Oct. 22, 1940. N. KNAUS ET AL 2,218,796

THREAD-CONTROLLING MECHANISM FOR OVEREDGE SEWING MACHINES

Filed July 15, 1939 6 Sheets-Sheet 1

Fig. 1a.

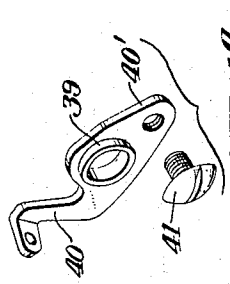


Fig. 1.

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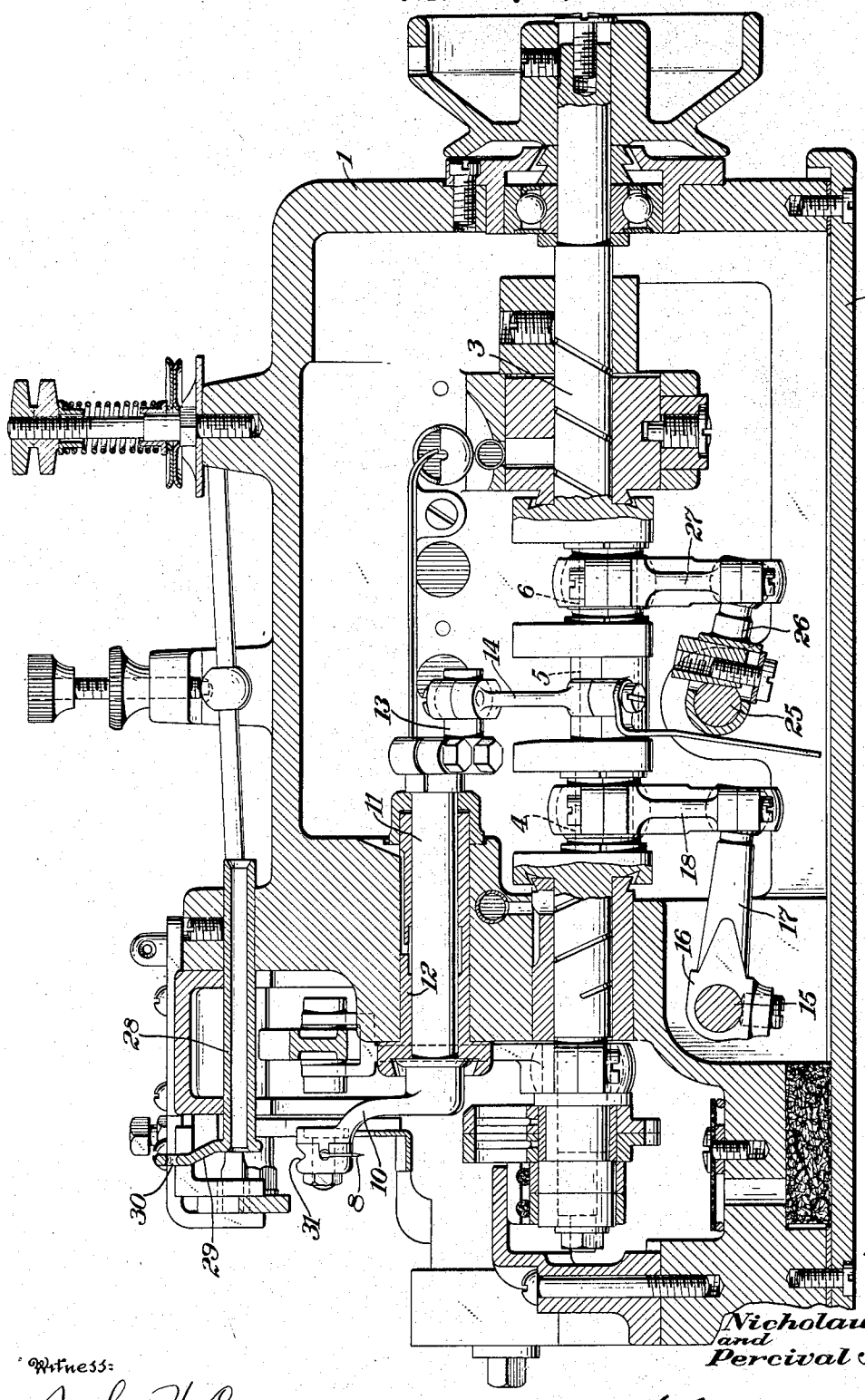


Fig. 2.

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THREAD-CONTROLLING MECHANISM FOR OVEREDGE SEWING MACHINES

Filed July 15, 1939 6 Sheets-Sheet 3

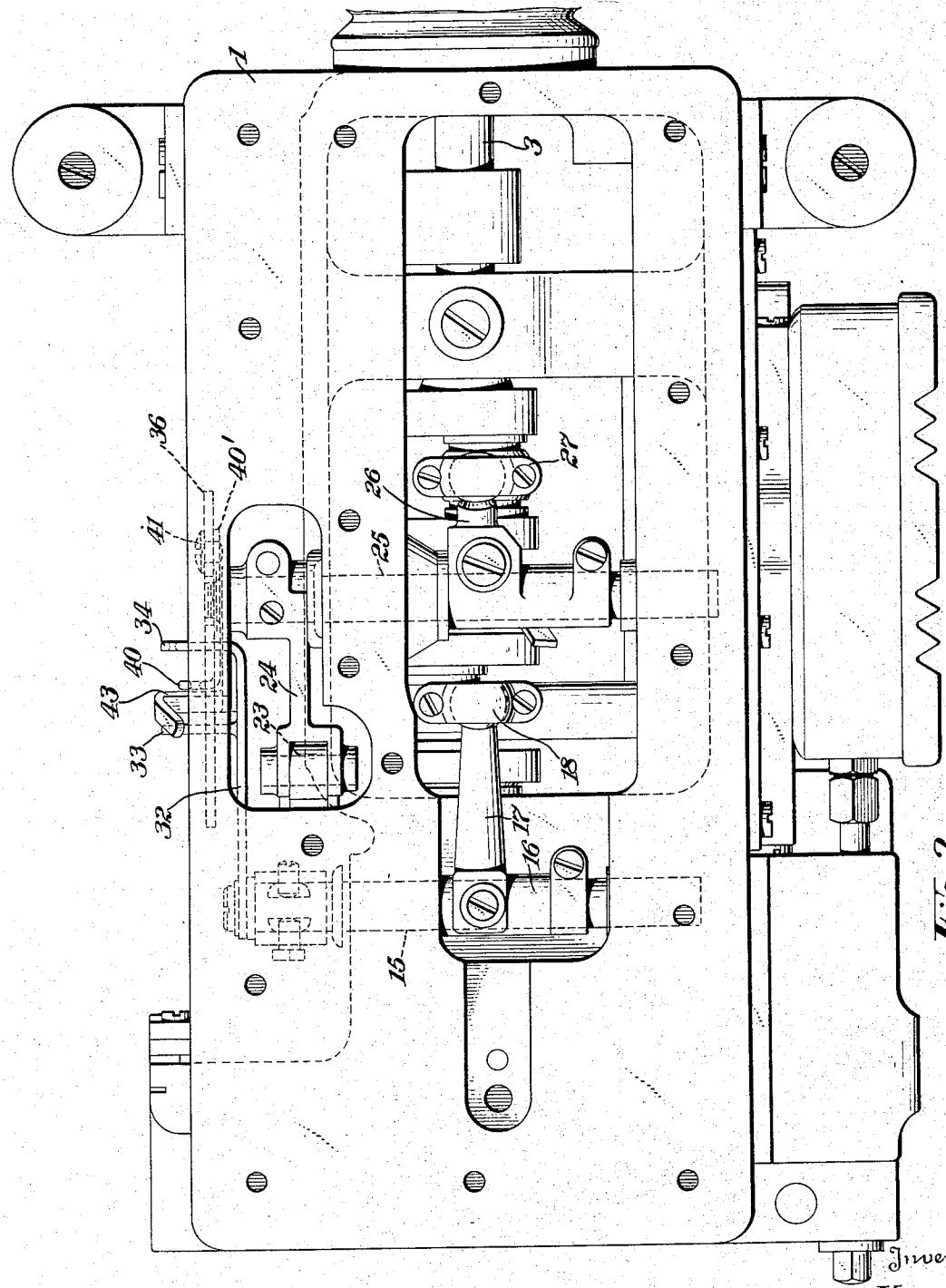


Fig. 3.

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THREAD-CONTROLLING MECHANISM FOR OVEREDGE SEWING MACHINES

Filed July 15, 1939 6 Sheets-Sheet 4

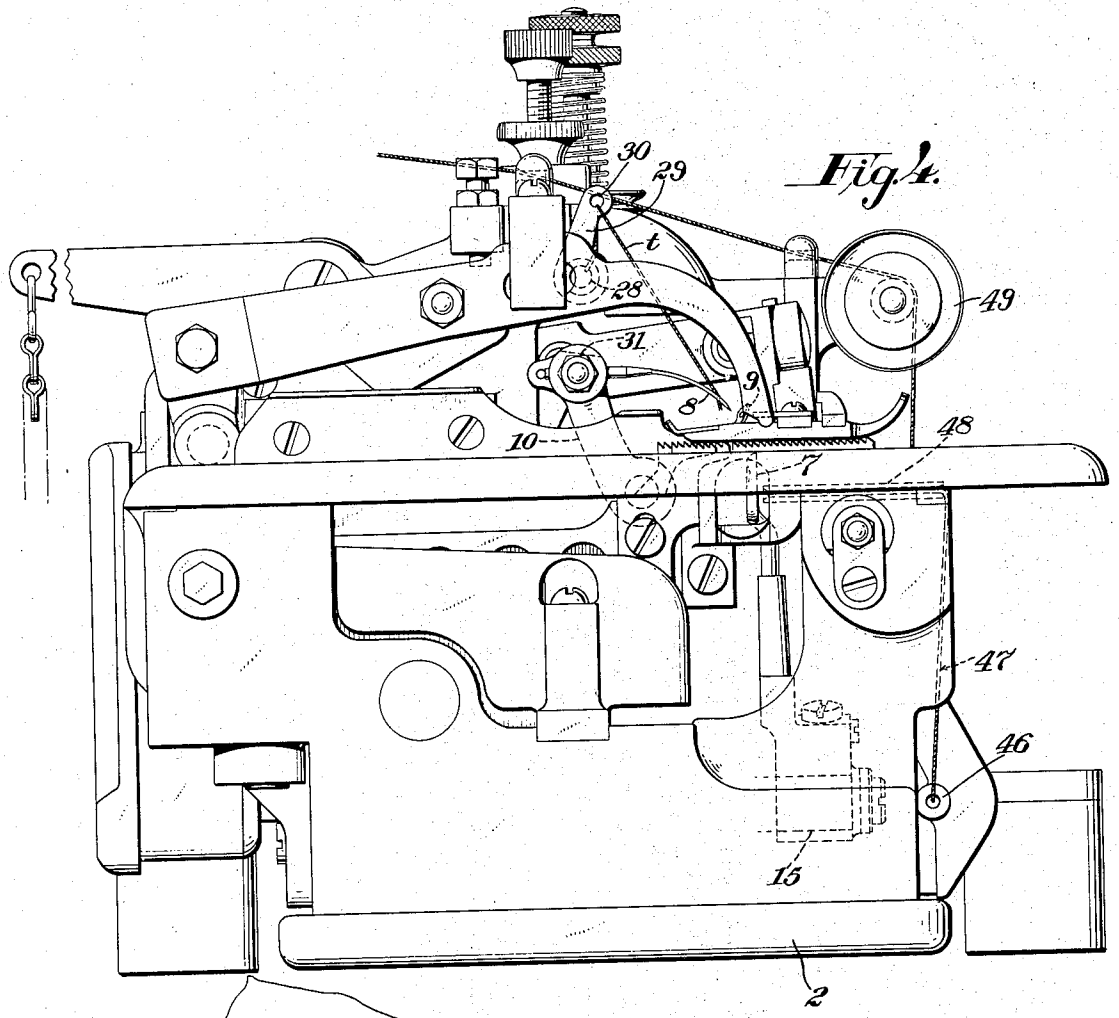


Fig. 4.

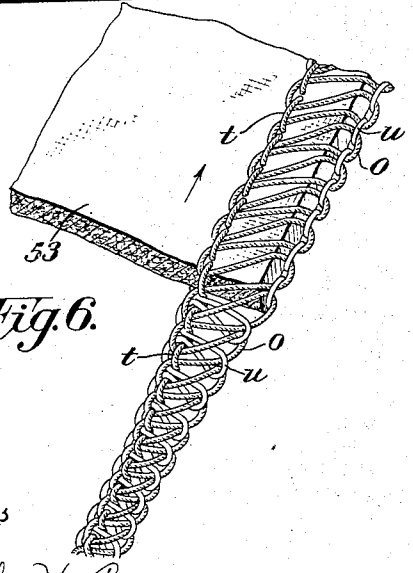


Fig. 6.

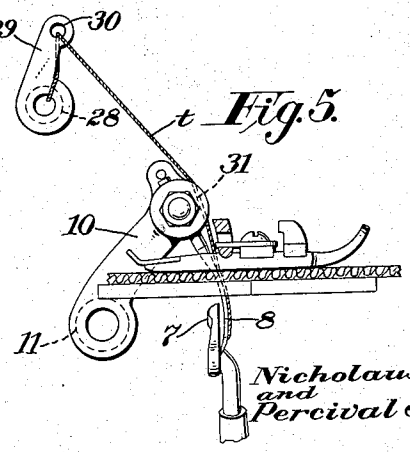


Fig. 5.

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THREAD-CONTROLLING MECHANISM FOR OVEREDGE SEWING MACHINES

Filed July 15, 1939 6 Sheets-Sheet 5

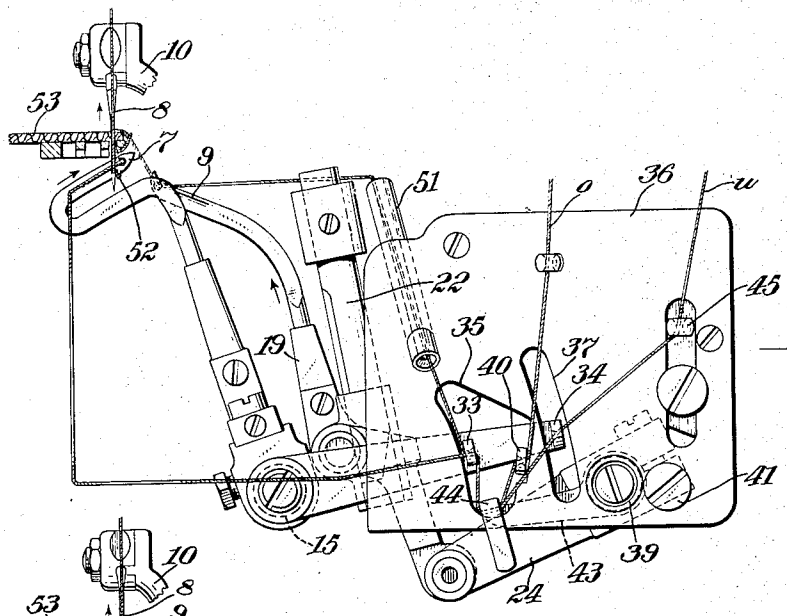


Fig. 7.

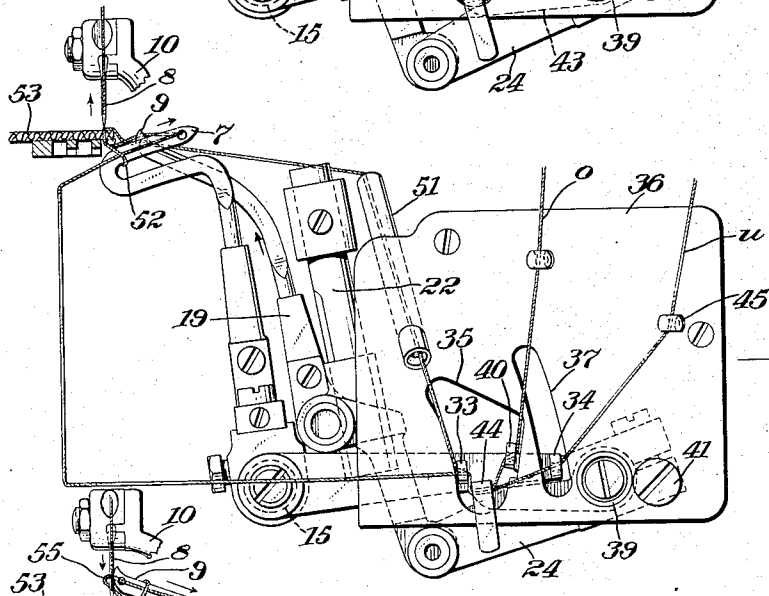


Fig. 8.

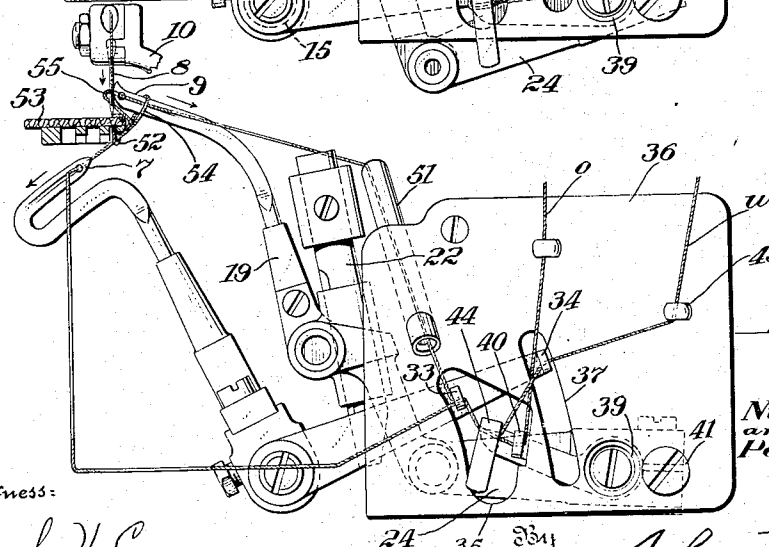


Fig. 9.

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THREAD-CONTROLLING MECHANISM FOR OVEREDGE SEWING MACHINES

Filed July 15, 1939 6 Sheets-Sheet 6

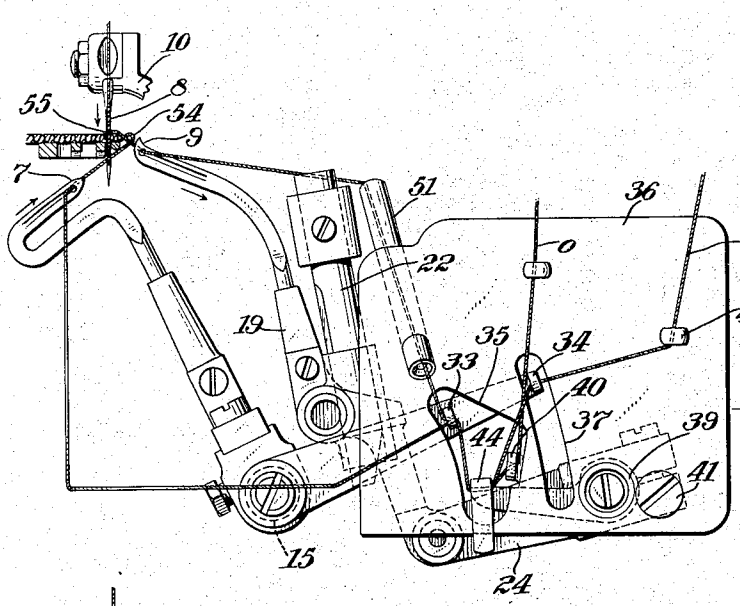


Fig. 10.

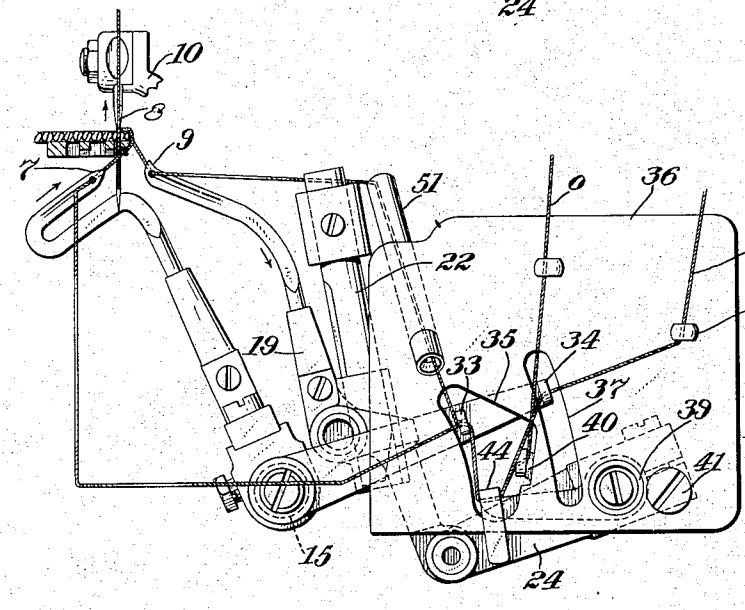


Fig. 11.

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Patented Oct. 22, 1940 2,218,796

UNITED STATES PATENT OFFICE

2,218,796

THREAD-CONTROLLING MECHANISM FOR OVEREDGE SEWING MACHINES

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Application July 15, 1939, Serial No. 284,628

13 Claims. (Cl. 112—162)

This invention relates to overedge sewing machines, more particularly of the type disclosed in the copending application of Nicholaus Knaus, Serial No. 278,393, filed June 10, 1939.

The invention has for an object to provide the machine with a simplified and efficient thread-controlling mechanism which is adaptable to stitching requirements on various materials, as well as meeting the requirements for sewing an elastic chain in the air in "chaining off" operations.

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 side elevation of an overedge sewing machine embodying the invention. Fig. 2 is a longitudinal vertical section through the machine frame. Fig. 3 is a bottom plan view of the machine. Fig. 4 is a stitching end elevation of the machine. Fig. 5 is a view of the needle, looper and needle-thread guiding parts of Fig. 4, with the needle all the way down. Fig. 6 is a perspective view of a work-sample sewed on the machine. Figs. 7, 8, 9, 10 and 11 are a series of views of the stitch-forming and thread-handling devices at different consecutive time-points of a stitch-forming cycle.

As disclosed in said Knaus copending application the machine is constructed with a frame in the form of a hollow casing 1 closed at the bottom by the base-plate 2. Journaled in the frame casing 1 is the main shaft 3 formed with the three cranks 4, 5 and 6 which drive the under looper 7, the needle 8 and the overedge looper 9, respectively.

The curved needle 8 is carried by the arm 10 of the rock-shaft 11 journaled in the frame bushing 12, Fig. 2, and carrying at its inner end the crank-arm 13 which is connected by the pitman 14 with the actuating crank 5. The under looper 7 is carried by the rock-shaft 15 to which is fixed the hub 16 of the crank-arm 17 actuated by the pitman 18 and its actuating crank 4. The carrier lever 19 for the overedge looper 9 is pivoted at 20 to a sleeve 21 which is slidably supported by the pin 22 carried by the frame 1. The lever 19 is pivotally connected at 23 to an arm 24 fixed to the rock-shaft 25 which carries the inner crank-arm 26 actuated by the pitman 27 and crank 6.

Mounted for rotative adjustment in the frame 1 is a needle-thread guide-tube 28 having at its delivery end an arm 29 formed at its free end with a thread-guide eyelet 30. The needle-carrying arm 10 has a V-notch 31 in the front side of the needle-clamp at its free end to deflect or bend the needle-thread *t* forwardly when the needle approaches the lower limit of its stroke. See Figs. 4 and 5. This bending of the needle-thread *t* has a stitch-tightening and pull-off action which is regulatable by turning the tube 28 in the frame 1, Fig. 2, about its longitudinal axis to carry the thread-eye 30 forwardly or backwardly, Fig. 5, about the axis of the tube 28.

Fixed to the under-looper rock-shaft 15 is a thread take-up arm 32 having two spaced forwardly projecting arms 33, 34 having thread-eyes at their free ends. The arm 33 projects through a slot 35 in the plate 36 while the arm 34 projects through the slot 37 in said plate.

Mounted in a circular hole 38 in the plate 36 for pivotal adjustment is the cylindrical hub 39 of a stationary thread-guide arm 40 having at its free end a thread-eye. The tail 40' of the thread-guide arm 40 is threaded to receive the clamp-screw 41 which passes through the arcuate slot 42 in the plate 36.

Fixed to the rock-shaft 25 is a thread take-up arm 43 which terminates in the hook 44 working between the thread-arms 33 and 34. The plate 36 carries the vertically adjustable guide 45 for the under-looper thread *u*. The thread-guide 40 is disposed between the take-up eye 34 and the take-up hook 44 and guides the overedge thread *o* only.

The thread *u* runs from the supply through the tension-device 46 and thread-guide 45 to and through the eye in the thread-arm 34, thence under the hook 44 and through the eye in the thread-arm 33. From the eyed arm 33 the thread *u* runs through the horizontal guide tube 46 and vertically in the slot 47 to the guide tube 48 through which the thread runs to the eye of the looper 7.

The overedge looper-thread *o* runs from the supply through the tension-device 49 and thread-guide 50 to the circularly adjustable guide 40, thence under the hook 44 and through the eyed guide 33 to the thread-tube 51 through which the thread *o* runs to the overedge looper 9.

Operation

Starting with Fig. 7, as the needle 8 rises to

throw out its thread-loop 52, the needle-thread *t*, which is under a stitch-tightening strain when the needle is at the bottom of its stroke, is immediately slackened by retraction of the needle-thread stitch-tightening notch 31 in the needle-carrying arm 10. The under looper 7 advances on a slack thread and takes the loop 52. The take-up arms 33 and 34 are dropping as the looper 7 advances and give up slack thread to the advancing under looper. There is very little movement of the overedge looper 9 and take-up hook 44 as the under looper 8 advances.

When the under looper 7 reaches the end of its advancing stroke, the needle-point is rising from the goods 53 and the point of the overedge looper 9 rises to take a thread-loop from the under looper, as shown in Fig. 8. As the overedge looper 9 rises, the thread take-up hook 44 rises and gives slack to the thread *o*. The rising guide 33 slides along and does not take-up on the thread *o* between the tube 51 and hook 44, Fig. 9, and the rising guide 34 is not engaged by the thread *o*. Thus, slack thread *o* is supplied for the overedge looper to rise with, and the looper 7 retracts leaving a looper-thread loop 54 on the overedge looper 9. The needle reverses its motion at the upper end of its stroke and takes a loop 55 of thread *o* from the overedge looper 9 as the latter retracts to shed the loop 54. After the loops 52 and 54 are shed, the down motion of the take-up hook 44 tightens both threads *u* and *o*, particularly the thread *u*, and draws up the loops 54 and 55 so that they lie snugly in place on the work or stitch-finger of the machine when no work is being sewn. The descending needle and notch 31 also tighten the previous needle-thread loop 52 shed by the retracting under looper 7. This completes a stitch-forming cycle.

By adjusting the thread-guide 40 upwardly, the take-up action of the falling guide-hook 44 on the thread *o* only is increased and vice versa. The take-up action of the eyed-arms 33 and 34 on the thread *u* only may be modified by vertical adjustment of the guide 45.

By the means provided it is possible to control the threads and draw up and properly set the stitch in a wide variety of materials. It is also possible to sew an elastic chain in the air, as shown in Fig. 6, in which the needle-thread *t* is not drawn tightly and runs over and under the threads *o* and *u*, respectively, in a serpentine course giving longitudinal elasticity to the chain.

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

1. A sewing machine having an endwise reciprocatory needle, an under looper and an overedge looper, a pair of spaced parallel rock-shafts each connected to actuate a respective one of said loopers, looper-thread take-up arms carried by said rock-shafts and extending toward one another for action on the looper-thread, and means to guide a looper-thread to a position within the range of action of said take-up arms.

2. A sewing machine having an endwise reciprocatory needle, an under looper and an overedge looper, a pair of rock-shafts each connected to actuate a respective one of said loopers, a double-eyed take-up arm carried by one of said rock-shafts, and a take-up arm carried by the other of said rock-shafts and having a thread-engaging portion working in the space between the eyes of said double-eyed take-up arm.

3. A sewing machine having an endwise reciprocatory needle, an under looper and an overedge looper, a pair of rock-shafts each connected too actuate a respective one of said loopers, a slotted plate, and looper-thread take-up arms carried by said rock-shafts and having thread-engaging terminal portions extending through said slotted plate.

4. A sewing machine having an endwise reciprocatory needle, an under looper and an overedge looper, a pair of rock-shafts each connected to actuate a respective one of said loopers, a slotted plate, looper-thread take-up arms carried by said rock-shafts and having thread-engaging terminal portions extending through said slotted plate and a pair of adjustably positioned stationary thread-guides on said plate for the respective looper-threads.

5. In an overedge sewing machine, a curved needle, a needle-carrying arm having a needle-thread engaging and bending portion, a rock-shaft carrying said arm, and a needle-thread guide between which and the needle the thread is engaged and bent by said arm as the needle approaches the end of its work-penetrative thrust.

6. In an overedge sewing machine, a curved needle, a needle-carrying arm having a needle-thread engaging and bending portion, a rock-shaft carrying said arm, and an adjustably positioned needle-thread guide between which and the needle, the thread is engaged and bent by said arm as the needle approaches the end of its work-penetrative thrust.

7. In an overedge sewing machine, a curved needle, a needle-carrying arm having a needle-thread engaging and bending portion, a rock-shaft carrying said arm, a rotatably adjustable needle-thread-guiding tube, and a thread-guiding arm carried by said tube and having a guide-eye offset from the axis of said tube to so lead the thread to the needle that the thread will be engaged and bent by said needle-carrying arm as the needle approaches the end of its work-penetrative thrust.

8. A sewing machine having an endwise reciprocatory needle, an under looper and an overedge looper, a pair of rock-shafts each connected to actuate a respective one of said loopers, a thread take-up arm secured to one of said rock-shafts and having two eyed lateral extensions, and a thread take-up arm secured to the other of said rock-shafts and having a lateral extension positioned to engage a looper-thread between the eyed lateral extensions of the first mentioned thread take-up arm.

9. A sewing machine having an endwise reciprocatory needle, an under looper and an overedge looper, a pair of rock-shafts each connected to actuate a respective one of said loopers, a looper-thread take-up arm carried by each of said rock-shafts for simultaneous cooperative action on the same looper-thread, and means to guide a looper-thread within the range of action of both of said take-up arms.

10. A sewing machine having a main shaft formed with three cranks, a needle-operating rock-shaft driven by one of said cranks, an under looper operating rock-shaft driven by another of said cranks, an overedge looper operating rock-shaft driven by the third one of said cranks, needle-thread stitch tightening means carried by said needle-actuating rock-shaft, and looper-thread stitch-tightening means carried by said looper-operating shafts.

11. A sewing machine having a main shaft formed with three cranks, a needle-operating

rock-shaft driven by one of said cranks, an under looper operating rock-shaft driven by another of said cranks, an overedge looper operating rock-shaft driven by the third one of said cranks, needle-thread stitch-tightening means carried by said needle-actuating rock-shaft, and looper-thread stitch-tightening means carried by said looper-operating rock-shafts, said means being timed to exert their stitch-tightening actions substantially simultaneously at a period of the stitch-forming cycle when the needle is approaching the end of its work-penetrative thrust after the under looper-thread loop has been shed by the retracting overedge looper and after the needle-thread loop has been shed by the retracting under looper.

12. An overedge sewing machine having a needle, an under looper, an overedge looper, a slotted plate, vibratory looper-thread take-ups extending through said slotted plate, and stationary looper-thread guides adjustably mounted on said plate.

13. An overedge sewing machine having a needle, an under looper, an overedge looper, a slotted plate, vibratory looper-thread take-ups extending through said slotted plate, and stationary looper-thread guides adjustably mounted on said plate, one of said adjustable stationary guides being disposed between two of said vibratory looper-thread take-ups.

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