

F. W. MERRICK.
 NEEDLE THREAD TAKE-UP AND CONTROLLING DEVICE FOR SEWING MACHINES.
 APPLICATION FILED OCT. 12, 1905.

933,479.

Patented Sept. 7, 1909.
 4 SHEETS—SHEET 1.

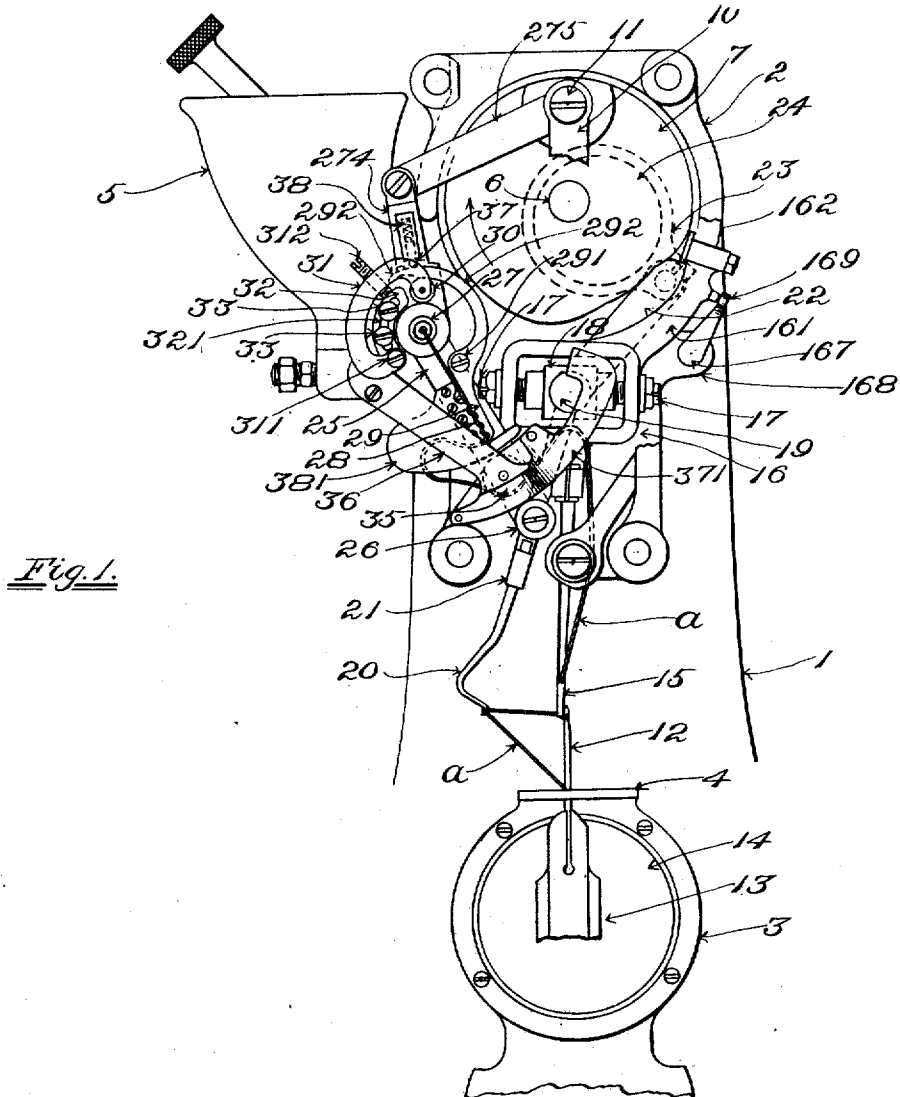


Fig. 1.

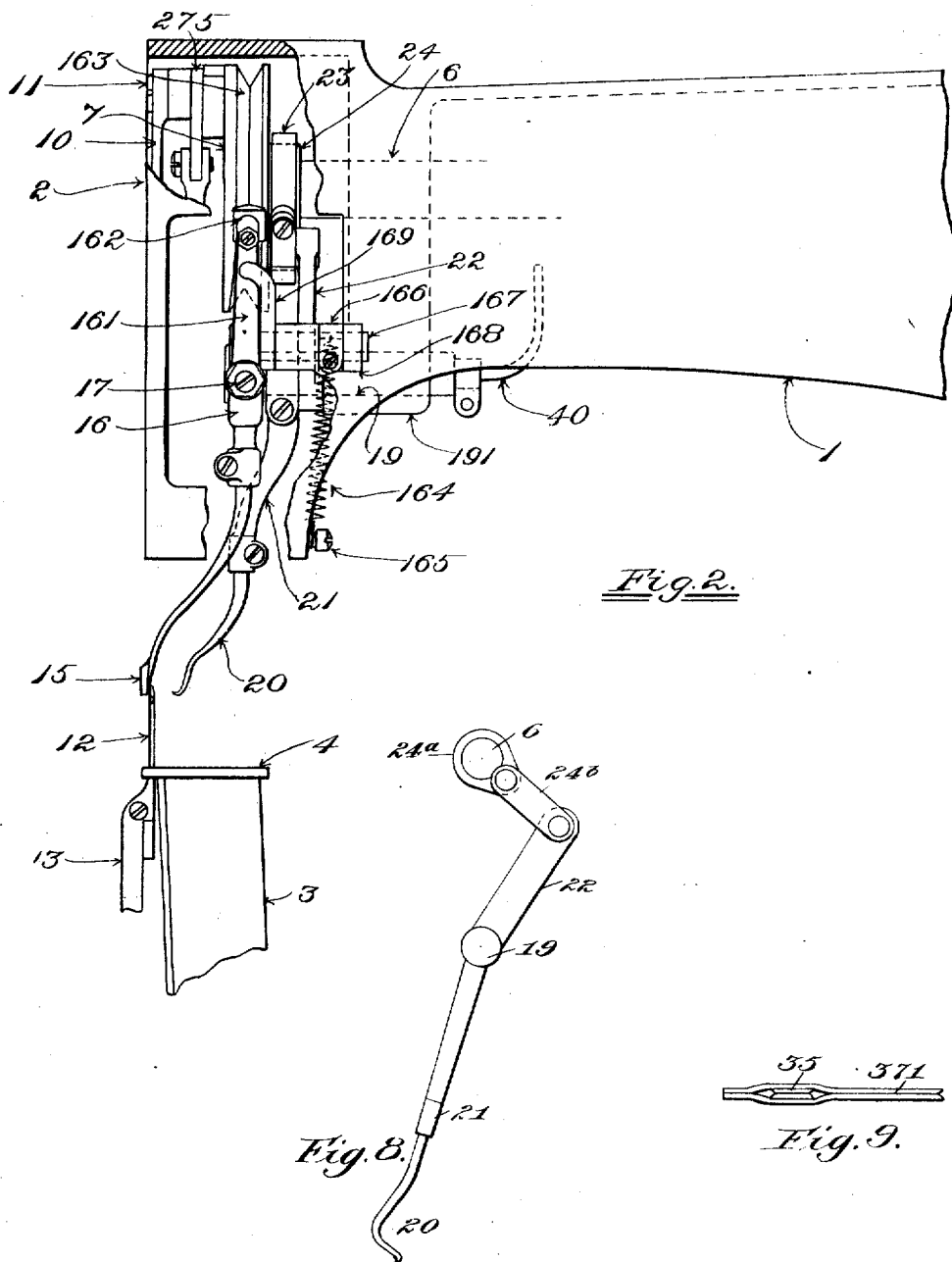
Witnesses
 Oscar F. Hill
 Edith J. Anderson.

Inventor:
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Fig. 7.

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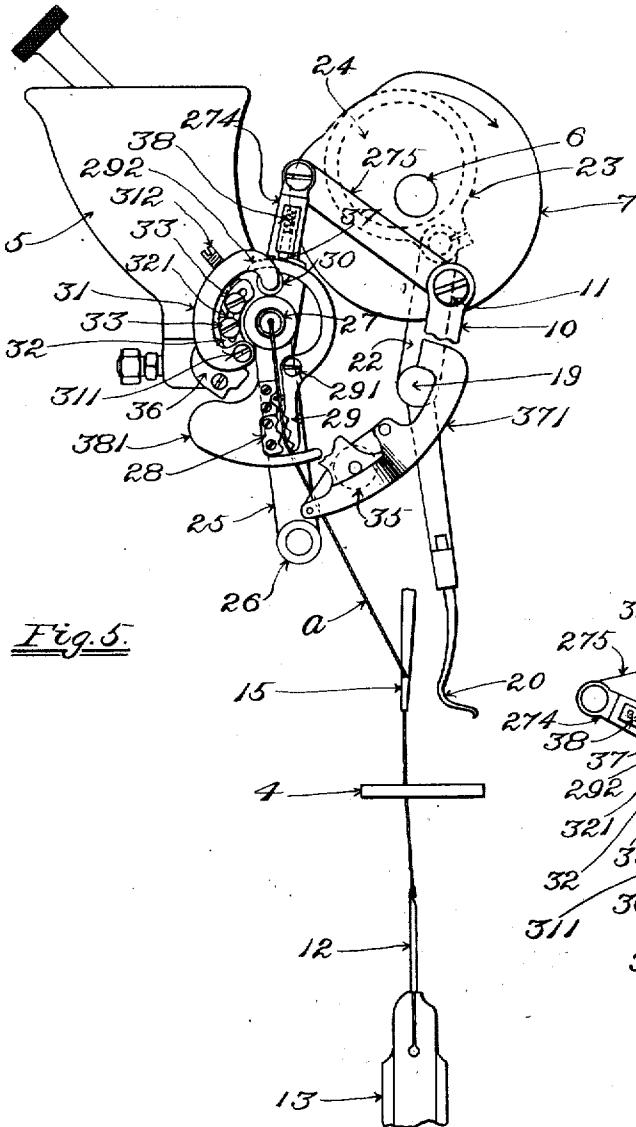


Fig. 5.

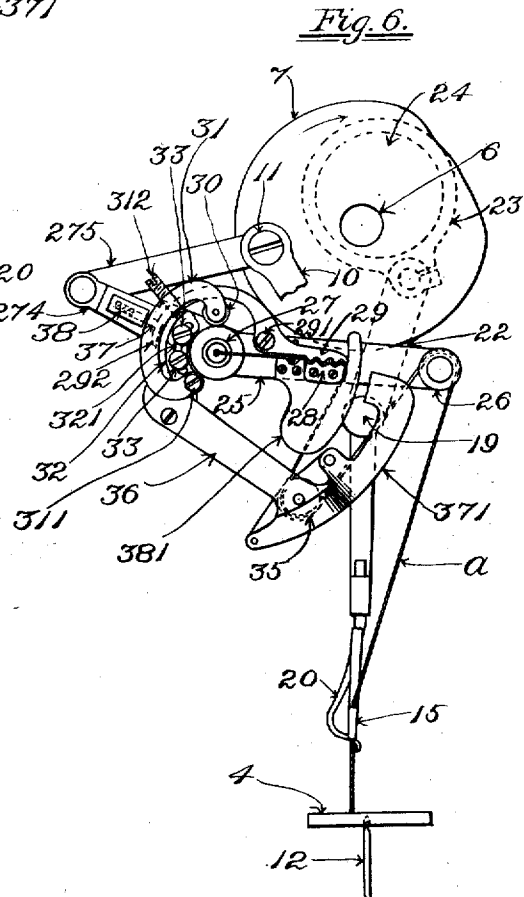


Fig. 6.

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UNITED STATES PATENT OFFICE.

FRANK W. MERRICK, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO UNION LOCK STITCH COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

NEEDLE-THREAD TAKE-UP AND CONTROLLING DEVICE FOR SEWING-MACHINES.

933,479.

Specification of Letters Patent.

Patented Sept. 7, 1909.

Application filed October 12, 1905. Serial No. 282,431.

To all whom it may concern:

Be it known that I, FRANK W. MERRICK, a citizen of the United States, residing at Boston, in the county of Suffolk, State of Massachusetts, have invented a certain new and useful Improvement in Needle-Thread Take-Up and Controlling Devices for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

The drawings illustrate certain portions of a hooked needle, lock-stitch, wax-thread sewing machine with the invention applied thereto, only such parts of the machine being shown as are necessary for the proper disclosure of the nature and relations of the invention.

In the drawings,—Figure 1 shows the said portions in elevation, looking at the left-hand end of the machine, the take-up device being represented as partially retracted, with the slack-thread retained by the thread-detainers. Fig. 2 is a front elevation, partly broken away to show features that would otherwise be concealed. Fig. 3 is a rear elevation. Fig. 4 is a view in vertical section on the plane indicated by the dotted line 4, 4, in Fig. 3. Fig. 5 is a view in elevation from the same point of view as in Fig. 1, showing certain of the parts in positions differing from those which are represented in Fig. 1, the take-up device having begun its operative stroke and the thread-grip being almost on the point of being closed. Fig. 6 is a view similar to Fig. 5, showing the thread-grip closed and the take-up device at the extreme point of its operative stroke. Fig. 7 is a sectional view of the take-up device and the supporting means therefor. Fig. 8 is a detail view illustrating a modification in which a crank is employed for operating the thread-finger. Fig. 9 is a detail view of the thread-detainer 371.

Having reference to the drawings,—A portion of the arm or gooseneck of a sewing machine is represented at 1, Figs. 1 to 4, the head thereof being designated 2 in Figs. 1, 2 and 3. A portion of the work-supporting post is represented at 3, the work-support itself upon the top of the said post being designated 4. A wax-pot is shown at 5, in Figs. 1, 3 and 5, upon the arm 1. The usual rotating shaft which is mounted in bearings in the arm is indicated at 6.

At 7 is a disk which is fixed upon the shaft

6 within the head of the machine, and from which motion is transmitted to various working parts through the operating connections which hereinafter are explained. An awl is shown at 8, Fig. 3, 9 being the awl-bar, and 10 a link joining the awl-bar to an actuating crank-pin 11, Figs. 1, 5 and 6, which is carried by the disk 7. By means of the said crank-pin and link the awl-bar and awl are reciprocated vertically in the working of the machine, as usual. For the purpose of simplifying the drawings and showing clearly the take-up and other parts which more immediately act in connection with the needle-thread *a*, the awl and awl-bar are omitted from Figs. 1, 2, 5 and 6.

12 is a needle, 13 being a portion of the needle-bar carrying the same.

14, Fig. 1, is a rotary shuttle, which is mounted upon the work-supporting post 3.

The guides for the awl-bar and needle-bar, and the actuating connections for the needle-bar and shuttle, are not shown. They may be as usual or as preferred.

15 is a thread-guide by which the thread *a* 80 is applied to the needle 12, and laid in the open eye thereof. The said thread-guide is carried by an arm projecting downward from a yoke 16, Figs. 1 and 2, which latter is mounted pivotally by means of center-screws 17, 17, upon the opposite ends of a block 18, the said block being supported by a shaft 19 to which it is fitted with capacity to turn independently thereon. The shaft 19 is mounted in a suitable bearing or bearings at 191, Fig. 2, in connection with the fixed head 2. For the purpose of actuating the thread-guide to cause the delivery-eye or tube thereof to travel around the hooked upper end of the needle, when the latter is in a raised position, and thereby place the needle-thread within the open eye of the needle, the yoke 16 is provided with an upwardly-projecting arm 161, Figs. 1 and 2, carrying a cam-follower 162 working in a cam-groove 163 in the periphery of the disk 7 upon the shaft 6. The said cam-follower is pressed toward the bottom of said groove by force which is transmitted to the arm 161 from a contracting spiral spring 164, Fig. 2, through a rocker 167, the said spring having one extremity thereof engaged with a pin or screw 165, that is applied to the lower portion of head 2, and the other extremity thereof connected with a rearwardly-pro-

jecting arm 166, Fig. 2, on the said rocker 167, the latter being mounted in a bearing at 168 upon the head 2, and being provided with a finger 169 which bears against the back of the arm 161 of the yoke. The cam-groove 163 is formed with both lateral and radial throws, as represented in Figs. 1, 2, 5 and 6:—that is to say, it is shaped to communicate movement to the arm 161 both radially with respect to the shaft 6, and also in the direction of the length of the said shaft. Thereby, the yoke 16 and block 18 are caused to turn around the supporting shaft 19, and in addition the yoke is caused to turn or swivel upon the center-screws 17, 17, relative to the block 18, in a direction at right-angles to the direction of the former turning movement. The result of these combined movements is to cause the thread-guide to travel in a path encircling the needle, as required in order to apply the thread properly to the latter. 20 is the thread-finger, or thread-measuring finger, it being carried by an arm 21 projecting downward from the shaft 19 and fast with the latter. For the purpose of rocking the shaft 19 to move the thread-finger from its position in Fig. 5 to that in Fig. 1, and vice versa, the said shaft is furnished with an upwardly projecting arm 22, fast thereon, with which is connected pivotally the strap 23 that is applied to an eccentric 24 fast upon the shaft 6. A crank 24^a and connecting rod 24^b, as shown in Fig. 8 are the equivalent of the said eccentric and strap.

Having reference, now, to the take-up, 25 is the swinging arm thereof, and 26 is a take-up roll that is mounted upon the said arm. The arm 25 is fast upon one end of a rockshaft 27, Figs. 1, 5, 6 and 7 the said rockshaft being supported in a bearing-sleeve 281, Figs. 3 and 7, which is fixed in place within a rearward projection 29 of the head 2. To secure a proper bearing fit of the rockshaft 27 within the bearing-sleeve 281, the said rockshaft is furnished with opposite cones 271, 272, and the opposite end-ports of the sleeve 281 are tapered interiorly to fit the said cones. The cone 271 adjacent the arm 25 is fixed upon or forms an integral portion of the rockshaft, while, for the purpose of enabling wear to be taken up, the remaining cone 272 is adjustably applied to the rockshaft, so that the fit of the cones within the tapered bearings may be tightened up when wear occurs. To provide for the adjustment, the inner portion of the rockshaft is screw-threaded to its free extremity, as indicated in Fig. 7, and the cone 272 is interiorly threaded to fit the screw-thread of the rockshaft, a lock-nut 273 being screwed upon the rockshaft at the large end of the cone 272 to prevent accidental loss of the adjustment of the latter. For the purpose of actuating the take-up

device, the rockshaft 27 is operatively combined with the rotating shaft 6 by means of an arm 274 that is fast upon the said rockshaft, and a link 275 connecting the said arm 274 with the crank-pin 11, previously referred to, from which motion is transmitted to the awl-bar and awl. The arrangement and proportions of the actuating devices of the take-up, as shown in the drawings, produce a quick taking-up action of the take-up arm and return movement thereof, followed by a relatively prolonged dwell of the said arm in its retracted position. The take-up roll 26, as shown clearly in Figs. 5 and 6, acts upon the needle-thread *a* intermediate the thread-guide 15 and a delivery or guide which is central with relation to the path of movement of the take-up arm. To provide the said central delivery, the rock-shaft 27 is bored centrally, longitudinally thereof, as shown best in Fig. 7, producing a thread-passage extending the length of the rockshaft, and the thread *a* after leaving the wax-pot 5 is conducted through the said thread-passage, and thence to the thread-guide 15. The take-up arm 25 carries, in addition to the roll 26, an intermittently-acting grip-device which comprises a fixed jaw 28 that is constituted by a block made fast to the said arm, and a movable jaw 29 that is constituted by one arm of a lever which is mounted by means of a pivotal screw 291 upon the take-up arm. The proximate or acting faces of the jaws 28, 29, are transversely serrated, in order that when closed together they may more effectually hold the thread *a* against the strain which is incident to the taking-up action. For the purpose of closing the grip-device upon the thread and holding the same thus closed during the taking-up action, a roll 30 is mounted, at a point conveniently adjacent the rockshaft 27, upon a fixed support 31, and the tail 292 of the movable jaw 29 is extended into position to engage with the said roll. The roll 30 constitutes a stationary bearing which, through the engagement of the tail of the movable jaw 29 of the moving grip-device therewith in the movement of the take-up arm, occasions the closing of the grip-device. The inner and outer surfaces of the said tail are concentric, or approximately concentric, with the axis of the rockshaft 27, except that at or near the free extremity of the tail the inner surface of the latter has an outward jog constituting a relief which, when presented to the bearing or roll 30, affords freedom to the movable member 29 to separate from the fixed member 28 of the grip-device. This jog or relief is presented to the roll when the take-up device occupies its completely retracted position shown in Fig. 5, at which time, in consequence of the separation of the members 28, 29, of the grip-device from each

other the thread is free to be drawn lengthwise between the opposing faces of the said members. Shortly after the beginning of the working stroke of the take-up device the shoulder or incline at the inner end of the said jog or relief is carried past the bearing or roll 30, with the result that the movable jaw is turned upon its pivot and caused to compress the thread against the fixed jaw. See Fig. 6. By the engagement of the roll with the inner concentric portion of the tail of the movable jaw, the grip-device is held closed upon the thread during the taking-up action, and until, by the return movement or retraction of the take-up device, the jog or relief of the tail of the movable jaw is again presented to the roll 30. In Fig. 1 the said jog or relief is about to be presented to the said roll. For the purpose of facilitating the separation of the jaws as soon as such presentation occurs, the exterior concentric surface of the tail of the movable jaw receives the pressure of a pin or plunger 37 that is held in a socket upon the arm 274 and backed up by an expanding spiral spring 38 that is contained within the said socket.

For the purpose of enabling the closeness of approach of the movable jaw to the fixed jaw, and the degree of compression of the thread between the two jaws, to be regulated as desired, provision is made for varying the position of the bearing or roll 30 radially with respect to the center of motion of the take-up device. To this end, the support 31 is hung upon a pivot 311, upon which pivot it is capable of being swung to carry the bearing or roll 30 either from or toward the said center of motion. For convenience in effecting the adjustment, an adjusting or set-screw 312 is fitted within a threaded hole that is tapped through the support 31, the inner end of the said screw making contact with a portion of the block 32 to which the support 31 is pivoted. To enable the timing of the closing and release of the grip-device in the working of the devices to be adjusted as may be required, the bearing or roll 30 is made angularly adjustable around the axis of the rockshaft 27 by providing the block 32 with one or more slots 321, concentric with the said axis, and by attaching the said block to the outer end of the arm of the carrier 34 by means of screws 33, 33, passing through the said concentric slot or slots 321, into threaded holes that are tapped into the said outer end. The carrier 34 is supported in fixed position by mounting it upon the bearing-sleeve 281, the said carrier having a split hub that is fitted upon a portion of the said bearing-sleeve that projects forwardly from the portion 29 of head 2 within which the sleeve is secured, the said hub being clamped upon the said portion of the sleeve by means of clamping-screws 341.

In order to enable a considerable length of thread to be taken up by a movement of small extent of the take-up device, permitting a large shuttle to be used for the interlocking thread without entailing undue length of stroke of the take-up device to care for the amount of thread which is required for the passage over the shuttle, an opposing draft-device is employed. The said draft-device herein is constituted by a draft-roll 35 that is pivoted upon a fixed arm 36 which is attached to the carrier 34, the said draft-roll 35 being located in position to act on the thread between the grip-device and the moving take-up roll 26. As the take-up arm 25 is swung for the taking-up action, the portion of needle-thread which extends from the jaws of the grip-device past the take-up roll 26 is carried by the movement of the said roll with the said arm against the stationary draft-roll 35, which latter holds back the thread in the form of a bight, thereby multiplying the amount of thread that is taken up by a movement of the take-up arm of given length. The grip-device, in consequence of being located intermediate the draft-roll and the center of motion of the take-up arm, and upon the take-up arm itself, serves, in traveling relative to the draft-roll, to take up a portion of the thread, as shown by Fig. 6, while, as a result of clamping the thread at the intermediate point aforesaid, it prevents any thread from being drawn from the supply-side during the taking-up action, compelling the draft to take place between the grip-device and the seam which is being stitched. By reason of employing the central bore of the rockshaft 27 as a thread-passage, so that the delivery of the thread on its way from the supply is effected centrally with respect to the path of movement of the grip-device, the swinging movement of the grip-device during the taking-up action operates in a path which is concentric with the point of delivery of the thread from such passage, and consequently without any tendency to draw fresh thread forward from the supply.

At 371, 381, are the thread-detainers by which the portion of thread *a* extending from the delivery at the forward end of the bore of the rock-shaft 27 to the thread-guide 15 is prevented from twisting, kinking, or snarling when left slack by the return movement of the take-up. By means of the said thread-detainers, such portion of thread is held under control until it is drawn down in the course of the operations which are incident to the formation of the next stitch. The thread-detainer 371 is mounted upon the stationary arm 36 by which the fixed draft-roll 35 is carried; the other, 381, is carried by the take-up arm 25. Each of the thread-detainers is provided with two surfaces which are sufficiently close together

to pinch or compress the thread *a* when it is drawn in between them, and thereby retain the said thread until it is drawn out from between them by the application of a proper degree of force. The thread-detainer 371 is formed of two plates, the rear portions of which are separated somewhat from each other and receive between them the fixed draft-roll 35, the separation at the rear of the said draft-roll being such that when the thread extends in a straight direction to the thread-guide 15, as in Fig. 5, through the space at the rear of the said fixed draft-roll, it will be free from compression between such plates. At the front of the said draft-roll, that is to say, at the right-hand side thereof in Figs. 5 and 6, the plates are closer together, to pinch or compress the thread when it is drawn in between these portions of the plates by the movement of the take-up arm 25 and its roll 26 in taking-up. The forward portions of the plates project forwardly adjacent the path of the take-up roll 26, practically to the forward limit of the said path as indicated by Fig. 6, so that they receive between them substantially all of the thread which extends from the fixed draft-roll 35 to the moving take-up roll 26 in the extreme forward position of the latter, as indicated by the said figure. To facilitate the entrance of the thread between the plates as it is carried forward by the movement of the take-up device, the outer edges of the plates flare or diverge from each other as indicated in Fig. 3, so as to produce an entrance into which the thread may readily find its way, and through which it may wedge its way in between the plates. The thread-detainer 381 is composed of plates which are attached to the take-up arm 25 intermediate the central delivery for the thread and the position of the fixed draft-roll 35, and also alongside the jaws or thread-engaging members of the grip-device. The outer one of the said plates is formed with a horn or extension projecting past the delivery end of the grip-device, and serving to loosely confine the thread extending downward from between the jaws of the grip-device in the position in which the parts are shown in Fig. 5. The outer edges of the plates of the thread-detainer 381 are also shaped to form a flaring or diverging entrance to facilitate the passage of the thread in between the said plates. In the position of the parts which is represented in Fig. 5 the thread *a* extends downward from the central delivery between the separated jaws or acting members of the grip device, between the spur or horn of the outer plate of the thread-detainer 381 and the corresponding portion of the inner plate thereof, or between such spur or horn and the take-up arm 25, and thence between the separated rear portions of the plates of the

thread-detainer 371, to the thread-guide 15. As the take-up arm swings from the position of Fig. 5 to the position of Fig. 6, the movement of the take-up roll 26 in unison with the said arm causes the portion of thread which extends from the fixed draft-roll 35 to the said take-up roll 26 to enter between the closely-approximated surfaces of the plates of the thread-detainer 371, where such portion is held by the compression which it undergoes. At the same time the thread-detainer 381 is carried around so that its plates receive between them the portion of thread which extends from the jaws of the grip-device to the fixed draft-roll 35, such portion of thread being subjected to compression between the said plates, and thereby held. As now the take-up device swings back from the position of Fig. 6 toward that of Fig. 5, releasing the thread from strain intermediate the grip-device and the seam which is being stitched, the slack of the thread remains held by the two thread-detainers, which latter, however, permit the thread to be drawn down readily by the action of the thread-measuring finger 20 in extending the needle-thread as indicated in Fig. 1, and by the passage of the shuttle through the loop drawn down by the needle.

By moving in unison with the grip-device, the thread-detainer 381 is enabled to control effectively the portion of thread extending between the grip-device and the fixed draft-roll 35 during the return movement of the said arm. There is this difference in the action of the two thread-detainers 371 and 381 in the case of the described embodiment of the invention. The one marked 371 acts as a passive holder of one portion of the thread which has been extended by the taking-up movement of the take-up arm 22, it serving to restrain such portion simply through its frictional engagement with the same. The other, 381, is a live or active controller which, by its return movement in company with the arm 22, operates to withdraw from its tautened position that portion of the thread with which it engages. The take-up device, the grip-device, and the thread-detainer 381, are all actuated by means of the single crank-pin 11 on the rotating shaft 6, which crank-pin also serves for the actuation of the awl-bar and awl. The take-up roll, grip-device, and the thread-detainer 381, are all supported and carried by the same moving part or member of the machine. The construction of the machine is rendered very simple by reason of these two features. For the purpose of enabling the length of the portion of thread which is taken up by the action of the take-up device to be varied, the fixed draft-roll is made adjustable forward and back in a line parallel with the path of movement of the take-up roll 26. To this end, the carrier 34 is capable of be-

ing turned around the bearing-sleeve 271. To permit such turning to be effected, the screws 341 are loosened, and after the carrier has been shifted to give the desired position to the draft-roll 35 the said screws are tightened to clamp the carrier fixedly in place again. After this adjustment has been effected, a compensating adjustment of block 32 is made if necessary in order that the bearing or roll 30 may act with the required timing to operate the grip-lever. This adjustment also enables the position of the "lock" of the stitch within the thickness of the material which is being stitched to be controlled.

The described construction embodies a positive crank motion for the actuation of the take-up. No adjustability of the actuating mechanism is required for the regulation of the working. The provisions for adjustability are all in connection with the fixed parts, whereby such provisions involve no inconvenience and entail no handicap. Thus I avoid loading down any rapidly moving member with the provisions for adjustment.

A pull-off device 40 acts upon the thread α between the wax-pot 5 and the inner end of the rockshaft 27. The said pull-off device consists of an upwardly bent arm having its free extremity notched to engage with the thread in the rising movement of the arm. The pull-off arm is fast upon the inner end of the rockshaft 19 of the thread-finger 20. Consequently, one train of operating devices serves for the actuation of both the thread-finger and the pull-off. Simultaneously with the movement of the thread-finger by which a measured portion of the thread is drawn out as in Fig. 1 preliminary to the next descent of the needle, the pull-off is caused to draw forward a similar quantity of thread from the supply in readiness for the next succeeding action of the thread-measurer. The simultaneous actions of the thread-measurer and pull-off take place while the thread remains held between them by the closed grip-device. The pull-off device 40 engages with the thread between the wax-pot and a fixed thread-guide 41 projecting from the arm 1 and having a hole through which the thread passes. The eccentric 24, or equivalent crank, strap or connecting-rod, and arm 22, are arranged and combined as shown to occasion a differential movement of the thread-finger 20 and pull-off 40. The acting portion of such movement, namely that in which the thread-finger and pull-off are caused to act to extend the thread and then yield the same up, is relatively rapid and prolonged. The idle portion of such movement is relatively slow and is short in duration.

A constant tension-device shown in Figs. 3 and 4 is caused to act upon the thread be-

tween the guide 41 and the entrance to the bore of the rockshaft 27. The said tension-device comprises a fixed jaw 42, Fig. 4, and a movable jaw 43. The jaw 43 is pivoted at 44, and the upwardly extending tail of the same is acted upon by the yielding force of an expanding spring 442 which is contained within a fixed tubular socket 45, the said force being transmitted from the spring to the movable clamping-jaw by means of a pin or plunger 46 which slides within the socket 45, the inner end of the said pin or plunger being acted against by the spring and its outer end being in contact with the tail of the movable jaw. The spring 44 is confined between the inner end of the plunger 46 and the inner end of an adjusting screw 441, Fig. 4. By turning the said screw the degree of compression of the spring may be varied to secure the required tension of the thread. The relatively-fixed portion of the tension-device is provided with a split socket 47, Fig. 3, which fits a pin 48 rising from the portion 29 of the head 2, the said split socket having a clamping screw 49 by means of which the socket may be contracted upon the supporting pin 48 to support the tension-device at the required height in the machine. By pressing upon the tail of the jaw 43 by hand the said jaw may be moved away from the companion jaw 42 so as to relieve the thread from compression and thereby release the tension, whenever for any reason this release is desired.

To facilitate the operation of threading up, the thread-passage through the rockshaft 27 of the take-up device, and that through the wax-pot 5, are located in line with each other, as will appear from Fig. 3, and the jaws 42, 43, of the constant tension-device are arranged between the said thread-passages, so that the thread passes in a straight line through the thread-passage of the wax-pot, then between the jaws 42, 43, and then through the thread-passage of the rockshaft 27. This arrangement secures convenience in threading up, by rendering it possible to push lengthwise through the passage of the rockshaft 27, then between the jaws 42, 43, after the latter have been separated by hand, and then through the thread-passage of the wax-pot 5, a wire having the leading end thereof formed with a hook suitable to have the thread engage therewith, and then withdraw the said wire after the thread has been caught within the said hook, thus pulling the thread through the thread-passages and tension-device by means of the wire.

I claim as my invention:—

1. In combination, a take-up, a grip-device carried thereby, and a stationary actuator for the said grip-device.

2. In combination, a take-up arm, a grip-lever fulcrumed upon the said arm and oper-

ating to hold the thread coming from the source of supply, and a stationary actuating-bearing for the grip-lever.

3. In combination, a take-up, a grip-device 5 carried by the take-up and operated by the movement of the latter to hold during the taking-up action the thread coming from the source of supply, and adjusting means to regulate the timing of the gripping action 10 with relation to that of the take-up.

4. In combination, a take-up, a grip-device carried by the take-up and operated by the movement of the latter to hold during the taking-up action the thread coming from the 15 source of supply, and adjusting means to regulate the degree of the clamping action of the grip-device.

5. In combination, a take-up, a grip-device carried by the take-up and operated by the 20 movement of the latter to hold during the taking-up action the thread coming from the source of supply, and adjusting devices to regulate the timing of the gripping action and the degree thereof.

6. In combination, a take-up, a grip-device 25 carried by the take-up, a stationary bearing by which the grip-device is actuated, and adjusting means to regulate the time relation of the action of the grip-device with respect 30 to that of the take-up.

7. In combination, a take-up, a grip-device carried by the take-up, a stationary bearing by which the grip-device is actuated, and adjusting means to regulate the degree of the 35 clamping action of the grip-device.

8. In combination, a take-up, a grip-device carried by the take-up, a stationary bearing by which the grip-device is actuated, and adjusting devices to regulate the time and the 40 degree of clamping action of the grip-device.

9. In combination, a draft-device occupying a fixed position, thread gripping jaws, and operating means for the said gripping 45 jaws by which they are caused to clamp the thread and then moved relative to the said draft-device to take up the thread.

10. In combination, a draft-device, a take-up arm having means to engage the thread 50 beyond the said draft-device, and a moving grip-device engaging with the thread between the said draft-device and the center of vibration of the said arm and co-acting with the said draft-device to take up the thread.

11. In combination, a draft-device, a take-up 55 arm having means to engage the thread beyond the said draft-device, a moving grip-device engaging with the thread between the said draft-device and the center of vibration of the said take-up arm, and means to adjust 60 the draft-device around the said center.

12. In combination, a draft-device, a take-up arm having means to engage the thread 65 beyond the draft-device, and a taking-up grip moving in unison with the said arm, actuated by the movement of the latter, en-

gaging with the thread between the center of vibration and the said draft-device and co-operating with the draft-device in taking up the thread.

13. In combination, a draft-device, a take-up 70 arm coöperating with said draft-device and also having in connection therewith a thread-supply delivery at the center of movement of said arm, and an intermittent grip-device moving with the take-up arm engag- 75 ing with the thread between the said draft-device and the center of vibration of the said arm and coöperating with the draft-device in taking up the thread.

14. In combination, a draft-device, a take-up 80 arm coöperating with said draft-device and also having in connection therewith a thread-supply delivery at the center of movement of said arm, and a grip-lever fulcrumed upon the said arm operating to grip 85 the thread intermittently between the said draft-device and the center of vibration of the said arm and coöperating with the draft-device in taking up the thread.

15. In combination, a draft-device, a take-up 90 and a taking-up grip-device acting to take up lengths of the thread at both sides of the said draft-device, and a rotating crank operating the said take-up and taking-up 95 grip-device.

16. In combination, a take-up, a grip-device moving in unison with the take-up, and a thread-detainer with which the thread is caused to become engaged by the operative 100 movement of the take-up.

17. In combination, a take-up having a moving draft-device, and an opposing draft-device, an intermittent grip-device operating 105 at the time of the take-up action to hold back the thread at the supply-side, and a thread-detainer intermediate the said draft-devices and with which the thread is caused to become engaged by the action of the take-up.

18. In combination, a take-up having a moving draft-device, and an opposing draft- 110 device, an intermittent grip between the said draft-devices and the source of supply, and a thread-detainer adjacent the said opposing draft-device with which the thread is caused to become engaged by the action of the 115 take-up.

19. The combination with a take-up arm having a moving draft-device, an opposing draft-device, and a moving grip engaging 120 with the thread between the stationary draft-device and the source of supply, of a thread-detainer adjacent the said opposing draft-device with which the thread is caused to become engaged by the action of the take-up 125 arm.

20. The combination with a take-up arm having a moving draft-device, an opposing draft-device, and a moving grip engaging 130 with the thread between the opposing draft-device and the source of supply, of thread-

detainers engaging with the thread at opposite sides of the said opposing draft-device.

21. The combination with a take-up engaging the thread at separated points, and an opposing draft-device with which the thread is engaged between the said points, of a thread-detainer adjacent the said opposing draft-device with which the thread is caused to become engaged by the action of the take-up.

22. In combination, a taking-up grip-device, an opposing draft-device, and a thread-detainer with which the thread is caused to become engaged by the taking-up action.

23. In combination, a take-up engaging the thread at separated points, a draft-device with which the thread is engaged between the said points, a stationary thread-detainer with which the thread is caused to become engaged by the action of the take-up, and a thread-detainer moving in unison with the take-up.

24. In combination, a take-up arm engaging with the thread, a grip-device moving in unison with the said arm and operated by the movement of the latter, an opposing draft-device engaging with the thread between the points at which the latter is engaged by the take-up arm and grip-device, a stationary thread-detainer with which the thread is caused to become engaged by the action of the take-up arm, and a thread-detainer moving with the said take-up arm.

25. In a hooked-needle sewing-machine, in combination, a hooked needle, a thread-guide for laying the thread in the open eye of the needle, a thread-finger engaging with the thread to provide slack to obviate rendering of the thread through the said eye, a pull-off, and a rotating eccentric in operative connection with the said thread-finger and pull-off and actuating the same.

26. In a hooked-needle sewing-machine, in combination, a hooked needle, a thread-guide for laying the thread in the open eye of the needle, a thread-finger engaging with the thread to provide slack to obviate rendering of the thread through the said eye, a pull-off, and an eccentric operating the said thread-finger and pull-off with differential movement, the acting portion of which latter is rapid and relatively long while the idle portion thereof is slow and relatively short.

27. In combination, relatively movable draft-devices around which the thread becomes bent and extended by the taking-up

action, an intermittent thread-grip at the supply side of such devices, and a thread-detainer with which the thread is caused to become engaged by the taking-up action.

28. In combination, relatively movable draft-devices around which the thread becomes bent and extended by the taking-up action, an intermittent grip-device made effective by the taking-up action to grip the thread coming from the source of supply, and a thread-detainer with which the thread is caused to become engaged by the taking-up action.

29. In combination, a draft-device occupying a fixed position, and a grip-device which itself coacts with the said fixed draft-device in taking-up the thread and which, in being moved, is first actuated to grip the thread at the supply side of the said fixed draft-device and then by its continued movement acts effectively to take up the thread.

30. In combination, a draft-device, a thread-detainer adjacent the same with which the thread is caused to become engaged by the action of the take-up in taking-up, and a moving take-up device having means to engage the thread at both sides of the said draft-device and to grip during the taking-up action the thread coming from the source of supply.

31. In combination, a draft-device, a thread-detainer adjacent the same, and a moving take-up having means to engage the thread at both sides of the said draft-device and to grip during the taking-up action the thread coming from the source of supply and also having a second thread-detainer connected therewith.

32. In combination, relatively movable draft-devices around which the thread becomes bent and extended by the taking-up action, and thread-detainers respectively in connection with the respective draft-devices.

33. In combination, a draft-device, a moving take-up having devices to engage the thread at both sides of the said draft-device and to grip during the take-up action the thread coming from the source of supply, and means to adjust the said draft-device.

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

FRANK W. MERRICK.

Witnesses:

CHAS. F. RANDALL,

EDITH J. ANDERSON.