L. R. BLAKE.

Boot and Shoe Sewing-Machine.

No. 207,340. Patented Aug. 27, 1878.

Fig: 1.

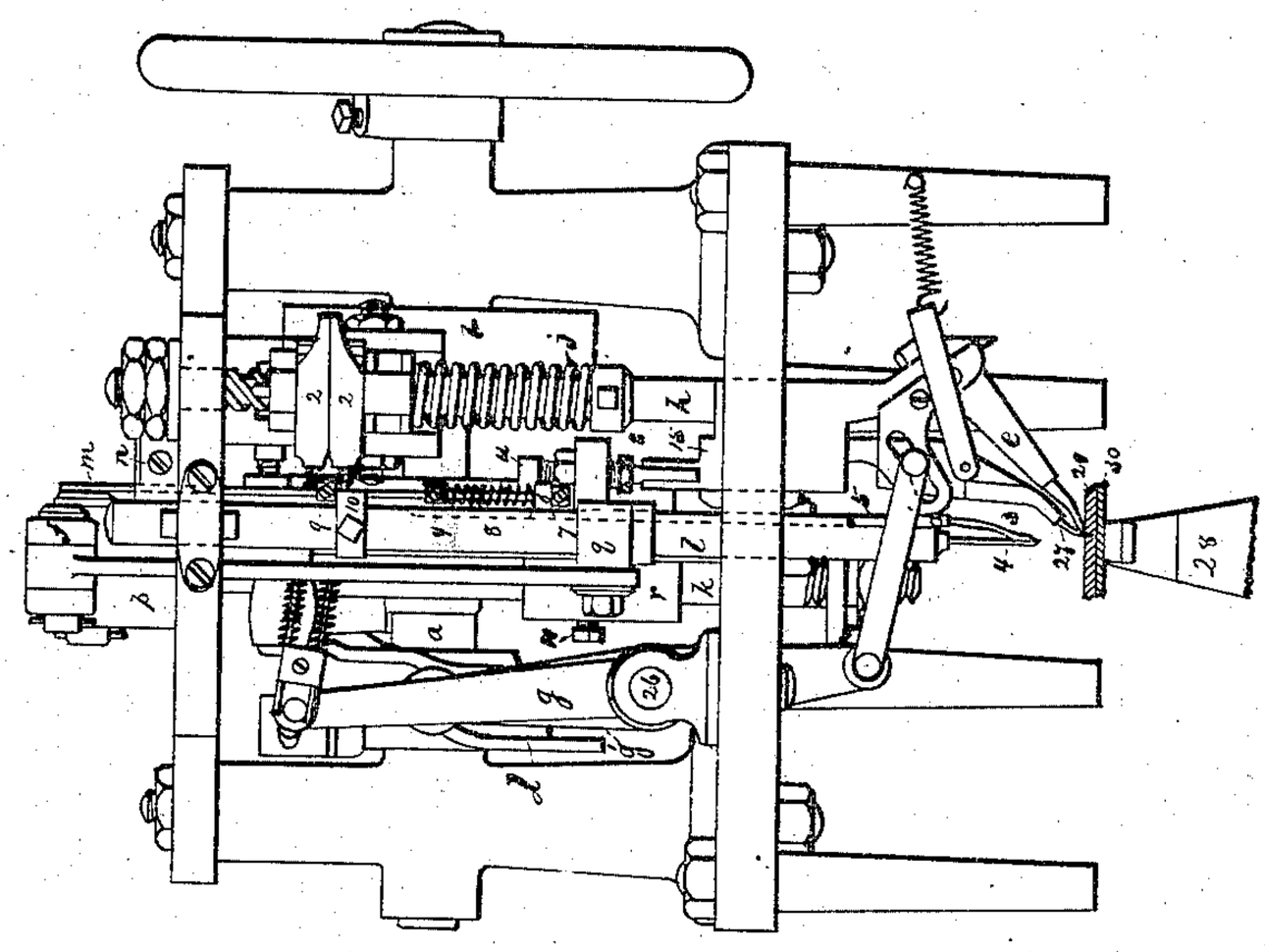


Fig: 3.

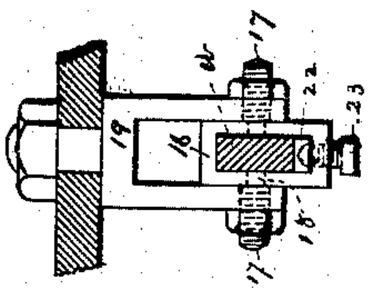


Fig: 4.

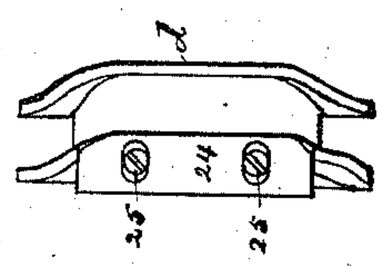
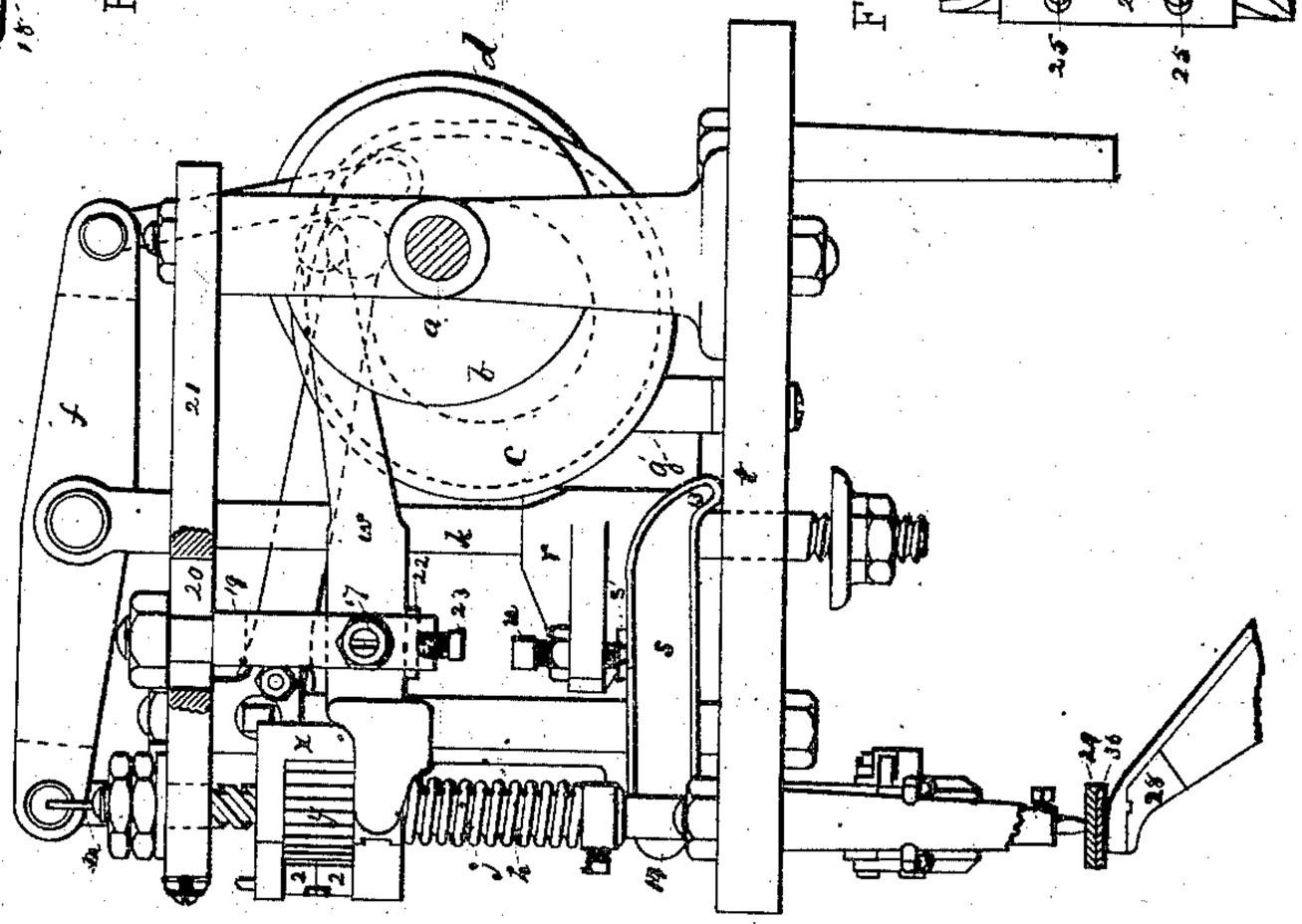


Fig: 2.



Witnesses.

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per Crosby & Gregory Attys

UNITED STATES PATENT OFFICE.

LYMAN R. BLAKE, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN BOOT AND SHOE SEWING MACHINES.

Specification forming part of Letters Patent No. **207,340**, dated August 27, 1878; application filed June 6, 1877.

To all whom it may concern:

Be it known that I, LYMAN R. BLAKE, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Sewing-Machines, of which the following is a specification:

This invention relates to sewing-machines chiefly designed to sew soles to uppers in the manufacture of boots and shoes, and is an improvement upon the machines represented in United States Patents Nos. 36,163 and 45,422.

In the present machine many of the parts operate as described in the said patents, and need not therefore be specifically described.

Instead of operating the presser as in such patented machines, it is timed with reference to the movement of the needle, so that the stock is held down upon the horn until the needle completes that portion of its upward movement derived from the action of the needle-bar-actuating lever and its operating-cam, such movement drawing up and completing the stitch, and then the presser is lifted while the stock is fed the necessary distance for another stitch. In this way the sole and upper are held clamped together between the presser and horn when the stitch is drawn taut, the stock being thereby held more firmly and closely together at the stitch-making point than would be possible were the thread alone depended upon, as heretofore.

In the McKay machine, as now made, the presser is raised just about as the hook of the needle in its ascent reaches and commences to draw the thread through the inner sole. This upward movement of the presser releases the stock from pressure between it and the horn, and the force with which the contacting faces of the stock is crowded or pressed together is made dependent on the thread alone.

The thread resting in the hook of the needle is usually subjected to all the strain that it will bear without breaking. This strain averages from seventy to ninety pounds, but in actual work the stock is not really drawn together with a force equal to the strength of the thread, for much of the strength of the waxed thread is consumed by friction about the stock and by reason of its being frayed and chafed by straining it about the hook of the needle.

I have found that the ripping of machine-sewed shoes is due to the fact that the stitches are cut at the junction of the sole and upper, by reason of the movement of the outer sole longitudinally with reference to the face of the upper placed between it and the inner sole. The sole, in ordinary use, is never pulled from bolts of thread attached to the inner sole or upper, as would be the case if the outer sole became loose by reason of cutting the thread at the outer face of the outer sole.

I have demonstrated that the thread holding the upper and outsole together is cut by the longitudinal movement of the sole over the upper as the shoe or boot is being worn, and I have also demonstrated that this cutting or ripping of machine-sewed work can be obviated, provided the stock, as the thread is being drawn through it, is crowded together very firmly and so held. If the stock is so held, the thread drawn by the needle is relieved from all strain except that resulting from friction between itself and the hole made for it in the stock, and, being drawn closely up to and upon the stock held as before described, the stock is retained by the thread in substantially the position at which it was held between the presser and horn, so that the sole or parts thereof outside the upper will not move longitudinally over the face of the portion of the upper between the outer and inner soles, and consequently the stitches will not be cut. In sewing in this way, the thread having been relieved from most of its strain, another most important result is accomplished—viz., the holes in the stock are better and more completely filled with thread. If the strain on the thread is not consumed in crowding the stock together, then the thread may be larger, as compared with the needle-hole, without fear of breaking it when being drawn therethrough. Either the needle may be made smaller with the same size thread, or with a needle of usual size a larger thread may be used. This increase of thread in the needle-holes adds very materially to the strength and durability of the shoe, as will be apparent to those skilled in the art.

The presser, resting in the channel of the outer sole just at or just in advance of the

stitch-making point, holds the stock together firmly and closely by the action, in this instance, of a strong spiral spring, made adjustable, so as to exert a certain minimum amount of pressure while the hook of the needle is below the stock; and as the hook of the needle, in rising with the loop, meets the stock and begins to exert an upward pull thereon, then the force required to draw the needle and loop through the stock is transferred to the presser through the action of a pressure-augmenting lever, one end of which is fixed in position, while the other end rests upon a lug projecting from the presser-bar. An arm from the needle-lever fulcrum rests upon this augmenting-lever, and is provided with an adjusting-screw to insure a loop of the proper length, and thereafter this length of loop is maintained, notwithstanding variation in the thickness of the stock.

Figure 1 represents, in front elevation, the upper part or head of a sole-sewing machine provided with my invention; Fig. 2, a side view thereof; Fig. 3, a detail of the fulcrum for the presser-lifter, and Fig. 4 a detail of the cam for operating and changing the length of feed.

The main shaft *a* of the machine is provided with cams *b c d* to operate the presser *e*, the needle-lever *f*, and the arm *g* of the feed-operating mechanism. The presser, its carrying-bar *h*, provided with a screw-thread, the ratchet-wheel *y* thereon, the pawls 2 2 and devices to operate them, spring *j*, needle-lever, its movable fulcrum-bar *k*, needle-bar *l*, and feeder are in construction substantially as in Patent No. 45,422, before referred to; but their times of movement and operation upon the stock in the process of making the shoe are varied for the purposes herein described, to produce more solid work, which will not rip.

The cast-off 3, connected with the cast-off bar 5, operates with the needle 4 to cover and uncover its hook, as usual. A lug, 6, at the upper end of the cast-off bar, receives through it a rod, *m*. An adjustable stop secured to the lower end of the rod *m* bears against the under side of the lug 6, and a spiral spring, 8, on the rod rests upon the top of the lug to permit the cast-off to be moved down under a yielding pressure.

A projecting collar, 10, on the needle-bar meets, at its ascent and descent, adjustable stops 9 attached to the rod *m*, so as to raise and lower it at the proper time to uncover and cover the hook of the needle. The rod *m* is held, when the needle-bar changes its direction of movement, by a friction device, *n*. The needle-lever is connected by a link, *p*, with a collar, *q*, on the needle-bar.

The arm *r*, adjustably connected with the movable fulcrum-post of the needle-lever by a screw, 11, has its free end extended laterally, so as to rest upon the pressure-augmenting lever *s*. This lever *s* bears at its rear end 13 on the plate *t*, instead of upon a projection from the rising-and-falling fulcrum-rod of the presser-lifting lever, as heretofore common, and its forward end rests, in this instance, in a slot in an ear, 15, forming part of the rising-and-falling stock of the presser. The arm *r* has an adjusting-screw, *u*, which may be adjusted to regulate the length of loop to be drawn above the stock, and thereafter the same length of loop is maintained automatically with all thicknesses of stock.

In the old machine, the length of loop was changed by moving the bar *r* up or down upon the needle fulcrum-post, which was difficult when it was desired to make but a slight variation in the length of loop, because the set-screw would slip into the depression made by the screw when previously set tight.

The end of the screw *u* will, in practice, rest upon a shoe, *s'*, as shown in Fig. 2, the shoe preventing the screw from wearing into the lever. The presser-lifting lever *w* is connected in the ordinary way with the block *x*, which carries the ratchet *y*, that surrounds the screw-threaded portion of the presser-shank *h*. The lever *w* has its fulcrum in a box, 16, pivoted on the turned-down ends 18 of screws 17, extended through ears of a depending stand, 19, made horizontally adjustable in a slot, 20, of the plate 21, so as to vary the length of the lever and the lift of the presser. A gib, 22, in the box 16 is pressed against the lower end of the lever *w* by a screw, 23.

The presser-foot may be lifted more or less at each rotation of the cam *b* by adjusting the fulcrum of the lever *w*.

In the ordinary McKay machine the presser-lifting lever has its fulcrum on a rising and-falling fulcrum-post. This is objectionable, for when the fulcrum-post is permitted to rise more or less, so as to vary the lift of the presser, the end of the lever is changed in position, so that the cam operates it out of time with relation to the feed.

In the present machine the length of the feed may be changed at pleasure by moving the throwing part 24 of the feed-cam *d*, such part 24 being adjustably connected with such cam by screws 25, placed in elongated slots in the throwing part.

In the usual McKay machine it is necessary to shift the feed-operating cam longitudinally on its shaft to lengthen the feed-stroke. This movement of the cam so changes its relation with the fulcrum of an arm in all respects like that herein marked *g* that the feed-point, as it is depressed, is thrown a little forward out of time.

In this invention the lateral movement of the feed is produced without shifting the cam on the shaft, and consequently the stock is not pulled when the presser holds it down, as it would be if the feed, as it descended, moved forward just in advance of its time.

The rocking motion of the shaft 26, moved by the cam *d* and arm *g'*, operates the feeding-dog 27 in the ordinary manner. The rotating

horn 28 will be as in the patents referred to. The usual whirl in the horn will preferably be operated continuously in one direction, but at a variable speed, by devices such as shown in another application filed by me June 6, 1877, for Letters Patent, such whirl being operated through the agency of eccentric-gears, so as to give it a fast and slow motion.

The drawing shows two pieces of leather, 29 30, between the presser and horn. It will be assumed that the piece 29 represents the outer sole and the piece 30 the upper, they being placed in contact in any of the ways in which such parts are placed together to be united on the McKay machine, and that the presser rests in a channel cut in the sole in any usual way.

In the drawing the needle is represented as having reached its top stroke, where the loop of thread is drawn closely and firmly up into the stock, and it has there rested sufficiently long to permit the feed to engage the stock and to permit the pawls to lock into the ratchet *y*, so that the presser-foot may be lifted, whereas in the old machine the ratchet is locked just as the needle commences to rise. Assuming that one stitch has been made, then when the needle commences to descend from its highest position the presser rests with its lower end in the channel in the outer sole just at or near the point at which the needle is about to enter the stock. The presser is held down by the stress of the spring *j*. The loop of thread just drawn into and through the stock, just beyond the end of the presser, holds the stock together at that point firmly. The needle penetrates the stock and enters the hole in the horn, and the whirl lays a thread into the hook of the needle, and then the needle is raised. As the needle commences to rise the needle-lever is called upon to exert sufficient power to draw the loop and hook up through the hole in the stock. The power required to do this is exerted by the needle-lever, and the force expended at the outer end of such lever is made to depress the fulcrum-post of the needle-lever with an equal amount of force, and such post, through the arm *r*, resting on the augmenting-lever *s*, connected with the presser, causes the strain required to draw the needle and loop up through the stock to be transferred at each stitch to the presser-foot, thereby increasing the pressure of the presser upon the stock at each stitch over and beyond the pressure of the spring, this amount of increase of pressure varying according to the thickness and density of the stock.

The thread, as heretofore used in the McKay machine, has crowded the stock together at the stitch-making point with a force equal to the strength of the thread employed less its loss of strength by reason of friction on the stock and abrasion on the hook of the needle. The maximum pressure exerted by such thread is many times less than the pressure exerted by the presser in the present invention. This presser holds the stock crowded closely together until the needle draws the loop up through the hole and the stock, and thereby confines the stock in the condition in which it was held by the presser and horn. After the stitch is drawn up the feed-point 27 descends and penetrates the stock. The presser-foot is then lifted positively just enough to permit the stock to be moved over the horn, and then the feed-point is moved laterally to feed the stock for a new stitch. The needle, through parts *s r k f p l*, was lifted a little as the presser was lifted. Such movement did not farther draw the loop into the stock, but simply held it taut. After the completion of the feed the presser is again allowed to descend upon and clamp and hold the stock until the thread is again drawn through it.

In the old form of machine the increased strain upon the needle fulcrum-post, caused by drawing the loop through the stock, was not permitted to increase the pressure of the presser on the stock, for at that time the pawls were thrown into engagement with the ratchet, and the presser-foot was lifted from the horn.

The pressure of the presser-foot upon the stock has been described as variable at each stitch. This is the way it is preferred to construct the machine; but instead of such construction the presser may be held down by the stress of a spring and be lifted from contact with the stock, as and in accordance with the time just before described.

In ordinary sewing, the thread, as the stitch is drawn taut, acts to give the final set to the material being sewed together.

In this my machine the presser-foot in the channel is caused to press the stock together in the exact line of the seam, and the pressure so exerted is always in excess of the pressure which the thread can exert, and consequently the stitch, when drawn taut, does not give to the stock its final set.

I claim—

1. In a sole-sewing machine, the presser and the needle-actuating lever and its movable fulcrum-post, in combination with connecting mechanism, whereby the resistance which the needle and thread meet with in being drawn up through the stock is transferred to the presser-foot resting thereon to increase its pressure at each stitch, substantially as described.

2. The combination, with the needle, the presser-foot, its spring, ratchet, and ratchet-holding pawl, of mechanism to lock the ratchet and permit the presser-foot to be lifted from pressure on the stock just as the needle completes the stitch, as and for the purpose described.

3. The combination, with the needle-lever, fulcrum-post, and its arm, of the screw *u*, to adjust the length of loop, substantially as described.

4. The presser-foot-lifting lever, in combi-

nation with the pivoted horizontally-adjustable fulcrum-block, to operate substantially as described.

5. The combination, with the feeding mechanism, its connected shaft 26, and arm g', of the cam d and its adjustable throwing part 24, to vary the length of feed, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LYMAN R. BLAKE.

Witnesses:
G. W. GREGORY,
W. J. PRATT.