

C DANCEL & A. EPPLER, Jr.
Sole Sewing Machine.

No. 240,307.

Patented April 19, 1881.

Fig. 1.

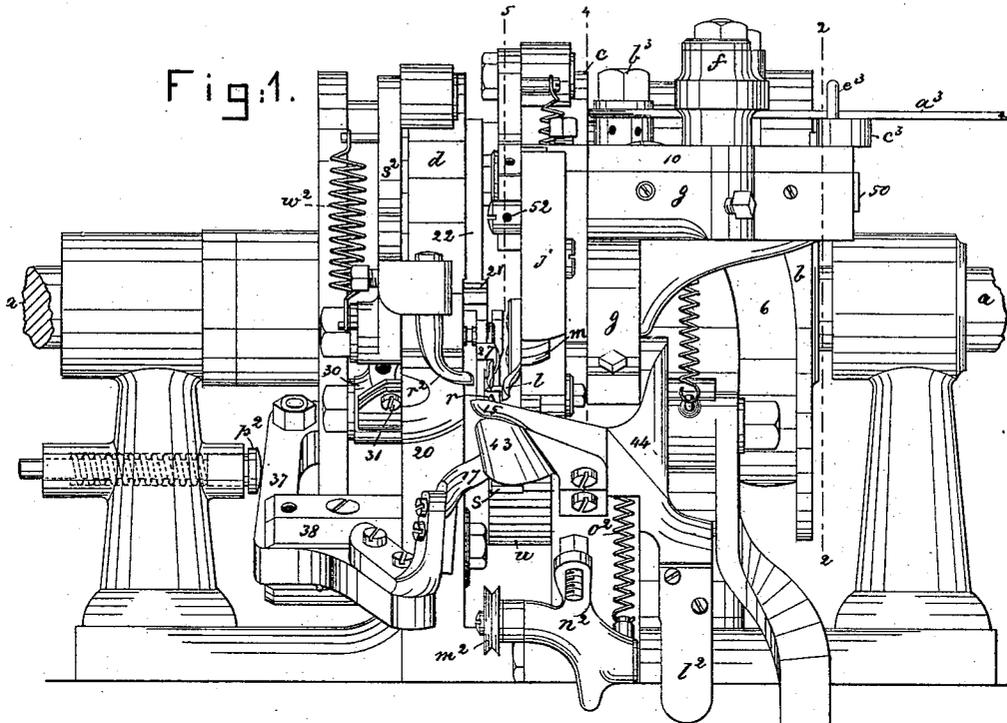
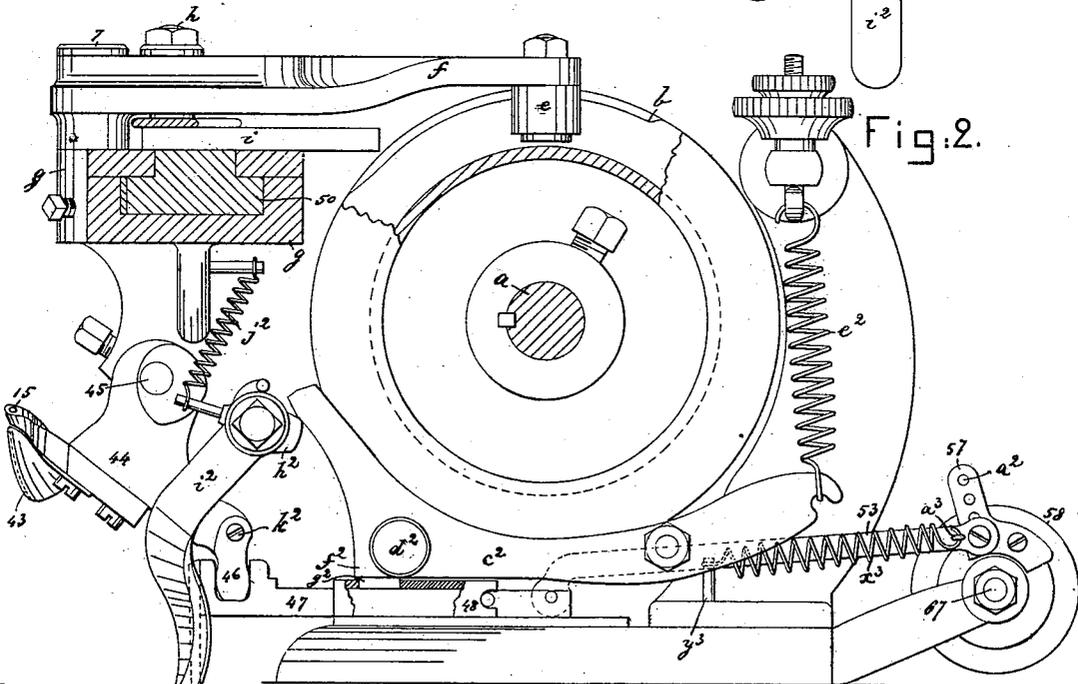


Fig. 2.



Witnesses.

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Fig:4.

Fig:3.

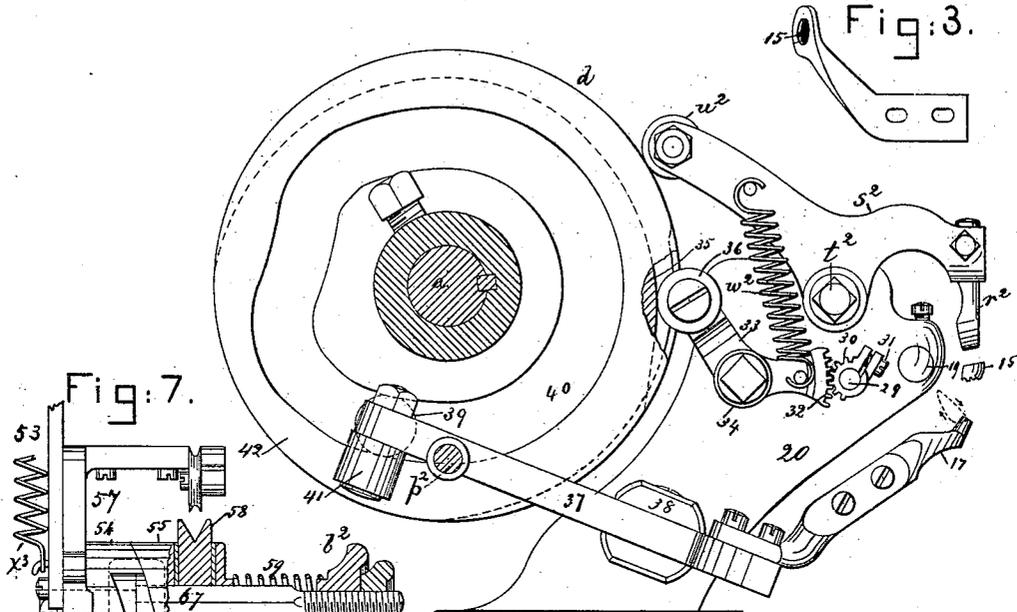


Fig:5.

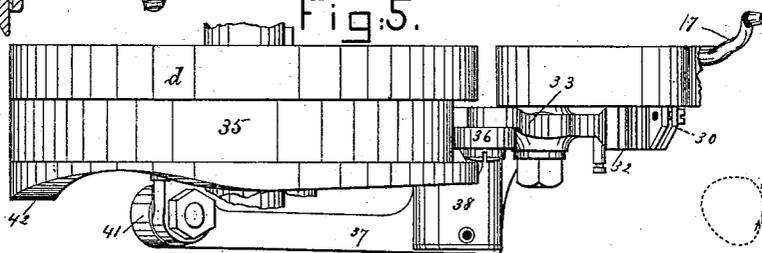


Fig:6.

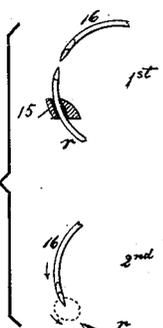
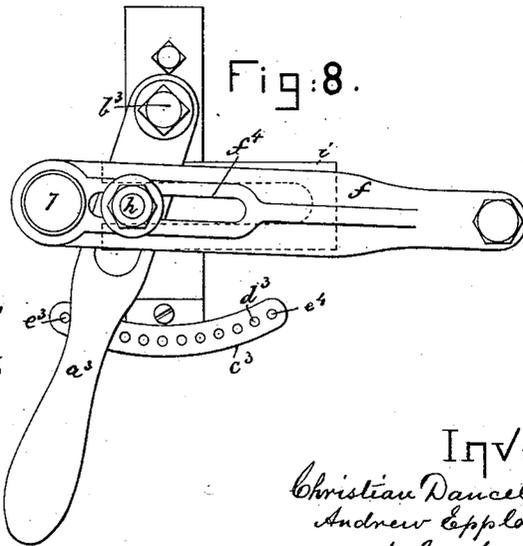


Fig:8.



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Fig:9.

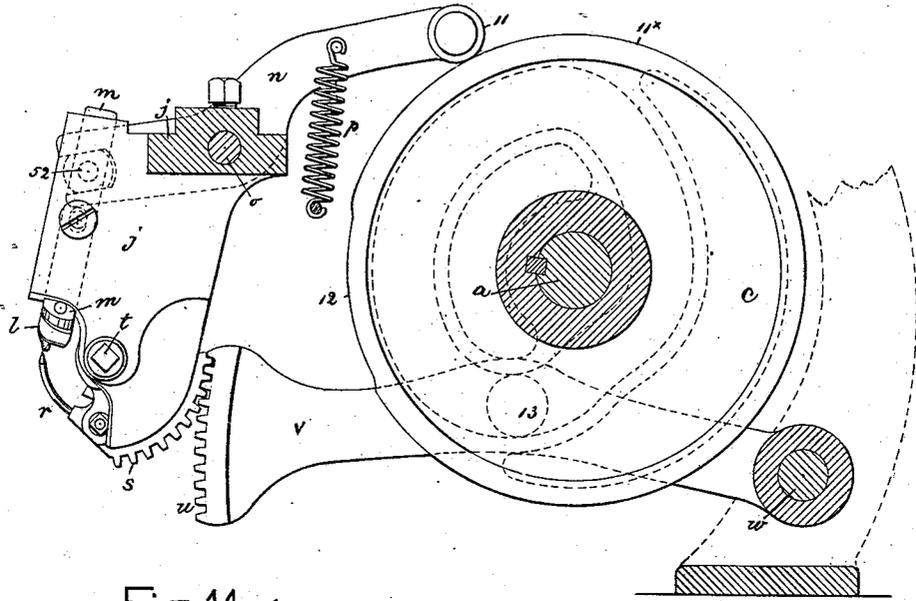


Fig:11.

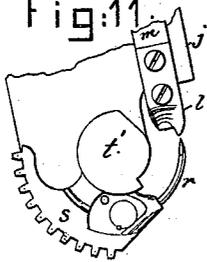


Fig:10.

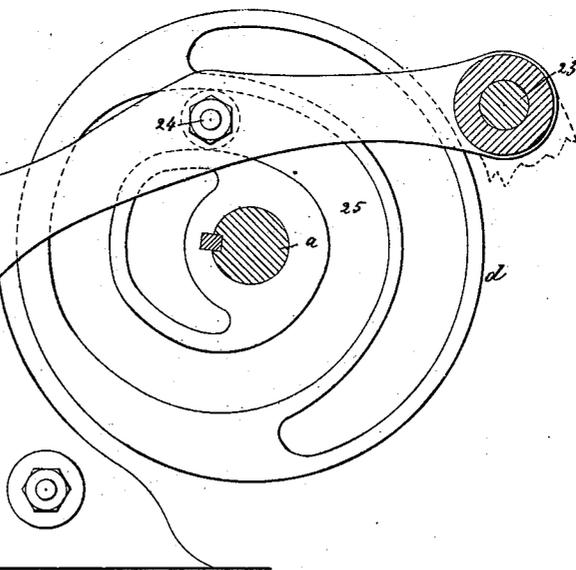
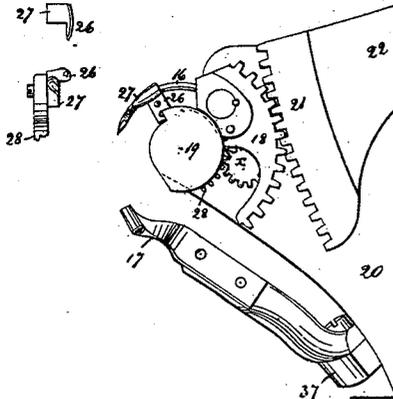


Fig:12.



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UNITED STATES PATENT OFFICE.

CHRISTIAN DANCEL, OF BROOKLYN, NEW YORK, AND ANDREW EPPLER, JR.,
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SOLE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 240,307, dated April 19, 1881.

Application filed May 21, 1879.

To all whom it may concern:

Be it known that we, CHRISTIAN DANCEL, of Brooklyn, county of Kings, State of New York, and ANDREW EPPLER, Jr., of Lawrence, county of Essex, State of Massachusetts, have
5 invented an Improvement in Sole-Sewing Machines, of which the following description, in connection with the accompanying drawings, is a specification.

10 The machine herein described is designed chiefly to stitch outsoles to welts in the manufacture of what are known as "welted" boots and shoes, and is an improvement upon the machine described in United States Patent No.
15 96,944, granted November 16, 1869. The herein-described machine, as well as the one described in that patent, employs a curved awl and needle, each held by segmental carriers, and the fair side of the chain-stitch is laid upon
20 the welt, the chain or loop part being embedded in the channel at the bottom of the outer sole.

In this invention the narrow work-support for the work, instead of being stationary, as is the case in other sole-sewing machines employing a curved needle and awl, is so mounted
25 as to yield at the proper time and accommodate itself to variations in the thickness of the work, and in connection with said yielding work-support there is employed a channel-gage, which, acting in the channel of the outer
30 sole, forces the sole and welt (herein denominated the "material") down to a fixed level, the material below the channel-gage, whatever may be its thickness, being sustained by the narrow work-support, which, as the channel-gage is thrown down, is released to permit the
35 work-support to yield and adapt itself to the thickness of the material, after which it is locked. The work-support, when not locked in position, is pressed upward against the material by means of a spring, which enables the work-support to rise to the proper level to hold the material, whatever may be its thickness. Co-operating with this yielding work-support
40 is an intermittingly-operated locking device, which locks the work-support while the awl and needle pierce the work, and releases it while the awl in the material feeds it forward, and then again just as the channel-gage hav-

ing been moved backward after its forward or
50 feeding movement is depressed upon the material, the needle during this operation being in the material and just ready to be moved to draw the loop for a stitch. This arrangement of the work-support has the effect of giving a
55 uniform length of loop above the surface of the material, irrespective of variations in its thickness, whereas in the machine referred to in the said patent the loop is drawn longer for thin than for thick material, which is a great
60 defect and causes the work to rip. The feed of the shoe or boot is produced by means of the awl and channel-gage, connected with the same sliding carriage and moved together horizontally while in engagement with the sole,
65 thereby producing a very strong and effective feed.

The invention also consists in the combination, with a work-support for the material and a tension-wheel or device for the waxed thread,
70 of intermediate connecting mechanism between them, whereby the tension upon the thread is varied automatically, according to the thickness of the material being sewed.

This present machine is provided with a
75 presser-foot, placed at the rear of the needle, in the direction of the movement of the work, said presser-foot co-operating with the work-support to hold the stock down more firmly, while the needle acts to draw up the loop. It
80 also acts directly upon the loops of the seam and presses them into the channel, and at the same time the channel-gage operates upon the material in front of the needle.

Figure 1 represents, in front elevation, the
85 head of a sewing-machine embodying our invention; Fig. 2, a section on the line 2 2, Fig. 1; Fig. 3, a view of the work-support, in which is made the needle-throat; Fig. 4, a view of a part of the left-hand end of the machine, showing the presser-foot, looper, and device for operating the cast-off; Fig. 5, a top view of Fig. 4, the presser-foot being omitted. Fig. 6 represents some details of movements of the needle and awl with reference to the work-support;
90 Fig. 7, a detail of the thread-tension mechanism; Fig. 8, a top view of the feed-varying device; Fig. 9, a section on line 4, Fig. 1; Fig.

10, a section on the line 5, Fig. 1; Fig. 11, a detail of the awl and its connected segment, and Fig. 12 details of the cast-off.

The main rotating shaft *a* of the machine has upon it hubs *b c d*, having proper projections, depressions, and grooves to correctly actuate the various parts of the machine to produce stitches. The cam-groove 6 receives a roll, *e*, at the end of and vibrates a lever, *f*, pivoted at 7, upon a rigid part, *g*, of the frame-work of the machine. The lever *f* is slotted at or near its central portion, as shown at *f*⁴, Fig. 8, to embrace a stud, *h*, the lower end of which is extended into a grooved block, *i*, (the groove being shown in dotted lines, Fig. 8,) rigidly attached to a carriage, *j*, having a part, 50, fitted into suitable guideways made in the frame *g*. (See Fig. 2, where the said part 50 and guideways are shown in section.) This carriage, at the lower end of its vertical portion, has attached to it the pivot *t*, which supports the awl carrier or segment *s*, so that as the carriage is moved the awl, being in the material, is made to act as the feeding device.

The channel gage and opener *l* has its shank or carrying-bar *m* fitted to be slid in a groove in the carriage *j*. (See Fig. 9.) The bar *m* of the channel-gage has a stud, which is embraced by the forked end of a lever, *n*, pivoted at *o*, and connected with a spring to depress the rear end of the lever and hold its roll 11 in contact with the cam-shaped periphery of one edge of the hub *c*, the said spring acting to depress the rear end of the said arm and lift the channel-gage when the roll 11 comes to the depressed part 12 of its actuating-cam, this lift of the channel-gage taking place while the needle is in the material, and so as to permit the gage to be moved backward over the material after having been moved forward to assist in feeding the material. When the roll 11 rests on the highest portions 11^x of its actuating-cam, as in Fig. 9, the channel-gage holds the material down to a certain determined level or position with relation to the extreme upward stroke or pull of the hooked-needle, notwithstanding variations in the thickness of the material being sewed, which is not the case in other machines of the class upon which this is an improvement, for in such other machines the channel gage or jaw which holds down the material rises and falls, according to the thickness of the material, thereby causing the needle to draw loops of different lengths. By forcing the channel-gage down to the same position before and while the needle penetrates the material, and also holding it down while the needle is withdrawn, that surface of the material out from which the loop of thread is drawn is always kept in exactly the same position with reference to the center of oscillation of the needle, and loops of the same length are always insured.

The awl *r* is connected with the awl-segment *s*, which is mounted to turn about the bolt *t*, the head *t*¹ of the bolt acting against one side of the segment *s*. (See Fig. 11.) This seg-

ment *s* and awl are oscillated by the rack *u* at one end of the lever *v*, pivoted at *w*, the said lever having a rolling pin, 13, (see Fig. 9,) which enters a cam-groove in the side of hub *c*, said groove being shown in dotted lines, Fig. 9. The teeth of the rack *u* are made long enough to remain constantly in engagement with the teeth of the segment *s*, as it is moved horizontally with the bracket *j* each time the material is fed, the awl being then in the material. The first diagram, Fig. 6, shows, in side and front elevation, the awl projecting above the work-support 15, having a long slot for a throat, as it will appear after the awl has completed its forward or feeding stroke, the awl being supposed to be yet in the material. The elongated throat in the support, as shown in black, permits this lateral or feeding movement of the awl. The awl then recedes from below the support 15, the point of the needle 16 approaches it and enters the hole just made in the material by the awl, and follows the awl-point closely, while the awl moves out from the welt, and the needle passes through the sole and welt far enough to receive upon its barb the thread carried by the looper 17, the needle then remaining at rest. After the awl is withdrawn from the welt it is moved laterally, as in the second diagram, Fig. 6, the lever *f* then moving the carriage, the channel-gage at that time being lifted. The awl remains stationary while the needle is raised and until the needle commences to draw the thread into the material, when the awl again begins to move about its center of motion, *t*, and about as the needle commences to emerge from the material the awl again penetrates the material, ready to be again moved laterally, to act as a feeding device in connection with the channel-gage, which is then held down positively into the channel in the sole.

The needle 16 is attached to a needle-carrying segment, 18, pivoted upon a bolt, 19, attached to a rigid part, 20, of the frame, and is oscillated by the rack 21 at the end of a lever, 22, pivoted at 23, a pin or roller, 24, entering a cam-groove, 25, in the disk *d*. (See Fig. 10.)

The cast-off prong 26, made of steel and in one piece with its neck 27, is attached to a sector, 28, (see Fig. 12,) the teeth of which are also shown in Fig. 10, and the teeth of the said sector are engaged by the teeth of a pinion, *x*, at the end of a short shaft, 29, upon the outer end of which (see Fig. 4) is a half-pinion, 30, preferably split, and provided with a set-screw, 31, to adjustably connect the pinion 30 with the said shaft, to thereby adjust the throw of the cast-off. The pinion 30 is oscillated by the rack-teeth 32 at the end of the cast-off-operating lever 33, pivoted at 34, and actuated in one direction by the cam portion 35 of the disk *d*, a suitable spring, *w*², holding the roll 36 of the said lever 33 against the said cam.

The looper 17 is connected with a lever, 37, mounted upon a block, 38, so supported as to

be free to oscillate about a horizontal pivot or bearing, and the said lever 37 is provided with a roller-pin, 39, (see dotted lines, Fig. 4,) which enters a cam-groove, 40, and with a roller, 41, which bears against the side cam, 42, (see Figs. 4 and 5,) has imparted to it such a movement that the end of the looper, provided, as usual, with an eye for the thread, is moved in an elliptical path about the end of the needle, to thereby lay its thread about the shank and into the hook of the needle. The movement of the looper is designated by dotted lines and arrows, Figs. 4 and 5. The rigid looper-guide 43, attached to the table, (see Figs. 1 and 2,) prevents the shoe from being borne against or impeding the movement of the looper, and also from contact with the needle.

The narrow work-support 15, provided with the needle-throat, is made to project from, and so as to form part of, a bed, 44, pivoted at 45 on a pivot, in line with the axes, about which turn the awl and needle segments or carriers, the said bed being provided with an arm, 46, which is engaged by a slide-bar, 47, held or directed as to its movements by a guide-box, 48. This slide-bar 47 is, by a connecting-rod, 53, attached to one member of the automatic tension-regulator, herein shown as composed of two hubs, 54 55, each of which has inclined faces 56. The strong spring x^3 , connected with the rigid stud y^3 and with the connecting-rod 53, acts, when the bar 47 is released, to slide the said bar, turn the bed 44, and force the work-support 15 firmly up against the material.

The hub 54 has an arm, 57, provided with a series of holes, a^2 , by which to adjustably attach the said arm with the connecting-rod 53, to thereby vary the extent of oscillation of the said hub 54 and regulate the extent of action of its inclined or cam surface 56 upon the oppositely-inclined surface of the hub 55. This hub 55 is free to slide upon the spindle 67, but not to rotate thereon, and consequently the hub 54, as it is turned more or less by the connecting-rod and slide-bar, actuated by change in the position or level of the upper end of the work-support 15, by reason of variations in the thickness of the material being sewed, is made to move the hub 55 longitudinally, so as to bear with more or less force or pressure against the tension-wheel 58, operated upon at its other side by the spring 59, the hubs acting in this manner being made to automatically vary the tension of the thread wound about and moving with the said tension-wheel, the tension being thereby automatically lessened as the stock or material passing under the rigidly-held channel-opener (which also acts to press the material) increases in thickness, or vice versa, such variation in thickness moving the top of the work-support 15, as before described. In practice it was found, as the material varied in thickness, that the thread, as the stitch was drawn taut, cut into the welt more or less, according to such variations.

The tension-wheel or tension-adjusting mechanism, when the machine is about to sew, is

set to hold the thread as taut as desirable, according to the thickness and nature of the material, so when the thickness of the material is increased, besides the regular tension, there is added the extra tension due to drawing the thread through more stock, which is very considerable with a waxed thread of a size to well fill the awl-holes. By automatically lessening the tension of the thread according to the increase of thickness of stock, it is possible to draw or set all the stitches made in the material at a uniform strain, which materially improves the quality of the sewing and the durability of the stitching.

Instead of the particular devices herein shown, the automatic tension-regulator may be varied and other well known equivalent devices be used to bear with more or less force upon, and so as to restrict the freedom of motion of the tension-wheel 58. The tension-wheel 58 has at each side leather or other usual washers.

The adjusting-nut b^2 is employed to regulate the pressure of the spring 59 according to the size and strength of the thread being used.

The work-support 15, in contact with the usual welt of the boot or shoe, is automatically locked in position during the time that the needle penetrates the material, and while the channel-gage is moved backward from its forward position, immediately after which, and as the channel-gage is descending upon the material, the support is unlocked, to permit the channel-gage resting in the channel of the outer sole to place the bottom of the channel always at the same uniform level, the support 15 then yielding to compensate for all variations in the thickness of the material. After the channel-gage is depressed the needle is raised from the material, but just before it leaves the material the support is again locked, and is held locked while the awl pierces the material and until the feed takes place. This locking device, to hold the support 15 or its bed 44 rigidly in position, is herein shown as a lever, e^2 , pivoted at d^2 , depressed twice at each revolution of the main shaft a by means of the cam-shaped periphery of one edge of the hub b , the said lever being raised by a strong adjustable spring, e^2 , (see Fig. 2,) the upward motion of the said lever by the spring e^2 causing the toe f^2 of the said lever to force a dog, g^2 , down upon the sliding bar 47, to hold it in place. The short arm of this lever e^2 is extended upward and forward (see Fig. 2) in position to be acted upon by a cam, h^2 , operated in one direction by a hand-lever, i^2 , and in the other direction by a spring, j^2 , the movement of the lever i^2 in the direction of the arrow near it, Fig. 2, actuating the lever e^2 to release the slide-bar, and as the movement of the lever i^2 is continued it strikes the pin k^2 , projecting laterally from the bed 44, and turns said bed about its pivot 45, to depress the support 15, for the removal or insertion of the material.

To force the end of the work-support 15 up

against the material firmly when commencing sewing, the slide 47 is provided with a handle, h^2 . The thread will extend from the tension-wheel through the head of the machine, where the wax on the thread is kept warm, thence

about the truck m^2 on a pivoted take-up lever, n^2 , the short end of which is operated upon by a suitable spring, o^2 .

The sliding spring-pressed pin p^2 (see Fig. 1) holds the roller 41 of lever 37 in contact with the cam 42.

The presser-foot r^2 is adjustably connected with the end of a presser-foot lever, s^2 , pivoted at t^3 , and provided with a roll, u^2 , which bears upon the cam-shaped periphery of hub d . A spring, w^2 , holds the roller u^2 in contact with its actuating-cam surface, and acts, when permitted by the cam, to elevate the presser-foot. When the roller rides on the high parts of its actuating-cam (shown in full lines, Fig. 4) the presser is held down positively. The presser is held down positively at all times, except when the awl and channel-gage are being moved to feed the stock forward, and, acting upon the looped or enchaind portion of the stitch at the rear of the needle, it forces that portion of the stitch into the channel in the outer sole.

When sewing about the shank of the shoe or boot it is desirable to make the stitches longer than when sewing about the ball of the foot and toe.

To be able to quickly change from the maximum to the minimum length of feed and insure like length of stitches on all the work of certain sizes, the pin h in the slotted lever f is placed under the control of the feed-regulator a^3 , pivoted at b^3 , so that the pin h may be caused to traverse the slot f^4 and be placed at a greater or less distance from the fulcrum-pin of lever f , according as the feed is to be long or short.

Near the regulator a^3 is a plate, c^3 , provided with holes d^3 , in any of which may be placed the adjusting-pins e^3 e^4 , two being used a greater or less distance apart, so that the regulator resting against the pin e^3 or feed-stop, (see Fig. 8,) the feed will be short, and against the pin e^4 , long.

The change of feed-stroke may be made instantly by throwing the regulator against one or the other stop.

We claim—

1. In a boot and shoe sewing machine having a curved awl and needle, a channel-gage

and devices to hold the same down positively against the sole, as described, combined with the work-support 15, to sustain the shoe vertically, as described, and locking and releasing devices, substantially as described, to permit said support to yield to the varying thickness of material, and to remain locked in position to insure the formation of loops of equal length as the needle and thread are drawn from the material, substantially as described.

2. The hooked needle, cast-off, and thread-guide, and the laterally-movable carriage j , and the feeding-awl and its segment connected therewith, and the yielding work-support and its locking and releasing mechanism, combined with the channel-gage, lever n , and cam, to depress the channel-gage to a defined position as each stitch is being made, and hold it down while the needle operates to draw the loop of the thread out from the channel of the outer sole, substantially as described.

3. The lever 33 and mechanism to operate it, shaft 29, and pinion x thereon, combined with the adjustable pinion 30, to vary the throw of the cast-off, substantially as described.

4. In a sewing-machine, a work-support adapted to bear against one side of the material being sewed and to change its position according to variations in the thickness of the said material, and a thread-tension device or wheel, combined with intermediate tension-regulating mechanism and connections, whereby the change of position of the said work-support, when the material increases in thickness, lessens the tension of the thread, and increases the tension of the thread as the thickness of the material decreases, substantially as described.

5. The work-support 15 and its holding-bed and slide-bar 47, combined with the connecting-link, the frame-work, and the tension-regulating devices, and a spring, x^3 , substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

CHRISTIAN DANCEL.
ANDREW EPPLER, JR.

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Witnesses as to signature of A. Eppler, Jr.:
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