

A. H. DE VOE.
 THREAD CONTROLLER FOR SEWING MACHINES.
 APPLICATION FILED FEB. 17, 1909.

1,060,540.

Patented Apr. 29, 1913.

2 SHEETS—SHEET 1.

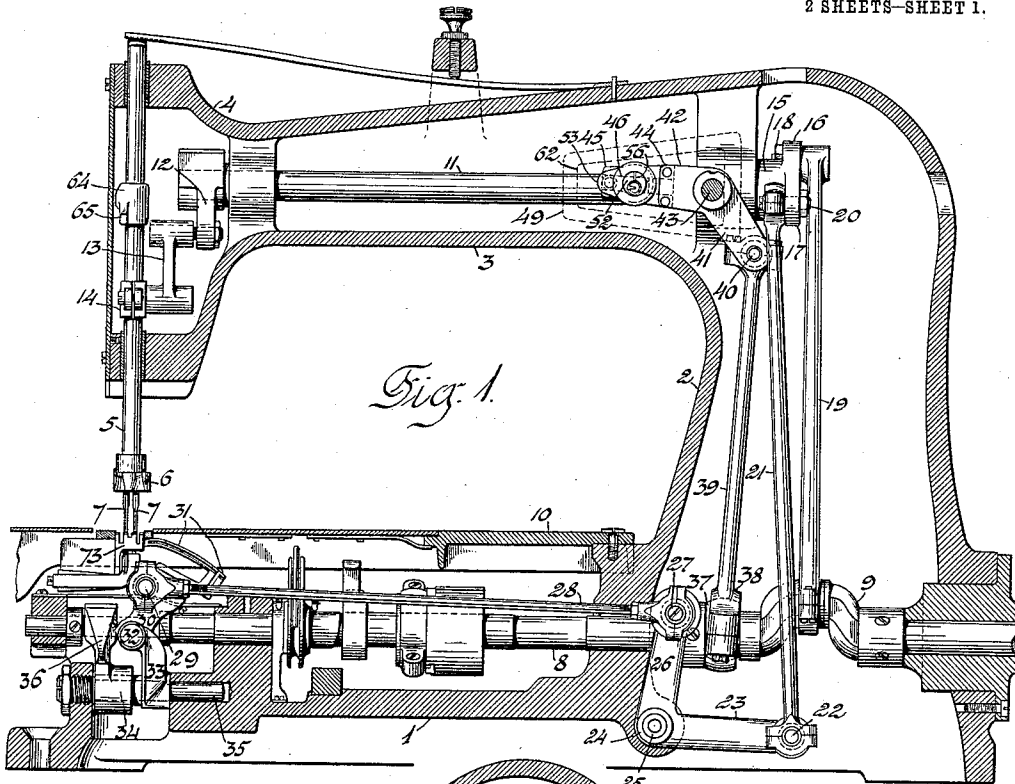


Fig. 1.

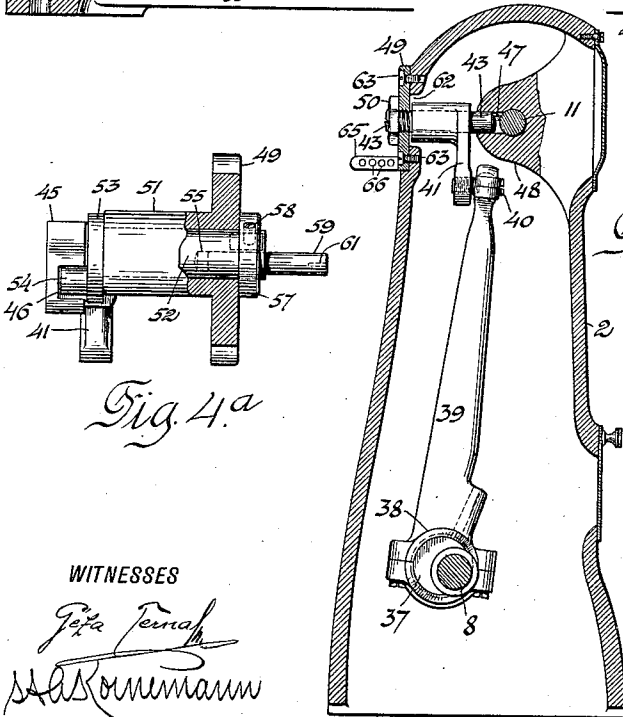


Fig. 2.

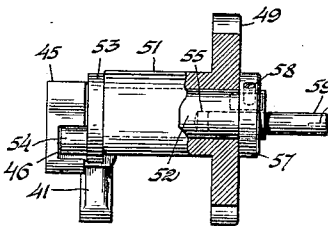


Fig. 4a.

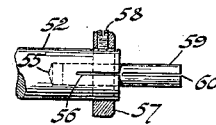


Fig. 4b.

WITNESSES

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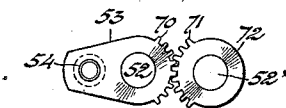
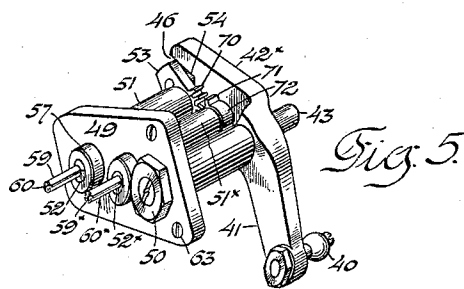
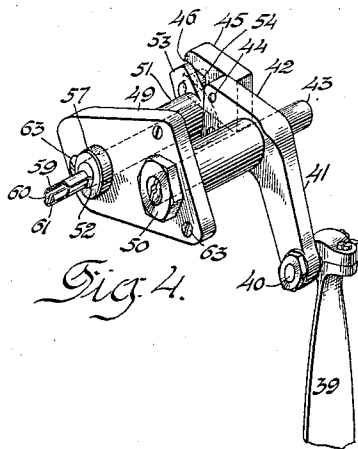
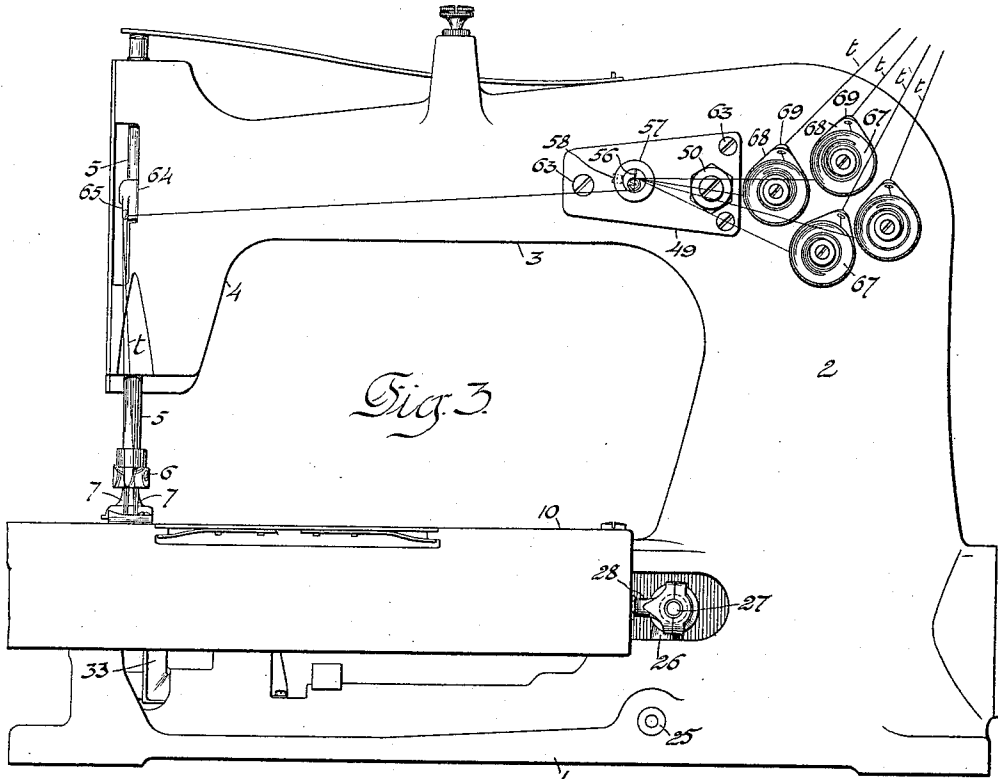
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WITNESSES

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THREAD-CONTROLLER FOR SEWING-MACHINES.

1,060,540.

Specification of Letters Patent.

Patented Apr. 29, 1913.

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To all whom it may concern:

Be it known that I, ALBERT H. DE VOE, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Thread-Controllers for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has for its object to provide a simple and effective thread-controlling device for sewing machines; and in its preferable form it comprises an oscillatory shaft disposed transversely of the lead of the thread from the source of supply to one of the stitch-forming implements and provided with an eccentric pin having a thread-receiving slit disposed diametrically in relation thereto and to the said rock-shaft and having one side at substantially the center of said rock shaft, whereby in one extreme position of the slotted pin the thread is permitted to pass freely to the needle, while in moving to the other extreme position, in which the thread-slit is disposed at an angle to the lead of the thread to the stitch-forming member, the thread is bent around the abrupt shoulders presented by the walls of the thread-slit to detain the same therein, and the movement of the outer side of the pin serves to exert a pull upon the thread in setting the stitch or drawing thread from the source of thread supply.

By employing the slitted thread engaging pin, whose slit assumes varying angular relations with the lead of the thread in the different stages of the stitch-forming operation, the single member serves as both a thread pulling and nipping device, while the thread is not positively gripped in any position of the thread-pin, so that it may be drawn through the same under abnormal conditions, as in stitching material of varying thickness, involving the employment of variable thread lengths for successive stitches.

The transverse slit, formed to receive the thread, in the pin mounted eccentrically to its own axis of oscillation, affords angular thread-engaging shoulders around which the thread is abruptly bent so as to prevent slipping under the pulling action which the device is designed to produce; but it is obviously immaterial to the present invention, in its broader aspect, what is the specific form of the thread-engaging shoulders or

whether or not they are formed upon the same oscillatory member, inasmuch as one of them is substantially stationary relative to the axis of oscillation while the other moves in a circular arc about the same.

The present improvement includes certain additional constructive features which will be hereinafter described and set forth in the appended claims.

In the accompanying drawings, Figure 1 is a sectional front elevation of a machine provided with the present improvements, and Fig. 2 a vertical transverse section of the same through the hollow upright portion of the bracket-arm, looking forwardly. Fig. 3 is a front side elevation of the machine representing the lead of the threads from the source of supply through the tension and take-up devices to the needles. Fig. 4 is a perspective view of the take-up device of the present improvement detached from the machine, Fig. 4^a an end elevation of the same in section through the thread-controlling rock-shaft, and Fig. 4^b represents a detail of the latter. Fig. 5 is a perspective view of a take-up and pull-off device constituting a modification or development of the improvement represented in the preceding figures, and Fig. 6 is a face view of the gearing connecting the take-up and pull-off rock-shafts.

The present improvement is shown herein embodied in the well-known Singer No. 62 double thread chain-stitch machine, forming the subject of the patent of William H. Hugg No. 1,005,645 dated October 10, 1911. It is constructed with the base 1 and bracket-arm comprising the hollow upright portion 2 and overhanging member 3 in the head 4 of which is journaled the vertically reciprocating needle-bar 5 provided with the multiple needle-clamp 6 carrying two pairs of eye-pointed needles 7. The longitudinally arranged main or driving shaft 8 is journaled in bearings in the base 1 beneath the work-plate 10 and is provided near its rearward end with an actuating crank 9. The needle-actuating rock-shaft 11 is journaled in suitable bearings within and longitudinally of the overhanging bracket-arm and carries at its forward end a crank-arm 12 having a pin connected by means of the usual link 13 with a rearwardly projecting stud carried by a collar 14 fixed upon the needle-bar 5, from which connections the

needles derive their reciprocating movements. The rock-shaft 11 has fixed upon its rearward end a rocking member 15, with oppositely extending crank-arms 16 and 17, the former of which is provided with a stud-screw 18 embraced by the upper end of a pitman-rod 19 whose opposite end embraces the crank 9 of the driving shaft, through which connections the rock-shaft 11 derives its operative movements from the main-shaft. The second crank-arm 17 of the rocking member 15 carries a crank-pin 20 embraced by the upper end of a pitman 21 whose lower end embraces a crank-pin 22 carried by the rearwardly extending arm 23 of an angle-lever whose hub 24 is fitted upon the transverse fulcrum-pin 25, the upwardly extending arm 26 of the angle lever carrying a crank-pin 27 embraced by the rearward end of the pitman 28 whose forward end embraces a crank-pin 29 laterally projecting from the looper-carrier 30.

Upon the looper-carrier are mounted the two thread-carrying loopers 31 each adapted to cooperate with the needles of one of the pairs of needles carried by the needle-bar. The looper-carrier is fulcrumed upon a transverse pin 32 carried by an arm 33 of a rocker 34 fulcrumed upon the longitudinally disposed supporting pin 35 and provided with a forked arm 36 embracing an eccentric upon the main-shaft which imparts to the loopers through the rocker 34 and carrier 30 their sidewise or needle avoiding movements.

Mounted upon the main-shaft adjacent the crank 9 is a ball eccentric 37 embraced by a strap 38 at one end of an eccentric-rod 39 whose other end embraces a ball-stud 40 carried by the rearwardly and downwardly inclined arm 41 of a rock-lever having its tubular hub mounted upon a transverse bearing pin 43 and provided with a forwardly projecting arm 42 to which is secured by means of screws 44 a block 45 forked or slotted to provide a longitudinal guide-way 46. The inner end of the bearing pin 43 enters a transverse bearing aperture 47 in the rearward bearing lug 48 of the needle-actuating rock-shaft 11, and the opposite end of said pin is threaded and screwed into a similarly threaded aperture in a bearing plate 49 in which it is secured from working loose by means of the lock nut 50.

The plate 49 is provided with an inwardly projecting bearing boss 51 in which is journaled the oscillatory thread-controller shaft 52 having upon its rearward end the crank-plate 53 carrying a roller-stud 54 entering the slide-way 46 in the block 45 carried by the arm 42 of the actuating rock-lever. The outer end of the rock-shaft 52 is provided with an eccentrically disposed socket 55 whose walls are adapted to yield by provision of the transverse slit 56 in the adja-

cent portion of the shaft 52, to the outer end of which is applied the collar 57 secured thereto by means of the set-screw 58 adapted to compress the slitted portions of the shaft together to contract the eccentric socket 55.

Within the socket 55 is introduced the inner end of the thread-pin 59 whose outer or operative portion is of tubular form and provided with the diametrical thread-receiving slit 60 open at the outer end and flared to facilitate the introduction of the thread. Upon the inner wall of the thread-pin, adjacent the open end of the slit, is a thread confining fin 61 with inclined forward edge and abrupt rearward edge extending slightly across the diametrical thread slit to lock the threads within the latter while permitting their easy introduction. The thread-pin may be readily turned to adjust the position of its thread-slit while the set-screw 58 is retracted, but when the latter is advanced into engagement with the yielding outer surface of the slitted shaft 52, the pin 59 is firmly clamped within its socket in the required adjustment.

As herein represented, the front side of the bracket-arm 3 is formed with a lateral aperture 62 around which is provided an external seat to receive the bearing plate 49, which latter is secured thereto by means of the fastening screws 63.

To the needle-bar 5 is fixed in a manner well-known a collar 64 provided with a lateral thread arm 65 with thread apertures 66. Upon the side of the bracket-arm at the top of the upright portion 2 are shown secured a series of tension devices 67 each having the usual disk 68 with thread guide-eye 69, through which the threads are led from the source of supply.

In the use of the machine, the needle threads *t*, four of which are provided for in the present machine, are led through guide-eyes 69, between the tension disks 67, thence through the thread slit 60 of the eccentric pin 59 to the thread arm 65, whence they are led to the eyes of the respective needles. The thread has normally a substantially direct lead through the range of action of the controller between the tension device and the thread-arm 65, and the axis of movement of the controller is disposed transverse to this lead of the thread, so that the bending and unbending of the thread around the concentric thread-engaging shoulder of the controller serves to impose thereon an intermittent drag similar to the action of an automatic tension device. The loopers are threaded in a well-known manner.

As the needles approach their highest point in rising after giving their loops to the loopers, the thread-pin 59 assumes the position represented in Fig. 4, with the slit 60 substantially in the direction of lead of the threads, when the drag upon the thread

imposed by the thread-arm 65 serves to draw a supply for the succeeding stitch from the tension devices through the slit 60. As the needles descend, the loopers commence to withdraw from the previously seized needle-thread loops, and the movement of the rock-shaft 52 a quarter-turn brings the thread-pin 59 into the other extreme position represented in Figs. 1 and 3, wherein the thread embraced thereby is locked from movement through the same and that portion intermediate the controller and the work is pulled up so as to draw the thread-loops just released by the loopers up to the under side of the work to set the stitch. As the needles begin their rising movement, the loopers seize the loops which are thus thrown out and the thread-pin 59 commences to give up thread for the distension of the loops surrounding the loopers. As the needles again approach their highest positions, the thread-pin 59 assumes its thread releasing position and the thread arm 65 is enabled to draw thread through the same from the tensions for the succeeding stitch-forming operations.

As before indicated, the resistance imposed upon the thread by the thread-pin in the transverse relation of its slit to the lead of the thread is that which would be produced by a yielding nipping device or automatic tension; but the present improvement has the advantage over those which have preceded it of accommodating several threads, the accidental crossing of which in the operation of the machine does not impair the effectiveness of the device, as would be the result if nipping or clamping jaws were employed.

In Figs. 5 and 6 an alternative form of the present improvement is shown. In this embodiment the rock-lever has the arm 41 adapted for connection with the eccentric rod 39, as before described, the forwardly extending arm 42* being offset and forked to embrace the roller-stud 54 carried by the crank-arm 53 of the rock-shaft 52. In this form of the improvement the bearing plate 49 is provided with a second bearing boss 51* in which is journaled a second oscillatory controller-shaft 52* carrying an eccentric thread-pin 59* similar to the thread-pin 59 already described. The crank-plate 53 is provided upon its rearward end with a segmental series of teeth 70 meshing with a similar series of teeth 71 upon a collar 72 fixed upon the rearward end of the controller-shaft 52*, whereby the latter is rocked simultaneously with but in the opposite direction from the shaft 52. As indicated in the drawings, the thread-pins 59 and 59* are so set in their respective shafts 52 and 52* that when their thread notches 60 and 60* are in alinement they are eccentric upon opposite sides of their respective carrying shafts; but when the latter are reversely oscillated as above

described, the primary thread-pin, constituting the take-up member, draws thread backwardly from the needles, while the secondary thread-pin, constituting a pull-off device, by its reciprocal movement draws thread through the tension devices for the succeeding stitch. In this operation sufficient resistance is imposed by the edges of the thread-slits to prevent the movement of the thread through the thread-pins while producing their respective thread drawing actions, but as soon as the thread-slits assume parallel relation, the thread is entirely released for supply of the stitch-forming members for a succeeding stitch.

As above described, the diameter of the thread-pin determines the relative positions of the thread-engaging shoulders, but it is evident that such shoulders may be provided by other means, and that it is not even necessary that the inner or concentric shoulder be carried by the oscillatory shaft 52 or 52*, inasmuch as in any case it is not designed to have a movement of translation but preferably to maintain a position substantially in the axial line of the thread-controller shaft. The transverse slit 60 forms at its intersections with the periphery of the thread-pin two pairs of thread-confining shoulders disposed respectively at and remote from the axis of the thread-controller shaft, one of the shoulders of each pair constituting an active member of the thread-controller while the other acts merely to maintain the thread in operative relation with the same.

It will be observed that as the thread-pins 59 and 59* are identical in construction and mode of mounting in their respective shafts, both may be circularly adjusted to bring their thread-engaging slits in the desired relation with the axes of motion, while their degree of oscillation and the timing of their operative movements is determined by the circular adjustment of the actuating eccentric 37 upon the main-shaft 8. It is also obvious that the relative positions of the thread-pins 59 and 59*, as well as their relative movements, may be determined by the gearing 70 71, and the operative connections intermediate the same.

By suitable circular adjustment of the pull-off thread-controlling pin, the latter may obviously be used to measure the precise length of thread required for each stitch, so that the thinnest and softest materials may be stitched without puckering in the drawing up and setting of the stitches.

The timing of the operative parts of the machine is so arranged that as the work is advanced a stitch-length by means of the feed-dog 73 just as the points of the needles emerge from the work, the take-up pin 59 performs its return movement to give up thread in compensation of such feed of the work, but as the thread-arm 65 approaches

its highest position, the angle of the thread-slit 60 with the lead of the thread to said arm is so slight as to offer practically no resistance to the drawing off of the thread through the tension devices for a succeeding stitch, in case the secondary or pull-off thread-pin is not employed, or for drawing the slack thread provided by the pull-off, in case the latter is employed. It is evident that the take-up thread-pin 59 may be so set in its socket in the oscillatory shaft 52 that its action will be timed to control the size of the loops thrown out by the needles, so that such loops will be sufficiently large to insure their seizure by the loopers, but not sufficiently large to cause the loops of one set of needles to be seized by both of the closely spaced loop-takers.

As the transversely apertured or slitted thread pins perform a graduated bending or cramping action upon the threads which increases in a large proportion the initial tension imposed by the disks 67 upon the threads, it is evident that the tension disks 67 may be adjusted to offer a minimum drag upon the thread which is little more than sufficient to maintain the same taut to insure the above described bending or cramping action by the thread pins, thus imposing little work upon the thread-arm 65 in its pull-off action, or the thread-pin 59*, in case the latter is employed.

In most cases it will be found that a suitable resistance is imposed by the varying angular relation of the thread slits to the lead of the thread between the tension devices and the thread-arm upon the needle-bar, but it is evident that if desired thread nipping or automatic tension devices may be used in addition.

Although the thread-controlling device constituting the present improvement is herein shown and described as applied to the needle-threads, it is evident that the same is equally applicable for handling the looper threads; and also that the improvement is adapted for use in many other types of sewing mechanism than that in connection with which it is herein illustrated.

From the foregoing description it will be seen that the principles of the present improvement may be embodied in a variety of ways, although those herein shown and described are deemed preferable.

Having thus set forth the nature of the invention, what I claim herein is:—

1. In a sewing machine the combination with the frame comprising a bed-plate and an overhanging bracket-arm, a work-plate sustained upon the bed-plate, a main shaft journaled in the frame beneath said work-plate, stitch-forming mechanism comprising a reciprocating needle and a cooperating loop-taker, and needle-actuating means operatively connected with the main shaft, of

a thread-guide and a tension device carried by the bracket-arm, an intermediate oscillating thread-controlling member sustained by and having an axis of rotation transverse to the bracket-arm and provided with a plurality of thread-engaging shoulders of which one is disposed in substantially concentric and another in eccentric relation to the axis of motion, and an operative connection between said thread-controlling member and the main shaft independent of the connection of the latter with the needle-actuating means.

2. In a sewing machine, the combination with the frame comprising a bed-plate and an overhanging bracket-arm, and stitch-forming mechanism comprising a reciprocating needle and a cooperating loop-taker, of a thread-guide, a tension device, and an intermediate oscillatory thread-controlling member all mounted upon said bracket-arm and arranged substantially in a plane parallel with the needle-path, said controlling member having its axis of movement transverse to said bracket-arm and to the needle-path and being provided with a plurality of thread-engaging shoulders of which one is disposed in substantially concentric relation to the axis of movement and another is normally disposed eccentrically upon the side nearest the needle relative to said axis of movement, and means connected with a moving part of the machine for actuating said member.

3. In a sewing machine, the combination with stitch-forming mechanism comprising a needle and a cooperating loop-taker, of an oscillatory thread-controller shaft provided with pairs of spaced thread-engaging shoulders disposed substantially at and remote from the axis of said shaft, and means connected with a moving part of the machine for actuating said shaft.

4. In a sewing machine, the combination with stitch-forming mechanism comprising a needle and a cooperating loop-taker, of an oscillatory thread-controller shaft carrying an eccentrically disposed thread-pin formed with a transverse thread aperture one side of which is substantially in alignment with the axis of motion, and means connected with a moving part of the machine for actuating said shaft.

5. In a sewing machine, the combination with stitch-forming mechanism comprising a needle and a cooperating loop-taker, of an oscillatory thread-controller shaft carrying an eccentrically disposed tubular thread-pin formed with a transverse open-ended thread-slit and a fin upon the inner wall of said pin and projecting across the outer end of said slit, and means for actuating said shaft.

6. In a sewing machine, the combination with stitch-forming mechanism comprising a needle and a cooperating loop-taker, of

an oscillatory thread-controller shaft having a split outer end containing an eccentrically disposed divided socket, a thread-pin entering said socket and formed with a transverse thread aperture, means for clamping the socketed end of said shaft upon the thread-pin, and means for actuating said shaft.

7. In a sewing machine, the combination with stitch-forming mechanism comprising a needle and a cooperating loop-taker, of an oscillatory thread-controller shaft having a split outer end containing an eccentrically disposed divided socket, a thread-pin entering said socket and formed with a transverse thread aperture, a collar embracing the slitted end of said shaft, and a set screw passing through said collar and engaging one of the divided sections of said shaft.

8. In a sewing machine, the combination with the main-shaft and stitch-forming mechanism comprising a needle and a cooperating loop-taker, of an operative connection intermediate said main-shaft and the needle, an oscillatory thread-controller shaft, a transversely apertured thread-pin carried by and disposed eccentrically to said shaft, a crank upon the end of said shaft carrying a pin or stud, a rock-lever provided with a guideway embracing said pin or stud, an eccentric upon the main-shaft, and an operative connection intermediate said eccentric and said rock-lever.

9. In a sewing machine, the combination with the main-shaft and stitch-forming mechanism comprising a needle and a cooperating loop-taker, an operative connection intermediate said main-shaft and the needle, an oscillatory thread-controller shaft, a transversely apertured thread-pin carried by and disposed eccentrically to said shaft, a crank upon the end of said shaft carrying a pin or stud, a rock-lever having an arm formed with a guide-way embracing said pin or stud, an eccentric upon the main-shaft, and an operative connection intermediate said eccentric and another arm of said rock-lever.

10. In a sewing machine, the combination with stitch-forming mechanism comprising a needle and a cooperating loop-taker, of a plurality of oscillatory thread-controlling members each provided with thread-engaging shoulders of which one is concentrically and another is eccentrically disposed relatively to the axis of movement, the eccentrically disposed shoulders of said thread-controlling members being arranged upon different sides of their respective axes of

movement, and common actuating means for oscillating said thread-controlling members.

11. In a sewing machine, the combination with stitch-forming mechanism comprising a needle and a cooperating loop-taker, of a plurality of oscillatory thread-controlling members each provided with thread-engaging shoulders of which one is concentrically and another is eccentrically disposed relatively to the axis of movement, the eccentrically disposed shoulders of said thread-controlling members being arranged upon different sides of their respective axes of movement, actuating means applied to one of said controlling members, and an operative connection intermediate said members whereby the other of said members is actuated.

12. In a sewing machine, the combination with stitch-forming mechanism comprising a reciprocating needle and a cooperating loop-taker, of a thread-arm having to-and-fro movements simultaneous with the movements of said needle, a tension device, an oscillatory thread-controlling member provided with an eccentrically disposed thread-engaging shoulder arranged intermediate said tension device and thread-arm, a fixed thread-engaging shoulder disposed substantially at the axis of oscillation of said thread-controlling member and over which the thread is led directly from the tension and around the eccentrically disposed thread-engaging shoulder in its passage to said thread-arm, and means for oscillating said thread-controlling member across the direction of lead of the thread to said thread-arm.

13. In a sewing machine, the combination with the reciprocating needle-bar carrying the needle and a loop-taker cooperating with said needle, of a thread-arm fixed to said needle-bar and partaking of its movements, a tension device, an oscillatory thread-controller shaft disposed intermediate said tension device and thread-arm, means connected with a moving part of the machine for actuating said shaft, and a thread-pin formed with a transverse thread aperture mounted upon and disposed eccentrically of the axis of movement of said shaft.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ALBERT HARRISON DE VOE.

Witnesses:

VICTOR E. SMITH,
H. A. KORNE-MANN.