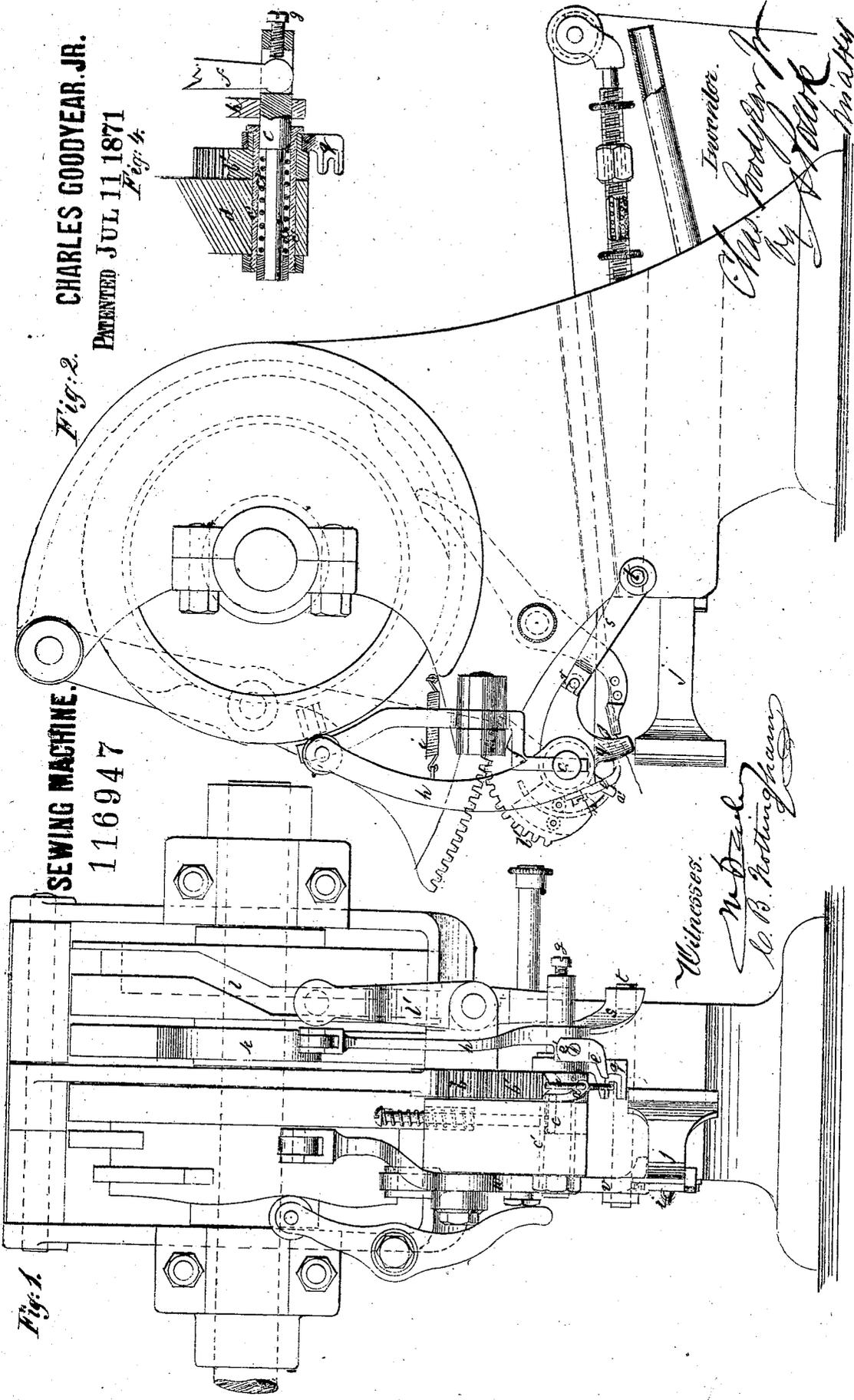


SEWING MACHINE.  
116947

Fig. 1.

Fig. 2.

CHARLES GOODYEAR, JR.  
PATENTED JUL 11 1871  
No. 4.



Witnesses.

*M. D. ...*  
*C. B. Nottingham*

Inventor.

*Chas. Goodyear Jr.*  
*By J. ...*  
*Attorney*

CHARLES GOODYEAR, JR.

SEWING MACHINE.

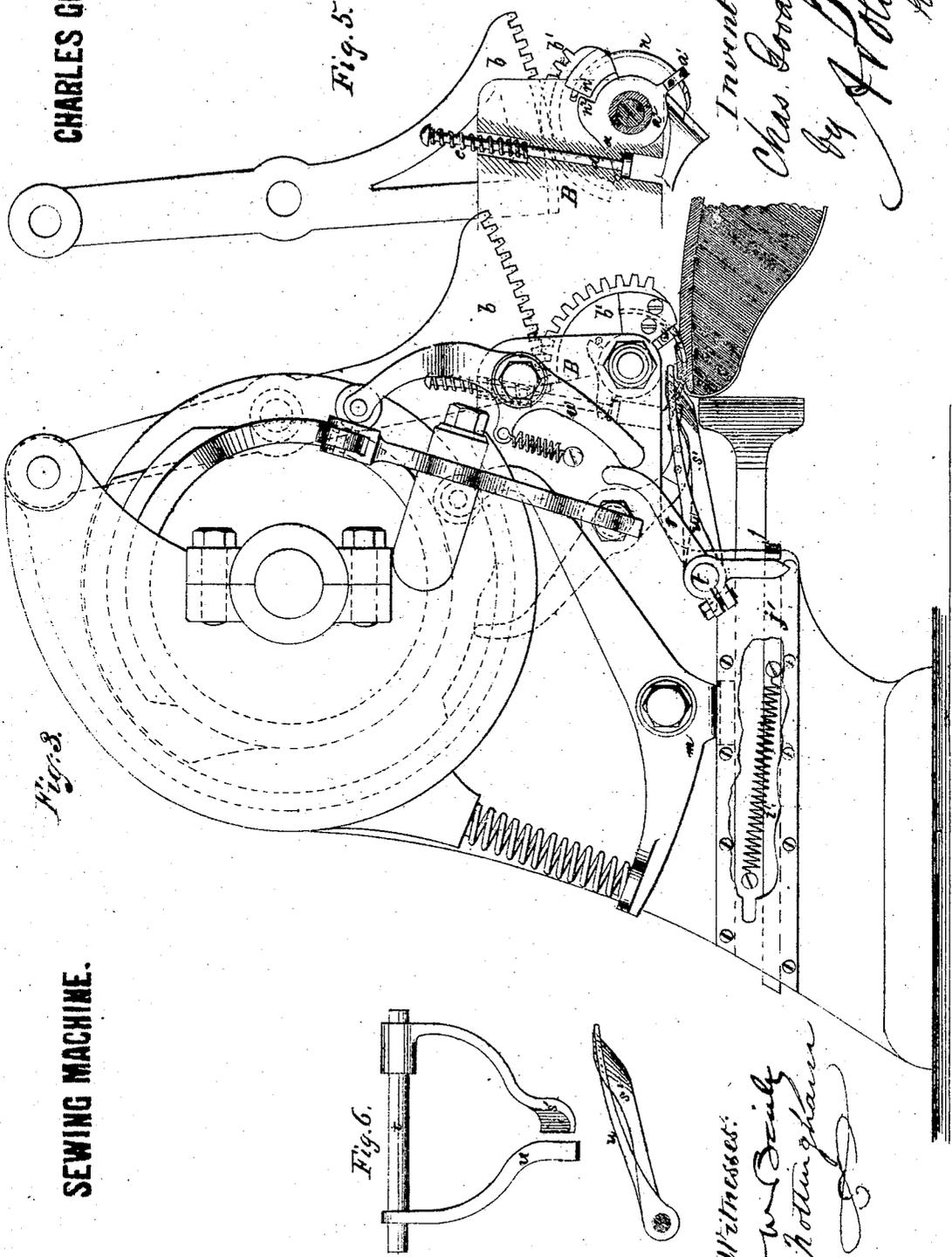


Fig. 5.

Fig. 3.

Fig. 6.

Inventor:

Chas. Goodyear Jr

By J. P. [Signature]

Attorney.

Witnesses:

W. B. [Signature]

C. B. Nottingham

# UNITED STATES PATENT OFFICE.

CHARLES GOODYEAR, JR., OF NEW ROCHELLE, NEW YORK.

## IMPROVEMENT IN SEWING-MACHINES FOR BOOTS AND SHOES.

Specification forming part of Letters Patent No. 116,947, dated July 11, 1871.

*To all whom it may concern:*

Be it known that I, CHARLES GOODYEAR, JR., of New Rochelle, in the county of Westchester 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:

The present invention relates to improvements in machinery for sewing turned work, or for sewing in-seams or welts, and it consists partly in improvements in the feeding mechanism, partly in improvements in the gauges for guiding or holding the work and in the methods of operating the same, partly in improvements in the construction and operation of the needle-shield or guard, and partly in other details hereinafter mentioned.

To enable those skilled in the art to understand and use my invention, I will now proceed to describe the manner in which the same is or may be carried into effect, by reference to the accompanying drawing, in which—

Figures 1 and 2 represent front and side views, respectively, of a machine embodying my improvements; and Fig. 4 represents a vertical section on an enlarged scale of a portion of the machine longitudinally through the axis of the shaft on which the combined feed-dog and gauge, hereinafter referred to, is mounted. Fig. 3 is an elevation of the machine on the side opposite to that shown in Fig. 2. Figs. 5 and 6 are views of details, which will be hereinafter referred to.

The feed mechanism heretofore used in machines of this class has consisted of a feed-dog having, in common with all sewing-machines substantially, an up-and-down and back-and-forth motion, and operating in connection with an independent channel-gauge. My improvement in this direction consists, 1st, in imparting to the feed mechanism an out-and-in and back-and-forth movement, the former two motions taking place in a vertical plane at right angles with the latter two; and 2d, in the employment, in lieu of the usual feed-dog and independent channel-gauge, of a feed device, which, for convenience sake, I will hereafter designate the combined feed-dog and gauge, so constructed and operating as to fill, in addition to its usual functions, the office of a channel-gauge. In order to effect the out-and-in movement of the feed device with greater simplicity of mechanism I mount it upon an axis,

on which, during this movement, it will oscillate or rock in a vertical plane at right angles with the line of feed; and this axis I prefer to have coincident with that of the needle, so that the feed device may move out and in concentrically with the needle in taking and releasing its hold on the bottom of the channel in the sole in which it works. Another distinguishing feature of this portion of my invention is that the needle is made to co-operate with the combined feed-dog and gauge for the purpose of holding the boot or shoe firmly in position by remaining in the work, while the said feed-dog and gauge releases its hold, moves back the length of a stitch and takes a fresh hold, ready to move the shoe forward when the needle is withdrawn from the stock. This portion of my invention will be readily understood by reference to the drawing, particularly Figs. 1, 2, and 4. The combined feed-dog and gauge is represented at *e*, and is preferably mounted upon a shaft or spindle, *c*, which has its bearing inside the hollow sleeve or cylinder *c'* upon which the geared needle-stock *b'* is mounted. A slight rocking motion concentric with the needle is imparted to the combined feed-dog and gauge by means of the cam-disk *k* operating upon the long arm *h* of the said feed-dog and gauge, the end of the arm being kept against the surface of the cam *k* by means of the spring *i* or its equivalent. The lateral or back-and-forth motions of the combined feed-dog and gauge are effected by means of the cam-disk *l* operating upon the lever *l'*, the other end of which lever works in the slot in the outer end of the shaft or spindle *c*, and the length of the stitch is governed by the set-screw *g* in the end of the shaft *c*, which can be screwed out or in to regulate the amount of lost motion in the slot. In lieu of making the motion of the feed-dog positive in both directions the dog need only be moved positively forward, while its back movement may be effected by means of a spring, *e<sup>2</sup>*, arranged around the shaft *c* within the sleeve *c'*, as shown in Fig. 4, or in any other suitable manner, which will be compressed as the feed-dog moves forward, and will, when the forward pressure is removed, expand and force back the dog. The spring may also be useful to prevent any jarring or rattling of the parts. The end of the combined feed-dog and gauge, which rests in the channel in the sole, is so shaped (see Fig. 2) that, while it fits the channel, its point is curved

to pass under and avoid lifting or bending the lap which covers the channel, whereby the operation of guiding the shoe, and keeping the feed-dog and gauge in the channel, is greatly facilitated. The needle *n* and its geared stock *b'* are moved by the geared lever segment *b* operated by a cam-disk in the usual manner. In the operation of the machine the cam-disks for providing the various motions of the needle and feed are so arranged that, supposing the needle *n* to have penetrated the work, it will remain there for the purpose of holding the shoe in position while the feed is actuated to take a fresh hold. This takes place as follows: The cam *k* and spring *i* cause at the proper time the combined feed-dog and gauge *e* to rock outwardly sufficient to release its hold on the work; the lever *l'* is then actuated by the cam *l* to cause the shaft *c* which carries the feed-dog to move back the length of a stitch, the distance being regulated by the set-screw *g*; the dog *e* is then caused by the cam *k* to take a fresh hold on the work; the needle *n* is then withdrawn, and finally the shaft *c* is moved up by the lever *l'* and cam *l*, causing the dog *e* to carry forward the work the required distance, after which the needle again descends.

I have thus described the combined feed-dog and gauge as having a rocking motion upon the axis of the needle-shaft in a plane at right angles with the line of feed. But it is manifest that the rocking movement of the feed-dog and gauge need not be concentric with that of the needle, but that the two devices may have different axes of oscillation, the feed-dog being so mounted that, in its outward motion, its point will rise slightly so as to clear the bottom of the channel in the sole. This feed-motion is also applicable not solely to the combined feed-dog and gauge *e* but to any suitable feed-dog or device in a boot-and-shoe-sewing machine, a great advantage of the motion being that the work is held more easily, and is not kept jumping up and down during the operation of the machine, as has heretofore been the case. That part of the feed-dog and gauge *e* which rests in the channel in the sole may be made adjustable to permit it to be raised or lowered with reference to the needle. I have indicated the manner in which this may be accomplished in Fig. 1 of the drawing, where the lower part of the feed-dog and gauge *e* is held to the other part by a set-screw, *e'*, which passes through a slot formed in said lower part, and admits of the vertical adjustment of this part. The second portion of my invention relates to the construction and operation of the back or edge-gauges. Hitherto in machines of this class the edge or welt-gauges, while the needle is piercing the stock, have been held against the work by the action of a spring with more or less pressure, according to the strength of said spring; and at the moment when the feed takes place the pressure of the spring is simply removed, but without lifting the gauge or gauges away from the work. My improvement in this direction consists, principally, in an arrangement whereby the back gauge, whether it be the welt-gauge used in sewing

“turns,” is lifted entirely off from the edge of the work while the shoe is being moved by the feed mechanism, so that the shoe may be as free to move as possible, and so as not to form wrinkles or folds in the upper of the boot or shoe. Another feature consists in locking or fastening the gauges operating as above described rigidly in their position against the work while the needle is piercing the stock, by means substantially as hereinafter specified. The manner in which this portion of my invention is or may be carried into effect, will be readily understood by reference to Figs. 1, 2, 3, and 6 of the accompanying drawing. In sewing welts or in-seams it is found desirable to mount the welt-gauge so that it will have a motion concentric with the needle, but in sewing turns I have found this plan objectionable, for the reason that it brings the pressure too much against the edge of the work and not sufficiently upon the top of the sole. For the latter purpose, therefore, I use a gauge such as shown at *S'*, Fig. 6, where it is represented in plan and side elevation, which, instead of being mounted concentrically with the needle, is attached to a rock-shaft, *t*, supported at a suitable point in the frame of the machine, preferably in rear of the needle-shaft, and below a horizontal plane passing through the same, so that the gauge *S'* may rest more upon the top of the work, as shown in Fig. 3. The motion of the rock-shaft should be so timed with that of the needle that the gauge *S'* shall press down upon the work or upon the top of the sole to keep it down upon the last while the needle is piercing the stock, at which time the said gauge is locked in its position by means substantially as will be presently described. But while the feed mechanism is moving the work the gauge *S'* is lifted entirely away from the same, by the action of the lever *w* upon the long arm of a lever, *v*, attached to the rock-shaft *t*, the motion of lever *w* being produced by a cam-disk, with which its upper end is in contact, as shown in Fig. 3, the cam being so shaped as to produce this movement of the lever at the proper time. This mechanism is sufficient to produce the lifting of the gauge. The downward movement of the gauge is produced by a spring arranged in any convenient manner, which, when the lever *w* ceases to be operated as above described, draws or presses down the gauge upon the work. As represented in the drawing, the gauge is operated in this direction by the spring *v'*, which is caused to operate the slide *j'*, whose front end is turned outward to form a hook which engages with the shorter arm of the lever *v*. The spring draws back the slide *j'*, and the latter draws back the short or lower arm of the lever *v*, and consequently actuates the rock-shaft *t* to effect the lowering of the gauge. The gauge when thus drawn down is locked rigidly in position by the locking-lever *m*, (which is actuated by a spring and cam-disk in the usual manner, as seen in Fig. 3,) and is so held while the needle is piercing the stock, after which it is released and raised from the work. The spring *v'* is arranged to operate both the gauge *S'*, and the auxiliary yielding edge-gauge *j* which is arranged

above the slide  $j'$ , and so as to press upon it when the locking-lever  $m$  is pressed down by its cam. The arrangement and functions of this yielding edge-gauge are fully set forth in another application for Letters Patent made by me and now pending in the United States Patent Office, and need not therefore be now described, all that is novel, so far as concerns the gauge in the machine here shown, being the arrangement of the two gauges, so that they are locked by the same lever and operated by the same spring. I have described my invention in connection with a gauge such as represented at  $S'$ , but when a welt-gauge is desired I remove the gauge  $S'$  and use in its stead a welt-gauge,  $g$ , mounted concentrically with the needle, as shown in Figs. 1 and 2. In order to operate this welt-gauge I mount upon the rock-shaft  $t$ , in lieu of the gauge  $S'$ , an arm,  $S$ , best seen in Fig. 2, which is connected with the welt-gauge through the slotted joint  $r$ , and operates said gauge in the same manner as the edge-gauge  $S'$  is operated. In combination with either kind of gauge I also use, when necessary, an arm or spring to press upon the work on the top of the seam as close as possible to the path of the needle, but on the opposite side of the needle from the combined feed-dog and gauge, in order to prevent the work from lifting the sole from the last in drawing up the loop. This gauge is shown in Figs. 3 and 6 at  $u$ , being mounted upon the rock-shaft  $t$ , by which it is caused to move in unison with the edge or welt-gauge toward or away from the work. The gauge may be made in the form shown, or may be otherwise suitably shaped. I prefer to make it springy or yielding, that it may adapt itself to any irregularities in the stock. Another feature of this invention consists in the arrangement and operation of the needle-guard or shield in such manner that when the needle descends to pierce the stock the needle-shield is caused to descend with it, and to brace and support it as closely as possible to the work while it is piercing the stock, and when the needle is withdrawn from the stock the motion of the shield is so timed that while the shield returns with the needle it will support the same all the time as near the barb as possible. The manner in which this result is accomplished will be readily understood by reference to Fig. 5, which represents a sectional side elevation of so much of the machine as is needed to illustrate this portion of my invention.  $a$  is the needle-shield or guard, shown also in Figs. 1, 2, 3, of any suitable construction, secured to or forming part of a ring or stock,  $a^2$ , mounted so as to vibrate upon the same axis as the needle. The stock is provided with a projection,  $a$ , upon which a continuous pressure or pull in an upward direction is exerted by means of the rod  $d$  and coiled spring  $c$ , arranged and supported in the frame of the machine substantially as shown, the lower end of the rod engaging with the projection  $a$ , and being drawn upward by the action of the spring  $c$ , by this means keeping the shield close to the barb of the needle, as shown. The return or back movement of the shield is occasioned by a projection or

shoulder,  $n^1$ , or the needle-stock  $b'$ , and a corresponding shoulder,  $n^2$ , on the shield-stock, the former projection being brought in contact with the latter when the needle moves back, thus causing the needle and shield to move together, and keeping the latter still close to the needle-barb. It is manifest that, in lieu of the particular arrangement just described, other arrangements and modifications of the devices named may be made; the object, as above stated, being to hold the needle-shield at all times as near as possible to the barb of the needle. In order to strengthen the needles used in these machines as much as possible, before cutting the barb I cause the wire of which the needle is formed to be stamped or swaged in such a manner as to throw the metal out upon the side which it is desired to strengthen, or opposite to the barb of the needle. This may be done sufficiently to add greatly to the strength of the needle, without, however, making such a swell upon the side of the needle as to be objectionable on account of deflecting the needle in passing through the stock. In order to make the needles pierce the stock easily I make the points triangular in shape, similar to a sail-makers' or glovers' needle, taking care to keep the point central with the curved line of the center of the wire.

Having now described the manner in which my invention may be carried into effect, what I desire to secure by Letters Patent is—

1. The combination, with a curved vibratory needle, as described, of a feed-dog having a back-and-forth rectilinear motion and a rocking out-and-in motion, the latter motion being concentric with that of the needle, substantially as shown and described.

2. The combined feed-dog and channel-gauge, constructed and operating substantially as herein shown and described.

3. The combination of the curved needle and the combined feed-dog and gauge with the mechanism for operating the same, under the arrangement, substantially as described, whereby the work is held in position by the needle while the combined feed-dog and gauge releases the work and takes a fresh hold thereon preparatory to producing the feed, as set forth.

4. The combined feed-dog and gauge operating in the channel as described, and curved inwardly at its lower end so as to move laterally in the channel in the sole to effect the feeding movement without lifting up the lap over said channel, substantially as shown and described.

5. The combination, with the curved needle, of the combined feed-dog and gauge made adjustable, substantially as herein described, so that the part which enters or rests in the channel in the sole may be raised or lowered with reference to the needle.

6. In combination with the vibratory edge-gauge, operating substantially as specified, the mechanism herein described, or the substantial equivalent thereof, for locking or rendering rigid the said gauge at the proper intervals, as set forth.

7. The edge-gauge and the rock-shaft upon which it is mounted, in combination with the

system of levers and spring and slide-bar, constructed and arranged substantially as herein described, for actuating and locking said gauge at the proper intervals, as set forth.

8. The combined edge-gauge and welt-guide, when mounted concentrically with the needle and operated by the rock-shaft and locking mechanism, as herein shown and described.

9. The combination of the vibratory edge-gauge and the sliding auxiliary edge-gauge with the mechanism herein described for actuating and locking the same, whereby both gauges are held rigidly by the operation of the same locking mechanism.

10. The auxiliary pressure-gauge arranged to bear at the proper time upon the top of the seam in the sole on the opposite side of the needle from the feed-dog, substantially as shown and described, to prevent the needle from lifting the sole from the last when drawing up the loop.

11. The auxiliary pressure-gauge mounted upon the same rock-shaft or axis with the vibratory edge-gauge, and actuated to move in unison with the same toward or away from the work, as set forth.

12. The combination, with a needle-shield mounted and operating concentrically with the needle, of the devices herein described, or their substantial equivalent, for keeping said shield at all times as near the needle-barb as possible, both before the needle enters and after it withdraws from the work.

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

CHAS. GOODYEAR, JR.

Witnesses:

CHAS. T. DEFOREST,  
GOWEN H. CRAGG.

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