groove in the disk 22. This cam, through the medium of parts 21 and 20, imparts at intervals an up-and-down movement to the last-support.

The down movement is effected by the downward pressure of fork 20 on the lower collar d^3. The up movement is caused by the rising of the fork against the spring d^2. The obect of interposing this spring between the fork and the upper collar d^3 is to allow the jack to yield and adapt itself to slight irregularities or differences of thickness in the work. The locking of the jack is effected by means of an eccentric roller,

e, hung in bearings e^1, and operated by a swinging arm, e^2, connecting-rod e^3, and hinged arm e^4, provided at its free end with a roller-stud working in cam-groove 23.

The movement and operation of the jack or last-support is as follows: While the awl is puncturing the work the last is in an elevated position and locked rigidly in place. As soon as the awl has concluded its downward motion and the feed is about to commence, the jack is lowered, the feed takes place, and the jack then rises simultaneously with the needle. It is then brought up with a yielding pressure against the work, and may there at once be locked in position, or the locking need not take place until the awl and edge-bender release the work and the needle is about to withdraw. It remains locked until the awl again descends and the feed is about to take place, when it is released and descends as before.

It now remains to describe the arrangement and operation of the needle. As before stated, with the awl and edge-bender operating as specified, I can use either a straight or a curved needle. I prefer the curved needle because I can use with it a common last, whereas a straight needle will need a last with a bottom somewhat modified from the usual form, or some equivalent arrangement, to adapt the same for the purpose. Whether a straight or curved needle be used, the edge-bender, however, will press the edge of the sole far enough out of the way to allow the needle to enter the material at the right point. The curved needle f is mounted in a suitable stock, g, and this stock I prefer should also have a sliding movement, both in order to obtain a larger loop with a needle of a curve of small diameter and for other purposes. The oscillating or reciprocating rotary movements of the needle are produced by mounting the stock in a segmental groove in the stock-support h, and connecting it, by a pin, with the rod 24, which is hinged to the vertical arm 25 vibrating on the pivot 26, and provided with a roller-stud on its lower end working in the cam-groove 27. The sliding up-and-down movement of the stock and needle are effected by fastening the stock-stupport h to a bar, h^1, arranged nearly vertically, but at an angle to the awl, as shown in Fig. 1, and sliding in ways h^2 attached to the frame of the machine. The lower end of the bar is provided with a transverse piece, h^3, having formed in it a horizontal slot, and in this slot works the end of a pin, i, which is adjustable in a slot formed in an arm, k, fixed on a horizontal transverse rock-shaft, l, mounted in stationary bearings in the frame of the machine. By adjusting this pin nearer to or further from the shaft l the length of movement of the sliding-bar h^1 can be increased or diminished in order to adapt the length of loop made by the needle to the nature of the work, whether it be light or heavy. The shaft l is actuated by means of a second arm, m, which is fixed to it, and is provided at its free end with a roller-stud working in the cam-groove 28. With the needle I employ a looper, n, of the usual construction, which vibrates on a universal joint, n', and is operated at the proper intervals to perform its work by means of the crank-disk or eccentric o attached to its rear end, said disk being operated by means of the beveled gears p q, crank-connection 29, and arm 30 vibrating on pivot 31, and provided with a roller-stud on its lower end working in cam-groove 32. I also employ a cast-off or barb-coverer, r, which, owing to the arrangement of the curved needle, I am enabled to make straight, as shown in Fig. 3. The cast-off is arranged to slide in bearings attached to the ways which contain the sliding-bar h^1, and is operated to move up and down by means of a forked arm, r', projecting from said bar. The arm in its upward movement presses against a spring encircling the cast-off, so that, when the latter has been moved up as far as practicable, the sliding-bar may move further up, if necessary, the arm r' in this case simply compressing the spring without moving the cast-off.

The operation of the needle in connection with the other parts of the machine is as follows: Supposing the awl and edge-bender to be moved back in order to take a fresh hold upon the work, the last support, consequently, being raised and locked, the awl descends and partly punctures the work. The edge-bender then moves forward and presses the edge of the sole outward, and the channel-guide is locked in place. The last-support then drops, the sliding head moves laterally toward the needle in order to effect the feed until the point of the awl is brought over the point of the needle, which is in its lowest position. The sliding needle-bar then rises, advancing diagonally, and the needle is caused by this movement to pierce the sole, entering it at or near the bottom of the outside chamfer, until it meets the point of the awl in the work. The last-support rises with the needle, and, when in contact with the work, remains in its elevated position until the feed again takes place, as before described. The sliding motion then ceases, and the upward stroke of the needle is completed by the rotation of the stock, the needle passing upward out through the sole in the channel or opening made by the awl, which recedes as the needle advances. When the needle completes its upward stroke the looper carries the thread around the barb, and, at the same time, the awl and edge-bender move back to take a fresh hold, the needle still being in the work. The needle then withdraws by a rotary movement; and, when withdrawn, its rotary motion ceases and the sliding-bar h^1 drops, drawing up the loop, and the awl and edge-bender, taking a fresh hold on the work, again feed the work forward.

The above description will suffice to explain fully the working of the machine. It will, of course, be understood that the details of construction of the various parts, their connections

and actuating mechanism, may be considerably varied without departure from the principle of my invention.

I do not limit myself, therefore, to the precise details herein described in illustration of my invention; but

What I claim, and desire to secure by Letters Patent, is—

1. The combination, with a vertically-reciprocating straight-awl, of a vibratory rotary curved needle, supported on a stock having a reciprocating sliding movement toward and away from the awl in a path at an angle to the path of movement of the latter, substantially as described, so that the awl shall enter the work from one side, and the needle shall then be caused by the sliding movement of its stock to penetrate the same from the opposite side until it meets or nearly meets the awl, and then to complete its course by its rotating movement, following the aperture made by the awl, which withdraws as the needle advances.

2. The combination of the awl and needle, constructed and operated as specified in the preceding clause, with the looper, substantially as shown and described.

3. The combination of the awl and edge-bender, moving together laterally to and fro, and operating to grasp the work and effect the feed, substantially as herein shown and described.

4. In combination with the awl and edge-bender, operating together as described, the channel-guide, moving to and fro laterally with the same during the feed movement, and pressed alternately tightly and with a yielding pressure on the work, substantially as shown and set forth.

5. The combination, for the purpose of bending the edge or outside chamfer of the sole, of the awl and the edge-bender, under the arrangement described, so that the awl shall first penetrate the sole from the inner channel to the proper depth, and the edge-bender shall then bend, over the point of the awl, that portion of the sole between the said point and the edge of the sole, as set forth.

6. In combination with the needle, awl, and edge-bender, operating together as described, the yielding last-support, having an up-and-down movement, and locked rigidly in place at proper intervals, substantially as shown and set forth.

7. The combination, with the sliding-stock which carries the rotary needle, of the means herein described, or their substantial equivalent, for varying the length of movement of said stock, in order to obtain loops of different sizes, as required, for light or heavy work.

8. The combination of the awl, edge-bender, and channel-guide, all supported in and moving with a laterally-sliding reciprocating head, arranged in the frame of the machine above the needle-stock, said parts being actuated and operating together substantially as herein shown and set forth.

9. The combination, with the reciprocating sliding head which carries the awl and edge-bender, of the means described, or their substantial equivalents, for varying the length of movement of said head and, consequently, regulating the feed.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

MICHAEL J. STEIN.

Witnesses:

M. BAILEY,

EDM. F. BROWN.

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