

April 25, 1933.

F. ASHWORTH
SHOE SEWING MACHINE

1,905,031

Filed Feb. 9, 1929

3 Sheets-Sheet 1

Fig. 1

Fig. 2

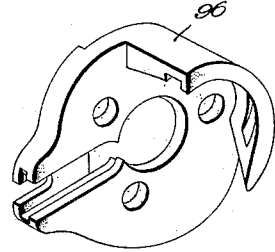
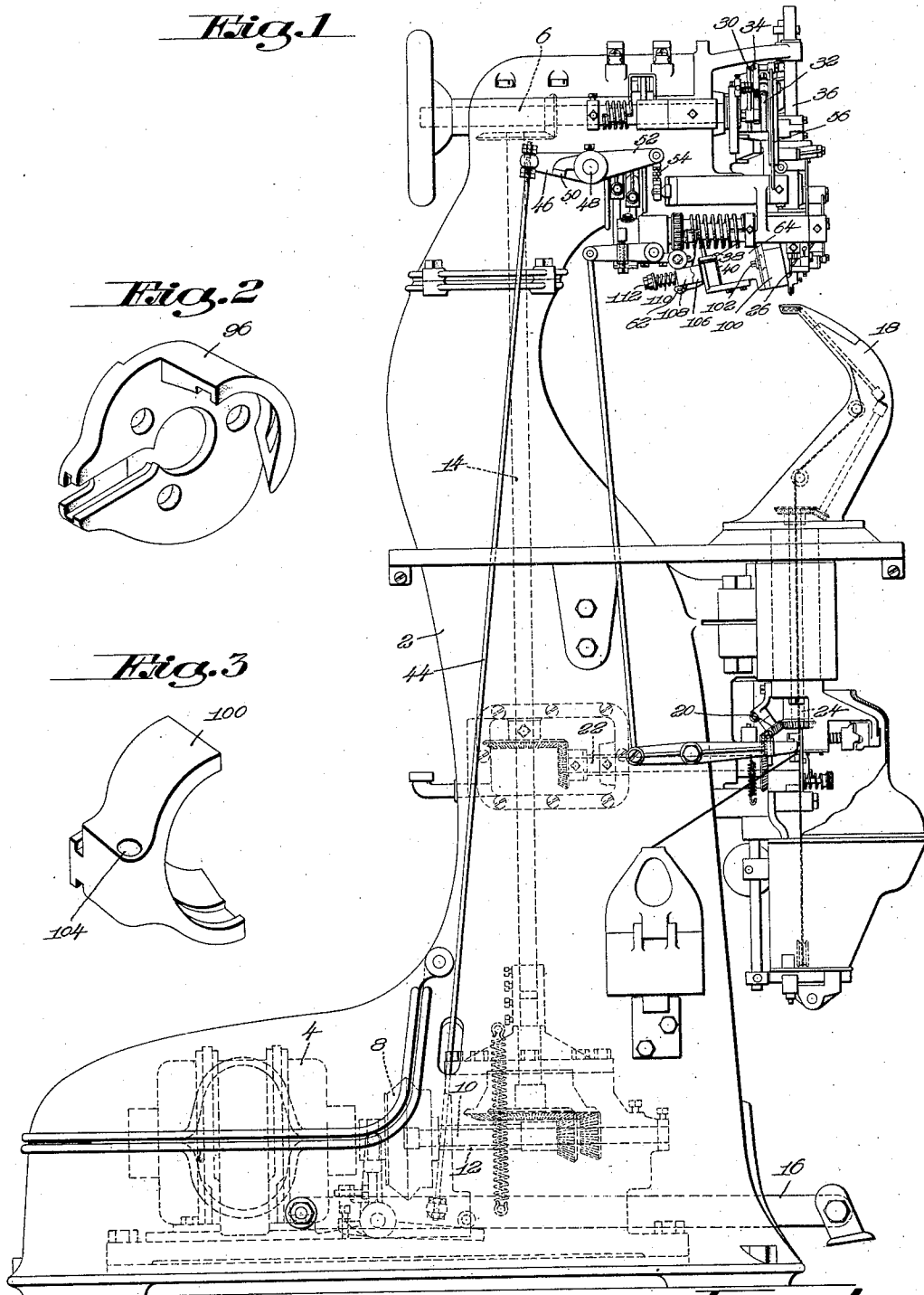
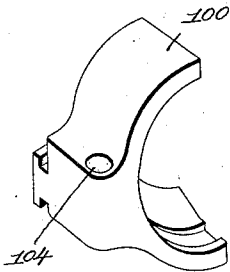


Fig. 3



Witness

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Fig. 4

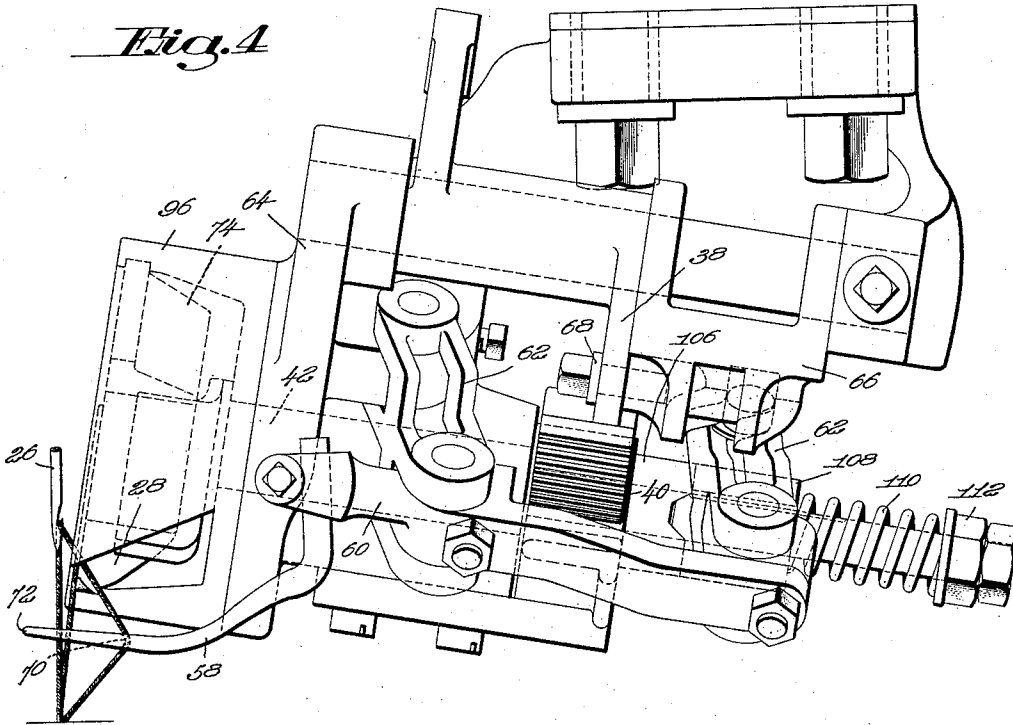
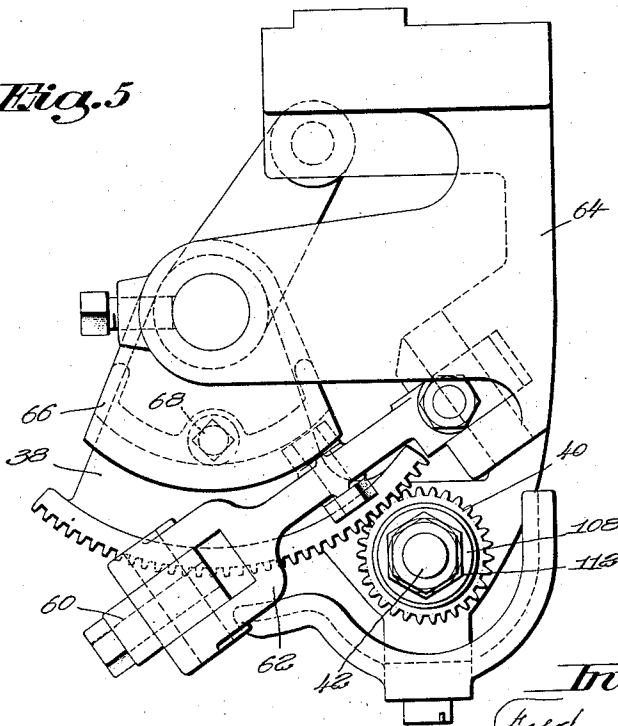


Fig. 5



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Fig. 6

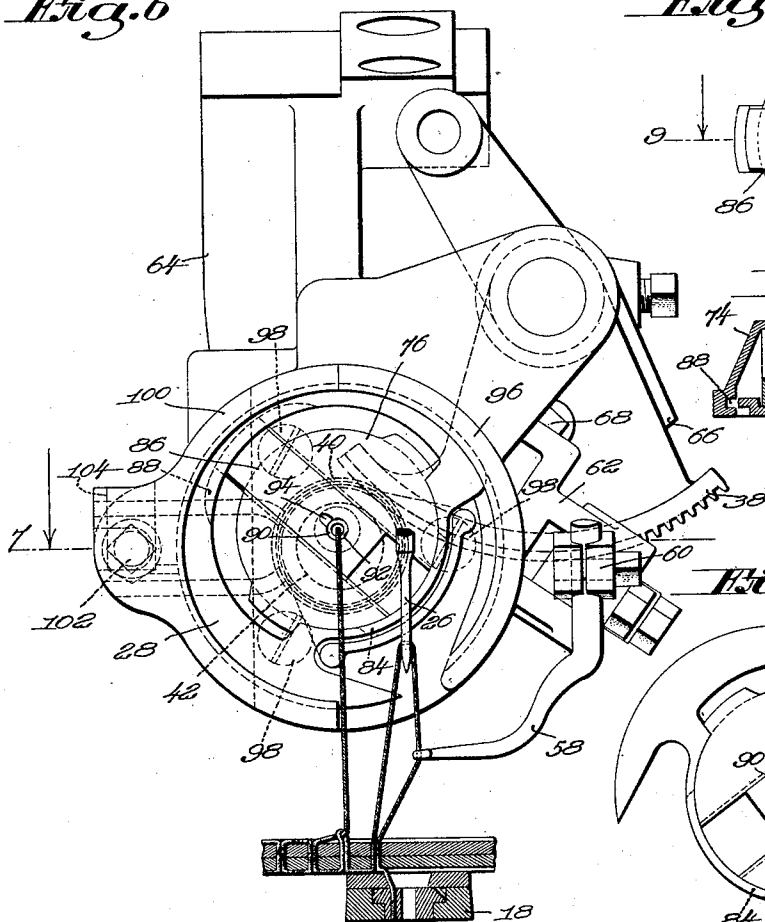


Fig. 8

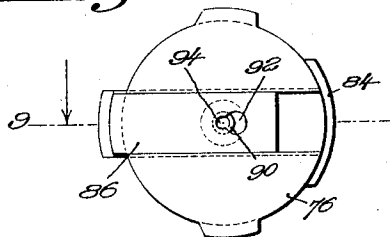


Fig. 9

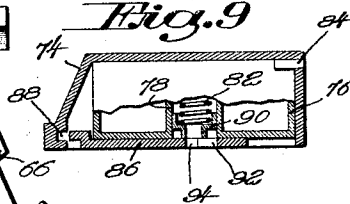


Fig. 10

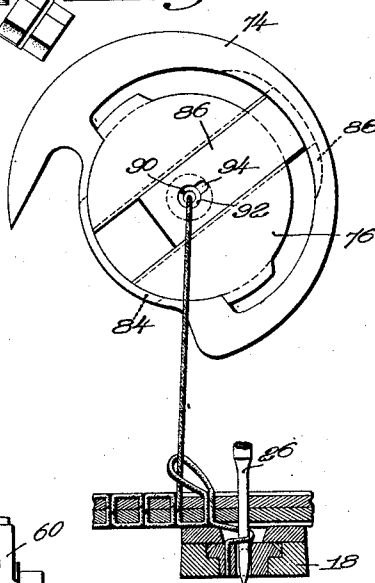


Fig. 7

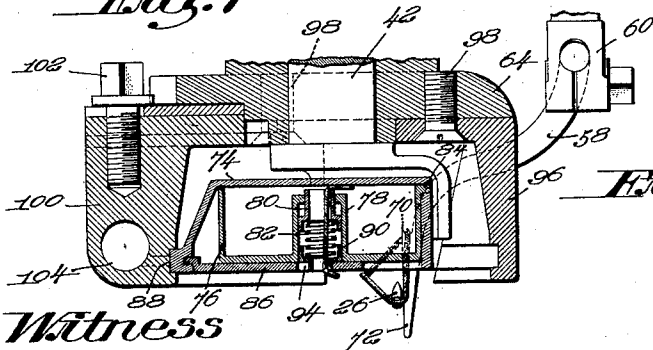
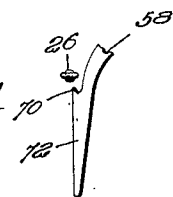


Fig. 11



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UNITED STATES PATENT OFFICE

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SHOE SEWING MACHINE

Application filed February 9, 1929. Serial No. 338,756.

The present invention relates to shoe sewing machines and is intended primarily as an improvement in lockstitch shoe sewing machines of the so-called McKay type which comprise a straight hook needle, a shuttle, a shoe supporting horn arranged to extend inside of the shoe, and a needle threading whirl located in the horn. Certain features of the invention, however, and particularly those relating to the shuttle are capable of embodiment and use in other types of machines.

The several features of the invention are herein illustrated as embodied in a lockstitch shoe sewing machine of the McKay type which is intended as an improvement on the machine disclosed in the pending application of Bernard T. Leveque for a lockstitch sewing machine, filed February 18, 1927, Serial No. 169,203. In the machine of the Leveque application, at the conclusion of the sewing operation the machine is brought to rest with the needle at the limit of its loop drawing stroke and with the last needle loop still held by the needle. One advantage of stopping the machine at this point in a cycle of operations is that the needle thread, as well as the shuttle thread, can be readily severed by the operator, the needle loop being in a position which permits the point of a knife to be inserted between the legs of the loop and the work side of the loop to be severed by the knife. A feature of the present invention still further facilitates the severing of the needle thread at the conclusion of the sewing operation and to this end is embodied in a construction which, as the machine is brought to rest, engages one side of the needle loop and spreads the loop so that after the machine stops the legs of the needle loop are held widely separated and the work side of the loop can be readily severed without any special care on the part of the operator and without any danger of severing the other leg. A short thread end can thus be left projecting from the shoe and a sufficient length of supply thread projecting from the horn to start the next shoe. In the illustrated embodiment of this feature of the in-

vention a loop spreader is provided which, during the operation of the machine in sewing a seam, performs the function of an ordinary loop spreader in spreading the needle loop for the entrance of the shuttle. In the machine of the Leveque application the needle loop is taken directly from the needle by the shuttle. In the illustrated embodiment of the present invention not only is the severing of the needle thread at the conclusion of the sewing operation facilitated, but also a location of the shuttle is permitted so that the shuttle beak passes at one side of the needle and the entrance of the shuttle into the needle loop is greatly facilitated. In the machine of the Leveque application, the needle and shuttle are actuated through connections from the main cam shaft which connections are rendered inoperative as the cam shaft is disconnected from its source of power in stopping the machine, this result being secured by disconnecting the mechanism from the cam shaft just as the needle reaches the limit of its loop drawing stroke and as the shuttle reaches the limit of its backward stroke. As a convenient means for controlling the operation of the loop spreader and causing it to come to rest with the needle as the needle reaches the limit of its stroke, means are provided in the illustrated machine for actuating the loop spreader from the connections through which the needle and shuttle are actuated so that the loop spreader comes to rest simultaneously with the needle and at the point in its movement when the needle loop is most widely distended.

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

Referring to the drawings, accompanying this application, Fig. 1 is a view in side elevation of a lockstitch shoe sewing machine of the McKay type embodying the several features of the invention; Fig. 2 is a detail perspective view of a portion of the

raceway for the shuttle; Fig. 3 is a similar view of another portion of the raceway for the shuttle; Fig. 4 is a detail view in side elevation illustrating the mechanism for actuating the loop spreader; Fig. 5 is an end view of the parts illustrated in Fig. 4, looking from the right of Fig. 4; Fig. 6 is a view in front elevation of the parts illustrated in Fig. 4 and also indicating in cross section a portion of the work, together with the tip of the horn and the needle threading whirl; Fig. 7 is a detail sectional plan view taken on the line 7 of Fig. 6; Fig. 8 is a detail front view of the thread holder casing removed from the shuttle; Fig. 9 is a detail sectional plan view of the shuttle and thread holder casing, a portion of the thread holder casing being shown in section on the line 9 of Fig. 8; Fig. 10 is a detail view illustrating somewhat diagrammatically the action of the whirl in carrying the thread around the needle; and Fig. 11 is a detail sectional plan view illustrating the relative arrangement of the needle and loop spreader.

Except as hereinafter described, the machine illustrated in the drawings is the same in the construction, arrangement and mode of operation of its various parts as the machine disclosed in the application of Bernard T. Leveque hereinbefore referred to. The machine comprises a column 2 in the lower portion of which is mounted an electric motor 4 by which the operating parts of the machine are driven. The main cam shaft or, as it may conveniently be termed, the sewing shaft, is indicated at 6 and is journaled in the upper portion of the column. The shaft 6 is driven from the motor 4 through a clutch 8, horizontal shafts 10 and 12 in the base of the machine and a vertical shaft 14. The clutch 8 is controlled from a treadle lever 16 by means of which the clutch may be actuated to connect and disconnect the shafts 10 and 12 from the source of power.

The shoe supporting horn is indicated at 18 and is provided in its tip with a whirl of usual construction which is driven through suitable connections from the vertical shaft 14, these connections being the same as those disclosed in the Leveque application except for the provision of an intermediate bevel gear 20 in the connections between the horizontal shaft 22 and the vertical shaft 24. The provision of this intermediate gear causes the whirl to rotate in a direction opposite to the direction of rotation of the whirl of the machine of the Leveque application for the reasons which will be hereinafter explained.

The straight hook needle 26 and the discoidal shuttle 28 are actuated from the sewing shaft 6 in the same manner as in the machine of the Leveque application. The

connections between the sewing shaft and the needle comprise a crank pin upon the forward end of the sewing shaft, a slotted lever 30 engaged by the pin, a needle actuating lever 32, a latch 34 connecting the slotted lever and the needle actuating lever, and a link connecting the needle actuating lever to the needle bar 36. The shuttle is driven from the needle actuating lever 32 through a link which connects a downward extension from the hub of the lever to the upwardly extending arm of the shuttle actuating gear segment 38. This segment meshes with a pinion 40 mounted upon the shuttle driver shaft 42. With this construction and arrangement of parts the needle and shuttle reach the limits of their movements and reverse their direction of movement simultaneously. Also, by actuating the connecting latch 34 the lever 32 can be disconnected from the sewing shaft 6 when the needle and shuttle are stationary at the limit of their movements in one direction, whereby these parts can be brought to rest accurately with the needle loop still held in the hook of the needle and free from the shuttle. The latch 34 is actuated from the starting and stopping treadle 16 on stopping the machine in the same manner as in the machine of the Leveque application, the release of the lever 32 by the latch 34 taking place at that point in the cycle of operations when the needle reaches the limit of its upward stroke.

The connections from the stopping and starting treadle 16 for actuating the latch 34 comprise a rod 44 connecting the treadle with an arm 46 projecting from a cross shaft 48 mounted in the upper portion of the column. This arm is provided with a lug 50 projecting laterally beneath a rearward extension of an arm 52 loosely mounted on the shaft 48 and connected at its forward end by a link 54 to a rock shaft upon the forward end of which the upwardly extending slotted arm 56 of the work feeding mechanism is secured. A heavy coiled spring surrounds the shaft 48 and tends to turn it in a clockwise direction. While the machine is running with the treadle 16 depressed the lug 50 is out of engagement with the arm 52. Upon the release of the treadle, however, the arm 46 swings upwardly so that the lug 50 engages the rearward extension of the arm 52 and thereafter the coiled spring acting through the arm 46 turns the arm 52 yieldingly in a clockwise direction and through the connections to the upwardly extending arm 56 moves the arm in a direction to disengage the latch 34 from the lever 32, all, as fully explained in the Leveque application.

The loop spreader which embodies that feature of the present invention relating to the spreading of the needle loop so as to

permit the work side of the needle loop to be readily severed after the machine stops is indicated at 58 and consists of a suitably bent arm or finger secured to the forward end of a carrier bar 60. This loop spreader in addition to spreading the loop to facilitate the cutting of the work side of the loop at the conclusion of the sewing operation also acts during the normal operation of the machine in sewing a seam to spread the needle loop during each cycle of stitch forming operations to facilitate the entrance of the shuttle into the needle loop. To actuate the loop spreader so as to engage one side of the needle loop and separate it from the other side of the loop the carrier bar 60 is supported by two parallel motion links 62 pivotally mounted at their inner ends upon a bracket 64 forming that portion of the machine frame in which the shuttle driver shaft 42 is mounted. The arrangement of the carrier bar 60 and links 62 is such that as the links are oscillated a movement back and forth in substantially a right line is imparted to the loop spreader. To oscillate the links 62 at the proper times during the stitch forming cycle, a block 66 is pivotally mounted upon the pivot shaft on the shuttle actuating gear segment 38 and is rigidly connected to the gear segment by means of a bolt 68, and a suitably shaped cam groove is formed in the block 66 which is engaged by a stud projecting upwardly from substantially the central point of the rear link 62. The loop spreader is thus actuated from the needle actuating lever through the connections which actuate the shuttle and consequently the loop spreader is actuated in proper timed relation to the needle and shuttle and its movement is stopped simultaneously with the movements of the needle and shuttle. As clearly indicated in Figs. 4, 6 and 7, the loop spreader engages one side of the needle loop during the upward stroke of the needle and is still in engagement with the needle loop when the parts come to rest on stopping the machine with the needle at the limit of its upward stroke. The supply side of the needle loop is engaged and deflected by the loop spreader and the work side of the loop is left in a position where it can be readily cut by a knife in the hands of the operator as will be clearly apparent from an inspection of Fig. 6. If desired, also the shuttle thread can be cut with the same stroke of the knife used in cutting the needle loop.

In order to permit the use of a simple movement of the loop spreader in substantially a right line and to facilitate the engagement of one leg only of the needle loop by the loop spreader, the needle is arranged with its barb or open side facing backwardly into the machine at an angle to the line of feed. In the construction shown, the

needle barb or open side of the needle faces at right angles to the line of feed directly towards the shuttle. This arrangement of the needle causes the needle loop to be presented so that one leg is in front of the other in the line of feed and separates the legs of the loop so that one leg can be engaged by the loop spreader during its straight line movement across the line of feed. To cause the supply side of the loop to be engaged by the loop spreader, the whirl is rotated in a direction to carry the thread first to the shuttle side of the needle, that is, as viewed from above, the whirl rotates in a clockwise direction. This movement of the whirl in a clockwise direction also results in facilitating the action of the take-up in pulling the needle loop down from the shuttle and the action of the shuttle in pulling thread from the supply as the needle loop passes over the top of the shuttle. A whirl rotating in this manner in combination with a needle having its barb facing at an angle to the line of feed constitutes a feature of an invention forming the subject-matter of an application of Hopkins filed of even date herewith. Serial No. 338,751 upon which Patent No. 1,839,390 issued January 5, 1932.

As has been stated, the loop spreader 58 is actuated during each stitch forming cycle of the machine to spread the loop to receive the beak of the shuttle. This relieves the shuttle of the necessity of taking the loop directly from the needle and renders the loop taking operation more certain and reliable while permitting the shuttle to be placed entirely to one side of the needle as indicated in Fig. 4. To engage and properly distend the loop, the loop spreader is provided with a notch or shoulder 70 as best shown in Figs. 7 and 11, and in order to support the work side of the needle loop against the thrust of the shuttle as well as the supply side of the loop, the loop spreader is extended outwardly beyond the shoulder to form a finger 72 which when the loop is completely spread as indicated in Figs. 4 and 7, extends completely across the loop.

The illustrated embodiment of those features of the present invention relating to the shuttle and the means for supporting the shuttle thread therein comprise a shuttle consisting of a discoidal shuttle casing 74, the rear end of which is closed and the forward end of which is open to receive a thread holder. The thread holder, as illustrated, consists of a cylindrical thread casing 76 the rear end of which is open to permit the insertion of a cop of thread while the holder is removed from the shuttle, and the front end of which, when the thread case is in position in the shuttle, forms a closure for the open end of the shuttle casing. From the closed end of the thread

holder casing a hollow stud 78 projects inwardly so as to form a central support for the inserted thread cop. Within this hollow stud a hollow plunger 80 is arranged which is acted upon by a coiled spring 82 tending to force the plunger against the rear wall of the shuttle casing when the thread holder is in position in the shuttle casing. The hollow stud 78 and tubular plunger 80 forms a central thread passage for the shuttle thread opening on the forward end of the thread holder casing; the shuttle thread leading from the interior of the thread cop between the end of the plunger 80 and the rear wall of the shuttle casing where it is subjected to sufficient pressure to produce the required tension on the thread and then passing through the thread passage formed by the hollow plunger and stud to the outside of the thread case. The cop of thread is placed in the thread case while the case is removed from the shuttle and it will be apparent that the thread case can be threaded before being placed in the shuttle and that after the thread case is placed in the shuttle casing no further threading of the shuttle is necessary.

In order to lock the thread case securely in position while permitting its ready removal, locking devices are provided for inter-engaging the thread case and shuttle casing at diametrically opposite sides of the thread casing. As illustrated, the inter-engaging locking devices at one side of the casing comprise a flange 84 projecting radially from the inner end of the thread casing and a slot formed in the adjacent wall of the shuttle casing to receive the flange. The other inter-engaging locking devices comprise a slide 86 mounted in a guideway extending diametrically across the outer face of the closed end of the thread case and a groove 88 formed in the inner wall of the shuttle casing to receive the end of the slide. With this construction, when the slide 86 is in engagement with the groove 88, as illustrated in Fig. 7, the thread case is held securely in position, while to permit the ready removal of the thread case it is merely necessary to move the slide 86 inwardly and then tip the thread case slightly so as to disengage the flange 84 from its cooperating slot. In order to hold the locking slide 86 in locking position, a plunger 90 is mounted in the hollow stud 78 and is provided with an outwardly extending end arranged to engage a hole 92 formed at the proper point in the slide 86. This plunger is acted upon by the spring 82 which actuates the plunger 80 and is hollow in order to form a continuation of the passage for the shuttle thread. The slide 86 may be conveniently unlocked by inserting a suitably shaped tool in the hole 92 thereby forcing the plunger 90 downwardly so as to disengage the slide 86 and allow it

to be moved into unlocking position. A side-wise extension 94 of the hole 92 permits proper threading of the thread case while the thread case is removed from the shuttle casing and while the locking slide is in unlocking position.

In the machine illustrated in the drawings, a construction of shuttle supporting raceway is provided which permits ready removal and replacement of the shuttle whenever this becomes necessary or desirable. As illustrated, the shuttle raceway is composed of two parts each having formed therein a portion of the guideway for the rim of the shuttle. One of these portions is indicated at 96 and is shown separately in Fig. 2. This portion of the raceway is secured by screws 98 (see Figs. 6 and 7) to the end of the bracket 64 in which the shuttle driver shaft 42 is mounted. The other portion of the shuttle raceway is indicated at 100 and is shown separately in Fig. 3. The portion 100 is provided on its rear side with a guiding projection which is received in corresponding guideway in the portion 96, the guideway being arranged horizontally. The portion 100 of the guideway can thus be readily removed from the portion 96 whenever it is desired to remove the shuttle from the machine and can be again readily replaced in exact position. The portion 100 is secured to the portion 96 by a clamping bolt 102 as indicated in Fig. 7. A recess 104 formed in the portion 100 and communicating with the guideway for the flange on the shuttle affords a simple and convenient means for lubricating the shuttle raceway.

The illustrated machine also is provided with a simple and efficient means for disconnecting the shuttle driver from its actuating means in case the shuttle becomes clogged in its raceway. To this end the pinion 40 is loosely mounted on the shuttle driver shaft 42 and is provided with a clutch block 106 which is engaged by a cooperating clutch block 108 splined on the shaft 42 and pressed against the block 106 by means of a spring 110 coiled about the rear end of the shaft 42 and interposed between the block 108 and a nut 112 on the rear end of the shaft.

Certain features of the present invention relating to the shuttle and the means for supporting the shuttle therein form the subject-matter of a divisional application filed May 1, 1930, Serial No. 448,909.

The nature and scope of the invention having been indicated and a machine embodying the several features of the invention having been specifically described, what is claimed is:

1. In a lockstitch sewing machine the combination, with the other stitch forming devices including a straight hook needle, of a shuttle, a shoe supporting horn arranged to extend within the shoe, needle threading

mechanism located within the horn, a loop spreader to engage and spread the needle loop for the entrance of the shuttle, and means acting automatically when rendered operative to stop the needle, shuttle and loop spreader with the last needle loop engaged and spread by the needle and loop spreader with the work side of the loop in position to be readily severed.

2. In a lockstitch sewing machine the combination, with the other stitch forming devices including a straight hook needle, of a shuttle, a shoe supporting horn arranged to extend within the shoe, needle threading mechanism located within the horn, a loop spreader to engage and spread the needle loop for the entrance of the shuttle, and means acting automatically when rendered operative to stop the needle, shuttle and loop spreader with the needle at the limit of a loop drawing stroke and with the last needle loop engaged and spread by the needle and loop spreader with the work side of the loop in position to be readily severed.

3. In a lockstitch sewing machine the combination, with the other stitch forming devices including a straight hook needle, of a shuttle, a shoe supporting horn arranged to extend within the shoe, needle threading mechanism located within the horn, a loop spreader to engage and spread the needle loop for the entrance of the shuttle, and means arranged to be rendered operative at the will of the operator, and acting automatically when rendered operative for stopping at will the needle, shuttle and loop spreader with the needle loop engaged and spread by the needle and loop spreader with the work side of the loop in position to be readily severed.

4. In a lockstitch sewing machine the combination, with the other stitch forming devices including a straight hook needle, of a shuttle, a shoe supporting horn arranged to extend within the shoe, needle threading mechanism located within the horn, a loop spreader to engage and spread the needle loop for the entrance of the shuttle, a sewing shaft and suitable connections for actuating the needle, shuttle and loop spreader, and means for disconnecting the sewing shaft from its driving means and for rendering inoperative the actuating connections between the shaft, the needle, shuttle, and loop spreader while the needle is at the limit of a loop drawing stroke and while the loop is engaged and spread by the loop spreader.

5. In a lockstitch sewing machine the combination, with the other stitch forming devices including a straight hook needle, of an oscillating discoidal shuttle, a shoe supporting horn arranged to extend within the shoe, a needle threading mechanism located within the horn, a reciprocating loop spread-

er, a sewing shaft and suitable connections for actuating the needle, shuttle and loop spreader arranged to reverse the movements of all of these parts simultaneously, and means for disconnecting the sewing shaft from its driving means and for rendering inoperative the actuating connections between the shaft and the needle, shuttle, and loop spreader while the needle, shuttle, and loop spreader are at the limits of their movements in one direction with the needle loop engaged and spread by the needle and loop spreader.

6. In a lockstitch sewing machine the combination, with the other stitch forming devices including a straight hook needle, of a shuttle, a shoe supporting horn arranged to extend within the shoe, needle threading mechanism located within the horn, a loop spreader to engage and spread the needle loop for the entrance of the shuttle, said loop spreader being arranged to engage and deflect one leg of the needle loop and being provided with a portion to support the other leg of the loop against the thrust of the shuttle as the shuttle enters the loop.

7. In a lockstitch sewing machine the combination, with the other stitch forming devices including a straight hook needle, of a shuttle, a shoe supporting horn arranged to extend within the shoe, needle threading mechanism located within the horn, a loop spreader to engage and spread the needle loop for the entrance of the shuttle, a carrier for the loop spreader, parallel links supporting the carrier, and means for oscillating one of said links.

8. In a lockstitch sewing machine the combination, with the other stitch forming devices including a straight hook needle, of a shuttle, a shoe supporting horn arranged to extend within the shoe, needle threading mechanism located within the horn, a loop spreader to engage and spread the needle loop for the entrance of the shuttle, a shuttle driving shaft, a pinion on the shaft, an oscillating gear segment meshing with the pinion, a sewing shaft and suitable connections for oscillating the gear segment, a carrier for the loop spreader, parallel links supporting the carrier, and a cam connected to move with the oscillating gear segment arranged to actuate one of said parallel links.

9. In a lockstitch sewing machine the combination, with the other stitch forming devices including a shuttle, of a straight hook needle arranged with its barb facing at an angle to the line of feed on the shuttle side of the needle, a horn arranged to extend within the shoe, a needle threading whirl located in the horn, means for rotating the whirl in a direction to carry the thread first to the shuttle side of the needle, a loop spreader mounted to move in a right line

across the line of feed to engage the supply
side of the needle loop and spread the loop
for the entrance of the shuttle, and means
for supporting and actuating the loop
5 spreader.

In testimony whereof I have signed my
name to this specification.

FRED ASHWORTH.

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