

No. 652,935.

Patented July 3, 1900.

H. P. RICHARDS.  
SEWING MACHINE.

(Application filed Jan. 12, 1898.)

(No Model.)

7 Sheets—Sheet 1.

Fig. 1.

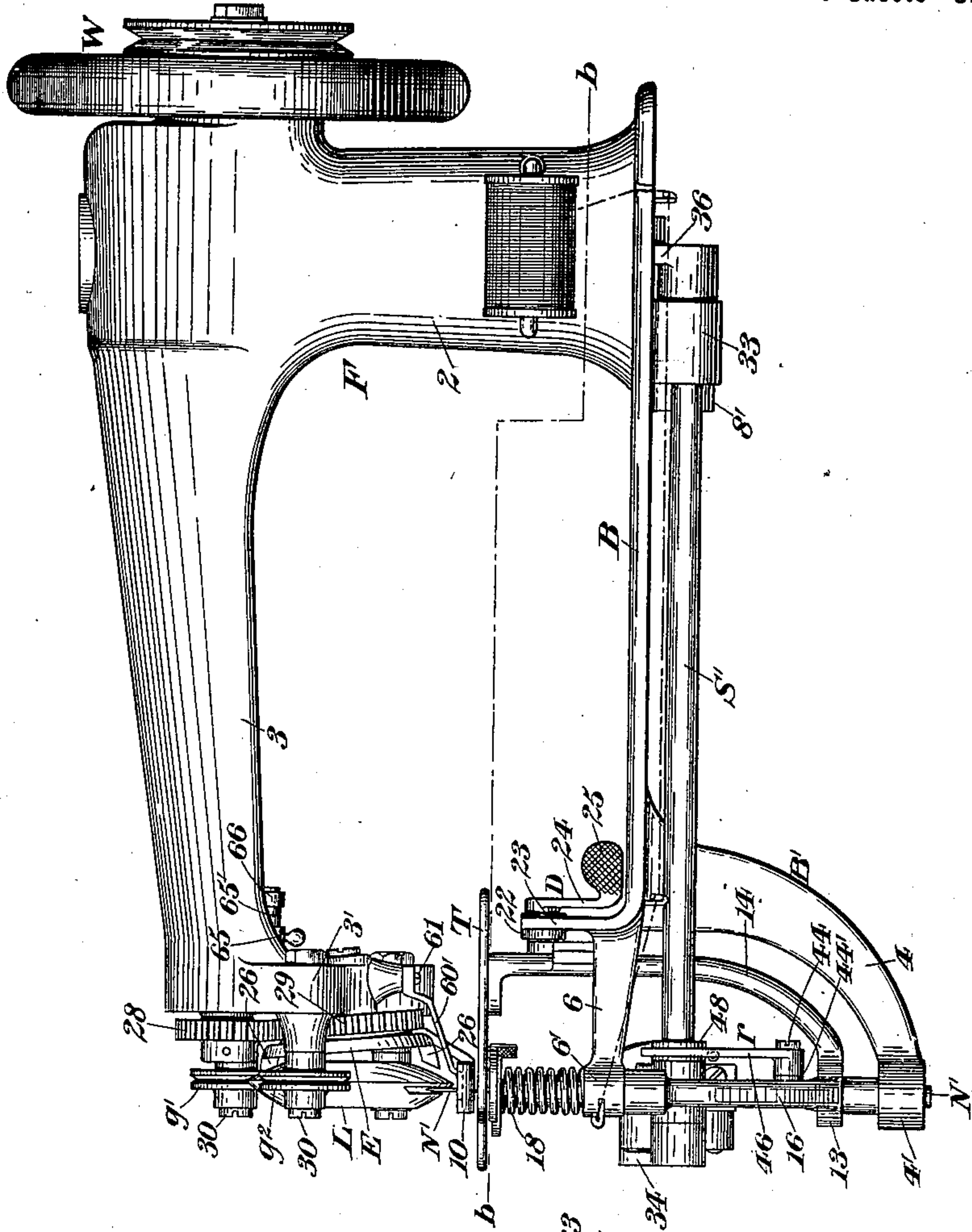
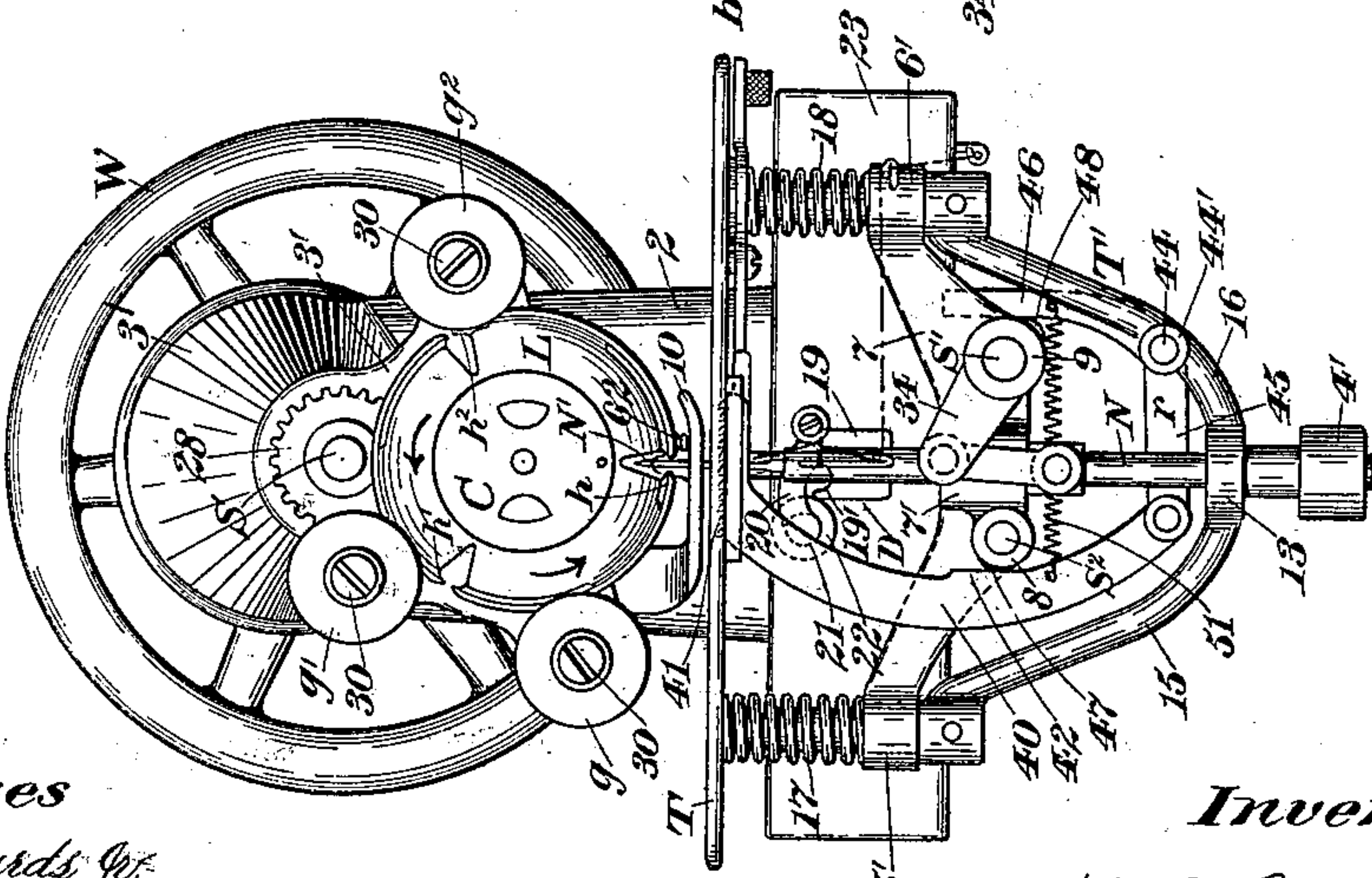


Fig. 2.



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**H. P. RICHARDS.**  
**SEWING MACHINE.**

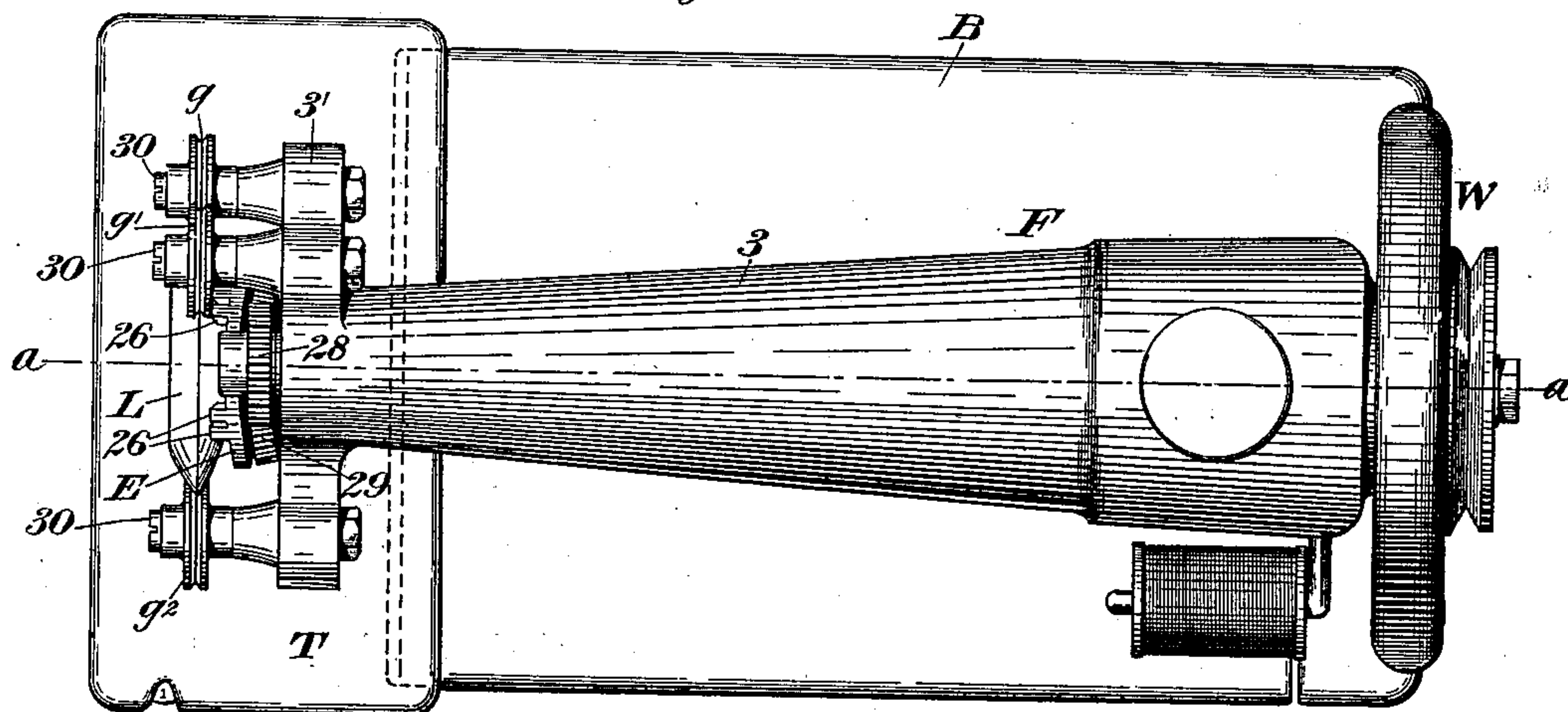
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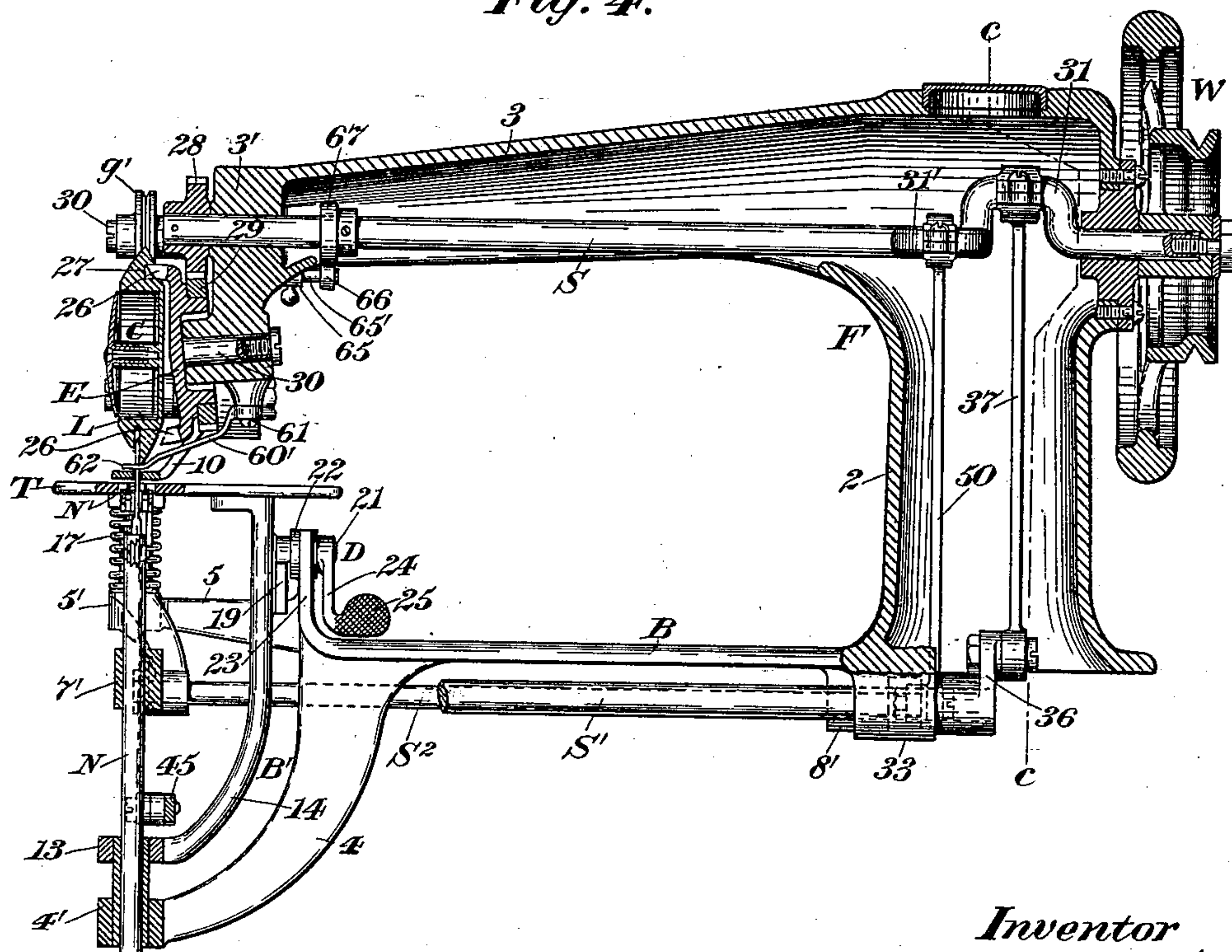
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**7 Sheets—Sheet 2.**

*Fig. 3.*



*Fig. 4.*



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Fig. 5.

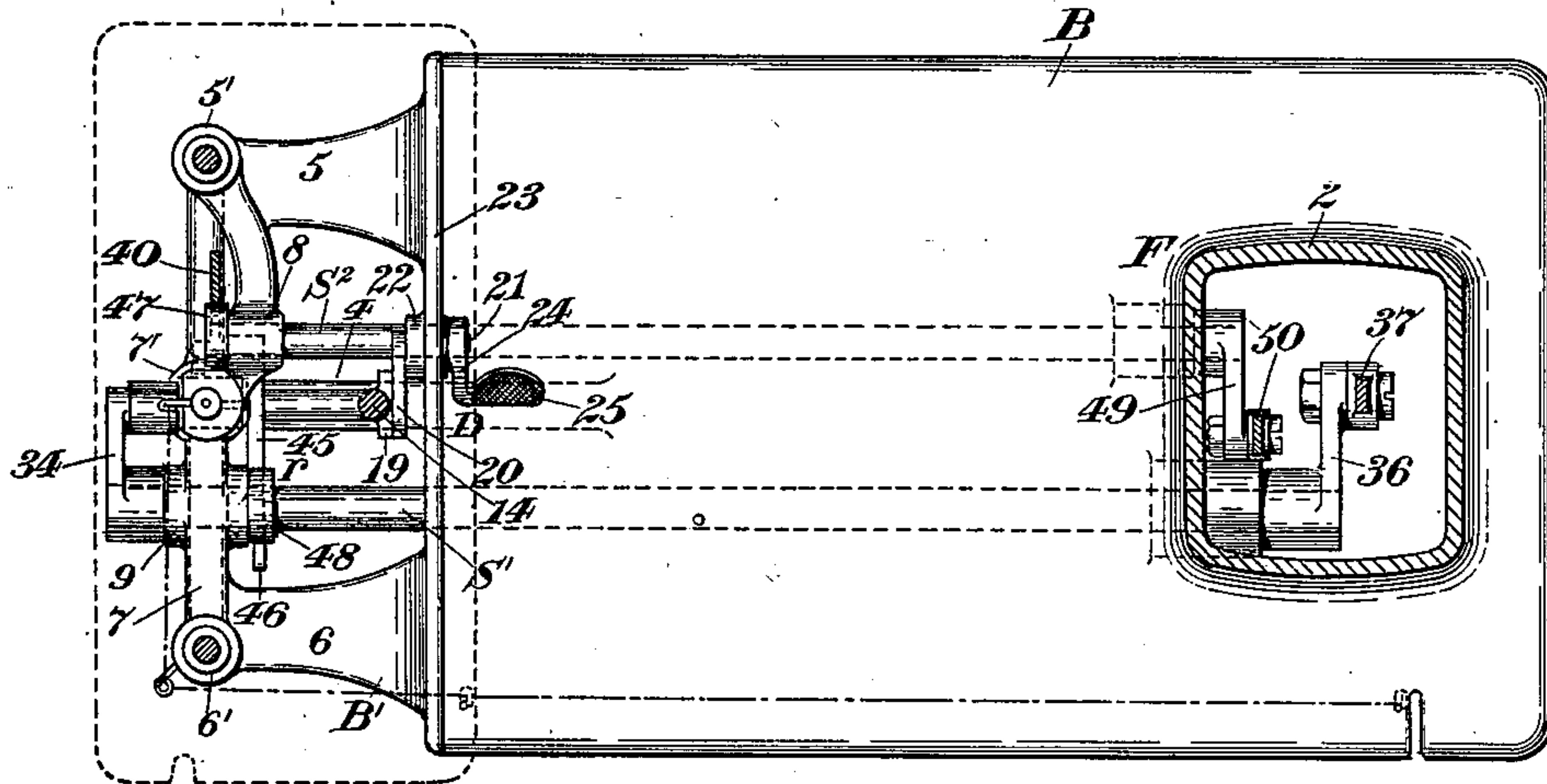


Fig. 6.

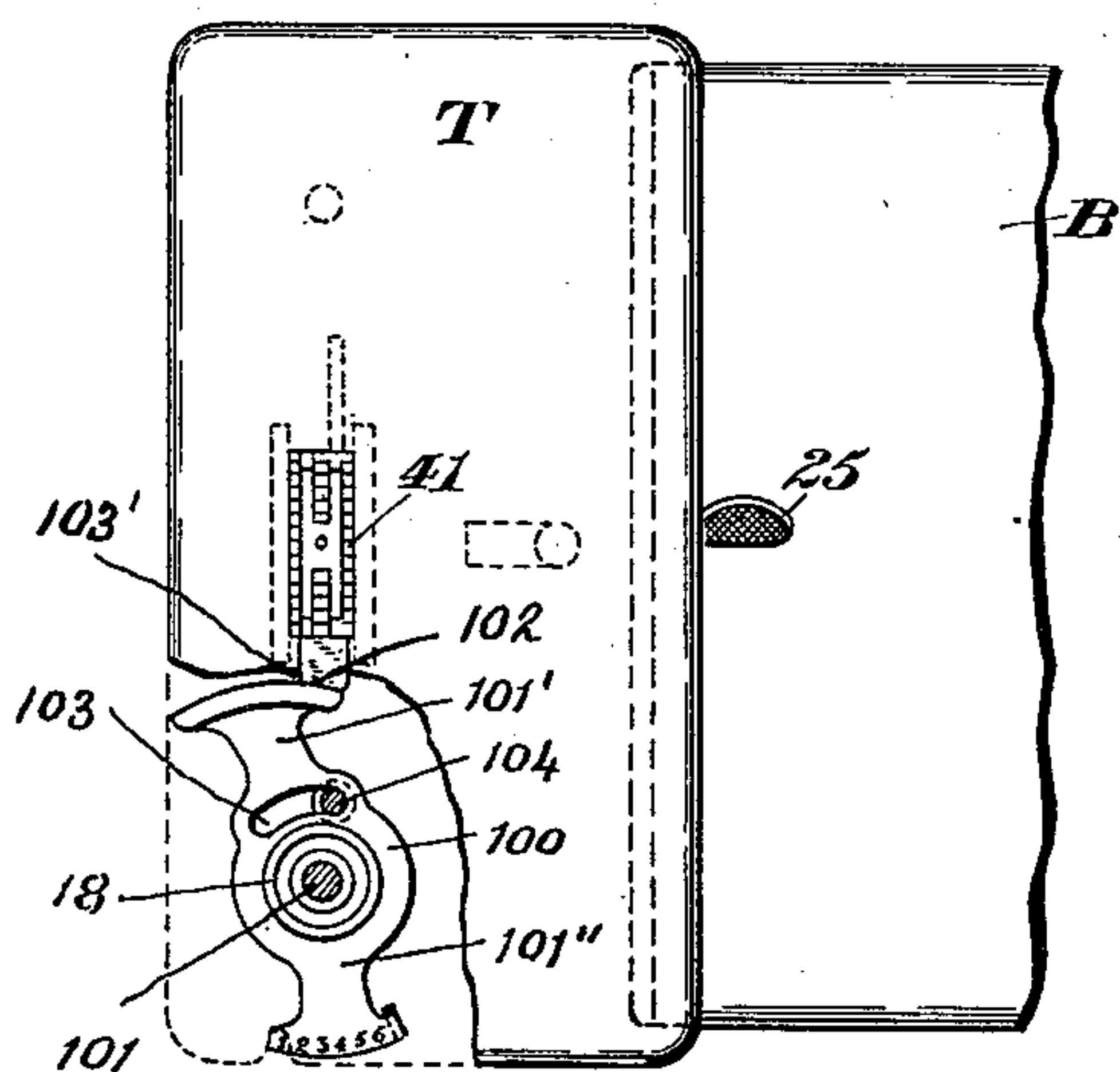
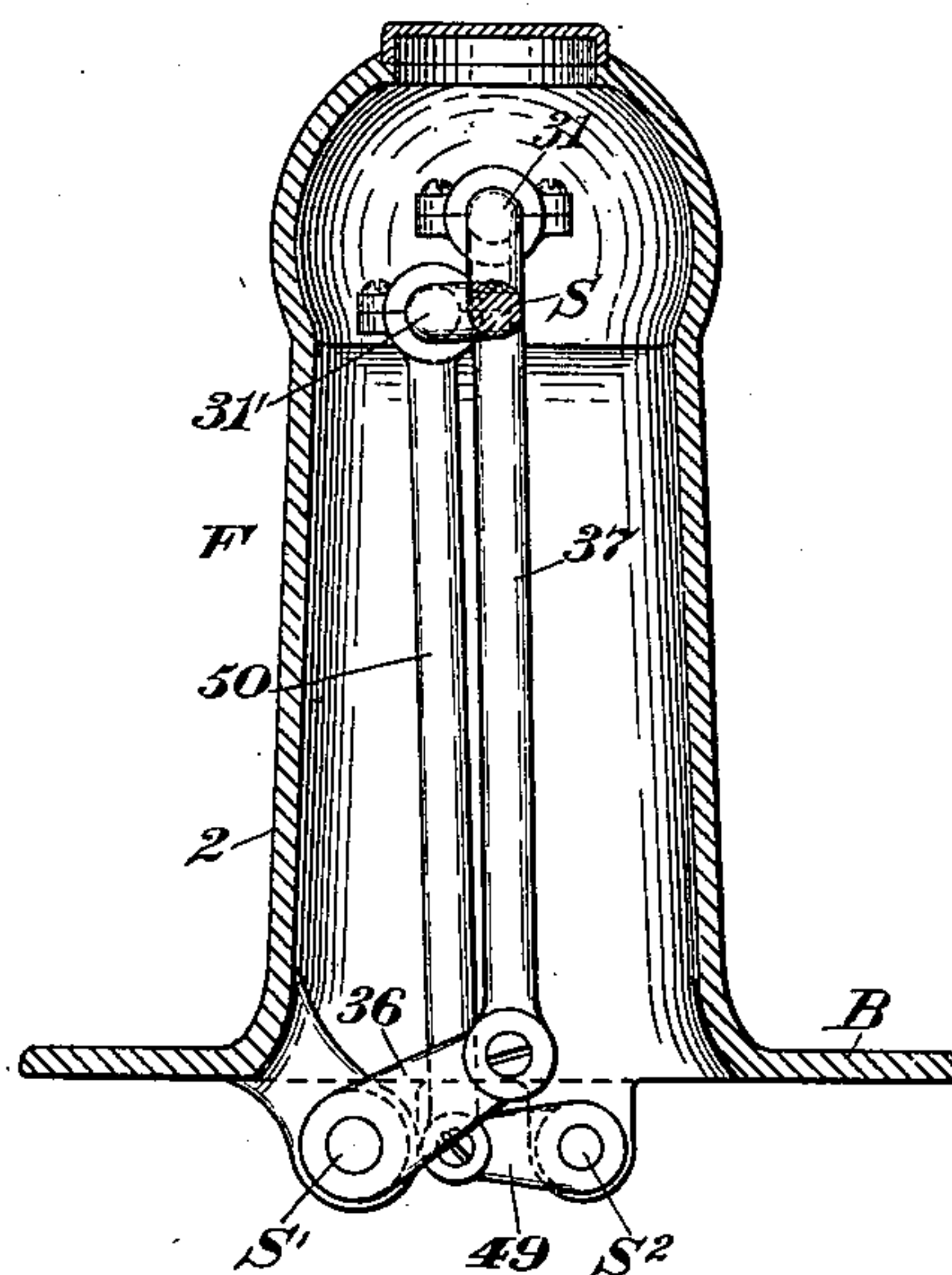


Fig. 7.



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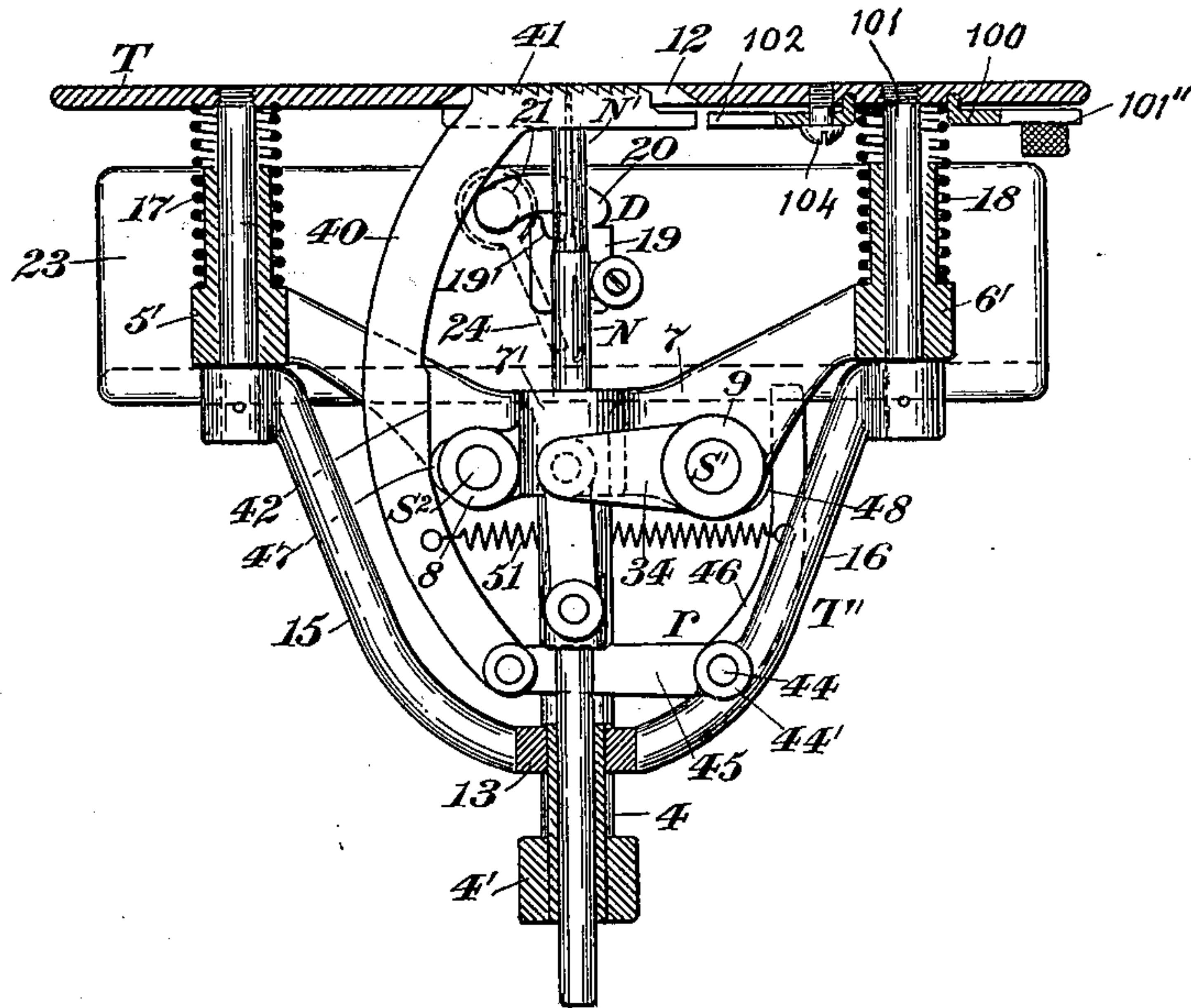
**H. P. RICHARDS.**  
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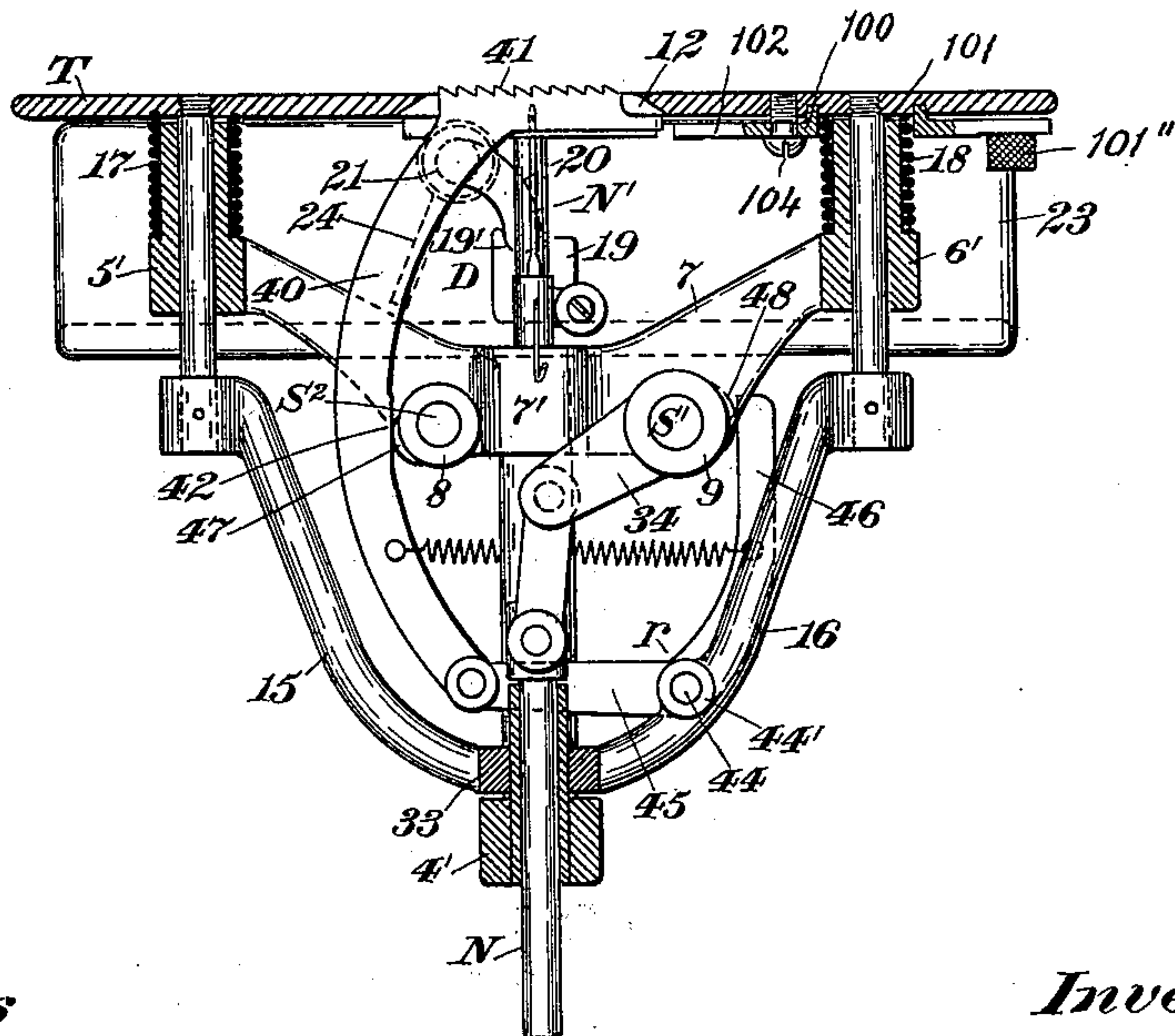
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*Fig. 8.*



*Fig. 9.*



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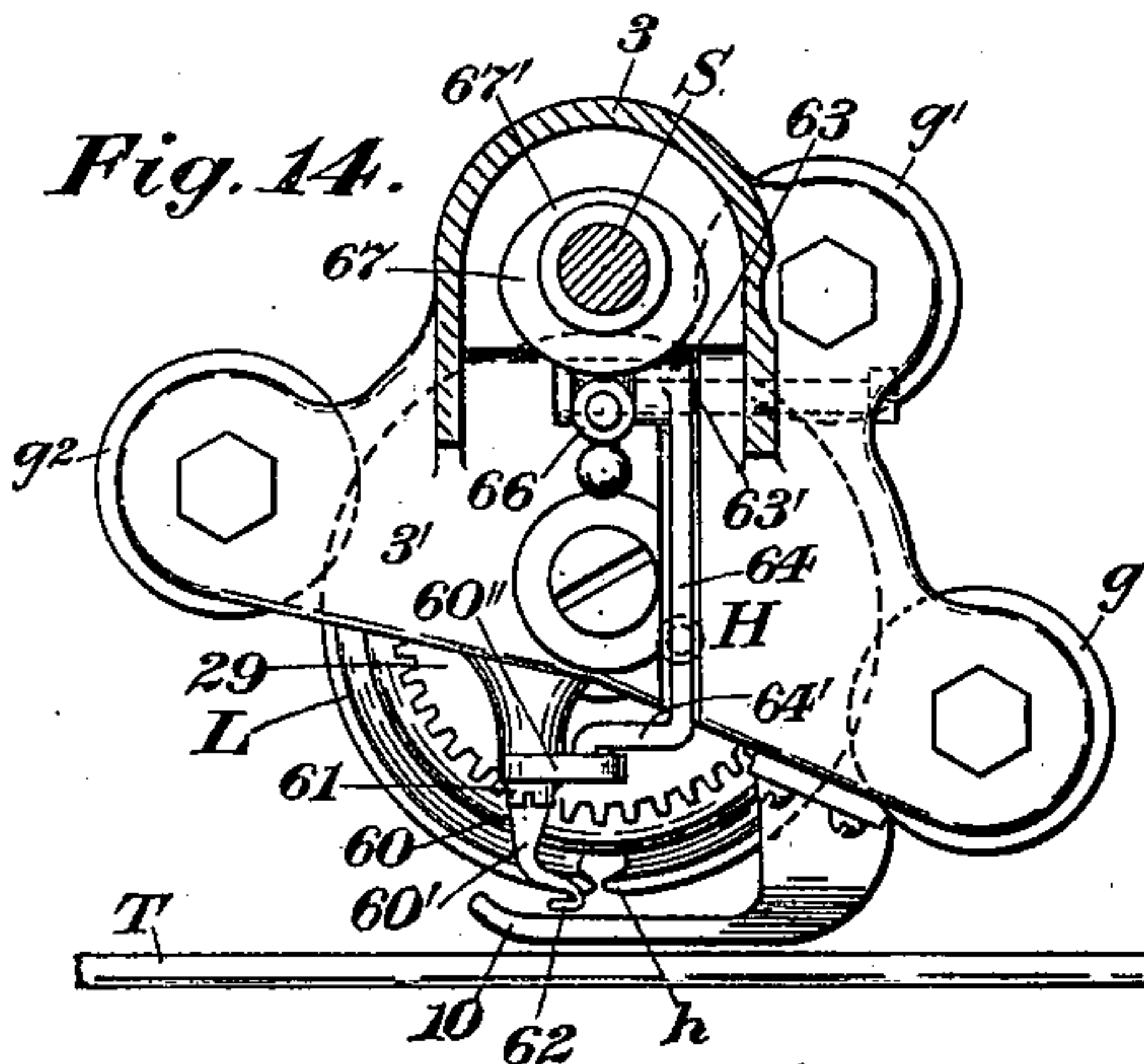
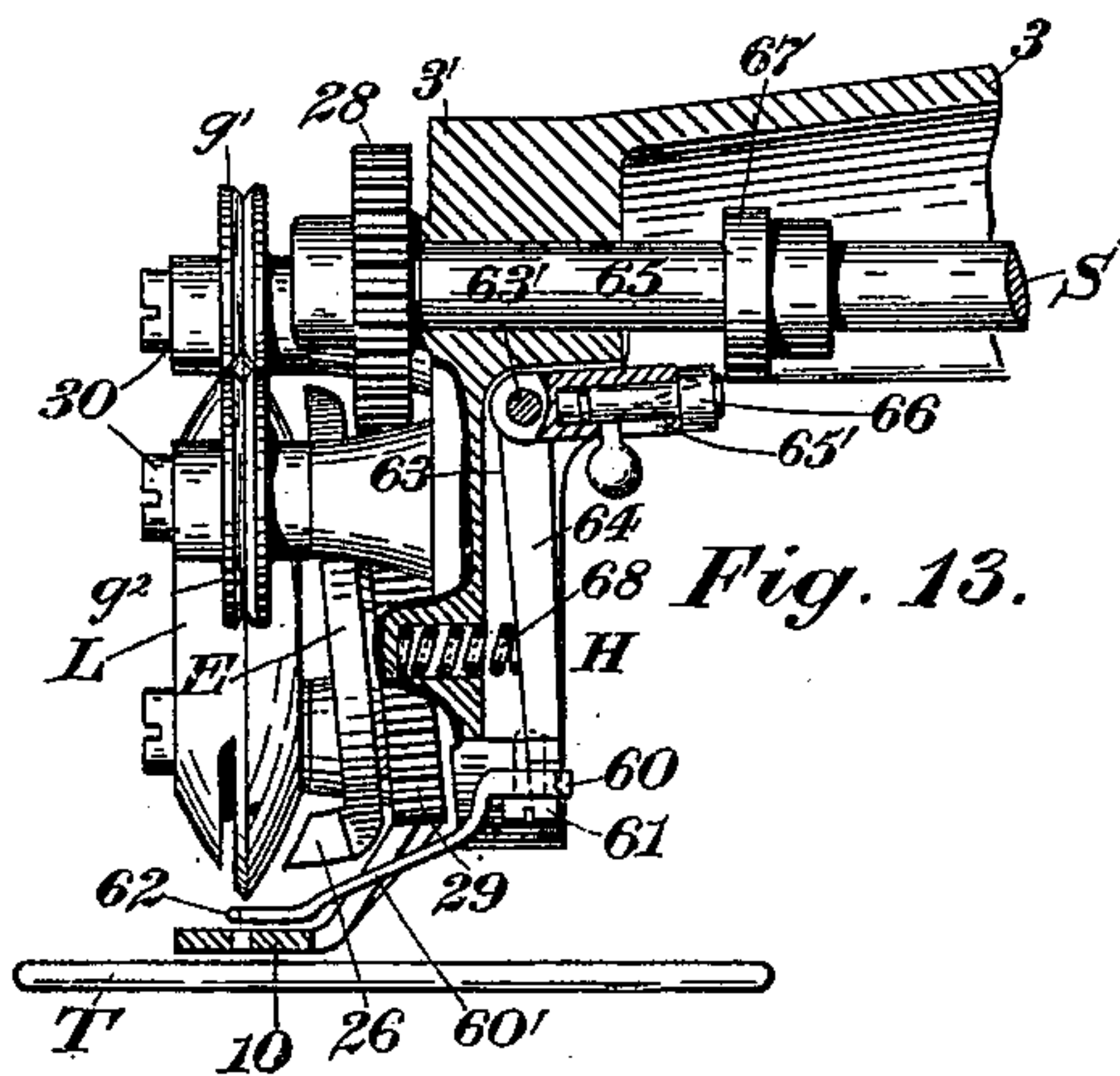
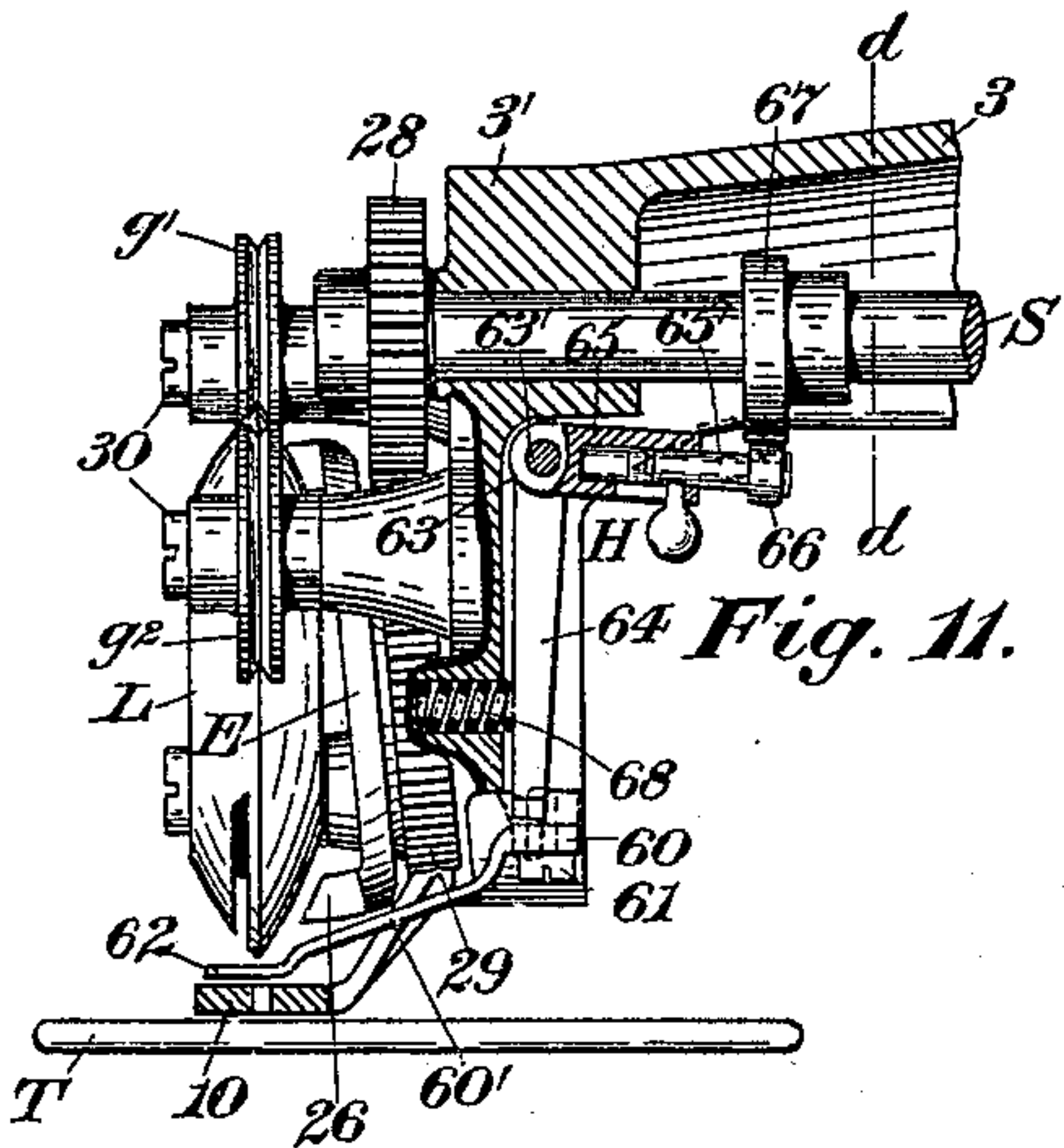
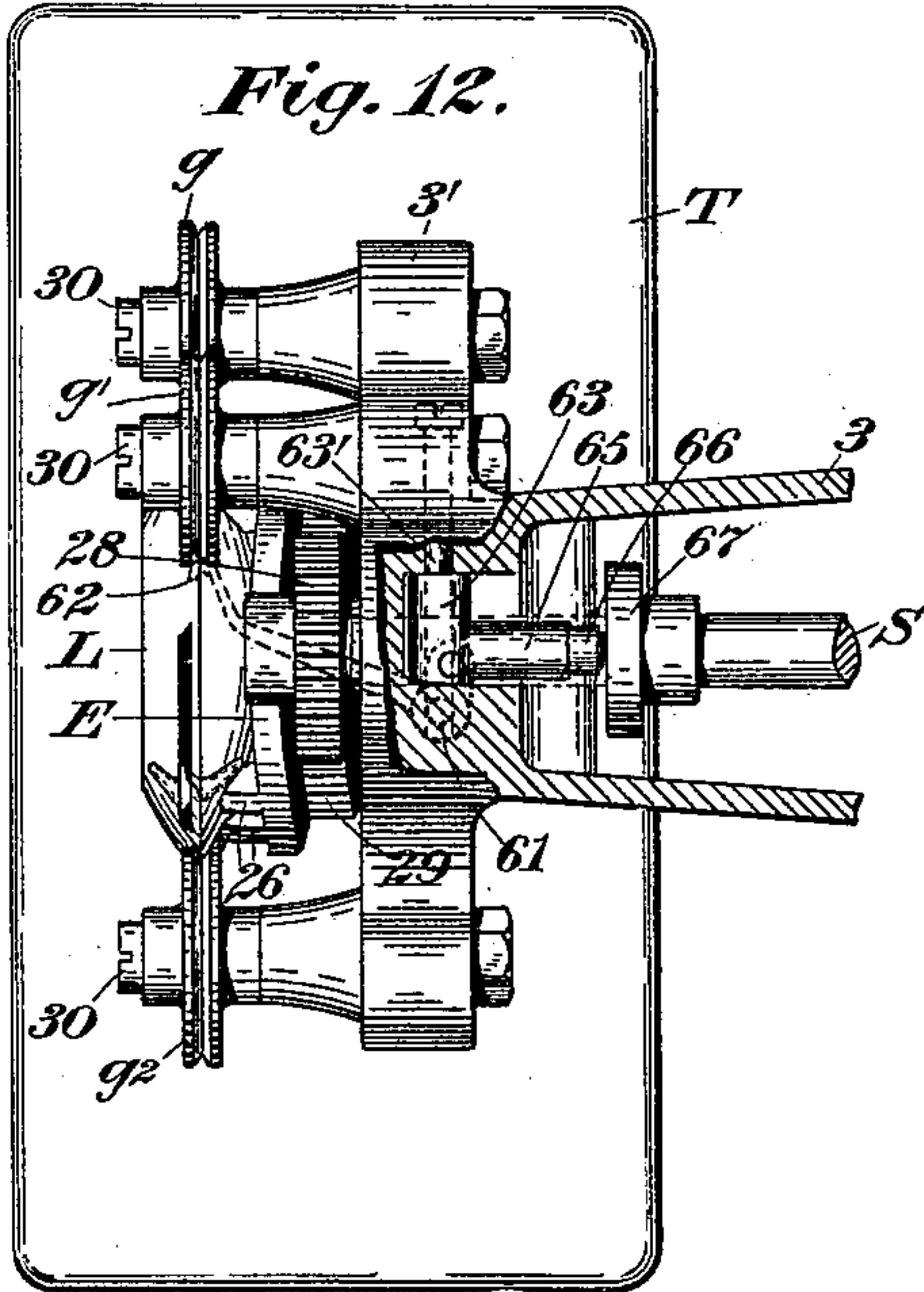
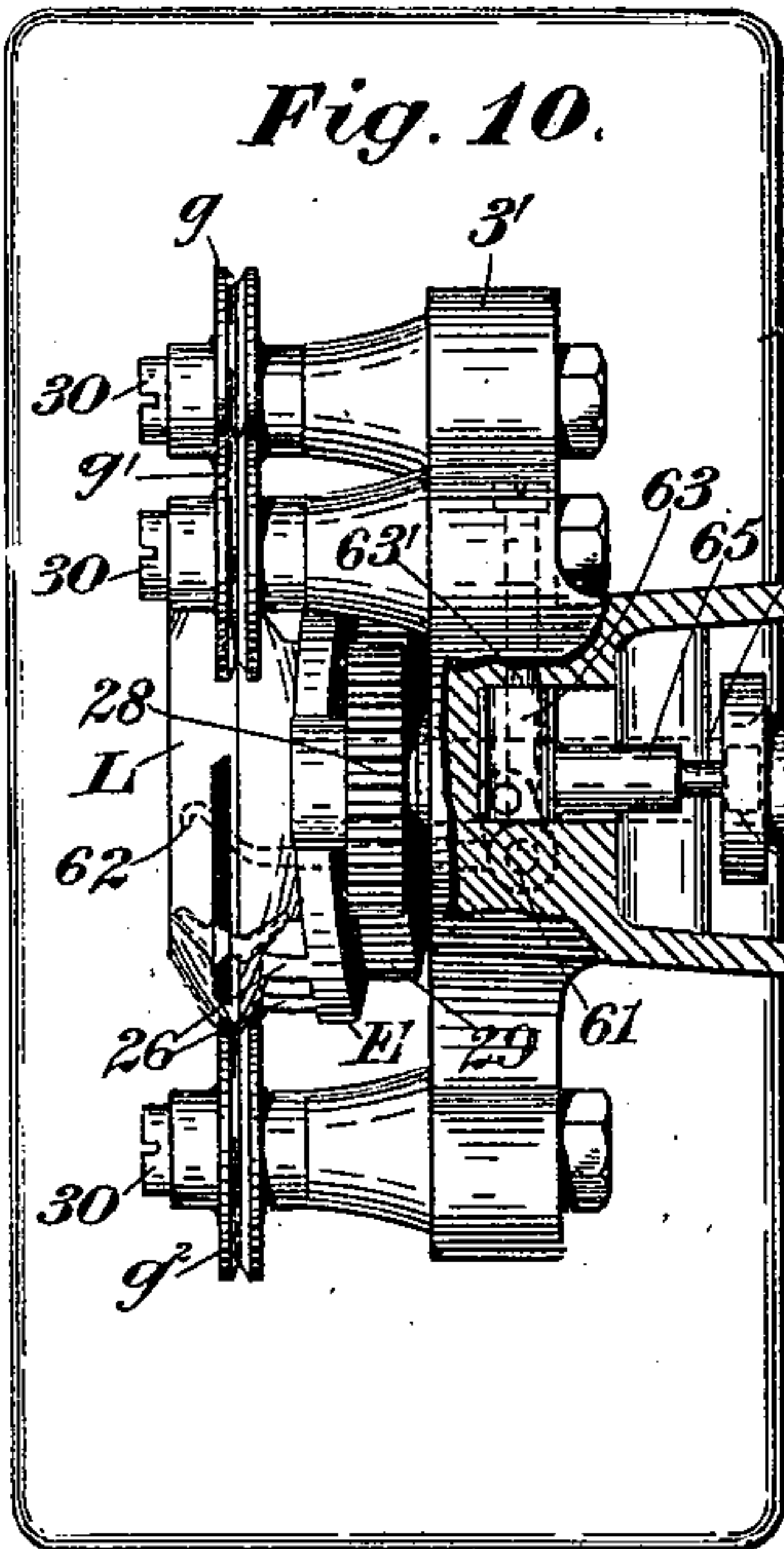
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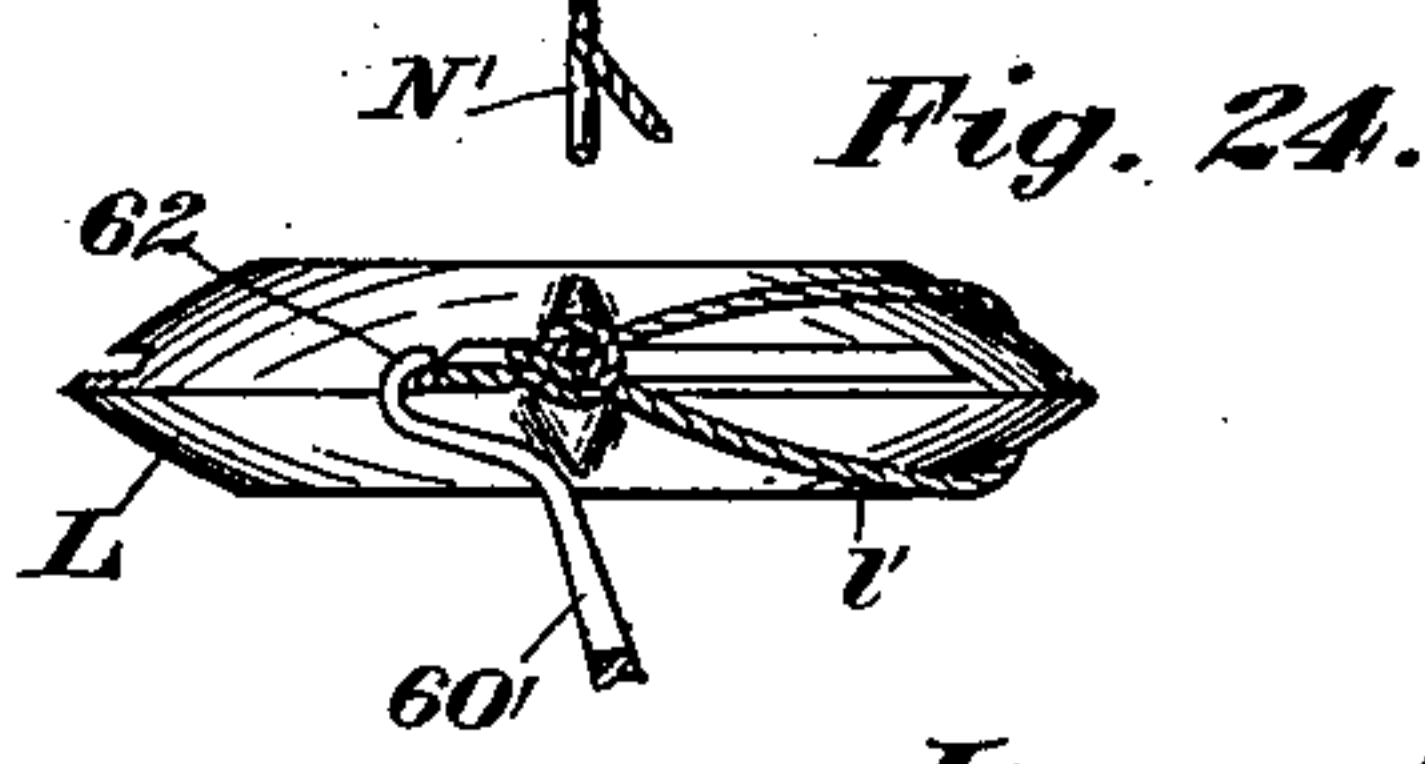
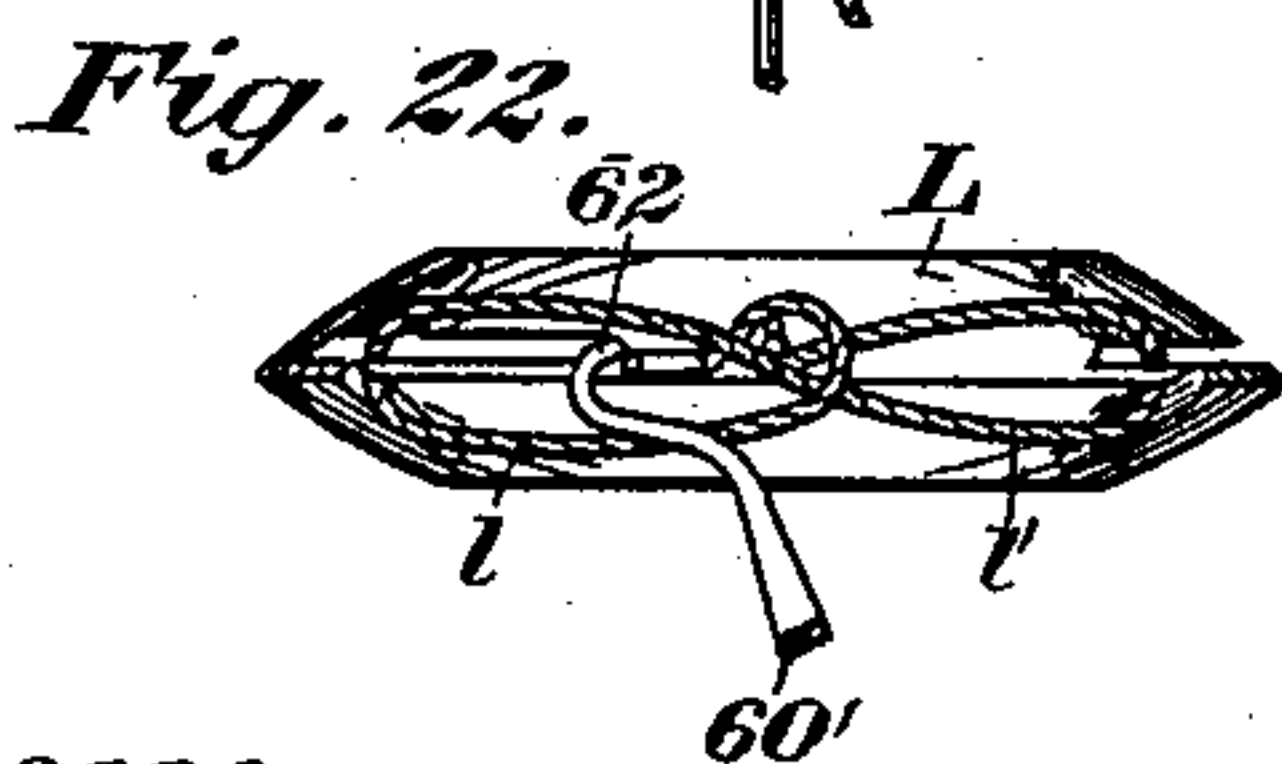
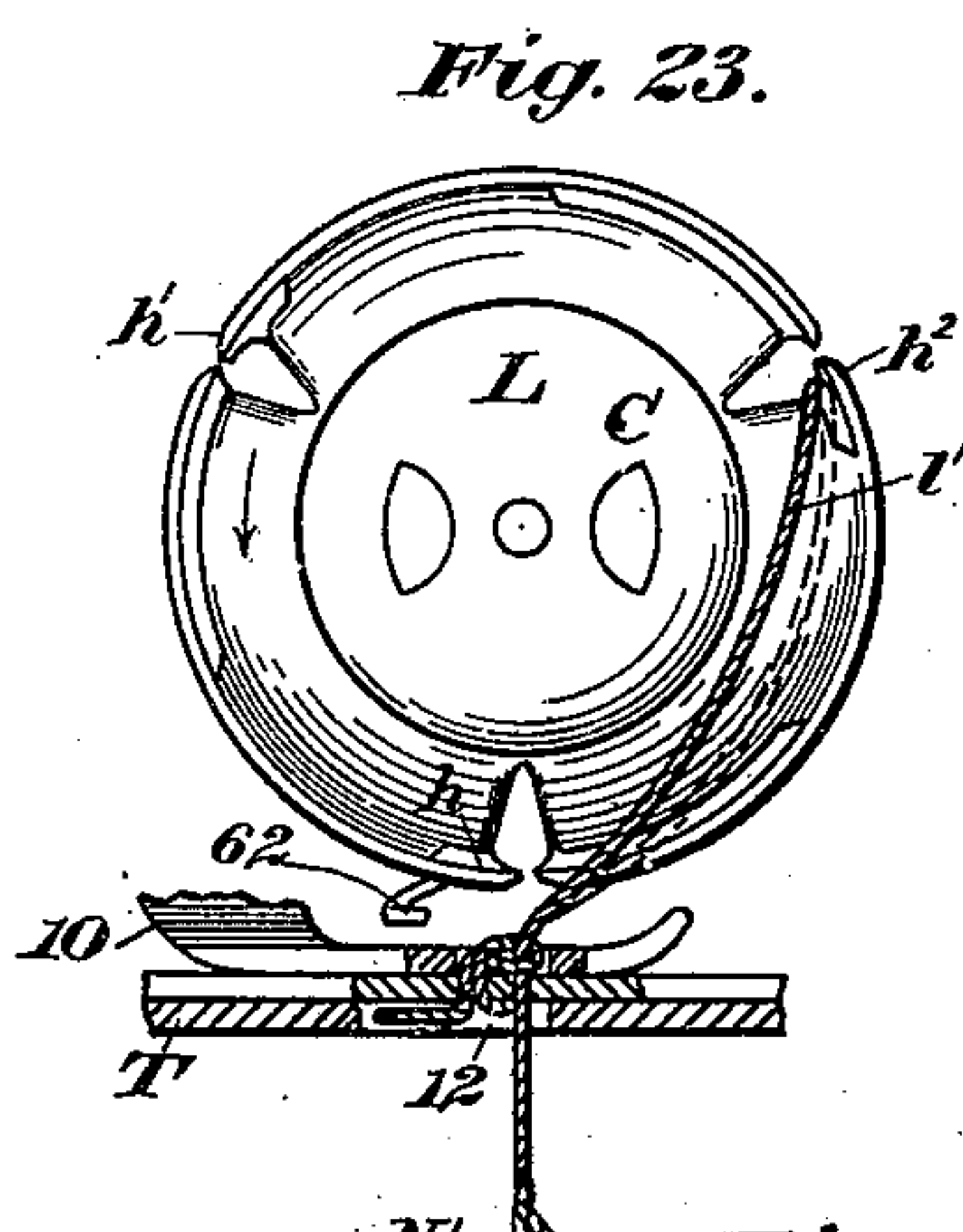
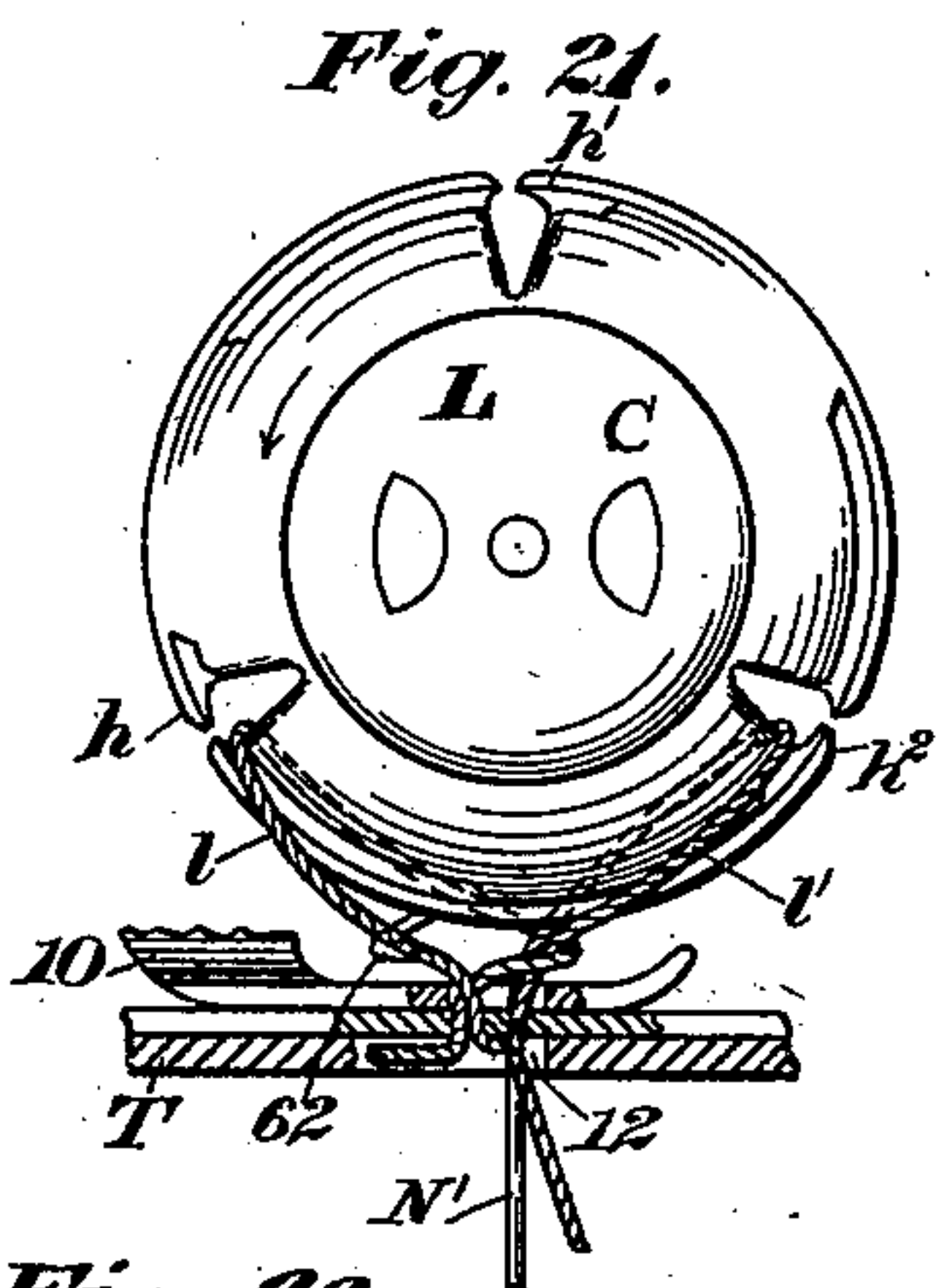
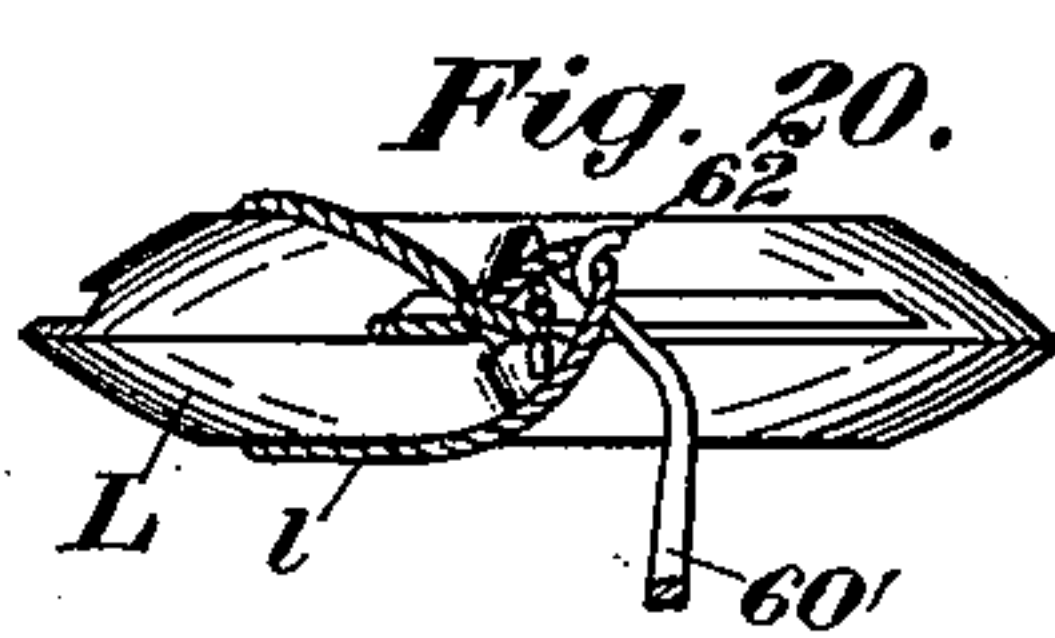
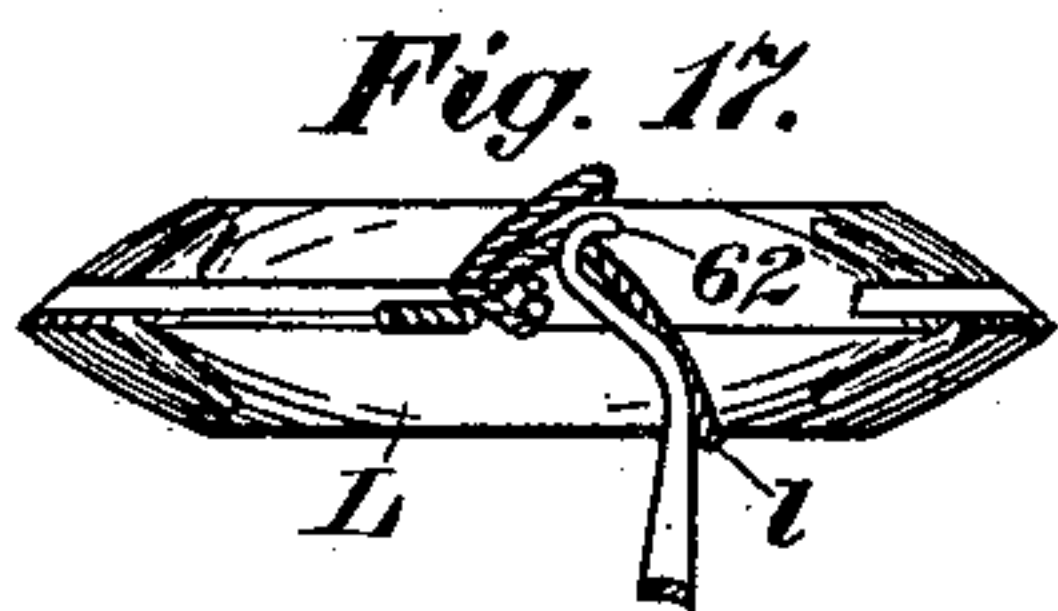
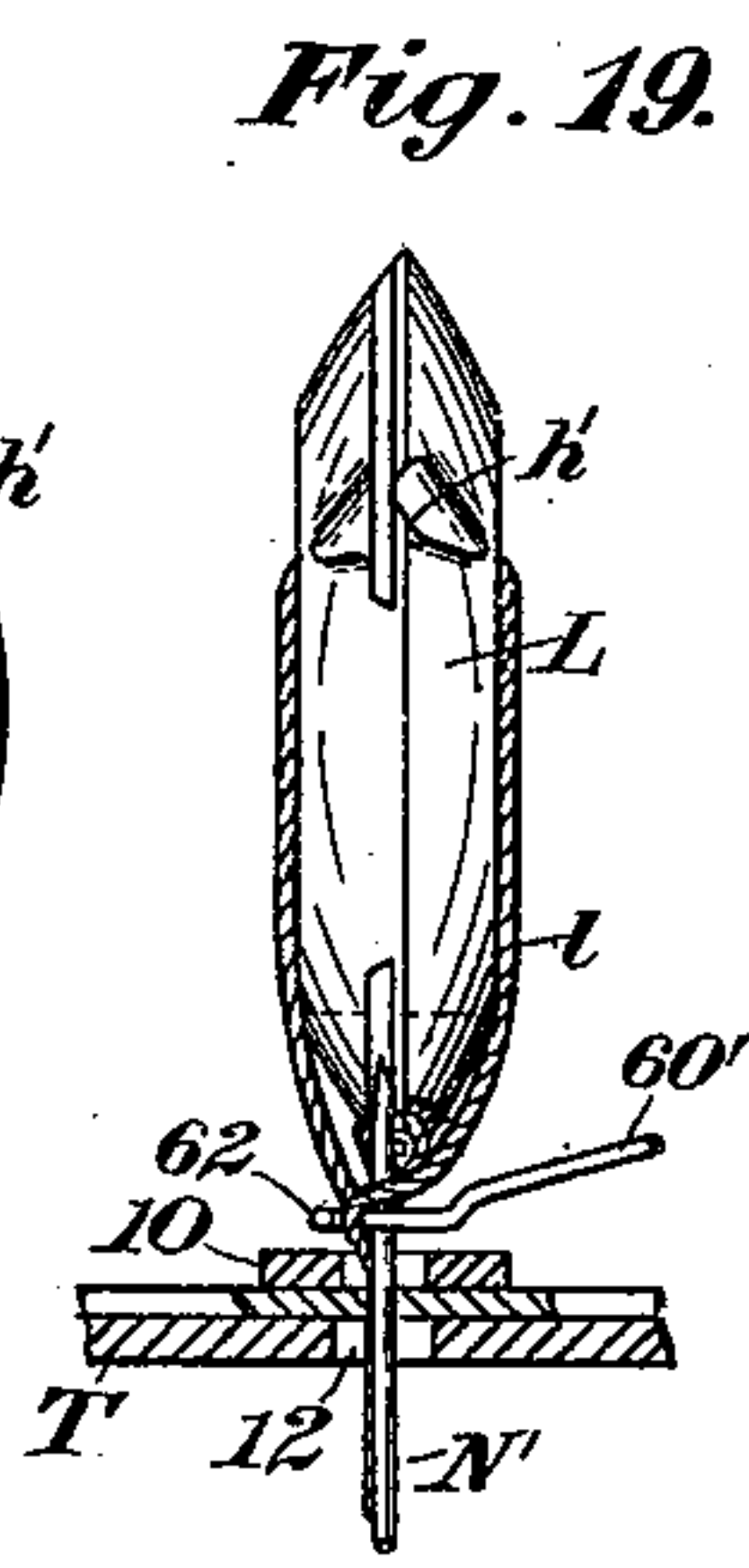
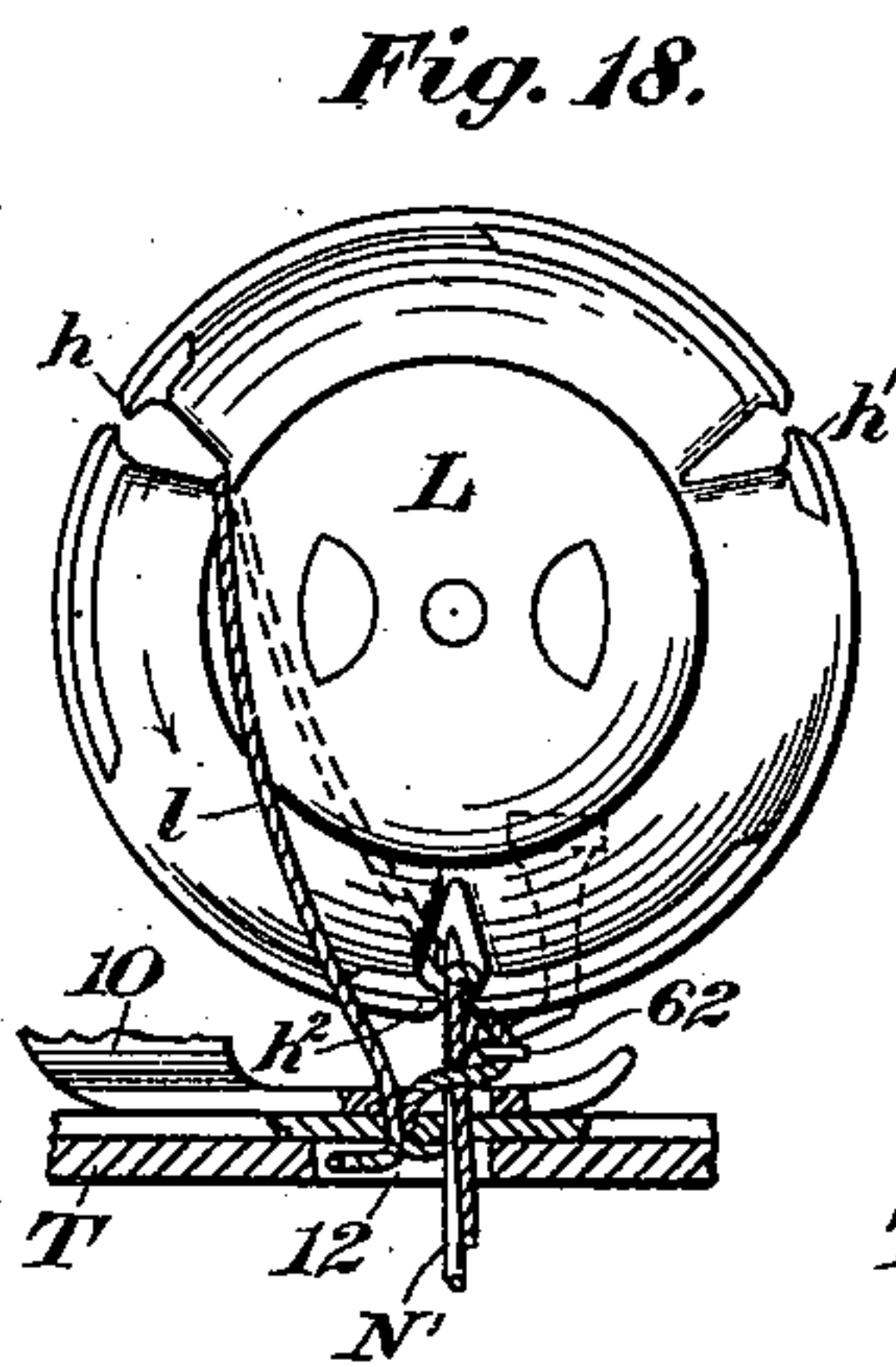
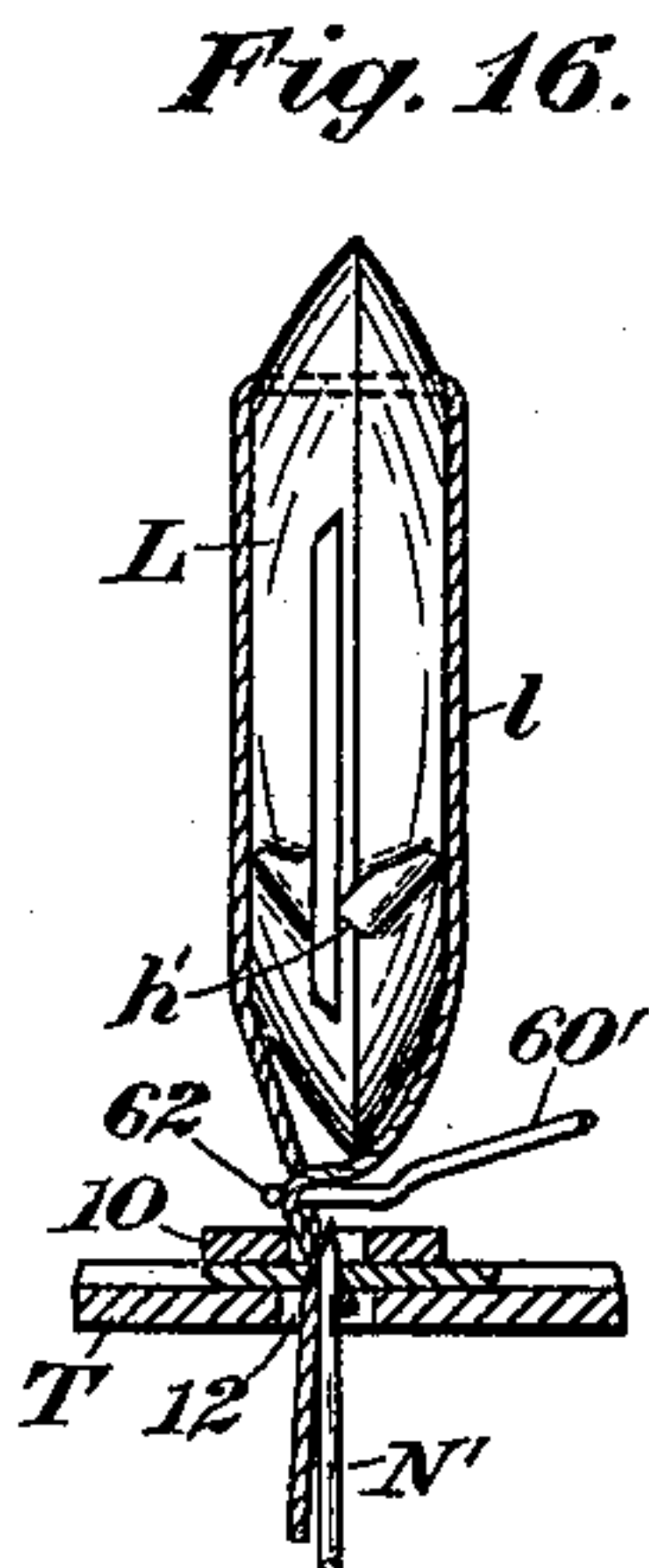
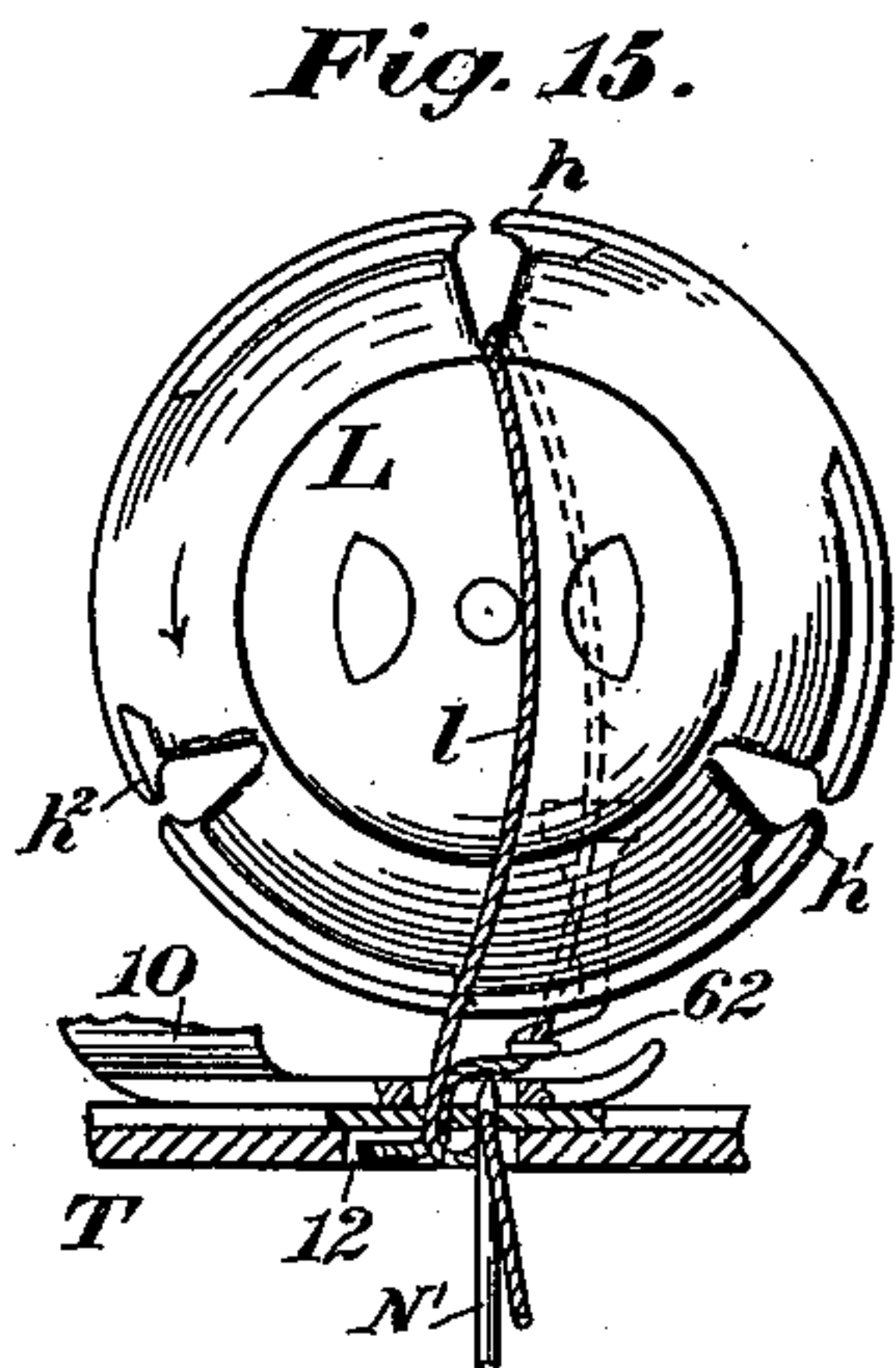
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(No Model.)

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Fig. 25.

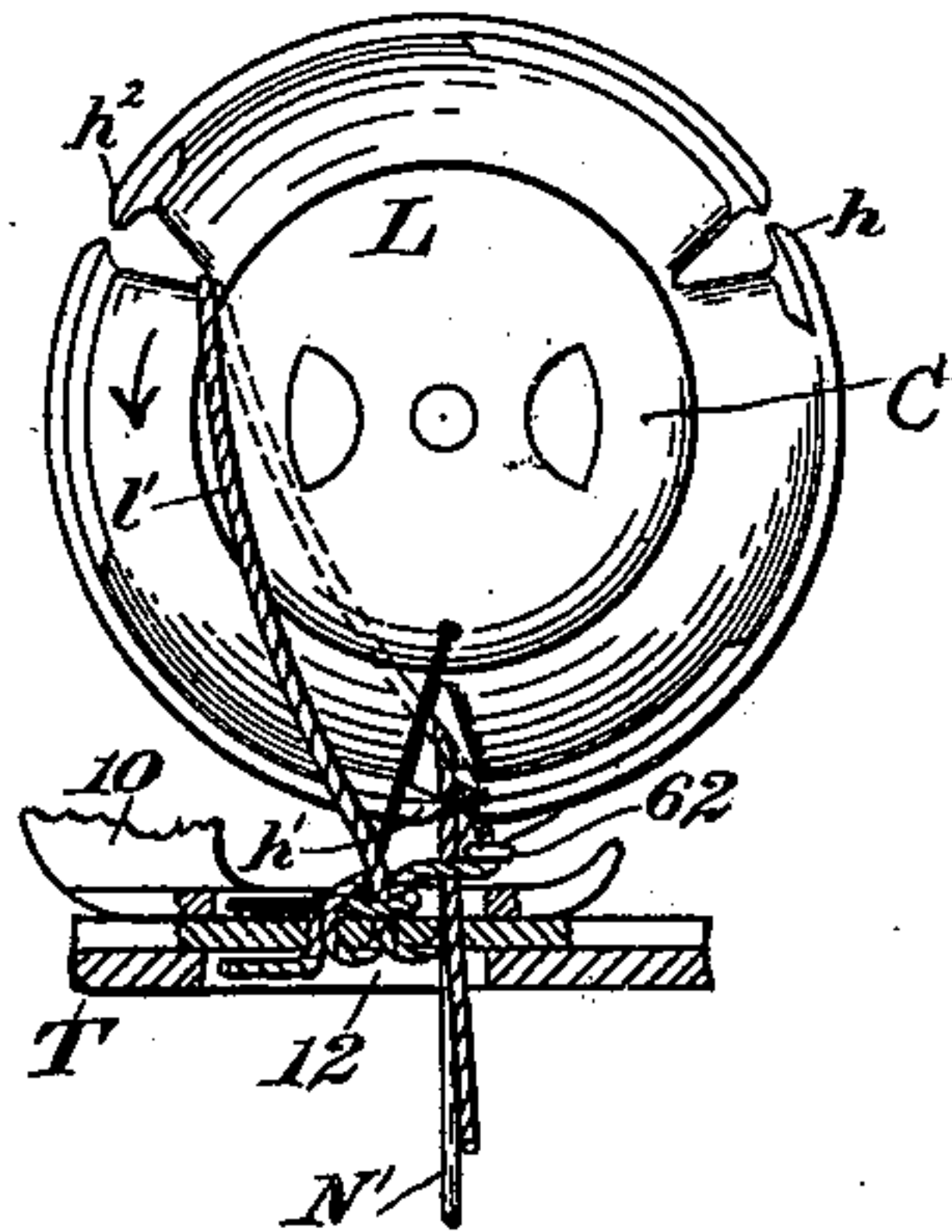


Fig. 26.

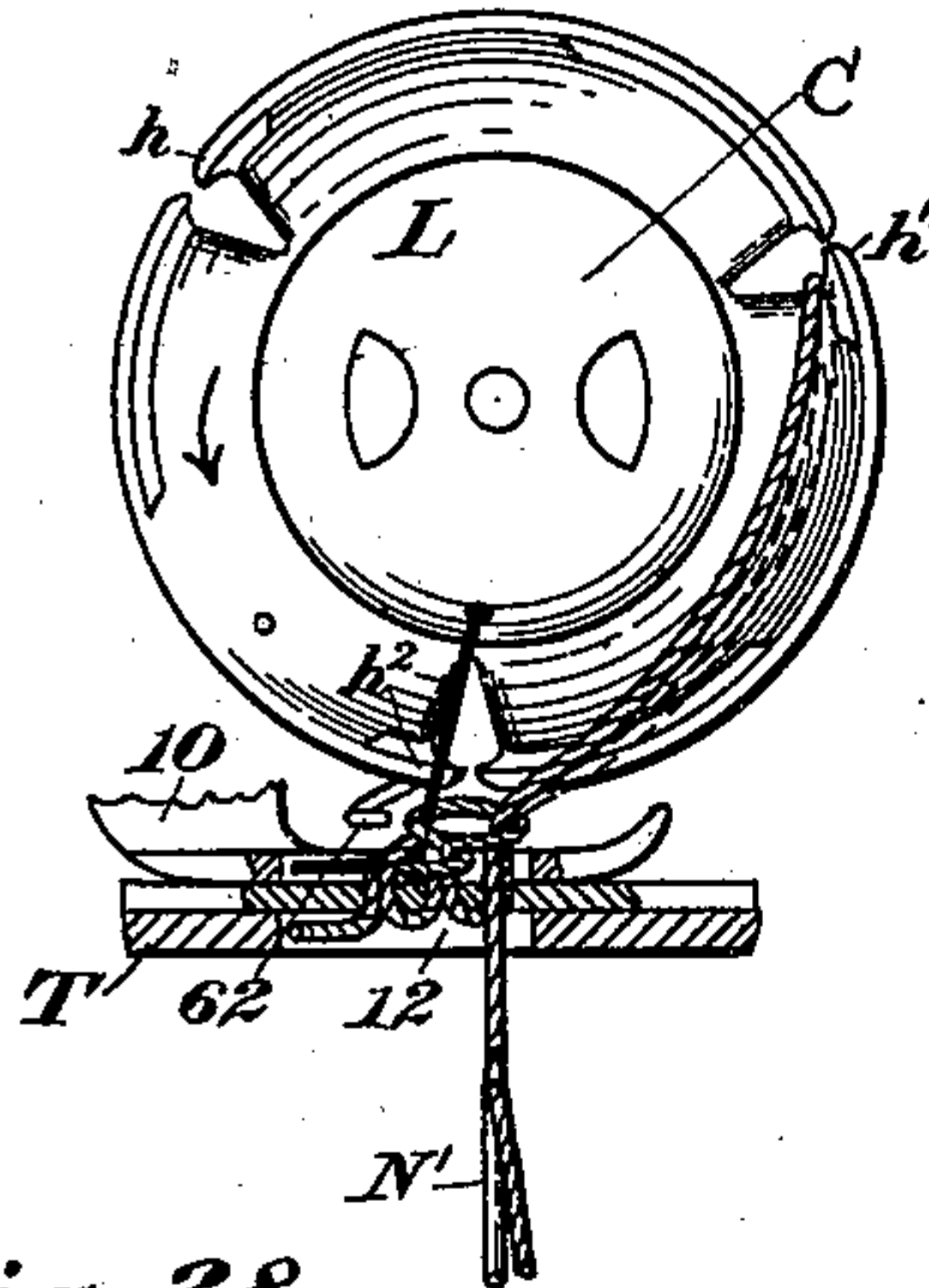


Fig. 27.

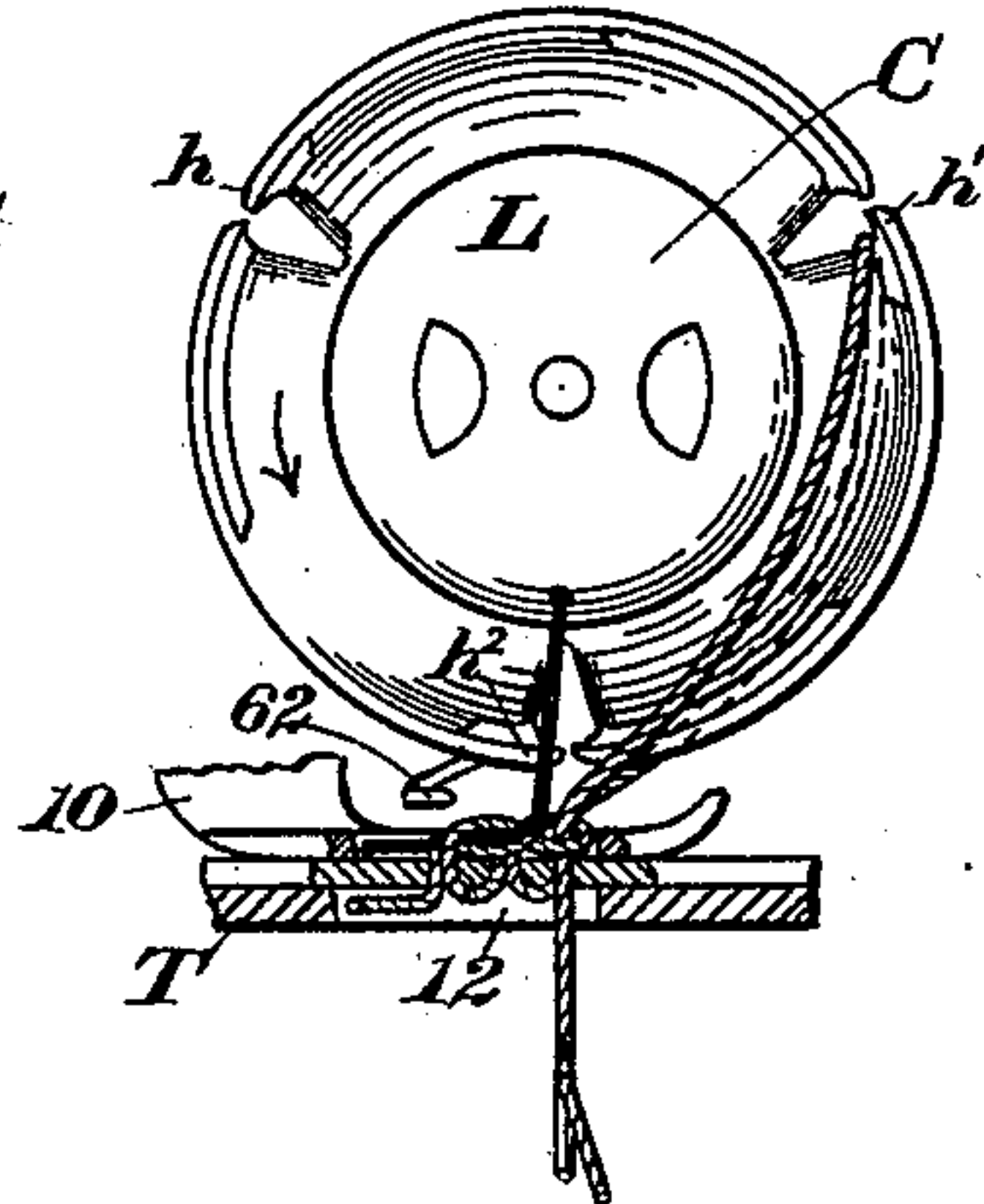


Fig. 28.

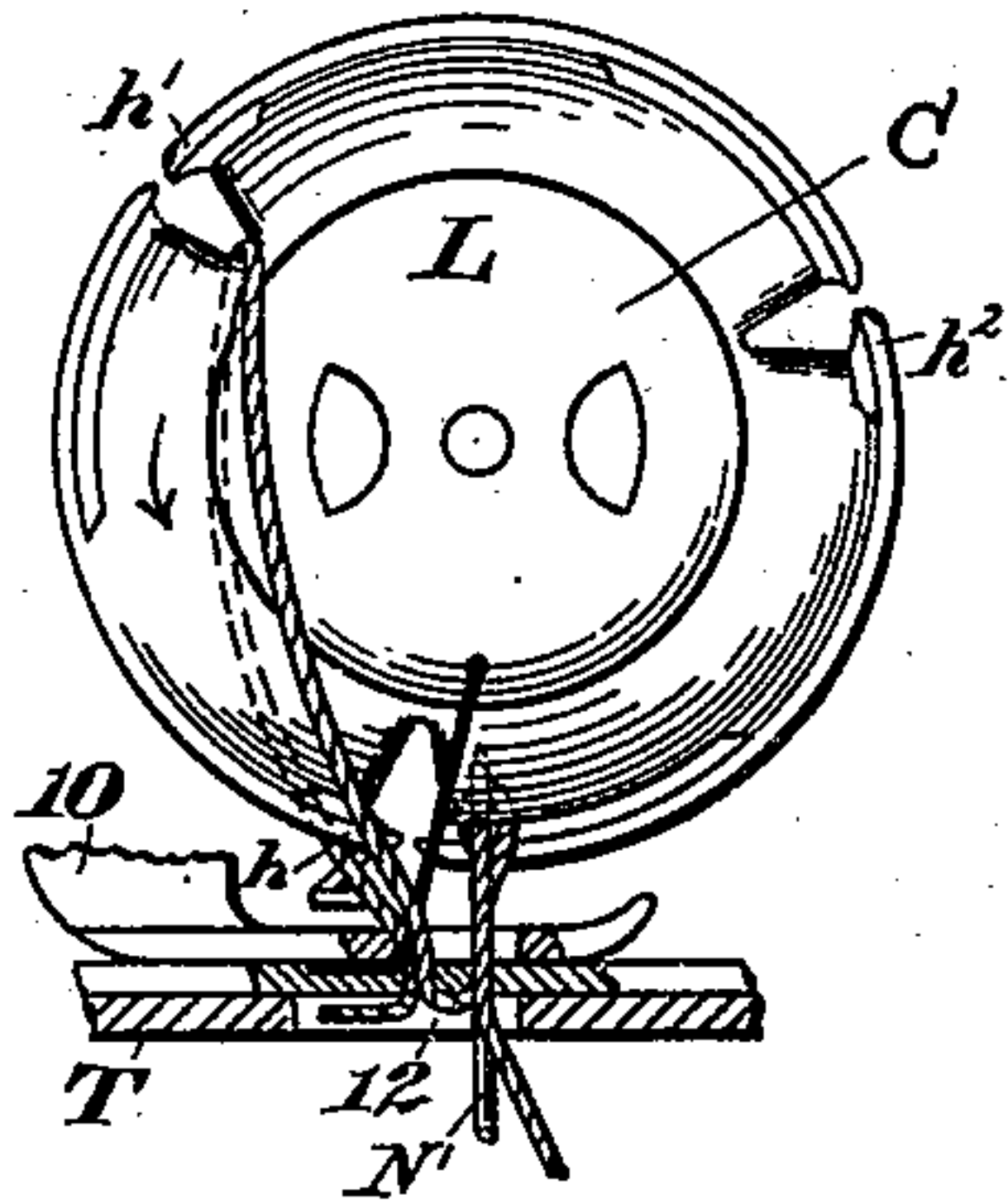


Fig. 31.

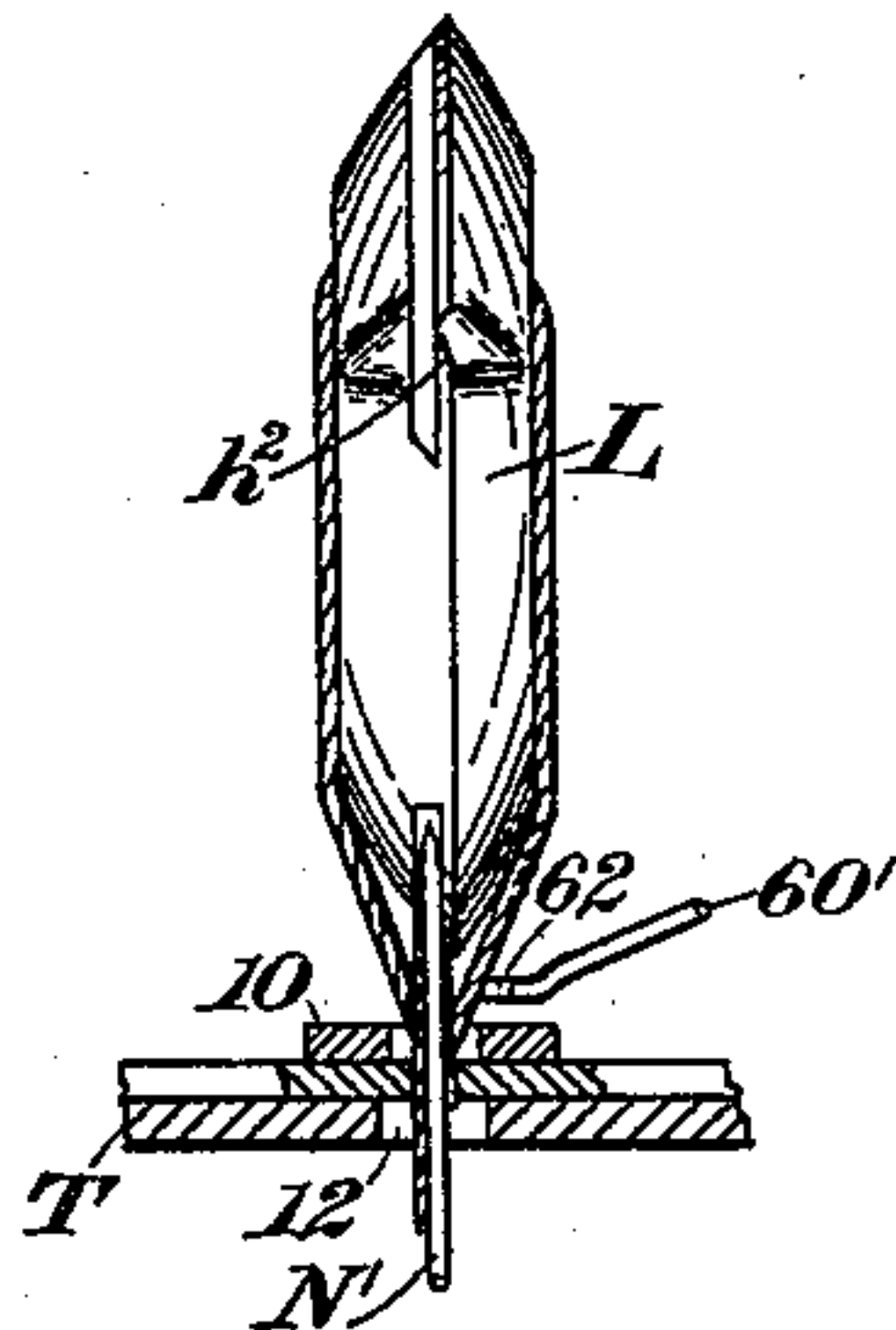


Fig. 29.

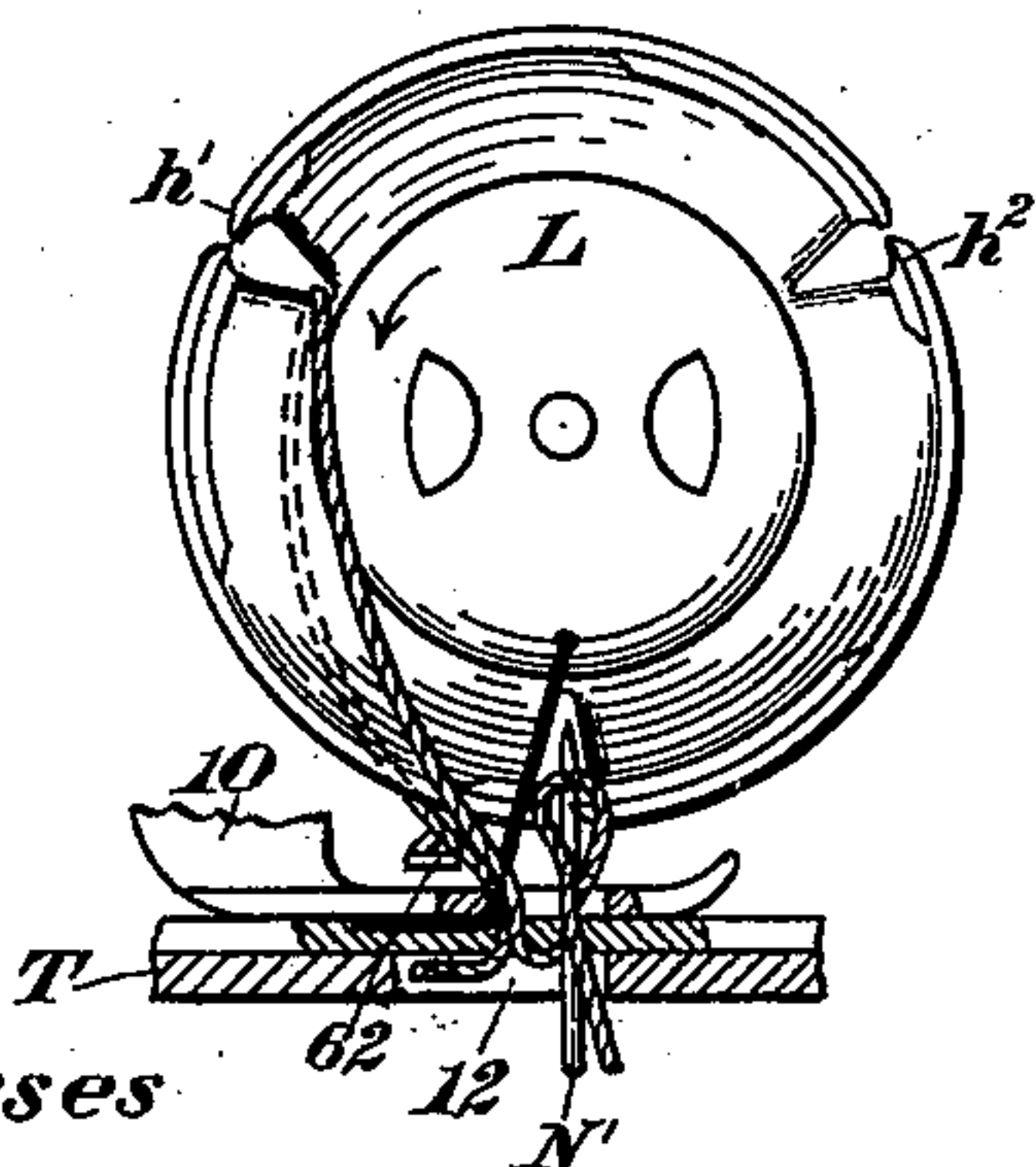
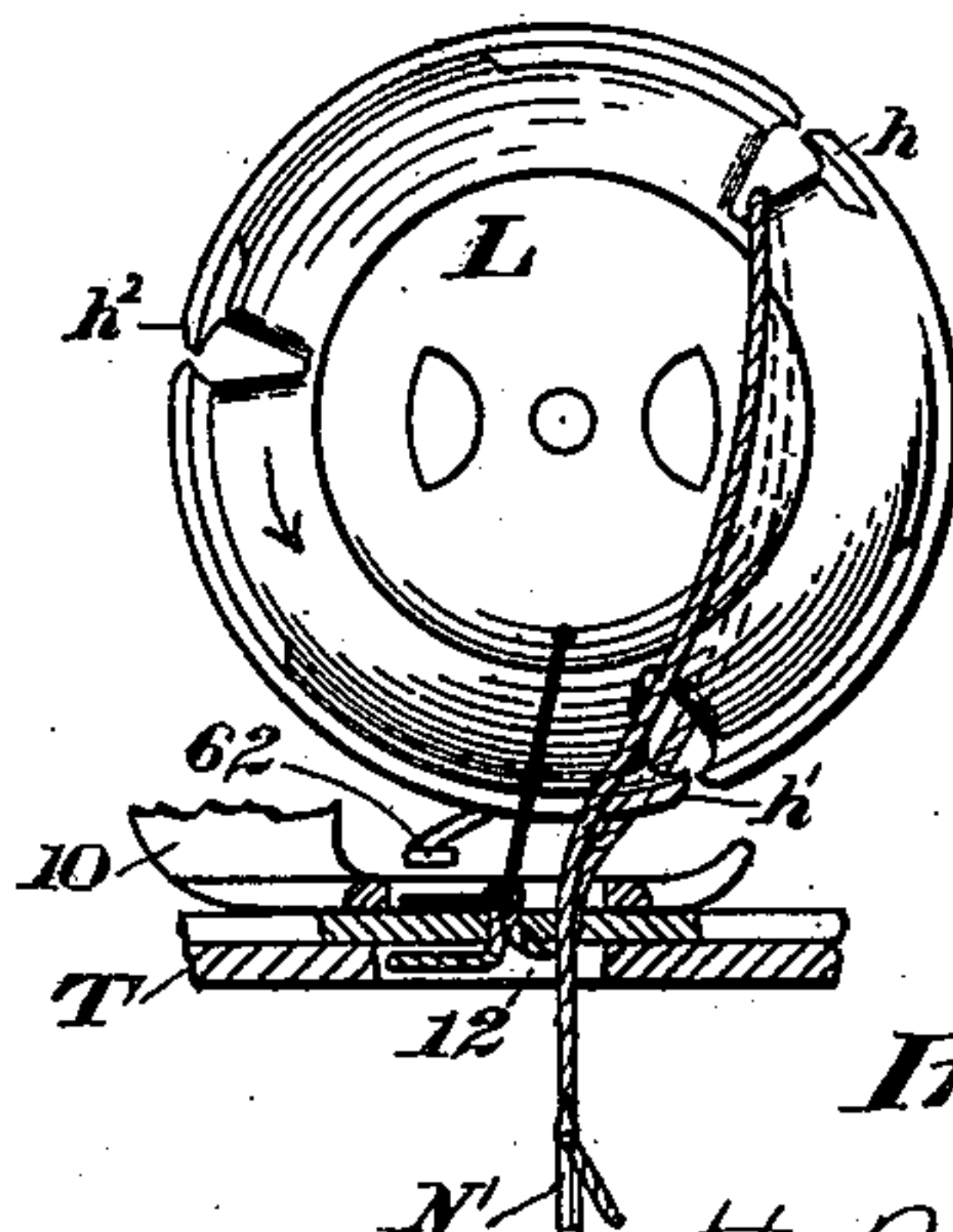


Fig. 30.



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# UNITED STATES PATENT OFFICE.

HUBERT P. RICHARDS, OF NEW BRITAIN, CONNECTICUT.

## SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 652,935, dated July 3, 1900.

Application filed January 12, 1898. Serial No. 666,432. (No model.)

*To all whom it may concern:*

Be it known that I, HUBERT P. RICHARDS, a citizen of the United States, residing in New Britain, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification.

This invention relates to sewing-machines, and particularly to that class of machines in which a shuttle or looper is employed in making the stitch and in which a loop of the needle-thread is engaged by the looper and is carried around the same to inclose a second thread to form a lock-stitch or in which a succeeding loop of the needle-thread is carried by the looper through a preceding loop to form a chain-stitch.

In sewing-machines of ordinary construction, in which the needle-bar is supported for reciprocatory movement above the work-plate and in which the looper is supported for rotary movement below said work-plate, the loops during the operation of sewing are formed below the work-plate on the descent of the needle through the fabric and are engaged by the looper and carried around the same to inclose the lower thread, and the loops so formed are drawn up against the under side of the fabric and are invisible to the operator during the operation of sewing.

In some classes of work, and especially "fancy-stitch" work, it is extremely desirable that the looped portion or what is normally considered the underside of the stitch shall be in plain sight during the operation of sewing.

It is one of the principal objects of my present invention to furnish a machine comprehending an improved organization of coacting mechanisms, whereby during the operation of sewing the needle will be carried upward through the fabric to form successive loops and whereby the loops so formed will be carried around the looper and drawn taut upon the upper face of the fabric in plain sight of the operator.

A further object of my present invention is to furnish a sewing-machine embodying improved fabric-holding and fabric-feeding mechanisms and stitch-forming mechanism, the constructions and organizations of which are such that in the operation of sewing a

loop will be formed on the ascent of the needle and drawn upward above the bed-plate of the machine through the fabric and engaged by and carried around the looper to inclose a second thread to form a lock-stitch or carried by the looper through a preceding loop to form a chain-stitch the loops of which will be visibly disposed upon the upper face of the fabric.

A further object of my present invention is to furnish a sewing-machine comprehending work-holding mechanism, including a shiftably-supported work-table, a presser-foot fixedly supported above and coöperative with the work-table for holding the work, and means for locking the work-table in a shifted position.

A further object of the invention is to furnish an improved sewing-machine comprehending a horizontally-disposed work-table or cloth-plate, springs supported below said work-table, a presser-foot fixedly supported above and coöperating with the work-table to clamp the work thereon, a reciprocatory feed-bar operable in a recess in the work-table, means for imparting a feed movement to the feed-bar, and means in connection with and effective for elevating and depressing the work-table and feed-bar simultaneously.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of a sewing-machine embodying my present invention. Fig. 2 is an end view of the sewing-machine as seen from the left in Fig. 1. Fig. 3 is a plan view of the sewing-machine. Fig. 4 is a vertical longitudinal section of the sewing-machine, taken on a line corresponding with the dotted line *a a*, Fig. 3, a portion of said machine being shown in side elevation in this figure. Fig. 5 is a horizontal cross-sectional view of the sewing-machine, taken on a line corresponding with the dotted line *b b*, Fig. 1. Fig. 6 is a plan view of a portion of the left-hand end of the sewing-machine, showing a portion of the bed-plate, work-table, fabric-feeder, and the feed-adjusting device, a portion of the work-table being broken away. Fig. 7 is a vertical section on a line corresponding with the dotted line *c c*, Fig. 4, of a portion of the sewing-machine as seen from the right hand in said figure and shows the relative positions of the actuating-connectors between the



5 looper-actuating shaft and the needle-bar and feeder-actuating shafts at one point in the rotation of said looper-shaft. Fig. 8 is an end elevation, partially in section, of a portion of the sewing-machine as seen from the left in Fig. 1 and showing the work-table in its normal elevated position. Fig. 9 is a view similar to Fig. 8 of the same parts, showing the work-table in its depressed position. Fig. 10 is a plan view, partially in horizontal section, of a portion of the left-hand end of the sewing-machine and illustrates in full lines the stitch-changing device in its advanced or loop-engaging position. Fig. 11 is a side view, partially in section, of the parts illustrated in Fig. 10 and shows more clearly the devices for controlling the operation of the stitch-changing device. Fig. 12 is a view similar to Fig. 10, showing in full and dotted lines the stitch-changing device in its retracted position. Fig. 13 is a sectional view similar to Fig. 11 of the parts shown in said figure and shows the stitch-changing device in the retracted or ineffective position illustrated in Fig. 12. Fig. 14 is a cross-sectional view taken on a line corresponding with the dotted line *d d*, Fig. 11, and shows the same parts as seen from the right hand in said figure. Fig. 15 is an end view, partially in cross-section, of a portion of the work-holding, stitch-forming, and stitch-changing devices and shows the relative positions of the needle, loop-taker, and the loop-diverter of the stitch-changing device at one point in the cycle of operations of forming a chain-stitch, said figure showing a loop as having been carried around the looper and as having one portion thereof deflected into a position to insure the passage of the needle and needle-thread through said loop, the needle being shown in the position it occupies just preparatory to its passage through the preceding loop. Fig. 16 is a front view of the parts illustrated in Fig. 15 and shows the elements thereof in the corresponding positions. Fig. 17 is an under side detached view of the looper and the loop-diverter of the stitch-changing device and shows the loop-diverter in the position thereof illustrated in Figs. 15 and 16. Figs. 18, 19, and 20 are views similar to Figs. 15, 16, and 17, respectively, showing the same parts and illustrating another advanced step in the operation of forming a chain-stitch. Figs. 21 and 22 are views similar to Figs. 18 and 20 of the same parts, illustrating a further-advanced step in the operation of forming a chain-stitch and said figures showing the succeeding loop as having been engaged by a loop-taker of the looper and carried through the preceding loop, the needle having been retracted to a point below the fabric or work and the loop-diverter of the stitch-changing device having been thrown out of engagement with the preceding loop. Figs. 23 and 24 are views similar to Figs. 21 and 22, respectively, of the same parts and show the needle in its fully-retracted position, the pre-

ceding loop in its fully-drawn-up position, and the succeeding loop as having been carried around the looper to nearly its fully-drawn-out position. Figs. 25, 26, and 27 are views similar to Fig. 15, showing the same parts, and illustrate three successive steps in the operation of forming a lock chain-stitch, the looper being shown in these figures in the nature of a shuttle and having a second thread adapted to be inclosed by the successive loops as they are carried around the looper. Figs. 28, 29, and 30 are views similar to Fig. 25, illustrating, respectively, three successive steps in the operation of forming an ordinary lock-stitch, the loop-diverter of the stitch-changing device being shown in a retracted, inoperative, or ineffective position; and Fig. 31 is a front view of the parts illustrated in Fig. 28.

Similar characters designate like parts in all the figures of the drawings.

The framework of the machine, which is designated in a general way by F and which may be of any suitable general conformation, comprises in the form thereof shown in the accompanying drawings a horizontal bed-plate B, having an outwardly-extending bracket B' at one end thereof, a hollow post 2, extending upward from the opposite end of said bed-plate, and an overhanging hollow arm 3, extending outward in a substantially-horizontal plane parallel with the bed-plate and having at the outer end thereof a head 3'.

The bracket B' at the outer end of the bed-plate B is shown comprising a depending outwardly-extended arm 4, located substantially midway of the width of the bed-plate and having at the outer end thereof a vertically-disposed bearing 4' and two substantially-horizontal arms 5 and 6, located one at each side of the depending arm 4 and having at the outer ends thereof vertically-disposed bearings 5' and 6', joined together by a plate 7, having a vertically-disposed bearing 7' substantially midway of the two vertical bearings 5' and 6' and also having two horizontal bearings 8 and 9, located at opposite sides, respectively, of the vertical bearings 7'.

The work-holding mechanism or device comprises, in the form thereof illustrated most clearly in Figs. 1, 2, and 14 of the drawings, a presser foot or bar 10, rigidly but removably secured to the head 3' of the arm 3, and a work-table (designated in a general way by T) shiftably supported below said presser-foot and having a recess or throat 12 formed therein.

The support T' for the work-table comprises, in the form thereof shown in the accompanying drawings, a sleeve 13, surrounding the reduced upper portion of the central bearing 4' and having three upwardly and outwardly extending arms 14, 15, and 16, respectively, the one 14 of which is flanged at the upper end and is secured to the under side of the work-table T, and the ones 15 and 16 of which have at the upper ends thereof ver-



tionally-disposed pins, which extend through the bearings 5' and 6', respectively, and are secured at their upper ends to the table T.

Springs 17 and 18 are provided for normally retaining the table T in the elevated or work-clamping position, (illustrated in Figs. 1, 2, 4, and 8,) said springs surrounding the reduced upper portions of the bearings 5' and 6' and being interposed between the enlarged lower portions of said bearings and the under face of the table T.

As a simple and convenient means for shifting the work-table relatively to the presser-foot and for holding the same in an ineffective or non-clamping position I have provided, in operative relation with the work-table support, a work-table depressing and locking device, (designated in a general way by D,) which in the preferred form thereof (shown most clearly in Figs. 1, 5, and 8 of the drawings) comprises a stop or bearing block 19, fixed to the upwardly-extending arm 14 near its upper end and having a stop-notch 19' in the upper face thereof, and a cam-arm 20, fixed to the outer end of a crank-shaft 21, journaled in a bearing 22 on an upwardly-extending flange 23 at the outer end of the bed-plate B, and which crank-shaft has at the inner end thereof a crank-arm 24, furnished with a thumb-piece 25, whereby said crank-shaft may be actuated to partially rotate the cam-arm 20 and shift the working end of said cam from the position shown in Fig. 8 to the position shown in Fig. 9, whereby to depress the work-table support and work-table, the stop-notch 19' being so disposed with relation to the axis of movement of the cam-arm 20 that when said arm is in the position thereof illustrated in Fig. 9 said arm will block the reactionary or vertical movement of the table T.

The stitch-forming mechanism practically comprehends two coöperative mechanisms—to wit, a looper mechanism and a needle-bar mechanism—operatively connected together for comparative movements of a predetermined ratio. The looper mechanism—all of the elements of which are disposed above the work-table—comprises, in the preferred construction and organization thereof illustrated in the accompanying drawings, a rotary looper or shuttle (designated in a general way by L) having a series of peripherally-disposed loop-takers or hooks, (shown as three in number and designated by  $h$ ,  $h'$ , and  $h^2$ , respectively,) a looper supporting and rotating driver (designated in a general way by E) having a series of driver pins or teeth 26, adapted for successively engaging in driver-sockets 27, formed in the inner face of the looper near the periphery thereof, a horizontally-disposed looper-actuating shaft S, journaled at opposite ends thereof in bearings at opposite ends of the overhanging arm 3, and two intermeshing looper-driving gears 28 and 29, the former of which is fixed to the shaft S and the latter of which is carried by

the looper supporting and rotating driver E. The shaft S is furnished at the inner end thereof with a suitable band-wheel W, whereby the same may be rotated.

In the organization thereof shown in the accompanying drawings the looper L is supported by the driver E to rotate in a truly-vertical plane, and the driver E is shown supported to rotate in a plane oblique to the plane of rotation of said looper, said driver having its shaft 30 supported in a bearing formed in the lower portions of the head 3' slightly oblique to the horizontal axis of rotation of the looper, the disposition of said driver relatively to the looper being such that the supporting and rotating teeth of the driver will successively engage the looper when said teeth arrive during the rotation of the driver near the upper portion of the arc through which said teeth travel and will leave said looper near the lower portion of said arc, as will be readily understood by reference to Fig. 4 of the drawings.

The gears 28 and 29, which constitute an actuating connector between the looper-actuating shaft S and the looper-driver E, are shown in the nature of a slightly-beveled gear.

As a convenient means for preventing lateral displacement of the looper L during the rotation thereof I have provided in connection with said looper a looper-guide which in the form thereof shown in the accompanying drawings comprises a series of peripherally-grooved guide-rolls (shown as three in number and designated by  $g$ ,  $g'$ , and  $g^2$ , respectively) which engage the periphery of the looper at different points in the length thereof and which rolls are rotatably supported on studs 30, secured to flanges on the head 3' of the machine, as shown most clearly in Figs. 1, 2, and 3 of the drawings.

It is distinctly to be understood that I do not limit myself to the particular construction or organization of the looper, looper-guide, and looper-driving devices illustrated in the accompanying drawings, as these may be variously modified within the purview of my invention.

The needle-bar mechanism in the preferred form thereof shown in the accompanying drawings comprises a needle-bar N, supported for reciprocatory movements below the work-table in the vertical aligned bearings 4' and 7' of the bed-plate bracket B', a needle-bar-actuating crank-shaft S', journaled at the outer end thereof in the horizontal bearing 9 of the bracket B' and at the inner end thereof in a bearing 33, depending from the rear end of the bed-plate B, a crank-arm 34, fixed to the outer end of the crank-shaft S', and a link pivotally connected at its upper end to the outer end of the crank-arm and at its lower end to the needle-bar N.

The looper L and driver E shown in the accompanying drawings are similar, in a general way, to the looper and driver described in Letters Patent of the United States No.



574,573, granted to Francis H. Richards January 5, 1897, and inasmuch as the looper is shown furnished with three loop-takers or hooks it is desirable that the looper mechanism and needle-bar mechanism of the machine shall have a two-to-three ratio of movement—that is to say, the relative timing in the movements of the looper and needle should be such that the needle-bar will have three complete reciprocations to two complete rotations of the looper—and as a means for securing this two-to-three ratio of movement between the looper and needle-bar it is preferable that the intermeshing gears 28 and 29 should be of relative sizes to constitute a two-to-three train, and the looper-actuating shaft S and needle-bar-actuating shaft S' should be so connected that one complete rotation of the first-mentioned shaft will impart one complete oscillation to the last-mentioned shaft, and to accomplish this the looper-actuating shaft S is furnished with a crank 31, and the needle-bar-actuating shaft S' is furnished with a crank 36, and said cranks 31 and 36 are operatively connected together by a pitman or connecting-rod 37 after the usual manner of connecting crank-shafts in sewing-machines, the relative dispositions of the two cranks 31 and 36 being such as to effect the requisite reciprocatory movement of the needle-bar, as will be readily understood by reference to Figs. 1, 4, 5, and 7 of the drawings.

The looper or shuttle L will in practice have a series of needle-grooves formed in the periphery thereof and will preferably be provided with a cop or bobbin-carrier C in the manner described in the patent referred to, it being necessary to provide the looper with thread to facilitate the formation of a lock-stitch and lock chain-stitch, as may be required, which is well understood in the art.

The feed mechanism, which is, in so far as I am aware, of a radically-different construction and organization from any feed mechanism known in the art, comprises in the preferred form thereof (illustrated in the accompanying drawings) a reactionary vertically-disposed feed-bar carrier or lever 40, having at the upper end thereof a horizontally-disposed serrated feed-bar or feed-dog 41 and also having substantially midway of the length thereof a cam-face 42; a feed-lever-actuating rocker *r*, shown in the nature of an angle or bell-crank lever, pivotally supported at 44 in a bearing 44' on one of the arms, as 16, of the shiftable bed-plate support and having a horizontally-disposed arm 45 pivotally connected at its outer end to the lower end of the feed-lever and having a vertically-disposed arm 46, the upper end of which extends slightly above and at one side the axis of the needle-bar-actuating shaft S'; a crank-shaft S<sup>2</sup>, journaled at its outer end in the bearing 8 of the bed-plate bracket B' and at its inner end in the bearing 8', depending from the inner end of the bed-plate; two actuating-cams 47 and 48, fixed to the shafts S' and S<sup>2</sup>, re-

spectively, in position one for engaging the upper face of the actuating-arm 46 of the feed-lever-actuating rocker and the other for operating against the cam-face 42 of the feed-lever 40 and the working faces of said cams being so disposed as to actuate the feed-lever and rocker alternately; an actuating connector between the rock-shaft S<sup>2</sup> and the looper-actuating shaft S, including a crank-arm 49, fixed to the inner end of said shaft S<sup>2</sup>, and a pitman or connecting-rod 50, pivotally connected at its lower end to said crank 49 and having a strap at its upper end in pivotal connection with the crank 31' on the looper-actuating shaft S.

As a means for retracting the rocker-arm 46 and feed-lever 40 and holding said parts in operative engagement with the cams 47 and 48, respectively, I have provided a retracting device, which is shown in the accompanying drawings as a spring 51, fixed at one end to the feed-lever and at its opposite end to the rocker-arm 46.

The crank-arm 43, shaft 44, and actuating-arm 46 practically constitute a bell-crank device adapted on one movement thereof through the cam 48 for elevating the feed-bar carrier and on another movement thereof through the spring 51 for depressing said carrier. The cam 48 is so disposed on the shaft S' as to impart a feed-lever-lifting movement to the bell-crank device at a predetermined point in the retractive or descending movement of the needle-bar, and the cam 47 is so disposed with relation to the cam-face 42 of the feed-lever and with respect to the position of the cam 48 that it will operate to impart an advancing or feed movement to the feed-lever immediately succeeding the elevation of said feed-lever to its operative work-engaging position, or, in other words, the cams 48 and 47, which control, respectively, the upward and advancing movements of the feed-lever 40, will be so disposed with respect to each other and the shafts S' and S<sup>2</sup> will be so connected and actuated that the effective operations of the cams 48 and 47 will take place in succession, the one 48 first acting to elevate and the one 47 next acting to advance the feed-dog, as will be readily understood by reference to Figs. 4, 5, 8, and 9 of the drawings.

In my present machine the looper or shuttle L will be rotated constantly in the direction of the arrow in Fig. 2, and the elements of the stitch-forming mechanism will normally produce an ordinary lock-stitch.

As a simple and convenient means for changing the form of stitch resulting from the normal operation of the needle and looper mechanisms hereinbefore described without effecting a change in the direction of movement of the looper or feed mechanism I have provided a stitch-changing device (designated in a general way by H) shiftable into coöperative relation with the looper and adapted for engaging portions of successive loops and for



deflecting such portions laterally of the path of the needle, so that succeeding loops may pass upward through preceding loops and cause the stitch-forming mechanism to produce a chain-stitch.

The construction and organization of the stitch-changing device are such that the same may be thrown into or out of operative relation with the looper to change the form of stitch made by the stitch mechanism without the necessity of changing the direction of rotation of the looper or the direction of movement of the feed mechanism and without the removal or substitution of parts, as heretofore necessary in machines of ordinary construction.

The stitch-changing device H, which in the present instance is located above the work-table T, comprises, in the preferred construction and organization thereof illustrated most clearly in Figs. 10 to 14, inclusive, of the drawings, a loop-diverter 60, shown in the nature of an angle-lever, fulcrumed at 61 on a lower portion of the head 3' of the machine and having at the other end of the longer arm 60' thereof a hook 62, disposed in position to engage portions of succeeding loops as the loop-diverter is shifted intermittently into effective loop-engaging positions, and an actuating device or lever 63, fulcrumed at 63' in the head 3' of the machine and having a vertically-disposed arm or member 64, at the lower end of which is a crank 64', pivotally connected to the outer end of the shorter arm 60'' of the loop-diverter 60, and said lever 63 also having at the upper end thereof a two-part extensible member, one part of which is in the nature of a horizontally-disposed longitudinally-recessed arm 65 and the other part 65' of which is in the nature of a pin shiftably supported in the part 65, preferably having at the outer end thereof a roller 66, adapted to be shifted into bearing contact with the working face of a cam 67, fixed to the looper-actuating shaft S, as illustrated most clearly in Fig. 11 of the drawings, the roller 66 of the shiftable pin 65' of the angle-lever 63 being normally held in engagement with said cam by means of a spring 68, which is shown as a spiral spring seated in a recess in the lower end of the head 3' and bearing at one end against said head and at its opposite end against the lower end of the arm 64 of the lever 63. This angle-lever 63, together with the shiftable pin 65', constitutes an actuating-lever for the loop-diverter and may be so referred to hereinafter.

The cam 67, which actuates the stitch-changing device, has a working portion 67', which is so constructed and disposed and is so timed with reference to the movements of the looper and needle-bar that it will advance the stitch-changing device to its loop-deflecting position preferably after a preceding loop, as l, has arrived at its fully-drawn-out position, as shown in Fig. 15, and will permit a retractive movement of said device to an ineffective po-

sition immediately preceding the arrival of the loop at its retightening position, the spring effecting said retractive movement—that is to say, the stitch-changing device is operated to deflect a portion of a preceding loop laterally of the path of the needle N' just before the needle on the ascending movement thereof passes through the work and holds said deflected portion in the position illustrated in Fig. 15 until the needle and needle-thread have arrived at a position whereby the succeeding loop l' is formed and is in position to be engaged by a loop-taker of the looper and carried through said preceding loop, as will be readily understood by reference to Figs. 15 to 20, inclusive.

The general operation of the stitch-changing device in my present machine is substantially the same as that of the stitch-changing device described and claimed in Letters Patent of the United States No. 607,079, granted to me July 12, 1898, to which reference may be had for a more detailed description of the operation of said stitch-changing device. The construction and organization of the stitch-changing device herein shown and described are, however, radically different from those in the patent referred to.

In connection with the fabric-feeding means I employ a feed-adjuster which is operative for regulating the stroke thereof in accordance with the kind of stitch to be formed, and said feed-adjuster consists in the present case of a lever 100, pivoted, as at 101, to the feed-table, and its working arm 101' has a cam-face 102 for engaging the beveled end 103' of the feed-bar 41 of the feed-bar carrier or lever 40, as shown in Fig. 6. A slot 103 is formed in the lever 100, and the movement of said lever is limited by a pin 104, projecting through said slot. When it is desired to vary the stroke of the feed-dog, the arm 101' is swung to the right or to the left, thereby moving the working arm 101' in the opposite direction, and the cam-face being in contact with the end of the feed-dog the stroke of the latter will be correspondingly regulated.

Having described my invention, I claim—

1. In a sewing-machine, the combination, with a yieldingly-supported work-table, of means independent of said work-table and of the stitch-forming mechanism for feeding the fabric; stitch-forming mechanism including a needle and a needle-bar, and a looper, located, respectively, at opposite sides of said work-table; and means for operating the stitch-forming mechanism.

2. In a sewing-machine, the combination, with a yieldingly-supported work-table and a fixed presser-foot coöperative therewith for holding the work, of means independent of said work-table and of the stitch-forming mechanism for feeding the fabric; stitch-forming mechanism including a needle and a needle-bar, and a looper, located, respectively, at opposite sides of said work-table; and means for operating the stitch-forming mechanism.



3. In a sewing-machine, the combination, with a work-table shiftable into two extreme positions, of means independent of said work-table and of the stitch-forming mechanism for feeding the fabric; means for locking said work-table in one of its extreme positions; stitch-forming mechanism including a needle and a needle-bar, and a looper, located, respectively at opposite sides of said work-table; and means for operating the stitch-forming mechanism.

4. In a sewing-machine, the combination, with a yieldingly-supported work-table, of means independent of said work-table and of the stitch-forming mechanism for feeding the fabric; means for shifting said work-table vertically and locking the same in its shifted position; stitch-forming mechanism including a needle, a needle-bar, and a looper, said looper being located above the work-table, and the needle and the needle-bar being disposed below said work-table; and means for operating said stitch-forming mechanism.

5. In a sewing-machine, the combination, with a shiftablely-supported work-table, of fabric-feeding means independent of said work-table and of the stitch-forming mechanism; means for elevating said table and for normally maintaining the same in its elevated position; independent means for depressing said work-table and for locking the same in its depressed position; stitch-forming mechanism including a needle, a needle-bar, and a looper, said looper being located above the work-table; and means for operating said stitch-forming mechanism.

6. In a sewing-machine, the combination, with fabric-holding means including a yieldingly-supported work-table, of fabric-feeding means independent of said work-table and of the stitch-forming mechanism; a presser-foot fixedly supported above and coöperative with the work-table for holding the work or fabric; a work-table depressing and locking device coöperative with the work-table; stitch-forming mechanism including a needle, a needle-bar, and a looper, said looper being located above the work-table; and means for operating the stitch-forming mechanism.

7. In a sewing-machine, the combination, with a yieldingly-supported work-table, of fabric-feeding means independent of said work-table and of the stitch-forming mechanism; a fixed presser-foot disposed above and coöperative with the work-table to clamp the work; stitch-forming mechanism including a looper situated above the work-table; and means for operating the stitch-forming mechanism.

8. The combination, with fabric-feeding mechanism, of an independent vertically-adjustable work-table; means coöperative with the work-table for holding the work to be advanced by the feeding mechanism; fabric-feeding mechanism operable independently of said work-table and of the stitch-forming mechanism; stitch-forming mechanism in-

cluding a looper the latter mounted above the work-table; and means for operating the stitch-forming mechanism.

9. In a sewing-machine, the combination, with a vertically-adjustable work-table, of a presser-foot fixed above and coöperating with the work-table; means for locking the work-table in one position relatively to the presser-foot; a fabric-feeder independent of the stitch-forming mechanism and extending through and operable in a recess in the work-table; actuating means for said fabric-feeder; stitch-forming mechanism including a looper located above the work-table; and means for operating the stitch-forming mechanism.

10. In a sewing-machine, the combination, with fabric-feeding mechanism including a reciprocatory feed-bar and actuating means therefor, of an independent work-table having a recess in which the feed-bar operates; a presser-foot fixedly supported above and coöperative with the work-table; instrumentalities for shifting the work-table toward and away from the presser-foot; a locking device for holding the work-table in a shifted position; stitch-forming mechanism independent of the fabric-feeding mechanism; and means for operating the stitch-forming mechanism.

11. In a sewing-machine, the combination, with a bed-plate or frame, of fabric-holding mechanism including a horizontally-disposed work-table or cloth-plate; springs yieldingly supporting the work-table in an elevated position; a presser-foot fixedly supported above and coöperative with the work-table to clamp the fabric; a work-table-depressing device carried on the bed-plate or frame and operable for shifting the table into an ineffective or non-clamping position, and embodying means for locking such table in such position; fabric-feeding mechanism, stitch-forming mechanism independent of the fabric-feeding mechanism and including a looper mounted above the work-table; and means for operating the stitch-forming mechanism.

12. In a sewing-machine, the combination, with fabric-feeding mechanism including a shiftable work-table and a presser-foot fixedly supported above said work-table, of a fabric-feeder carried by the work-table support and shiftable with the work-table; means for actuating the fabric-feeder; stitch-forming mechanism including a reciprocatory needle and a looper, said looper being located above the work-table; and means for operating said stitch-forming mechanism.

13. A sewing-machine comprehending fabric-holding and fabric-feeding mechanism including a shiftable work-table; a presser-foot fixedly supported with relation to said work-table; means including a cam-arm and a bearing-block for shifting the work-table and locking the same in a shifted position; a fabric-feeder; a feed-bar extending through a recess in the work-table and shiftable in two directions; and means for actuating the feed-bar.



14. In a sewing-machine, the combination, with a horizontally-disposed shiftable work-table, of springs yieldingly supporting said work-table; a fixed presser-foot located above and coöperative with the work-table to clamp the fabric thereon; a reciprocatory feed-bar operable independently of the work-table and disposed in a recess therein; means for imparting movement to the feed-bar; independent means for depressing the work-table and for holding the same temporarily in a depressed position for the purpose of applying or removing the work; and stitch-forming mechanism including a looper disposed above the work-table.

15. In a sewing-machine, the combination, with a horizontally-disposed work-table or cloth-plate, of springs yieldingly supporting said work-table; a presser-foot fixedly supported above and coöperative with the work-table to clamp the fabric thereon; a reciprocatory feed-bar operable independently of the work-table and pivotally connected to and operable in a recess in said work-table; means for imparting movement to the feed-bar; means in connection with and effective for elevating and depressing the work-table and feed-bar simultaneously for the purpose of applying or removing the work; stitch-forming mechanism including a shuttle located above the work-table; and means for operating the stitch-forming mechanism.

16. In a sewing-machine, the combination, with fabric-holding mechanism including a shiftable work-table, of fabric-feeding mechanism comprehending a feed-lever having at the one end thereof a feed-bar seated in a recess in the cloth-plate; a feed-bar-actuating rocker pivotally mounted on the work-table support and having an arm pivotally connected to the lower end of and supporting said lever, whereby on the movement of the work-table the feed-lever will have a corresponding movement; means independent of the work-table for imparting cloth-engaging and cloth-advancing movements to the feed-lever; and means for retracting the feed-lever.

17. In a sewing-machine, the combination, with fabric-holding mechanism including a vertically-shiftable cloth-plate or work-table, of fabric-feeding mechanism comprising a vertically-disposed feed lever or carrier having a feed-bar at the upper end thereof which extends through a recess in the cloth-plate; a feed-bar-actuating rocker fulcrumed on, and carried by, the cloth-plate support, and having an arm pivotally connected to the lower end of and supporting the feed-lever, whereby on a vertical movement of the cloth-plate the feed-lever will have a corresponding movement; means operative independent of the cloth-plate for imparting first an upward and then a cloth-advancing movement to the feed-lever; means for retracting the feed-lever; and a feed-adjuster in operative

relation with the feed-lever and effective for regulating the throw thereof.

18. In a sewing-machine, the combination, with a yieldingly-supported work-table, of a reciprocatory needle-bar; a looper located above the work-table; a fabric-feeder independent of the needle-bar and operable independently of the work-table; a needle-bar and a fabric-feeder actuating shaft; and means carried by said shaft for actuating the needle-bar and fabric-feeder in proper relation.

19. In a sewing-machine, the combination, with a depressible work-table and with stitch-forming mechanism including a reciprocatory needle-bar disposed below the bed-plate of the machine, and a looper located above the work-table; a fabric-feeder; a rock-shaft; means carried by the rock-shaft for directly actuating the needle-bar and fabric-feeder in proper timing, one relatively to the other; and means for actuating said rock-shaft.

20. In a sewing-machine, the combination, with a bed-plate having an overhanging arm, of a presser-foot fixed to said arm; a work-table yieldingly supported for vertical movement below and coöperating with the presser-foot for holding the work; means for feeding the work, said means being operable independently of said work-table and of the needle-bar; a reciprocatory needle-bar disposed below said work-table; a looper located above the work-table, and means for operating the looper and needle-bar to form a stitch.

21. In a sewing-machine, the combination, with fabric-holding means, of fabric-feeding mechanism including a feed-lever having a feed-bar; a rocker having an arm pivotally connected to the lower end of and supporting the feed-bar and also having another arm; two shafts located between the feed-lever and one arm of the rocker, and having cams in bearing engagement with said lever and arm; a retracting device for holding the feed-lever and rocker-arm in engagement with the cams; and means for actuating said shafts.

22. A sewing-machine comprehending, in connection with fabric-holding means, fabric-feeding mechanism including a feed-lever having a feed-bar at one end thereof and also having a cam-face; a rocker in pivotal connection with said feed-lever; means including two rock-shafts having cams in bearing engagement one with the cam-face of the feed-lever and the other with the rocker, and which cams have their working faces so disposed relatively to each other that on the oscillation of said rock-shafts one of said cams will operate in advance of the other and impart a lever-actuating movement to the rocker, and the other will subsequently impart a fabric-advancing movement to the feed-lever; and means for actuating the rock-shafts.

23. In a sewing-machine, the combination, with work-holding mechanism including a



yieldingly-supported work-table, and work-feeding mechanism including a lever having a feed-bar at one end thereof extending through the work-table, of a rocker having  
5 an arm in connection with and supporting the feed-lever and having another arm; two rock-shafts having cams in bearing engagement, respectively, with the feed-lever and  
10 one of the arms of the rocker, and having their working faces disposed relatively to each other to impart movements successively to the feed-lever; means for actuating said rock-shafts; and a retracting device in connection with the feed-lever.

15 24. In a sewing-machine, the combination, with stitch-forming mechanism including a looper disposed above the work-table and a looper-actuating shaft, of a stitch-changing device including an oscillatory loop-diverter  
20 pivotally supported above the work-table and having its working end shiftable into position for engaging portions of successive loops as said loops are carried around the looper; an angle-lever fulcrumed on the head of the  
25 machine and having one end thereof in engagement with an arm of the loop-diverter; and a cam carried by the looper-actuating shaft in position to operate the angle-lever to

impart an effective movement to the loop-diverter at predetermined points in the rotation 30 of said shaft.

25. In a sewing-machine, the combination, with stitch-forming mechanism including a looper and a looper-actuating shaft, of a stitch-changing device including a loop-diverter 35 having its working end shiftable into position for engaging portions of successive loops as said loops are carried around the looper; an angle-lever having an arm in connection with the loop-diverter, said lever also having an  
40 extensible arm or member; a cam fixed to the looper-actuating shaft and having its working face normally in engagement with the extensible arm whereby to actuate said arm and to impart a loop-deflecting movement to the  
45 loop-diverter; means for imparting a retractive movement to the loop-diverter and for normally maintaining the extensible arm in engagement with the cam; and means for  
50 shifting said extensible arm out of engagement with said cam.

HUBERT P. RICHARDS.

Witnesses:

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