

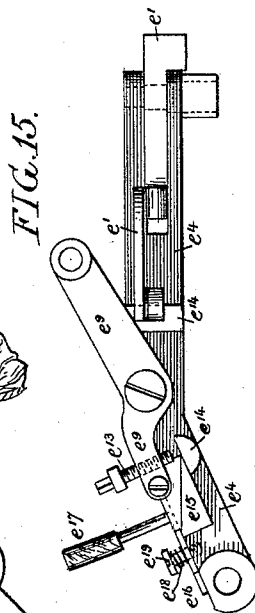
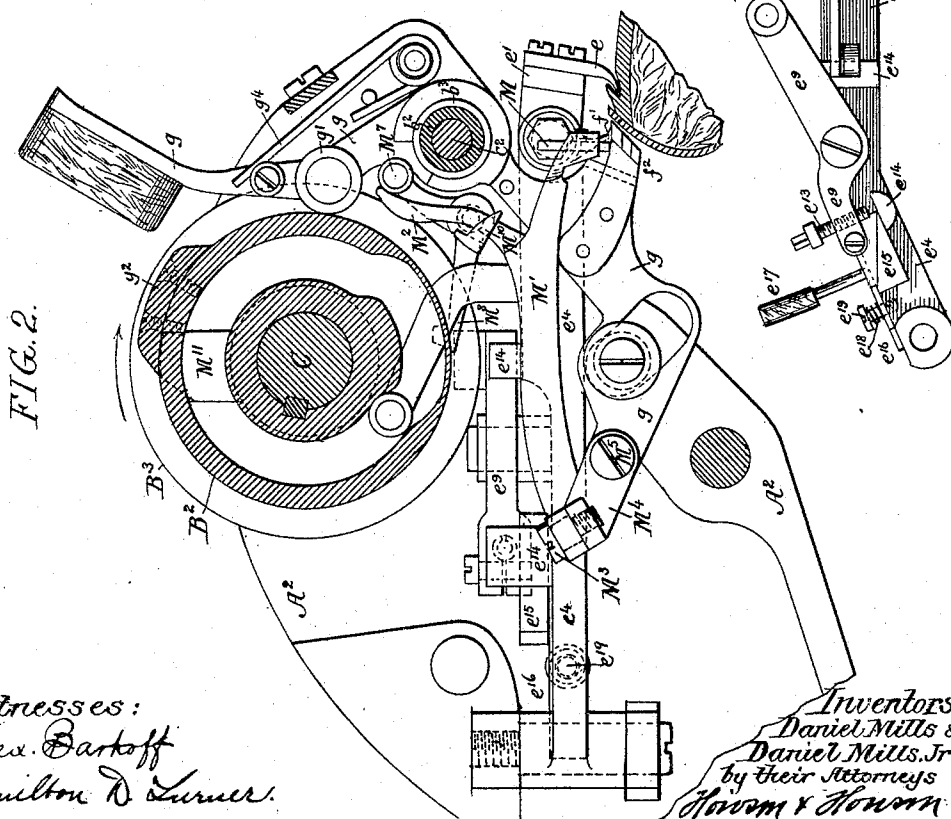
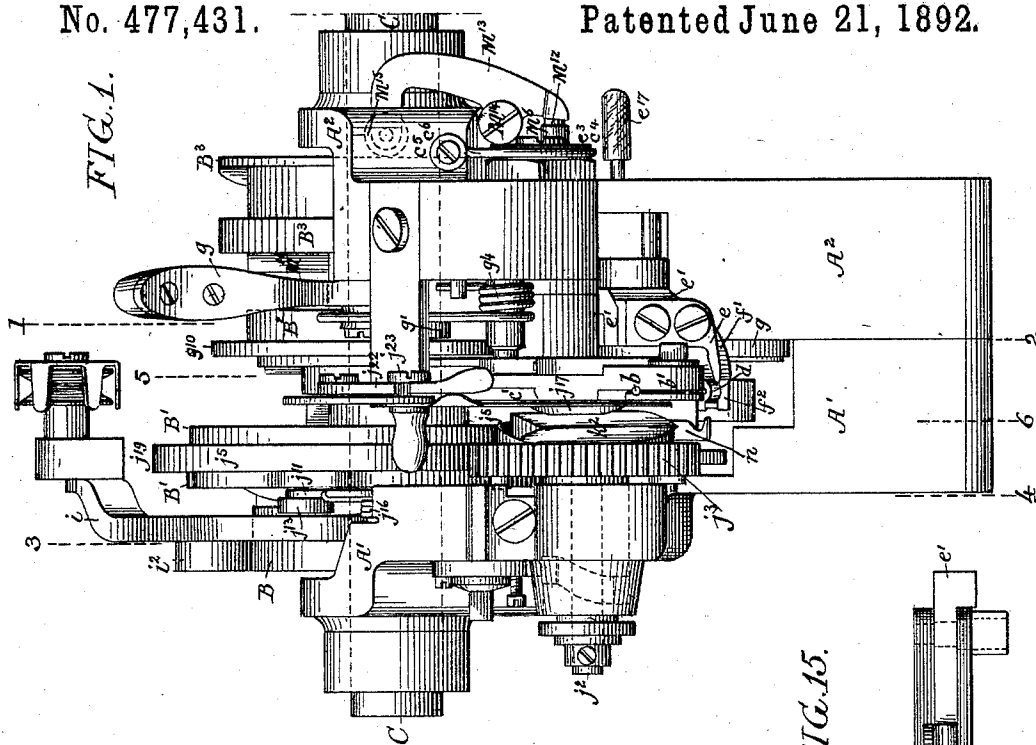
(No Model.)

4 Sheets—Sheet 1.

D. MILLS & D. MILLS, Jr.
BOOT OR SHOE SEWING MACHINE.

No. 477,431.

Patented June 21, 1892.



Witnesses:
Alex. Bartoff
Hamilton D. Turner.

*Inventors:
Daniel Mills &
Daniel Mills, Jr
by their Attorneys
Howson & Howson*

(No Model.)

4 Sheets—Sheet 2.

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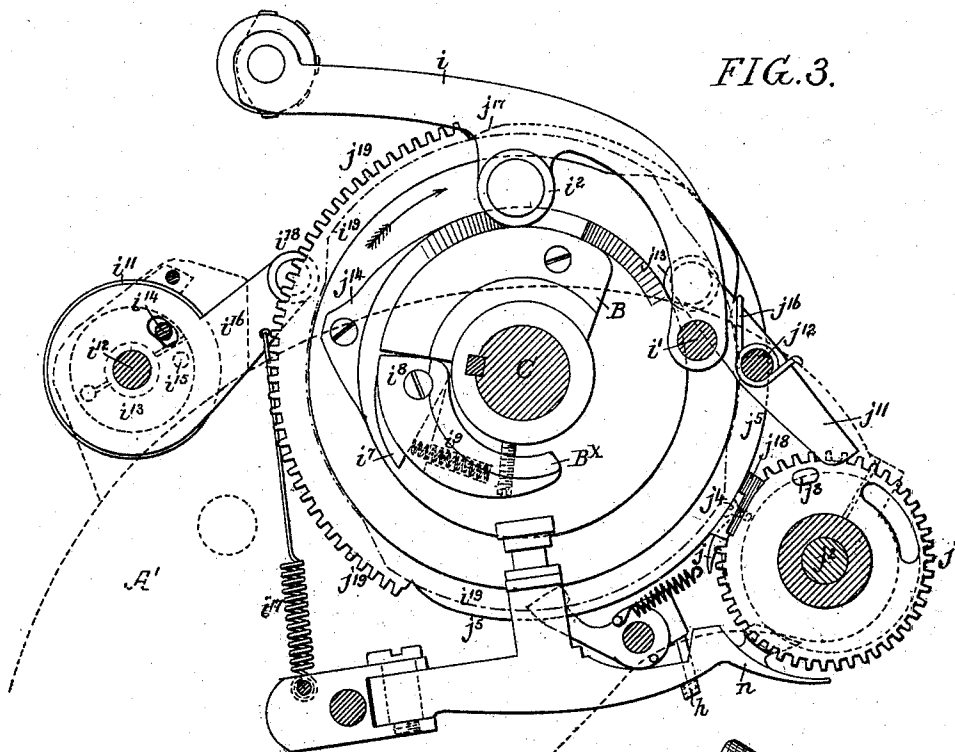


FIG. 3.

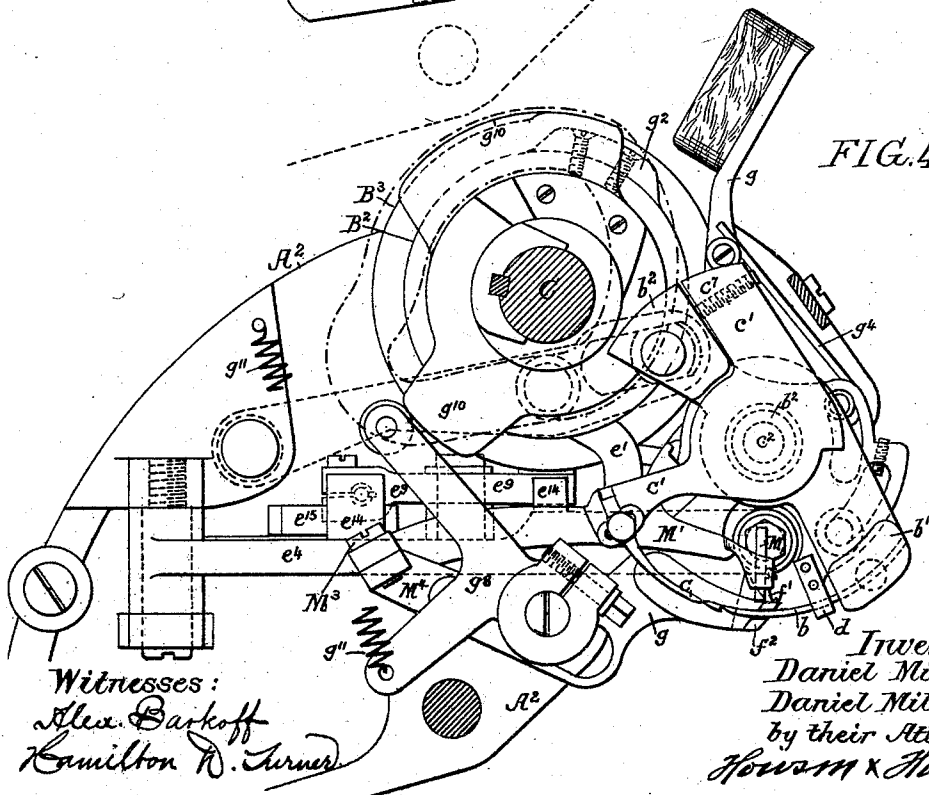


FIG. 4.

Witnesses:
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(No Model.)

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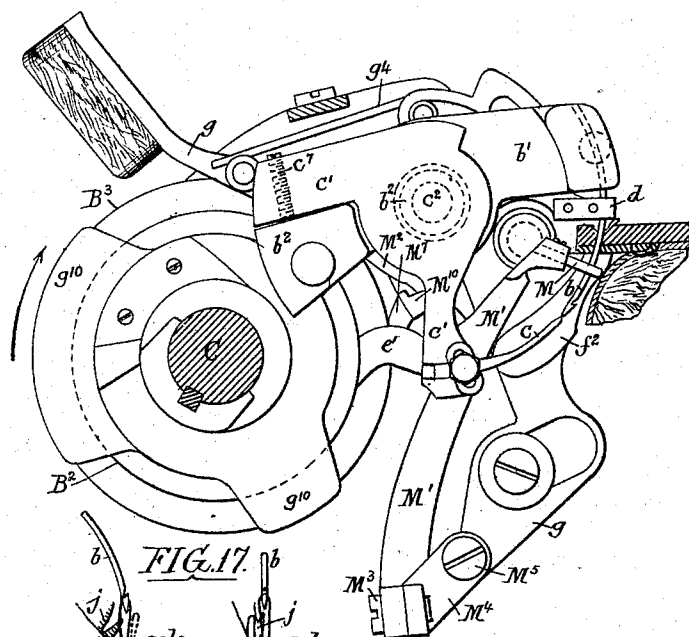


FIG. 5.

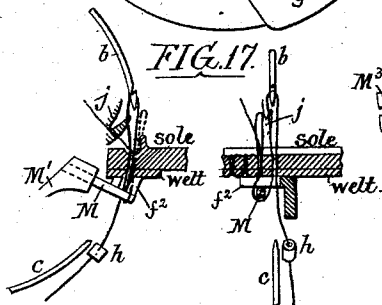


FIG. 17.

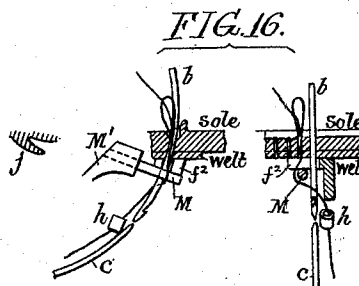


FIG. 16.

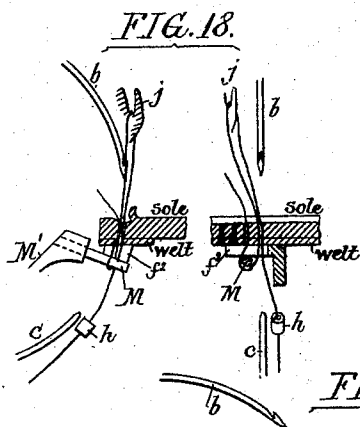


FIG. 18.

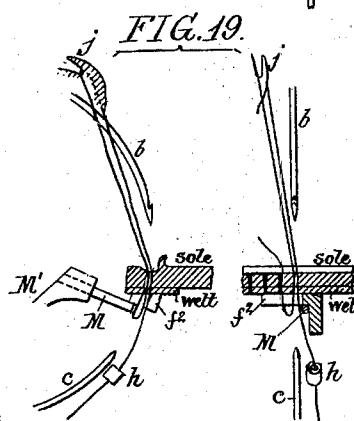


FIG. 19.

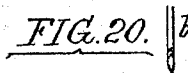
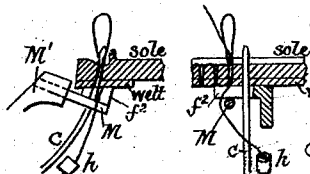


FIG. 20.

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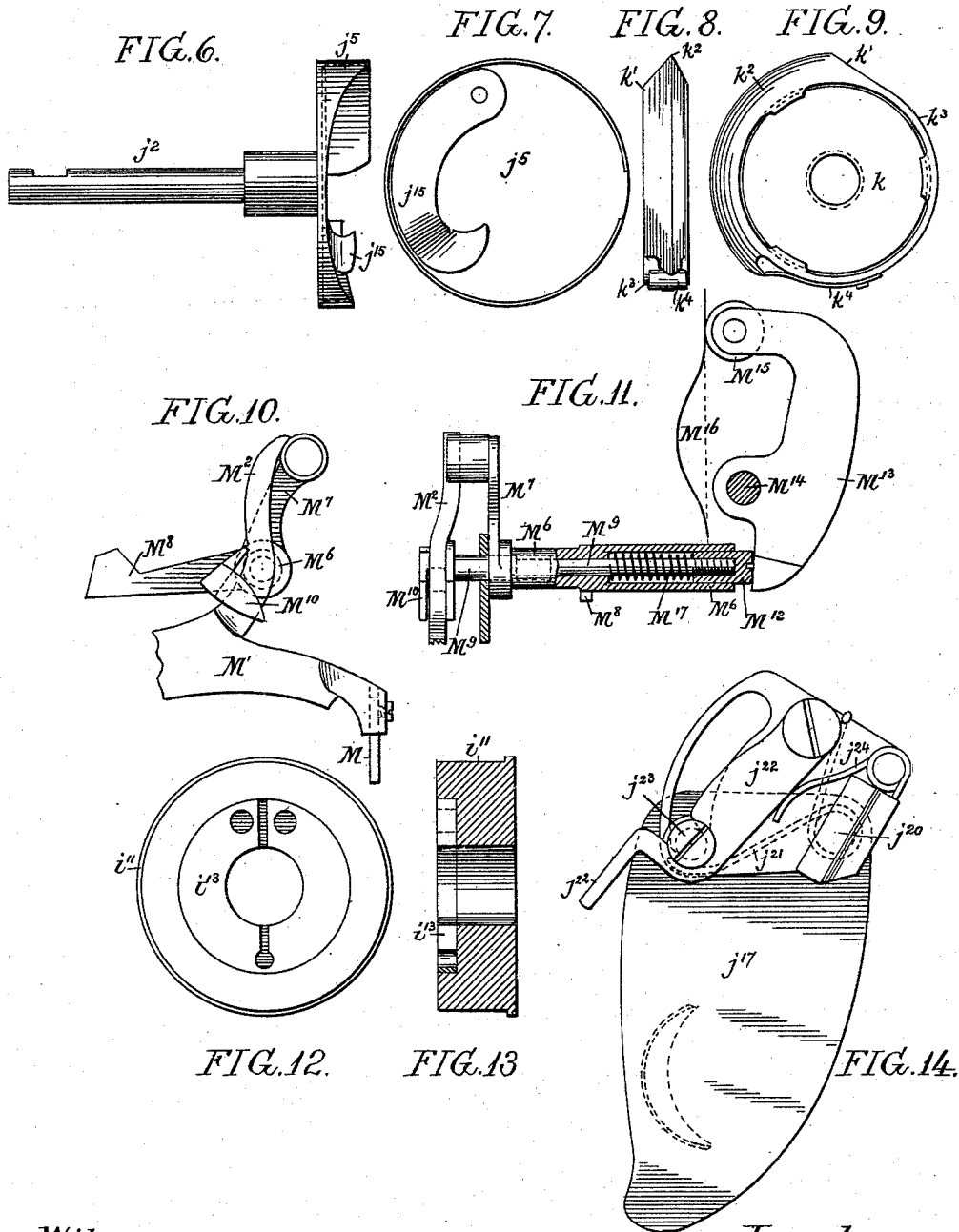
(No Model.)

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D. MILLS & D. MILLS, Jr.
BOOT OR SHOE SEWING MACHINE.

No. 477,431.

Patented June 21, 1892.



Witnesses:
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by their Attorneys
Howson & Howson

UNITED STATES PATENT OFFICE.

DANIEL MILLS AND DANIEL MILLS, JR., OF PHILADELPHIA, PENNSYLVANIA.

BOOT OR SHOE SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 477,431, dated June 21, 1892.

Application filed December 1, 1890. Serial No. 373,198. (No model.)

To all whom it may concern:

Be it known that we, DANIEL MILLS and DANIEL MILLS, JR., citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Boot or Shoe Sewing Machines, of which the following is a specification.

Our invention relates to improvements in boot or shoe sewing machinery whose general character is set forth in various United States and English patents granted to Daniel Mills, as follows: United States Patents No. 93,731, dated August 17, 1869, No. 96,944, dated November 16, 1869, and No. 97,951, dated December 14, 1869, No. 101,644, dated April 5, 1870, No. 127,423, dated June 4, 1872, and English Patents No. 1,237, dated April 30, 1870, No. 937, dated April 8, 1871, No. 2,899, dated October 28, 1871, No. 4,279, dated December 9, 1875, and No. 1,160, dated March 17, 1876; and our present improvements are devised especially with reference to use in a modernized form of machine, upon which are also based a series of applications filed by said Daniel Mills on the 6th day of October, 1891.

The machinery described in the specifications of the Letters Patent and applications before alluded to is designed for sewing a welt to the insole and upper, for stitching the outsole to the welt, and also for sewing the soles to the uppers of "turned" shoes.

The characteristic features of the mechanism are a curved needle which has a reciprocating motion or partial rotation to and fro around an axis and operates either with or without an awl, and with a looper, feed-dog, and back or bottom gage, and in the case of the lock-stitch machines with a discoidal bobbin, a hook for carrying the thread over the same, and other devices actuated by suitable cams, the whole of the mechanism being supported in a strong head placed on a stand in such a manner as to permit the work to be properly presented to the sewing mechanism.

Our present improvements are fully set forth and specifically claimed hereinafter, and relate to means for preventing the needle-thread from cutting the welt. These comprise a welt-protector for preventing the pulling of the needle-thread upon and over the welt while the preceding stitch is being drawn tight or "set" and the thread is being drawn

from the tension devices for the new stitch, a device for regulating or adjusting the movement of the take-up or pull-back lever, so as to correctly determine the amount of slack thread, and thereby regulate the embedding of the thread in the welt as it is set, a device for imparting a yielding tension to the needle-thread during the time that the same is being laid in the barb of the needle, so as to prevent the protector from interfering with this duty, and mechanism for locking the needle-thread during the time when the loop which has been passed over the bobbin is being partly pulled back and also during the time that the looper is applying the thread to the barb of the needle, so that the spring tension will work properly.

In the accompanying drawings, Figure 1 is a front view of the machine with our present improvements, showing the parts in position for sewing welts or turned work. Fig. 2 is a section on the line 1 2, Fig. 1. Fig. 3 is a section on the line 3 4, Fig. 1. Fig. 4 is a section on the line 5 6, Fig. 1. Fig. 5 is a similar section of part of the mechanism with the head adjusted to a different position and with a certain change in the needle back gage and in the position of the welt-protector to adapt the machine for "fair-stitching" or sewing soles to welts. Figs. 6 to 15 are detached views of parts of the machine, and Figs. 16 to 20 are diagrams illustrating the operation of the welt-protector.

Like letters represent corresponding parts in each figure.

The head is composed of the two parts $A' A^2$, secured together by transverse bolts, the various parts of the operating mechanism being mounted on said head, the parts $A' A^2$ of which have bearings formed in them for the reception of the main shaft C, to which are secured the various cams for operating the working parts of the machine.

The needle is shown at b, c being the awl; d , the needle-shield; e , the feed-dog; $f' f^2$, respectively, the feed back gage and needle back gage; g , the back-gage lever; h , the looper; i , the take-up or pull-back lever; j , the hook for carrying the needle-thread over the bobbin k , and n the holder for carrying the needle and bobbin threads laterally and holding them out of the way of the hook, it being understood that these parts are constructed

and operated in the same or substantially the same manner as in the machines shown in the previous applications before referred to, unless special reference is hereinafter made to the construction and operation of these parts or to some alteration or modification therein.

The feed-dog lever e' is carried by the feed-lever e^4 , as before, and pivoted to said lever e^4 is the stitch-regulating lever e^9 , which is vibrated by a cam on the shaft C, one arm of the lever e^9 having a set-screw e^{13} and the feed-lever e^4 having stop-lugs e^{14} , one of which serves to limit the movement of the stitch-regulating lever upon the feed-lever in one direction, while the other serves, in connection with the set-screw e^{13} , to limit such movement in the opposite direction, so that by adjustment of said set-screw e^{13} the lost motion of the stitch-regulating lever can be increased or diminished, and the movement of the feed-lever thus caused to be as much less than the positive throw of the cam as is required for the amount of feed desired for each stitch. It is occasionally necessary, however, to quickly vary the length of stitch. For instance, in sewing around the shank portion of the shoe the stitch is much longer than in sewing around the fore portion, and as it is usual to begin the sewing at the heel end of the shank at one side of the shoe it is desirable to start with a long stitch and to quickly change from said long stitch to a short stitch in passing from the shank to the fore part of the shoe and back again from a short stitch to a long stitch in passing from the fore part to the shank on the opposite side of the shoe. The feed-lever e^4 therefore has a wedge e^{15} for interposition between the short arm of the lever e^9 and the corresponding lug e^{14} on the lever e^9 , so as to reduce the lost motion of the lever e^9 and thus cause a longer stroke of the feed-lever as long as the wedge is thus interposed.

The wedge e^{15} in the present instance forms part of a plate e^{16} , provided with a suitable operating-handle e^{17} , projecting at the right-hand side of the machine, said plate being retained in the position to which it is adjusted by reason of the friction of a spring e^{18} , interposed between the plate and the head of a set-screw e^{19} , carried by the feed-lever e^4 , as shown in Fig. 15.

In machines of the class to which our invention relates the stitch is drawn tight or set by the hook pulling upon the needle-thread in order to carry it over the bobbin for the succeeding stitch, and if the thread from the stitch which is being pulled tight or set is drawn over the welt it has a tendency to draw into or embed itself in said welt to such an extent that the welt is damaged, and the line of stitches does not stand up on the face of the welt as prominently as it is desirable that it should. In our present machine, therefore, we provide what we call a "welt-protector," which is simply a finger in-

serted between the needle-thread and the face of the welt and serving as a bearing for said needle-thread while the needle is rising and drawing the thread being delivered by the pull-back lever and while the hook is pulling upon the loop of thread taken from the needle so as to draw tight or set the preceding stitch and pull the thread required from the tension device, this welt-protecting finger being withdrawn and releasing the needle-thread just before the hook reaches the limit of its upward movement, whereby, in connection with means hereinafter set forth, sufficient thread is left to be drawn down properly upon the face of the welt by the hook in completing its movement.

The welt-protecting finger is shown at M and is carried by a lever M' , which has an upwardly-projecting arm M^2 and is hung by means of a stud M^3 to a link M^4 , the latter being pivoted by means of a bolt M^5 to the back-gage lever g , as shown in Figs. 2 and 5, so that the welt-protector is always maintained in the same relative position to the bearing-face of the back gage f^2 , as shown in Fig. 5. Hence whatever the thickness of the sole and welt may be the distance of the welt-protector from the face of the welt is always the same. The arm M^2 of the protector-lever M' is controlled by an arm M^7 on a rock-shaft M^6 , suitably mounted in the frame of the machine, another arm M^8 on the shaft M^6 being under the influence of a cam M^{11} on the side of the cam-disk B^3 , so that a rocking movement is imparted to the shaft M^6 , and thence to the lever M^2 , so as to raise and lower the protector M for the purpose hereinafter set forth. The protector also has a lateral motion, which is effected by means of a rod or shaft M^9 , which passes through the hollow shaft M^6 and has at its inner end a forked or bifurcated head M^{10} , embracing the arm M^2 of the lever, as shown in Fig. 10, the outer end of said rod M^9 having an adjustable head or cap M^{12} , which is acted upon by a lever M^{13} , hung to a stud M^{14} on the portion A^2 of the head and having an anti-friction roller M^{15} , acted upon by a cam M^{16} at the end of the cam-disk B^3 , this cam being in the form of a depression in the disk, as shown in Fig. 11, and the anti-friction roller M^{15} being caused to enter this depression by reason of the action of a spring M^{17} , interposed between the head M^{12} and a shoulder in the tubular end of the rocker-shaft M^6 , as also shown in Fig. 11.

When sewing welts or turned shoes, the finger M is raised on the lever M' , as shown in Fig. 2, so as to be out of the way of the needle-thread and above the needle back gage used in this class of work; but in fair stitching or sewing soles to welts the needle back gage and feed back gage are changed and the finger is projected, as shown in Fig. 5. The operation of the welt-protector under these circumstances will be understood on reference to Figs. 16 to 20. When in its normal position,

the protector is in close contact with the bottom or needle back gage f^2 , and when the needle passes through the work occupies a position between the needle and the preceding stitch, so that when the thread is laid in the 5 bard of the needle by the looper it will be engaged by the protector, as shown in Fig. 16. As the needle rises through the work it forms above the latter a loop, which is caught by the 10 rotating hook j , as shown in Fig. 17, and said hook then carries this loop up over the bobbin and during this movement pulls tight or sets the preceding stitch in the channel of the sole, as shown in Fig. 18, and also pulls a 15 certain amount of thread from the tension devices for the next stitch. The welt-protector remains in the under loop of needle-thread during the time that the preceding stitch is being drawn or set and the thread 20 drawn from the tension devices; but before the hook reaches the limit of its upward movement the protector is withdrawn from the under loop of needle-thread, as shown in Fig. 19, so that in completing its movement the 25 rotating hook draws up this loop against the surface of the welt, there being just enough thread in the loop, in connection with the thread given off by the pull-back lever, as hereinafter set forth, to permit of the drawing of the thread properly upon the surface of 30 said welt. As there is practically no drawing of the thread over the surface of the welt from one awl-hole to the other in drawing up or setting the stitches and pulling the thread from the tension devices, there is no wearing 35 away or indenting of the welt at or near the awl-holes. Hence each stitch stands upon the face of the welt without undue embedment in the welt and the welt is not partially cut 40 through or damaged by the needle-thread. After being withdrawn from the under loop of needle-thread the protector goes back and over the needle-thread and is then depressed in front of the thread running to the looper, as shown in Fig. 19, so as to engage with said 45 thread, and projected again to its normal position, as shown in Fig. 20, before the awl punctures the work for the formation of a new stitch. Hence on the next descent of the 50 needle the parts are in the position shown in Fig. 16 and the operations above described are repeated.

We are aware that various methods have been devised for the purpose of accomplishing the object of this feature of our invention—such, for instance, as measuring off the 55 various lengths of thread to suit the various thickness of work; but such devices are complicated, as they require automatic adjustment, whereas in our case the welt-protector does not require adjustment, but acts in precisely the same manner without regard to the 60 thickness of the work.

It is desirable, as before set forth, to deliver to the hook a certain amount of slack thread when the hook is passing the loop of 65 needle-thread over the bobbin, so that there

will be no undue strain on the thread, and the loop will not be pulled too tightly upon the face of the welt after the withdrawal of the 70 protector. For this reason the take-up or pull-back lever i is journaled at i' on the side of the head A' of the machine and has an anti-friction roller i^2 , which is acted upon by a cam on the main shaft C ; but this cam, instead 75 of being single, as in the former machine, is made in two parts $B B^x$, the latter being pivoted to a screw-stud i^3 , so that said portion B^x , which constitutes the tail end of the cam, can be adjusted to a position nearer to or farther from the axis of the cam, and thus regulate the amount of slack thread delivered to the hook when the roller i^2 of the take-up lever finally leaves the cam B^x . 80

In the front portion of the cam B^x is a 85 spring-tongue i^7 , also journaled on the stud i^3 , this tongue being pressed outward by a spring i^9 in such a manner that when the spring-tongue is passing under the roller i^2 the lever i is subjected to a yielding upward pressure, 90 and at this time the looper is applying the thread to the barb of the needle, so that said thread is drawn tightly across the face of the needle, and its engagement with the barb of the needle is thus insured, irrespective of the 95 presence of the protector.

It is desirable to lock the thread at the time when the loop which has been passed over the bobbin is being pulled back and also during the time that the looper is putting the thread 100 in the barb of the needle, so that there will be no delivery of thread from the tension devices during such times, and the spring-tension can be properly exerted upon the thread. The thread, therefore, after leaving the tension devices and before being acted upon by the roller 105 on the outer end of the take-up lever, is passed several times around a drum i^{11} , which is mounted upon a stud or spindle i^{12} on the frame of the machine and is recessed for the 110 reception of a split ring i^{13} , Fig. 13, which has near its free ends two openings, one for the reception of a pin i^{14} on the frame and the other for the reception of a pin i^{15} , carried by a lever i^{16} , which is slotted for the passage of said pin 115 i^{14} , and the lever i^{16} is mounted upon the stud i^{12} , as shown in Fig. 3. This lever i^{16} is acted upon by a spring i^{17} and carries an anti-friction roller i^{18} for being acted upon by a cam i^{19} , as shown by dotted lines in Fig. 3. When 120 the arm of the lever is being acted upon by the high portions of said cam i^{19} , the split ring i^{13} is contracted, and hence the drum i^{11} is free to turn on the stud i^{12} , so as to permit the free delivery of thread; but whenever the 125 roller i^{18} passes from the high portion of the cam i^{19} the spring i^{17} causes such a movement of the lever i^{16} as to expand the split ring i^{13} , and thus prevent any rotating movement of the drum i^{11} and any further delivery of thread 130 therefrom.

The feed back gage f' has a bearing upon and the needle back gage f^2 is carried by the back-gage lever g , which has an anti-friction

roller g' , acted upon by a cam g^2 on the cam-disk B^2 when the machine is intended for sewing welts or turned work, so as to retract the needle back gage and lever during the feed, so that the feed back gage is allowed to slide on the work without any pressure, in order to prevent the making of plaits or puckering of the upper, the gages being pressed against the work, however, as soon as the feed movement is completed, owing to the action of the spring g^4 upon the back-gage lever when the roller g' leaves the cam g^2 . When fair stitching or sewing outsoles to welts, the cam g^2 is removed, the lever g and back gages f' and f^2 being then always subject to the action of the spring g^4 .

The back-gage locking-lever g^8 is acted upon by two cams g^{10} , so as to unlock the back-gage lever g during the forward and backward movements of the feed-lever e^4 , the back-gage lever being at the required times firmly locked by reason of the movement of the lever g^8 under the influence of the spring g^{11} .

The bobbin k is adapted to a bobbin-case k' , which fits within the bobbin-holder j^5 , the latter entering the recess at the front end of the hook-shaft j^2 , so that an ordinary flat bobbin can be used, the case k' having a beveled edge k^2 , over which the loop of needle-thread can be drawn, whereby the necessity of forming the bobbin with beveled periphery is avoided. The bobbin-case, however, is not beveled throughout its entire periphery, a portion of this periphery being flat, as shown at k^3 , Figs. 8 and 9, so that when the bobbin-case rests within the bobbin-holder j^5 this flat portion of the case will form the bearing against the pull of the thread, and hence there will be no tendency for the bobbin-case to slip down from the holder and wedge itself between the holder and the retainer, as might result if the bobbin-case has a beveled or tapered periphery throughout. On the flat part k^3 of the bobbin-case is a small tension-spring k^4 , which constitutes a tension device for the bobbin-thread.

The bobbin-holder has an internal spring j^{15} , tending to project the bobbin and bobbin-case against the retainer-plate j^{17} , Fig. 1, and the latter is hung to a stud j^{20} on the frame, and is acted upon by a spring j^{21} , tending to lift it, so as to expose the bobbin-case, the retainer-plate being normally held in the lower or retaining position by means of a locking-lever j^{22} , which engages with a stud j^{23} on said retainer-plate, the locking-lever being preferably held up by a spring j^{24} , as shown in Fig. 14. By simply depressing the outer end of this lever j^{22} , therefore, the stud j^{23} is released and the retainer-plate will be lifted by the action of the spring j^{21} , and the plate will be automatically relocked when again depressed, so as to permit the lever j^{22} to engage with the stud j^{23} , quick changing of the bobbins being thus rendered possible.

It should be understood that we do not claim in this specification the feeding or work-hold-

ing devices of the machine, nor the mechanism for operating the bobbin-hook, nor the general details in construction which we have illustrated, as such parts of the machine form the subjects of the separate applications before alluded to, our present invention relating to the welt-protector and to the devices operating in conjunction therewith. It is manifest, however, that the welt-protecting finger can be used in connection with machines having equivalent devices for performing the functions of the rotating hook and bobbin—for instance, a vibrating hook or a shuttle acting in conjunction with a suitable take-up—the rotating hook and bobbin being, however, in all cases preferred as the simplest device for the purpose.

We therefore claim and desire to secure by Letters Patent—

1. The combination of the feeding devices, the needle, the looper, the bobbin, and the bobbin-hook with a welt-protector consisting of a finger so located in respect to said hook as to permit of the passage of the work between them, and means for moving said finger so as to cause it to first engage and then release that portion of the thread which is between the stitch being formed and the preceding stitch, substantially as specified.

2. The combination of the feeding devices, the needle, the looper, the bobbin, and the bobbin-hook with the welt-protector consisting of a finger so located in respect to said bobbin-hook as to permit of the passage of the work between them, and means for moving said finger both transversely and longitudinally, substantially as specified.

3. The combination of the feeding devices, the needle, the looper, the bobbin, and the bobbin-hook with the welt-protecting finger, the needle back gage, and a lever carrying said welt-protecting finger and hung to the back-gage carrier, whereby said welt-protecting finger always retains the same relative position to said back gage, irrespective of the thickness of the work, substantially as specified.

4. The combination of the feeding devices, the needle, the looper, the bobbin, and the bobbin-hook with the welt-protecting finger, the pivoted lever carrying the same, a secondary lever acting on the said welt-protector lever to vibrate the same, a sliding shaft having a head engaging with said welt-protector lever to swing the same longitudinally, and means for operating said secondary lever and sliding shaft, substantially as specified.

5. The combination of the feeding devices, the needle, the looper, the bobbin and bobbin-hook, and the welt-protector with the take-up or pull-back lever, the two-part operating-cam therefor, and means for adjusting the tail part of the cam, whereby the extent of movement of the take-up or pull-back lever for the delivery of slack thread may be regulated, substantially as and for the purpose specified.

6. The combination of the feeding devices,

the needle, the looper, the bobbin and bobbin-hook, the pull-back, the tension device, and the welt-protector with a thread-locking device and with means for operating the same, 5 so as to lock the thread during the action of the pull-back and while the looper is applying the thread to the needle, substantially as specified.

10 7. The combination of the feeding devices, the needle, the looper, the bobbin and bobbin-hook, the welt-protector, the take-up or pull-back lever for the needle-thread, and an operating-cam for said lever, having a spring-

tongue, whereby a yielding pressure or draft is imparted to the thread when the looper is 15 laying the same in the barb of the needle, substantially as specified.

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

DANL. MILLS.

DANL. MILLS, JR.

Witnesses:

EUGENE ELTERICH,
HARRY SMITH.