

No. 757,171.

PATENTED APR. 12, 1904.

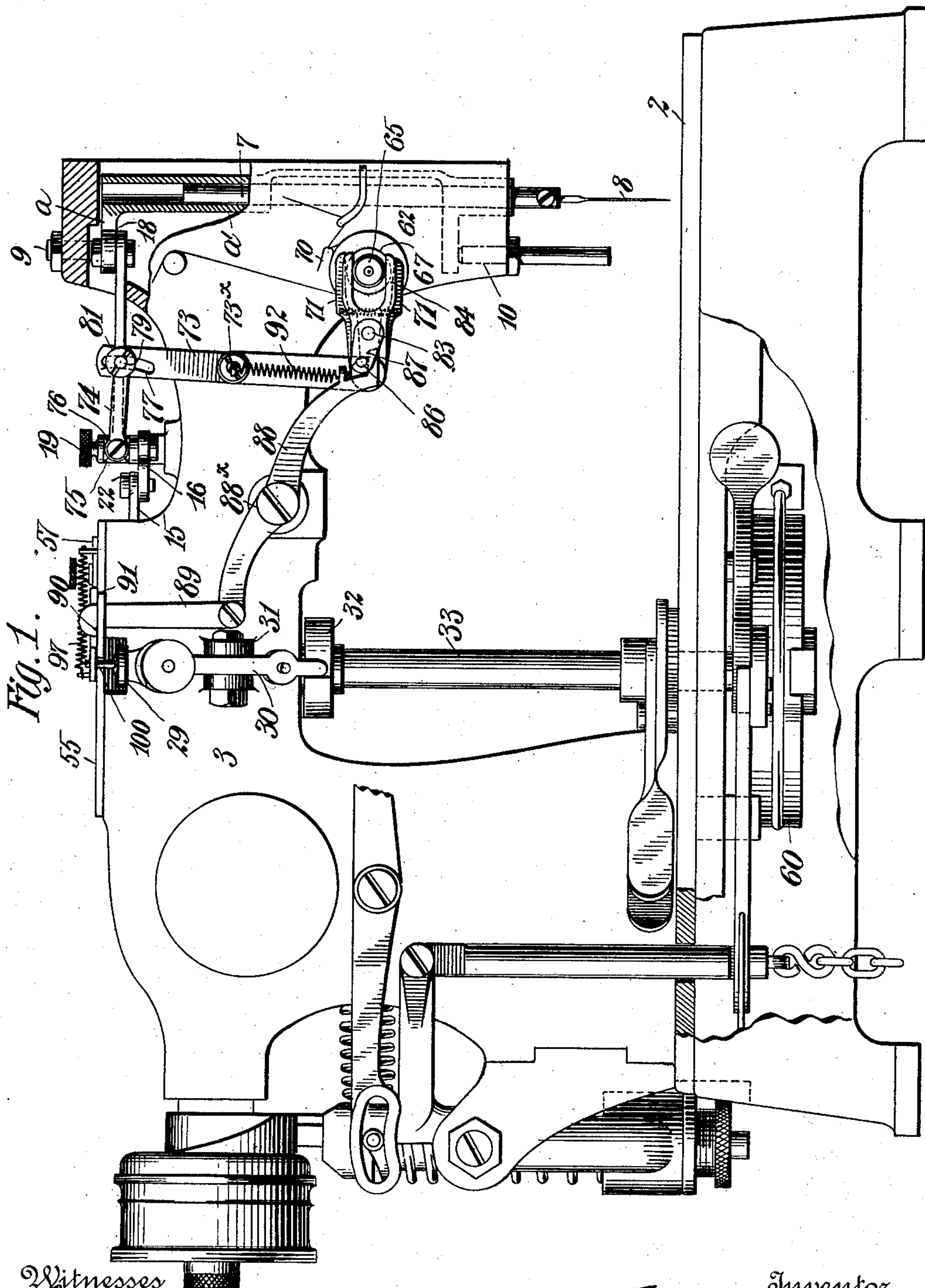
E. B. ALLEN.

THREAD CONTROLLING DEVICE FOR SEWING MACHINES.

APPLICATION FILED NOV. 24, 1903.

NO MODEL.

5 SHEETS—SHEET 1.



Witnesses
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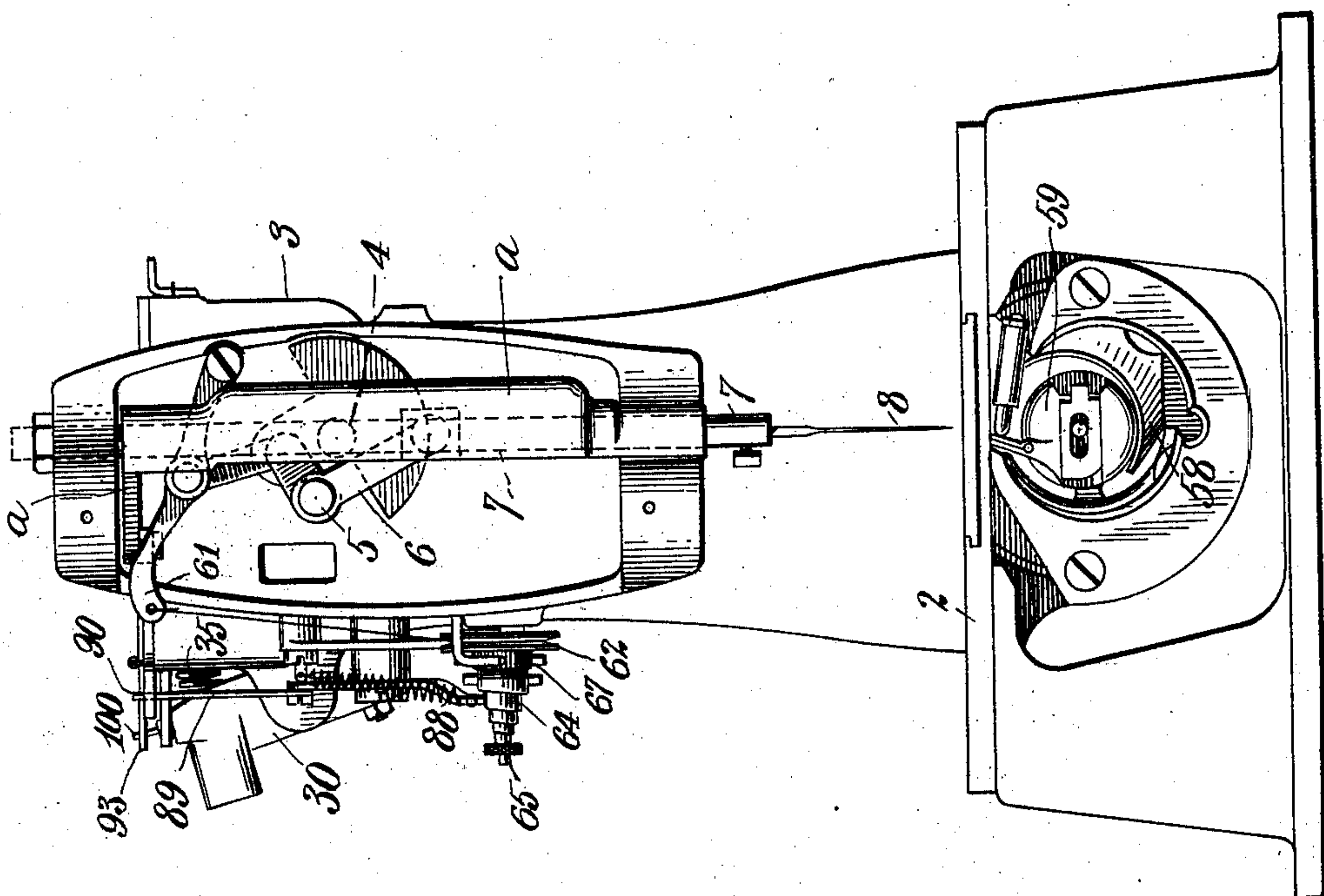


Fig. 2.

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Fig. 3.

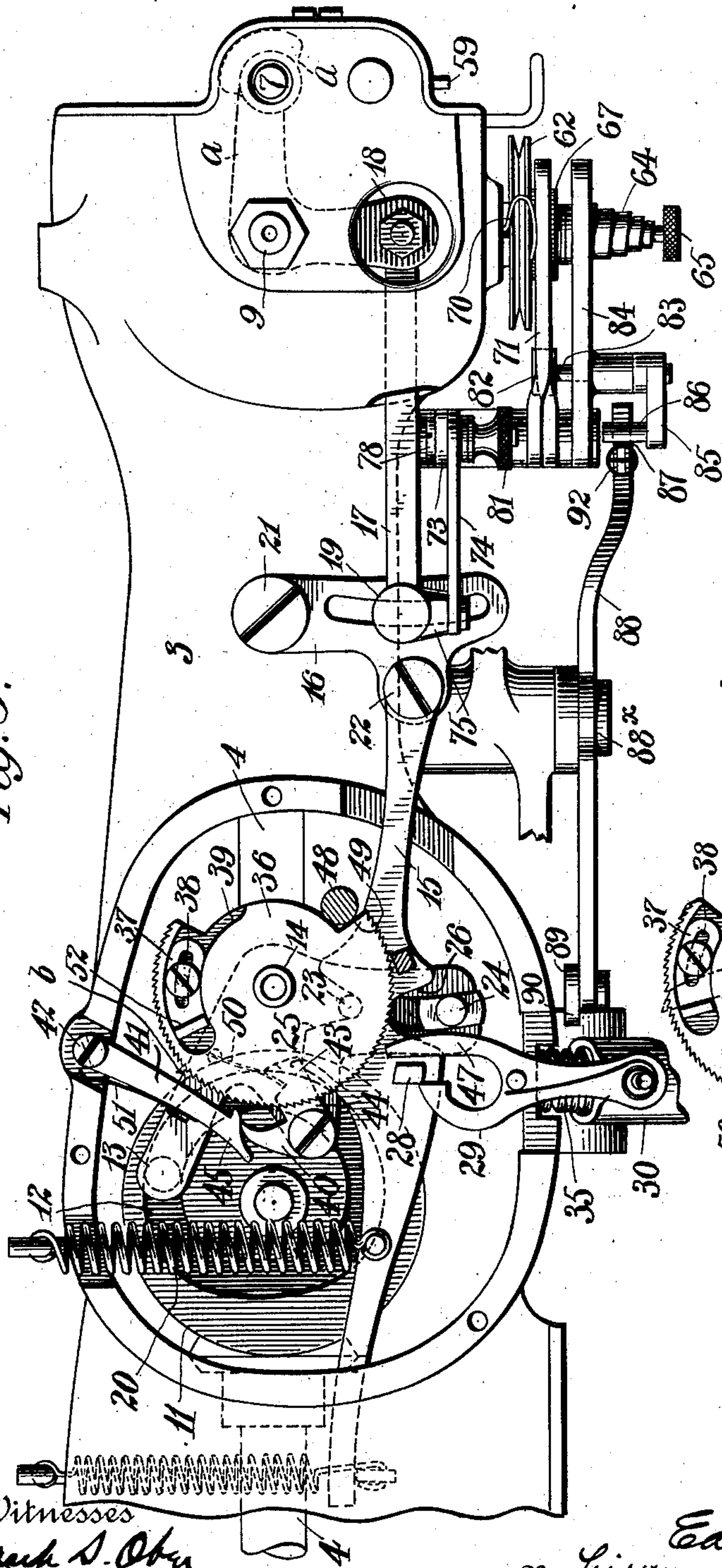
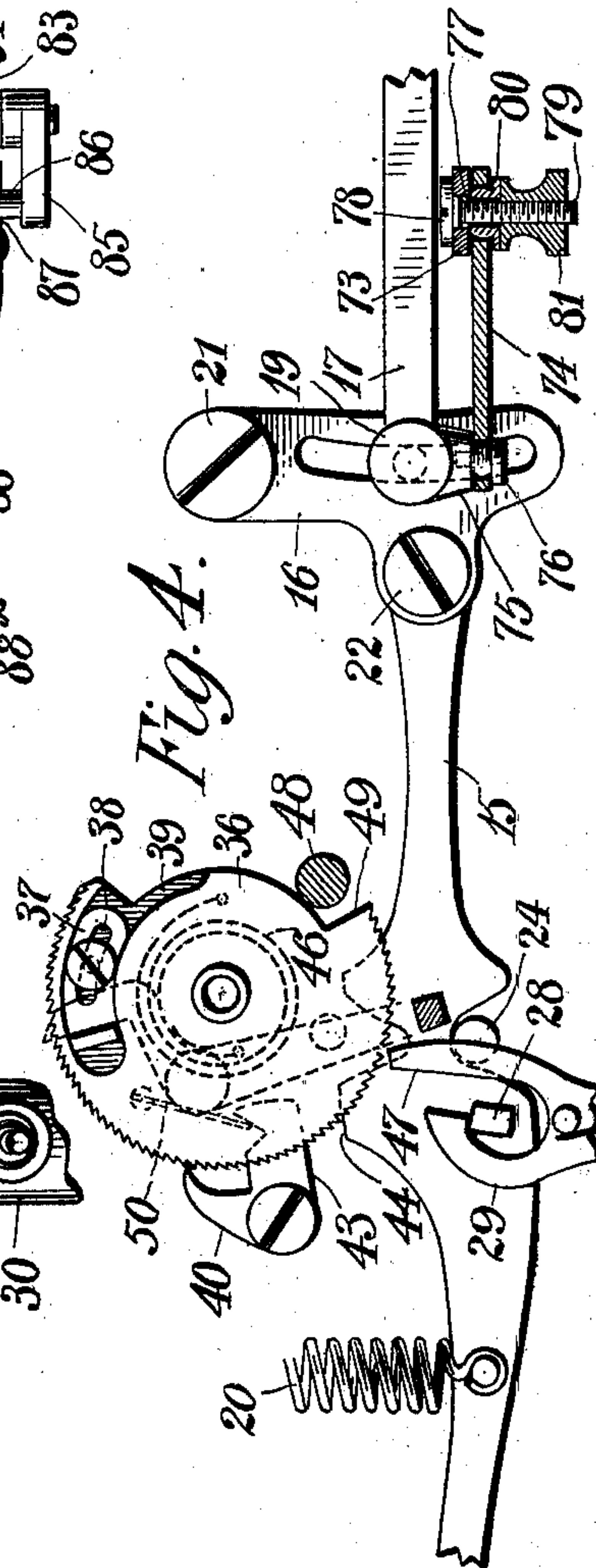


Fig. 4.



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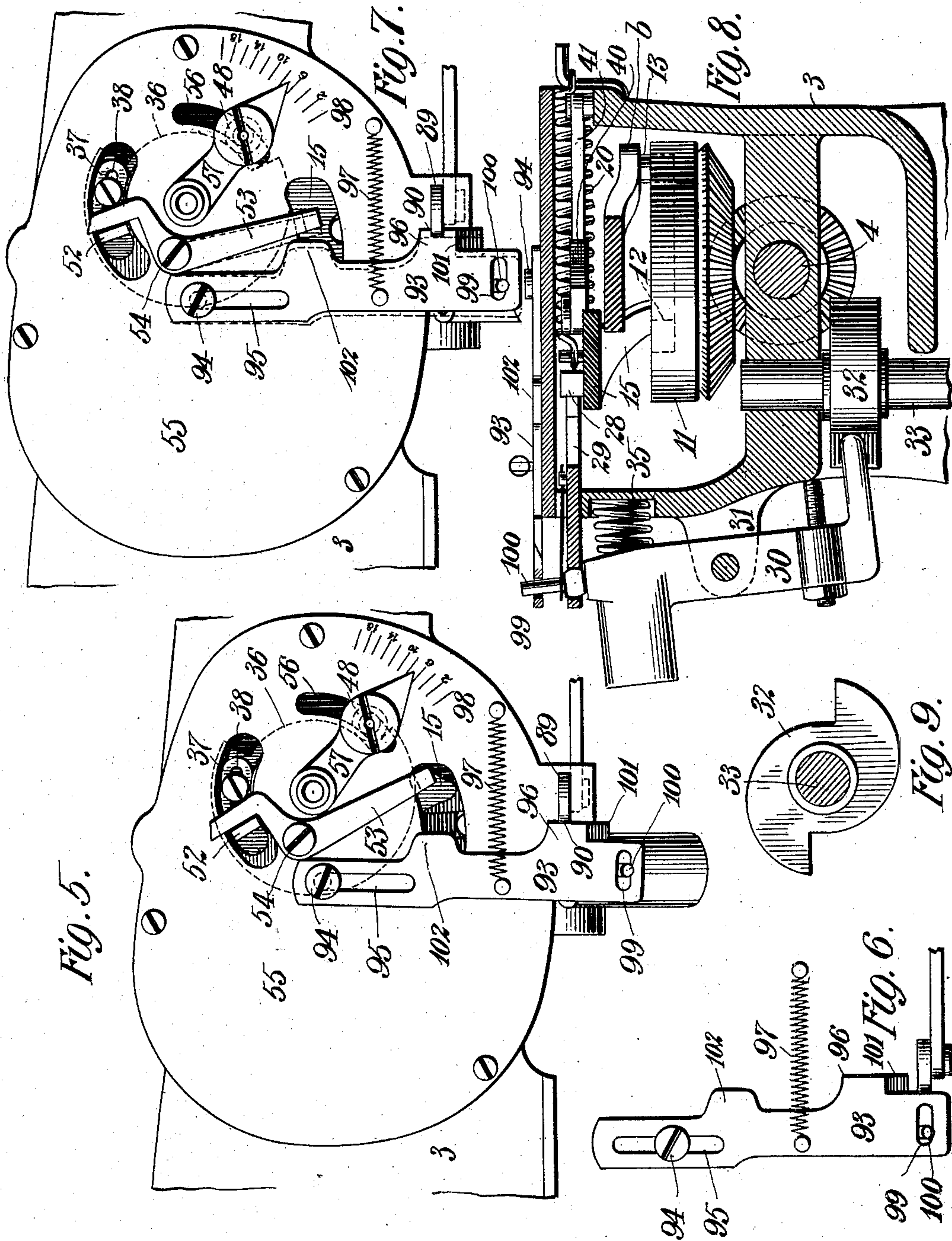
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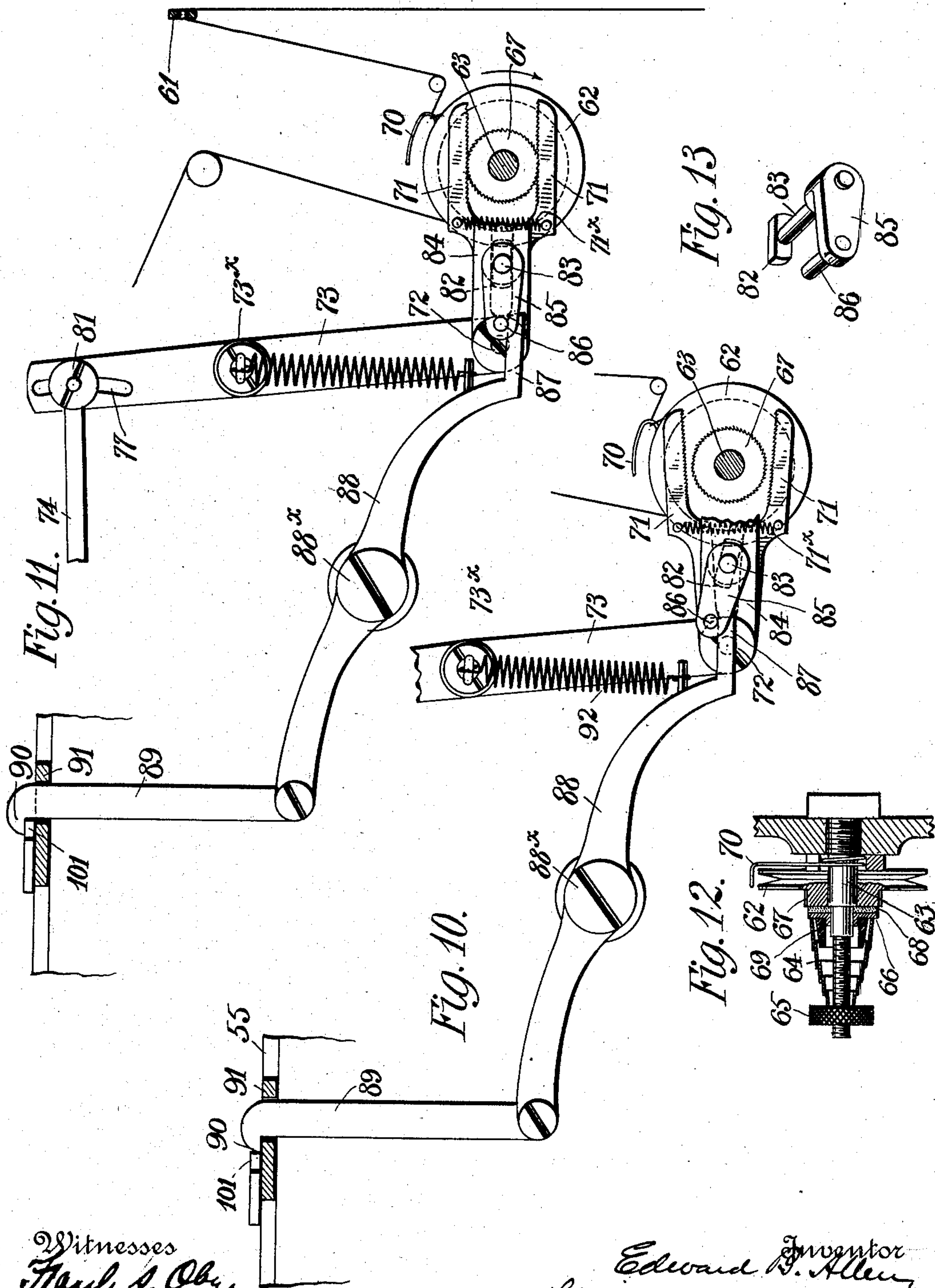
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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

EDWARD B. ALLEN, OF ELIZABETH, NEW JERSEY, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

THREAD-CONTROLLING DEVICE FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 757,171, dated April 12, 1904.

Application filed November 24, 1903. Serial No. 182,445. (No model.)

To all whom it may concern:

Be it known that I, EDWARD B. ALLEN, 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-Controlling Devices 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 sewing-machines, and more especially to buttonhole-stitching and barring machines of the type shown and described in the United States Patent No. 738,591, granted to me September 8, 1903; and it has for its primary object to fully maintain the control of the thread in the formation of different kinds of stitches, as in embroidery-work or in the production of the side and bar stitches of a buttonhole.

As applied to buttonhole-machines it has for its further object partly to obviate the drawing or puckering of the material at one or both ends of the buttonhole where the length of the overseaming-stitches is materially increased, partly to vary the position of the concatenation of the barring-stitches relative to that of the side stitches and partly to obviate the severing of the thread in the barring operation to which the machines of this character have heretofore been liable.

The invention consists, essentially, in the combination, with the stitch-forming devices and a tension device, of a thread-feeding device operating periodically or during the formation of a group or series of stitches to draw off slack thread intermediate the tension device and stitch-forming devices, whereby a stitch or stitches may be produced with an entirely loose thread without loss of control of the thread in such operation. As illustrated herein, the tension device is of the rotary type and is so connected with the periodically-acting thread-feeding mechanism that it will be positively rotated at intervals to give the required amount of slack thread at the time that the needle-thread loop is being expanded by the loop-taker to bring the lock of the thread at the desired point in reference to the

needle-punctures, the uniform condition of the tension device enabling it to normally hold the end of the thread for the setting operation so as to insure the production of a stitch which is taut and not, therefore, open to the objection of the bar-stitches of machines heretofore in general use, in which the operation of the tension device has been varied for the side and bar stitches of a buttonhole.

In the drawings annexed, Figure 1 is an elevation of a buttonhole-stitching and barring machine embodying my present improvement, with a portion of the base broken away to expose certain parts within the same. Fig. 2 is a front elevation of the same. Fig. 3 is a plan, upon a larger scale, of the forward portion of the overhanging arm with the cap-plate normally covering the barring mechanism removed to expose the parts beneath the same. Fig. 4 is a plan of a portion of the barring mechanism similar to Fig. 3, but showing the parts at a different stage of the operation of the machine. Fig. 5 is an external plan view showing the exposed parts of the barring mechanism and the means operated thereby for throwing the thread-feeding mechanism into operation, such device being shown in the position occupied when the machine is started for producing the side stitches of a buttonhole. Fig. 6 is a similar view showing the timing mechanism of the thread-feed in the position assumed just before the beginning of the barring operation; and Fig. 7 is a plan view similar to Fig. 5, showing the positions of the parts during the barring operation. Fig. 8 is a transverse section through the arm of the machine on the axial line of the feed-shaft, and Fig. 9 is a plan of the timing snail-cam of the barring mechanism. Figs. 10 and 11 are elevational views of the thread-feeding mechanism at the stages of the stitching operation corresponding with Figs. 5 and 7, respectively. Fig. 12 is a sectional elevation of the rotary tension device, and Fig. 13 is a detail perspective view of one member of the thread-feeding mechanism.

As in my prior United States patent before mentioned, the machine embodying the pres-

ent improvement is constructed with the usual work-plate 2 and overhanging arm 3. The driving-shaft 4 has at its forward end the usual crank 5, connected by pitman 6 with the vertically-reciprocating needle-bar 7, having the needle 8 and carried by the swinging frame or gate *a*, mounted on vertical pivots 9 10, the horizontal or lateral movements of the needle-bar frame being derived from a cam-wheel 11, geared to the shaft 4 to rotate once for each two rotations of such shaft. The cam-wheel 11 is provided with a cam-groove 12, entered by a pin or stud 13 on an arm of a lever or rocker *b*, having its fulcrum or center of motion at 14 and which lever or rocker is connected through a bar 15, slotted swinging arm 16, and link 17 with an arm 18 of the needle-bar frame. The link 17 is adjustable to and from the screw-stud 21, upon which the arm 16 is pivoted by means of a screw 19, entering the slot in said arm. The bar 15 is pivotally connected at its forward end to the swinging arm 16 by the screw 22. The lever or rocker *b* is provided with two pins 23 and 24, the latter being adjustable, located at different distances from the fulcrum or center of motion 14 of said lever or rocker, and the bar 15 is provided with notches 25 and 26 for alternate engagement with said pins.

The bar 15 is normally held by a spring 20 in such position that the narrow part of the notch 25 will embrace the pin 23, so that the parts will be in side-stitching position, and the said bar is at the proper times automatically shifted to barring position with the contracted portion of the notch 26 embracing the pin 24. To this end the bar 15 is provided with a pin 28, arranged to be engaged by a spring-pressed pawl 29, pivotally connected with the upper end of the bent lever 30, fulcrumed in brackets 31 on the arm 3, an in-turned finger upon the lower portion of said lever being held by means of the stiff spring 35 in peripheral contact with the double snail-cam 32, mounted upon the vertical shaft 33, carrying the feed-wheel 60 and rotating therewith, the feed-wheel imparting to the work-clamp the usual longitudinal feeding and lateral shifting movements.

At the end of the first side-stitching operation the cam 32 has caused the pawl 29 to move inward to enable its hook or shoulder to engage the pin 28 on the bar 15, the passing of one of the shoulders of the cam 32 under the lower portion of the lever 30 permitting the latter under the impulse of the spring 35, which is stronger than the spring 20, to tilt upon its pivotal connection with the brackets 31 and through the pawl 29 and pin 28 to draw the bar 15 outward into engagement with the pin 24 and out of engagement with the pin 23, so as to increase the throw of the needle-bar frame to form the barring-stitches.

The number of stitches for each bar is governed by a ratchet-wheel 36, provided with a

curved controlling-plate 37, let into a corresponding groove 39 in the top of said wheel, in respect of which it is adjustable by means of a set-screw entering a segmental slot 38 in the plate 37. The ratchet-wheel 36 is given intermittent forward rotary movements during the barring operations by a spring-pressed operating-pawl 40, mounted on the lever or rocker *b*, a detent-pawl 41, pivoted on a screw or stud 42, fixed to the bracket-arm 3, being provided to prevent the return motion of the ratchet-wheel. The operating-pawl 40 is provided with a tripping-arm 43, arranged to be engaged by a lug or projection 44 on the bar 15, and the detent-pawl 41 is provided beyond its operative tooth with a finger or projection 45, adapted to be engaged by the pawl 40 when the latter is thrown out of operative relation with the wheel 36 to render said wheel free to effect its return movement to initial position under the impulse of the spring 46. (Shown in dotted lines in Fig. 4.)

From the foregoing it will be observed that when the bar 15 is shifted into barring relation its shoulder or projection 44, being withdrawn from engagement with the tripping-arm 43, will permit the operating-pawl 40 and detent-pawl 41 under the action of their springs 50 and 51, respectively, to drop into operative relation with the ratchet-wheel 36, in which relation they remain until an upwardly-projecting lug 52 upon the controlling-plate 37 by engagement with one arm of a bent lever 53, pivoted at 54 upon the cap-plate 55, causes the turning movement of such lever, so that its other arm engages the contact-finger 47 of the pawl member 29, which operates to release the pin 28 to permit the bar 15 to return to initial position under the action of the spring 20, the engagement of its shoulder or projection 44 with the tripping-arm 43 serving to throw out of action the operating-pawl 40 and detent-pawl 41, thereby permitting the ratchet-wheel 36 under the action of its spring 46 to return to initial position with the shoulder 49 of the peripheral notch therein in engagement with the adjustable stop-pin 48, projecting through a slot 56 in the cap-plate 55 from a pointer-arm 57 by which it is carried. The position of the stop-pin 48, as indicated by the scale in conjunction with the pointer 57, determines the initial position of the ratchet-wheel, which in turn determines the number of barring-stitches to be applied to the end of a buttonhole, as in my former patent before mentioned.

The stitch-forming devices shown herein are of the lock-stitch type, the needle 8 operating in conjunction with a loop-taking device, indicated herein as a shuttle 58, with bobbin-case 59, carrying the under thread, and include a take-up 61 of any suitable character.

As shown herein, the tension device consists of a grooved wheel 62, mounted upon a bearing-stud 63, surrounded by a friction-

spring 64, interposed between an adjusting-nut 65 and a washer 66, surrounding the bearing-stud, between which washer and the hub 67 of the tension-wheel is inserted a friction-washer 68, of felt or other suitable material, for producing the necessary drag upon the tension-wheel. A conical ring 69 is mounted upon the washer 66 for preventing the lateral displacement of the spring 64 thereon. The usual check-spring 70 is shown applied to the stud 63, with its thread-eye adjacent the rim of the tension-wheel.

The tension-wheel 62 is positively rotated periodically to feed or measure off the requisite amount of thread for the barring-stitches by the mechanism now to be described. The hub 67 of the tension-wheel is provided upon its periphery with ratchet-teeth adapted to be engaged upon opposite sides by the similarly-toothed spring-closing jaws 71, pivotally mounted upon a pin 72, carried by the lower arm of a swinging lever 73, pivotally mounted at 73^x upon the arm 3 of the machine and having its upper end connected, by means of a link 74, with a block 75, forming a part of the pivotal connection of the link 17 with the swinging arm 16, and adjustable to and from the screw-stud 21 by means of the screw 19, the shouldered portion of the pivotal screw 76 being of spherical form to afford a universal-joint connection for permitting of lateral adjustment upon the swinging arm 16. The upper end of the lever 73 is provided with a slot 77, to which is fitted the contracted portion of the shouldered head 78 of a pivotal screw 79, to the threaded shank of which is loosely fitted the flanged sleeve 80 with cylindrical bearing portion entering the aperture in the adjacent end of the link 74, such stud and bearing-sleeve being secured adjustably in position upon the lever 73 by means of the clamp-nut 81. The spring-jaws 71 are thus given a reciprocating motion for each corresponding movement of the needle-bar frame derived from the rocker 6 and are normally separated by means of a cam-block 82, interposed between their respective shanks and mounted upon a rock-shaft 83, journaled in a supporting-lever 84, hung at one end upon the pin 72 and forked at the other end to embrace the spring 64. The rock-shaft 83 carries a crank 85, with laterally-projecting pin 86, engaged by a finger 87 upon one end of a bent lever 88, pivoted at 88^x upon the overhanging arm 3, the opposite end of which lever is pivotally connected with a link 89, of which the upper end projects through a slot in a lateral lug 91 of the cap-plate 55 and is provided with a hook or shoulder 90.

The finger 87 of the lever 88 is held normally raised to maintain the cam-block 82 in inclined position for separating the jaws 71 by means of a spring 92, interposed between said lever and a suitable abutment upon the overhanging arm 3.

Under the impulse of the spring 92 the

hook 90 of the link 89 rests normally upon the top of the cap-plate 55; but in order to raise the same for tilting the lever 88 to release the spring-jaws 71 and allow them to come into engagement with the ratchet-wheel formed by the hub 67 and the tension-wheel 62 a sliding plate 93 is applied to the top of the cap-plate 55 and secured from lateral displacement by means of a headed stud 94 entering longitudinal slot 95 in said plate, a projecting portion 96 at the outer end of said sliding plate being held normally in contact with the hooked upper end of the link 89 by means of a spring 97, connecting the same with a fixed pin 98 upon the cap-plate. The outer end of the plate 93 is provided with a transverse slot 99, entered by a pin 100 upon the upper end of the lever 30, and the vibration of the latter under the impulse of the cam 32 and spring 35 causes a corresponding longitudinal movement of the plate 93. The outer end of the projection 96 is provided with a chisel-shaped edge, forming a tooth 101, and when the plate 93 moves forward from its retracted position, (shown in Fig. 6,) the projection 96 having dropped back of the hooked end of the link 89 under the impulse of the spring 97, the forward movement of the plate 93 under the action of the lever 30 for initiating the barring operation causes the tooth 101 to raise the link 89, and thereby release the jaws 71 to effect their engagement with the ratchet-wheel 67.

The sliding plate 93 is provided with a second projection 102, disposed in the path of movement of the outer arm of the bent lever 53, and at the conclusion of the barring operation such lever engages the projection 102 and forces the plate 93 aside in opposition to the spring 97, whereby the projection 96 is removed from engagement with the hook 90 of the lever 89, which drops into its initial position, causing the spreading of the jaws 71, as indicated in Fig. 10.

The jaws 71, whose ratchet-teeth are disposed in opposite directions, together form a reciprocating yoke embracing the ratchet-wheel 67, which is normally idle or inoperative when in open position, (and thus out of contact with the ratchet-wheel,) but when periodically permitted to close into engagement with the ratchet-wheel under action of the spring 71^x imparts to the tension-wheel a rotary feeding movement for each reciprocation of the lever 73 in either direction, derived from the needle-bar-frame actuating bar 15, the upper jaw producing such feeding movement by engagement with the upper side of the ratchet-wheel for each overseaming stitch corresponding with the inward throw of the needle-bar frame, and the lower jaw producing a similar movement in the same direction by engagement with the lower side of the ratchet-wheel for each outward throw of the needle-bar frame.

In the operation of the machine the rotation of the main shaft 4 communicates a corresponding movement of the cam-wheel 11, which produces continuously throughout the cycle of the machine to-and-fro movements of the needle-bar frame varying in amplitude for the side and bar stitches under the control of the barring mechanism. The thread-feeding mechanism comprising the reciprocating yoke 71, with its permanent connections with the needle-bar-frame-actuating mechanism, maintains its to-and-fro motion throughout each buttonhole-stitching operation, deriving such motions entirely independently of the barring mechanism, which operates periodically independently of the feeding mechanism for spacing the side stitches, the operation of which barring mechanism serves to throw the jaws 71 into and out of engagement with the tension-wheel ratchet 67, by means of which the rotary movement of the tension-wheel normally derived from the pull of the needle-thread encircling the same in the side-stitching operation is exchanged for a positive feeding movement, by which the exact length of needle-thread is measured off for each barring-stitch in order that not only may a length of slack needle-thread be provided for each bar-stitch to be drawn into the material by means of the shuttle-thread under its uniform tension, but that the tension device may become again effective at the stitch-setting stage of the operation to resist the strain upon the needle-thread under the action of the take-up, whereby each barring-stitch is set as effectively and under precisely the same conditions as the side stitches. As the barring mechanism begins its action as soon as the needle is out of the material and while the needle-thread loop is being expanded for the passage of the lower thread, it is evident that the thread-feeding mechanism is actuated at the same time to measure off thread for each bar-stitch, by means of which timing of the feed of the thread the slack thus afforded is drawn down by the shuttle, so as to avoid any kinking or knotting to which the loss of control of the same would render it liable with a different timing of the thread-feeding mechanism.

It will be observed that the specific mechanism herein shown and described for determining the relative conditions of the needle-thread in the production of the side and bar stitches comprises a tension member, including the tension-wheel 62 and means for subjecting the same to a uniform frictional resistance to rotation, and a thread feeding or measuring member, also including the tension-wheel in combination with its attached ratchet-wheel 67, the toothed jaws 71 periodically engaging the same, means for positively reciprocating said toothed jaws, and means for effecting their engagement with the ratchet-wheel 67. It will further be observed that

while in the present embodiment of the improvement the ratchet-wheel 67, forming a part of the thread-feeding mechanism, rotates with the tension-wheel under the mere pull of the thread in the side-stitching operation independently of the positive actuation of the other operative parts of the train of mechanism of which it is temporarily an idle member such idle rotation is not effective in feeding the thread, as at such time the sole impulse is derived from the take-up immediately at the completion of its stitch-setting action. When the thread-feeding mechanism is thrown into action by the means already described, this serves to anticipate or replace the thread-drawing action of the take-up by providing independently thereof just sufficient needle-thread for each bar-stitch, so as to positively locate the position of the interlock of the threads relative to the needle puncture and to cause the take-up to complete its action upon the needle-thread in the setting operation without the usual succeeding thread-drawing action involved in the production of the side stitches. In other words, the feed of the thread by positive means for each bar-stitch preparatory to the action of the take-up in drawing up or setting the stitch serves to confine the take-up to this stitch-setting action and to prevent its pulling-off action succeeding the latter, as when the thread-feed is inoperative upon the thread in the side-stitching operation.

In machines heretofore constructed wherein a uniform tension upon the thread has been maintained throughout the stitching of the buttonhole the locking of the bar-stitches at the end of the buttonhole-slit has caused the severing of the thread at the needle-eye by reason of the formation of a hard mass of thread at that point to be repeatedly penetrated by the needle; but by the location of the lock of the needle and shuttle threads at the ends of the bar-stitches, as in the present improvement, this difficulty is fully avoided.

Heretofore it has been customary in that class of buttonhole stitching and barring machines comprising a thread-carrying needle and a shuttle by which a purl has been formed along the edge of the buttonhole-slit at or upon the upper side of the material by the interlock of the two threads to employ a very light tension for the shuttle-thread and a very strong tension for the needle-thread, in which case in order to prevent puckering or drawing of the goods the upper thread tension has been almost wholly released for the barring operation, so that the tension upon both upper and lower threads was practically the same, whereby the interlock of such threads was drawn into the body of the material at such time. The maintenance of the exceedingly loose tension upon both threads in the barring operation thus caused practically a loss of control of such threads, which result-

ed not only in failure to positively locate the position of the interlock of the threads, as in the formation of the side stitches with one strong tension, but produced a bar at the end of the buttonhole of which the component threads were extremely loose and readily displaced in the laundering of the goods. In the present improvement by the employment of a constant tension device uniformly acting upon the needle-thread throughout the cycle of the machine and merely feeding through said tension device the requisite amount of needle-thread for the bar-stitches the slight tension of the shuttle-thread is sufficient to maintain the loop of needle-thread through which it is passed by the shuttle taut, so that the lock will be located within the goods at the end of the length of thread fed through the tension device; but the take-up will act to set the stitch under precisely the same relative tensions upon the needle and shuttle threads as when producing the side stitches, so that the control of both threads is uniformly maintained throughout the entire operation of the machine, notwithstanding the formation of stitches of different character in different parts of the buttonhole.

The present improvement has still another advantage in connection with the handling of the shuttle-thread in that for the barring operation the needle-thread passes through the eye of the take-up lever in entirely loose condition, so that no tendency is produced thereby to untwist the thread so as to cause knots or kinks to which machines of this class have heretofore subjected it by the maintenance of the needle-thread taut between the tension device and the needle intermediate which the take-up operates.

The mechanism herein described provides a combined tension and thread-feeding device whose action is proportionate to the lateral throw of the needle-bar frame in all its adjustments, while adjustable independently thereof, so as to produce a feed of the exact amount of needle-thread required in the formation of each bar-stitch.

From the foregoing description it will be understood that the various parts of the mechanism shown and described herein may be widely varied without departure from the spirit of the present invention, it being immaterial in what class of machine the improvement is embodied, as well as the member by which the thread-feeding mechanism is actuated or tripped into operation.

As the chief object of the present improvement is the differential manipulation of the thread in the production of the stitches of successive groups, so as to vary the character of such stitches without varying the action of the tension upon the thread, it is evidently immaterial to this improvement in its broader aspect whether or not the thread-feeding action continues throughout the entire cycle of

the machine inclusive of both the barring and side-stitching operations or is confined to the duration of the barring operation, as in the embodiment shown and described herein.

It is to be understood that the thread-feeding mechanism, as referred to herein, is the device which determines the character and amount of the thread-drawing action irrespective of the normal action of the tension device, operation of which upon the thread is unaffected in any manner by the operation of such thread-feeding mechanism.

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

1. In a sewing-machine, the combination with stitch-forming devices, and a tension device normally acting upon the thread for each stitch-setting operation, of periodically inoperative thread-feeding mechanism and automatically-acting devices for positively operating the same after a predetermined number of stitches has been formed.

2. In a sewing-machine, the combination with stitch-forming mechanism comprising a needle and complemental under-thread stitch-forming devices, of a tension device acting uniformly upon the thread in all the stitch-setting operations, means for setting the stitches, a device whereby the position of concatenation of the upper and lower threads may be varied, and automatic means for controlling the operation of said device for changing the character of the stitches of succeeding groups at predetermined times.

3. In a sewing-machine, the combination with stitch-forming devices, of thread tension and feeding devices, a take-up normally acting to set each stitch and to draw thread for the succeeding stitch for a given number of stitches, and automatic actuating means operating the thread-feeding device at fixed and predetermined times to supply thread for each of a succeeding number of stitches, whereby the character of the stitches of successive groups is changed.

4. In a sewing-machine, the combination with stitch-forming devices and a uniformly-acting tension device, of a thread-feeding mechanism operating in conjunction with said tension device, and means for causing the alternate action and inaction of said thread-feeding mechanism for feeding the thread in successive groups of stitches.

5. In a sewing-machine, the combination with stitch-forming devices, and a take-up, of a rotary tension-wheel, and means alternately active and inactive for feeding the thread in successive groups of stitches in effecting the periodical rotation of said tension-wheel independently of the pull of the thread under the action of the take-up in the normal operation of the stitch-forming devices.

6. In a sewing-machine, the combination with stitch-forming devices, and a take-up, of a rotary tension-wheel, and positively-actu-

ated means alternately operated for successive groups of stitches to rotate said tension-wheel and to permit its rotation by the normal pull of the thread under the action of the take-up in the stitch-forming operation.

7. In a buttonhole stitching and barring machine, the combination with stitch-forming devices, a take-up, and barring mechanism, of a tension device acting uniformly upon the needle-thread in the setting of all the stitches, and means acting in advance of the take-up in the barring operation for feeding the exact amount of thread required for the bar-stitches.

8. In a buttonhole stitching and barring machine, the combination with stitch-forming devices, comprising upper and lower thread mechanism, barring mechanism and a tension device, of means for positively locating, under uniform conditions of tension for the stitch-setting operation, the position of the concatenation of the threads at different points in reference to the needle-punctures for the side and bar stitches.

9. In a buttonhole stitching and barring machine, the combination with stitch-forming devices, and barring mechanism, of a tension device and thread-feeding mechanism inactive for feeding the thread during the side-stitching operation, and means for automatically bringing said thread-feeding mechanism into action during the formation of the barring-stitches.

10. In a buttonhole stitching and barring machine, the combination with stitch-forming mechanism and barring mechanism, of a tension device and thread-feeding mechanism inoperative in feeding the thread during the side-stitching operation, and means connected with the barring mechanism for automatically bringing said thread-feeding mechanism into action during the formation of the barring-stitches.

11. In a buttonhole stitching and barring machine, the combination with stitch-forming devices, and barring mechanism, of a thread-feeding device inoperative upon the thread during the side stitching, and automatically-acting means for positively operating the same to determine the exact amount of thread used for the barring-stitches.

12. In a buttonhole stitching and barring machine, the combination with stitch-forming devices comprising a laterally-moving needle-bar and means for adjusting the throw of the same, and barring mechanism, of a thread-feeding device and means governed by the lateral movement of the needle-bar for determining the exact amount of thread used for the barring-stitches.

13. In a buttonhole stitching and barring machine, the combination with stitch-forming devices and barring mechanism, of a periodically-acting thread-feeding device and means connected with the barring mechanism for controlling its time of action.

14. In a buttonhole stitching and barring machine, the combination with stitch-forming devices comprising a needle and lower thread-carrying loop-taker, and barring mechanism, of a rotary needle-thread tension device, and means acting during the barring operation to positively rotate said tension device to give up slack thread after said loop-taker begins to expand the needle-thread loops.

15. In a sewing-machine, the combination with a vertically-reciprocating and laterally-vibrating needle and complementary stitch-forming devices, and means for varying the lateral movements of said needle, of a tension device, and thread-feeding mechanism with means for actuating the same to feed the thread proportionately to the lateral movements of the needle.

16. In a sewing-machine, the combination with stitch-forming devices, a take-up and a continuously - operating tension device, of thread-feeding mechanism and periodically-acting means controlled in its time of action by an operative member of the machine to cause the action of the thread-feeding mechanism during the formation of alternate groups of stitches for measuring off a given length of thread intermediate the tension device and the stitch-forming devices, whereby the thread thus drawn off may be freely manipulated in the stitch formation but may be drawn taut by the take-up against the tension device in setting the stitches.

17. In a sewing-machine, the combination with stitch-forming devices, a tension device uniformly operative in the setting of each stitch, and a take-up normally acting to successively tighten the thread against the tension in setting each stitch and draw-thread through the tension for the succeeding stitch, of means acting periodically upon the tension device to prevent the normal thread-drawing action of said take-up upon the thread after the setting of the stitch and thereby changing the character of the stitches of successive groups.

18. In a buttonhole stitching and barring machine, the combination with stitch-forming devices, and barring mechanism for varying the relative lengths of the stitches for the side-stitching and barring operations, of a constant tension device, a take-up normally acting to successively tighten the thread against the tension device in setting each stitch and draw-thread through the tension for the succeeding stitch, and means controlled in its time of action by the barring mechanism and operating upon the tension device to confine the action of the take-up to setting the bar-stitches.

19. In a buttonhole stitching and barring machine, the combination with stitch-forming devices and barring mechanism for varying the relative lengths of the stitches for the side-stitching and barring operations, of a tension device, continuously but normally ineffect-

ively operating thread-feeding mechanism, and periodically-acting means controlled by the barring mechanism for throwing the latter into effective operation.

5 20. In a sewing-machine, the combination with stitch-forming mechanism and a rotary tension-wheel with connected toothed wheel, of a yoke having toothed jaws embracing said toothed wheel, means for reciprocating said
10 yoke, and means for automatically throwing the jaws of said yoke into and out of engagement with said toothed wheel to cause the periodical rotation of said tension-wheel.

15 21. In a sewing-machine, the combination with stitch-forming mechanism and a rotary tension-wheel with connected toothed wheel, of a yoke having yielding toothed jaws embracing said toothed wheel, and means for automatically throwing said jaws simultaneously

into and out of engagement with said toothed wheel to cause the periodical rotation of said tension-wheel. 20

22. In a sewing-machine, the combination with stitch-forming devices, and a uniformly-acting tension device, of means controlled in
25 the time of action by an operative member of the machine acting independently of the relative movements of the needle and work and operating to periodically change the character of the individual stitches of successive groups
30 of predetermined number.

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

EDWARD B. ALLEN.

Witnesses:

H. J. MILLER,

H. A. KORNEMANN.