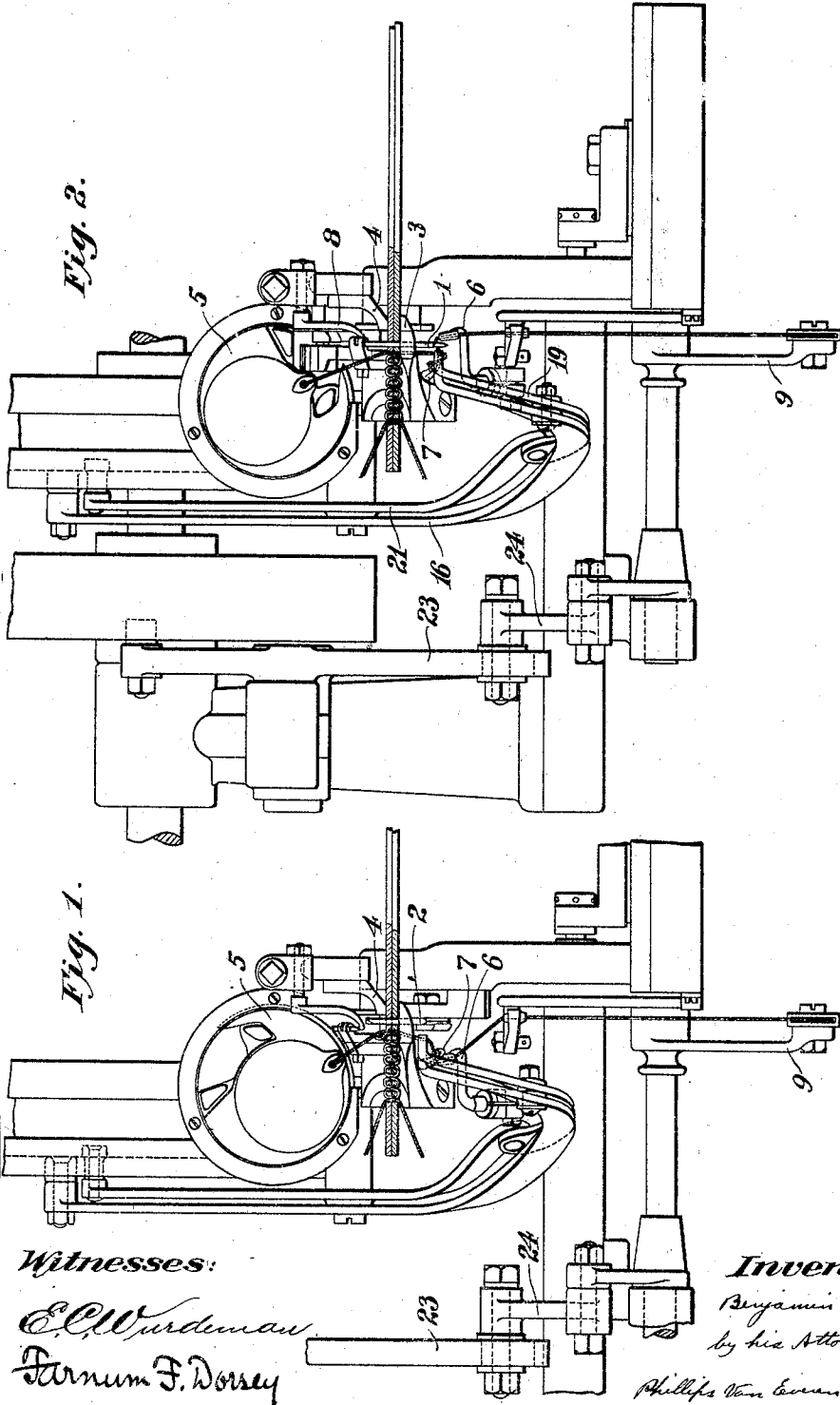


B. F. MAYO.
SEWING MACHINE.
APPLICATION FILED SEPT. 6, 1906.

1,003,192.

Patented Sept. 12, 1911.

2 SHEETS—SHEET 1.



Witnesses:

E. C. Wurdeman
Farnum F. Dorsey

Inventor:

Benjamin F. Mayo
by his Attorneys
Phillips Van Curen & Fish

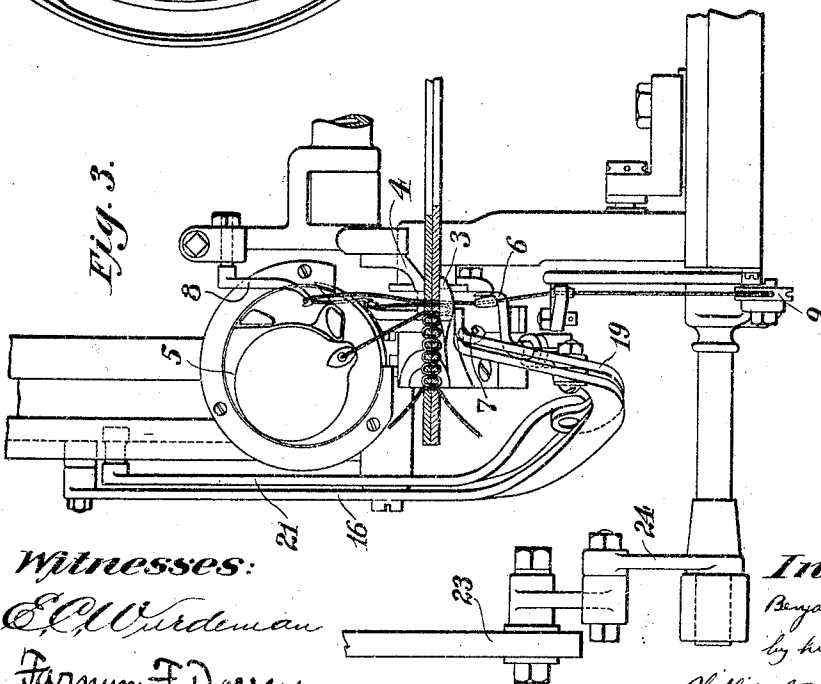
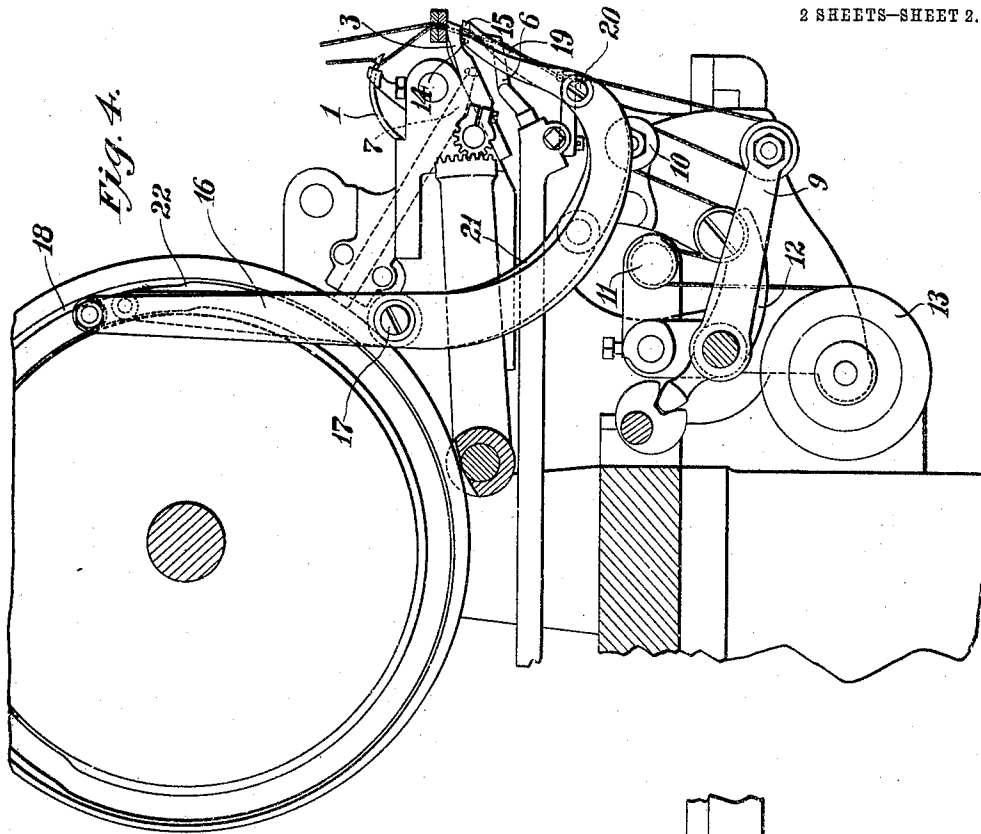
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UNITED STATES PATENT OFFICE.

BENJAMIN F. MAYO, OF SALEM, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SEWING-MACHINE.

1,003,192.

Specification of Letters Patent.

Patented Sept. 12, 1911.

Application filed September 6, 1906. Serial No. 333,528.

To all whom it may concern:

Be it known that I, BENJAMIN F. MAYO, a citizen of the United States, residing at Salem, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Sewing-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to shoe sewing machines and more particularly to lock stitch, wax thread, shoe sewing machines which employ a hooked needle.

In all shoe sewing machines of the type above referred to which have heretofore been devised, the tightening or setting of a stitch has been produced by a sudden pull on the thread continuing for a comparatively small portion of the entire interval used in forming the stitch. This manner of tightening or setting the stitch is necessitated by the fact that the stitch tightening or setting device acts upon the thread in such a manner as to prevent any manipulation of the thread in the formation of a succeeding stitch while the stitch tightening or setting device is acting. The action of the stitch forming devices in manipulating the thread to form a stitch must therefore be delayed while the stitch tightening or setting device is operating, and in order to enable the machine to be run at a reasonably high speed without imparting an excessive speed to the other parts of the mechanism a comparatively small portion of the time required to complete a cycle of operations of the machine can be utilized in actuating the stitch tightening or setting device. In setting the stitch the needle thread is reeved over the shuttle thread and both threads are subjected directly to the strain necessary to produce a tight seam. The sudden pull exerted upon the thread by the stitch tightening or setting device as the needle thread is pulled into its final position causes the needle thread to reeve rapidly over the shuttle thread thereby tending to abrade and weaken both threads, and as the needle thread reaches its final position it is subjected to a sudden jerk which is liable to break one or both threads as soon as the speed of the machine exceeds a certain limit.

The stitch tightening or setting device is therefore an important factor in limiting the speed at which the machine can be operated. Also the sudden action of the stitch tightening or setting device causes the thread forming the stitch to cut more or less into the stock and thereby weaken the seam.

Another objectionable feature of the stitch tightening or setting devices which are now used in lock stitch, wax thread, shoe sewing machines is that on account of the rapidity with which they are actuated, they tend to move varying distances so that the needle thread is not pulled always into the material to the same distance and an imperfect seam results.

In machines to which the present invention relates the stitch tightening or setting devices act on the needle thread at a considerable distance from the work and the pull exerted by the stitch tightening or setting device acts upon a comparatively long portion of the thread. On account of this arrangement and mode of operation of the stitch-tightening or setting device the thread leading from the work to the supply is stretched more or less while each stitch is being tightened or set. This stretching of the thread also tends to produce irregularities in the stitches since the thread is not always stretched to the same extent and in consequence the position of the lock in the material varies.

The objects of the present invention are to overcome the objections, above noted, in the arrangement and mode of operation of the stitch tightening or setting devices of lock stitch wax thread, shoe sewing machines.

With these objects in view a feature of the present invention contemplates the provision, in a wax thread, lock stitch, shoe sewing machine, of a stitch tightening or setting device which acts to exert a pull on the thread to set or tighten a stitch during a portion of the time occupied by the stitch forming devices in manipulating the thread to form a succeeding stitch. The pull on the thread is thus continued through substantial portion of the interval used in forming a stitch so that no sudden strain is put upon the thread and the stitch tightening or setting device can be actuated, even when the machine is run at a high rate of speed, with-

out any liability of varying the extent of the movements imparted thereto. An even seam having stitches formed in a regular manner is produced and the machine can be speeded as high as the other operating parts will permit.

Broadly considered this feature of the invention contemplates the provision of any suitable device, either separate from the other stitch forming devices or forming a part thereof, for tightening or setting a stitch, and means for actuating said device to set or tighten a stitch while the thread is being manipulated in the formation of a succeeding stitch. In the preferred form of the invention, however, a stitch tightening or setting device is provided in addition to the usual take up, which device is arranged to act on the needle thread after the take-up has drawn the loop of thread through which the shuttle is passed down upon the work, and to pull the thread into its final position in the seam, this action of the stitch setting device continuing while the needle thread is being manipulated in the formation of the next stitch.

Another feature of the invention consists in the provision of a stitch tightening or setting device which is arranged to grasp the thread in close proximity to the work and exert a pull only on that portion of the thread leading to the work. By arranging the take-up device to act in this manner a comparatively small portion of the thread is affected by the pull of the take-up device and the objectionable stretching of the thread incident to prior constructions is avoided. Also portion of the thread leading from the stitch setting device to the supply is left in a condition which permits it to be manipulated in forming the next stitch so that the action of the stitch tightening or setting device can be continued and the stitch set without subjecting the thread to a sudden jerk.

In addition to the features of invention above referred to the present invention also consists in certain devices, combinations and arrangements of parts hereinafter described and claimed, the advantages of which will be obvious to those skilled in the art from the following description.

The present invention will be clearly understood from an inspection of the accompanying drawings in which—

Figure 1 is a view in front elevation of a portion of a lock stitch wax thread sewing machine with the preferred embodiment of the invention applied thereto, so much only of the machine being shown as is necessary to illustrate the connection of the present invention therewith. Fig. 2 is a view similar to Fig. 1 with the parts in the positions they assume at another stage in the operation of forming a stitch. Fig. 3 is a view

similar to Figs. 1 and 2 with the parts in the positions they assume at still another stage in the formation of a stitch, and Fig. 4 is a view in side elevation, partly in section, of a portion of the machine, with the parts in the position illustrated in Fig. 3 and illustrating particularly the construction and arrangement of the devices which manipulate and control the needle thread.

In the drawings the invention is illustrated as applied to the sole sewing machine disclosed in the patent to French and Meyer, No. 473,870, dated April 26th, 1892, to which patent reference may be had for a complete disclosure of the construction and mode of operation of those parts of the machine not illustrated in the accompanying drawings or hereinafter specifically described.

Referring to the drawings 1 indicates the curved hooked needle, 2 the awl, 3 the work support, 4 the presser foot, 5 the shuttle, 6 the looper, 7 the thread arm, 8 the loop spreader or lifter, 9 the take-up, 10 the auxiliary take-up, 11 the pull-off, 12 the thread clamp and 13 the tension, these parts, with the exception of slight changes in the movement of the looper and take-up, hereinafter described, being constructed and arranged to operate as in the machine of the patent above referred to.

The device for setting the stitch illustrated in the drawings consists of a gripper comprising two jaws 14 and 15 located beneath the work support 3 and adapted to grasp the needle thread between the work support and the looper. The jaw 14 is formed upon the forward end of a curved lever 16 pivoted at 17 on the frame of the machine and provided at its upper end with a stud engaging the cam groove 18 in the face of one of the cam disks on the cam shaft. The jaw 15 is formed upon the forward end of a bent lever 19 which is pivoted at 20 upon the lever 16 so that the two jaws move together toward and from the work support. The jaw 15 is moved toward and from the jaw 14 to grasp and release the needle thread by means of a lever 21 pivotally mounted at 17 at one side of the lever 16, the lower end of said lever being pivotally connected to the rear end of the lever 19 and the upper end of said lever being provided with a stud engaging a cam groove 22 cut in the bottom of the cam groove 18. The shape of the cam grooves 18 and 22 is such, as will be apparent from an inspection of Fig. 4, that the jaws 14 and 15 are moved toward and from the work support and the thread is grasped between the jaws during the movement of the jaws away from the work support.

The needle thread is placed between the jaws 14 and 15 of the stitch setting device by a lateral movement of the looper and the movement of the looper in the machine of

the patent above referred to is modified to produce this result by changing the shape of the cams by which the looper is actuated. The movement of the take-up is modified so that the take-up instead of setting the stitch, as in the machine of the patent above referred to, merely draws thread from the loop of needle thread after the passage of the shuttle therethrough, the movement of the take-up being so adjusted that substantially all of the slack thread is taken out of the loop but the loop is not drawn down into the work. This adjustment of the movement of the take-up is secured by providing an adjustable connection between the cam actuated lever 23 and the lever 24 through which the take-up is operated.

The operation of setting a stitch will be clearly understood from an inspection of Figs. 1, 2 and 3 in which Fig. 1 illustrates the position of the parts at the beginning of the stitch setting operation, Fig. 2, the position of the parts at the end of the stitch setting operation and Fig. 3 the position of the parts after the stitch has been set and while the shuttle is entering the loop of needle thread drawn up in the formation of the next stitch. Starting with the parts in the position indicated in Fig. 3, the shuttle passes through the loop of needle thread and the take-up acts to pull the loop of needle thread down to the work substantially as indicated in Fig. 1. The looper now moves to place the needle thread between the jaws of the stitch setting device which immediately close upon the thread and begin their downward movement. This downward movement is substantially perpendicular to the work and is in the direction of the lead of the thread so that a direct pull is exerted upon the thread and the thread is not deflected during the stitch setting operation but is acted upon to the best advantage. The downward movement of the jaws of the stitch setting device continues while the looper presents the thread to the thread arm and returns to the position indicated in Fig. 2 in which position the thread has been placed in the hook of the needle. By the time the looper reaches the position indicated in Fig. 2 the thread arm has been actuated to form a loop in the needle thread between the looper and the jaws of the setting device so that the downward movement of the stitch setting device continues during the thread manipulating movements of both the looper and the thread arm.

While the above described movements of the looper and thread arm are taking place the awl is actuated to pierce and feed the stock and is withdrawn therefrom, the presser foot is released to allow the work to be fed and is then again locked and the

needle is advanced through the work into position to receive the needle thread from the looper. The needle is now retracted drawing up a loop of needle thread through the material and simultaneously the jaws of the stitch setting device release the thread.

The thread manipulating movement of the looper and thread arm takes place during approximately 180° of the revolution of the cam shaft so that the stitch setting device, which is acting to set the stitch during the movements of the looper and thread arm, exerts a pull on the needle thread during substantially one-half of the entire interval consumed in forming a stitch. The movement of the stitch setting device is thus comparatively slow and the machine can be operated at as high a rate of speed as the other working parts will permit, without producing any injurious strain upon the thread by the stitch setting device or causing any irregularity in the operation of the device.

The nature and scope of the invention having been indicated and a preferred form of the invention having been specifically described, what is claimed is—

1. A lock stitch wax thread shoe sewing machine having, in combination, stitch forming devices including a hooked needle, a shuttle, a looper, a take-up, and a stitch setting device, means for actuating the take-up to draw the thread from the loop of needle thread after the passage of the shuttle therethrough, and means for actuating the stitch setting device to engage the needle thread between the work and the looper and to exert a pull on that portion only of the thread between the work and the stitch setting device to set the stitch while that portion of the thread on the supply side of the stitch setting device is kept in condition to be manipulated by the stitch forming devices.

2. A lock stitch, wax thread, shoe sewing machine, having, in combination, stitch forming devices including a hooked needle, a shuttle, a looper, a take-up and a stitch setting device, means for actuating the take-up to draw thread from the loop of needle thread after the passage of the shuttle therethrough, and means for actuating the stitch setting device to exert a stitch setting pull on the needle thread in the direction in which the thread leads prior to the stitch setting pull.

3. A lock stitch, wax thread, shoe sewing machine, having in combination, stitch forming devices adapted to form a lock stitch, said devices including a hooked needle, a shuttle and a stitch-setting device, and means for actuating said device to exert a pull on the needle thread to set a stitch during a portion of the time occupied

by the stitch forming devices in manipulating the needle thread in the formation of a succeeding stitch.

4. A lock stitch, wax thread, shoe sewing machine, having, in combination, stitch forming devices including a hooked needle, a shuttle, a take-up, and a stitch setting device, means for actuating the take-up to draw thread from the loop of needle thread after the passage of the shuttle therethrough, and means for actuating the stitch setting device to exert a pull on the needle thread to set the stitch during a portion of the time occupied by the stitch-forming devices in manipulating the needle thread in the formation of a succeeding stitch.

5. A lock stitch, wax thread, shoe sewing machine, having, in combination, stitch forming devices including a hooked needle, a shuttle, a take-up and a stitch setting device, means for actuating the take-up to draw thread from the loop of needle thread after the passage of the shuttle therethrough, and means for actuating the stitch setting device to grasp the needle thread and exert a pull on the thread to set the stitch.

6. A lock stitch, wax thread, shoe sewing machine, having, in combination, stitch forming devices including a needle, a shuttle, and a stitch setting device, and means for actuating said devices to manipulate the thread in forming a stitch and simultaneously to exert a pull on the needle thread to tighten or set a preceding stitch.

7. A lock stitch, wax thread, shoe sewing machine, having, in combination, stitch forming devices including a hooked needle, means for drawing back thread from the loop of thread drawn out by the needle, a stitch setting device and means for actuating the stitch setting device to engage the needle thread close to the work and exert a pull on that portion only of the thread between the work and the stitch setting device while that portion of the thread on the supply side of the stitch setting device is kept in a condition to be manipulated by the stitch forming devices.

8. A lock stitch, wax thread, shoe sewing machine, having, in combination, stitch forming devices including a hooked needle, a looper and a stitch tightening or setting device, and means for actuating said device to engage the thread between the work and the looper and to exert a pull on that por-

tion only of the thread between the work and the stitch setting device to tighten or set the stitch while that portion of the thread on the supply side of the stitch setting device is kept in a condition to be manipulated by the stitch forming devices.

9. A lock stitch, wax thread, shoe sewing machine, having, in combination, stitch forming devices including a hooked needle and shuttle, a looper, a thread finger, a take-up and an independent stitch setting device, means for actuating the take-up to draw thread from the loop of needle thread after the passage of the shuttle therethrough, and means for actuating the stitch setting device to exert a pull on the needle thread to set the stitch.

10. A lock stitch wax thread shoe sewing machine, having, in combination, stitch forming devices including a hooked needle, a shuttle, a looper, a take-up and a stitch setting device, means for actuating the take-up to draw thread from the loop of needle thread after the passage of the shuttle therethrough and means for actuating the stitch setting device to exert a pull on the needle thread in a direction at substantially right angles to the work.

11. A lock stitch wax thread shoe sewing machine, having, in combination, stitch forming devices including a hooked needle, a shuttle, a looper, a thread finger, and a stitch setting device, and means for actuating the stitch setting device to exert a pull on the needle thread to set a stitch in the interval of time during which the thread arm, looper, and needle, are manipulating the needle thread in the formation of a succeeding stitch.

12. A lock stitch, wax thread, shoe sewing machine, having, in combination, stitch forming devices, including a hooked needle, means for drawing back thread from the loop drawn out by the needle, a stitch setting gripper and means for actuating the stitch setting gripper to grasp the needle thread close to the work and exert a pull on the thread to set the stitch.

In testimony whereof I affix my signature, in presence of two witnesses.

BENJAMIN F. MAYO.

Witnesses:

BENJAMIN PHILLIPS,
FRED O. FISH.