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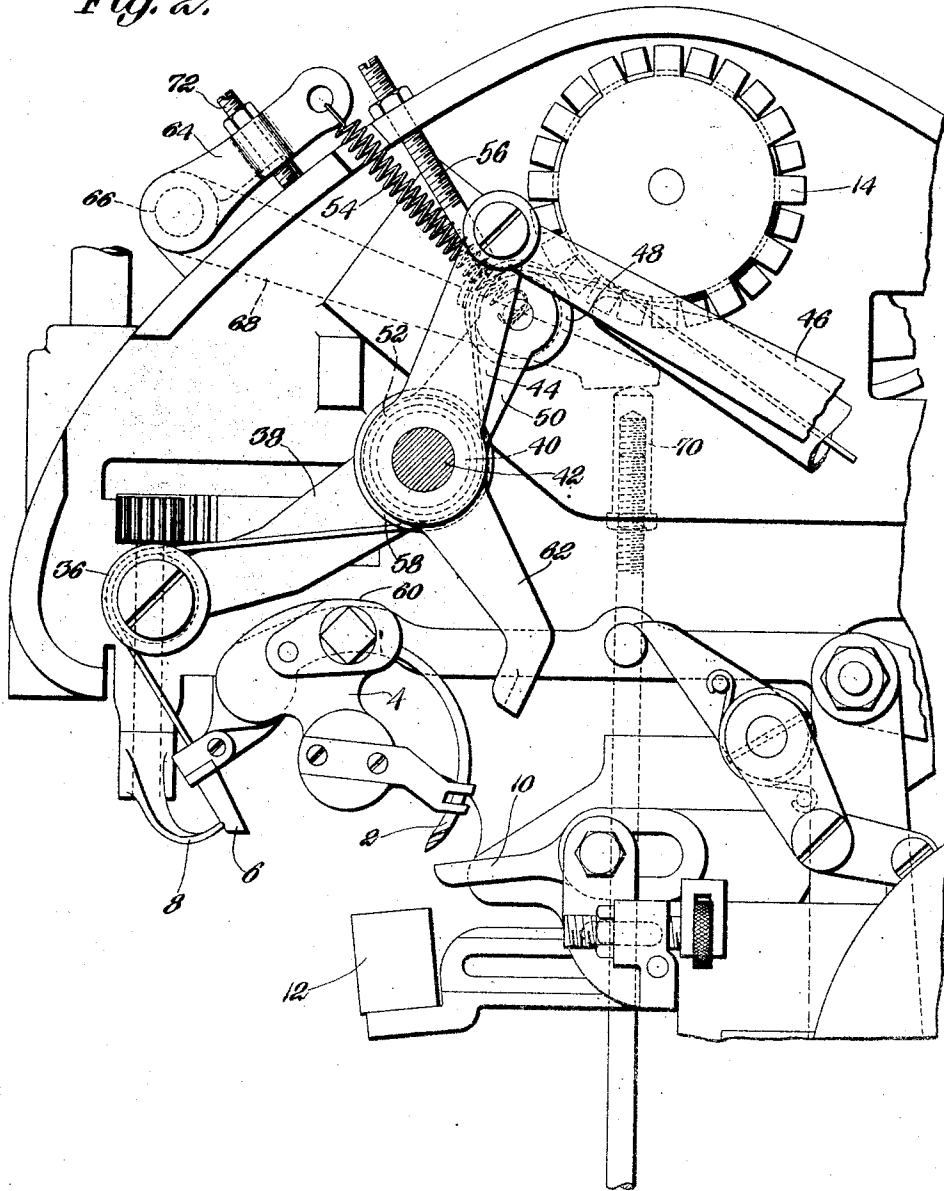
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A. B. FOWLER

SEWING MACHINE

Original Filed Oct. 21, 1920 2 Sheets-Sheet 2

Fig. 2.



Witness:

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# UNITED STATES PATENT OFFICE.

ALFRED B. FOWLER, OF BEVERLY, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY CORPORATION, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## SEWING MACHINE.

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To all whom it may concern:

Be it known that I, ALFRED B. FOWLER, a citizen of the United States, residing at Beverly, 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 sewing machines, and more particularly to wax thread chain stitch inseam shoe sewing machines, although certain features of the invention are applicable to other types of sewing machines.

In the operation of sewing machines, and particularly wax thread chain stitch inseam shoe sewing machines, it has been found that the stitch setting strain which must be exerted on the thread to produce the best results varies with the speed at which the machine is operated, a heavier stitch setting strain ordinarily being required to produce a tight seam when the machine is operated at a low speed than when the machine is operated at a high speed.

An object of the present invention is to provide means of novel and improved construction and mode of operation for thus regulating the stitch setting strain exerted on the thread upon a variation in the speed of the machine.

Another object of the invention is to provide a novel and improved take-up mechanism which is particularly adapted for use on inseam shoe sewing machines.

With these and other objects in view the features of the invention consist in certain constructions, arrangements, and combinations of parts hereinafter described and claimed, the advantages of which will be obvious to those skilled in the art.

The several features of the invention will be clearly understood from the following description and accompanying drawings, in which:

Figure 1 is a front elevation of the head of a wax thread chain stitch inseam shoe sewing machine embodying the features in

their preferred form; and Fig. 2 is a side elevation on an enlarged scale of a portion of the head of the machine with a side of the casing removed.

The sewing machine illustrated in the drawings is provided with a curved hook needle 2, a needle carrier 4, a looper 6, a thread arm 8, a back gage 10, a back rest or bunter 12, and a thread tensioning device comprising a tension wheel 14. The machine is also provided with a high speed driving mechanism comprising a pulley 16 mounted on the driving shaft 18 of the machine and a low speed driving mechanism comprising a worm wheel 20 mounted on the driving shaft. The high speed driving mechanism is thrown in upon the depression of a rod 22 connected with a treadle mechanism at the base of the machine, and is thrown out and the low speed driving mechanism is thrown in upon the rod being released. The rod 22 is connected with the driving mechanisms through an arm 24 secured to one end of a rock shaft 26 that carries a forked arm 28 engaging a clutch sleeve 30 mounted to slide on and rotate with the driving shaft 18. When the treadle rod 22 is released to throw out the high speed driving mechanism and to throw in the low speed driving mechanism, the upward movement of the arm 24 which is effected by means of a torsion spring 31 connected with the arm, is limited by the engagement of a stop lug 32 thereon with the lower end of a latch lever 34 pivoted on the frame of the machine. At a predetermined point in the rotation of the driving shaft after the low speed driving mechanism is thus thrown in, the latch lever 34 is released from the stop lug 32 by a cam carried by the driving shaft allowing the arm 24 to be further carried upwardly by its spring which shifts the clutch sleeve 30 into position so that upon the completion of a predetermined number of degrees of rotation of the driving shaft after the latch lever 34 is released, the low speed driving mechanism is thrown out, and stopping devices act to stop the shaft in a predetermined angular position. In sewing about the toe of a pointed toe shoe, it is desirable

that the machine shall be run at a uniformly low speed, and it will be apparent that this may be accomplished in the illustrated machine by the operator releasing the treadle rod 22 only sufficiently to throw in the low speed driving mechanism without rendering the stopping devices of the machine active, and that upon again depressing the treadle rod 22 the driving mechanism may be shifted back to high speed. The parts above described may be and preferably are the same as the corresponding parts of the machine illustrated and described in applicant's co-pending application Serial No. 298,589, filed May 21, 1919, to which reference may be had for a full and complete description of the same.

The illustrated machine is provided with a main take-up and an auxiliary take-up which are of simple and improved construction. The main take-up comprises a thread truck 36 mounted on the free end of an arm 38 projecting from a sleeve 40 which is loosely mounted on a stud shaft 42 secured to the frame of the machine. The main take-up is actuated by an arm 44 projecting upwardly from the sleeve 40 and having its free end pivotally connected with a cam actuated link 46. The auxiliary take-up which is interposed between the main take-up and the tension wheel 14 comprises a thread truck 48 mounted on the free end of an arm 50 projecting from a sleeve 52 which is loosely mounted on the sleeve 40 of the main take-up. A coiled spring 54 is connected with the auxiliary take-up arm 50 which tends to raise the arm until a projection thereon abuts against the lower end of an abutment screw 56, which may be adjusted and locked in any desired position of adjustment by a lock nut. The thread passes from the tension wheel over the thread truck 48, beneath a thread truck 58 loosely mounted on the auxiliary take-up sleeve 52, over the thread truck 36, and thence through the looper to the work.

The thread handling devices of the machine illustrated in the drawings are so arranged and operated that the main take-up acts to exert a stitch setting strain on the seam and draw off thread for the next loop from the tension wheel when the needle is in its forward position and extended through the work. The main take-up then falls during the thread measuring movement of the thread arm, during the looping movement of the looper, and during the first part of the loop drawing movement of the needle. As the needle nears the limit of its loop drawing movement, it exerts a pull on the thread to tighten the preceding loop, such pull moving the auxiliary take-up arm 50 away from the abutment screw 56 and placing the auxiliary tension spring 54 under tension. To render the action of the main

take-up, the auxiliary take-up and the needle reliable and uniform under all conditions of sewing, means are provided in the illustrated machine which insure that the pull exerted upon the thread by the needle as it reaches the limit of its backward movement shall always be against the resistance offered by the auxiliary tension spring 54 and not against the resistance offered by the tension wheel 14. To secure this result the needle carrier 4 is provided with a cam surface 60 to cooperate with the end of an arm 62 projecting from the auxiliary take-up sleeve 52. The cam surface 60 acts to positively raise the auxiliary take-up and hold the auxiliary take-up in raised position during the action of the main take-up in setting the stitch, so that during the latter portion of the taking-up action of the main take-up, the auxiliary take-up is practically locked in the position in which the arm 50 of the auxiliary take-up is nearly in contact with the abutment screw 56. As the main take-up moves to give up thread, however, the needle carrier during its retracting movement moves the cam surface 60 away from the path of the end of the arm 62, leaving the auxiliary take-up free to be moved against the tension of its spring 54, so that when the needle exerts a pull on the thread during the latter part of its retracting movement, the auxiliary take-up can yield to the required extent without bringing up against a positive stop so as to cause any strain to be exerted on the thread in addition to that caused by the spring 54 of the auxiliary take-up.

In the machine disclosed in applicant's co-pending application, hereinbefore referred to, the main take-up is located between the auxiliary take-up and the tension wheel, and it has been found that with such arrangement of these devices there is danger of the main take-up not properly acting on the stretch of thread extending over the auxiliary take-up to the work. By locating the main take-up between the auxiliary take-up and the work so that the thread extends directly from the main take-up to the looper, as in the present construction, it will be apparent that the above described disadvantage of said prior construction is entirely overcome.

In order to increase the tension exerted on the thread upon a decrease in the speed of the machine to obtain the desired uniformity in the tightness of the stitch irrespective of the speed of the machine, it has heretofore been proposed to increase the tension of the thread tensioning device. In such prior constructions, the take-up mechanism is so constructed that the stitch tightening strain exerted on the thread both while the needle is in its forward position and during the retracting movement of the needle is against

the tension of the thread tensioning device. It will be apparent, however, that in a construction, such as that illustrated in the drawings, in which the tension exerted on the thread during the retracting movement of the needle is against the tension of the auxiliary take-up spring and not against the tension of the thread tensioning device, that a variation in the tension of the thread tensioning device would not effect the stitch tightening strain exerted on the thread during the retracting movement of the needle. Moreover, applicant has found that by suitably increasing the strain exerted on the thread during the retracting movement of the needle upon a decrease in the speed of the machine, that the desired uniform tightness of stitch may be obtained without the necessity of varying the stitch setting strain exerted on the thread when the needle is in its forward position. To obtain such increase in the strain exerted on the thread during the retracting movement of the needle, the illustrated machine has provision for increasing the tension of the auxiliary take-up spring 54 upon shifting from the high to the low speed driving mechanism. This enables the operation of the thread tensioning device to be uniform at all times, which ensures that the main take-up in drawing thread from the supply and exerting a stitch tightening strain on the thread while the needle is in its forward position will be certain and reliable in operation and of uniform effectiveness.

The outer end of the auxiliary take-up spring 54 is connected with the free end of an arm 64 secured to one end of a rock shaft 66 mounted in the machine frame. An arm 68 is secured to the other end of the rock shaft 66 and its free end extends into position to be engaged by the upper end of a rod 70, the lower end of which rod is pivotally connected with the free end of the arm 24. With this construction it will be apparent from an inspection of the drawings that upon releasing the treadle rod 22 sufficiently to shift from the high to the low speed driving mechanism, the upward movement of the arm 24 will act through the rod 70 and arm 68 to raise the arm 64 and thereby increase the tension of the auxiliary take-up spring 54, and that upon again depressing the rod 22 to shift back to the high speed driving mechanism the arm 68 will be released, allowing the arm 64 to return to its normal position to relieve the tension of the auxiliary take-up spring 54, this movement of the arm 64 being limited by an adjustable abutment screw 72 on the arm engaging the machine frame.

While it is preferred to employ the specific construction and arrangement of parts illustrated and described, it is to be understood that this construction and arrange-

ment is not essential except so far as specified in the claims, and may be changed or modified without departing from the broader features of the invention.

The nature and scope of the present invention having been indicated and a machine embodying the several features of the invention in their preferred form having been specifically described, what is claimed is:—

1. A shoe sewing machine having, in combination, stitch forming devices including a hook needle, a needle carrier, a main take-up, an auxiliary take-up, and means operated by the needle carrier for raising the auxiliary take-up against the strain of the thread during the taking-up stroke of said main take-up and for holding said auxiliary take-up raised during the remainder of the taking-up stroke.

2. A chain stitch shoe sewing machine having, in combination, a hook needle, a looper, a take-up acting to exert a stitch setting strain on the thread while the needle is in the work, a spring pressed auxiliary take-up located at the opposite side of the main take-up from the work, a stop to limit the yielding movement of the auxiliary take-up under the strain exerted on the thread by the main take-up and means for moving the stop during each cycle of operations to permit a greater yielding movement under the strain exerted on the thread by the needle.

3. A shoe sewing machine having, in combination, stitch forming devices including a hook needle, a main take-up, an auxiliary take-up, a spring normally tending to move said auxiliary take-up in one direction, and means comprising a needle carrier for actuating the needle and for moving said auxiliary take-up a predetermined distance in the direction of movement thereof by said spring during the taking-up stroke of the main take-up.

4. A chain stitch shoe sewing machine having, in combination, a hook needle, a looper, a thread tensioning device, a main take-up acting to exert a stitch setting strain on the thread while the needle is in the work and to pull thread from said tensioning device, a spring pressed auxiliary take-up interposed between the main take-up and said tensioning device, a stop to limit the yielding movement of the auxiliary take-up under the strain exerted on the thread by the main take-up, and means for moving the stop during each cycle of operations to permit a greater yielding movement under the strain exerted on the thread by the needle.

5. A chain stitch shoe sewing machine having, in combination, a hook needle, a looper, a main take-up acting to exert a stitch setting strain on the thread while the needle is in the work, a spring pressed aux-

- iliary take-up, and a needle carrier constructed and arranged to limit the yielding movement of the auxiliary take-up under the strain exerted on the thread by the main take-up during the forward movement of the needle and to release the auxiliary take-up to permit a greater yielding movement thereof under the strain exerted on the thread by the needle during the retracting movement of the needle.
6. A sewing machine having, in combination, a high speed driving mechanism, a low speed driving mechanism, stitch forming devices including a needle, means cooperating with the needle to exert a strain on the thread during the retracting movement of the needle, and means for shifting from the high to the low speed driving mechanism and for simultaneously varying the effectiveness of said means for exerting a strain on the thread.
7. A sewing machine having, in combination, a high speed driving mechanism, a low speed driving mechanism, stitch forming devices, means for exerting a strain on the thread, and means for shifting from the high to the low speed driving mechanisms and for simultaneously varying the effectiveness of said means for exerting a strain on the thread.
8. A sewing machine having, in combination, stitch forming devices, a main take-up, an auxiliary take-up, a spring for actuating the auxiliary take-up, and means acting simultaneously with a variation in the speed of the machine for varying the tension of said spring.
9. A sewing machine having, in combination, stitch forming devices, a thread tensioning device, a take-up mechanism for drawing thread from the tensioning device, to set the stitch and to give up thread to the stitch forming devices, and means acting simultaneously with a reduction in the speed of the machine for varying the action of the take-up mechanism while the action of the tensioning device remains unchanged.
10. A sewing machine having, in combination, stitch forming devices, a main take-up, an auxiliary take-up, a spring for actuating the auxiliary take-up, and treadle controllable means for varying the tension of said spring during the operation of the machine.
11. A sewing machine having, in combination, stitch forming devices, a take-up, a spring for moving the take-up in one direction to place a strain on the thread, and means acting simultaneously with a reduction in the speed of the machine for increasing the tension of said spring.
12. A sewing machine having, in combination, a take-up mechanism comprising a pivoted arm, a spring tending to move the arm in the direction to place a strain on the thread, and means acting simultaneously with a variation in the speed of the machine for varying the tension of the spring.
13. A sewing machine having, in combination, stitch forming devices, a main take-up mechanism for exerting a stitch setting strain on the thread while the needle is in the work, an auxiliary take-up mechanism for exerting a strain on the thread during the retracting movement of the needle, and means acting simultaneously with a reduction in the speed of the machine for adjusting the auxiliary take-up mechanism to increase the strain thereby exerted on the thread.
14. A sewing machine having, in combination, stitch forming devices, a thread tensioning device, a take-up mechanism for exerting a strain on the thread, and means acting independently of said tensioning device simultaneously with a variation in the speed of the machine for varying the effectiveness of the take-up mechanism.
15. A sewing machine having, in combination, stitch forming devices, a thread tensioning device, means for exerting a strain on the thread, and means acting simultaneously with a variation in the speed of the machine for varying the amount of said strain independently of the thread tensioning means.
16. A sewing machine having, in combination, stitch forming devices, a main take-up for exerting a stitch setting strain on the thread while the needle is in its advanced position, an auxiliary take-up to cooperate with the needle to exert a strain on the thread during the retracting movement of the needle, and means acting simultaneously with a variation in the speed of the machine for adjusting one of said take-ups to vary the effectiveness thereof while the operation of the other take-up remains constant.
17. A sewing machine having, in combination, stitch forming devices, a take-up mechanism for exerting a stitch setting strain on the thread while the needle is in its advanced position and to cooperate with the needle to exert a strain on the thread during the retracting movement of the needle, and means for adjusting said mechanism upon a variation in the speed of the machine to vary the strain exerted on the thread during the retracting movement of the needle while the stitch setting strain exerted on the thread when the needle is in its advanced position remains constant.
18. A sewing machine having, in combination, stitch forming devices, a thread tensioning device, a take-up mechanism interposed between the thread tensioning device and the stitch forming devices for exerting a strain on the thread during the loop drawing movement of the needle, and means acting

ing simultaneously with a variation in the speed of the machine for adjusting the take-up mechanism independently of the thread tensioning device to vary the strain exerted on the thread.

19. A sewing machine having, in combination, a thread tensioning device, a main take-up for exerting a stitch setting strain on the thread while the needle is in its advanced position, an auxiliary take-up inter-

posed between the main take-up and said tensioning device for exerting a strain on the thread during the loop drawing movement of the needle, and means acting simultaneously with a variation in the speed of the machine for adjusting the auxiliary take-up to vary the strain exerted on the thread.

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