

No. 875,751.

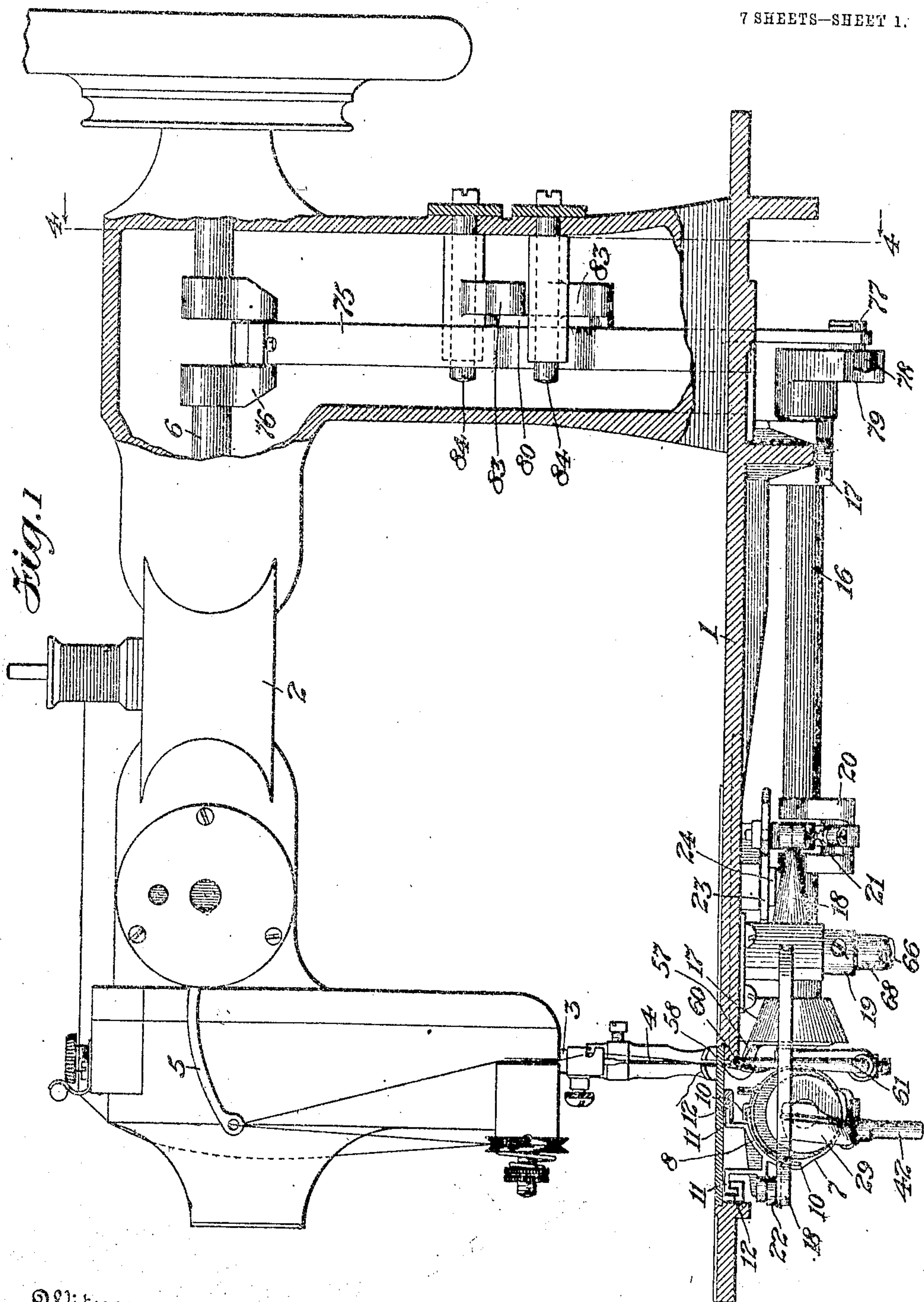
PATENTED JAN. 7, 1908.

J. VANNETTE.

UNDER THREAD MECHANISM FOR SEWING MACHINES.

APPLICATION FILED FEB. 23, 1906.

7 SHEETS—SHEET 1.



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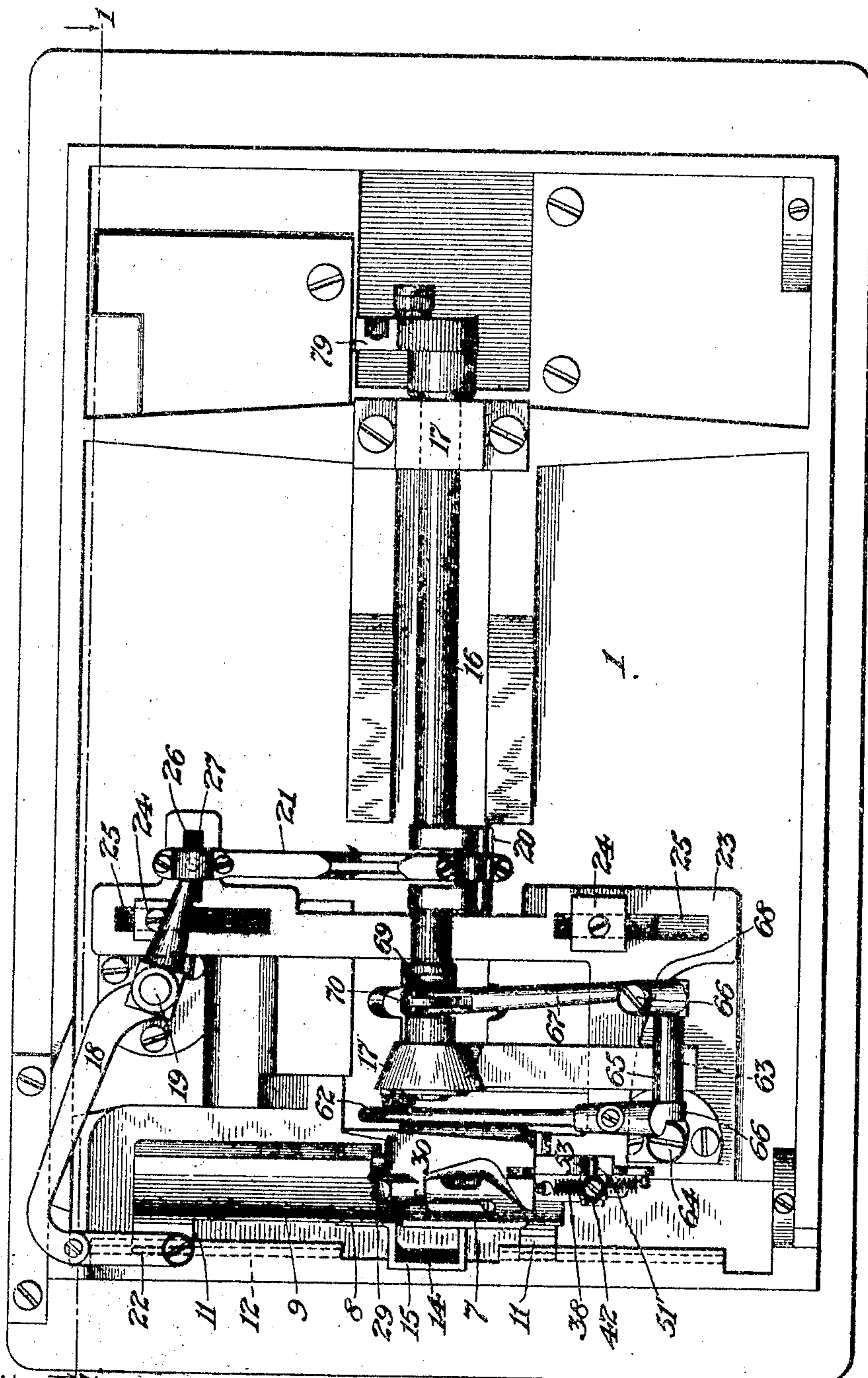
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7 SHEETS—SHEET 2.

Fig. 2



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Fig. 3

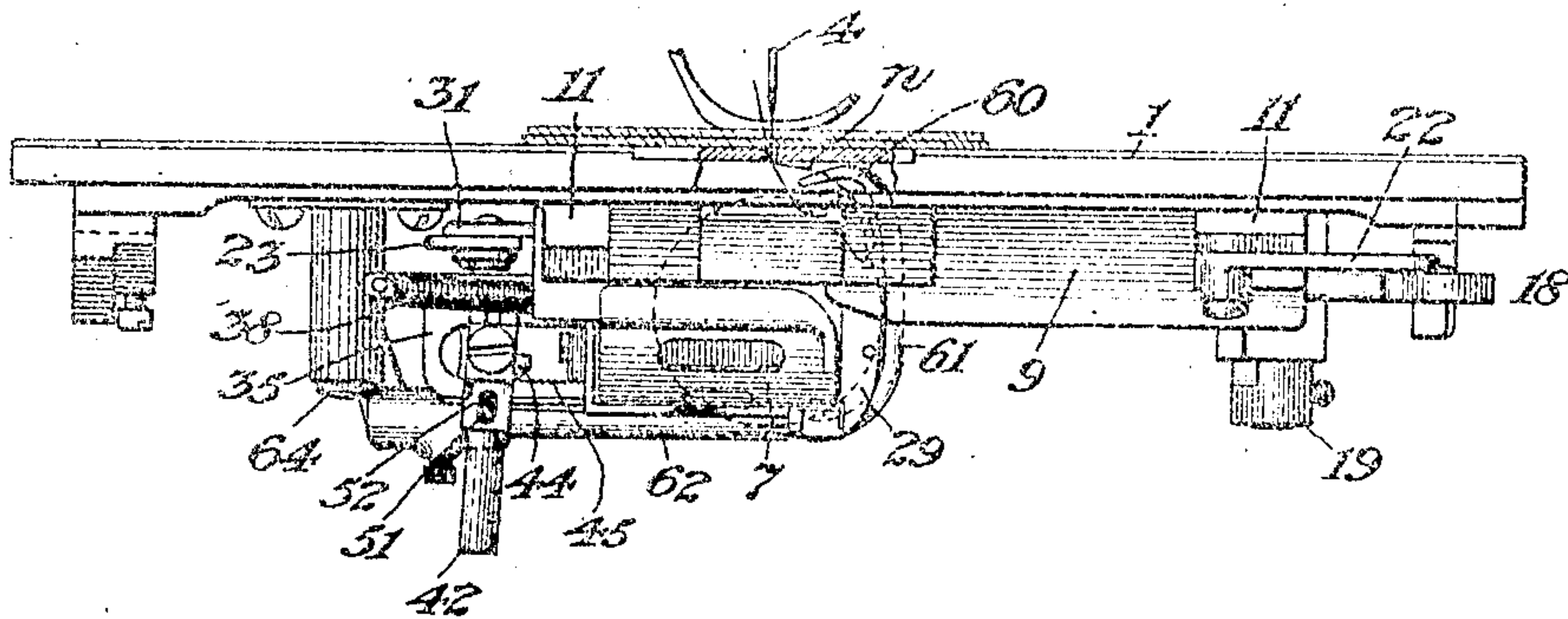


Fig. 5

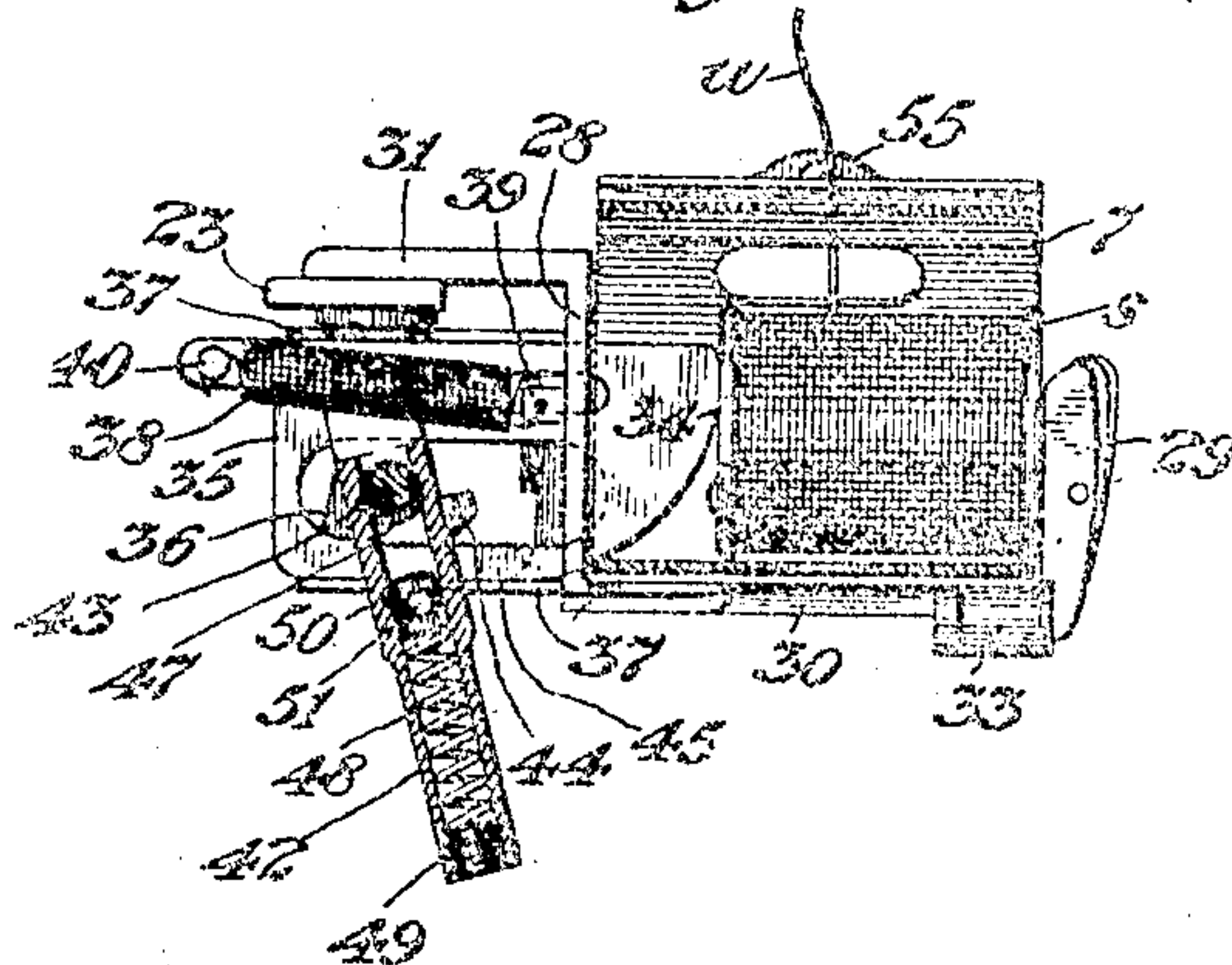
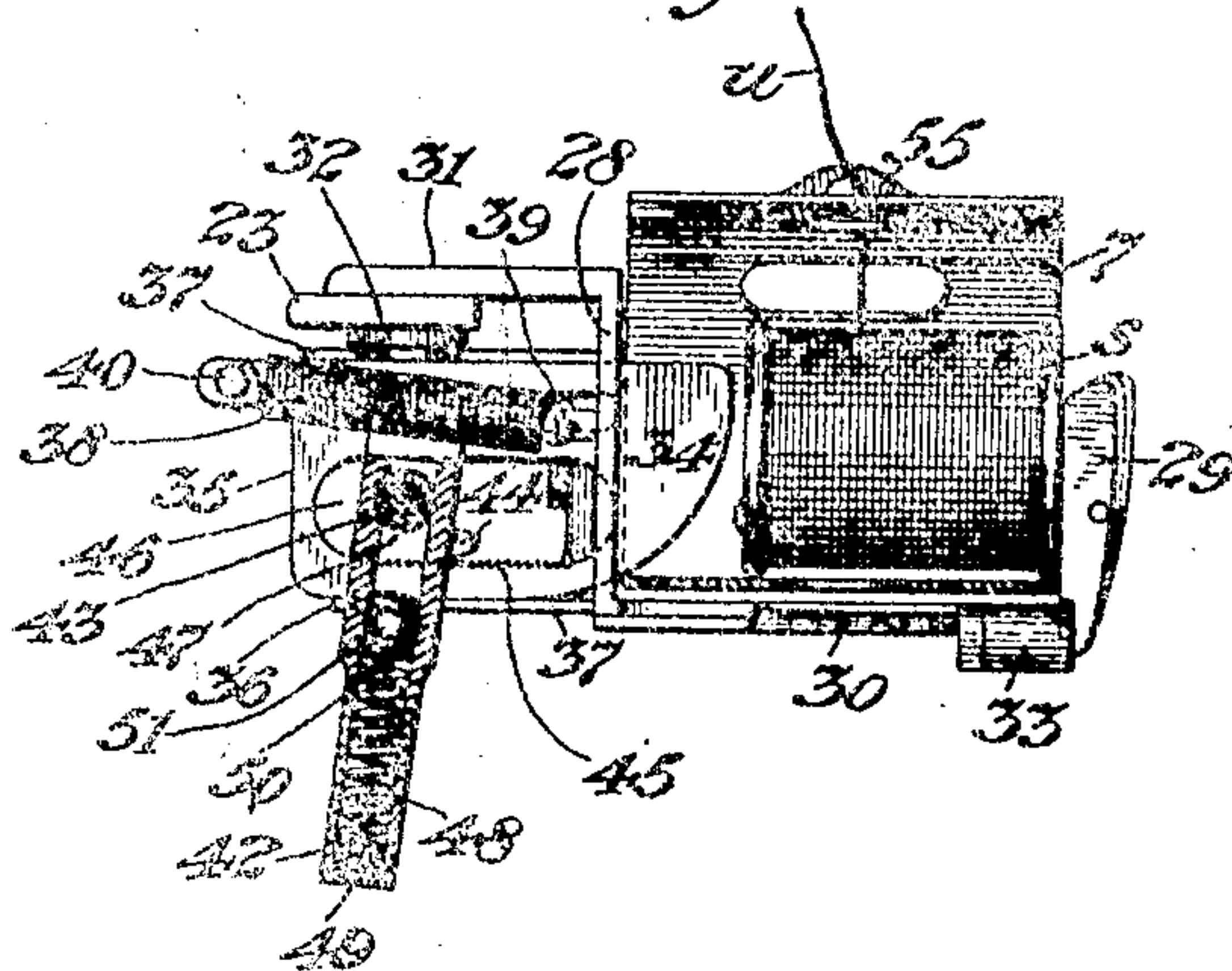


Fig. 6



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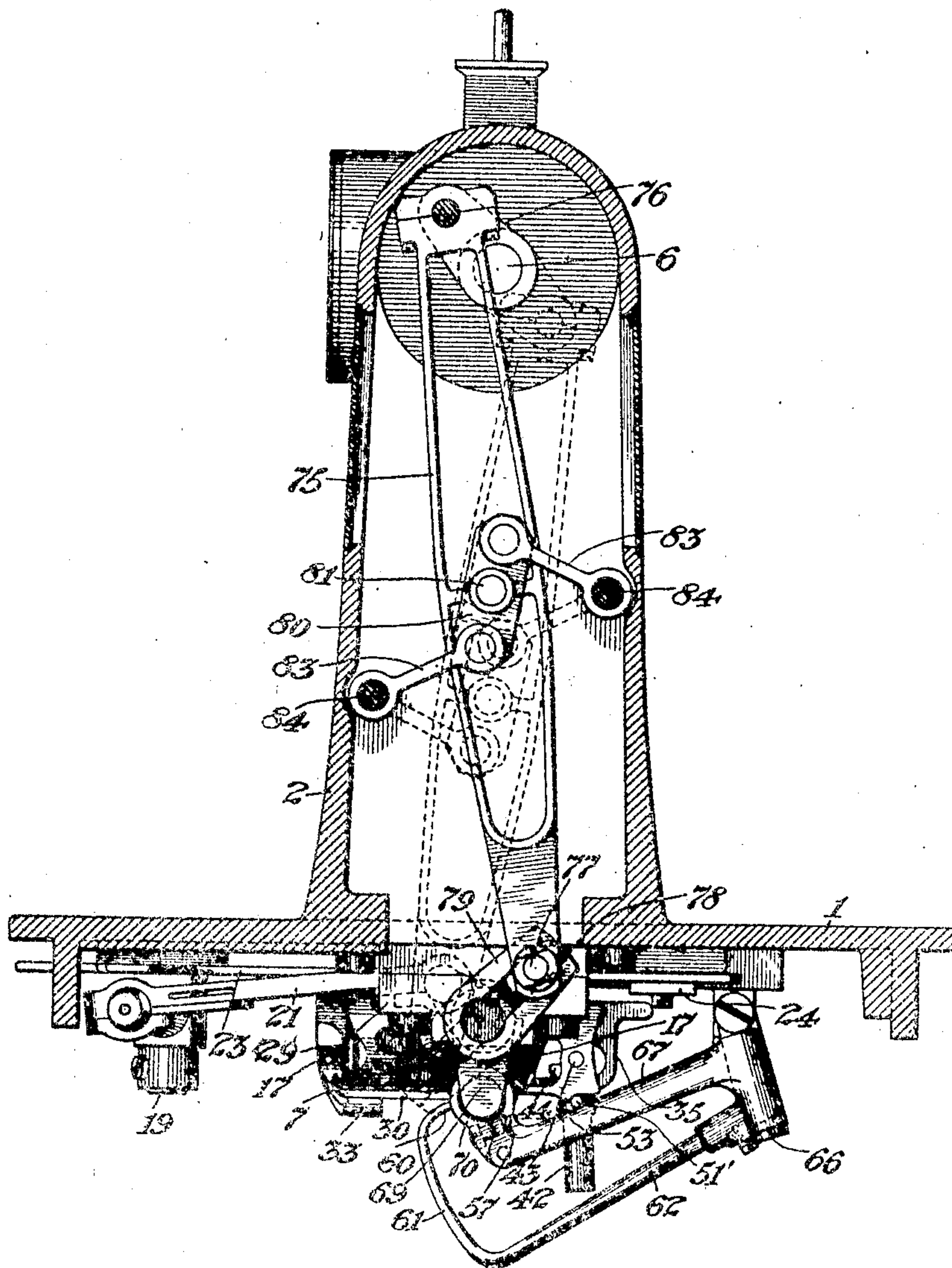
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7 SHEETS—SHEET 4.

Fig. 4.



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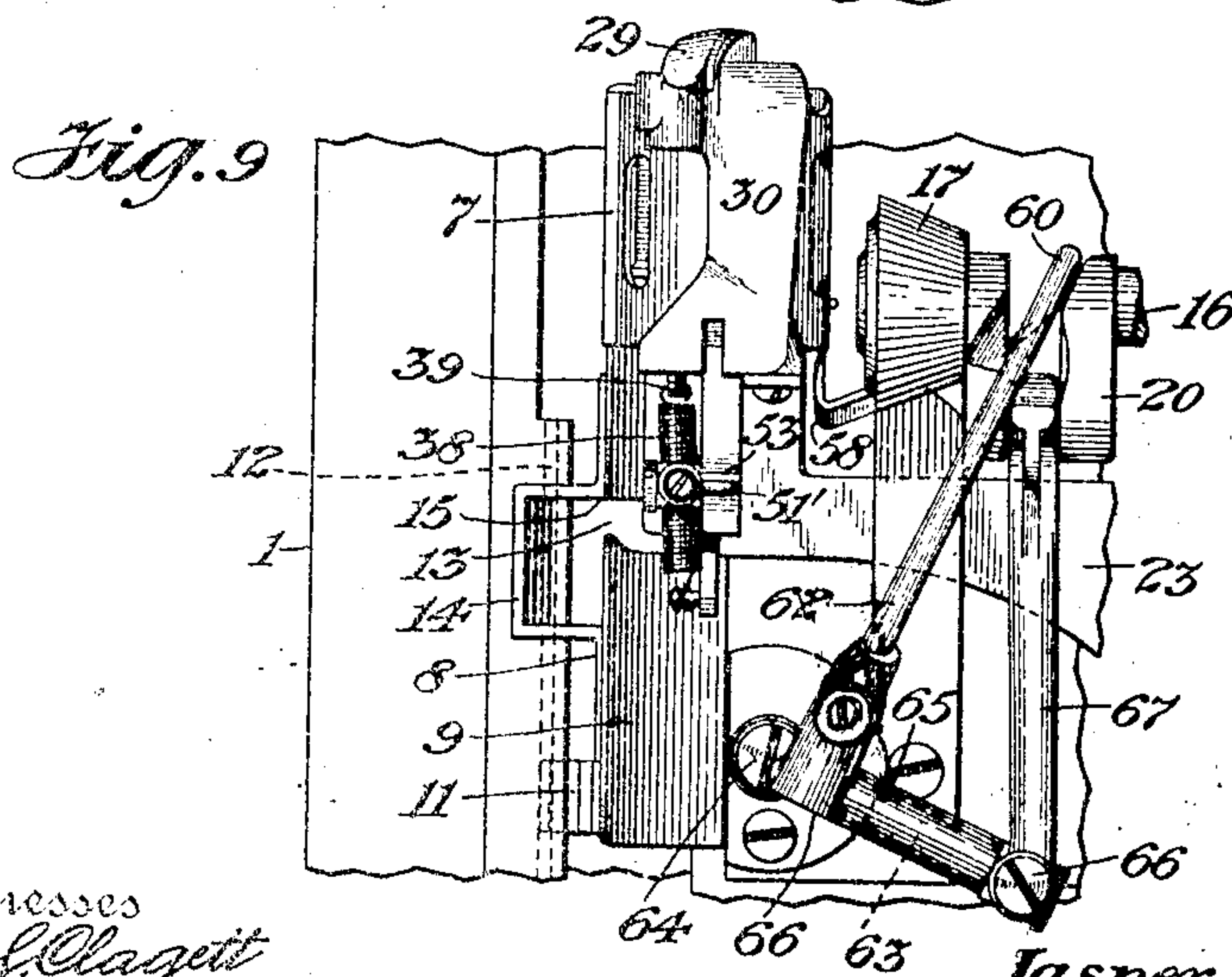
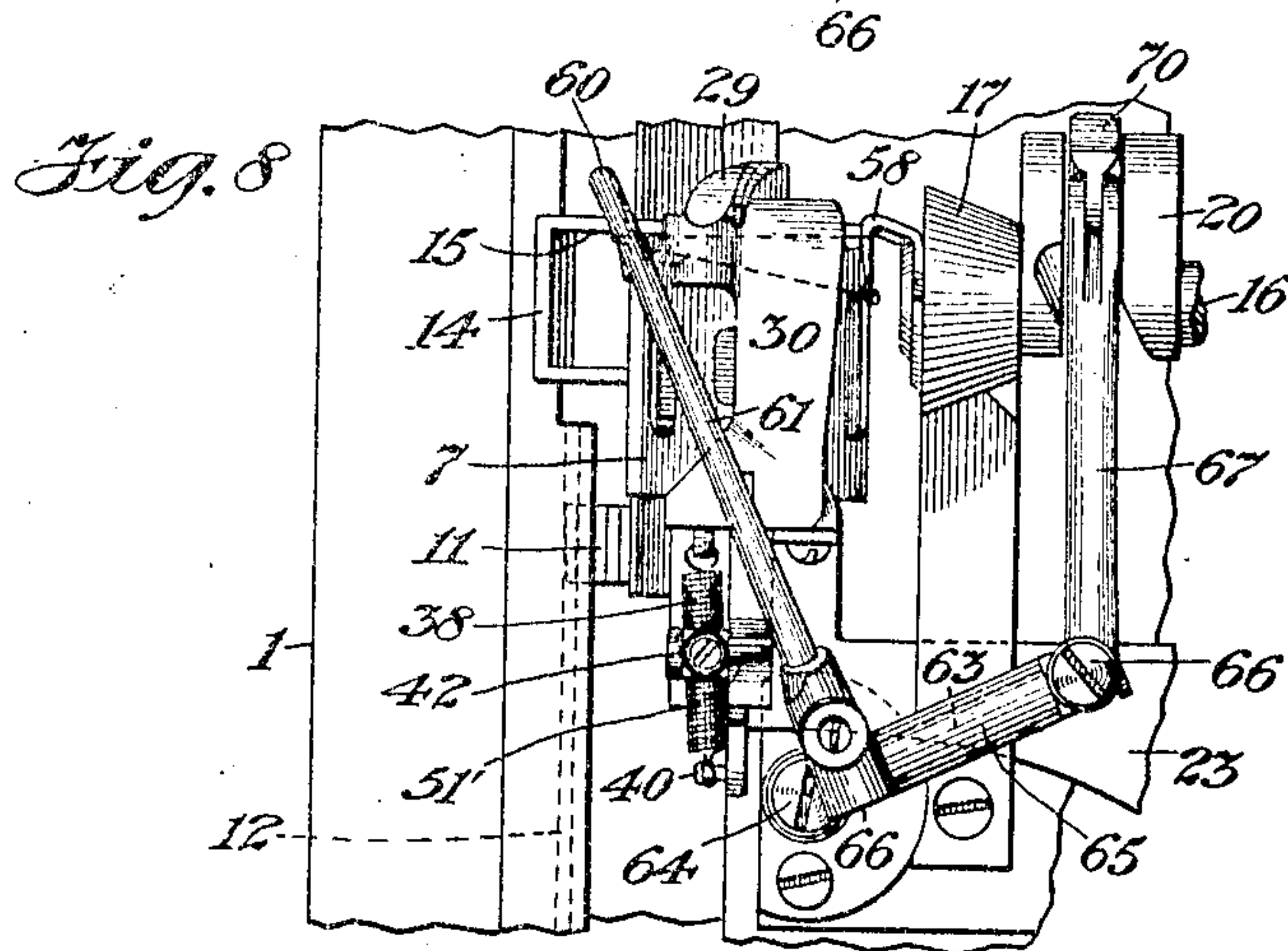
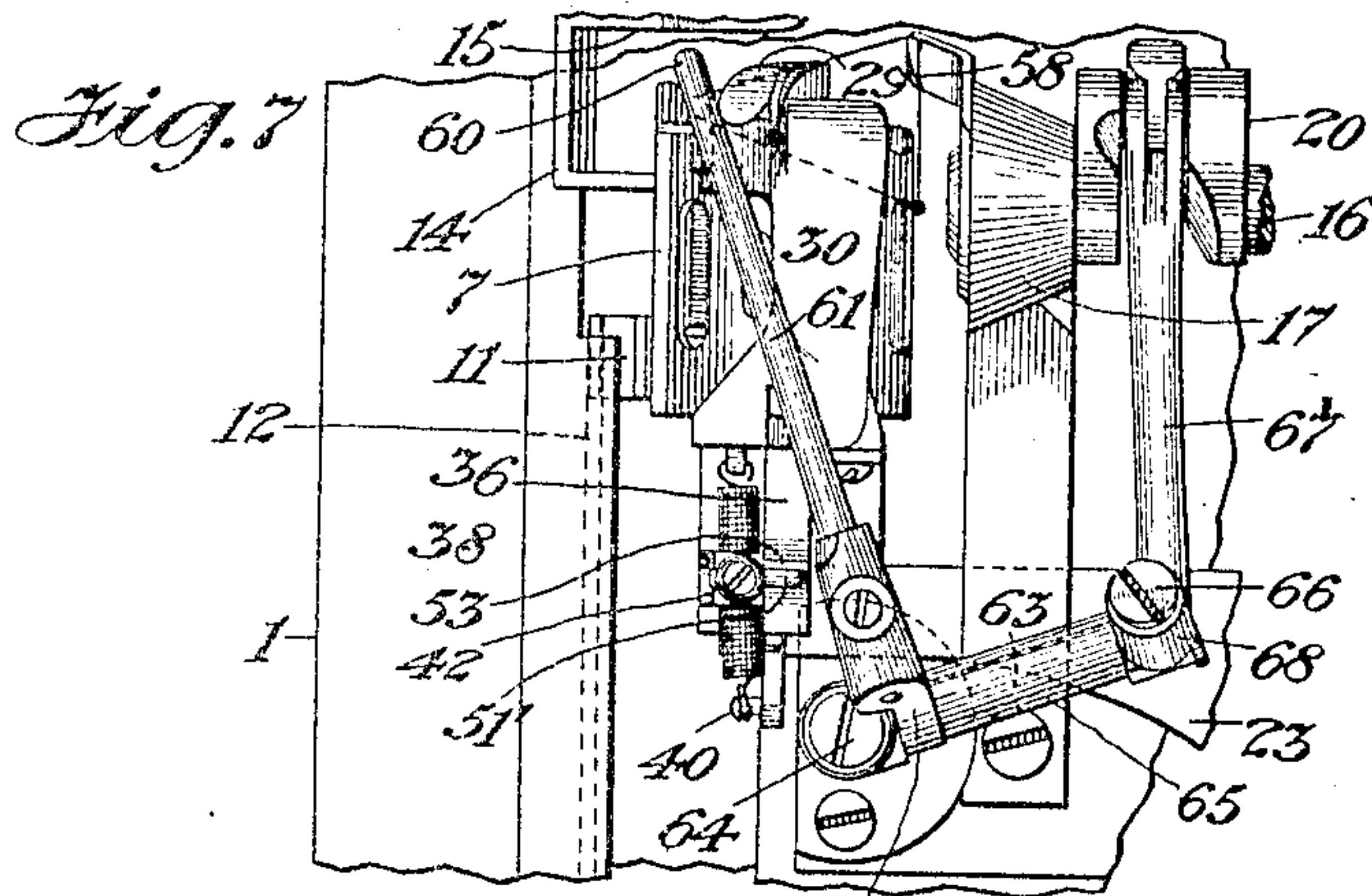
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7 SHEETS—SHEET 5.



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Fig. 10

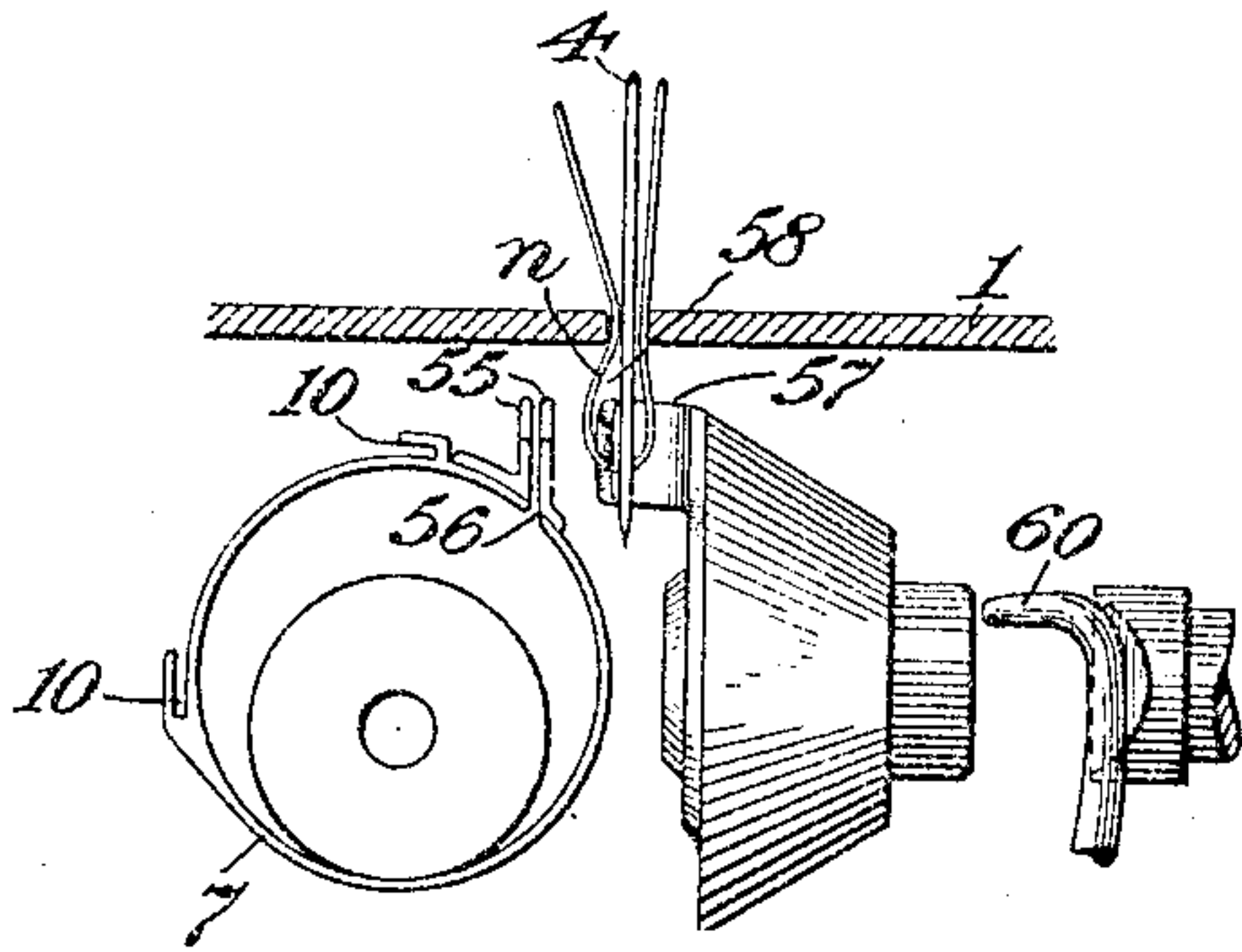


Fig. 11

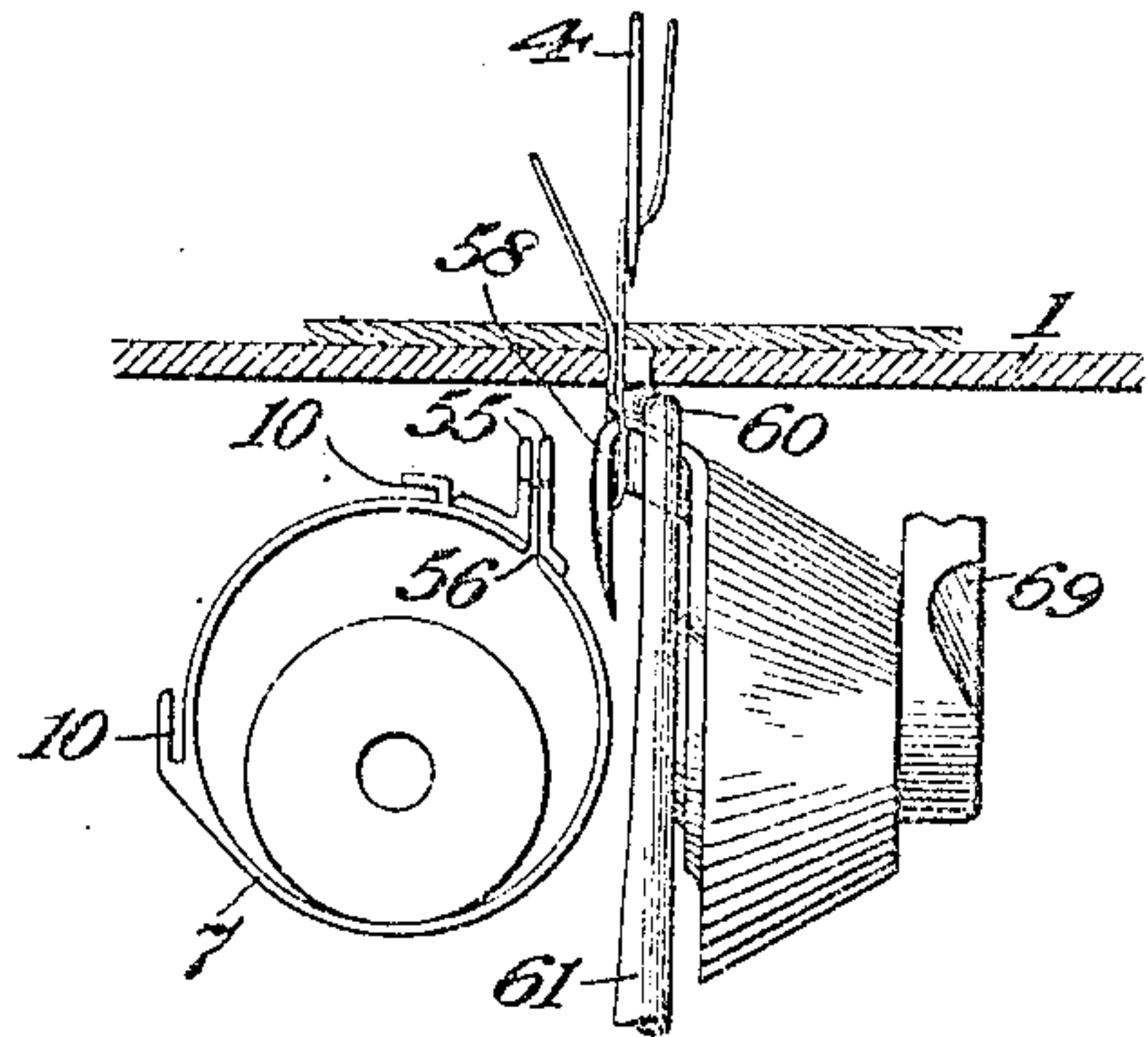


Fig. 12

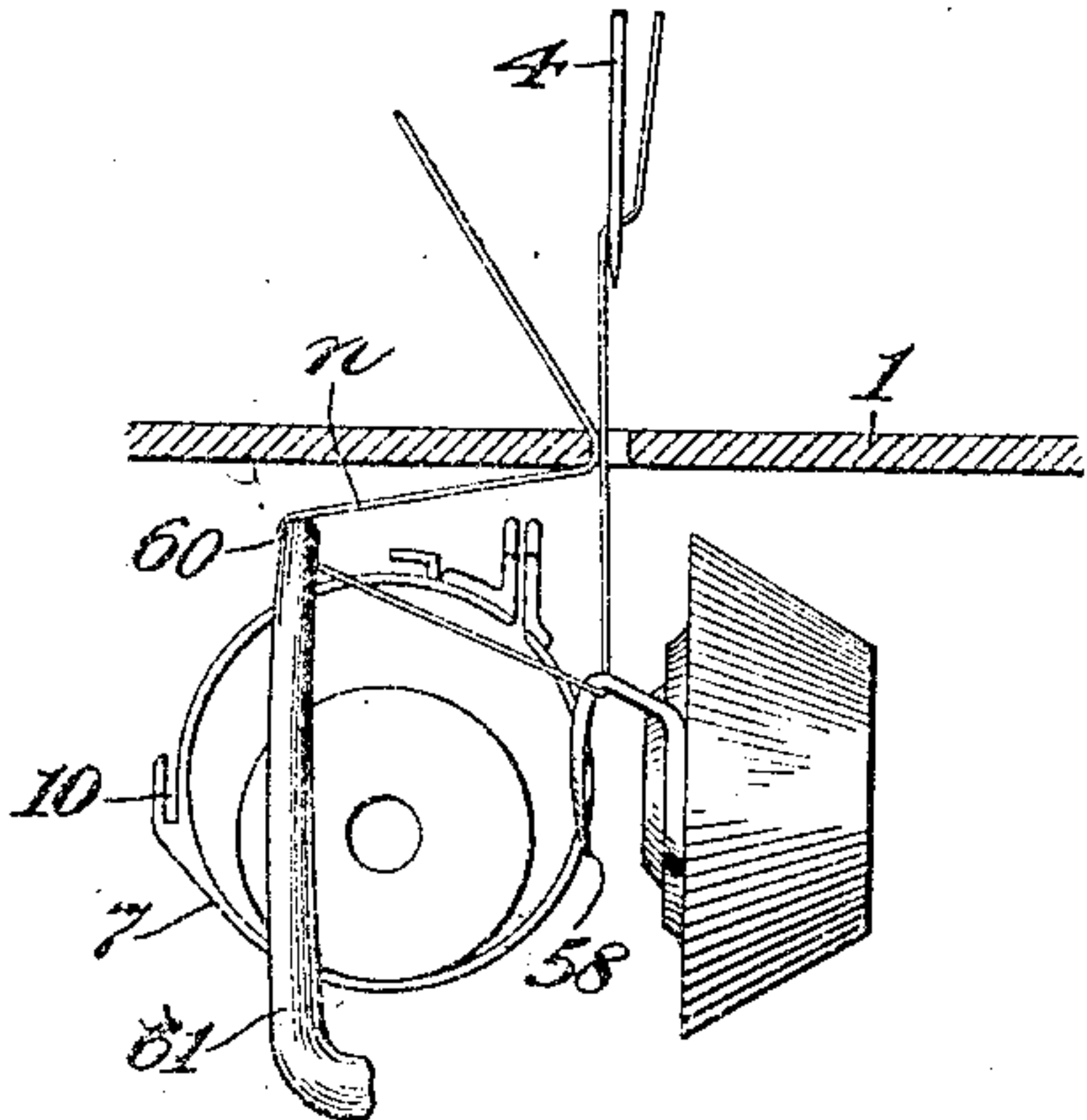


Fig. 13

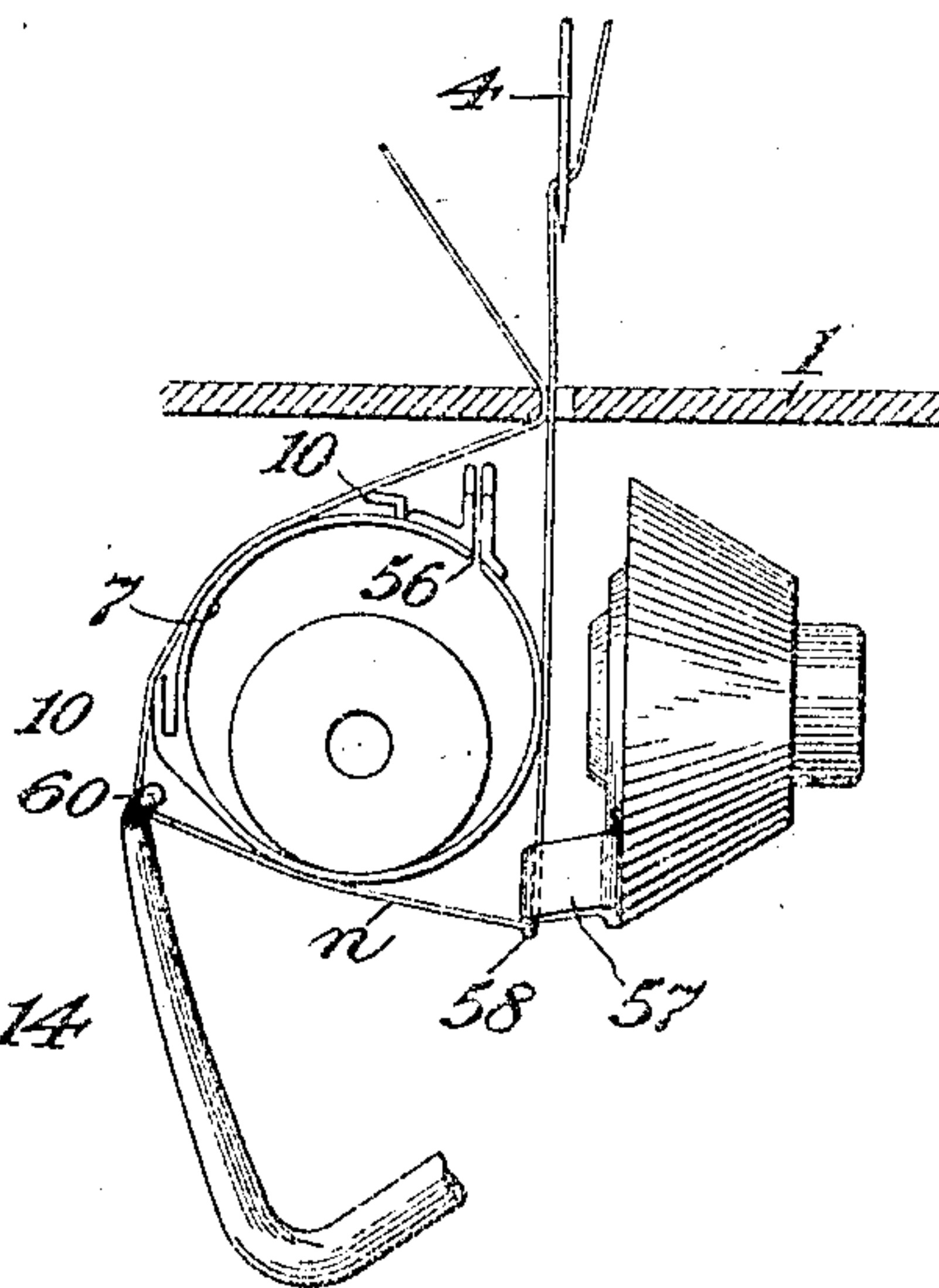
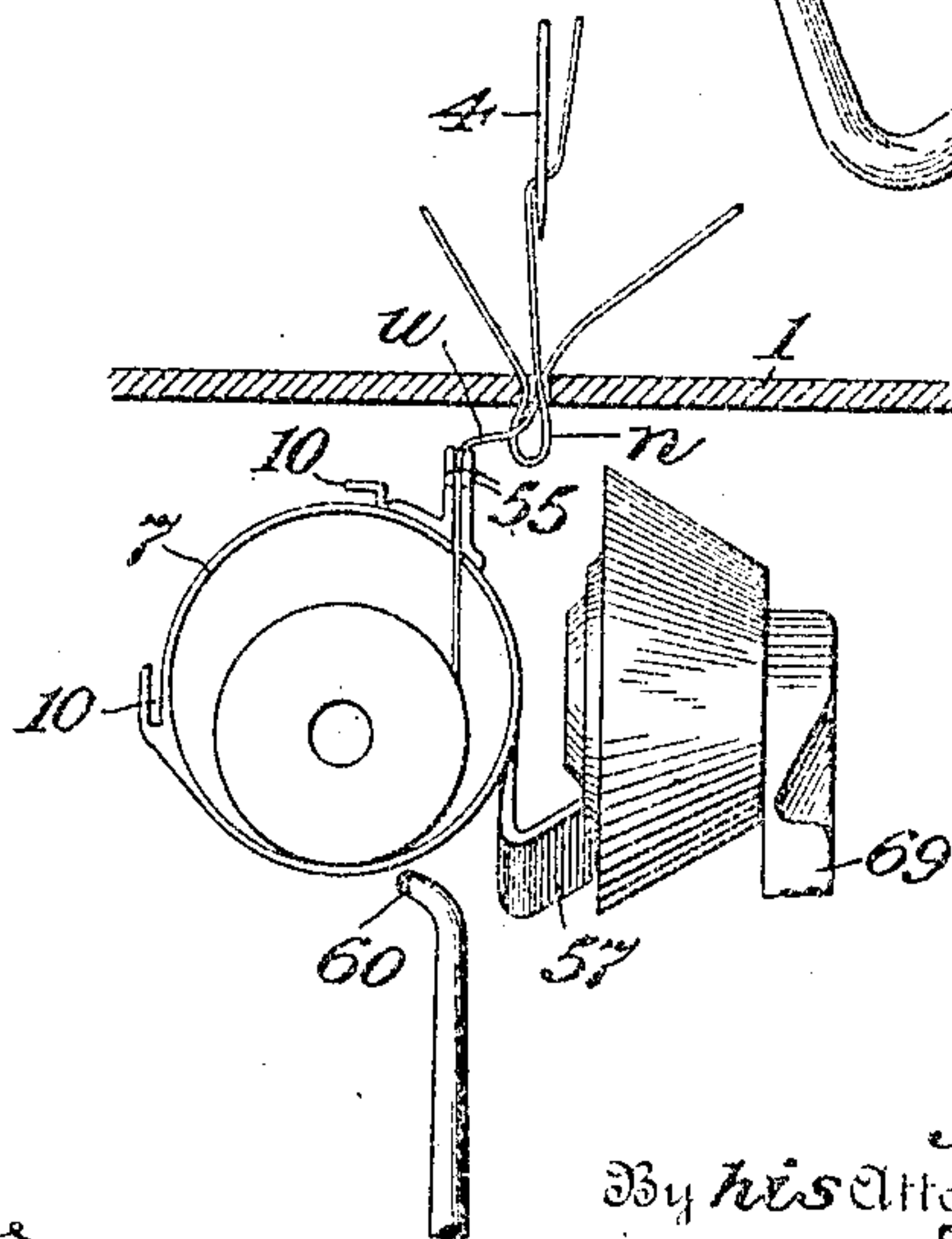


Fig. 14



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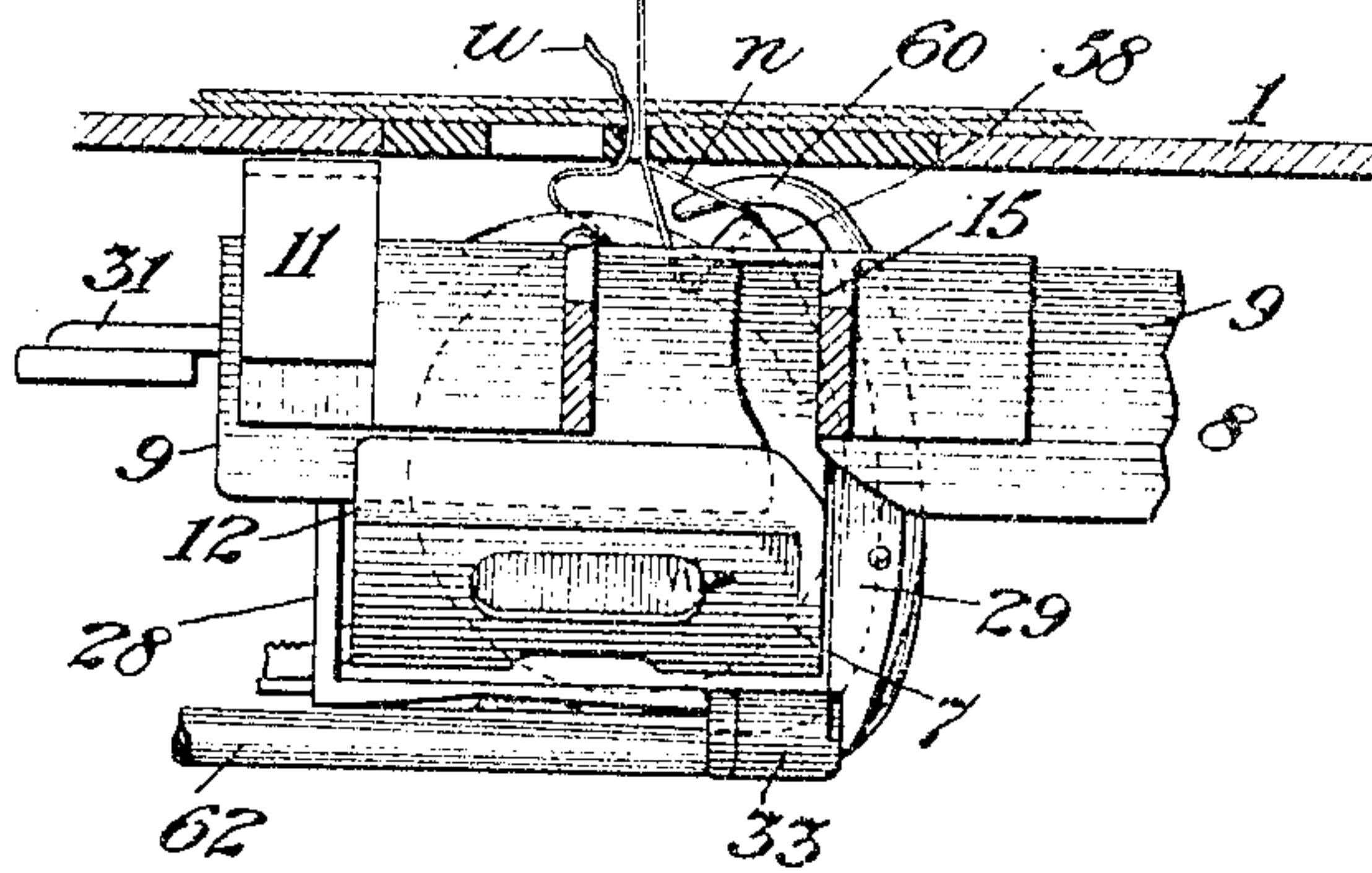
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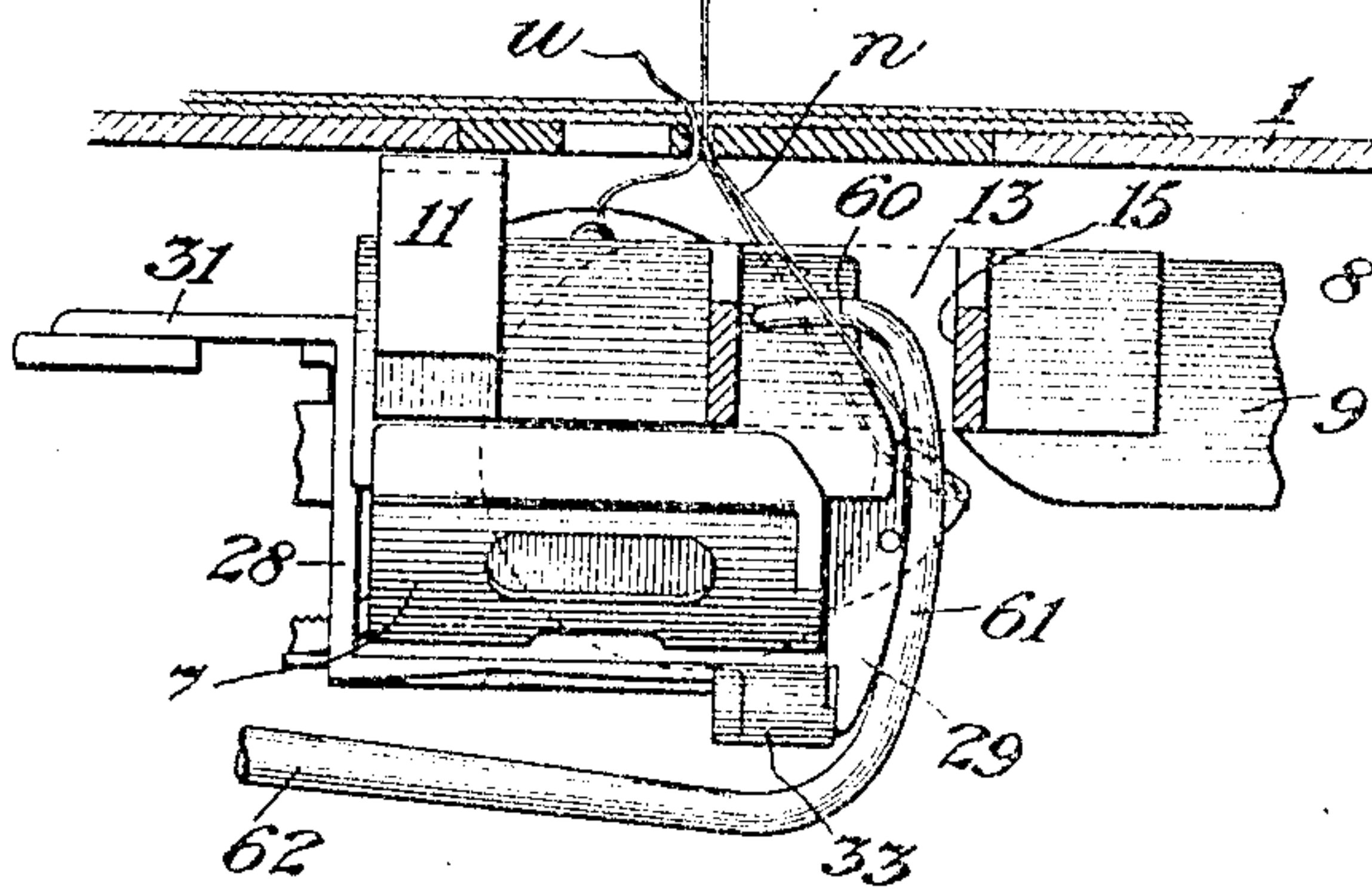
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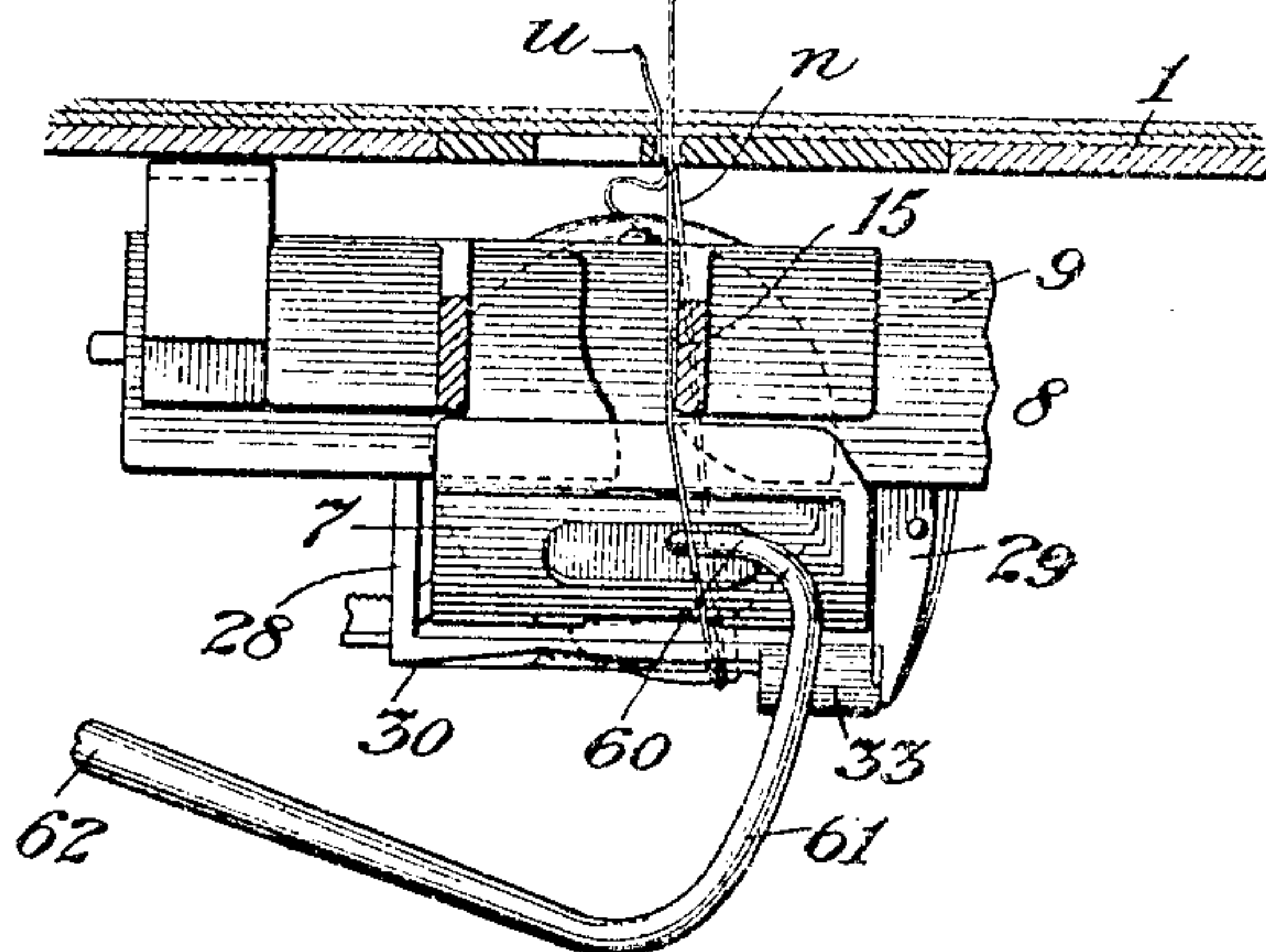
4-1 Fig. 15



4-1 Fig. 16



4-1 Fig. 17



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# UNITED STATES PATENT OFFICE.

JASPER VANNETTE, OF TIFFIN, OHIO, ASSIGNOR OF ONE-FOURTH TO CHARLES J. YINGLING AND ONE-FOURTH TO GEORGE S. YINGLING, OF TIFFIN, OHIO.

## UNDER-THREAD MECHANISM FOR SEWING-MACHINES.

No. 875,751.

Specification of Letters Patent.

Patented Jan. 7, 1908.

Application filed February 28, 1906. Serial No. 302,613.

*To all whom it may concern:*

Be it known that I, JASPER VANNETTE, a citizen of the United States, and resident of Tiffin, in the county of Seneca and State of Ohio, have invented certain new and useful Improvements in Under-Thread Mechanism for Sewing-Machines, of which the following is a specification.

This invention relates to sewing machines and more particularly to lock-stitch sewing machines of that class in which both the upper and under thread is taken direct from the ordinary commercial spool of sewing thread; the invention consisting of improvements on a sewing machine of the class referred to disclosed in Letters Patent No. 813,929, issued to me February 27, 1906.

In the machine of my aforesaid patent the under-thread-carrying spool has a reciprocating movement for passage through the needle-thread loop during the stitch-forming operation and is slidably supported by a frame which also has a reciprocating movement but in a direction in opposition to the direction of movement of the spool, the movement of said frame operating to shift the position of a thread-passage opening or cut-out with which it is provided from one end of the spool to the other in order to facilitate the rapid passing of the needle-thread loop about the spool for interlocking engagement with the under-thread and also to assure such operation with a minimum length of loop thread. Cooperating with said spool and frame are means for taking the thread-loop from the needle and passing it about the spool comprising a rotary loop-seizing hook operative in a path at one side of the spool to initially seize the thread-loop thrown out by the needle and open the same; a rotary loop-spreader operative in a path extending transversely around the path of movement of the spool to engage one side of the opened-thread loop held by said hook and cooperate with the hook in passing the thread loop around one end of the spool to be passed there-through; and a loop-pusher operative in a path at one side the path of movement of the spool to engage one side of the spool-encircling thread-loop and push it along the spool in a direction in opposition to the direction of movement of the spool so as to assure the positive and rapid passage of the thread-loop longitudinally about the spool.

In the machine of my present application I retain the general features referred to of the machine of my aforesaid patent but with some of them in an improved form. For instance, in the prior machine the reciprocatory spool supporting frame embodied two aligned pins or plungers which engaged the spool within its central opening to slidably support the same and its case and which were arranged with an opening or cut-out between their adjacent ends for the passage of the needle-thread loop in being passed around the spool. Experience, however, has demonstrated the fact that when the spool is slidably supported by centrally engaging parts or pins and a coil or coils of thread become loosened from the spool and slip over its end, as is quite liable to happen, such loosened thread becomes entangled about the supporting pins and prevents proper operation of the machine. A further objection to supporting the spool on centrally engaging pins is the delay and inconvenience attending the insertion and removal of the spool to and from its operative position; it being necessary in placing or inserting a spool into operative position in the machine to first insert the spool into its case, then shift one of spool supporting pins from its normal position to a position to receive said spool and case thereon, and thereafter to shift the pin back to its normal position.

Because of the objections noted, among others, it has been one of the objects of my present invention to provide an improved means for slidably supporting the spool and its case by means of which the said objectionable features will be avoided. To this end I slidably connect the spool-case, preferably at its exterior side, directly with the frame, whereby said spool-case will present an open and unobstructed chamber to receive and contain the spool and into and from which chamber the spool may be readily inserted and removed without change or adjustment of parts other than the shifting of a suitable spool-retaining latch at the open or spool-receiving end of the case.

A further and important feature of my present invention resulting from the connection of the spool-case at its exterior side with its reciprocatory supporting frame is the fact that I am enabled to utilize said frame as a loop-pusher for moving the thread-loop lon-



gitudinally along the spool-case and thus combine in one element the supporting frame and loop-pusher of my prior machine.

In the machine of my aforesaid patent the spool was given its reciprocating movement by a driver having arms loosely engaging the opposite ends of the spool-containing case, and as it was desirable that the spool-case should be of a substantially predetermined length to properly fit between the driver engaging arms without undue endwise movement other than enough to permit of the passage of the thread-loop between the parts, and as it was also desirable that the spool should be loosely held within the case against undue endwise movement, it was necessary to employ a series of cases specially adapted to contain the different sizes of commercial spools. In my present machine, however, although the spool is also given its reciprocating movement by a driver having arms loosely engaging the opposite ends of the spool-case as in the prior machine, the necessity of employing more than one spool-case for different sizes of spools is avoided by reason of the spool-case being supported directly by the frame and providing an open or unobstructed spool-receiving chamber which I am enabled to provide with means for adapting it to receive and hold without undue movement commercial spools of varying sizes. This means comprises a movable end wall for the spool-case which is adjustable relatively to an opposing end wall to vary the spool-receiving space therebetween.

In the passage of the needle-thread loop about the under-thread carrying spool it is moved between the ends of the spool and the adjacent end walls of the spool-case; consequently it is desirable that said end walls should be so spaced relatively to each other and to the spool as to provide the required thread-clearance space for such passage of the thread but without permitting undue endwise movement of the spool therebetween. I have, therefore, as a further and important feature of my present invention, provided means for automatically spacing the spool-engaging end walls of the spool-case relatively to different sizes of spools inserted into the spool-case to provide in every instance the same predetermined thread-clearance space between the parts.

Other features of my present invention not hereinbefore referred to will be herein after described in the detailed description which follows and then pointed out in the claims and are illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a machine embodying my invention with the arm partly broken away and with the bed-plate in section on line 1—1 of Fig. 2. Fig. 2 is a bottom or underside view of the machine. Fig. 3 is a front end elevation of the machine with

the parts above the bed-plate removed. Fig. 4 is a vertical section, taken on line 4—4 of Fig. 1, showing by full and dotted lines different positions assumed by the connecting pitman between the upper and lower shafts at different times during the operation of the machine, and also showing the parts beneath the bed-plate at the forward end of the machine in a different position from that shown in the preceding figures. Figs. 5 and 6 are enlarged sectional detail views of the spool-case and driver showing the operation of parts in effecting an adjustment of the end walls of the spool-case relatively to an inserted spool. Figs. 7, 8 and 9 are detail views in bottom plan, showing the position of the spool-case and certain cooperating parts for passing the needle thread-loop around said spool-case, at different times during the operation of the machine. Figs. 10, 11, 12, 13 and 14 are also detail views, but in elevation, showing the position of the spool-case and certain cooperating parts for passing the needle-thread loop around said spool-case, at different times during the operation of the machine, and Figs. 15, 16 and 17 are further detail views in elevation of the same parts, and also of the spool-case frame partly broken away, looking from the left as shown in Figs. 10—14.

Similar reference characters designate like parts in the several figures of the drawings.

My improvements relate mainly to the looper mechanism and associated under-thread mechanism at the under side of the bed-plate of the machine and may be applied to any suitable machine having suitable cooperating needle and take-up mechanism.

The machine shown in the drawings to which my improvements are applied comprises a bed-plate 1 having an overhanging arm 2, a vertically reciprocating needle-bar 3 supported by the arm 2 and carrying a needle 4, a take-up 5 also supported by the arm 2, and an upper driving shaft 6 journaled in the arm 2 for actuating the said needle-bar and the take-up.

Located at the under side of the bed-plate 1 is the reciprocating spool-case 7 herein shown as of a cylindrical form to contain a correspondingly shaped commercial spool, and being supported by a sliding connection at its exterior side with the reciprocatory frame 8 which in turn is supported by a sliding connection with the bed-plate 1. The sliding connection between the spool-case 7 and the frame 8 may be effected by any suitable means to permit of a reciprocating movement of said parts relatively to each other with the spool-case maintained against transverse rotary movement, the means employed in the present case for effecting such connection comprising an elongated relatively wide portion 9 of the frame 8 extending at its op-



posite lateral edges into longitudinally arranged grooves 10, 10, on the exterior side of the spool-case; the said spool-case engaging portion 9 of the frame 8 being shown as transversely curved to conform to the adjacent wall of the spool-case. The slidable connection of the said frame 8 with the bed-plate or other suitable support may also be effected in any desired or suitable manner, it being effected in the present case by means of arms 11, 11, on the frame 8 extending into transversely arranged sustaining grooves 12, 12, at the under side of the bed-plate, as clearly shown in Fig. 1.

The spool-case engaging portion 9 of the reciprocatory frame 8 is provided with an opening or cut-out 13 at a point between its ends to permit of the needle-thread loop *n* being passed exteriorly about the spool-case during the stitch-forming operation, the said opening or cut-out being shifted by the movement of the frame from a position at one end of the spool-case to permit of the passage therethrough of the needle-thread loop in being passed around the adjacent end of the spool-case to a position at the opposite end of said spool-case to permit of the withdrawal therefrom of the thread-loop as it is acted upon by the take-up to be drawn into interlocking engagement with the under-thread *u*. In the performance of the function stated the said opening or cut-out 13 corresponds to the opening or cut-out between the adjacent ends of the spool-supporting pins of the machine of my said prior patent. Another function, however, provided for in the present case by reason of the said opening or cut-out containing portion 9 of the frame 8 being located and operative at the exterior side of the spool-case is that of pushing the needle-thread loop longitudinally along the spool-case after it has been passed or spread around the end of said case; the means provided for so engaging with and pushing the thread-loop comprising a U-shaped part 14 connecting the adjacent ends of the frame portion 9 at the opening 13 and providing a loop-pusher 15 which engages with a thread-loop passed through said opening 13 as and for the purpose stated.

The reciprocatory frame 8 may be actuated by any suitable means, the means herein shown comprising a rotary driving shaft 16 journaled in bearings 17, 17, at the under side of the bed-plate 1, and a lever 18 mounted on a fixed pivot stud 19 also located at the under side of the bed-plate; the said lever at one end having connection with a crank 20 in the driving shaft through a link 21 and at its opposite end having connection with the frame 8 through a link 22. With this arrangement of parts the lever 18 receives a vibrating movement from the driving shaft 16 and in turn imparts to the frame 8 its described reciprocating movement.

The spool-case is actuated to receive its reciprocating movement in a direction in opposition to the direction of movement of its supporting frame 8 by means of a suitable driver loosely engaging the spool-case at its opposite ends. This driver, which will presently be described, may also be actuated by any suitable means, the means herein shown comprising a driver-carrying frame 23 slidably held to the under side of the bed-plate 1 by means of headed lugs 24, 24, engaging the same through elongated guide slots 25, 25, and being operatively connected with the crank-driven link 21 by means of a block 26 pivotally connected to said link and engaging the frame within an elongated slot 27 therein. With this arrangement of parts both the driver supporting frame 23 and the spool-case supporting frame 8 are reciprocated from the driving shaft 16 by connection with the crank-driven link 21, the movement of said frames in a direction in opposition to each other being obtained by the interposition of the lever 18 between the said link 21 and the spool-case supporting frame 8.

The spool-case driver, as most clearly shown in Figs. 5 and 6, comprises heel and toe portions 28 and 29 for engaging respectively with the rear and front ends of the spool-case and being connected by an intermediate portion 30 arranged at the under side of said spool-case. The driver as thus formed is provided with an arm or extension 31 at the upper end of its heel portion 28 which is rigidly attached to the driver-carrying frame 23 by suitable fastening means, such as the screw 32. The toe portion 29 of the said driver is shown as having a pivotal connection 33 with the lower driver portion 30, whereby it may be moved from its normal position opposite the open front end of the spool-case to permit of either the insertion of a spool into said case or its removal therefrom; the said toe 29 serving, when in its normal operative position opposite the open end of the spool-case, as a latch for removably retaining the spool within said case.

As commercial spools of thread vary considerably in size, both in length and diameter, it is necessary, when only one case is provided for containing different sizes of spools as in the present instance, that such case be made sufficiently large to accommodate a maximum size of spool. It is desirable, however, for the proper operation of the machine, that the spool should be held against undue endwise movements within the case, as a too free endwise movement of the spool would obviously result in an excess loosening and unwinding of the thread from the spool and a consequent entangling of the same in the case such as would prevent the proper passage of the thread from said case and also cause a breakage of the same. Therefore, to prevent any undue endwise



movement within the spool-case of a spool under maximum size, I have located at the inner end of the spool-case an adjustable wall 34 which, together with the driver arm or latch 29 at the front end of the case, form the end walls of the spool-case between which the spool is loosely held. The said adjustable wall 34 may be supported and rendered adjustable to vary the spool-receiving space between it and the front wall by any suitable means. In the present instance shown, said wall 34 is provided by the front end of a plate 35 which is slidably supported by the spool-driver at its rear end to be movable therewith and arranged with its said front end 34 extending centrally into the open rear end of the spool-case through a suitable slot in the driver heel 28; the means for so supporting the plate 35 comprising a bracket plate 36 fixedly held to the rear end of the driver and having upper and lower guide flanges 37, 37, between which the plate 35 is slidably held. A spring 38 connecting at one end with the driver at 39 and at its opposite end with the plate 35 at 40 operates to yieldingly hold said plate 35 in a normal position with its front end wall 34 sufficiently far advanced into the spool-case as to render the spool-receiving space between it and the opposite end wall 29 small enough to closely receive a spool of minimum size, and permit said wall 34 to yield against the pressure of an inserted spool to adapt the spool-receiving space to any size of spool ranging between a minimum and maximum size. To insert a spool into the spool-case, the latch 29 constituting the front end wall of the spool-case is swung laterally aside to open the spool-case, after which a spool is inserted into the case and moved against the pressure of the yielding wall 34 until it is sufficiently far inserted to permit closing of the end wall latch 29. When a spool is thus inserted into its case, however, it is yieldingly held with its ends in engagement with the opposite end walls 34, 29, of the spool-case, while it is desirable that sufficient space be provided between the spool and the adjacent end walls of the case to permit of the ready passage of the needle-thread loop therebetween without undue friction on the thread. For this reason I provide a means that is operative subsequent to the entry of a spool into the case for moving the adjustable wall 34 a predetermined distance in a direction to increase the spool-receiving space between it and the opposite end wall whereby the desired thread-passage space between said walls and the spool will be provided. The said means for so moving the adjustable wall 34 may be more or less varied, but the same as herein shown comprises a lever 42 fulcrumed on a pivot stud 43 on the driver bracket-arm 36 and having a dog 44 for engagement with a series of teeth 45 located on

the lower wall of an elongated slot 46 in the adjustable wall plate 35.

The opening 47 in the lever 42 which receives the pivot 43 is made somewhat elongated to permit of a longitudinal movement of the lever relative to said pivot and the lever is yieldingly held in a position with the upper wall of the said opening in contact with the pivot by means of a coiled spring 48 located within an elongated opening in the lever and expanding therein between a relatively fixed wall 49 and a movable block 50, which latter is provided with a transversely arranged pin 51 seated therein with its ends extending through oppositely located elongated slots 52 in the lever 42 to limit the movement of the block relatively to the lever, and with one of its said ends, indicated at 51', extending into engagement with the under side of the bracket plate 36; the engagement of the said pin end 51' with the plate 36 operating to limit the upward movement of the block 50 and thereby causing the spring 48 to normally exert a downward pressure against the lever. With this described combination and arrangement of parts, when the lever is swung forward in a direction toward the spool-case its dog 44 will be released from engagement with the teeth 45 of the wall plate 35 and the latter will be free to be moved either forward under the action of the spring 38 or backward under the pressure of an inserted spool; the said lever 42 being movably held in its said inoperative position of non-engagement with the wall plate 35 by means of a preferably rounded projection 53 on the under side of the bracket-arm 36 engaging with the rear side of the projection or pin 51' on the lever block 50. With the wall plate 35 thus free from locked position, when a spool is inserted into the spool-case it will be engaged at its opposite ends by the end walls of the spool-case in manner as hereinbefore described and as shown in Fig. 5. To now provide the desired thread-clearance space between the spool and adjacent end walls of the spool-case, the lever 42 is swung backward from its said plate-releasing position shown in Fig. 5 and causes its dog 44 to engage the adjacent tooth on the wall plate 35 and move the latter backward a predetermined distance to increase the spool-receiving space between the end walls of the spool-case for the purpose stated and as shown in Fig. 6, the distance of movement of the wall-plate 35 as given by the lever 42 being determined in the present instance by the length of the elongated pivot opening 47 in the said lever, the lower end wall of which opening is brought into contact with the pivot 43 to limit the described backward and plate-retracting movement of the lever 42 by reason of the lever dog 44 being yieldingly held in contact with the cooperating plate 35 and being caused to fulcrum thereon as



said plate is moved backward in a straight line and thereby impart a slight longitudinal movement to the lever on its pivot sufficient to bring the said lower end wall of the opening 47 into contact with the pivot. In effecting such backward movement of the lever 42, its yieldingly supported pin 51' is shifted to the rear side of the projection 53 on the bracket-arm which projection serves as a locking projection for coöperation with the said spring-pressed pin 51' to hold the lever either in its forward plate-releasing position or in its backward plate-locking position.

The means for locating a spool in the spool-case and adjusting the spool-engaging end walls of the latter to hold spools of varying sizes against undue endwise movement in the case with a proper thread-clearance space between said walls and the spool have now been described. When it is now desired to remove the spool for any purpose, the front end wall or latch 29 is first swung laterally from its position opposite the front end of the case and the lever 42 is then swung forward to release the wall-plate 35, whereupon the latter will be projected forward in the case under the action of the spring 38 and operate to eject the spool from the case; the said plate 35 thus serving both as an adjustable end wall for the spool-case and also as an automatic spool-ejector.

When the under-thread carrying spool is inserted into the spool-case it rests directly upon the bottom or lower wall of the case. This is desirable for the reason that it prevents a too free rotation of the spool as the thread is drawn therefrom during the stitch-forming operation and also prevents the loosened coils of thread slipping off the ends of the spool. A desired tension may be placed on the thread as it is drawn from the spool by means of impinging tension-plates 55, 55, located at the exterior side of the spool-case and between which the thread may be readily placed when the spool is inserted into the case by means of a threading-slot 56 leading therebetween and opening at the front end of the case.

The means for seizing the thread-loop thrown out by the needle and passing it around one end of the spool-case to have the latter with its contained spool entered there-through comprises a loop-seizing hook and a loop-spreader which, as before stated, are of the same general construction and operation as the corresponding parts in the machine of my aforesaid patent. The loop-seizing hook is rigidly attached to the front end of the rotary driving shaft 16 and comprises a suitable attaching shank 57 having a substantially triangular-shaped loop-seizing blade 58 which is tapered from a point at its front or loop-entering end to considerable width at its rear end. This form of

blade insures its ready entry into the needle-thread loop and, after receiving a partial turn, as shown in Figs. 3 and 15, operates to open the loop to considerable width and cause it to assume a well-defined triangular shape with the forward or upper side thereof in the path of the loop-spreader 60, which latter moves forward at such times in a path in a plane substantially at right angles to the plane of the path of the loop-seizing hook and engages the said forward side of the thread loop, as shown in Figs. 11 and 15, and carries the same over and across one end of the spool-case and through the opening 13 of the frame 8. This loop-spreader moves in a generally circular path around the end of the spool-case and, as it engages one side of the loop and carries it over and across the end of the spool, the hook 58 with its engaged portion of the loop continues its downward movement and acts in combination with the loop-spreader to pass the loop entirely around the end of the spool-case whereby the latter with its contained spool may be passed therethrough.

The detailed operation of the parts in taking the needle-thread loop from the needle and passing it around the spool as illustrated in the drawings, is as follows: The loop-seizing blade first enters the needle-thread loop and, after fully entering the same, causes the loop to receive a partial turn as one side thereof passes around to the rear end of the blade as shown in Figs. 11 and 15, whereby the sides of the loop will be opened apart in a direction substantially at right angles to the plane of the path of movement of the loop-spreader. Continuing its movement, the loop-seizing blade causes the loop to assume a triangular shape with the sides widely separated and the upper side in the path of the loop-spreader which now advances to engage the same as in said Figs. 11 and 15. After the parts have reached the latter position, the loop-spreader continues to move forward and the loop-seizing hook downward, as in Figs. 12, 16 and 7, until they reach the position shown in Figs. 13, 17 and 8, at which time the spreader has carried one side of the loop from the needle-opening of the throat-plate over the upper side of the spool-case and through the opening 13 of the frame 8, while the spreader and hook together have carried the intermediate portion of the loop across the end of the spool-case and between the adjacent ends of the spool and spool-case wall 29 to a position at the under side of the spool-case, the combined operation of the hook and spreader causing the thread-loop to completely encircle the spool-case. During such action of the parts in passing the thread-loop around the end of the spool-case, the frame 8 and the spool-case are being moved in a



direction in opposition to each other, the timing of the parts being such that as soon as the loop is carried through the opening 13 in the frame 8 at the front end of the spool-case, as in Fig. 16, the position of the said opening 13 is quickly shifted to the opposite or rear end of the spool-case to permit of the release of the thread-loop and its being drawn up by the take-up to interlock with the under thread (as in Fig. 14) in the formation of a stitch in the usual manner; the said thread-loop passing between the rear end of the spool and the adjacent end wall of the spool-case when being drawn up by the take-up subsequent to its passing off the rear end of the spool-case. After the thread-loop has been passed through the opening 13 in the frame 8 at the front end of the spool-case as described, it is positively moved toward the opposite or rear end of the spool-case by the combined action of the loop-seizing hook 58 and the loop-pusher 15 operating at opposite sides of the spool-case, the action of the said loop-pusher on the thread-loop being most clearly shown in Fig. 17. In the described operation of passing the needle-thread loop around the spool-case, the thread-loop is carried around the front end of the spool-case, between such end and the spool-case-driver arm 29, and then moved along the spool-case between the latter and the adjacent part 30 of the spool-case-driver to the rear end of the spool-case, and is then drawn up by the take-up in the usual manner through the space between the rear end of the spool-case and the rear spool-case-driver arm 28.

The looper-spreader 60 is herein shown in the form of a thread-engaging finger carried at the upper end of a vertically-ranging arm 61 which is formed as an extension of a horizontally-ranging shank portion 62 attached to the spreader operating mechanism; the said arm portion 61 being of sufficient length to permit the front end of the spool-case being received between the finger 60 and shank 62 during the operation of the parts as will hereinafter be described. The operating mechanism for this loop-spreader device 60—61—62 comprises a horizontally swinging arm 63 pivoted at one end on a stud 64 at the under side of the bed-plate and having mounted thereon a tubular rocker shaft 65 which is provided with two downwardly projecting arms 66, 66, to one of which the spreader-shank 62 is rigidly attached and to the other of which one end of a pitman 67 is pivotally connected by means of an extended bearing sleeve 68, which said pitman at its opposite end has a pivotal connection with a crank 69 in the driving shaft 16 through the medium of a loosely jointed collar 70. With this described combination and arrangement of parts between the spreader and driving shaft, rotation of the crank 69 operates

through the pitman 67 to cause the rocker shaft 65 to both rock about its longitudinal axis on the arm 63 and also swing about the axis of the pivot stud 64; which compound movement of the rocker-shaft 65 results in the attached loop-spreader being moved in its described generally circular path about the end of the spool-case with a gyratory motion.

The described means for operating the loop-spreader from a crank in the driving shaft is an improvement over the cam and roller system of the machine of my aforesaid patent in that an easier and more positive movement of the parts is secured; and furthermore, the gyratory movement imparted to the loop-spreader results in such a change of angular position of the spreader finger 60 laterally relatively to the general plane of its path of movement about the spool as to cause the end of its finger to enter the thread-loop at one angle when moved into engagement therewith, as shown in Fig. 11, and to thereafter be shifted to an opposite angle when releasing the thread-loop, as shown in Fig. 13; the angular position of the spreader-finger when engaging the loop being such as to assure a positive retention of the loop in engagement therewith, and the changed angular position when releasing the loop being such as to assure a free release or cast-off of the loop.

The lower driving shaft 16 should preferably be rotated with a minimum degree of differential motion and any suitable means may be provided for such purpose. In the present instance, the said lower or secondary driving shaft 16 is operated from the upper or primary driving shaft 6 through the medium of a connecting rod or pitman 75 which at its upper end connects with a crank 76 in the shaft 6 and at its lower end carries a stud 77 engaging a block 78 slidably supported in a grooved crank-arm 79 on the shaft 16. At a point centrally between its ends the pitman 75 is also connected with a fulcrum-bar 80 by means of a stud 81 on one part entering a corresponding seat or opening in the other, and which said fulcrum-bar 80 at its opposite ends and at points equi-distant from its center fulcrum is pivotally connected with two links 83, 83, which are respectively pivoted on fixed studs 84, 84, attached to the machine arm at opposite sides of the pitman 75. This combination of parts provides a central fulcrum for the pitman 75 which is controlled by the links 83, 83, to move in a straight vertical line whereby the driving end of the pitman will have imparted thereto a substantially uniform rotary movement.

What I claim is:

1. In a sewing machine, the combination with the needle and its operating mechanism, of a case for containing the under-thread supply, a frame having a movable connection



with said case exteriorly of the contained thread supply to support the same and also having an opening or cut-out for the passage therethrough of the needle-thread loop in being passed around the case, means for operating said case and frame to move each in a direction opposite to the other, and means for passing a needle-thread loop around the case.

2. In a sewing machine, the combination with the needle and its operating mechanism, of a case for containing the under-thread supply, a frame having a sliding connection with said case exteriorly of the contained thread supply to support the same and also having an opening or cut-out for the passage therethrough of the needle-thread loop in being passed around the case, means for operating said case and frame to move each in a direction opposite to the other, and means for passing a needle-thread loop around the case.

3. In a sewing machine, the combination with the needle and its operating mechanism, of a case for containing the under-thread supply, a frame having a sliding connection with said case exteriorly thereof to support the same and also having an opening or cut-out for the passage therethrough of the needle-thread loop in being passed around the case, means for operating said case and frame to move each in a direction opposite to the other, and means for passing a needle-thread loop around the case.

4. In a sewing machine, the combination with the needle and its operating mechanism, of a case for containing the under-thread supply, a frame having a direct sliding connection with said case exteriorly of the contained thread supply to support the same and also having an opening or cut-out for the passage therethrough of the needle-thread loop in being passed around the case, means for operating said case and frame to move each in a direction opposite to the other, and means for passing a needle-thread loop around the case.

5. In a sewing machine, the combination with the needle and its operating mechanism, of a case for containing the under-thread supply having a guide, a frame cooperating with the guide of said case to slidably support the latter and also having an opening or cut-out for the passage therethrough of the needle-thread loop in being passed around the case, means for operating said case and frame to move each in a direction opposite to the other, and means for passing a needle-thread loop around the case.

6. In a sewing machine, the combination with the needle and its operating mechanism, of a spool carrying the under-thread supply, a case for containing said spool having exteriorly located guides, a frame cooperating with the guides of said case to slidably sup-

port the latter and also having an opening or cut-out for the passage therethrough of the needle-thread loop in being passed around the case, means for operating said case and frame to move each in a direction opposite to the other, and means for passing a needle-thread loop around the case.

7. In a sewing machine, the combination with the needle and its operating mechanism, of a case for containing the under-thread supply, a frame supporting said case in suspension and having an opening or cut-out for the passage therethrough of the needle-thread loop in being passed around the case, means for operating said case and frame to move each in a direction opposite to the other, and means for passing a needle-thread loop around the case.

8. In a sewing machine, the combination with the needle and its operating mechanism, of a case for containing the under-thread supply, a frame having a movable connection with said case exteriorly of the contained thread supply to support the same and also having an opening or cut-out for the passage therethrough of the needle-thread loop in being passed around the case, means for operating said case and frame to move each in a direction opposite to the other, means for passing a thread loop around the case, and a loop-pusher carried by the said frame to move in a path at one side of the case.

9. In a sewing machine, the combination with the needle and its operating mechanism, of a case for containing the under-thread supply, a frame having a movable connection with said case exteriorly of the contained thread supply to support the same and also having an opening or cut-out for the passage therethrough of the needle thread loop in being passed around the case, one wall of said opening or cut-out constituting a loop pusher, means for operating said case and frame to move each in a direction opposite to the other, and means for passing a thread loop around the case.

10. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, and means for passing a needle-thread loop around said case.

11. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is yieldingly adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, and means for passing a needle-thread loop around said case.

12. In a sewing machine, the combination with the needle and its operating mechanism,



of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is spring-pressed and adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, and means for passing a needle-thread loop around said case.

13. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, and the other of which is movable in a direction to permit of the insertion or removal of a spool into or from said case, and means for passing a needle-thread loop around said case.

14. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, means independent of the spool for holding said adjustable wall in adjusted position, and means for passing a needle-thread loop around said case.

15. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is yieldingly adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, means independent of the spool for holding said adjustable wall in adjusted position, and means for passing a needle-thread loop around said case.

16. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, means operative subsequent to the entry of a spool into the case for removing said adjustable wall in a direction to increase the said spool-receiving space between it and the opposite end wall, and means for passing a needle-thread loop around said case.

17. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, means operative subsequent to the entry of a spool into the case for moving said adjustable wall a predetermined distance in a direction to increase the said spool-receiving space between it and the opposite end wall, and means for passing a needle-thread loop around said case.

18. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, means operative subsequent to the entry of a spool into the case for moving said adjustable wall a predetermined distance in a direction to increase the said spool-receiving space between it and the opposite end wall and locking the same in such adjusted position, and means for passing a needle-thread loop around said case.

19. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, means operative to yieldingly hold said adjustable wall in a normally projected position toward the opposite end wall to be engaged and retracted by an inserted spool, means operative subsequent to the entry of the spool to further retract said adjustable wall from contact with the spool and hold the same in adjusted position, and means for passing a needle-thread loop around said case.

20. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, means operative to yieldingly hold said adjustable wall in a normally projected position toward the opposite end wall to be engaged and retracted by an inserted spool, means, including a lever, operative subsequent to the entry of the spool to further retract said adjustable wall from contact with the spool and hold the same in adjusted position, and means for passing a needle-thread loop around said case.

21. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, means operative to yieldingly hold said adjustable wall in a normally projected position toward the opposite end wall to be engaged and retracted by an inserted spool, means, including a series of teeth on the adjustable wall element and a cooperating lever, operative subsequent to the entry of the spool to further retract said adjustable wall from contact with the spool and hold the same in adjusted position, and means for passing a needle-thread loop around said case.



22. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, means operative to yieldingly hold said adjustable wall in a normally projected position toward the opposite end wall to be engaged and retracted by an inserted spool, a lever operative subsequent to the entry of the spool to yieldingly engage said adjustable wall element and further retract the same from contact with the spool, and means for passing a needle-thread loop around said case.

23. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, means operative to yieldingly hold said adjustable wall in a normally projected position toward the opposite end wall to be engaged and retracted by an inserted spool, a lever operative subsequent to the entry of the spool to yieldingly engage said adjustable wall element and further retract the same from contact with the spool, means cooperative with said lever to hold the same either in operative position in holding engagement with the adjustable wall element or in inoperative position disengaged therefrom, and means for passing a needle-thread loop around said case.

24. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is adjustable relatively to the other, means independent of the spool for holding said adjustable wall in adjusted position relative to the opposite wall, means operative to automatically project said adjustable wall in a direction to eject the spool from its case upon the release of the wall by its said holding means, and means for passing a needle-thread loop around said case.

25. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is adjustable relatively to the other, means independent of the spool for holding said adjustable wall in adjusted position relative to the opposite wall, a spring operative to automatically project said adjustable wall in a direction to eject the spool from its case upon the release of the wall by its said holding means, and means for passing a needle-thread loop around said case.

26. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is adjustable relatively to the other, in a direction to vary the spool-receiving space therebetween, means operative to yieldingly hold said adjustable wall in a normally projected position toward the opposite end wall to be engaged and retracted by an inserted spool, means independent of the spool operative to hold said adjustable wall in retracted position and also to release the same at will to permit it to be automatically returned to its normally projected position and eject the spool from its case, and means for passing a needle-thread loop around said case.

27. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, a spool-case driver supporting the said end walls, and means for passing a needle-thread loop around said case.

28. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is yieldingly adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, a spool-case driver supporting the said end walls, and means for passing the needle-thread loop around said case.

29. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is spring-pressed and adjustable relatively to the other in a direction to vary the spool-receiving space therebetween, a spool-case driver supporting the said end walls, and means for passing a needle-thread loop around said case.

30. In a sewing machine, the combination with the needle and its operating mechanism, of a case for receiving loosely therein the under-thread-carrying spool, end walls for said case one of which is adjustable relatively to the other in a direction to vary the spool-receiving space therebetween; and the other of which is movable in a direction to permit of the insertion or removal of a spool into or from said case, a spool-case driver supporting the said end walls, and means for passing the needle-thread loop around said case.

31. In a sewing machine, the combination with the needle and its operating mechanism, of an under-thread-spool case having an open end, means supporting said spool-case, a



driver for imparting movement to the spool-case having an arm extending into a position opposite the said open end of the spool-case and forming an end wall therefor, the said arm being movable to and from its said position, and means for passing the needle-thread loop around said case.

32. In a sewing machine, the combination with the needle and its operating mechanism, of an under-thread-spool case, a spool-case driver having an adjustable element supported thereby and extending into the spool-case and forming an end wall for engagement with a spool in said spool-case, means for holding said element in adjusted position relative to the spool to provide a thread-passage space between it and the spool, and means for passing the needle-thread loop around said case.

33. In a sewing machine, the combination with the needle and its operating mechanism, of an under-thread-spool case, a spool-case driver having means for engaging with the opposite ends of the spool-case and also having an adjustable element supported thereby and extending into the spool-case and forming an end wall for engagement with a spool in said spool-case, means for holding said element in adjusted position relative to the spool to provide a thread-passage space between it and the spool, and means for passing a needle-thread loop around said case.

34. In a sewing machine, the combination with the needle and its operating mechanism, of an under-thread-spool case, a spool-case driver having heel and toe portions for engaging with the spool-case and also having an adjustable element supported thereby and extending into the spool-case and forming an end wall for engagement with a spool in said spool-case, means for holding said element in adjusted position relative to the spool to provide a thread-passage space between it and the spool, and means for passing a needle-thread loop around said case.

35. In a sewing machine, the combination with the needle and its operating mechanism, of an under-thread-spool case having open ends, a spool-case driver having heel and toe portions for engaging with the opposite open

ends of the spool-case and also having an adjustable element supported thereby and extending into the spool-case through one end thereof and forming an end wall for engagement with a spool in said spool-case, and means for passing a needle-thread loop around said case.

36. In a sewing machine, the combination with the needle and its operating mechanism, of an under-thread carrying spool, means for passing the needle-thread loop about said spool including a loop-spreader, and means for moving said spreader in a path about the spool and turning the same simultaneously during such movement to change the angular position of its thread-engaging portion laterally relative to its path of movement about the spool.

37. In a sewing machine, the combination with the needle and its operating mechanism, of an under-thread carrying spool, means for passing the needle-thread loop about said spool including a loop-seizing hook operative in a path at one side the path of movement of the spool and a loop-spreader operative in a path about the spool, and means for moving said spreader in a path about the spool and turning the same simultaneously during such movement to change the angular position of its thread-engaging portion relative to its path of movement about the spool.

38. In a sewing machine, the combination with the needle and its operating mechanism, of an under-thread carrying spool, means for passing the needle-thread loop about said spool including a loop-spreader, and means including a rotary crank for moving the said spreader in a path about the spool and turning the same simultaneously during such movement to change the angular position of its thread-engaging portion laterally relative to its path of movement about the spool.

Signed at Tiffin in the county of Seneca and State of Ohio this 23rd day of January A. D. 1906.

JASPER VANNETTE.

Witnesses:

CALVIN D. SPITLER,  
J. W. HERSHBERGH.