Sept. 19, 1939. A. H. DE VOE 2,173,320

THREAD-CONTROLLING MECHANISM FOR SEWING MACHINES

Filed July 9, 1938 3 Sheets-Sheet 1

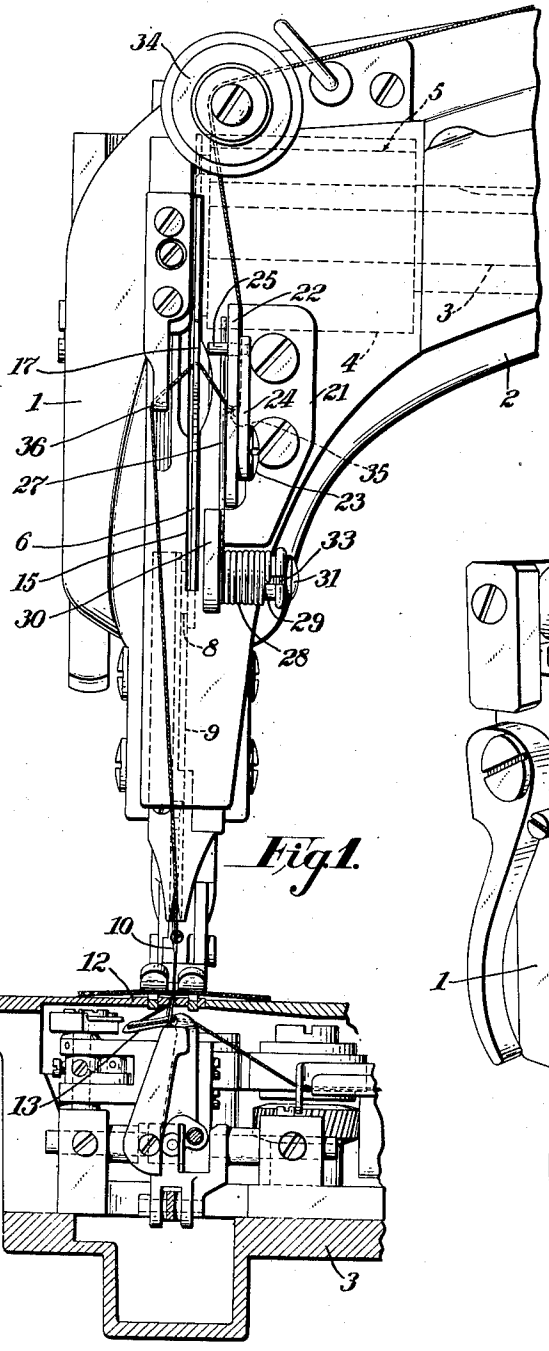


Fig. 1.

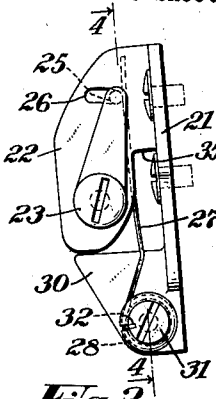


Fig. 3.

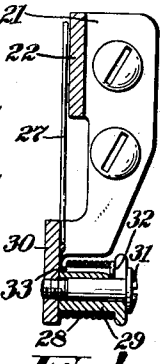


Fig. 4.

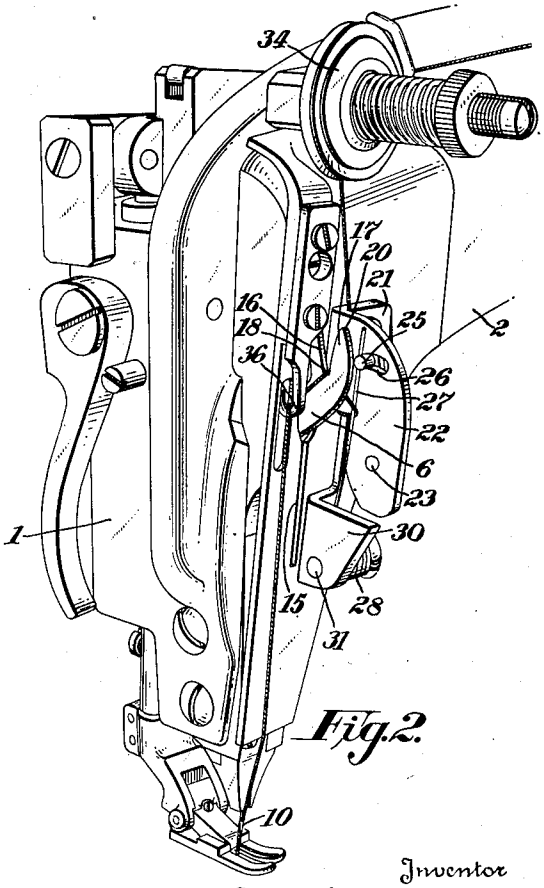


Fig. 2.

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THREAD-CONTROLLING MECHANISM FOR SEWING MACHINES

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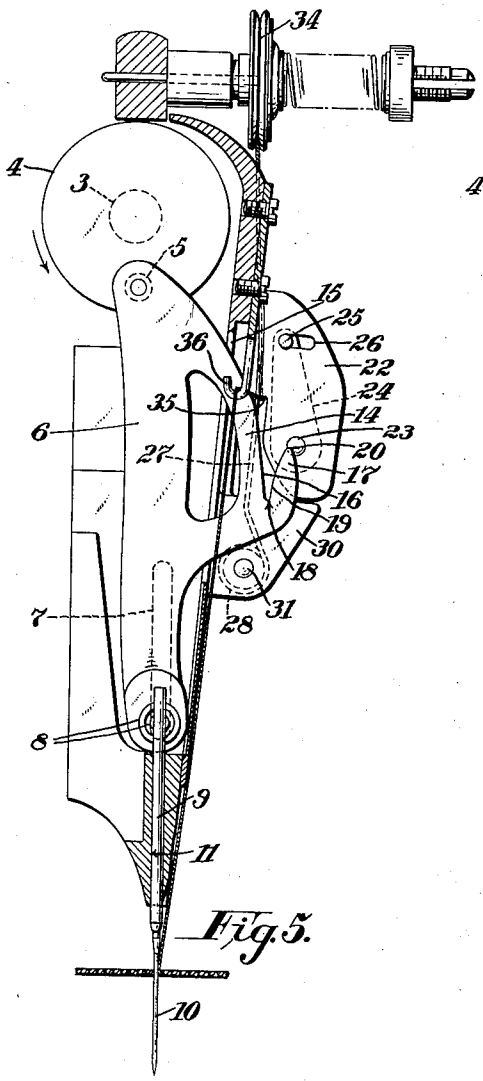


Fig. 5.

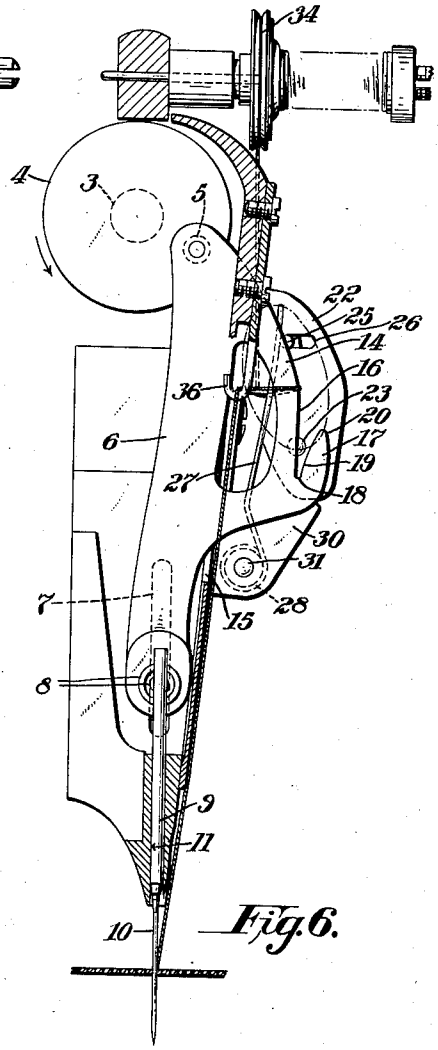


Fig. 6.

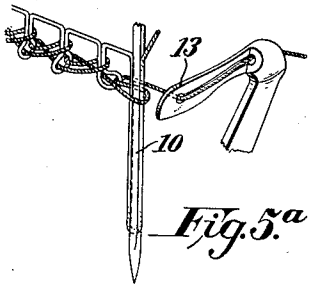


Fig. 5a.

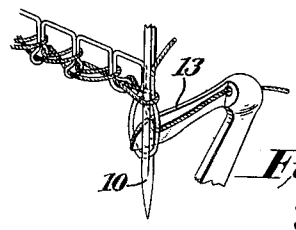


Fig. 6a.

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THREAD-CONTROLLING MECHANISM FOR SEWING MACHINES

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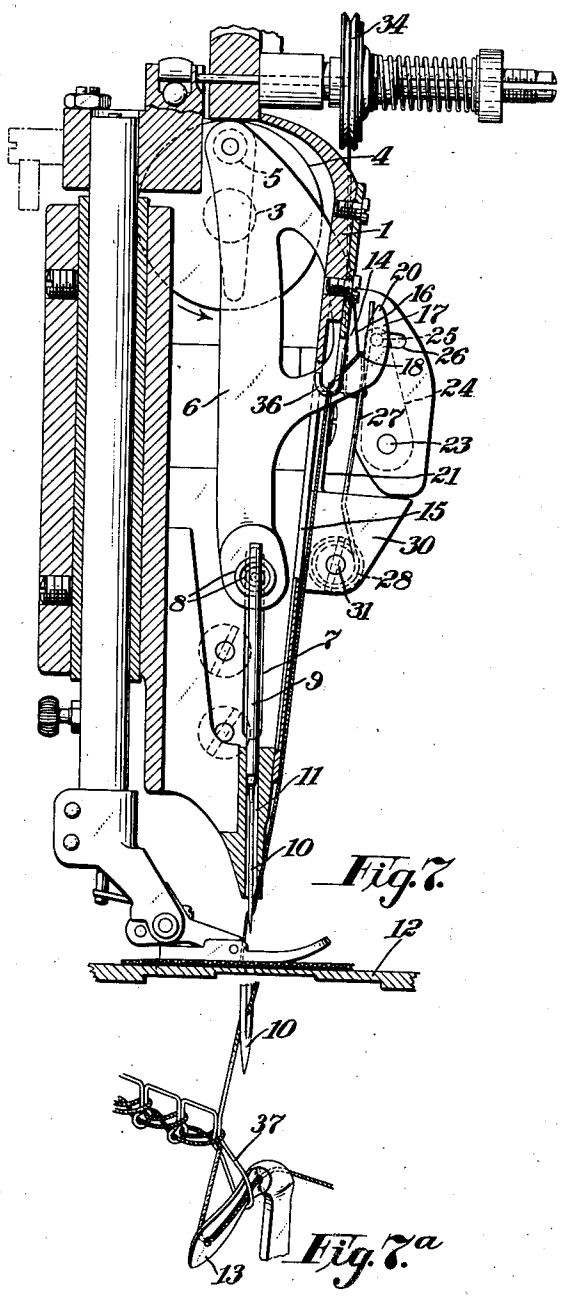


Fig. 7.

Fig. 7a.

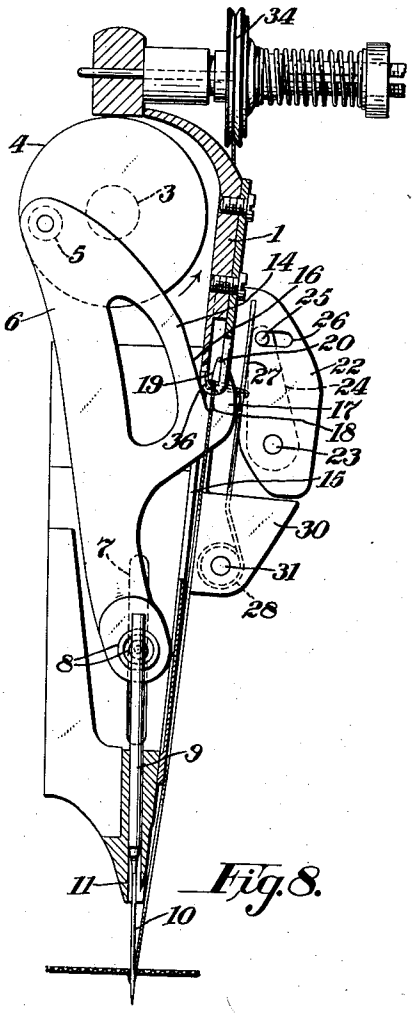


Fig. 8.

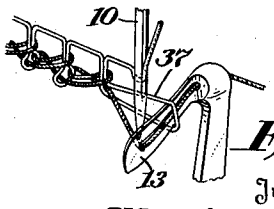


Fig. 8a.

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UNITED STATES PATENT OFFICE

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THREAD-CONTROLLING MECHANISM FOR SEWING MACHINES

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Application July 9, 1938, Serial No. 218,288

11 Claims. (Cl. 112—241)

This invention relates to thread-controlling mechanism for sewing machines and, more particularly, to needle-thread controlling mechanism for two-thread chain-stitch sewing machines having an endwise reciprocatory eye-pointed needle above the cloth-plate and a thread-carrying looper disposed below the cloth-plate and having endwise needle-loop-seizing and -shedding movements and sidewise movements designed to present a loop of looper-thread for entry by the descending needle.

The invention has for an object to provide simplified and improved means to accurately control the needle-thread so that the machine will sew with certainty at high operative speeds of the order of 8000 to 9000 stitches per minute.

Another object of the invention is to provide needle-thread controlling mechanism which is readily adjustable to meet various sewing conditions and which is easily threaded.

The invention also aims to provide a needle-thread controller which is readily adjustable to control the size of the needle-loop presented to the looper and which also prevents the formation of slack in the needle-thread at the time the needle point is about to enter the so-called "thread-triangle" presented by the looper to the needle and comprising the looper-blade, the looper-thread length between the looper-eye and the last stitch in the work and the needle-thread loop which is around the looper-blade.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the accompanying drawings Fig. 1 is a front elevation, partly in section, of the bracket-arm head and underlying portion of the bed of a sewing machine embodying the invention. Fig. 2 is a perspective view of the bracket-arm head of the machine. Fig. 3 is a right side elevation of an element of the thread-controlling mechanism. Fig. 4 is a section on the line 4—4, Fig. 3. Fig. 5 is a left side elevation of the thread-controlling mechanism at the period of a stitch-forming cycle when the needle is at the lower end of its stroke. Fig. 6 is a similar view of the parts at the period of a stitch-forming cycle when the advancing looper is about to seize or enter the needle-thread loop thrown out by the rising needle. Fig. 7 is a similar view at the period of the cycle when the needle is at the upper end of its stroke. Fig. 8 shows the parts at the time when the descending needle point is about to enter the thread-triangle presented by the retracting looper, and Figs. 5ª, 6ª, 7ª and 8ª are perspective views of the needle and cooperating looper at the times of a stitch-forming cycle represented in Figs. 5, 6, 7 and 8, respectively.

In the specific embodiment of the invention chosen for the purposes of the present disclosure, 1 represents the head at the free end of the bracket-arm 2 of a sewing machine including the hollow bed 3; such sewing machine being more completely disclosed in my co-pending applications, Serial Nos. 196,641; 196,642; 196,643; 196,644; filed Mar. 18, 1938.

Journaled in the bracket-arm 2 is the rotary shaft 3 carrying the cylindrical head 4 having therein a crank hole in which is journaled the crank-pin 5 rigid with the upper end of a thin plate-like link or pitman 6 having at its lower end a pin (not shown) which is guided in a vertical slot 7 in the head 1 and also having the concentric circular ribs 8 which engage corresponding grooves in the side of the shank 9 of the eye-pointed needle 10, which shank is guided in the slide-bearing 11 in the head.

Cooperating with the needle 10 below the work-support or throat-plate 12 is the thread-carrying looper 13 which may be actuated in any usual or suitable manner, but is preferably constructed, mounted and operated substantially in accordance with the disclosure of my said co-pending application, Serial No. 196,641. It will be understood that the looper 13 has endwise loop-seizing and loop-shedding movements and lateral or sidewise movements, so that the looper advances along one side of the needle to seize a loop of needle-thread, then moves on to the end of its advancing stroke, then shifts laterally to the other side of the needle-path and returns so that the descending needle will enter the well known "thread-triangle" presented by the looper.

The thin plate-like pitman 6 has a forwardly extending portion 14 which projects through a vertical slot 15 in the head 1 when the needle 10 is on its upstroke. The forwardly projecting portion 14 of the pitman 6 is also formed with a substantially straight front edge portion 16 adjacent to which is a thread-hook 17 having a throat the bottom of which is at 18. The hook 17 has a convexly curved inner edge 19, Fig. 5, leading from the bottom 18 of the hook-throat to the hook-point 20. The orbital path of move-

ment of the hook-point 20 is shown by a dash-dot ellipse in Fig. 6, in which it will be observed that the hook point 20 is rising substantially vertically along its orbit at the time the needle-thread is being engaged by the thin vertical straight edge-portion 16 of the link 6 which thus has a zero action on the needle-thread for a time after the looper has seized the needle-loop, as will be hereinafter explained.

Mounted on the head 2, alongside the slot 15 and link 6, is the base-plate 21 of a thread-guiding device having an upper forwardly-projecting ear-plate 22 on which is mounted the pivot clamp-screw 23 for the arm 24 carrying at its upper end a pin 25 which projects through the arcuate slot 26 in the ear-plate 22 and constitutes an adjustable abutment or stop for the free end of the spring 27 the coiled shank 28 of which embraces the sleeve 29, Fig. 4, which is clamped to the lower forwardly projecting ear-plate 30 of the base-plate 21 by the screw 31. The free end 32 of the coiled shank 28 of the spring 27 is inturned and is anchored in the groove 33 in the sleeve 29 which may be rotatively adjusted on the screw 31 to stiffen or weaken the spring 27, i. e., to increase or decrease the pressure of the spring against the abutment or stop 25. The spring arm 27 lies closely adjacent, that is, substantially in contact with and parallel to the left side face of the ear-plate 22; said spring arm 27 bearing yieldingly against the juxtaposed side face of the ear-plate 22, as well as against the stop 25. The pressure of the spring against the plate 22 is much less, however, than the pressure of such spring against the stop pin 25.

The needle-thread leads through the conventional thread-tension device 34, Fig. 1, thence downwardly along the right side face of the ear-plate 22 along the corner between such face and the base-plate 21, as shown in Figs. 1 and 2. The thread next leads through the gap or notch 35, Fig. 3, between the ear-plate 22 and base-plate 21, to the left side of the ear-plate 22 and thence around the spring-arm 27 and horizontally through the thread-guide hook 36 and downwardly to and through the eye of the needle 10.

Operation

Beginning with Fig. 5, with the needle 10 at the bottom of its stroke and the looper 13 in retracted position, the needle-thread is under a strain sufficient to hold the spring-arm 27 drawn backwardly from the stop-pin 25. As the needle rises, the needle-thread is thereby slackened and the spring 27 and front edge of the pitman 6 move forwardly substantially simultaneously and steal thread from the needle-loop, thereby preventing the needle from throwing out a needle-loop of excessive size. When the spring 27 strikes the stop 25 its forward motion is arrested, but the front edge of the pitman 6 continues its forward movement to prevent abnormal expansion of the needle-loop until the loop is seized by the looper, Figs. 6 and 6a, at which time the straight vertical edge-portion 16 of the pitman 6 engages the thread. The size of the needle-loop at the moment of seizure by the looper, Fig. 6a, may be regulated by adjusting the stop 25 in the arcuate slot 26. After the looper 13 has seized the needle-loop, the vertical edge-portion 16 of the pitman 6 is moving substantially vertically and past the needle-thread and has no thread-taking or slack-giving action as the needle is rising out of the work on the cloth-plate. As the needle nears the end of its upstroke the thread is engaged by the bottom 18 of the throat of the hook 17 which rising bottom 18 takes up the thread given up by the movement of the vertical edge 16 to the left between the positions of Figs. 6 and 7. In other words, when the movement of the vertical edge 16 begins to give slack to the needle-thread, the rising bottom 18 absorbs such slack, with the next result that the needle-thread is maintained closely under control while the needle is above the work.

As the needle descends from the position of Fig. 7, the motion of the hook 17 to the left absorbs the slack given by the falling throat-bottom 18 and prevents the needle-thread from doubling between the needle-eye and the work and being fouled by the needle-point. As soon as the needle-eye reaches the work and begins to double the thread through the work, the sudden demand by the needle, for needle-thread, puts a strain on the needle-thread which is relieved by the yielding of the spring-arm 27, as shown in Fig. 8. The needle-thread thus put under strain is tightened as a loop 37, Fig. 8a snugly around the shank of the retracting looper which holds the loop 37 at one side of the path of the descending needle as the latter enters the thread-triangle, as shown in Fig. 8a.

As the needle continues to the bottom of its stroke, the retracting looper sheds the needle-loop 37 which is tightened by the take-up action of the needle in descending to the extreme down position shown in Fig. 5a. At the same time the spring arm 27 is strained to the extreme position shown in Fig. 5 and a supply of needle-thread is drawn through the tension-device 34 for the next stitch. This completes a stitch-forming cycle of operations.

The present needle-thread controller is particularly efficacious in the sewing of thin, sleazy materials, such as organdies, etc. which must be sewn under a very light tension to avoid puckering of the work. Under a light adjustment of the main tension device there is a tendency for the advancing looper, in taking the needle-loop, to steal thread through the tension device. The additional tension afforded by the side pressure of the spring 27 against the plate 22 at the time of seizure of the needle-loop by the looper prevents the stealing of needle-thread through the main tension 34 at this time and enables the main tension 34 to be adjusted sufficiently light to sew thin sleazy materials without puckering the same.

While I have shown and described the invention as embodied in a two thread chain-stitch sewing machine to control the needle-thread, it is to be understood that the invention is not, in its broader aspects, limited in its application to the control of the needle-thread, but may be applied to the control of a sewing machine thread generally, regardless of whether such thread is a needle-thread, a looper-thread or a covering thread; the thread-controller to be appropriately located to control the selected thread. The pitman 6 need not be a needle-actuating pitman but may be a crank-driven pitman of general application. The shaft 3 need not be the needle-driving shaft of a sewing machine but may be any sewing machine shaft used to drive any pitman.

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

1. In a thread-controller for sewing machines, a rotary shaft, a crank-driven pitman actuated by said shaft and having a thread-engaging part

thereon, means to guide the thread across the path of movement of said thread-engaging part, and a thread-controlling spring arranged to engage the thread length passing across the path of movement of the thread-engaging part of said pitman.

2. In a thread-controller for sewng machines, a rotary shaft, a crank-driven pitman actuated by said shaft and having a thread-engaging part thereon, a thread-controlling spring disposed alongside the thread-engaging part of said pitman but supported independently of said pitman, and means to guide the thread across the paths of movement of said pitman and spring.

3. A thread-controller for sewing machines including spaced thread-guides, and a slack-thread controlling spring and a driven thread-controlling members working in parallel planes which are between and transverse to a straight line connecting said thread-guides.

4. A thread-controller for sewing machines including spaced thread-guides, and a slack-thread controlling spring and a driven thread-controlling member working in parallel planes between said thread-guides, one of said thread-guides being constituted by a notched plate having a face in juxtaposition with and parallel to the plane of movement of said spring.

5. A thread-controller for sewing machines including spaced thread-guides, a slack-thread controlling spring and a driven thread-controlling member working in parallel planes which are between and transverse to a straight line connecting said thread-guides, and a stop for limiting the movement of said spring in one direction.

6. A thread-controller for sewing machines including spaced thread-guides, a slack-thread controlling spring and a driven thread-controlling member working in parallel planes between said thread-guides, one of said thread-guides being constituted by a notched plate having a face in juxtaposition with and parallel to the plane of movement of said spring, and a stop mounted on said plate in position to limit the movement of said spring in one direction.

7. In a thread-controller, the combination with a thread take-up element having an orbital path of movement in a plane, of a slack-thread controlling spring spaced from and movable in a plane parallel to the plane of orbital movement of said take-up element, and means to guide a thread across the paths of movement of said take-up element and spring.

8. In a thread-controller, the combination with a thread take-up element having an orbital path of movement in a plane, of a slack-thread controlling spring spaced from and movable in a plane parallel to the plane of orbital movement of said take-up element, and means to guide a thread across the paths of movement of said take-up element and spring, said take-up element being in the form of a hook which alternately seizes and releases the thread.

9. In a sewing machine, the combination with a stationarily mounted slack-thread controlling spring, of means moving alongside such spring in a direction to seize a thread and move it against said spring so that said spring will be displaced by said thread, said means thereafter releasing the thread so that the thread is subjected only to the control of said displaced spring.

10. A sewing machine having a frame including a bed and a bracket-arm terminating in a head having a slot in its forward side, a shaft journaled in said bracket-arm, a needle, a complemental loop-taker, a crank-driven needle-actuating pitman driven by said shaft, said pitman having a portion which projects forwardly through said slot and has a hook thereon with an upwardly opening throat, and means to guide a thread across said slot externally of said head in position to be seized by said hook and released in each stitch-forming cycle of operations of the machine.

11. In a sewing machine, the combination with a reciprocatory needle, a loop-taker and a main tension device, of a thread-controller disposed to act on the needle-thread length between the needle and main tension device, said thread-controller including a plate and a spring having thread takeup movements in a plane parallel to a face of said plate and close enough to said face to press the needle-thread against the latter.

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