A. E. JERRAM.

CHAIN STITCH SHOE SEWING MACHINE.

APPLICATION FILED SEPT. 2, 1910.

1,154,774.

Patented Sept. 28, 1915.

2 SHEETS—SHEET 1.

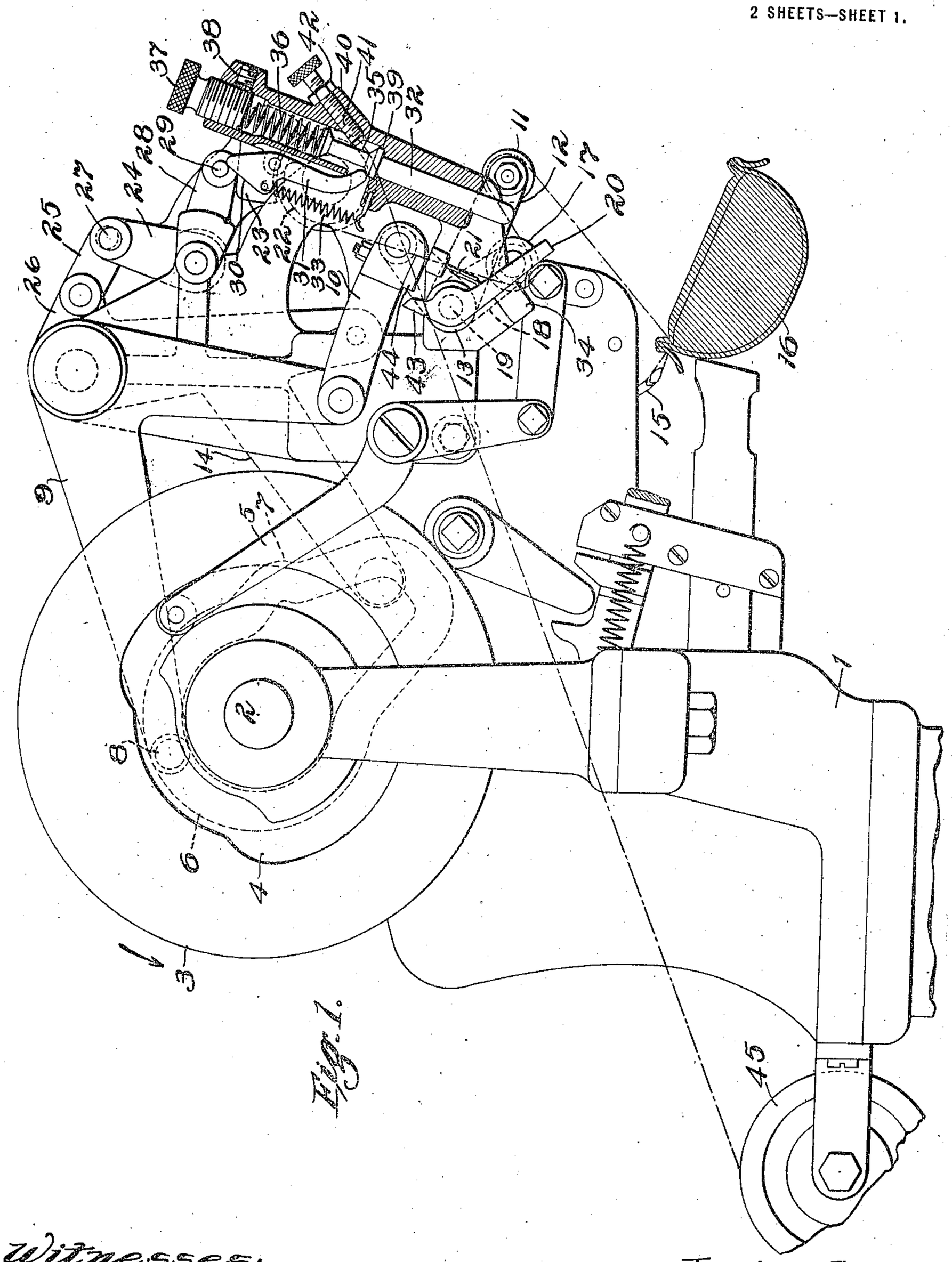

Fig. 1.

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Fig. 2.

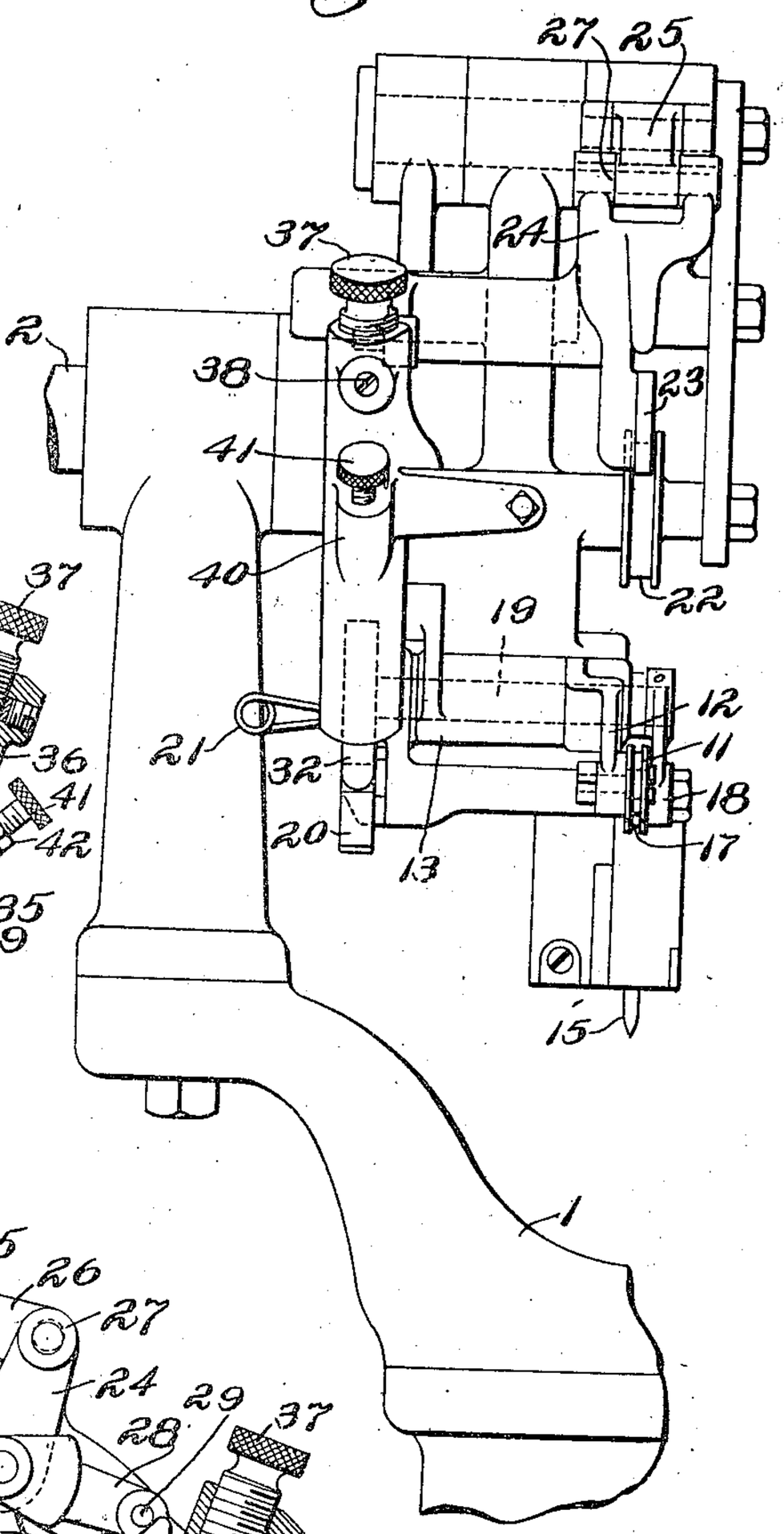


Fig. 3.

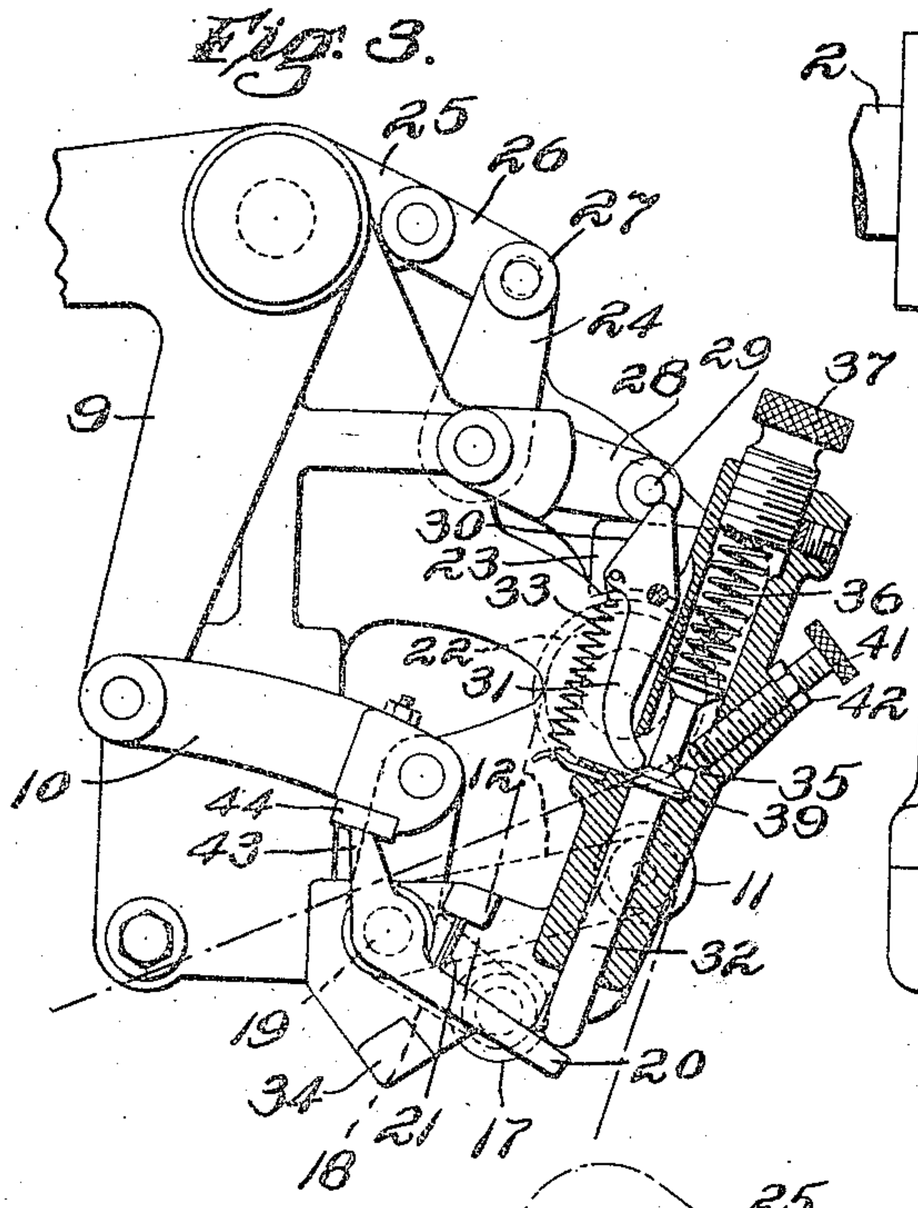
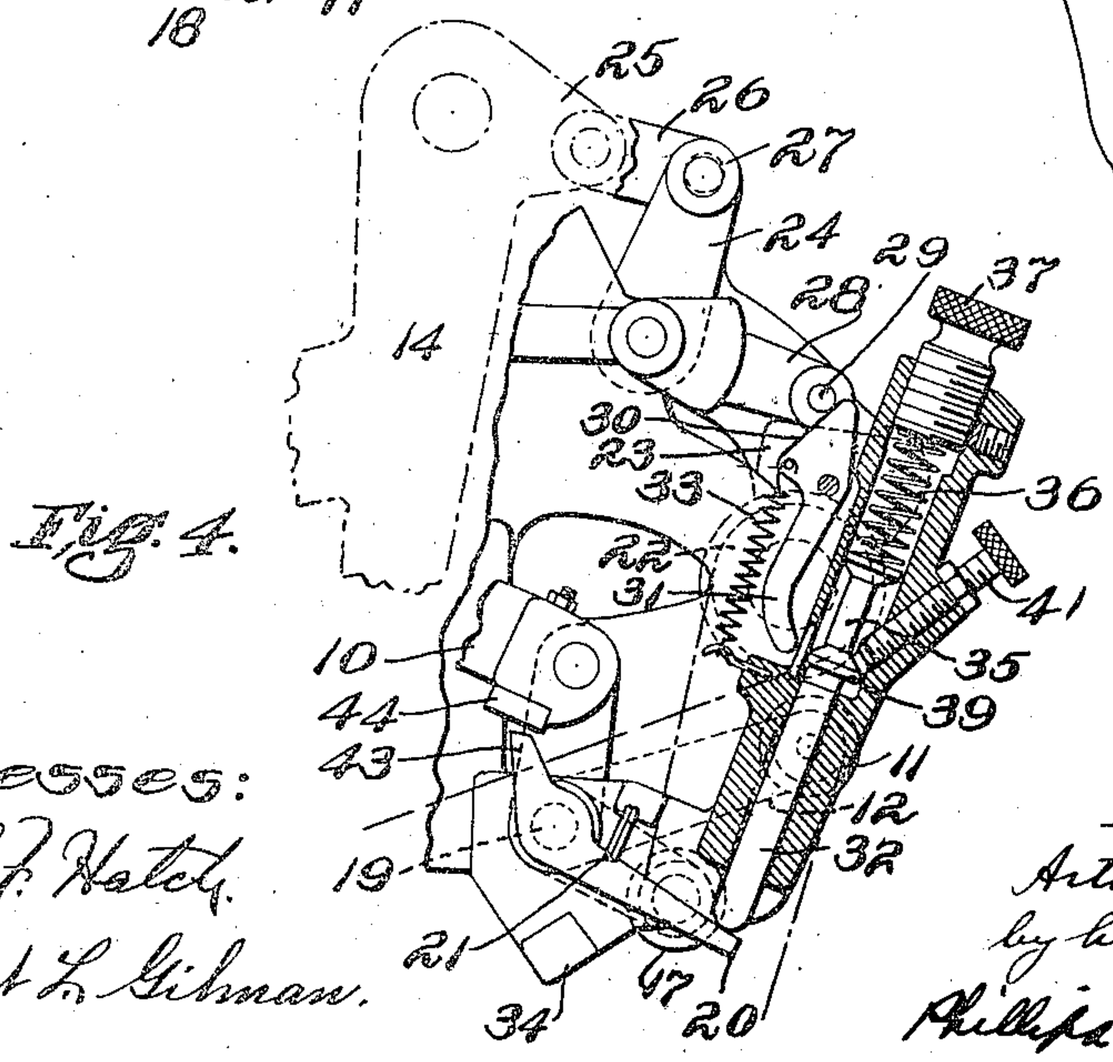


Fig. 4.



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UNITED STATES PATENT OFFICE.

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CHAIN-STITCH SHOE-SEWING MACHINE.

1,154,774. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed September 2, 1910. Serial No. 580,171.

To all whom it may concern:

Be it known that I, ARTHUR E. JERRAM, a subject of the King of Great Britain, residing at Leicester, in the county of Leicester, England, have invented certain new and useful Improvements in Chain-Stitch Shoe-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 stitch setting and thread controlling devices particularly applicable to chain stitch sewing machines having hooked needles.

The object of this invention is to insure a better and a more positive control of the thread whereby only the amount of thread required for the stitch shall be pulled from the supply, and whereby the stitch shall be tightened more effectually than heretofore.

Accordingly, the invention comprises the provision for a chain stitch shoe sewing machine having a hooked needle and thread controlling devices comprising a take-up and a thread locking device, with a yielding auxiliary take-up or thread check between them, of locking means independent of the action of the thread for definitely determining the position of the yielding auxiliary take-up when thread for a stitch is measured from the supply, in order that the yielding resistance shall not be able to "steal" or cause an undue quantity of thread to be measured off from the supply as it would be had this resistance to be overcome as heretofore by the pull of the thread itself during the thread measuring stroke of the take-up.

Another feature of the invention contemplates a construction of the controlling devices which comprise an abutment, that to enable the stitch to be set against a predetermined resistance, is made yielding, and in conjunction with this there may be a locking device operating at certain periods in the cycle of operations to cause it to act as a stationary abutment, and there may be further or adjustable means to limit the extent of yield.

A further feature comprises the employment in the operative mechanism for the take-up of means, for example, a cam with a "dwell" in it, which will interrupt the thread pulling motion of the take-up at the moment at which the lock is put on the supply to enable a stitch setting pull to be exerted on the thread.

With these objects in view, my invention consists in the stitch setting and thread controlling devices hereinafter described, as defined in the claims.

In the drawings accompanying this application I have illustrated a preferred form of my invention as applied to the well-known Goodyear welt and turn machine which is illustrated and described in the patent to French and Meyer, No. 412,704, October 8, 1889. It is to be understood, however, that my invention is clearly applicable to other types of sewing machines, and that it can be otherwise embodied without departing from the spirit of my invention.

In the drawings, Figure 1 is a side elevation partly in section of the head of the machine; Fig. 2 is a partial front elevation of the head shown in Fig. 1; Fig. 3 is a side elevation of the take-ups and their mechanisms with the spring plunger locked; and Fig. 4 is a view of the parts shown in Fig. 3, but with the spring plunger free.

Referring to the drawings, 1 indicates the standard of the machine, 2 the driving shaft which bears the cam wheels for operating the sewing mechanism, and which rotates in the direction indicated by the arrow in Fig. 1, the cam wheel 3 with its cam slot 4 for actuating the thread finger cam lever 5 being shown in full lines, and indicated in dotted lines is the cam slot 6 (provided with a "dwell" 7) and in which is engaged the cam roller 8 carried upon and operating the bell crank lever 9 which through the link 10 operates the main take-up which comprises a thread roll or truck 11 mounted on the end of an arm 12 which is fulcrumed by a sleeve 13. At 14 is indicated the cam operated lever controlling the feed point or awl, which is not shown. The needle 15 is shown in Fig. 1 as operating upon a lasted shoe 16, the needle being in retracted position having pulled the loop of thread through the work, the thread being indicated by a dot-dash line.

The parts above described are constructed and arranged to operate in a well-known manner substantially as set forth in the

above mentioned patent to French and Meyer, and further description thereof is considered unnecessary.

The auxiliary take-up or thread check comprises a truck or roll 17 mounted on the end of the short arm 18 which is attached to a rock shaft 19 which passes through the sleeve 13 which supports the main take-up. The rock shaft is extended through the sleeve, and carries rigidly fixed to its end a lever arm 20 adapted to coöperate with various stops in order to limit and control the amount of the movement of the auxiliary take-up. The auxiliary take-up is impelled in a downward direction by means of a spring 21 acting on the arm 20.

Coöperating with the rolls of the take-up and auxiliary take-up is a large roll 22 journaled to the frame of the machine and around which the thread passes so that a shoe piece 23, which is adapted to coöperate with the large roll, may lock or clamp the thread thereon. The shoe piece is mounted on one end of an elbow-lever 24, the other end of said elbow-lever being connected through a toggle 25 and 26 to some moving part of the mechanism, preferably, as shown, the cam operated lever 14 which controls the feeding point or awl, and the cam path which controls the movement of the lever 14 may be given the necessary variation from that shown in the French and Meyer patent to cause the shoe 23 to fall and rise to clamp and unclamp the thread at the correct time in the cycle of operations, and still not interfere with the engagement of the feeding point with the work. In order that the grip of the shoe piece on the thread may be adjusted, an eccentric adjustment is provided at the joint 27 of the toggle. Connected to the elbow lever 24 is an arm 28 having a pin 29 which acts on the cam face 30 of the pivoted detent 31, which is adapted to engage and lock a spring pressed plunger 32 which at times forms an abutment for the arm 20 which is rigidly connected with the auxiliary take-up roll 17. The detent is normally rocked about its pivot into locking engagement with the plunger 32 by means of a spring 33, but when the elbow lever 24 is rocked about its pivot to depress the shoe piece 23, the pin 29 rides down the cam face 30 and forces the lower end of the detent outward and so releases the plunger 32.

The lever arm 20 is adapted to engage with its upper face the plunger 32 and with its lower face the fixed stop 34 on the machine frame. Thus its movement is limited positively in the downward direction and yieldingly in the upward direction. The plunger 32 is formed of a rod sliding in a recess in an extension on the machine frame and has a reduced portion 35 near its upper end. The plunger is pressed downwardly by means of a spring 36, which is adjustably held in position in an enlargement of the recess by means of the thumb screw 37, which screws into the end of the enlarged recess. This thumb screw is held in its adjusted position by means of the small locking screw 38. At the lower end of the reduced portion of the rod there is a collar 39 which is adapted to limit the downward movement of the plunger under the action of the spring 36.

Opposite the reduced portion 35 of the plunger there is a projection 40 on the machine frame into which is threaded a screw 41 held in adjustable position by means of the jam nut 42. This screw is adapted to project more or less into the space left at the reduced part upon the plunger, and forms an abutment against which the collar 39 may strike to limit the upward movement of the plunger 32 under the action of the lever arm 20 so that said upward movement is checked positively.

When the stitch is being set by the take-up 11, the thread pulling on the roll 17 acts through the arm 20 and the plunger 32 to compress the spring 36, whereby the stitch is set with a yielding pull. When the upward movement of the plunger 32 is checked by the screw 41, the roll 17 can no longer yield so that the stitch may be finally set with a positive pull. The amount of the yielding movement of the plunger 32 and hence the amount that the thread may be positively pulled in the final setting of the stitch can be varied by adjusting the screw 41. To prevent the spring plunger 32 being displaced by the yielding of its spring during the thread measuring stroke of the take-up, the detent 31, already described is provided, and this detent operates in conjunction with the shoe piece 23 so that as soon as the thread is locked the plunger 32 is released by the retraction of the detent. The lever arm 20 has an extension 43 which is adapted to be engaged at certain times by an abutment 44 on the link 10 which operates the main take-up, whereby the auxiliary take-up lever arm 20 will be lifted against its spring 21 and brought into contact with the spring plunger 32 for a purpose to be described. The thread comes from the usual tension 45 at the back of the machine, passes around the large locking roll 22, under the thread truck or roll 17 of the auxiliary take-up, over the thread truck or roll 11 of the main take-up, and thence to the looper and the work.

It has been found that when, as heretofore, the upward motion of the take-up is continuous and the machine is running at a high speed, it is extremely difficult, owing to the inertia of the parts and especially after they have become somewhat worn, to apply the shoe piece 23 to the large roll 22 at the precise moment necessary in order to insure

that the correct amount of thread only has been drawn out from the supply. To obviate this difficulty, the cam slot 6 operating the take-up has been so shaped as to provide a "dwell" 7 in order that the thread pulling motion of the take-up shall be interrupted for a sufficient length of time to permit the shoe piece 23 to be applied to the thread on the large roll 22 and so lock the supply. The "dwell" in the cam thus insures that the thread shall be locked at the correct time in the cycle of operations and so provides that the correct amount of thread be drawn from the supply.

The operation of the device is as follows: While the needle is being looped by the thread and while it is pulling the thread through the material, the main take-up acts in its usual manner and the auxiliary take-up acting under the tension of the light spring 21 coöperates in the usual manner with the main take-up to control the thread. After the needle has been thrust through the work and the loop drawn about the shank of the needle, the rising of the take-up pulls thread from the supply 45 in preparation for the next succeeding stitch. In order that there may be always an exact amount of thread measured from the supply, and that there may be no yielding means acting on the thread which would tend to "steal" more thread, I have provided that the thread shall be given a positive pull during the time that it is pulled from the thread supply. As the main take-up 11 rises to pull the thread from the supply 45, the abutment 44 rides over and depresses the stop 43, thus raising the arm 20 against the plunger 32 and positively locking the auxiliary take-up in the position shown in Fig. 3. The flat face of the abutment 44 acts as a lock on the stop 43 as the link 10 is given further movement, and the plunger 32 is locked against upward movement by the detent 31 engaging the collar 39. During this part of the stitch forming operation the shoe 23 is out of engagement with the roll 22 so that the thread may be drawn from the supply 45, and it will be seen that since all of the spring pressed parts of the thread controlling mechanism are positively locked there is nothing to "steal" thread, and that an exact amount will always be drawn from the thread supply. At the completion of this movement of the take-up 11 which has measured the thread from the supply for the next stitch, the roller 8 enters the "dwell" 7 in the cam slot 6. While the roller 8 is still in the "dwell" 7 the continued turning of the shaft 2 actuates the lever 14 sufficiently to clamp the shoe piece 23 against the thread roll 22 locking the thread and at the same time to cause the pin 29 to ride over the cam face 30 releasing the detent 31 from the part 39. After the thread is locked and the detent is retracted, the further turning of the shaft causes the roller 8 to leave the "dwell" 7 and the upward movement of the take-up 11, which has been interrupted by the dwell, is continued for the stitch setting operation. The thread has now been firmly locked by the shoe 23 so that no more thread may be drawn from the supply. As the take-up 11 is now lifted it will pull the thread upwardly against the auxiliary take-up 17. The auxiliary take-up 17 is now no longer locked by the plunger 32, but rises, lifting the plunger 32 and compressing the spring 36, the continued compression of the spring 36 giving an increasing tension to the thread as the stitch is set in the work, and thus imitating the manner of the setting of a stitch by the hand of a skilled workman. The screw 41 may be adjusted to engage the collar 39, so that, if desired, at the end of the stitch setting stroke the stitch may be set under a positive pull. It can be readily seen that by momentarily interrupting the thread pulling motion of the take-up 11 while the thread is being locked, an exact adjustment of the amount of thread measured from the thread supply may be had. After the stitch has been set, the take-up 11 falls, and the elbow lever 28 is retracted, releasing the thread locking shoe 23 and raising the pin 29 which allows the detent 31 to again engage the collar 39 on the plunger 32. On continued downward movement of the take-up the stop 43 is released from the abutment 44, leaving the auxiliary take-up free to act under the tension of the light spring 21 during the retraction of the needle and during the first steps of the stitch forming operation after the needle has entered the next awl hole. It will be noted that the auxiliary take-up has a triple function. During the retraction of the needle and the preliminary loop forming operation it performs the usual function of the auxiliary take-up as set forth in the French and Meyer patent, and then when the thread is being pulled from the thread supply and the stitch is being set, it acts as a fixed roll over which the thread is drawn, and later it forms a yielding thread roll acting against a comparatively heavy spring to firmly set the stitch.

While I have illustrated the preferred embodiment of my invention with the various parts thereof in one coöperating combination, yet it will be apparent that the several features of my improvement may be used singly, the other parts of the combination being omitted. For instance, the device which raises the auxiliary take-up against the pressure of its spring 21 could be dispensed with and the auxiliary take-up raised by the tension of the thread alone against the plunger 32, which would then act to set

the stitch against the increasing pressure of the spring 31, or again it would be possible to omit the "dwell" in the cam and rely on the accuracy of the parts for drawing the correct amount of thread from the supply, or other parts may be used singly as necessity or convenience may dictate.

I am aware of the patent to Briggs, No. 687,719, dated December 3, 1901, which discloses a spring pressed device against which the stitch is set and which is locked while thread is being pulled from the supply. This spring pressed device of the Briggs patent, however, is not the equivalent of the auxiliary take-up referred to in the following claims which is the ordinary auxiliary take-up which takes care of the slack thread given up by the take-up and which in a machine of the Briggs type exerts a slight tension on the thread during the operation of the looper and thread finger.

Having explained the nature and object of the invention, and specifically described one form of mechanism in which it may be embodied, what I claim is:—

1. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, a take-up, an auxiliary take-up coöperating with the take-up to control the thread given up by the take-up and exerting a light strain on the thread as compared with the strain exerted in setting a stitch, and means for preventing the auxiliary take-up from acting during the time the thread is being pulled from the thread supply.

2. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, a positively actuated take-up, a yielding auxiliary take-up coöperating with the take-up to control the thread given up by the take-up and exerting a light strain on the thread as compared with the strain exerted in setting a stitch, and means for preventing the action of the auxiliary take-up while the thread is pulled from the thread supply, whereby the action of all yielding means, which would tend to steal thread, is prevented.

3. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, a take-up having a positive action on the thread, a yielding auxiliary take-up coöperating with the take-up to control the thread given up by the take-up and exerting a light strain on the thread as compared with the strain exerted in setting a stitch, and means for locking the auxiliary take-up during the time the thread is being pulled from the thread supply, whereby the thread is relieved from the action of all yielding means tending to steal thread.

4. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, a take-up having a positive action on the thread, a spring-pressed auxiliary take-up, and means independent of the action of the thread and operating in timed relation to the stitch forming mechanism for retracting the auxiliary take-up against the tension of its spring during that part of the cycle of stitch forming operations when the thread is pulled from the thread supply.

5. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, a take-up, a spring-pressed auxiliary take-up, and means for retracting and locking the auxiliary take-up against the tension of its spring during a part of the stitch forming operation.

6. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, an intermittent thread locking device for locking the thread while the stitch is being set, a take-up, and means for arresting the thread taking movement of the take-up while the locking means is being actuated to lock the thread.

7. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, a take-up having a thread pulling movement, a part of said movement serving to draw off thread from the thread supply for the next succeeding stitch and the succeeding part of said movement serving to set the stitch, an intermittent thread locking device for locking the thread during the stitch setting movement, and means for interrupting the thread pulling movement of the take-up while the thread locking means is being actuated to lock the thread, whereby the amount of thread to be drawn off from the thread supply may be accurately measured.

8. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, an intermittent thread locking device for locking the thread while the stitch is being set, a take-up and a cam for actuating the take-up having a "dwell" to interrupt the thread pulling stroke of the take-up while the locking device is actuated to lock the thread.

9. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, a take-up, an auxiliary take-up, a movable stop limiting the movement of said auxiliary take-up, means for locking said stop while the thread is being pulled from the thread supply, means for unlocking said locking means, and means for interrupting the thread taking movement of the take-up while the unlocking means is being actuated.

10. A chain stitch shoe sewing machine, having, in combination, stitch forming

mechanism, a thread supply, a take-up, an auxiliary take-up, means for locking said auxiliary take-up while the thread is being pulled from the thread supply, means for unlocking said locking means, and means for interrupting the thread taking movement of the take-up while the unlocking means is being actuated.

11. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, an intermittent thread locking device, a take-up, an auxiliary take-up, a movable abutment for limiting the movement of the auxiliary take-up, means for locking said abutment while the thread is being pulled from the thread supply, and means for unlocking said abutment when the intermittent thread locking means is actuated to lock the thread.

12. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, a take-up, an auxiliary take-up, a spring resisting the first movement of the auxiliary take-up, and an abutment arresting further movement of the auxiliary take-up, said abutment being yieldingly held against movement by a spring during a part of the stitch forming operation and being locked during the remainder of the stitch forming operation.

13. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, a take-up, an auxiliary take-up, means for locking the auxiliary take-up while the thread is being pulled from the thread supply, yielding means for resisting the movement of the auxiliary take-up while the stitch is being set, and an adjustable stop to limit the extent of the yield of said yielding means.

14. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, a take-up, an auxiliary take-up coöperating with the take-up to control the thread given up by the take-up and exerting a light strain on the thread as compared with the strain exerted in setting a stitch, means for locking the auxiliary take-up while the thread is being pulled from the thread supply, yielding means for resisting the movement of the auxiliary take-up while the stitch is being set, and a stop to limit the extent of the yield of said yielding means.

15. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, a take-up, an auxiliary take-up, an abutment limiting the movement of the auxiliary take-up, means for locking said abutment while the thread is being pulled from the thread supply, and yielding means resisting the movement of said abutment with an increasing pressure during the setting of the stitch, whereby the thread may be taken from the thread supply with a positive pull and the stitch may be set under an increasing tension.

16. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, a take-up, an auxiliary take-up, an abutment limiting the movement of the auxiliary take-up, means for locking said abutment while the thread is being pulled from the thread supply, and yielding means resisting the movement of said abutment with an increasing pressure during the setting of the stitch, the extent of yield of said yielding means being limited by a stop, whereby the final setting of the stitch may be made positive.

17. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism. a thread supply, a take-up, an auxiliary take-up means for yieldingly holding the auxiliary take-up against the tension of the thread, means for locking said auxiliary take-up while the thread is being pulled from the thread supply comprising means for retracting said auxiliary take-up against its yielding means and a spring-held abutment, means for locking said abutment while the thread is being pulled from the thread supply, and means for releasing said abutment locking means while the stitch is being set, whereby the auxiliary take-up may resist the pull of the thread with a gradually increasing tension during the setting of the stitch.

18. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, an intermittent thread locking device for locking the thread while the stitch is being set, a take-up, an auxiliary take-up, a spring-held movable abutment for arresting the movement of the auxiliary take-up, means for locking said abutment while the thread is being pulled from the thread supply, and means for releasing the abutment while the stitch is being set whereby the stitch may be set against the tension of the spring-held abutment.

19. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, an intermittent thread locking device for locking the thread while the stitch is being set, a take-up, an auxiliary take-up, a spring-held movable abutment for arresting the movement of the auxiliary take-up, means for locking said abutment while the thread is being pulled from the thread supply, means for releasing the abutment while the stitch is being set, whereby the stitch may be set against the tension of the spring-held abutment, and a stop for limiting the movement of the abutment, whereby the final setting of the stitch may be made positive.

20. A chain stitch shoe sewing machine, having, in combination, stitch forming mech-

anism, a thread supply, a take-up, an auxiliary take-up, a light spring normally holding said auxiliary take-up, yielding means by which the auxiliary take-up is engaged near the extremity of its movement, and means for locking said yielding means against movement during a part of the stitch forming operation.

21. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, a take-up, an auxiliary take-up, a spring normally pressing against said auxiliary take-up, a second spring acting on said auxiliary take-up only while the stitch is being set, and means independent of the action of the thread and operating in timed relation to the stitch forming mechanism for holding the auxiliary take-up retracted against the first spring during that part of the cycle of stitch forming operations when the thread is pulled from the thread supply.

22. A chain stitch shoe sewing machine, having, in combination, stitch forming mechanism, a thread supply, an intermittent thread locking device for locking the thread while the stitch is being set, a take-up, an auxiliary take-up, a spring normally holding the auxiliary take-up against the tension of the thread, a spring-held movable abutment against which the auxiliary take-up is engaged near the extremity of its movement, means for holding the auxiliary take-up retracted against the action of the first spring and in engagement with the movable abutment while the thread is being pulled from the thread supply, means for positively locking the movable abutment while the thread is being drawn from the thread supply, and means for unlocking said abutment locking means while the stitch is being set, whereby the stitch may be set against the tension of the movable abutment.

23. A chain stitch shoe sewing machine having, in combination, stitch forming mechanism, a thread supply, a take-up, a yielding auxiliary take-up coöperating with the take-up to control the thread given up by the take-up, and means for locking the auxiliary take-up during a part of the cycle of the stitch forming operations comprising an abutment stationary during said part of the cycle and a member for positively holding the auxiliary take-up against said abutment.

24. A chain stitch shoe sewing machine having, in combination, stitch forming mechanism, a thread supply, a take-up, an auxiliary take-up coöperating with the take-up to control the thread given up by the take-up and exerting a light strain on the thread as compared with the strain exerted in setting a stitch, means for locking the auxiliary take-up when the thread is being pulled from the thread supply, and yielding means acting on the auxiliary take-up to offer a gradually increasing resistance to the pull of the thread when the stitch is set in the work.

25. A chain stitch shoe sewing machine having, in combination, stitch forming mechanism, a thread supply, a main take-up, mechanism for operating the main take-up, a yielding auxiliary take-up coöperating with the take-up to control the thread given up by the take-up and exerting a light strain on the thread as compared with the strain exerted in setting a stitch, and mechanism operated from the main take-up mechanism for locking the auxiliary take-up during a part of the cycle of the stitch forming operations.

26. A chain stitch shoe sewing machine having, in combination, stitch forming mechanism, a thread supply, a take-up, an auxiliary take-up coöperating with the take-up to control the thread given up by the take-up and exerting a light strain on the thread as compared with the strain exerted in setting a stitch, and means for locking the auxiliary take-up against movement in either direction during a part of the cycle of the stitch forming operations.

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Witnesses:

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