

No. 885,990.

PATENTED APR. 28, 1908

G. S. GATCHELL.
THREAD CUTTING MECHANISM FOR SEWING MACHINES.

APPLICATION FILED FEB. 7, 1907.

2 SHEETS—SHEET 1.

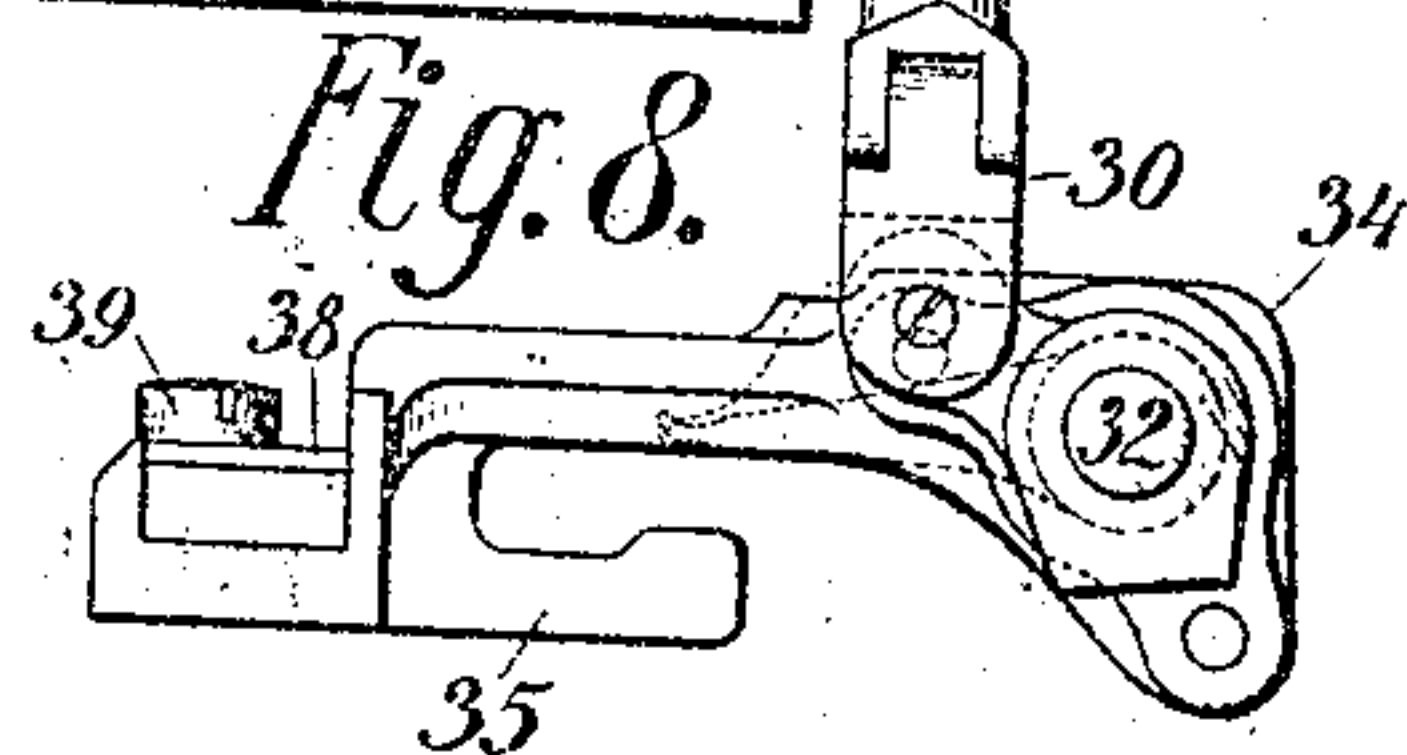
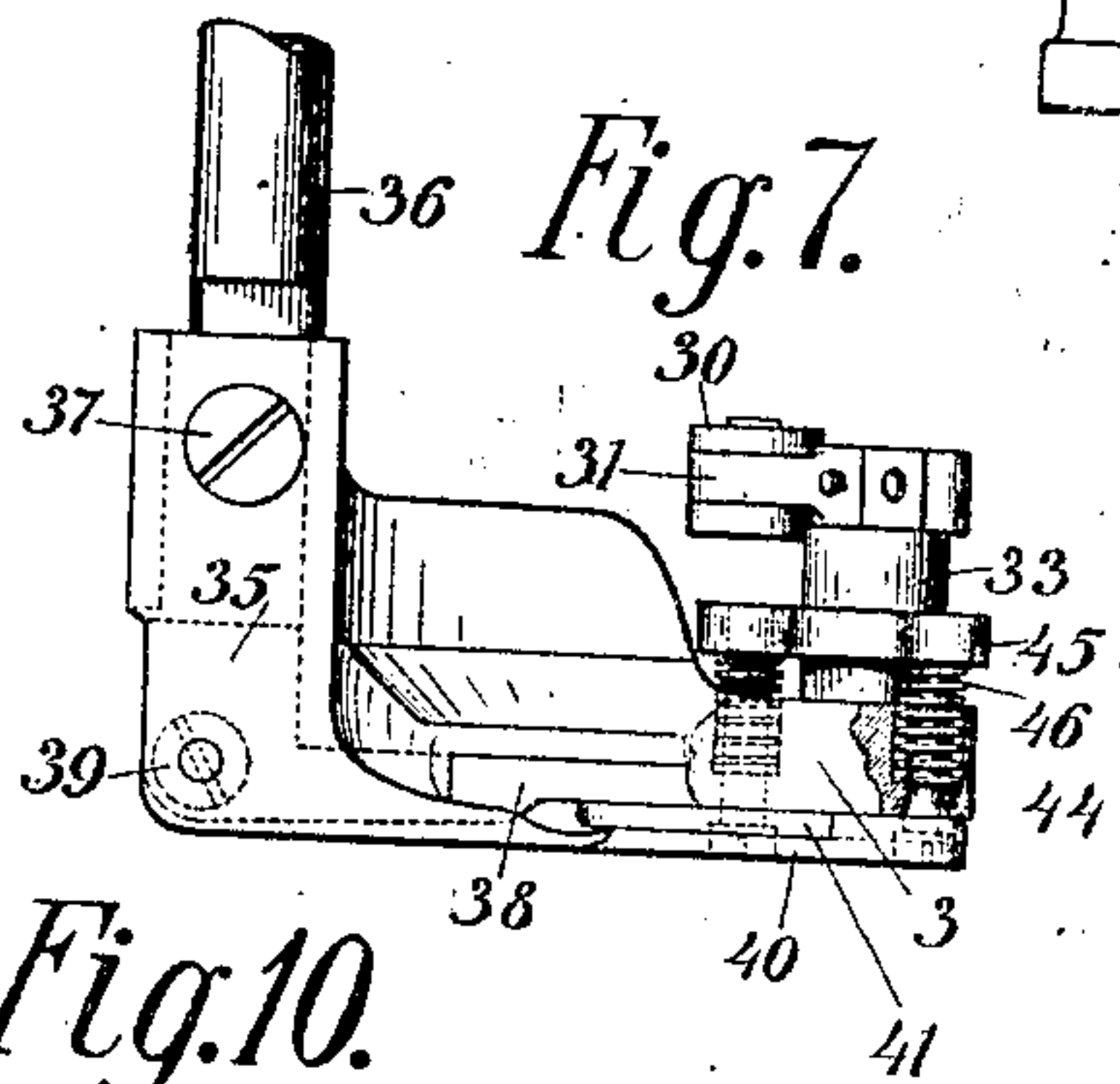
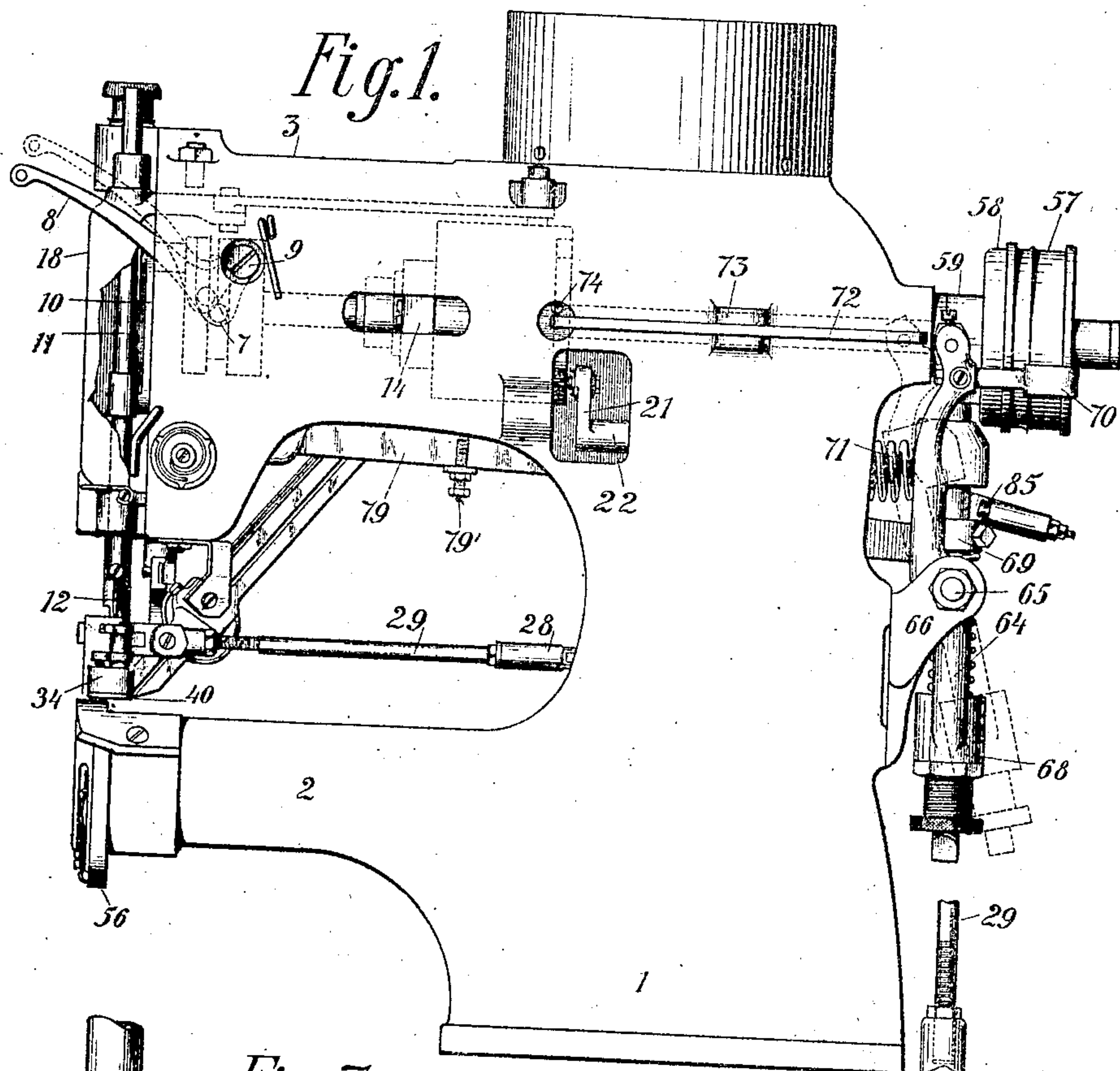


Fig. 10.

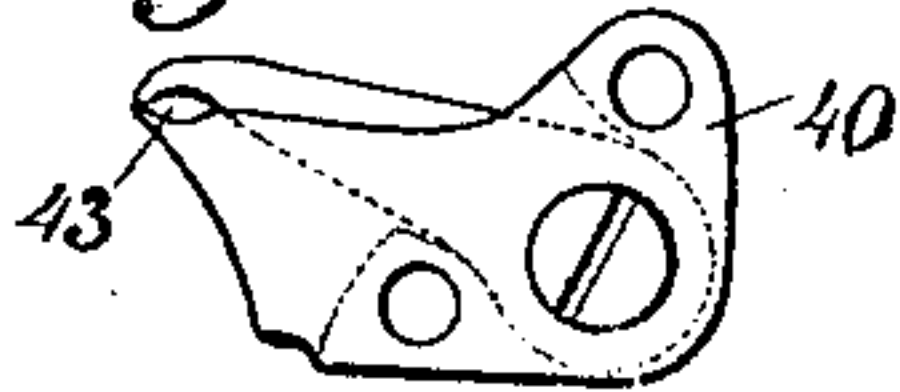


Fig. 11.

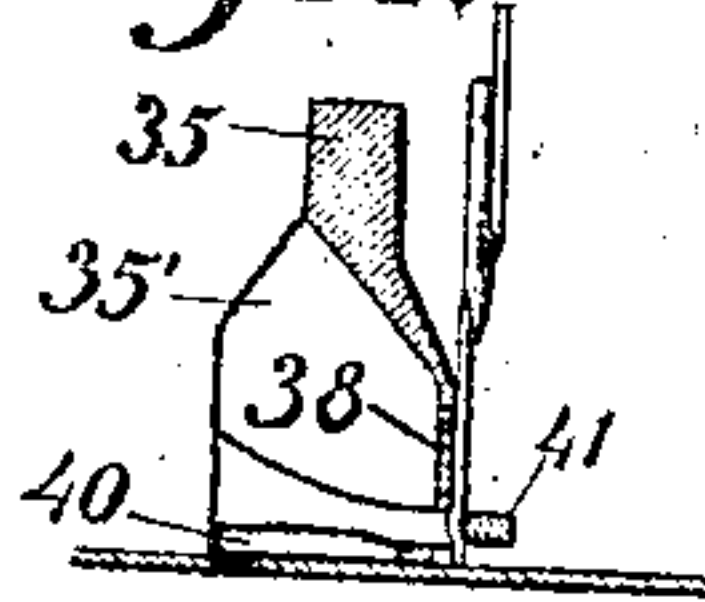


Fig. 12.

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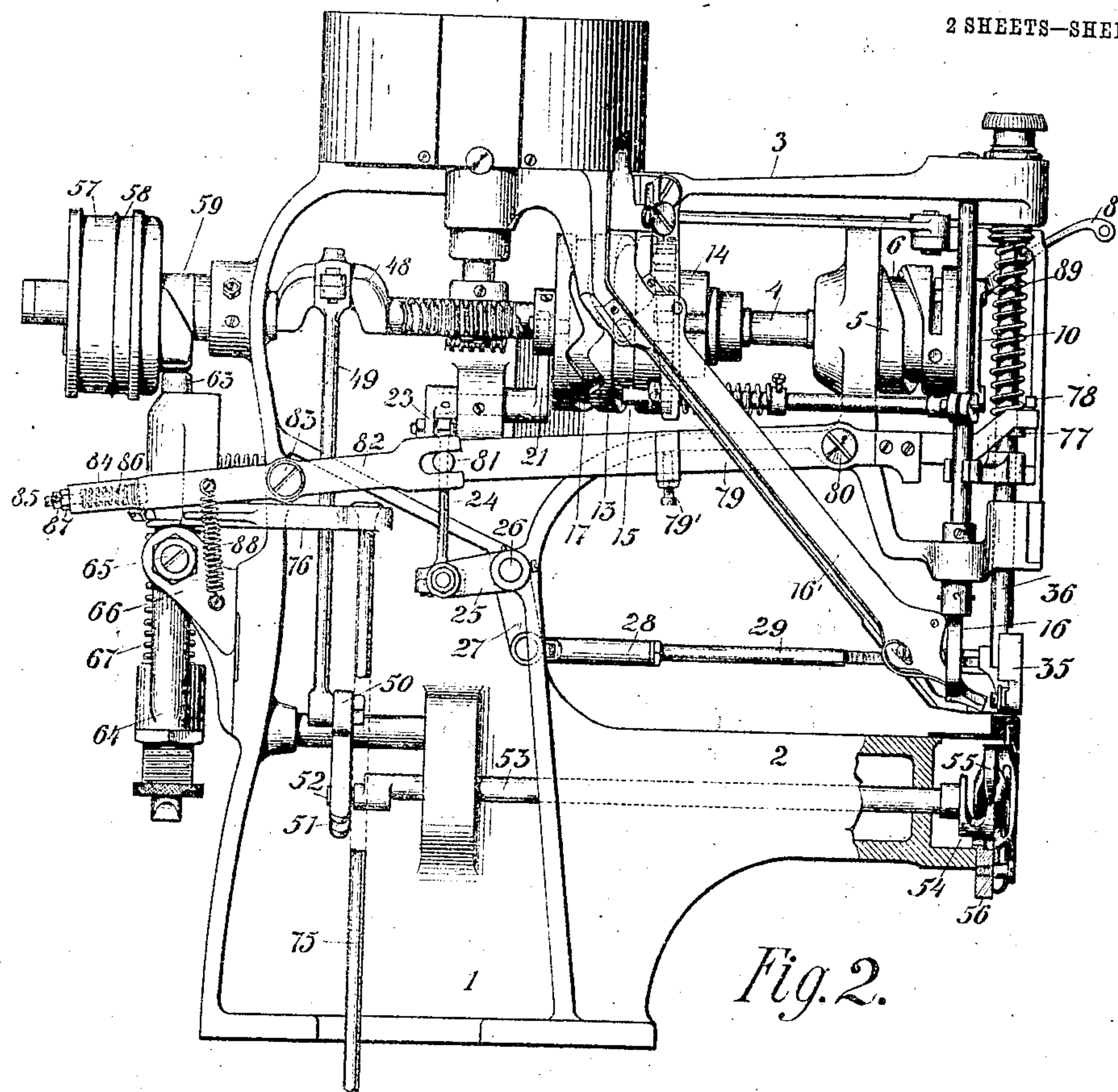


Fig. 2.

Fig. 3.

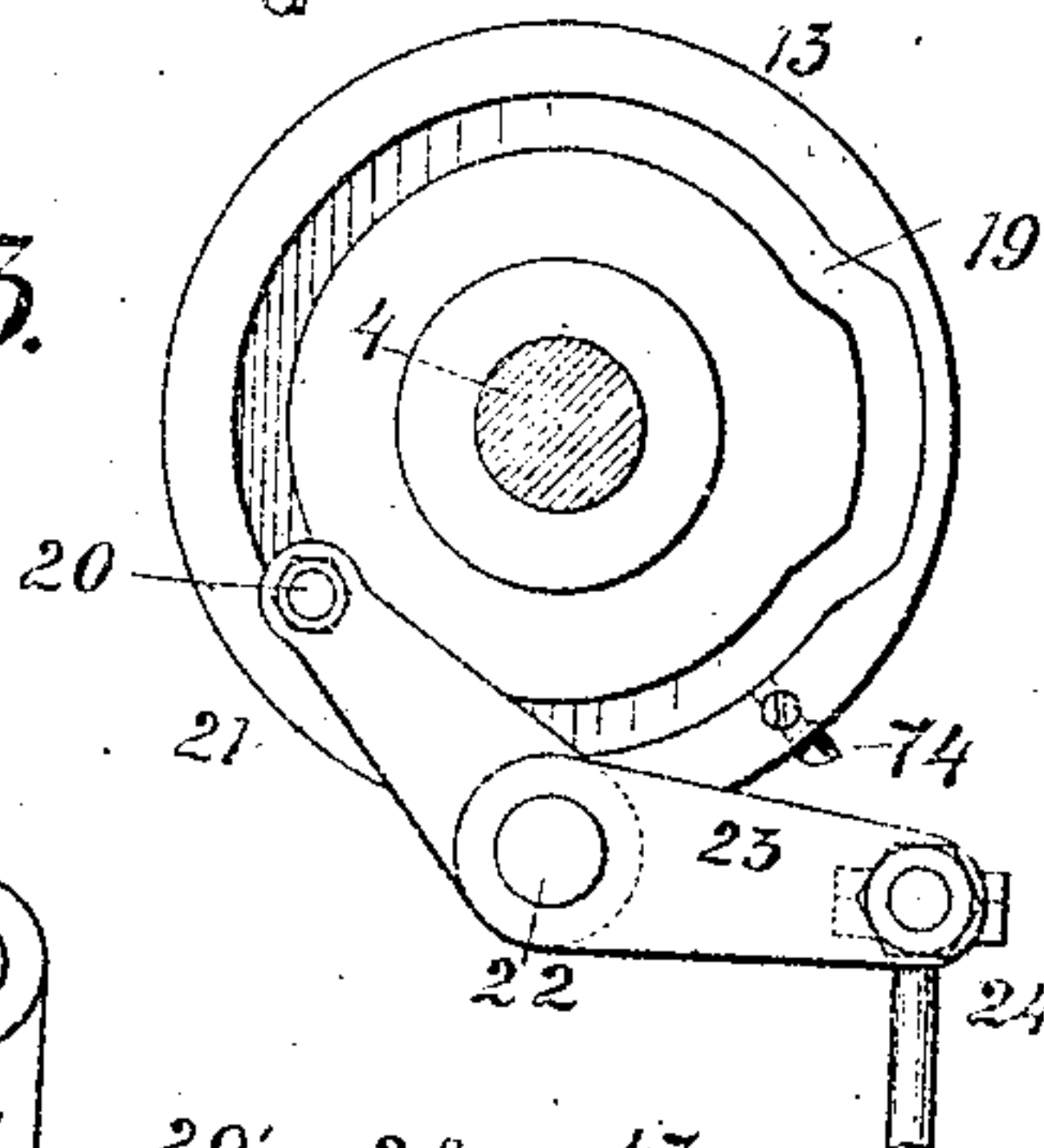


Fig. 4.

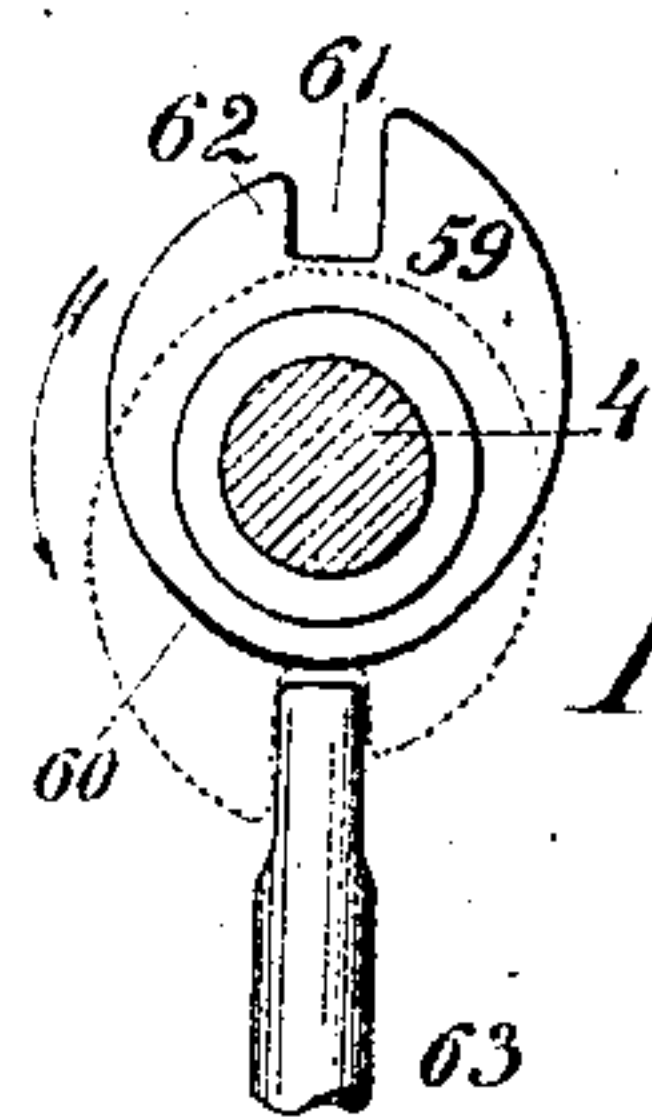
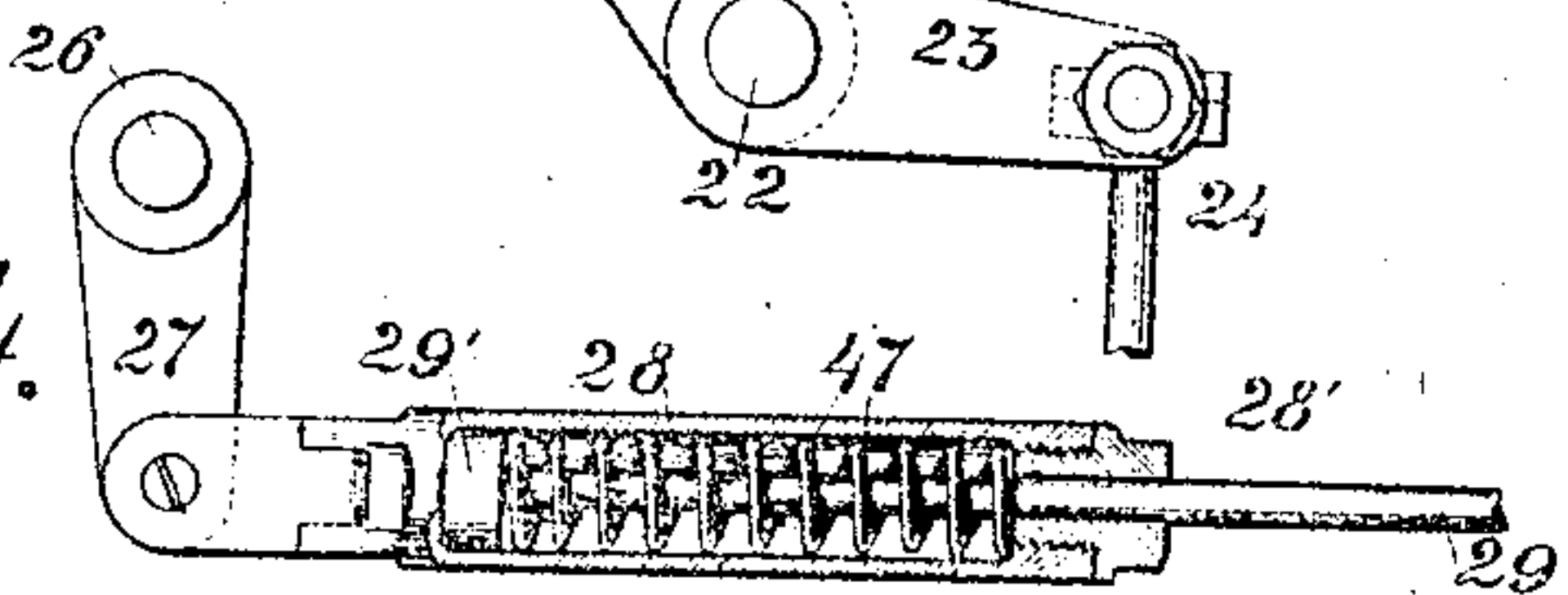
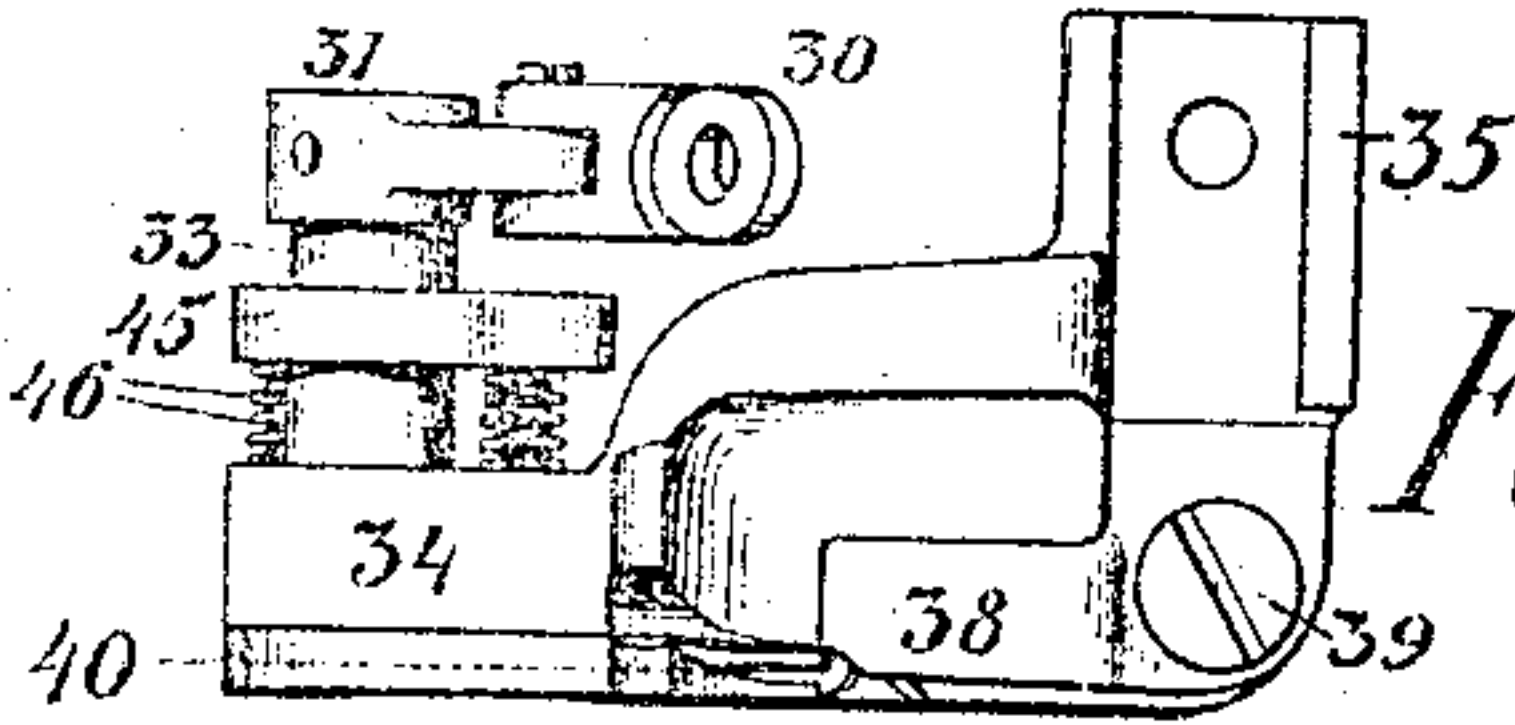


Fig. 5.

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UNITED STATES PATENT OFFICE.

GEORGE S. GATCHELL, OF ELIZABETH, NEW JERSEY, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

THREAD-CUTTING MECHANISM FOR SEWING-MACHINES.

No. 885,990.

Specification of Letters Patent.

Patented April 28, 1908.

Application filed February 7, 1907. Serial No. 356,146.

To all whom it may concern:

Be it known that I, GEORGE S. GATCHELL, 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-Cutting Mechanism for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to an improvement in thread-cutting mechanism for sewing machines, and has for its object more particularly to simplify and render more effective the mechanism of this class forming the subject of the United States Patent No. 742,366, of October 27, 1903.

The present improvement is designed particularly for embodiment in shank-button sewing machines of the well-known Singer type, and in its preferred form comprises a button-holding and positioning presser-foot carrying a normally fixed dipping member, a stationary cutting member spaced therefrom and an interposed movable cutting and nipping blade mounted upon a rock-shaft and provided with a positive connection with the pattern-cam for controlling the movements of the needle-bar frame and the button-feeder. The operative portion of the stationary cutting blade is arranged slightly beyond the corresponding portion of the stationary nipping member, and the movable cutting and nipping blade has its operative edge of double-wedge-shape, the actuating mechanism of the latter being timed in operation to impart an operative movement thereto as the take-up is in the act of completing its rising movement, whereby the movable blade initially coöperates with the take-up in drawing up the needle-thread to set the stitch and simultaneously carrying a loop of the same laterally around itself, preparatory to nipping the upper portion of such loop, after which it continues to slip over the end portion of the nipped thread until its lower edge severs the opposite end of such loop in conjunction with the stationary or ledger-blade.

The machine is provided with a stop-motion mechanism comprising a stopping-cam having the usual yielding connection with the driving or needle-actuating shaft and formed with a peripheral cam-portion terminating in a stop-notch adapted to be

entered by the upper end of a spring-pressed plunger-rod carried by a swinging stop-lever. The presser-bar carries the usual rigid finger engaged by the forward end of a lifting lever fulcrumed intermediate its ends upon the machine frame and having at its opposite end a positive pivotal connection with one end of an actuating rock-lever carrying at its other end a latch device adapted for engagement with the stop-motion plunger-rod when the same is in operative relation with the stopping-cam. The swinging stop-lever, which is adapted to be pressed into operative relation with the stopping-cam by means of a suitable spring, is normally maintained out of such operative relation by means of the usual latch-lever one end of which lies in the path of a tripping-pin carried by the pattern-cam. The timing of the parts is such that the final engagement of the plunger-rod with its notch in the stopping-cam effects the actuation of the presser-bar lifting lever to raise the presser-foot in opposition to its spring which takes place immediately after the actuation of the cutting and nipping mechanism. In the present machine, the stopping-cam is provided with an abrupt shoulder at the forward edge of its peripheral notch, whereby the plunger-rod is prevented from beginning its final endwise motion to enter such notch until the main-shaft has actually reached its stopping position, by which the final operation of the mechanism is the lifting of the presser-foot which is insured to take place invariably after the thread nipping and cutting actions which can be effected only while the pattern-cam is actually in motion.

The movable nipping and cutting blade is retracted from operative position after the first few initial stitches of a group have been formed, and its positive actuation by the pattern-cam insures such movement while the needle is out of the work, whereby any interference with the needle by imperfect timing is prevented. While the movable blade is provided with positive actuating means one of its connections is preferably constructed with a safety device adapting its component parts to receive a relative yielding movement in case the blade should become clogged or otherwise prevented by means of an obstruction from free action, thus insuring against breakage or disarrangement of parts in the further operation of the

machine until the obstruction may be removed.

The invention will be understood by reference to the drawings annexed, in which—

5 Figure 1, is a side elevation of one side of a Singer button sewing machine provided with the present improvement, and Fig. 2 a similar elevation of the opposite side thereof, with a portion of the work-supporting arm in section. Fig. 3 is an end view of the pattern-
10 cam and the cooperating member of the cutter-actuating mechanism, and Fig. 4 is a detail view of a portion of the cutter-actuating mechanism showing partly in section the safety device. Fig. 5 is a detail face view of the stopping-cam and the upper end of the plunger-rod of the stop-motion device. Fig. 6 is a detached side elevation of the presser-
15 foot, carrying the thread-cutting and nipping members and Fig. 7 a similar view of the opposite side of the presser-foot. Figs. 8 and 9 are plan views of the presser-foot showing the movable cutting and nipping member respectively in closed and open po-
20 sitions. Fig. 10 is a bottom plan view of the stationary cutting blade and the movable cutting and nipping blade in open or inoperative relation. Figs. 11 and 12 are sectional views illustrating respectively the initial and
25 final operations of the thread cutting and nipping members upon the needle-thread. Figs. 3 to 12 inclusive are upon a larger scale than Figs. 1 and 2.

The machine is constructed with a frame
35 comprising the base portion 1 having the cylindrical work-supporting arm 2 and the bracket-arm 3, in which latter is journaled the driving shaft 4 carrying at its forward end the take-up cam-cylinder 5 with cam-
40 groove 6 entered by the stud 7 of the angular take-up lever 8 pivoted at 9 in the bracket-arm and carrying the usual crank-pin connected by link 10 with the reciprocating
45 needle-bar 11 carrying the needle 12. The main-shaft 4 carries the pattern-cam cylinder 13 loosely mounted thereon and receiving a step-by-step rotary motion by means of the reciprocating and vibrating lever-dog 14. This cam-cylinder is provided with a cam-
50 groove 15 from which the button-feeder 16 derives its operative movements and the cam-groove 17 for controlling the swinging movements of the needle-bar frame 18 in a manner well-known. The cam-cylinder 13
55 is provided in its rearward end with a cam-groove 19 entered by a stud 20 carried by a crank-arm 21 mounted upon one end of a rock-shaft 22 having upon its opposite end a crank-arm 23 connected by means of a link
60 24 with a lateral crank-arm 25 mounted upon one end of a second rock-shaft 26 having at its opposite end a depending crank-arm 27 to which is attached by universal joint connection a socket-member 28 of a link comprising
65 a rod 29 also having a universal joint connec-

tion by means of the intermediate block 30 with a crank-arm 31 of a vertical rock-shaft 32 journaled in a fixed sleeve 33 in the forwardly projecting portion 34 of the presser-
70 foot 35, secured to the lower end of the presser-bar 36 by means of the fastening screw 37. The lower edge of the portion 34 of the presser-foot provides the fixed jaw or member of the thread-nipping device, and is herein represented (see Figs. 6, 7, 11 and 12) as a ver-
75 tical blade 38 removably secured to the body of the presser-foot by means of a fastening screw 39. The stationary thread-cutting member or ledger-blade 40 is spaced slightly beneath the stationary nipping jaw, and in
80 the intermediate space is arranged the movable nipping and cutting blade 41 fixed to the lower end of the rock-shaft 32. As represented in the drawings, the operative edge of this blade is slightly concaved at 42 present-
85 ing to the thread a blunt operative portion with inwardly inclined faces in the form of a wedge. As represented more particularly in Fig. 10, the cutting edge of the ledger-
90 blade 40 is substantially flush with the operative edge of the nipping jaw 38, but in its operative portion it is provided with a notch or recess 43 which is sharpened along the face adjacent the path of movement of the mov-
95 able blade 41. By the provision of the notch or recess 43 in the ledger-blade, its operative portion is located slightly rearward of that of the stationary nipping jaw 38 as shown in Figs. 10 and 11, whereby the
100 closing movement of the movable member 41 serves to move the needle-thread successively into engagement with the nipping jaw and the ledger-blade. The operative portions of the blades 40 and 41 are concaved at 43 and
105 42, respectively, in order to insure the engagement of the thread to be operated upon at the desired point of these implements, while the operative portions of the members 38 and 40 are disposed the one in advance of
110 the other in reference to the movable member 41 in order that the thread may be first firmly nipped, and an extra length of thread provided beyond the nipped portion before the thread is actually severed, whereby the
115 compressed portion of the thread is given an increased resistance to pulling out by means of the adjacent uncompressed portion between the same and the cut extremity.

While the arrangement of the stationary nipping and cutting jaws 38 and 40 are de-
120 pendent upon the shape of the movable member 41 for their successive action in connection with the latter as before described, they are in practice limited in such position by the concave button-channel 35' formed in
125 the presser-foot 35 to afford a guide-way for the button heads as they are successively delivered from the button chute 16' by the button-feeder 16 for the stitching operations.

The ledger-blade is yieldingly secured in 130

position upon the bottom of the presser-foot portion 34 by means of a pair of stud-screws 44 passing upwardly through the same and sockets formed in the portion 34 and entering suitably threaded holes in a thrust-plate 45 intermediate which and the bottom of said sockets are interposed the springs 46 serving to produce a yielding upward pressure upon the ledger-blade 40. By providing a yielding connection between the ledger-blade and the supporting presser-foot portion 34 accommodation is provided for variations in thickness of the needle-thread used in the machine as well as that of the movable blade cooperating therewith.

The rearward end of the rod 29 is provided with a fixed thrust-collar 29' fitted to the socket 28 and maintained yieldingly seated within its rearward end by means of a safety spring 47 interposed between said collar and a perforated screw-plug 28' in the forward threaded end of the socket 28, through which the rod 29 enters the socket 28. It will be observed that the member 28, 29, affords a positive and unyielding connection between the crank-arms 27 and 31, excepting in case the blade 41 becomes clogged or obstructed by any means, forcibly preventing the blade from assuming closed operative position, in which case the spring 47 permits a yielding action between the parts 28 and 29, thereby preventing breakage of the normally positively actuated elements of the cutting and nipping mechanism.

The main-shaft 4 is provided with the usual crank 48 with pitman connection 49 with the intermediate rocker 50 having slotted arm 51 embracing a crank-pin 52 upon the rearward end of the shuttle-actuating rock-shaft 53 having at its forward end the shuttle-driver 54 engaging in a manner well known the shuttle 55 oscillating in the shuttle-race 56, and cooperating with the needle 12 in the production of stitches. The main-shaft 4 carries upon its rearward portion the loose pulley 57 and fast pulley 58 to which is yieldingly connected, by means similar to those of United States Patent No. 742,366 before mentioned, the stopping-cam 59 having the peripheral cam-portion 60 terminating in its higher operative portion in the notch 61 with abrupt shoulder 62. The cam 59 is adapted to be engaged by the reduced upper end of the plunger-rod 63 slidably mounted in the swinging stop-lever 64 pivoted at 65 upon a bracket 66 of the machine frame, such plunger-rod being normally pressed upwardly by means of a spring 67 interposed between a boss 68 of the stop-lever 64 and a collar 69 fixed upon the plunger-rod. The stop-lever is provided with the usual belt shifting arm 70 and is normally pressed rearwardly into operative position by means of a spring 71 interposed between the same and the frame of the machine, but is adapted to

be held in retracted inoperative position (as represented in dotted lines in Fig. 1) by the hooked rearward end of the latch-lever 72 fulcrumed upon a lug 73 of the bracket-arm and having its opposite end lying in the path of movement of a tripping pin 74 projecting from the periphery of the pattern-cam cylinder 13.

The machine is set in motion by means of the treadle-actuated rod 75 connected with a rigid lateral arm 76 of the stop-lever 64, whereby the latter is tilted backwardly and engaged by the latch-lever 72 until the latter is tripped by the pin 74, when the stop-lever 64 is thrown backwardly by its actuating spring 71 and the upper end of the plunger-rod 63 shifted beneath the lower portion of the stopping-cam 59 upon which it rides in retarding the movement of the machine under its momentum (the belt having been initially shifted to the loose pulley 57 in the stopping operation) until it passes over the shoulder 62 and into the peripheral notch 61, when the machine is brought to rest.

The presser-bar 36 is provided with a fixed collar 77 having a lateral finger 78 which engages the forward end of a lifting lever 79 fulcrumed upon the bracket-arm at 80 and having upon its rearward end a lateral pin 81 entering a notch or fork in the forward end of an actuating rock-lever 82 fulcrumed upon the bracket-arm at 83 and having its rearward end extending laterally behind the plunger-rod 63 and provided with a longitudinally disposed socket 84 entered by a shouldered latch-pin 85 surrounded by a spring 86 intermediate the rearward end of said socket and the shouldered head of said latch-pin, which latter is provided with a pair of lock-nuts 87 one of which serves as a stop to limit the forward motion of the latch-pin 85 under the action of its spring 86. A spring 88 is interposed between the rearward portion of the rock-lever 82 and the bracket 66 for yieldingly maintaining the same depressed and the connected lever 79 in normal inoperative position with its adjustable stop-screw 79' in engagement with the under side of the bracket-arm, while the presser-spring 89 bearing upon the collar 77 of the presser-bar 36 serves to normally maintain the presser-foot 35 in operative relation with the work.

When the stop-lever 64 is in inoperative position, the plunger-rod with its collar 69 is withdrawn from operative relation with the latch-pin 85, but when shifted into operative position the side of the collar 69 first engages the end of the latch-pin 85 and temporarily forces the same inwardly, until the stopping-cam 59 depresses the plunger-rod 63 to carry the collar 69 below the pin 85, as represented in full lines in Fig. 1, when the latter is enabled to spring outwardly above the collar 69. When the plunger-rod rises upon entering the cam-notch 61 carrying the collar 69

with it, the latter engages the lower side of the latch-pin 85 and carries upwardly with it the rearward end of the rock-lever 82 whose forward end is depressed, thus causing the rocking of the lifting lever 79 and the raising of the presser-foot. It will be observed that the operative portion 60 of the stopping-cam offers a positive barrier to the automatic actuation of the rock-lever 82 by the plunger rod 63 until the shaft 4 actually assumes its stopping position, when the notch 61 is presented to the plunger-rod and permits the spring 67 to force the latter upwardly and thus perform the final presser-lifting operation in conjunction with the stopping of the machine.

As before indicated, the several upper-thread engaging parts of the machine are so timed in their operative actions upon the thread that the nipping and cutting blade 41 commences its operative movement while the take-up 8 is still rising, and before the stitch is fully set. As the path of movement of the member 41 is crosswise of the thread leading from the work to the eye of the needle, its engagement with the latter produces a bend therein and thus causes it to cooperate with the take-up in performing the setting action between the nipping parts and the work in the final stitch of a group in addition to its primary nipping and cutting actions. This is of considerable practical importance in the operation of the machine, as it insures the severing of the thread uniformly at the cutting edges and obviates the liability of the tearing apart of the thread at the nipping shoulder of the member 38, which has characterized other cutting and nipping devices timed to act upon the thread after the stitch-setting has taken place and when the needle-thread has become tightened to its fullest extent. When the take-up is nearing its upper or stitch-setting position, as represented for instance in full lines in Fig. 1, and before the stitch has been finally set, a small amount of slack still remains in the needle-thread at that instant engaged by the blunt operative edge of the blade 41. As this blade advances to its extreme operative position between the members 38 and 40, it first carries the thread between itself and the blunt blade 38, bending it around the latter and progressively against the lower edge of such blade and its own top face, drawing the remaining slack from below so as to prevent the entire rendering of the thread leading abruptly around the edge of the blade 38. This action continues until the blade 41 has reached the cutting edge of the blade 40, the drawing up of the thread between the member 38 and the work serving to perform the final setting of the stitch, while the continued movement of the blade 41 serves to thrust the thread against the cutting edge of the member 40 to sever the thread. The parts

are so timed that as the take-up reaches its highest position, represented in dotted lines in Fig. 1, the lower edge of the blade 41 encounters the cutting edge of the blade 40 and the thread is severed after having been firmly nipped between the members 38 and 41.

It will be observed that, in order that the described operation of the nipping and cutting blade 41 may be performed, the pattern-cam 13 must continue to operate so as to impart these cutting and nipping movements, and the cam-groove 19 is therefore so disposed that the final cutting action takes place just prior to the entrance of the plunger-rod 63 into its cam-notch 61 in stopping the machine; and the shoulder 62 of the cam 59 intermediate the cam portion 60 and notch 61 is made more abrupt than heretofore in order that the final rise of the plunger-rod 63, and the consequent lifting of the presser-foot, may be deferred until the completion of the thread-nipping and cutting action. As previously indicated, and as represented in Fig. 3, the form of the cam-groove 19 is such as to maintain the blade 41 in closed position for at least two or three stitches, so that upon the starting of the machine the severed end of the needle-thread continues to be nipped until one or more initial stitches have been formed by the stitch-forming mechanism, after which the blade 41 is retracted into the position represented in Fig. 9, while the needle is elevated above the same.

The button sewing machine shown and described herein comprises overseaming mechanism of the type in which the needle-bar is mounted in a swinging frame deriving its lateral movements from a connection with the pattern-cam 13, but it is evident that the overseaming feature of the machine forms no part of the present invention.

While the preferred embodiment of the present improvement is shown and described herein, it is to be understood that the present invention is susceptible of material modification in constructive details, and that the same is not therefore limited to those specifically shown and described herein.

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

1. In a sewing machine, the combination with stitch-forming mechanism including a reciprocating thread-carrying needle, of a thread-cutter for severing the needle-thread after the formation of a group of stitches, and operating means for said thread-cutter including a positively driven actuating member and a normally unyielding connection adapted to transmit operative movements directly from said actuating member to the thread-cutter, said connection being adapted to yield under excessive loads imposed by abnormal resistances to the action of the cutter.

2. In a sewing machine, the combination with stitch-forming mechanism including a reciprocating thread-carrying needle, and a pattern-cam for controlling the character of the stitches, of a thread-cutter for severing the needle-thread after the production of a group or succession of stitches, and a normally unyielding connection intermediate said cam and the thread-cutter, which is adapted to transmit operative movements directly from the one to the other and to yield under abnormal resistances to the cutting operation.

3. In a sewing machine, the combination with stitch-forming mechanism including a reciprocating thread-carrying needle, and a pattern-cam for controlling the character of the stitches, of a thread-cutter for severing the needle-thread after the production of a group or succession of stitches, and a normally unyielding connection intermediate said cam and thread-cutter including two relatively movable members having abutting portions and a spring for maintaining such abutting portions forcibly in contact relation, and means including a positive connection with one of such members for actuating said cutter to sever the needle-thread.

4. In a sewing machine, the combination with stitch-forming mechanism including a reciprocating thread-carrying needle, and a pattern-cam for controlling the character of the stitches, of a thread-cutter for severing the needle-thread after the production of a group or succession of stitches, and a normally unyielding connection intermediate said cam and thread-cutter including a link-member composed of a socket and a headed rod embraced by the latter and maintained firmly seated therein by means of a spring, whereby said cutter is actuated to sever the needle-thread.

5. In a sewing machine, the combination with stitch-forming mechanism, a presser-foot and a thread-cutting and -nipping device carried by said presser-foot, of automatically acting means for actuating said thread-cutting and -nipping device for severing and nipping the thread, and automatically acting means operating independently of said actuating means for lifting the presser-foot after the thread-cutting and -nipping operation.

6. In a sewing machine, the combination with stitch-forming mechanism, a presser-foot and a thread-cutting and -nipping device carried by said presser-foot, of automatically acting means, including a cam for actuating said thread-cutting and -nipping device for severing and nipping the thread, and automatically acting means, controlled by said cam independently of said thread-cutting and -nipping device, for lifting the presser-foot after the thread-cutting and -nipping operation.

7. In a sewing machine, the combination

with stitch-forming mechanism, a presser-foot, and a thread-cutting and -nipping device carried by said presser-foot, of automatically acting means for actuating said thread-cutting and -nipping device to cause it to sever and nip the thread, a stop-motion device, means carried by said actuating means for tripping said stop-motion device into operation, and a positive connection intermediate said stop-motion device and presser-foot whereby the latter is raised as the machine is stopped after the cutting and nipping operation.

8. In a sewing machine, the combination with stitch-forming mechanism, a presser-foot and a thread-cutting and -nipping device carried by said presser-foot, of automatically acting means, including a cam, for actuating said thread-cutting and -nipping device for nipping and severing the thread, a stop-motion device including a peripherally notched rotary stopping-cam and a reciprocating plunger-rod cooperating therewith, means carried by said cam for tripping the stop-motion device into action in stopping the machine, and a positive connection intermediate said presser-foot and plunger-rod whereby the final action of the latter under the control of the rotary stopping-cam effects the lifting of the presser-foot.

9. In a sewing machine, the combination with stitch-forming mechanism, a stop-motion device for controlling the period of operation of the same, a presser-foot and a thread-cutting and nipping device carried by said presser-foot, of automatically acting means independent of said stop-motion device for actuating said thread-cutting and nipping device for nipping and severing the thread, independently acting means for lifting the presser-foot, and means positively connected with and controlled by said stop-motion device whereby the operation of the presser-foot lifting means is effected at the end of the final stitch-forming operation of a series and after the thread has been nipped and cut.

10. In a sewing machine, the combination with a stitch-forming mechanism, including a reciprocating thread-carrying needle and a reciprocatory take-up member acting upon the needle-thread, of a thread-cutting and -nipping device acting successively to first nip and then sever the needle-thread, means for actuating the take-up member in setting the stitches, and means for actuating the thread-cutting and -nipping device while the take-up member is completing its action upon the thread to first draw off and nip the thread during the final action of the take-up member and thereafter sever the thread at the completion of said take-up action.

11. In a sewing machine, the combination with stitch-forming mechanism, and a presser-foot, of a thread-cutting and -nipping de-

vice carried by said presser-foot and comprising spaced stationary nipping and cutting blades with the operative portion of the latter disposed slightly beyond that of the former, and an intermediate movable nipping and cutting blade with double-wedge-shaped operative edge, and means for actuating said movable blade to engage the thread and deflect the same beneath the nipping blade and thereafter carry the same to the stationary cutting blade for severing it.

12. In a sewing machine, the combination with stitch-forming mechanism, including a reciprocating thread-carrying needle, and a presser-foot, of a thread-cutting and -nipping device carried by said presser-foot and comprising a fixed nipping member, a yieldingly mounted cutting member spaced beneath the same, and an intermediate movable cutting and nipping blade adapted to engage the needle-thread and carry it first to the fixed nipping member and then to the yieldingly mounted cutting member, and means for actuating said movable cutting and nipping blade.

13. In a sewing machine, the combination with stitch-forming mechanism, including a reciprocating thread-carrying needle, and a presser-foot, of a thread-cutting and -nipping device, carried by said presser-foot and comprising a fixed nipping member, and a normally stationary cutting member spaced beneath the same, a thrust-plate disposed above said presser-foot, a plurality of guide-pins for connecting said cutting member and thrust-plate, springs for pressing said thrust-plate upwardly, and a pivotally mounted cutting and nipping blade intermediate said stationary nipping and cutting members, and means for actuating said cutting and nipping blade to carry the thread successively to the stationary nipping and cutting members.

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

GEORGE S. GATCHELL.

Witnesses:

HENRY J. MILLER,
H. A. KORNEMANN.