

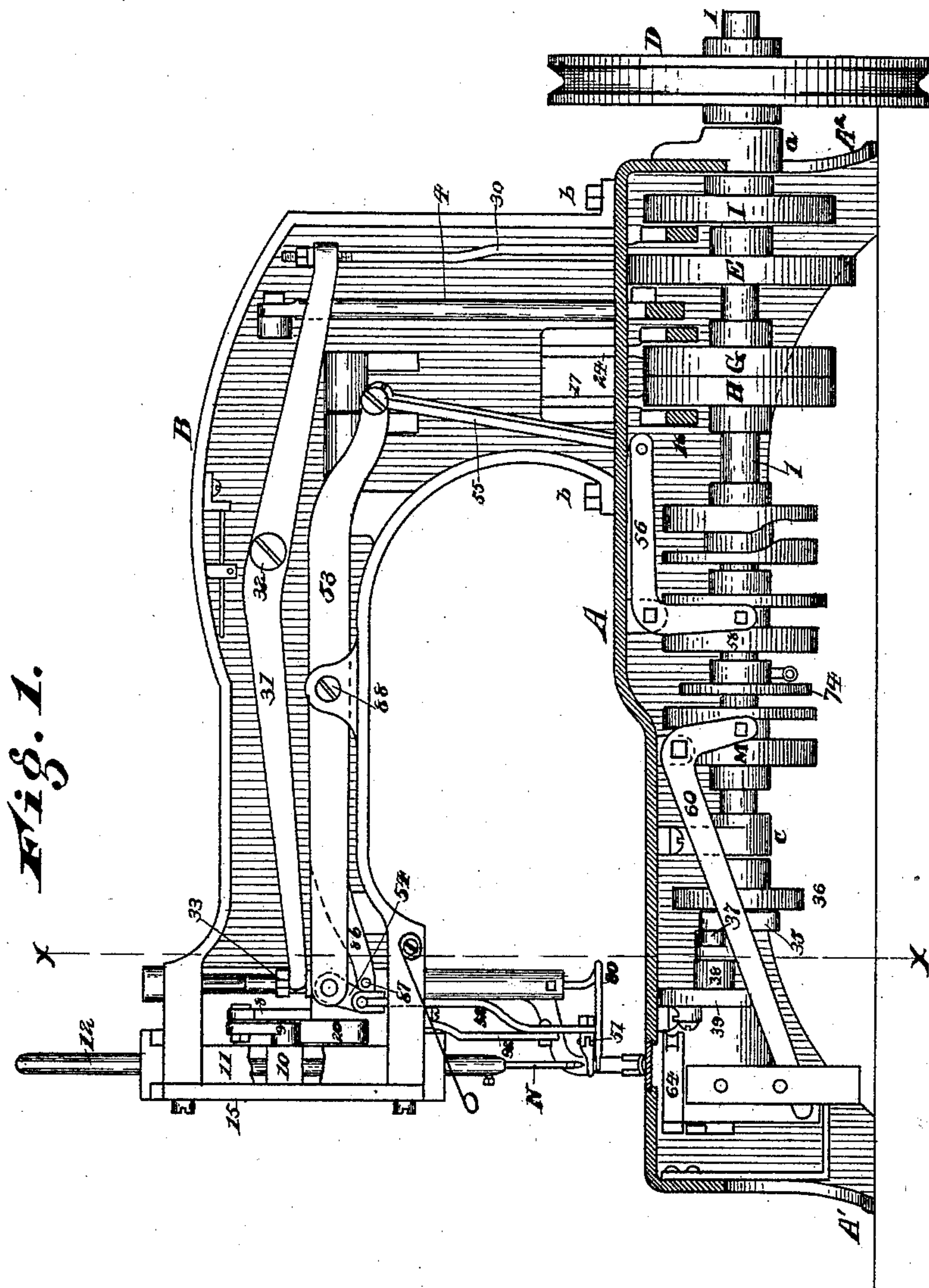
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7 Sheets—Sheet 1.

L. L. MILLER.
SEWING MACHINE.

No. 424,330.

Patented Mar. 25, 1890.



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George Ashton

Inventor
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By Wood & Boyd
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(No Model.)

7 Sheets—Sheet 2.

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Fig. 2.

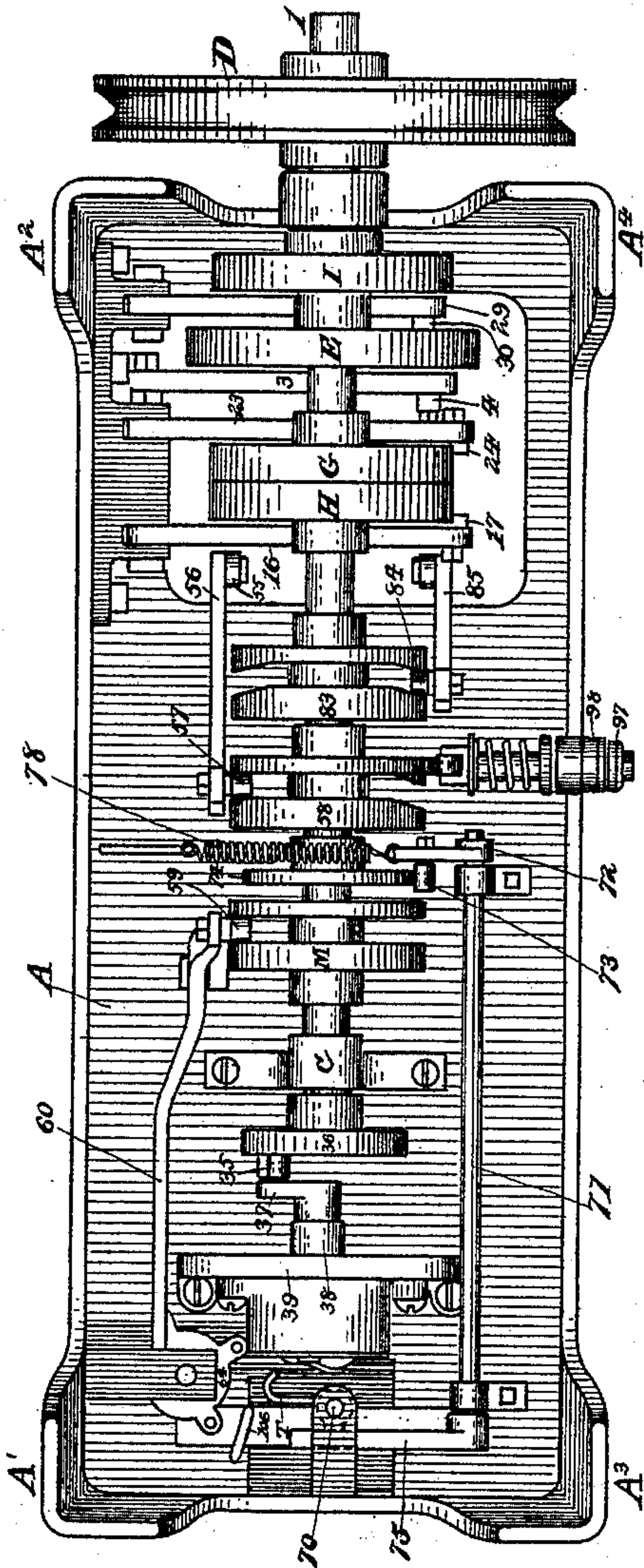
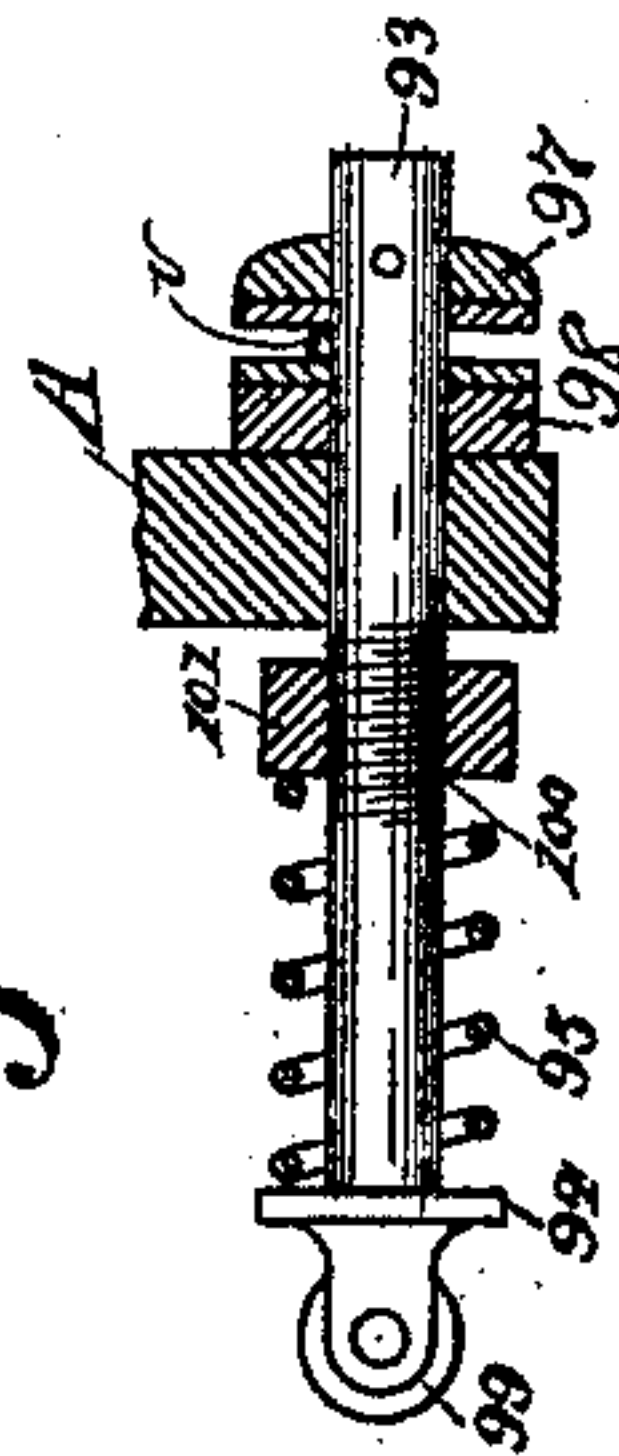


Fig. 30.



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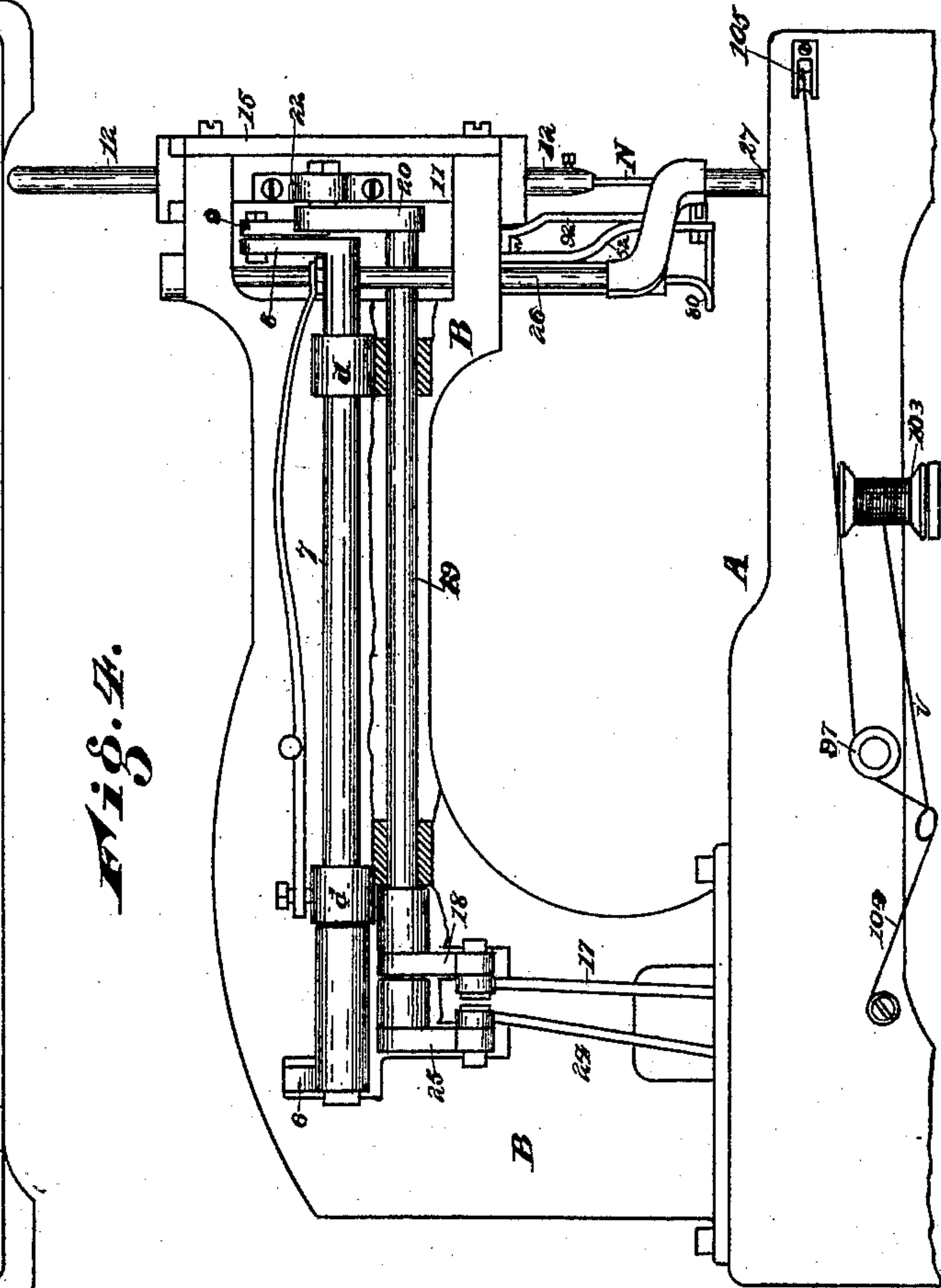
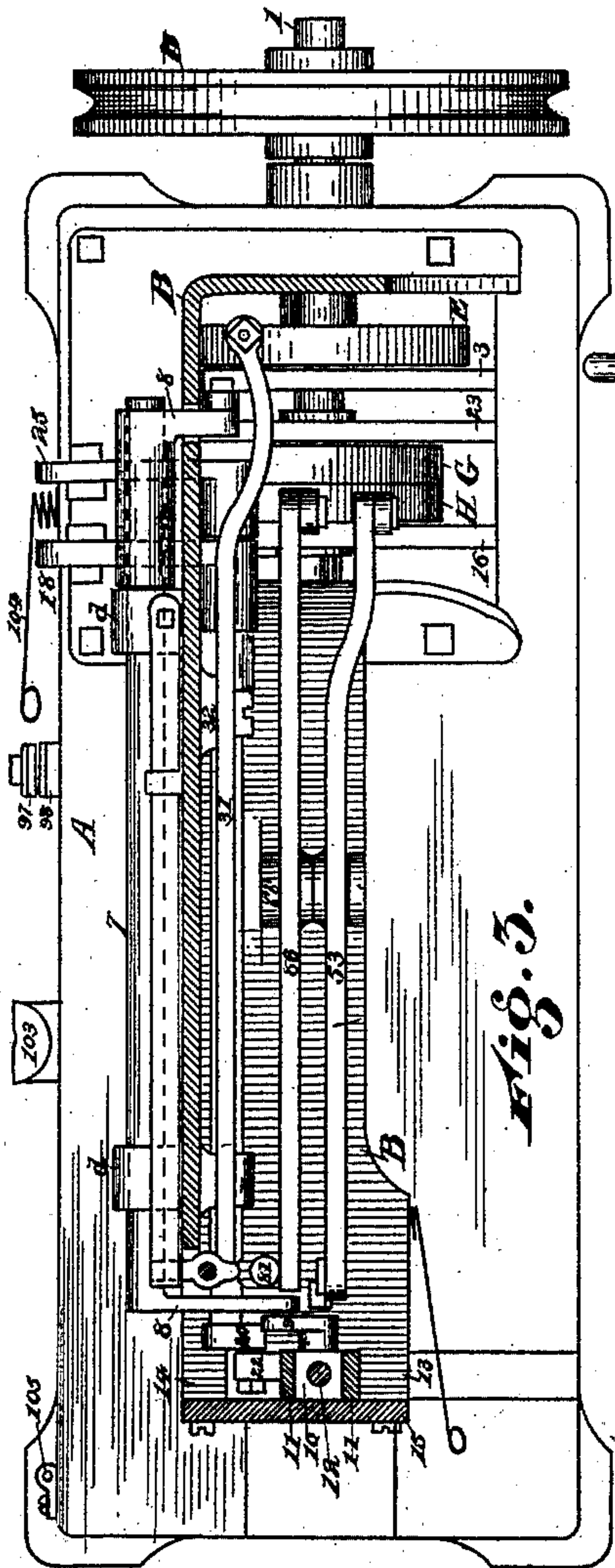
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Fig. 6.

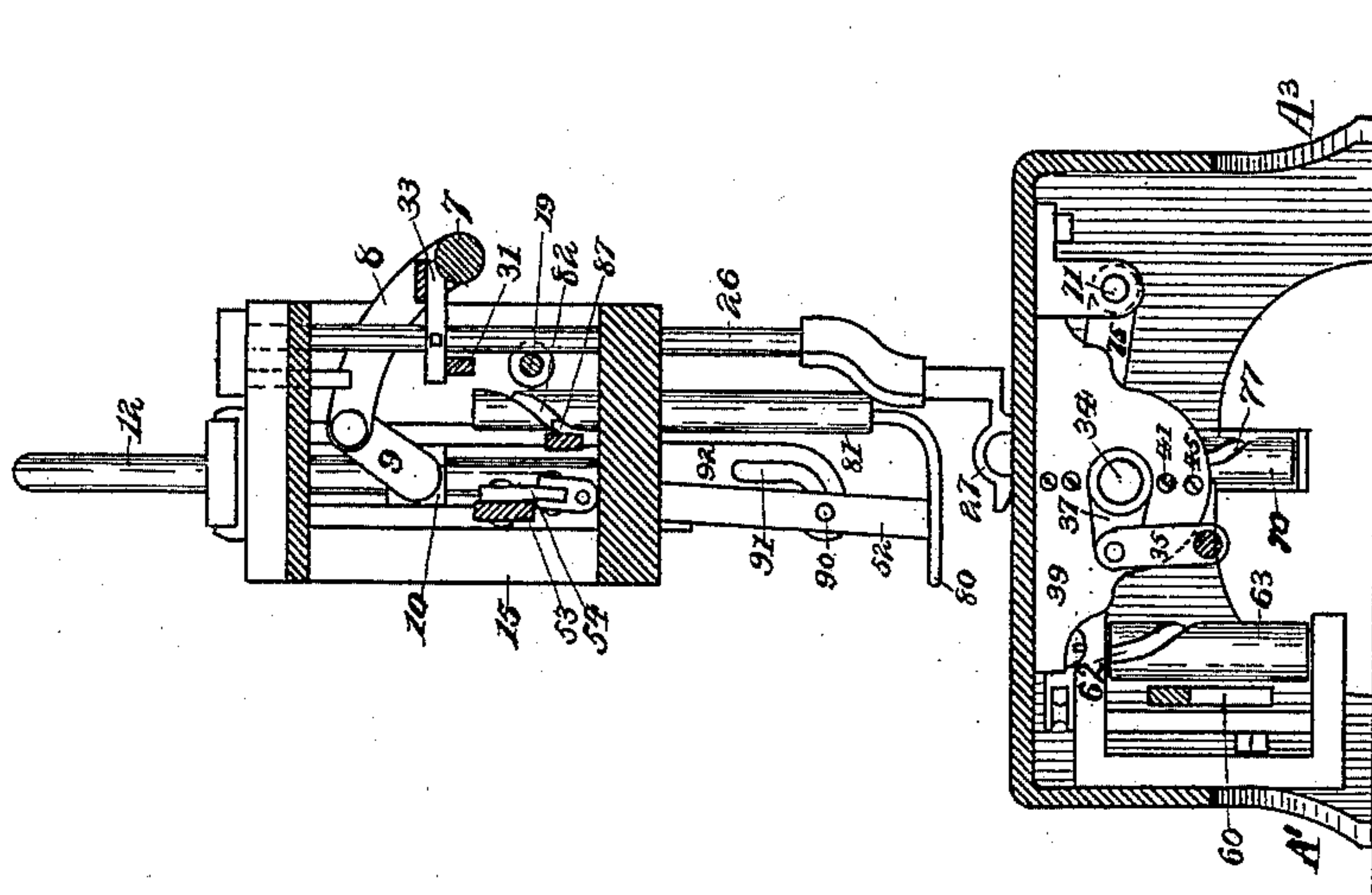
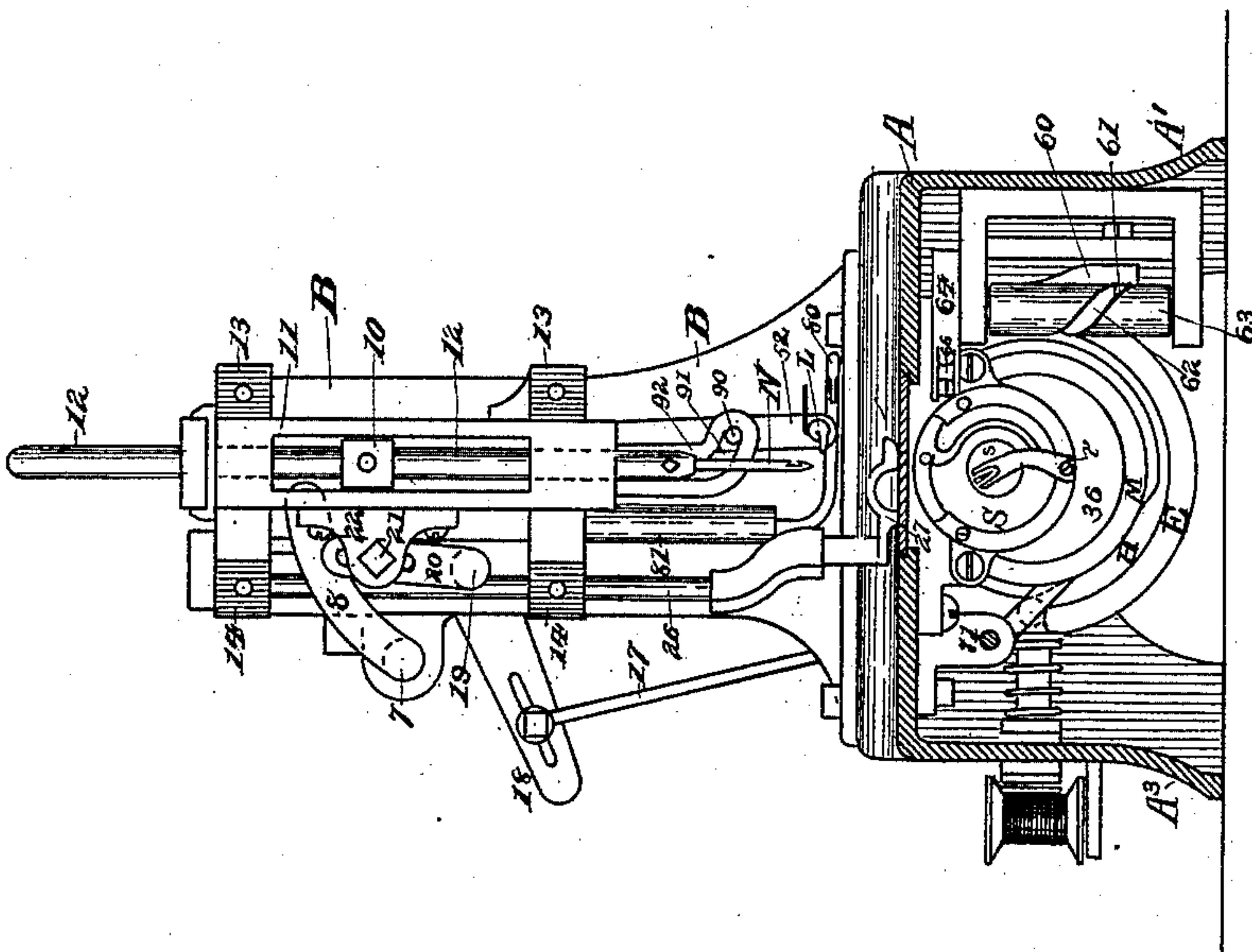


Fig. 5.



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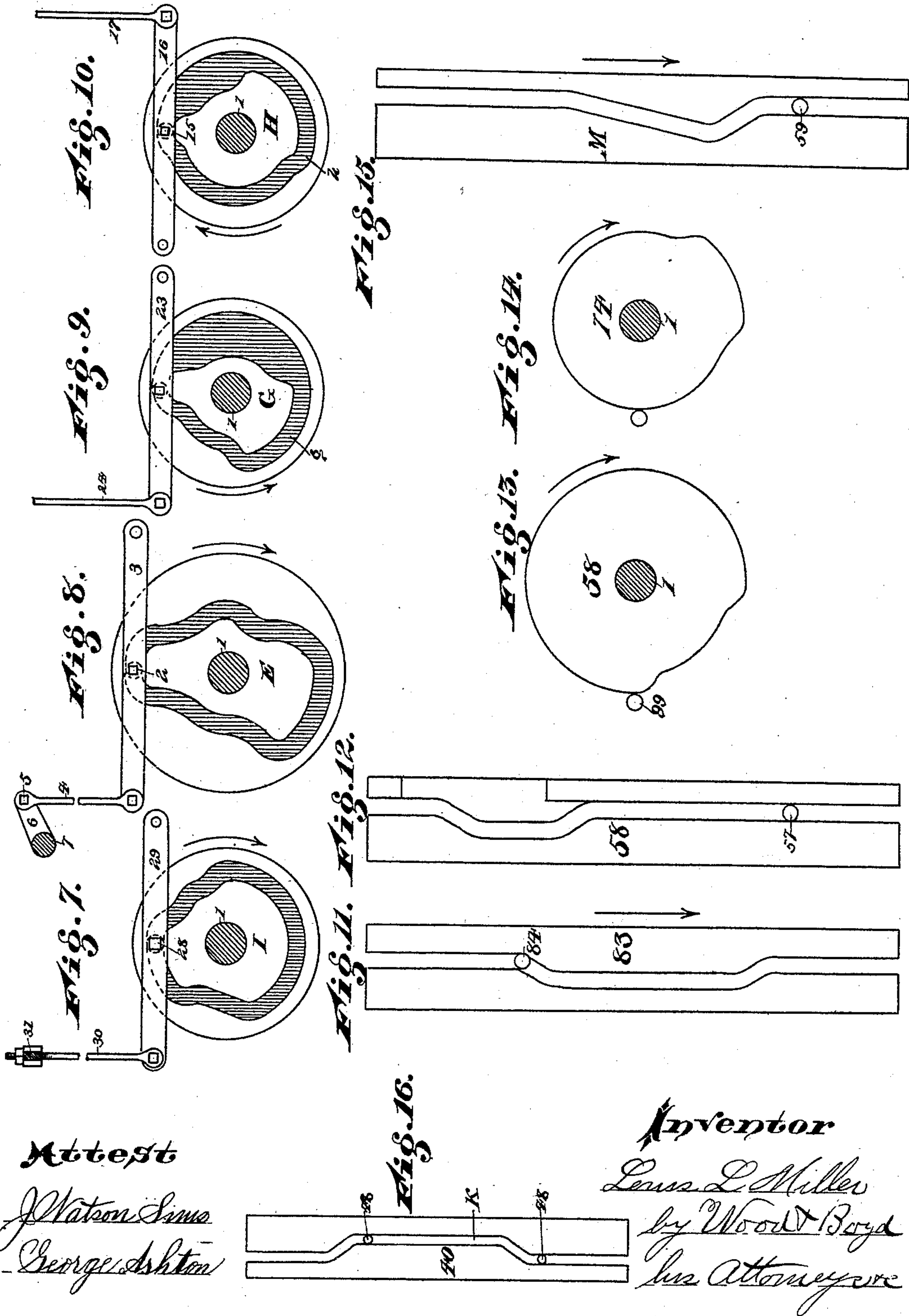
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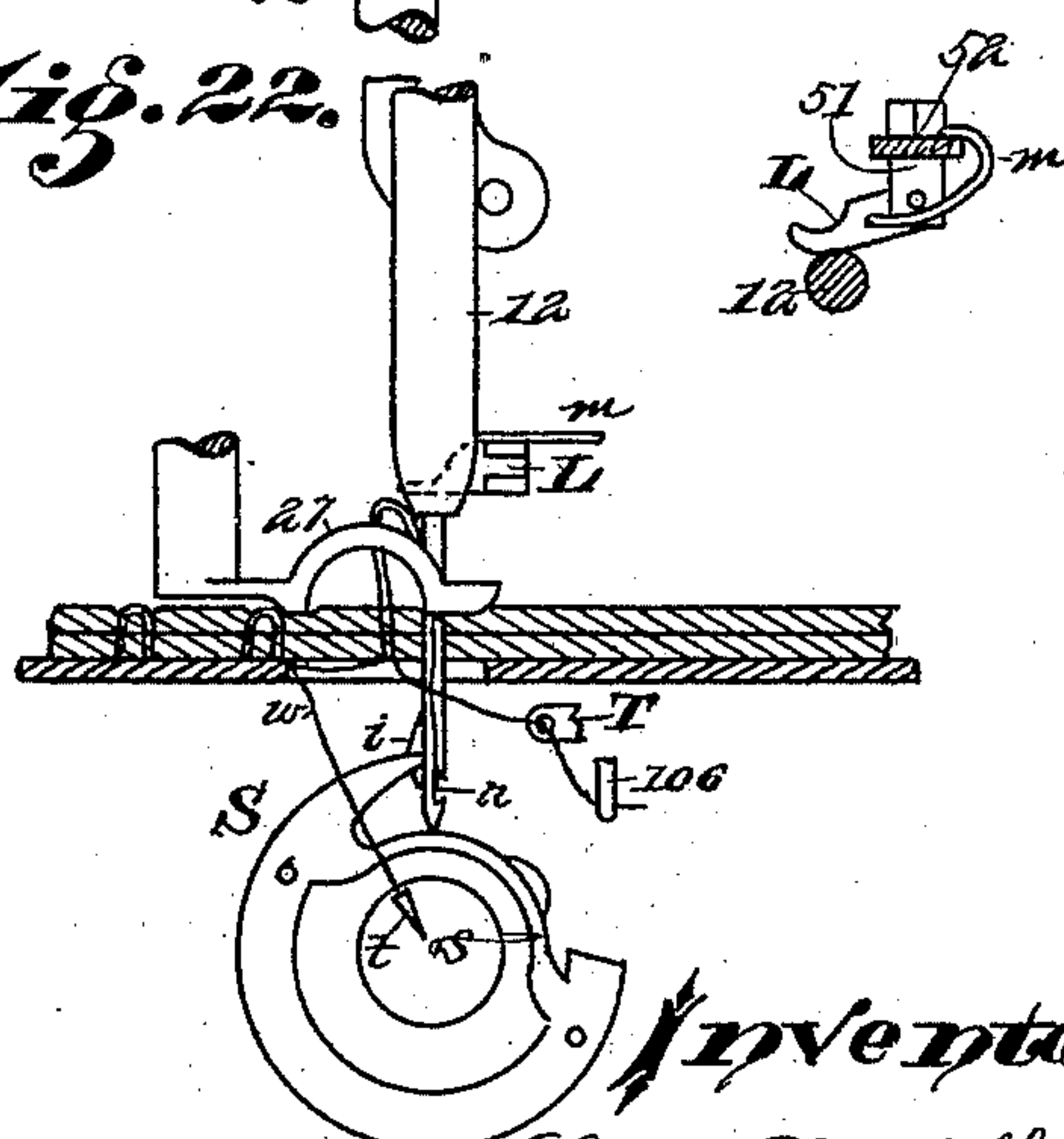
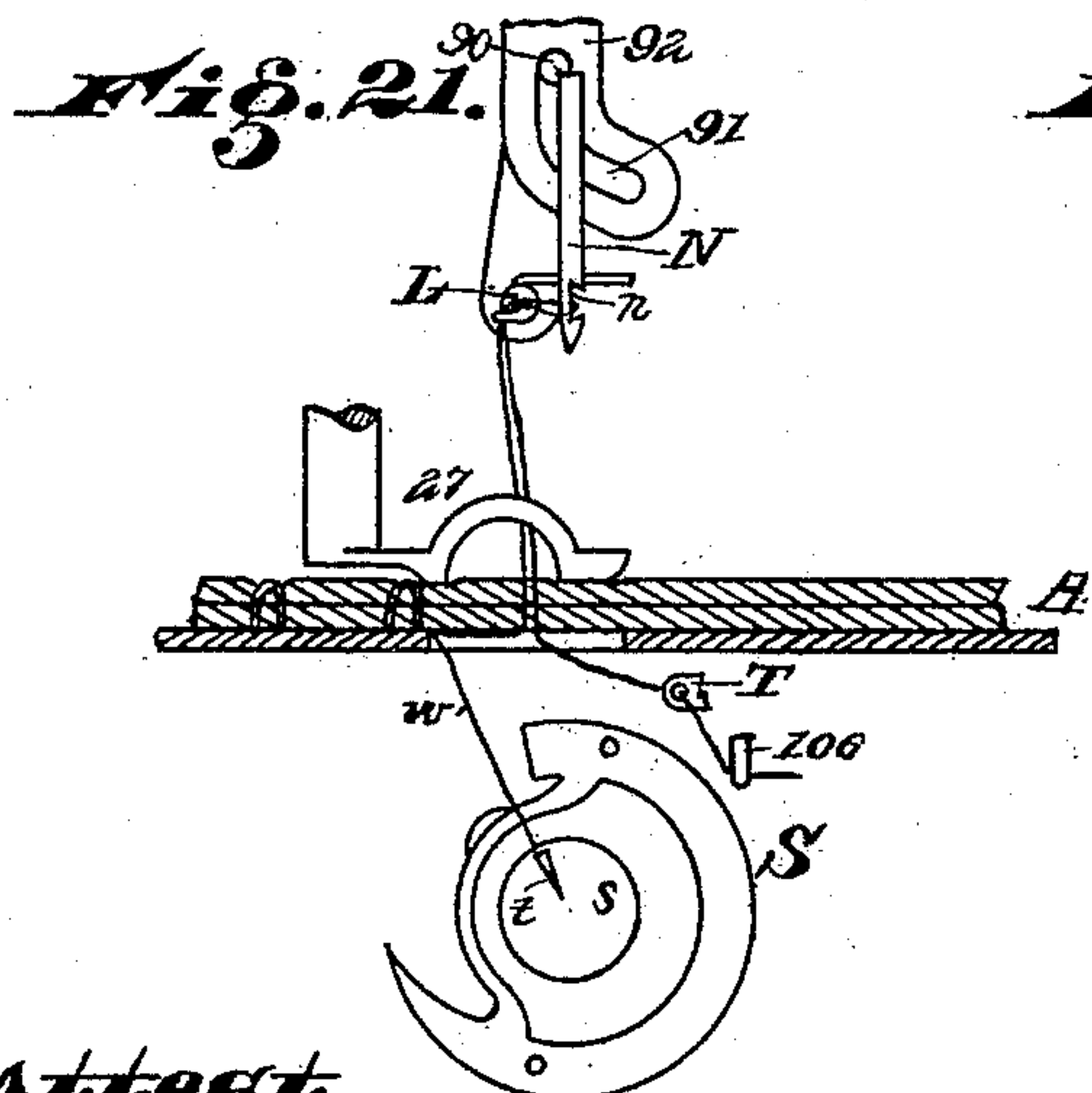
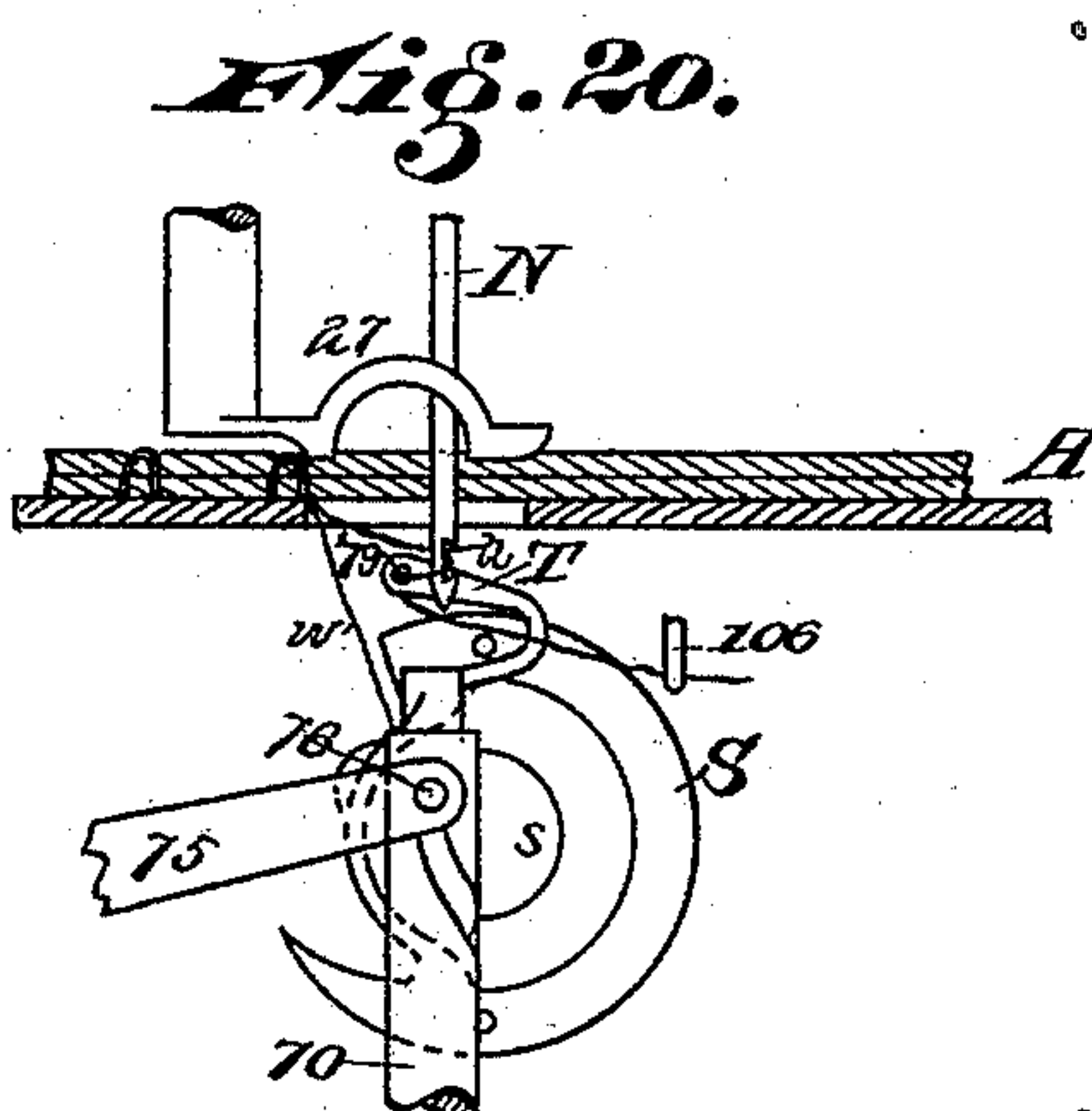
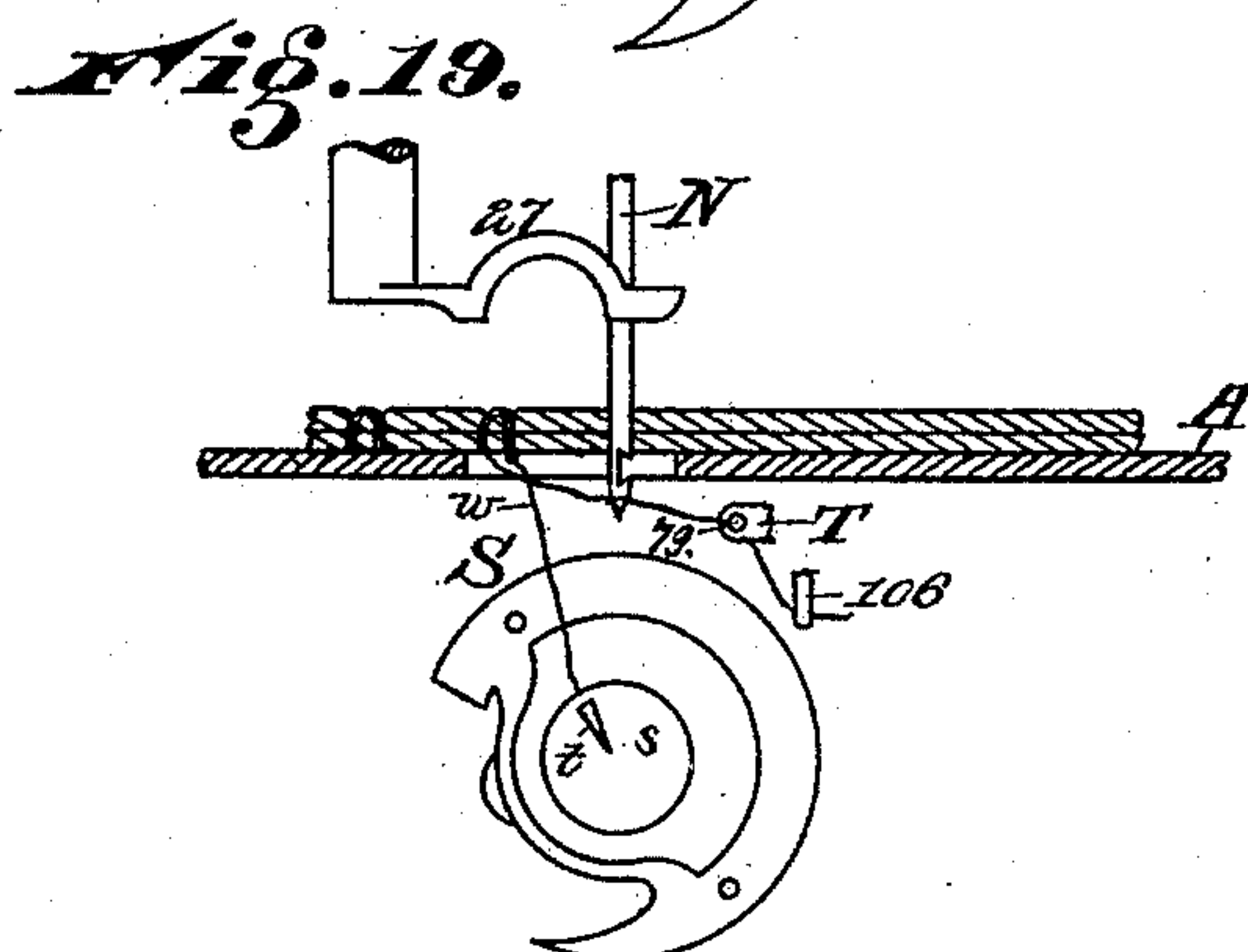
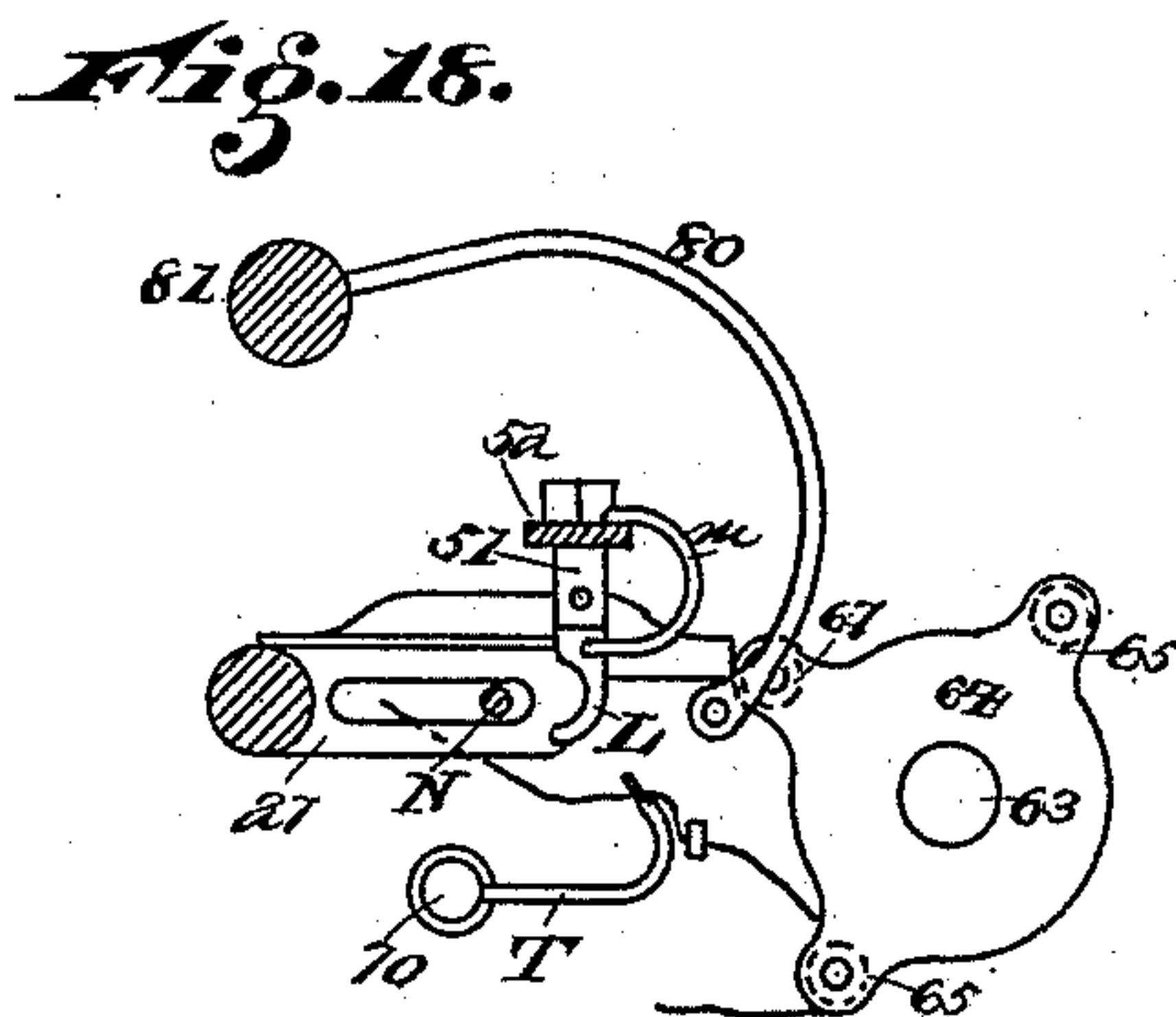
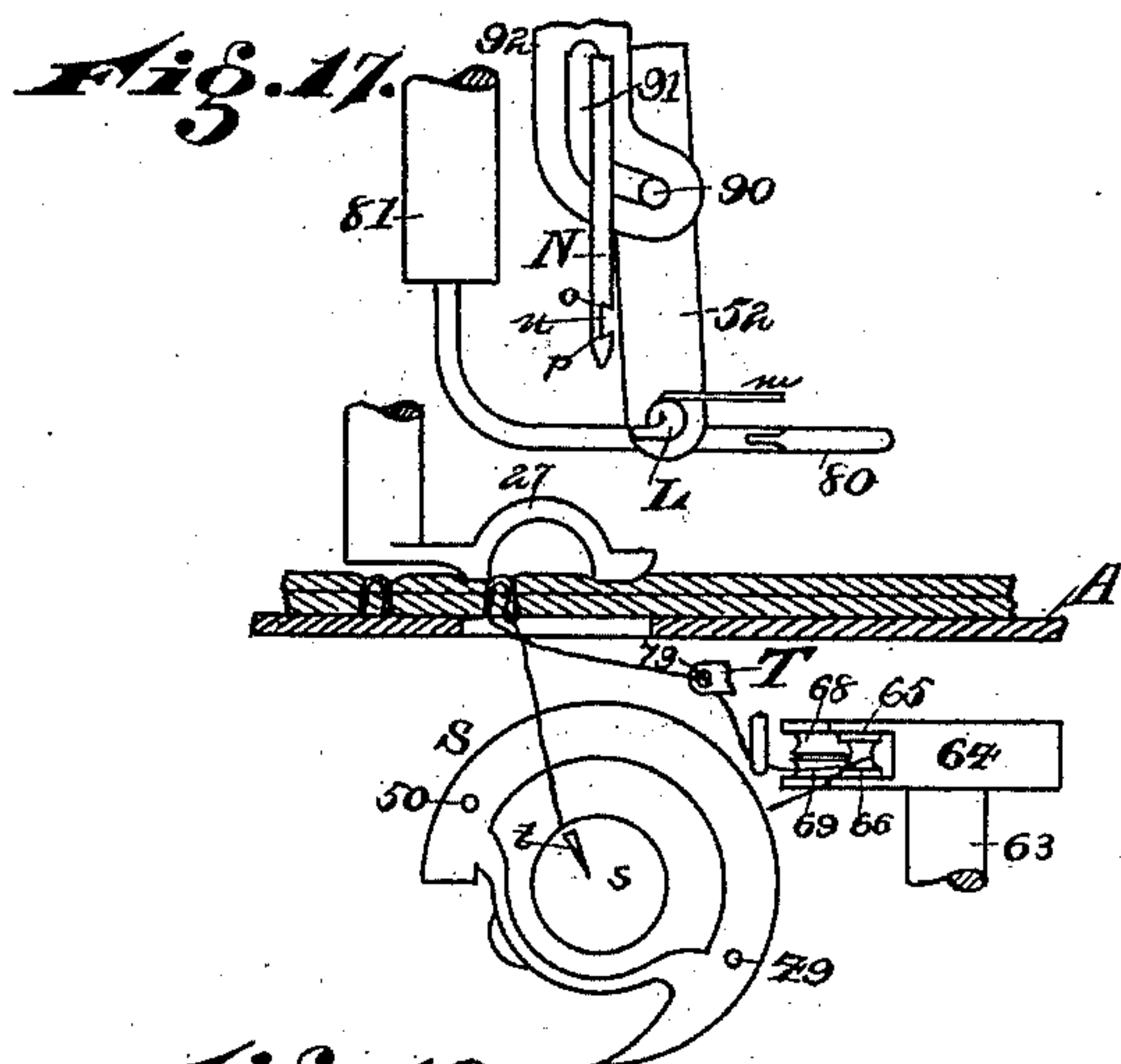
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Fig. 23.

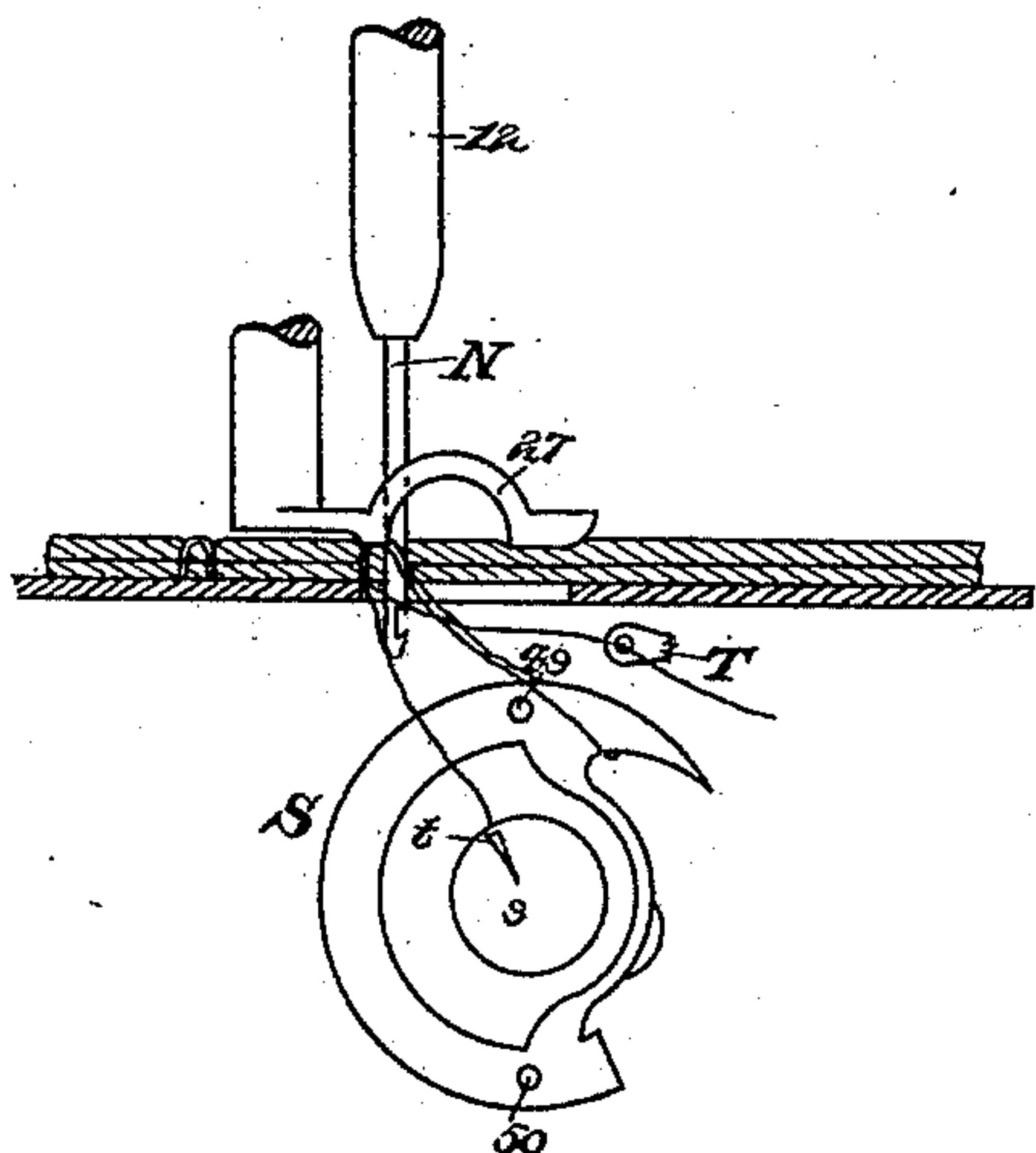


Fig. 24.

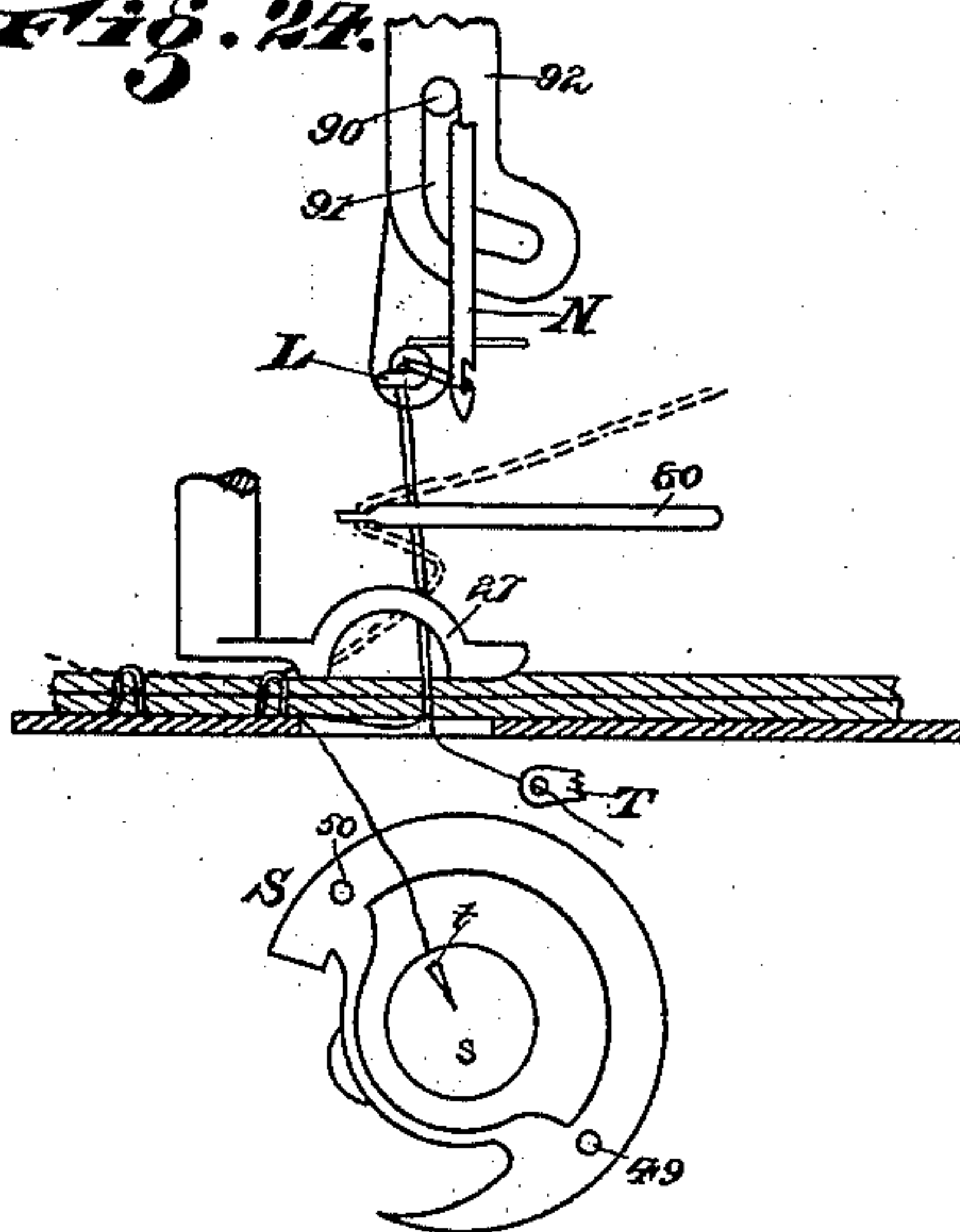


Fig. 20.

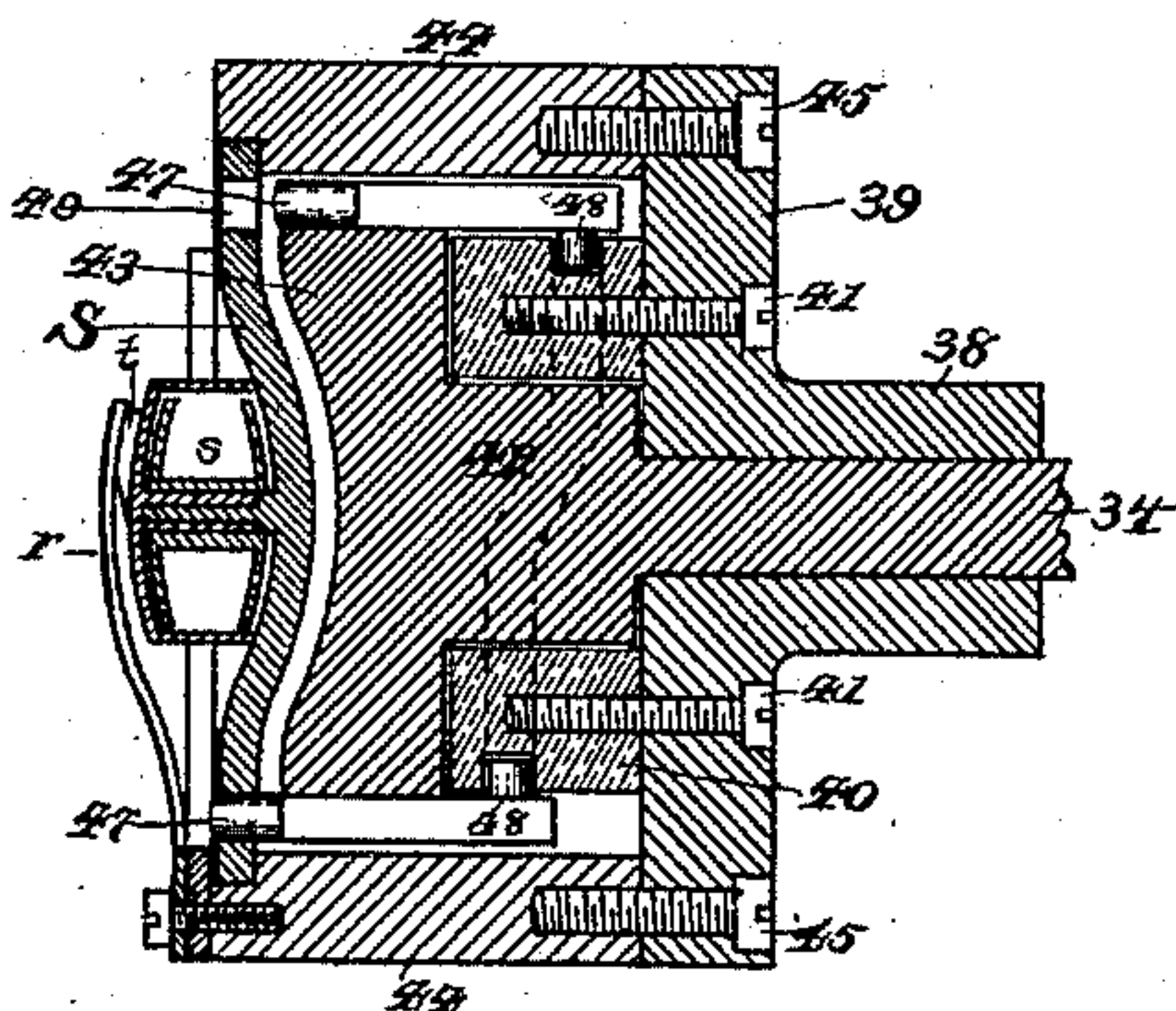


Fig. 25.

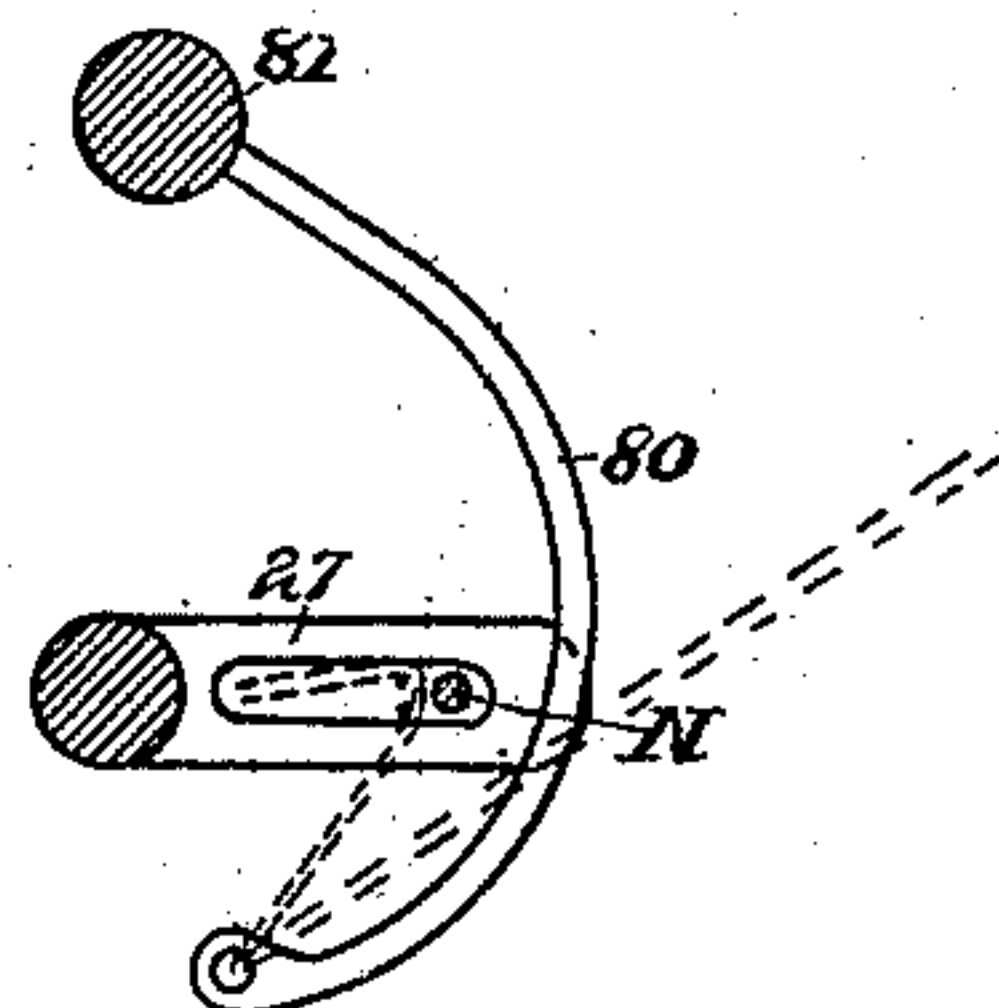


Fig. 27.

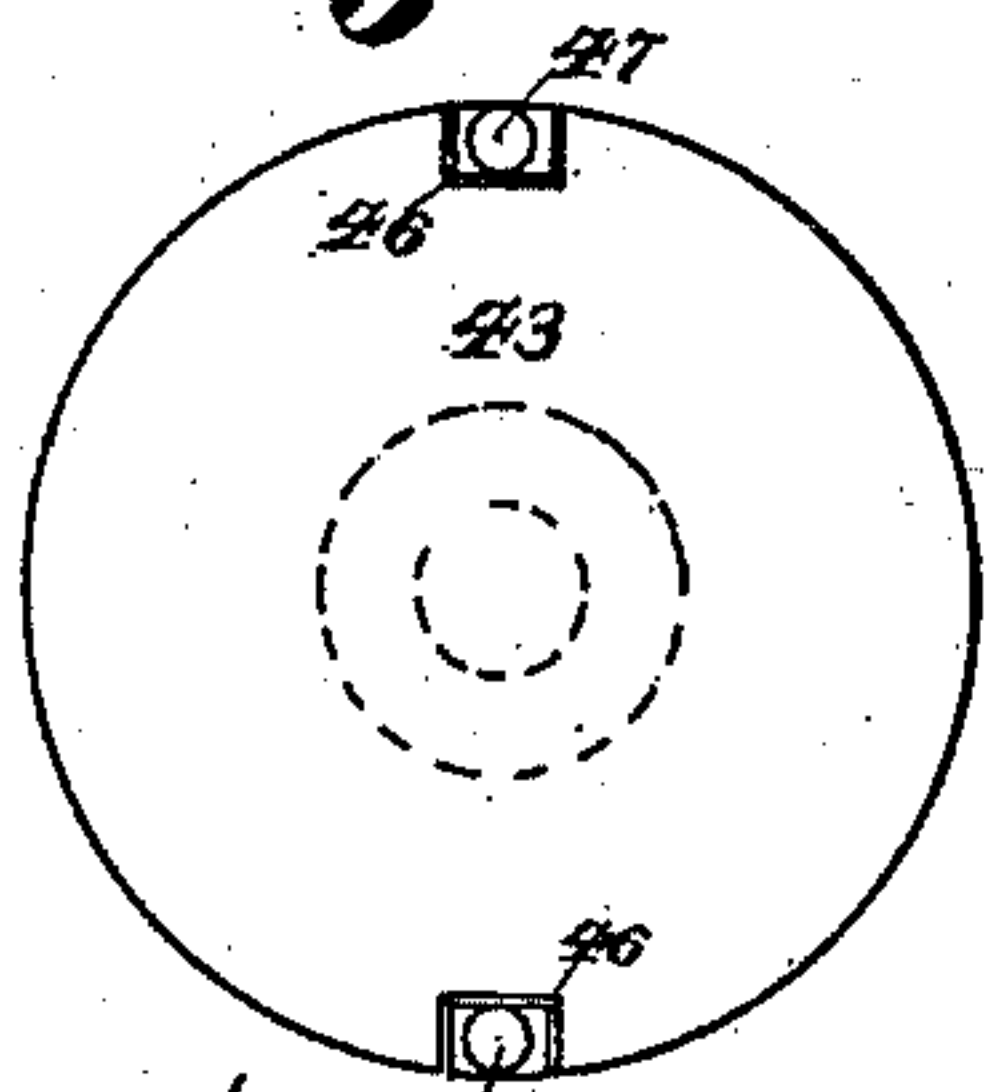
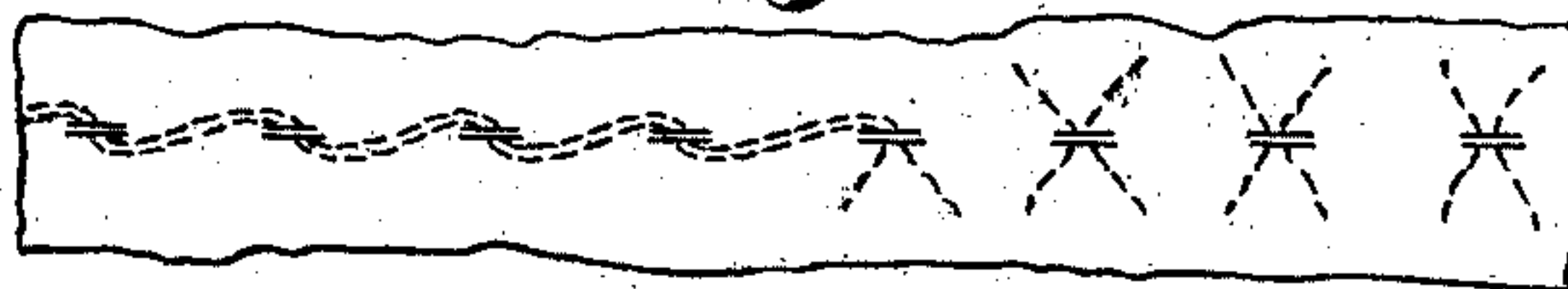


Fig. 28.



Fig. 29.



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UNITED STATES PATENT OFFICE.

LOUIS L. MILLER, OF NEWPORT, ASSIGNOR OF ONE-HALF TO FRANK H. PERKINS, OF COVINGTON, KENTUCKY.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 424,330, dated March 25, 1890.

Application filed April 9, 1889. Serial No. 306,583. (No model.)

To all whom it may concern:

Be it known that I, LOUIS L. MILLER, a citizen of the United States, and a resident of Newport, in the county of Campbell and State of Kentucky, have invented a certain new and useful Improvement in Sewing-Machines, of which the following is a specification.

My invention relates to a new machine adapted to making a new kind of stitch for quilting, which I term a "skip-and-lock stitch."

In quilting various kinds of materials it is desired to have the thread principally upon one side of the goods and still have the goods or material suitably stitched or fastened together by proper threads at intervals. This is essentially the case with sweat-collars for harness, saddle-pads, and other parts of harness where the presence of the thread upon one side of the material would rub the horse. By sewing these parts with my improved stitch the thread is principally on one side of the pad, and securely tied or quilted together at intervals. I have therefore invented a new machine as well as a new stitch for accomplishing these objects, also a new form of needle.

The various features of my invention will be fully set forth in the description of the accompanying drawings, making a part of this specification, in which—

Figure 1 is a side elevation of my improvement with one side of the frame removed. Fig. 2 is a bottom plan view. Fig. 3 is a top plan view of the working parts with the top of the frame removed. Fig. 4 is an elevation of the rear side of the machine opposite that shown in Fig. 1. Fig. 5 is a front elevation with the front portion of the frame removed. Fig. 6 is a section on line *xx*, Fig. 1. Figs. 7, 8, 9, 10, 11, 12, 13, 14, 15, and 16 are detail views of several driving-cams. Figs. 17, 18, 19, 20, 21, 22, 23, 24, and 25 are sectional diagrams of the stitching mechanism representing the parts in different positions in making the stitch. Fig. 26 is a central vertical cross-section of the rotating shuttle and its driving mechanism. Fig. 27 is a front elevation with the shuttle removed. Fig. 28 is an enlarged sec-

tional view of the stitch. Fig. 29 is a top plan view of the stitch, showing the floss under the stitch. Fig. 30 is a central section of thread-grip.

A represents the base of the frame. It is of shell form and provided with feet $A^1 A^2 A^3 A^4$.

B represents the upper portion of the frame, which is rigidly connected by bolts *b* to the base. It is also made of shell form and of suitable shape to protect the operating parts, which are journaled within the overhanging frame.

1 represents the main driving-shaft, supported by journal-brackets *a c* in the base of the frame. D represents the driving-wheel keyed upon said shaft. The several motions of the machine are communicated from this main shaft to the operating parts by cams.

E represents the needle-cam. (Shown in plan, Fig. 8.) This cam is preferably a groove cut in the face of the disk mounted on said main shaft.

2, Fig. 8, represents a friction-roller traveling in said cam-groove E. It is supported upon a lever 3, which is journaled upon the rear side of the frame at one end and the other pivoted to the pitman 4. Said pitman is pivoted to the crank-rod 5 of the crank 6, which is attached to the oscillating shaft 7, that is journaled upon the outside of the frame, as shown in Fig. 3, by bearings *d*. 8 represents a crank at the front end of said oscillating shaft 7.

9 represents a secondary crank pivoted to crank 8 at one end, the opposite end of which is pivoted to the head 10. Said head travels in a slot or way provided in the slide 11, which is moved laterally by the needle at the front end of the machine, as shown in Fig. 5.

12 represents the needle-bar, which is journaled in the said slide 11 at the top and bottom thereof. Said slide is in turn supported between the frame-pieces 13 14 and the front plate 15, as shown in Fig. 3, so as to reciprocate backward and forward between the arms or frames 13 and 14. The motions of the needle-bar are conveyed from the cam E through the crank-connections, oscillating shaft 7, cranks 8 and 9, and head 10, rigidly

secured to the needle-bar, while the reciprocating motion of the needle-bar slide 11 is obtained by other suitable mechanism. As the quilting is performed by this machine making one short stitch, then unthreading the needle, and making a long feeding movement, which would make a stitch were the needle threaded, it is necessary that this needle-arm slide 11 have two motions, one to make the short stitch and the other to make the long-space motion by reciprocation of the needle-bar.

G H represent cam-disks mounted upon shaft 1, each provided with cam-grooves *g h*. The working portion of one groove is set opposite the idle portion of the other, and vice versa. They are constructed so that during one revolution of said shaft 1 one of said cams *h* has reciprocated the needle-bar 7 a short distance after the needle has descended and passed through the cloth, and then the cam *h* moves slide 11 a short distance with the needle in the cloth. Then it stops, and the needle is retracted, when it is by the same cam moved back to its original position, and during the remaining portion of one revolution the other cam *g* operates the needle-bar. The needle descends through the cloth, and then the cam *g* moves the needle in the goods the long distance. Then the needle is retracted, when the cam *h* moves the said slide 11 back to its original position, thus making the needle-feed for both long and short spaces. This compound movement is accomplished by means of the studs or rolls traveling in cam-grooves *g h*. The roller 15 in groove *h* is supported upon the lever 16, which is hinged to connecting-rod 17, the other end of which is hinged to crank 18, which is keyed to the rock-shaft 19, journaled upon the top of the frame B. The other end of the rock-shaft 19 is provided with slotted crank 20, (see Fig. 5,) that engages with the stud-pin 21, projecting through the ear 22, which is attached to said slide 11. Now, the short lateral movement of the needle and needle-bar is made by means of this cam *h* and its connections to the rock-shaft 19 during one portion of the revolution of the main shaft 1, and during the remaining portion of said revolution the cam *g*, by means of the roller supported on lever 23, operating connecting-rod 24, and crank 25, connected to said rock-shaft 19, makes the long lateral or space movement of the slide 11, carrying the needle and needle-bar, the appropriate motions of the needle-bar being given by its own cam E and connecting mechanism.

26 represents the presser-foot bar, and 27 the presser-foot attached thereto. Said foot is provided with a slot, as shown in Figs. 18 and 25, through which the needle passes, and which is long enough to make the longest feed movement of the needle. I have shown said foot curved or hollowed out upon its under side, which is not essential to the opera-

tion, although it allows the goods to full up a little in said recess, which is sometimes desirable in quilting. It is necessary to have the said foot press upon the goods when the needle is withdrawn and to be raised when the needle is moved longitudinally with the goods for the two feeds, and these two vertical motions are made at the appropriate time during one revolution of the main shaft by means of the cam I, which is shown in plan, Fig. 7, 28 representing a stud journaled in the groove of cam I, supported by lever 29, hinged to the connecting-rod 30, which is loosely hinged at the other end to the oscillating lever 31, which is journaled with the frame by center 32, the forward end of which is supported in a wrist 33, which is rigidly connected to the foot-bar 26, so as to raise and lower said foot-bar by the oscillation or rocking of the lever 31. The cam-slot I is of suitable shape and adjustment so as to bring the foot down just before the needle is retracted or pulled out of the goods and held up during both the short and long longitudinal movements of the needle while in the goods.

The stitch is made by means of two threads, one of which is looped round the other by means of the revolving shuttle S. This shuttle is operated, preferably, by means of the secondary shaft 34, which is driven from shaft 1 by means of link 35, which is hinged to the disk 36 on the main shaft at one end, and to the other end is hinged to the crank 37 on shaft 34, which crank and link connections with the two shafts are such that the shuttle is revolved at the appropriate variable speed during the parts of the said revolution. Shaft 34 journals in the sleeve 38, which is a part of the bracket 39.

40 represents a disk rigidly attached to the bracket 39 by screws 41. The forward end of shaft 34 is provided with a boss 42, which journals in said disk 40, and to this boss 42 is attached a disk 43. The shaft, boss, and disk are shown integral.

44 represents a cylinder secured to the bracket 39 by screws 45, which cylinder forms a journal-support for the disk 43. Said disk is provided with notches 46, which form ways for the driving-pins 47. Said pins 47 are provided with friction-rollers 48, which engage in the cam-groove K, cut in the disk 40, a plan of which is shown in Fig. 16. The configuration of this cam-groove K is such that during half of a revolution one of said pins 47 is projected outward and engages with the orifice pierced in the shuttle S, and the opposite pin is retracted during said portion, and vice versa, so that one pin is alternately engaged with the shuttle S while the other is retracted. This cam is so adjusted that each pin is disengaged from connection with the shuttle during the upper half of its revolution and engaged during the lower part of the revolution, and allows the thread to be

drawn off from the shuttle S, so as to allow said shuttle to revolve and lock a stitch each revolution.

The proper form of shuttle is shown in elevations, Figs. 17 to 24.

s represents the bobbin-case, with a thread-orifice on the outer side.

t represents a lug projecting from the bobbin-case.

7, Fig. 5, represents an arm attached to the case, the upper end being forked, engaging with a lug t, so as to hold the bobbin-case from turning.

49 and 50 represent orifices in the shuttle for the pins 47 to engage with alternately, so as to drive said shuttle by the revolution of the shaft 34.

L represents a looping-finger, which is pivoted to the bracket 51, which is attached upon the vertically-moving arm 52. This arm is operated by means of the rock-lever 53 and connected to said arm 52 by means of link 54, and the pitman 55, pivoted to the bell-crank arm 56, which is provided with stud 57, traveling in the cam-groove 58. In order that this looping-finger may be moved longitudinally in front and behind the needle, the arm 52 is provided with the stud 90, engaging with slot 91 of stationary arm 92. The shape of the slot is such that as said arm 52 is moved backward it is raised up by the incline of the slot for a purpose which will be hereinafter explained. This looping-finger is operated in time-movements with the needle. It is hinged so that it will swing horizontally as it moves forward past the needle, the spring m bringing it back into position. (See Fig. 22.)

In the operation of this machine the needle is unthreaded for making the skip movement; and to take up the slack and also to provide sufficient thread to make the stitch I have provided the following devices: M represents a cam operating the stud 59, traveling in said groove, supported by the bell-crank lever 60. The forward end of said lever carries a pin 61, which travels in the spiral groove 62, formed in the periphery of the shaft 63. On the top of said shaft 63 is mounted a disk 64, carrying forked arms 65, in which are journaled anti-friction rollers 66. 67 represents another arm carrying two thread-rollers 68 and 69, journaled between the forks of said arms 67. (See Fig. 17.) This disk 64 is rotated by its spiral shaft to move the arms and thread-carrying rollers to and from the needle. N represents the needle. It is shown having an open eye n and two barbs o p, one the top and the other the bottom of said eye. The thread is placed in this small groove n to make the stitch after the needle has been passed through the goods. T represents the threader. It is mounted upon the top of the shaft 70, which is provided with a spiral groove and driven by means of the crank-shaft 71, (see Fig. 2,) operated by crank 72, which is provided with roller 73, engaging

with the cam 74, which is shown in plan, Fig. 14, which cam is mounted on shaft 1, and the forward end of crank-shaft 71 is provided with a crank-arm 75 and crank-pin 76, which travels in spiral groove 77. (See Fig. 20.) This spiral and the crank and link connections with the main shaft are so arranged that the threader T (the forward end of which is provided with an eye 79, carrying the thread) is thrown round so as to place the thread into the eye n of the needle at the appropriate time for making the stitch.

78 represents a coil-spring for holding the stud against the cam.

It is sometimes desirable to use a finishing tuft formed from yarn laid over the goods just before the stitch is made, so as to form a tuft when the loops of the yarn are cut away between the stitches. In order to lay in this yarn, I provide an oscillating arm 80, which is provided with an eye at its front end, through which is passed the tufting-thread. This arm is of such shape and located with reference to the needle that the arm 80 is oscillated round, passing yarn under the needle, and it is held in that position until the stitch has been made which binds the yarn, when the arm slides back ready for a second operation. This arm is shown in Figs. 24 and 25. This arm 80 is mounted upon the oscillating shaft 81, which is driven intermittently by means of the spiral groove 82, operated by means of the cam-groove 83, stud 84, suspended upon bell-crank lever 85, which bell-crank is placed opposite the bell-crank 56, as shown in bottom plan view, Fig. 2, and by connecting-rod connecting it to the oscillating arm 86, which is shown in top plan view, Fig. 3. To the forward end of said arm 86 is attached a stud 87, that travels in the spiral 82. (See Figs. 1 and 6.)

88 represents the center of oscillating arm 86.

In order that the thread may be held by appropriate tension when the needle is unthreaded, I have provided an automatic grip-tension device, which is constructed as follows: 93 represents a shaft carrying a spiral spring-seat 94. Said shaft journals in the frame A, so as to slide in or out. 95 represents a coil-spring, normally holding the pulling-disk 97 against disk 98, so as to form a tension for the thread v, which is compressed between them. 99 represents a roller journaled in the end of shaft 93, and it bears against the periphery of the cam 58, which is shown in elevation, Fig. 13. The shape of the cam is such as to open the tension-disks so as to allow the thread to pass through loosely when the needle is pulling the thread through the goods, and to close when the take-up is drawing the thread to tighten the stitch, forming an automatic friction clutch and release. 100 represents screw-threads on shaft 93, engaging with nut 101, for regulating the tension of spring 95.

The machine is threaded as follows: A bob-

bin of thread is inserted into shuttle S. The thread *w*, wound on said bobbin, is pulled through the orifice of the case up through the throat of the machine. Thread *v* passes from
 5 spool 103 through the loop of the take-up spring 104; thence through the tension 97 98; thence along the back of the machine over roller 105; thence through guide 106, under the base of the machine, (see Figs. 4, 17 to 24;)
 10 thence through the eye of the threader T; then up through the throat of the machine.

The skip-and-lock stitch is shown complete in Fig. 28, which is enlarged to show the position of the thread to the goods, the loop of
 15 the thread being embedded slightly in the face of the goods, and the line of stitches being maintained by thread on the back side of the goods. This skip-and-lock stitch is formed as follows: Fig. 17 represents the position of
 20 the parts when a stitch has been completed ready to form another. The foot 27 rests on the goods; the needle descends through the goods; then the foot rises when the parts are in position shown in Fig. 19, the stitch or line-
 25 thread *v* being in front of the needle when the needle moves with the goods a short distance in slot of the foot; when the threader T moves around the needle, placing the thread in the slot of the needle, as shown in Fig. 20;
 30 when the needle rises and pulls the thread up through the goods, making the part of the stitch indicated at *l*, Fig. 28. The threader meantime moving back to position, the needle is moved by the needle-arm forward to its
 35 original position, (shown in Fig. 17,) when the looper-finger L moves back, catches the thread *v*, and holds it, as shown in Fig. 21; when the needle descends through the goods in the path *l'*, Fig. 28, and occupies the position more fully shown in Fig. 22. The needle
 40 rises slightly and pauses momentarily to form a slack *i*, when the hook of the shuttle engages this loop and moves rapidly, pulling thread *v*, as shown in Fig. 28, out of the needle-eye when the needle moves its long distance backward, making the long space *f*, Fig.
 45 28, the shuttle S passing around till the heel or notch has passed the center of its axis, (see Fig. 24,) when the take-up arm 65 (see Fig. 18) pulls the thread *v* off the shuttle S and
 50 draws the stitch tight, the tension-grip 97 98 grasping the thread *v* to hold it against the pull of take-up arm 65. During the movement of shuttle S, pulling the thread *v*, the
 55 needle, which has moved backward, carrying the goods the long or skip space, rises and moves forward into position over the goods, and then descends to receive the thread, which has been pulled to draw the stitch which fur-
 60 nishes slack for the threader T to carry into the notch of the needle after it descends in the path *l*, as above stated, and shown by Fig. 17.

In Figs. 17, 19, 20, 21, 22, and 23 I have shown
 65 the different positions of the stitch mechanism according to the successive steps. The

tufting apparatus is omitted in these figures, as it may or may not be used, as desired.

In the plans, Figs. 24 and 25, I have shown the yarn or tufting-arm with the dotted lines
 70 indicating the yarn, which is brought round by said arm 80 under the needle, so as to be caught by the stitching-thread, the needle passing up one side of said yarn and descending on the opposite side, tying it down, as
 75 shown in Fig. 29, part of the yarn being shown continuous and the stitch cut away to show the tufted ends.

The machine and devices herein shown operate on the same general principles as shown
 80 in my application filed May 29, 1888, No. 275,452; but I have shown herein the most approved form of mechanism.

The method of making the skip-and-lock stitch forms the subject of a separate ap-
 85 plication filed by me April 19, 1889, No. 307,676, and the needle is embraced in another application, No. 307,677, filed April 19, 1889.

Having described my invention, what I claim is—

1. In combination with the needle-bar carrying the open-eyed needle N, the threader T, oscillating to and from said needle at each alternate movement thereof, the revolving shuttle S, provided with a hook for engaging the
 90 thread passing through the loop and unthreading the needle and pulling the shuttle-thread through said loop to draw the stitch, and mechanism for operating the parts, substantially as specified.

2. In combination with the needle-bar and the open-eye needle, the threader T, for placing the thread in the eye of the needle, the revolving shuttle S, rotated close to said needle and provided with hook for engaging and
 95 unthreading the same, and mechanism for operating the threader and shuttle intermittently at each alternate movement of the needle, substantially as specified.

3. In a sewing-machine, the combination of
 100 the needle-bar carrying the needle N, having the open eye *n*, and driven by mechanism for stopping the needle on each alternate upward movement to form the slack *i*, and the shuttle S, carrying a thread and engaging with
 105 said slack to unthread the needle and pull the shuttle-thread through said loop and make a skip-stitch, substantially as described.

4. In a sewing-machine, the combination of a vertically-reciprocating needle, a needle-
 120 bar, a horizontally-reciprocating slide in which said bar is mounted, and mechanism, substantially as described, for imparting an alternate long and short movement to said slide in the line of the feed, substantially as
 125 set forth.

5. In a sewing-machine, the combination of the elongated slotted presser-foot, a vertically-reciprocating needle-bar and needle, a hori-
 130 zontally-reciprocating slide in which said needle-bar is mounted, mechanism for imparting an alternate long and short movement to said

slide in the line of the feed, mechanism for moving the needle-bar vertically between each horizontal movement of the slide, and mechanism for moving the presser-foot up and down alternately with the horizontal movement of the needle, substantially as described.

6. In a sewing-machine, the combination, with the needle and needle-bar, of the horizontally-reciprocating slide 11, forming a support for the needle-bar, mechanism for moving the said slide alternately a long and short step in the line of the feed, and mechanism for vertically reciprocating the needle-bar between each movement of the slide, substantially as described.

7. In a sewing-machine, the combination of a vertically-reciprocating needle-bar, a horizontally-reciprocating slide in which said needle-bar is mounted, a rock-shaft connected with said slide, and a driving-shaft provided with cams connected with said rock-shaft and adapted to impart an alternate long and short movement to the slide in the line of the feed at each revolution of the driving-shaft, substantially as described.

8. In a sewing-machine, the combination of an open-eyed needle, a vertically-reciprocating needle-bar, a horizontally-reciprocating slide in which said needle-bar is mounted, mechanism for imparting an alternate long and short movement of said slide in the line of the feed, a revolving shuttle, and means, substantially as described, for imparting a vertical movement to the needle-bar twice during each revolution of the shuttle and to stop said bar when rising in one of said movements to permit the unthreading of the needle, substantially as described.

9. In a sewing-machine, the combination of an open-eyed needle, a vertically and horizontally reciprocating needle-bar, the oscillatory threader T, a revolving shuttle, and mechanism for oscillating the threader to and from the needle at each alternate movement thereof, substantially as described.

10. In a sewing-machine, the combination, with the vertically-reciprocating open-eyed needle carried by a needle-bar supported in a horizontally-reciprocating slide 11, having an alternate long and short movement, of the threader T, and mechanism for oscillating the same to thread the needle before the short movement, and the revolving shuttle S, provided with a mechanism for unthreading the needle at the end of each short movement, substantially as described.

11. In a sewing-machine, the combination of the open-eyed needle N, the needle-bar 12, journaled in a horizontally-reciprocating slide 11, mechanism for reciprocating the needle vertically and moving it in the line of the feed while in the cloth alternately a long and short distance, the oscillatory threader T, the looping-finger L, and the revolving shuttle S, substantially as described.

12. In a sewing-machine, the combination

of the open-eyed needle N, mechanism for reciprocating the needle vertically and horizontally, the looping-finger L, mounted upon the reciprocating arm 52, mechanism for moving said looping-finger around the needle at each alternate vertical movement of the needle, the threader T, and the revolving shuttle S, substantially as described.

13. In a sewing-machine, in combination with a needle-bar carrying an open-eyed needle and mechanism for threading and unthreading the needle at each alternate needle movement, the looper-finger L, pivoted to arm 52, held normally in position by a retractile spring, which is moved by a cam at each alternate movement of the needle to allow the looping-finger L to cross the path of the needle, substantially as specified.

14. In a sewing-machine, the combination, with the open-eyed needle N, of the threader T, and mechanism for operating the same alternately to the reciprocating movement of the needle, the take-up arm 64, and mechanism for operating said arm to take up the slack at the end of the unthreading shuttle movement, substantially as specified.

15. The combination, with an open-eyed needle and a stitch-forming mechanism, of the hinged and horizontally-swinging looper-finger L, the vertically-movable arm 52 supporting said finger, and the bar 92, provided with a slot 91, serving as a guide to direct the movement of the arm 52, substantially as described.

16. The combination, with the looping-finger, an open-eye needle, and a revolving shuttle, of the spirally-grooved shaft 63, the disk 64, mounted on the upper end of said shaft and carrying forked arms 65 and anti-friction rollers 66, the lever 60, having a pin 61, engaging the spirally-grooved shaft, and mechanism connecting said lever with the main shaft, substantially as described.

17. The combination, with the open-eyed needle N and mechanism for imparting thereto a vertical movement and for moving it alternately a long and short distance in the cloth to form a skip-and-lock stitch, of the oscillatory threader T, having an eye 79, the looping finger L, and the revolving shuttle S, provided with an unthreading-hook, substantially as described.

18. In combination with the open-eyed needle N and mechanism for operating the same to form a skip-and-lock stitch, the oscillating arm 80, provided with an eye, and mechanism for oscillating it across the path of the needle at each alternate movement of the needle, whereby the yarn is laid across and bound under the stitch-thread, substantially as herein specified.

19. In combination with the vertically and horizontally reciprocating needle of a sewing-machine and mechanism for operating the same to form a skip-and-lock stitch, the oscillating arm 80, provided with an eye for carry-

ing a third thread, and mechanism for oscillating the same in time movements with the needle, so as to carry the said thread across the path of the needle, which moves up on one side and passes down upon the other side of said thread, substantially as specified.

20. In a sewing-machine, the combination, with the needle, the needle-bar 12, and the horizontally-reciprocating slide 11, in which the needle-bar is mounted, of the shaft 1, provided with a cam E, and connecting mechanism for reciprocating the needle-bar vertically, and with grooved cam-disks G H, and connecting mechanism for imparting an alternate long and short movement to the horizontally-reciprocating slide, substantially as described.

21. In a sewing-machine, the combination, with the vertically and horizontally reciprocating needle N, the threader T, the revolving

shuttle S, the looping-finger L, and a take-up mechanism, of the main driving-shaft 1, provided with cams and connecting mechanism, whereby said parts are operated in time movements, substantially as described.

22. In a sewing-machine, the combination, with a vertically and horizontally reciprocating open-eyed needle and a revolving shuttle having an unthreading-hook, of an automatic grip tension comprising the shaft 93, having a spring-seat 94, the spring 95, the disks 97 and 98, the roller 99, and the cam 58 on the main driving-shaft, substantially as described.

In testimony whereof I have hereunto set my hand.

LOUIS L. MILLER.

Witnesses:

EDWARD BOYD,
T. SIMMONS.