

No. 611,862.

Patented Oct. 4, 1898.

I. W. LAMB.
KNITTING MACHINE.

(Application filed June 11, 1897.)

(No Model.)

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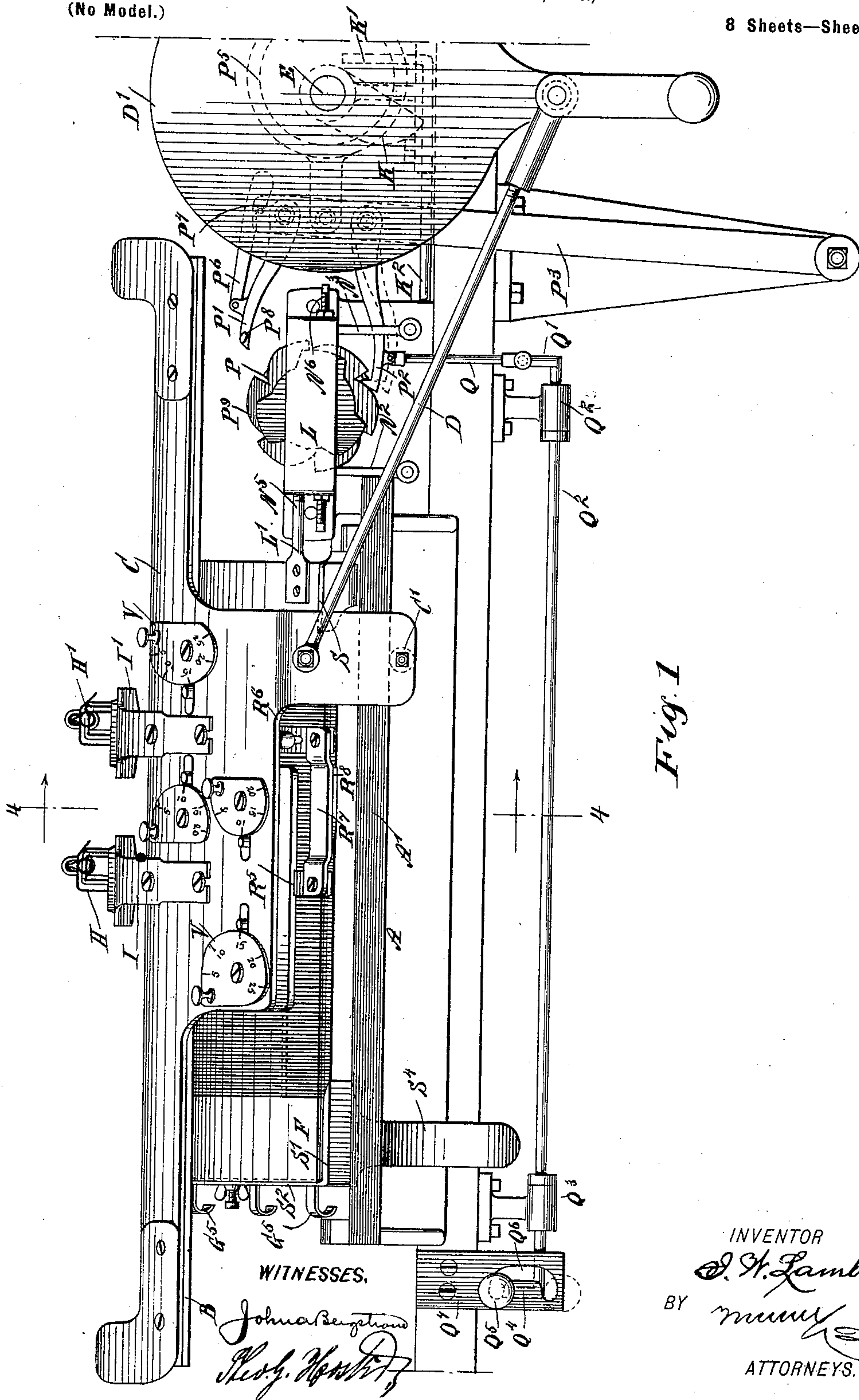


Fig. 1

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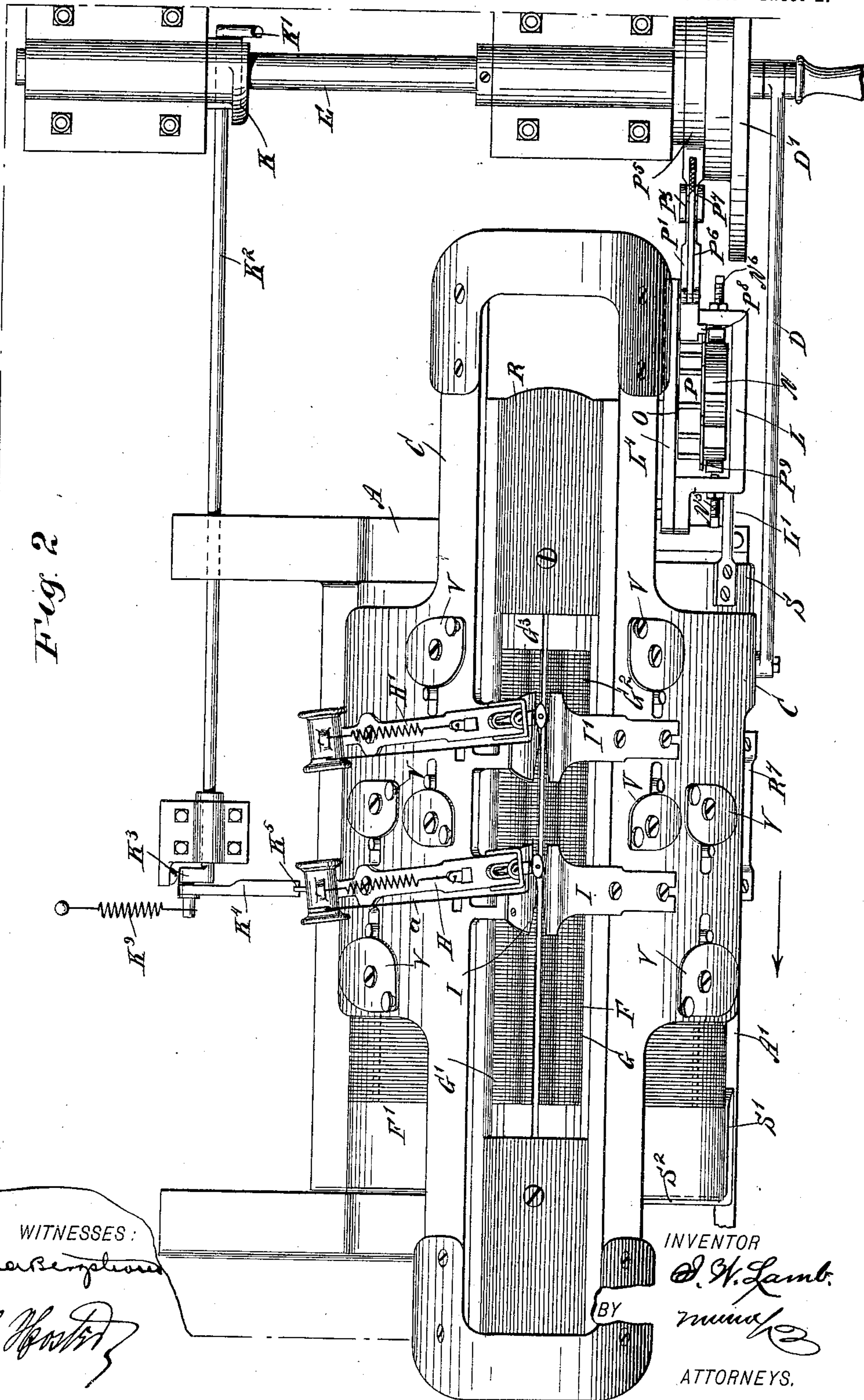
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(No Model.)

(Application filed June 11, 1897.)

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Fig. 2



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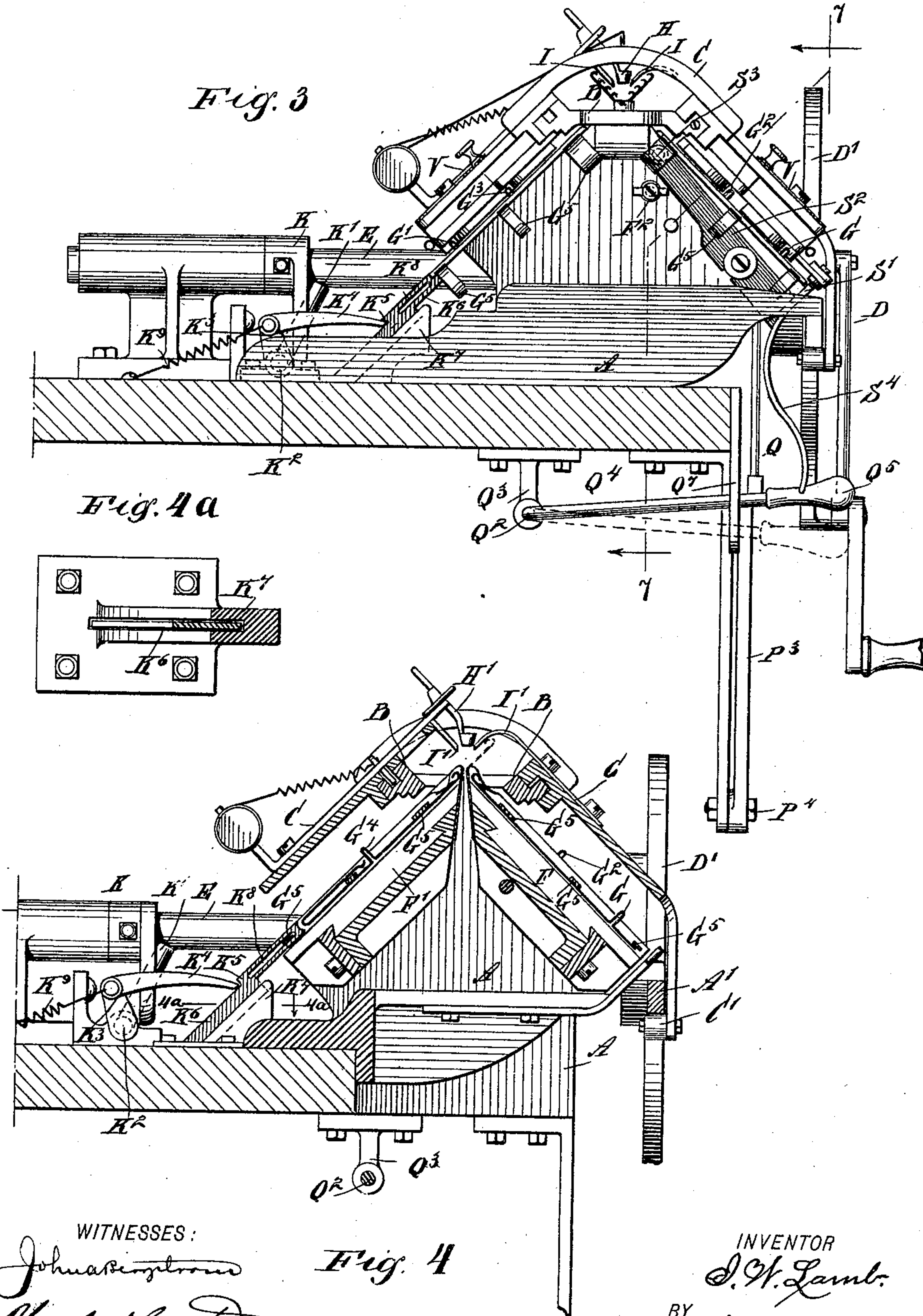
I. W. LAMB.

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(No Model.)

(Application filed June 11, 1897.)

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WITNESSES :

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Fig. 4

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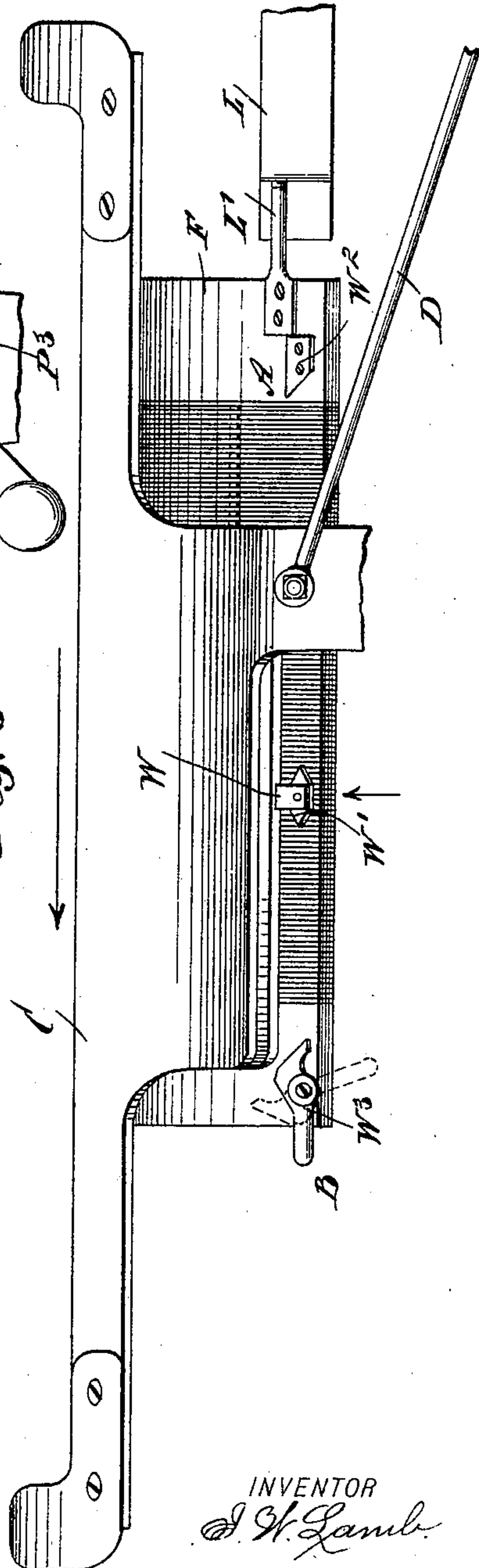
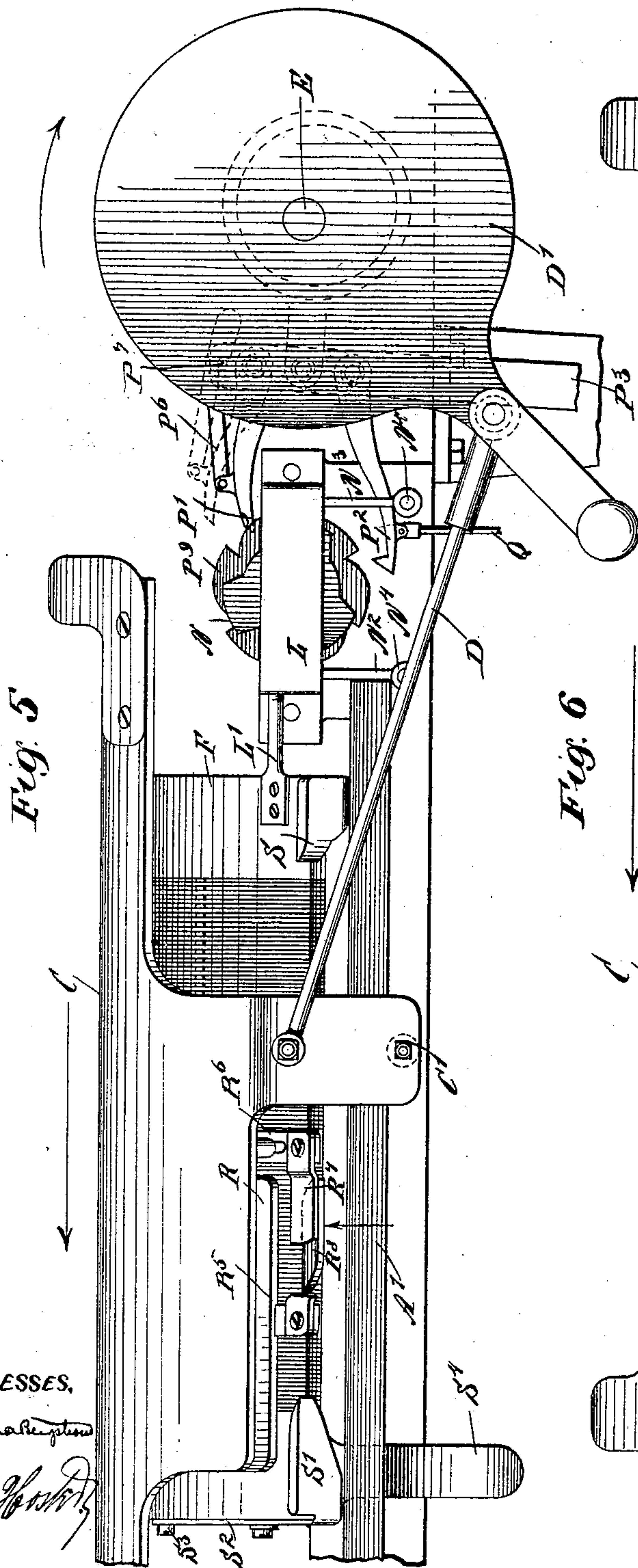
Patented Oct. 4, 1898

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(Application filed June 11, 1897.)

(No Model.)

8 Sheets—Sheet 4.



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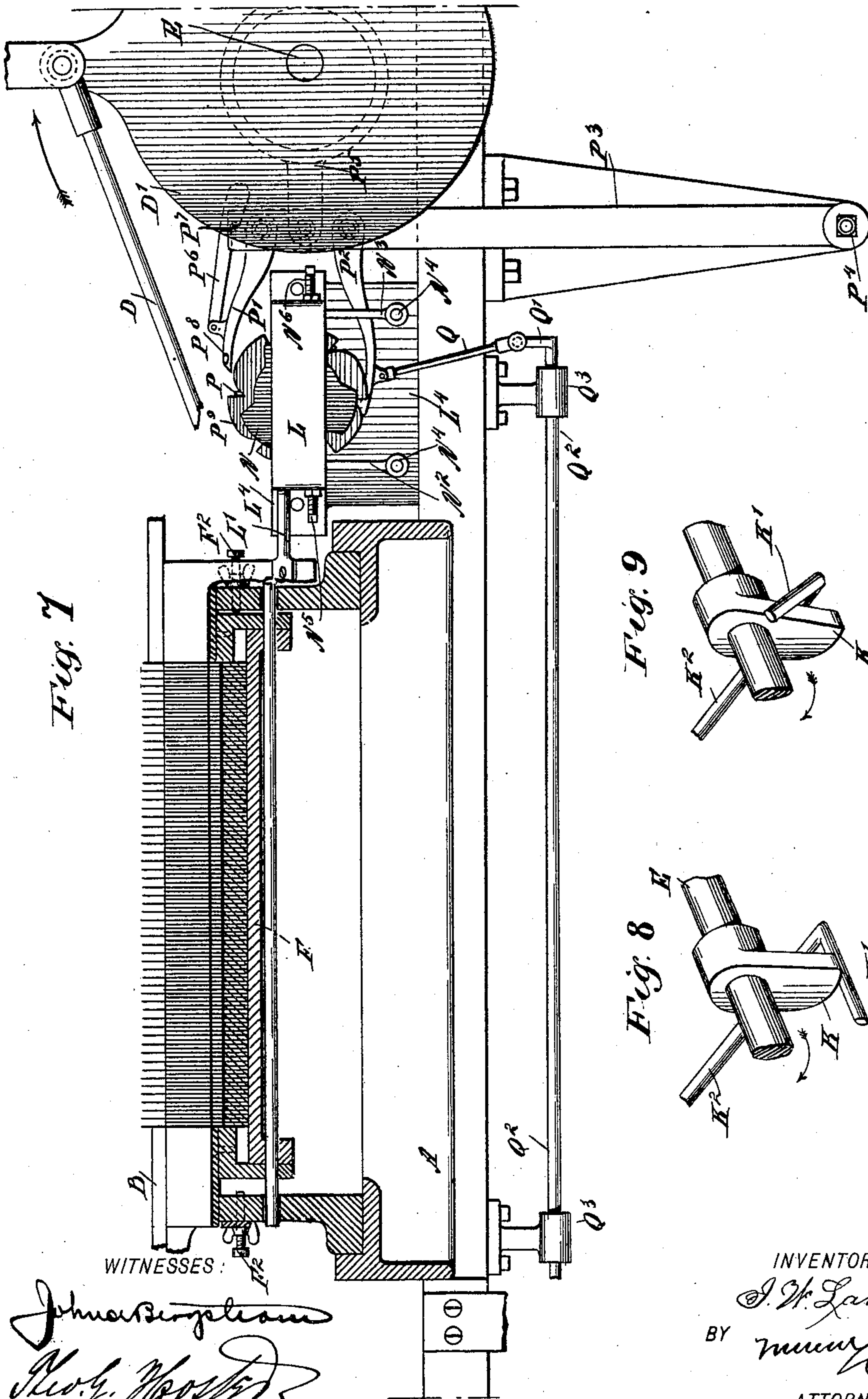


Fig. 9

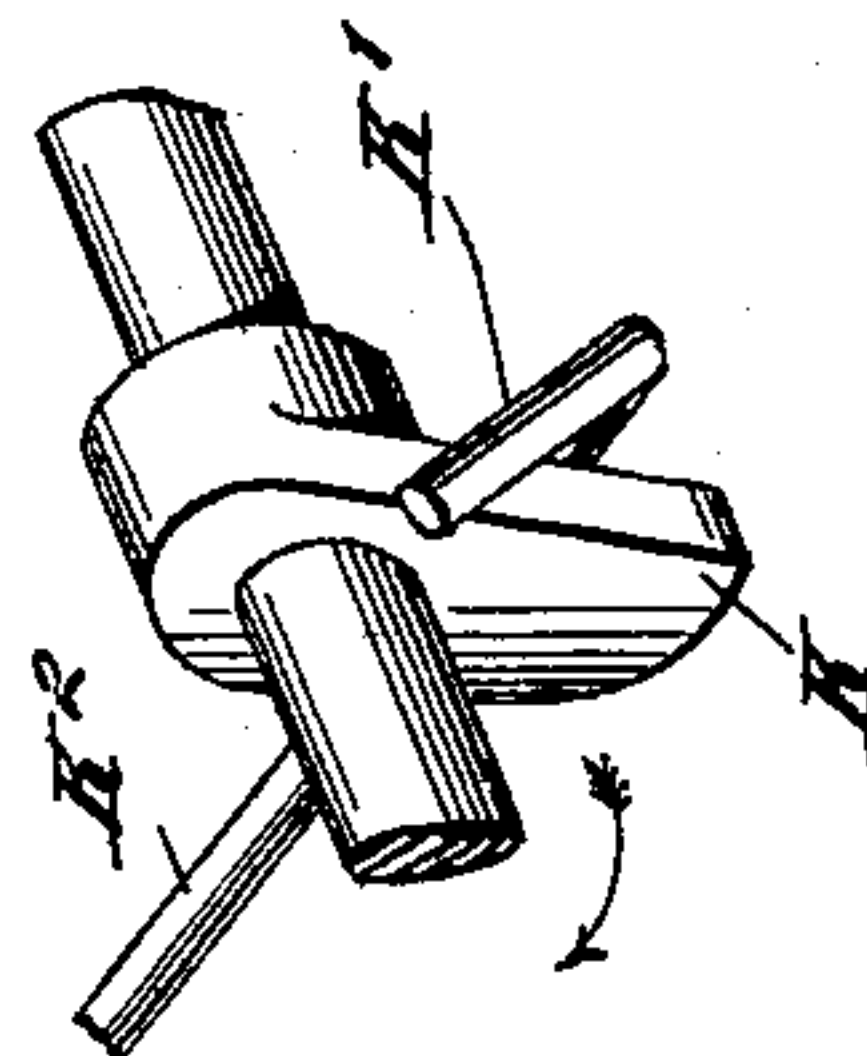
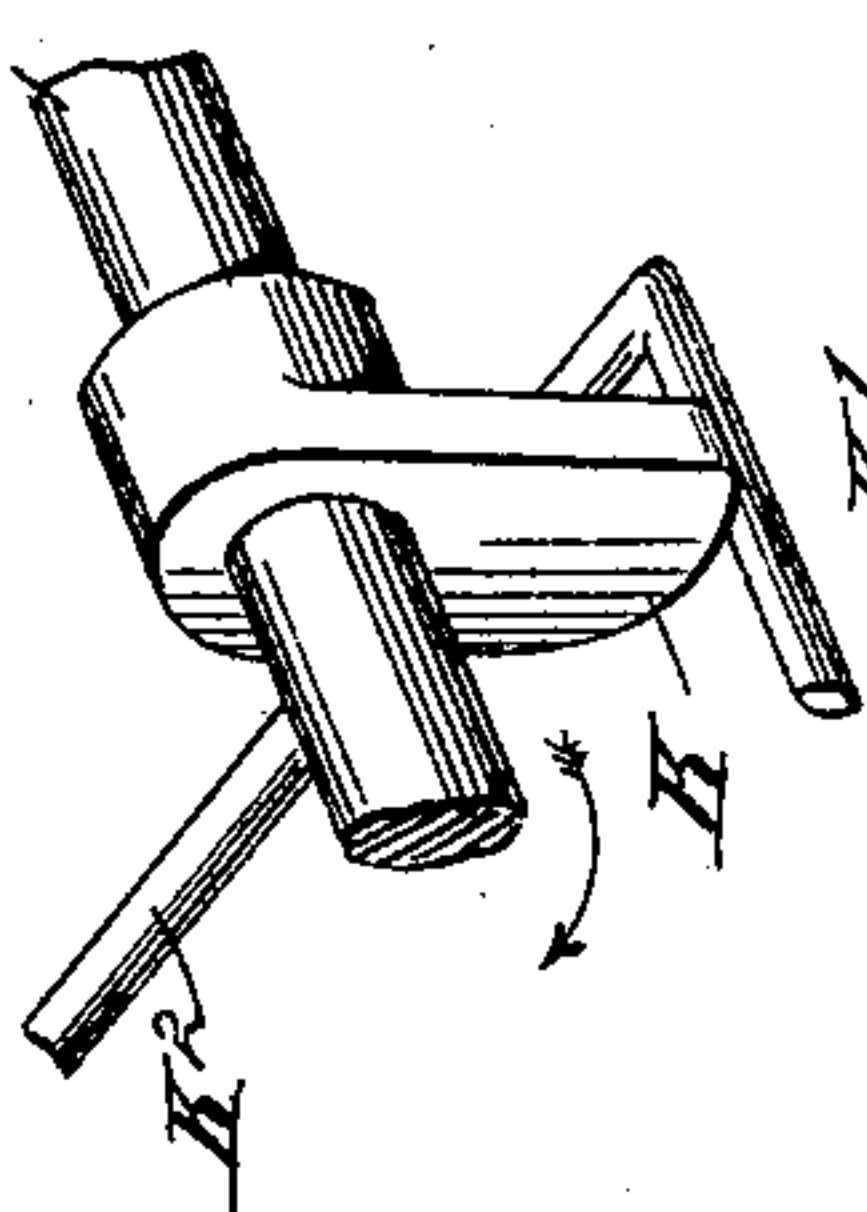


Fig. 8



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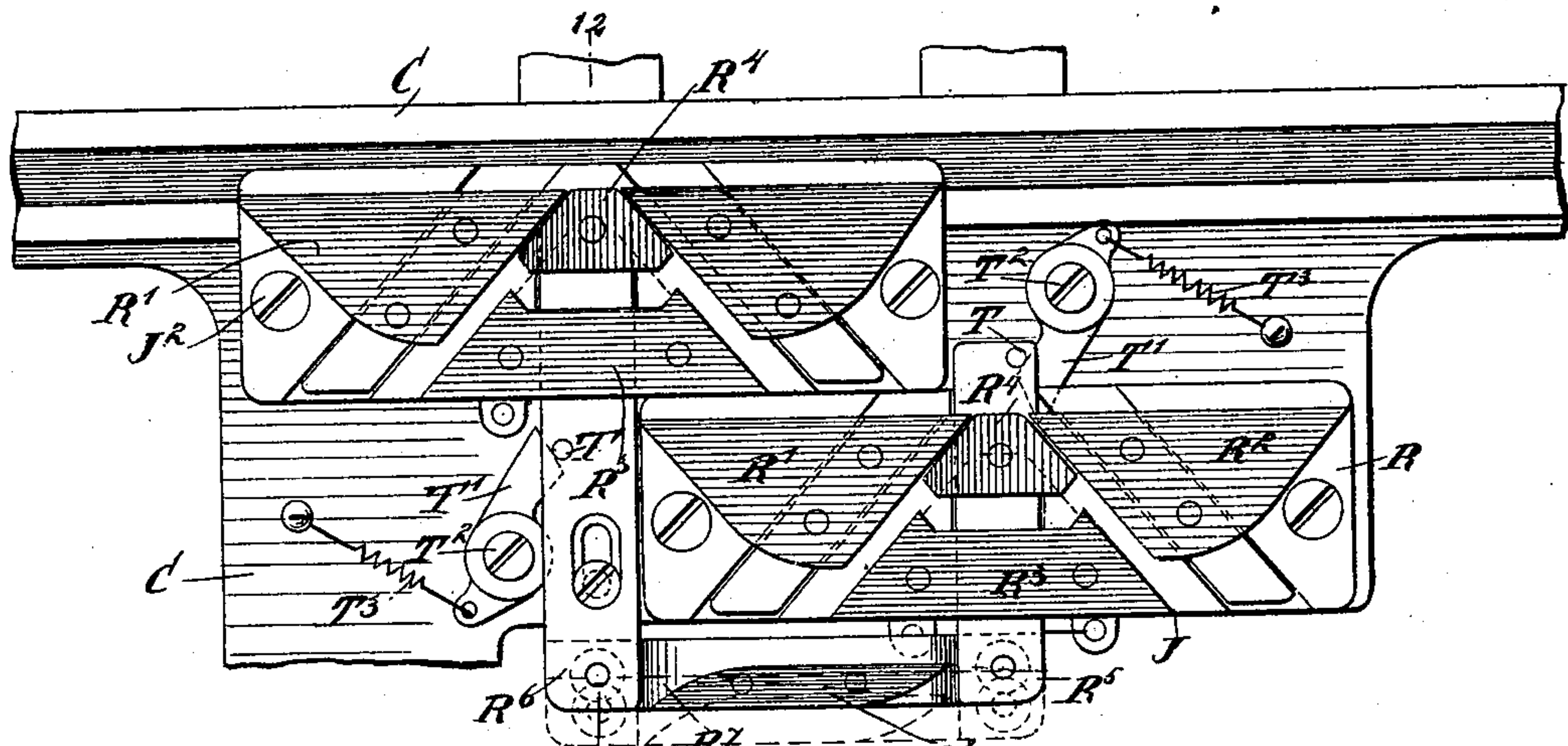


Fig. 10

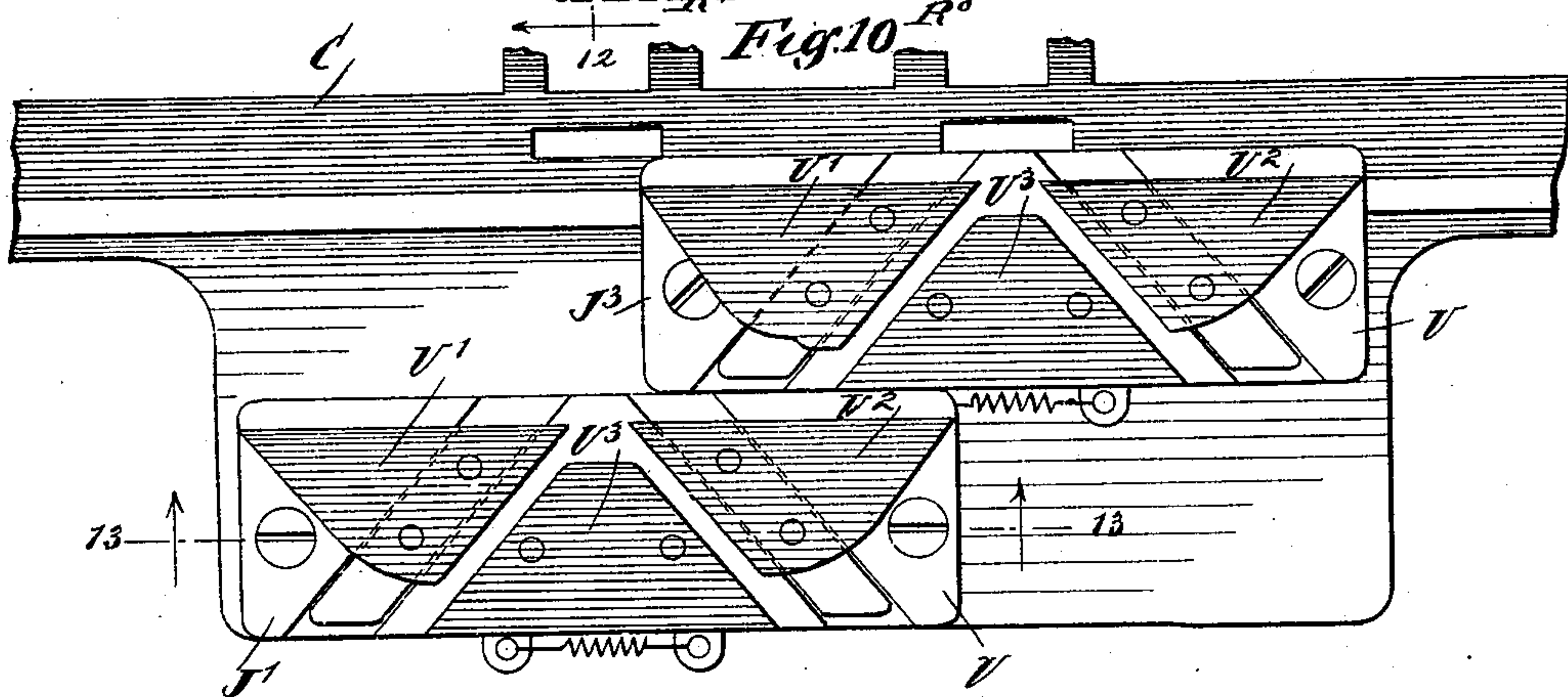


Fig. 11

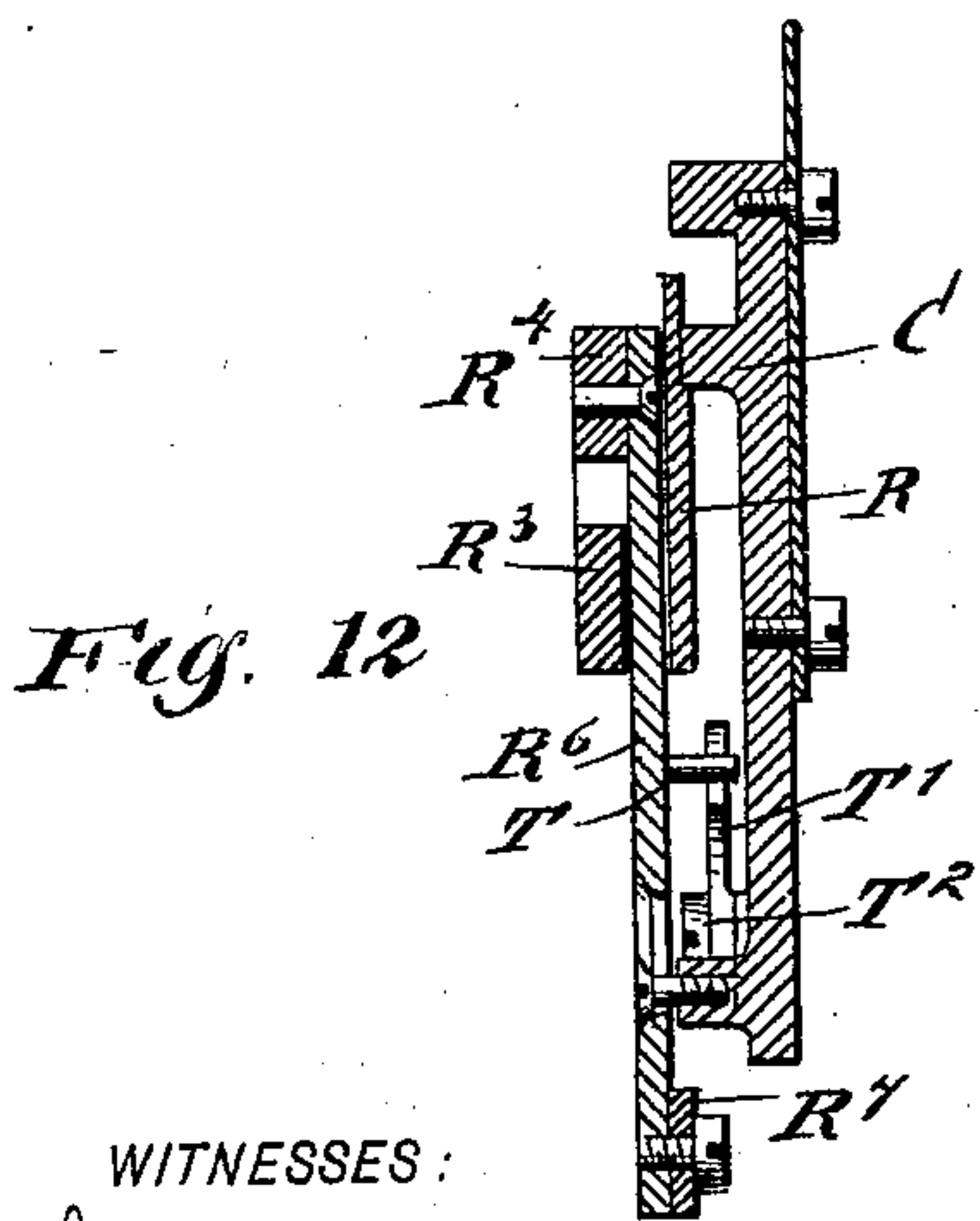


Fig. 12

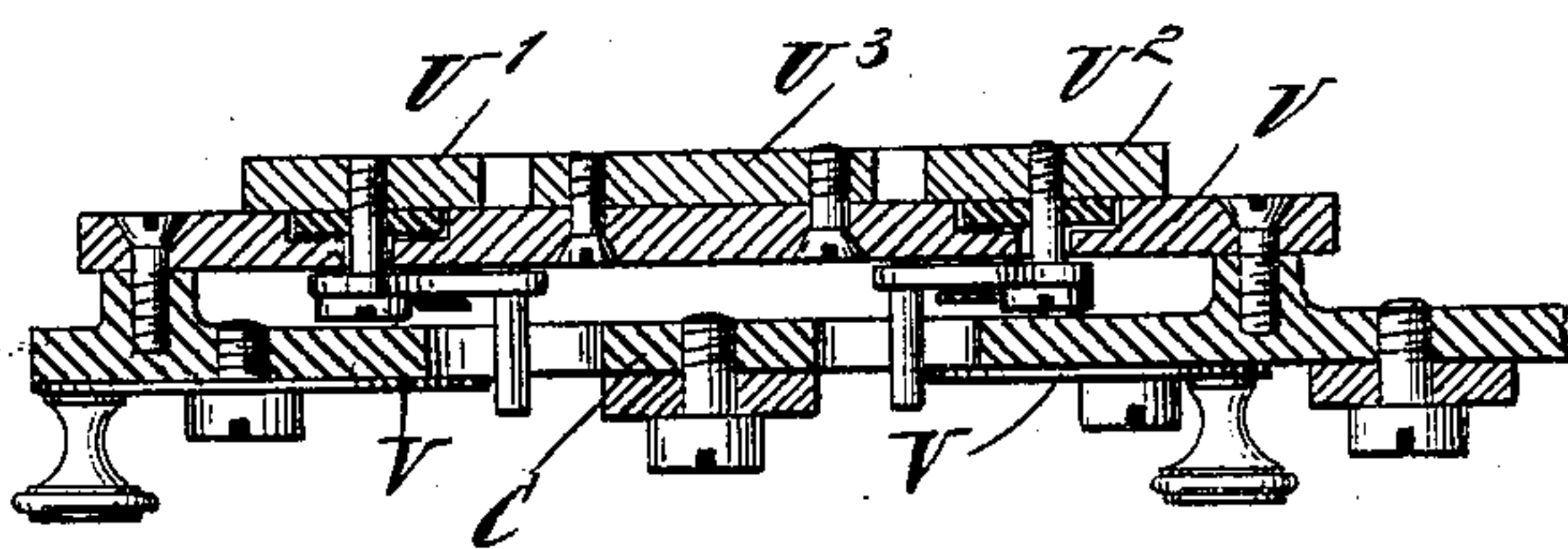


Fig. 13

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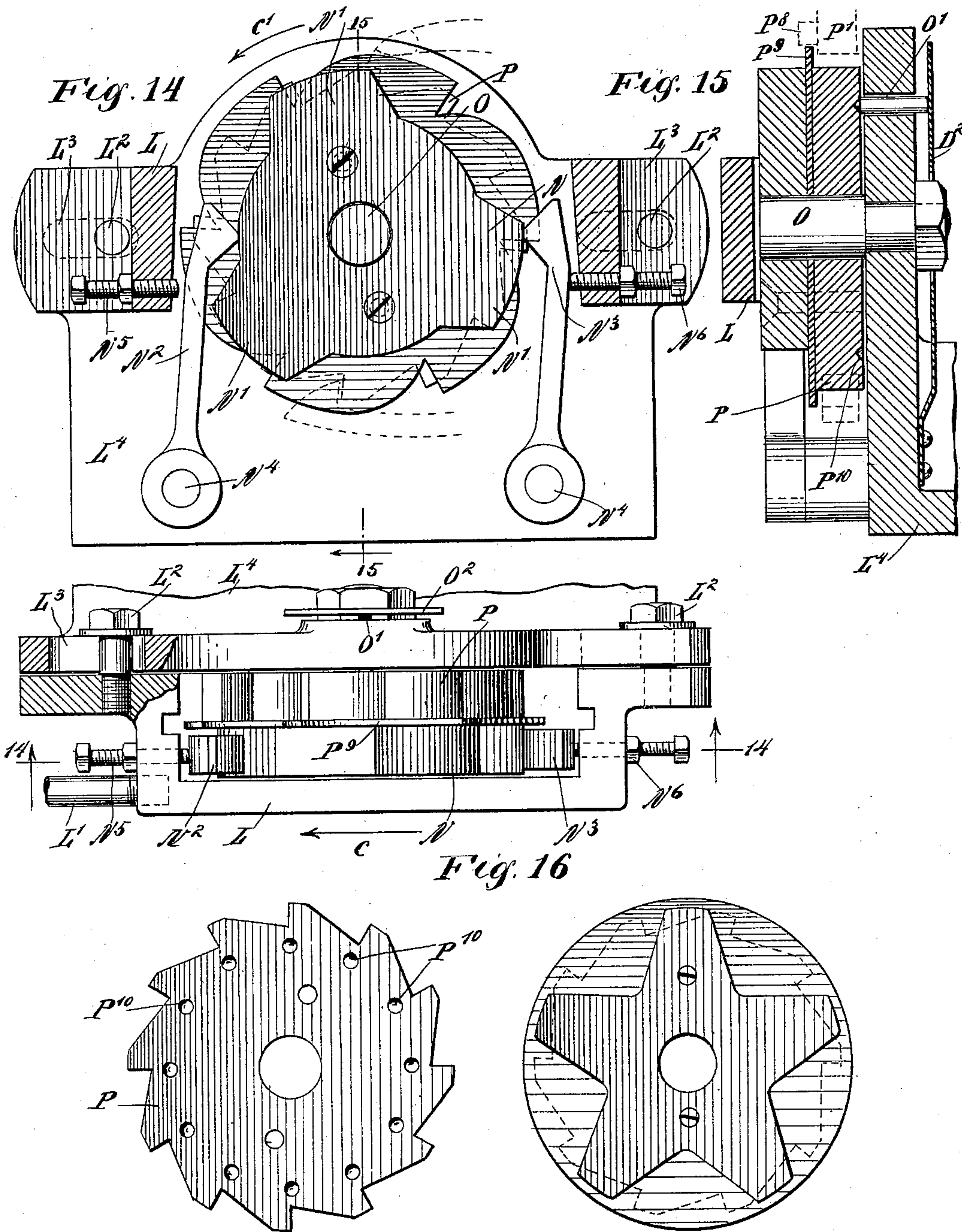
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(Application filed June 11, 1897.)

(No Model.)

8 Sheets—Sheet 7.



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(No Model.)

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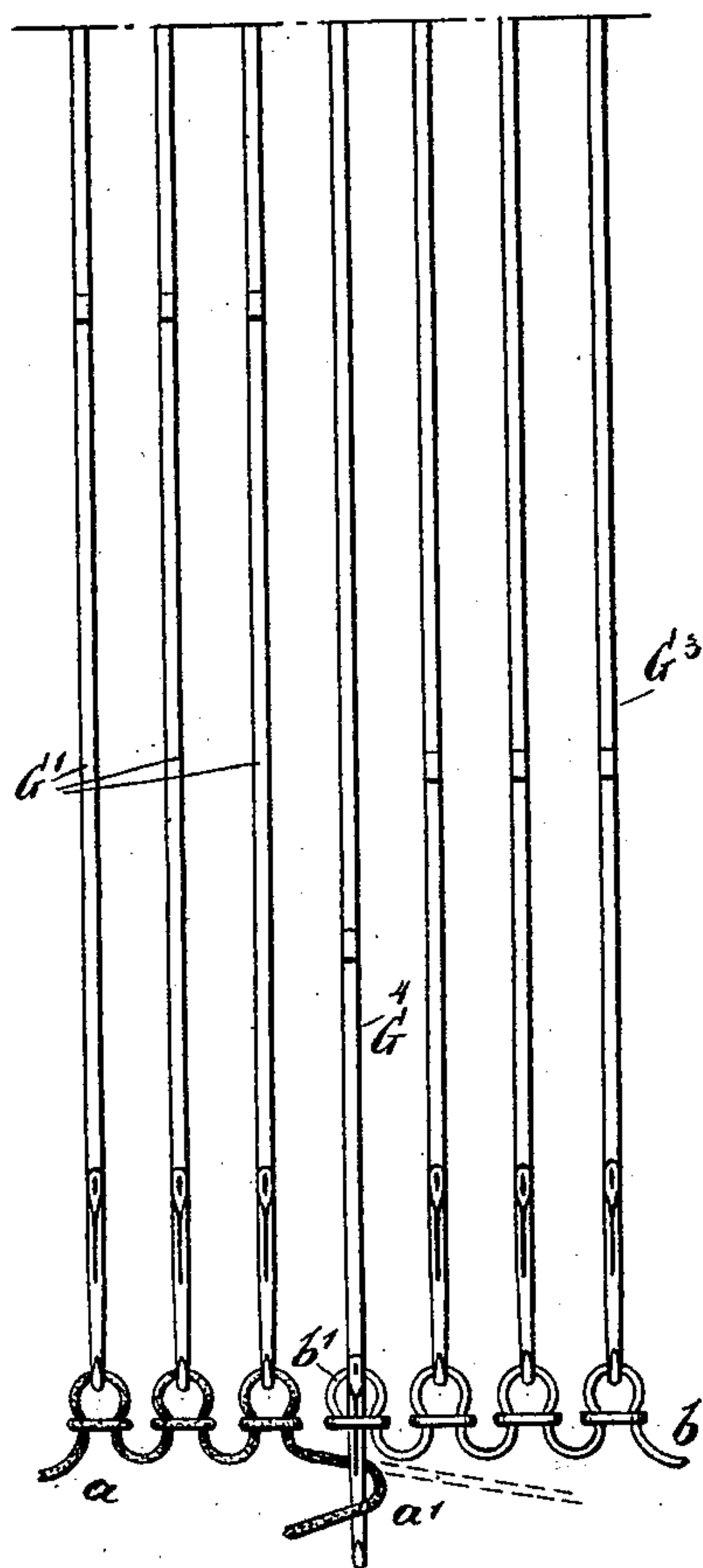


Fig. 19.

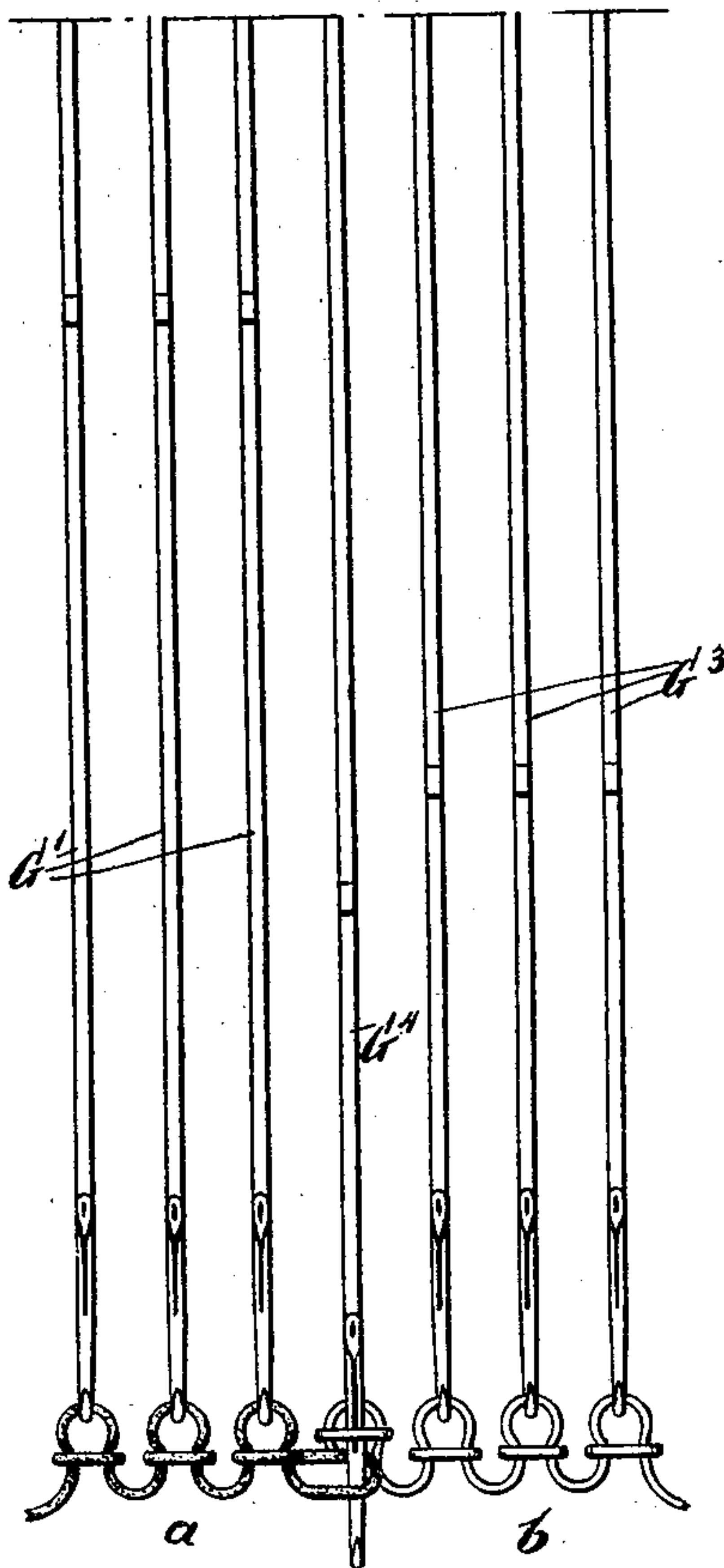


Fig. 20.

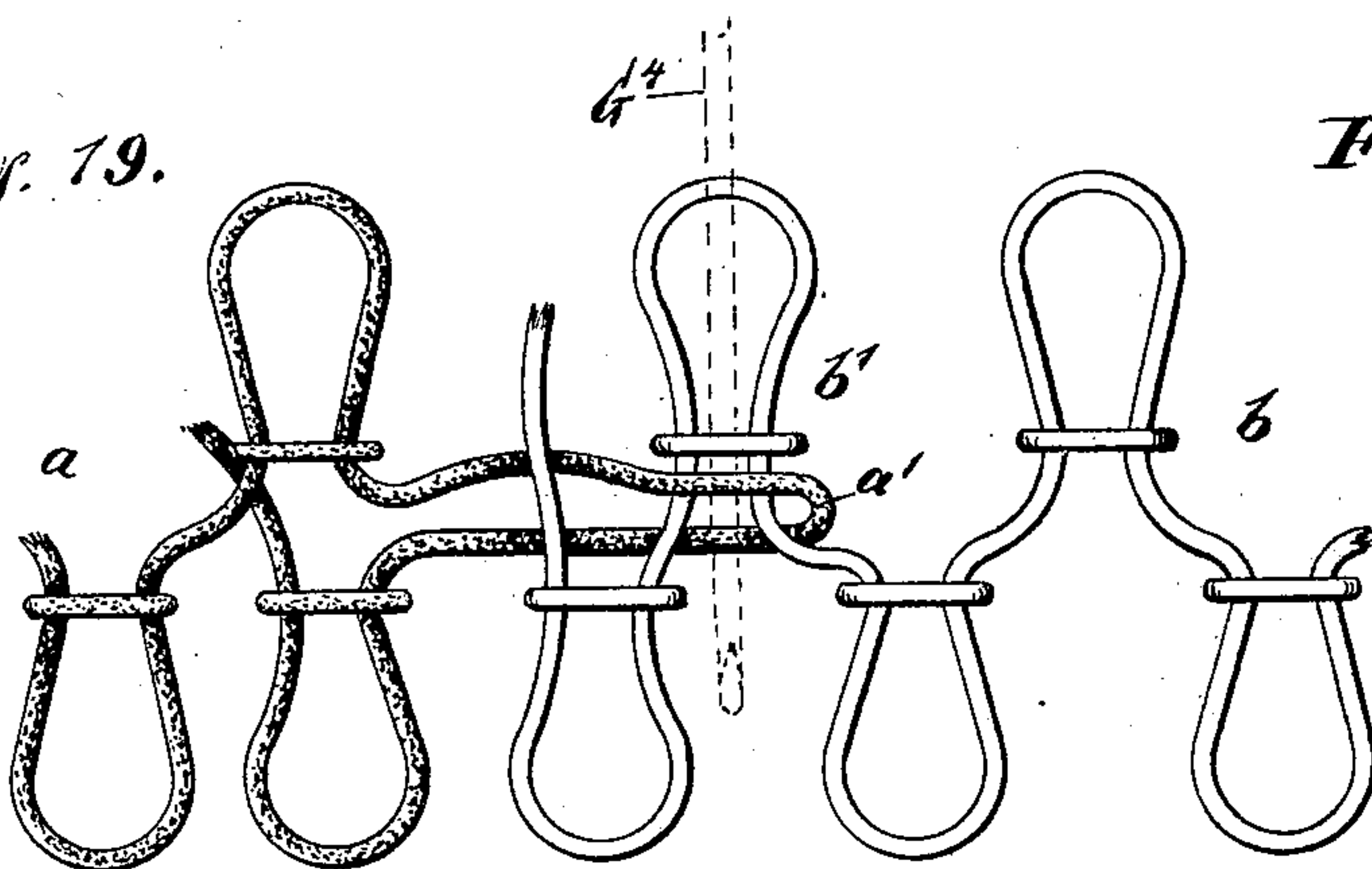


Fig. 21.

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UNITED STATES PATENT OFFICE.

ISAAC W. LAMB, OF PERRY, MICHIGAN.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 611,862, dated October 4, 1898.

Application filed June 11, 1897. Serial No. 640,347. (No model.)

To all whom it may concern:

Be it known that I, ISAAC WIXOM LAMB, of Perry, in the county of Shiawassee and State of Michigan, have invented a new and Improved Knitting-Machine, of which the following is a full, clear, and exact description.

The invention relates to knitting-machines of the Lamb type, having two straight rows of needles arranged on opposite sides of the machine and between which rows of needles the work passes.

The object of the invention is to provide a new and improved knitting-machine designed for knitting fabrics of various kinds, principally, however, such fabrics as shown and described in the Letters Patent of the United States, No. 578,153, granted to me on March 2, 1897, which fabric comprises two ribbed fabrics of which the selvage-yarn of one fabric is extended between the front and back loops of the selvage of the other fabric to form the two fabrics in one piece.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement. Fig. 2 is a plan view of the same. Fig. 3 is an end elevation of the same. Fig. 4 is a cross-section of the same on the line 4 4 of Fig. 1. Fig. 4^a is a sectional plan view of part of the mechanism for actuating the sewing-needle, on the line 4^a 4^a of Fig. 4. Fig. 5 is a side elevation of part of the improvement as arranged for cardigan work and with the needle-plate-shifting device thrown out of action. Fig. 6 is a similar view of a modified form of the improvement as arranged for plain work. Fig. 7 is a sectional side elevation of the improvement on the line 7 7 of Fig. 3. Fig. 8 is a perspective view of part of the mechanism for actuating the sewing-needle. Fig. 9 is a like view of the same with parts in a different position. Fig. 10 is an enlarged inner face view of the cams for the needles on the front needle-plate. Fig. 11 is a like view of the set of cams for the needles on the rear needle-plate. Fig. 12 is a trans-

verse section of the cams on the line 12 12 of Fig. 10. Fig. 13 is a sectional plan view of the cam on the line 13 13 of Fig. 11. Fig. 14 is an enlarged side elevation of part of the mechanism for shifting the needle-plate, the section being taken on the line 14 14 of Fig. 16. Fig. 15 is a transverse section of the same on the line 15 15 of Fig. 14. Fig. 16 is a plan view of the same. Fig. 17 is a face view of the ratchet-wheel for the needle-plate-shifting device. Fig. 18 is a like view of a modified form of a pattern-wheel for the needle-plate-shifting device. Fig. 19 is an enlarged side elevation of the needles on the rear needle-plate with the threads looped thereon. Fig. 20 is a like view of the same with the sewing-needle in a different position, and Fig. 21 is an enlarged edge view of the fabric with the front loops and the rear loops spread transversely and in opposite directions.

The improved knitting-machine is mounted on a main frame A, supporting a gib-frame B, on which reciprocates a carriage C, connected by a pitman D with a crank-disk D', secured on a transverse shaft E, connected with suitable machinery for imparting a rotary motion to the said shaft E, to cause the crank-disk D' and pitman D to impart a reciprocating motion to the carriage C on the gib-frame B.

The detail construction of the parts so far referred to is the same as the one shown and described in the application for Letters Patent of the United States for a knitting-machine, No. 630,200, filed by me on April 1, 1897, so that it is not deemed necessary to describe the parts in detail.

Of the two needle-plates F F' the front needle-plate F is fitted to slide longitudinally in suitable bearings on the frame A at the front of the machine, and the said needle-plate is adapted to be held either stationary or to receive an intermittent sliding motion according to the work in hand by means of a needle-plate-shifting device actuated from the main driving-shaft and as hereinafter more fully described. The other or rear needle-plate F' is rigidly secured to the frame A.

The needle-plates F and F' are provided with suitable guideways for the sets of long needles G G' and the sets of short needles G².

G³, of which the long needles are preferably arranged at the left of the needle-plates and the short needles are arranged at the right thereof, the said long needles receiving their
 5 yarn from an oscillating yarn-carrier H and the short needles receiving their yarn from a second oscillating carrier H', the said carriers operating between guide-arms I I', respectively, and are carried by the carriage C.

10 The long needles G G' are actuated by cam devices J J', respectively, and the short needles G² G³ are actuated by cam devices J² J³, respectively, all carried by the reciprocating carriage C.

15 The short needle G⁴, adjacent to the long needles G' on the needle-plate F', (see Figs. 19 and 20,) is the sewing-needle, and receives, in addition to the movement by its cam device J³, a preliminary movement by a suitable mechanism actuated from the main driving-shaft, as hereinafter more fully described, so that the sewing-needle takes the yarn from the carrier H to unite the two fabrics formed by the two sets of long and short needles
 20 whenever it is desired to do so and as shown in Figs. 19, 20, and 21.

If preferred, the long needle next to the short needle may be used for the sewing-needle, taking the yarn from the yarn-guide belonging to the short needles to make the
 30 seam.

In case the device for moving the sewing-needle G⁴ into a preliminary position is thrown out of action by the operator then the sets of
 35 long needles produce a fabric and the sets of short needles produce a fabric alongside the first-named fabric, and when it is desired to join these adjacent fabrics at their selvages the said mechanism for moving the sewing-needle into a preliminary position is thrown
 40 into action, so that when the carriage C returns to the right-hand end of its stroke and begins to move to the left and the needles of both sets have cast their loops and have their new loops in their hooks then the sewing-needle G⁴ is moved up into a preliminary position by its actuating device a distance of
 45 about one-half inch (see Fig. 19) and to the left of the yarn-carrier H sufficient to catch the new thread, but not sufficient to permit its old loop to pass under its latch. The needle, therefore, at this time has two loops in its hook, and the two loops are cast off together when the needle completes its stroke.

55 Now when the carriage C moves to the left the yarn a from the carrier H is laid over the sewing-needle G⁴ to form the loop a' in addition to the loop b' from the yarn b of the carrier H' and held on the sewing-needle by the previous movement of the carriage to the right. Upon a further movement of the carriage to the left the long needles G' move upward to take the yarn a and then move down again to complete their new loops. As the carriage C continues to move to the left the cam
 65 device J³, which operates the short needles G³, engages the sewing-needle G⁴ and draws the

same down to the position of the other short needle G³, and is then moved up to take the yarn b and knit its regular stitch just the same
 70 as it would if it did not have the loop a'. As the sewing-needle G⁴ takes its own yarn, both of the loops a' b', which have now passed below the latch, are cast together off the said needle G⁴, so that there is only one stitch
 75 formed by the sewing-needle, as will be readily understood by reference to Figs. 19, 20, and 21. Thus one loop a' of the fabric formed by the long needles G G' is knitted into the outside loop b' of the other fabric formed by
 80 the short needles G² G³, whereby the two fabrics are joined.

The mechanism for moving the sewing-needle G⁴ into a preliminary uppermost position is shown more fully in Figs. 2, 3, 4, and 4^a,
 85 and is provided with a cam K, secured on the shaft E, and adapted to engage an arm K' upon every revolution of the said shaft, so as to press the said arm downward. The arm K' projects from the forward end of a longitudinally-extending rock-shaft K², provided at
 90 its other end with a crank-arm K³, carrying a pawl K⁴, adapted to engage a tooth or shoulder K⁵, formed on a slide K⁶, fitted to slide on a suitable guideway K⁷ and in alignment with
 95 the sewing-needle G⁴, engaging the lower end thereof, so as to push the sewing-needle upward in its guideway in the needle-plate F'. The slide K⁶ is formed with an elongated slot K⁸, engaged by one of the usual bars G⁵ for
 100 holding the needles in their guideways, the bar also serving to hold the slide in proper position in the guideway for the needle G⁴.

When the shaft E rotates and the cam K presses the arm K', then the shaft K² is turned
 105 to cause the crank-arm K³ to rock forward. This movement of the crank-arm K³ causes the pawl K⁴ to engage the shoulder K⁵ and push the slide K⁶ and the sewing-needle G⁴ upward. A spring K⁹ pulls on the crank-arm K³ to return the latter and the pawl K⁴
 110 to a normal or lowermost position immediately after the cam K passes over the arm K' and shortly after the sewing-needle has been pushed into an uppermost preliminary position, as above described and as indicated in
 115 dotted lines in Fig. 4. The sewing-needle G⁴ is thus freed from the pawl K⁴ and can be acted on and moved downward by its cam device J³, as previously explained, without interference from the pawl.
 120

It is understood that other suitable mechanism may be employed for accomplishing the same result, and hence I do not limit myself to the particular construction shown and
 125 described for moving the sewing-needle G⁴.

The pawl K can be readily thrown rearward out of action whenever it is desired to have the sewing-needle G⁴ operate as an ordinary needle—that is, when it is desired to
 130 leave the two fabrics disjoined for any distance. For instance, when a mitten-blank has been formed up to the point where it is desired to narrow off the tip then the pawl

K⁴ is thrown back out of action and the work is narrowed off as two separate pieces. The narrowing at the left-hand of the work is done when the carriage C is at the right-hand side of the gib-frame, and the narrowing at the right-hand side of the work is done when the carriage is at the left of said frame. By this method it is not necessary to make any changes in the machine or in the weights attached to the work when it is desired to narrow off the tip, except to merely turn back the pawl K⁴, as above explained. Thus by the use of this machine it is as simple to narrow off the work at four points as it is in other machines capable of narrowing off the work at two points. About one-third of the time required to produce a mitten is thus saved by the use of the present machine.

As the two sets of cam devices which operate the two series of needles are as far apart as the width of one series of needles, it is evident that the stroke of the carriage C can be lessened by an amount equal to the width of one series of needles. Thus if there are ten-inch needle-plates employed the stroke of the carriage can be shortened five inches, as compared with the stroke required to produce the same work on an ordinary machine, and, in addition, the machine can be safely run at a higher rate of speed than an ordinary machine with the same length of needle-plate.

As shown and described, the two sections or divisions of needles and two sets of cam devices for operating the said needles are employed; but it is evident that any desired number of such sections and corresponding cam devices may be used. Thus if it is desired to make a knit cap four, five, or more sections can be employed. The main part of the cap can in this case be made all in one piece and the crown narrowed off in as many sections as there are sections of needles employed.

If it is desired to produce ribbed shirts, then all that is necessary is to construct the machine with needle-plates of the required length. The back of the shirt is then knit in one piece up to the back of the neck, and then a sufficient number of stitches are thrown off and the needles put out of work, so that the opening for the neck is formed, it being understood that the pawl K⁴ is thrown back during this part of the operation. Needles may be added to make the desired form around the neck portion until all those needles are again at work which were thrown out to form the neck-opening. The work is now continued as two separate fabrics as far as it is desired to have the opening in the front of the shirt. Then the pawl K⁴ is again thrown into action to operate the sewing-needle G⁴, so as to continue the work as one fabric.

In order to produce fancy work on the machine, it is necessary to intermittently reciprocate the front needle-plate F, and for this purpose I provide the following device:

The right-hand end of the needle-plate F is connected by a rod L' with a yoke L, fitted to slide longitudinally and formed with transversely-extending pins or screws L², engaging elongated slots L³, formed in an auxiliary frame or plate L⁴, secured to the main frame A or forming an integral part therewith.

Within the yoke L is arranged a pattern-wheel N, secured to a ratchet-wheel P, both mounted to rotate loosely on a stud O, carried by the frame L⁴. The pattern-wheel N is provided on its periphery with any desired but odd number of cam projections N', adapted to alternately engage dogs N² N³, arranged on opposite sides of the pattern-wheel, and preferably fulcrumed at N⁴ on the frame or plate L⁴. The dogs N² N³ are adapted to be thrown by the cam projections alternately against set-screws N⁵ N⁶, respectively, adjustably held in the yoke L, the movement of the said pattern-wheel on the dogs causing an intermittent reciprocating motion of the yoke, and consequently of the needle-plate F, as the yoke is rigidly connected with the said needle-plate by the rod L'.

The ratchet-wheel P is adapted to be engaged on the top by a pushing-pawl P' and at its bottom by a pulling-pawl P², both fulcrumed on a lever P³, fulcrumed at P⁴ on a bracket attached to the main frame. The lever P³ is pivotally connected with the eccentric-rod of an eccentric P⁵, held on the main shaft E, so that when the latter is rotated the said eccentric will impart a swinging motion to the lever P³ to cause the pawls P' P² when in mesh with the ratchet-wheel P to turn the latter twice for every revolution of the shaft E—that is, once for each stroke of the carriage C.

The pawl P' is provided with a pivoted hook P⁶, adapted to engage a pin P⁷ on the lever P³, so as to hold the said pawl P' in an uppermost position—that is, out of engagement with the ratchet-wheel P, as indicated in Figs. 1 and 5. On the free end of the pawl P' is formed a transversely-extending lug or teat P⁸, adapted to engage the peripheral surface of a ratchet-disk P⁹, interposed between the pattern wheel N and the ratchet-wheel P and having one-half the number of teeth that the ratchet-wheel P has, so as to cause the pawl P' to always engage two teeth of the ratchet-wheel P instead of one or to remain entirely out of action, as more fully described hereinafter. The other pawl P² is adapted to be thrown in and out of mesh by the operator, and for this purpose the free end of the said pawl is pivotally connected by a link Q with an arm Q', formed on one end of a shaft Q², mounted to rock in suitable bearings Q³, attached to the main frame A, the other end of the said shaft being provided with a forwardly-extending arm Q⁴, formed at its outer end with a knob or handle Q⁵, adapted to be taken hold of by the operator. The arm Q⁴ engages a slot Q⁶ in a fixed plate Q⁷, so as to lock the arm Q⁴ in either an uppermost or lowermost position—

that is, when in an uppermost position the pawl P^2 is in mesh with the ratchet-wheel P , and when the arm Q^4 is in a lowermost position in the said plate then the pawl P^2 is thrown out of mesh with the said ratchet-wheel. The shaft Q^2 is made so light that it forms a torsion-spring and so holds the pawl P^2 with a yielding pressure against the ratchet.

Now it is evident that by the arrangement described the lower pawl P^2 can be readily thrown out of work by the operator moving the knob Q^5 accordingly, and when this is done the upper pawl P' is rendered inoperative, as the ratchet-disk P^9 will hold the upper pawl P' out of engagement with the teeth of the ratchet-wheel P , it being understood that the lug P^8 then simply rides on the correspondingly large tooth of the ratchet-disk P^9 without being brought into engagement with a tooth of the ratchet-wheel P .

By reference to the detail view, Fig. 14, it will be seen that the back of each tooth of the ratchet-disk P^9 is somewhat at the rear of the back of the corresponding tooth of the ratchet-wheel P , so that when the upper pawl P' engages the uncovered back of a tooth of the ratchet-wheel P the lug P^8 will not engage the disk P^9 , so that no driving strain will come upon the thin disk P^9 .

If it is desired to produce racked work on the machine, the knob Q^5 is moved into the uppermost position, (shown in Fig. 1,) so that the pawls turn the ratchet-wheel P alternately to impart an intermittent motion to the yoke L and the plate F and shift the needles G G^2 thereon longitudinally relatively to the needles G' G^3 on the other or fixed needle-plate F' .

If plain work is desired, the knob Q^5 is moved into a lowermost position—that is, the pawls are both rendered inactive and the needle-plate F remains stationary. If another pattern or rackwork is wanted, the upper pawl P' is thrown out of engagement with the ratchet-wheel P and locked in position by the hook P^6 engaging the pin P^7 , while the lower pawl P^2 is left in mesh with the said ratchet-wheel. The needle-plate F is now shifted but once during every revolution of the shaft E —that is, one-half as often as when the two pawls P' P^2 are both in mesh with the ratchet-wheel. The forms of the pattern-wheel and ratchet-wheel can be greatly varied, as indicated in Figs. 17 and 18. The pattern-wheel must, however, have an odd number of cam projections N' , so that only one at a time is in engagement with a corresponding dog N^2 or N^3 .

In order to prevent the ratchet-wheel P and the pattern-wheel N from being accidentally turned, I provide a transversely-extending pin O' , fitted to slide in the frame L^4 and pressed on by a spring O^2 , secured to the said frame L^4 . The forward pointed end of the pin O' is adapted to engage one of a series of indentations or recesses P^{10} to temporarily lock the ratchet-wheel P in place, but to permit the

same to be turned, the pin O' yielding rearwardly when this operation takes place. The number of indentations P^{10} corresponds to the number of teeth in the ratchet-wheel, as indicated in Fig. 17.

In order to produce a great variety of work, I provide some or all of the cam devices for shifting the needles with a movable section forming a part of the V-shaped middle cam and which section can be opened or closed at the option of the operator, according to the work desired to be formed.

It is understood that when the movable section R^4 of the cardigan-cam R^3 is open, as shown by dotted lines in Fig. 10, the latter acts as a solid cam to cause a full throw of the needles for ordinary work; but when the section is in a closed position, as shown by full lines, then the cam acts on the needles in such a way that the needles do not cast any stitches and move only up far enough to receive the yarn, but not far enough to permit their latches to pass through the loops. The cardigan-cam, with its movable section, is applicable not only in the present machine, but also can be used in an ordinary Lamb machine, and if used on one of the cams either plain ribbed work is produced or half-cardigan work. If both the front and back V-shaped cams are constructed in this manner, then either half-cardigan or full-cardigan work can be produced, or plain work if the section is open. However, by combining the cardigan-cams with the shifting needle-plate and the different pattern-wheels an endless variety of work can be produced, and the changes can be made while the machine is running, thus greatly facilitating the production of certain work.

As illustrated in the drawings, (see Figs. 10, 11, 12, and 13,) the cam-shifting devices J J^2 for the long and short needles G G^2 , respectively, on the front movable plate F are each provided with a cam-plate R , secured to the under side of the front part of the carriage C , and on each cam-plate are adjustably held the side cams R' R^2 , between which is arranged a V-shaped middle or cardigan cam R^3 , having its upper or apex section R^4 movable, so as to close the upper adjacent sides of the cams R' R^2 , as is plainly shown in Fig. 10, to prevent the needles from passing up the entire distance for the purpose previously explained.

When the sections R^4 are in a lowermost position, as shown in dotted lines, each of the cams R^3 acts as a solid cam and, in conjunction with the said cams, causes the needles to travel their full stroke. The movable sections R^4 of the two cam devices J J^2 are secured on bars R^5 R^6 , respectively, fitted to slide in suitable bearings on the cam-plates R , the said bars being connected with each other at their lower ends by a switch-link R^7 , carrying a switch R^8 , adapted to be engaged at the right-hand end of the machine by a shifter S , secured to the main frame A , and

at the left-hand end of the machine the said switch R^8 is adapted to be engaged by a shifter S' , held on a lever S^2 , fulcrumed at S^3 on the left side of the main frame A. The lever S^2 is provided with a handle S^4 , adapted to be taken hold of by the operator to move the shifter S' in or out of the path of the switch R^8 .

When the lever S^2 is swung downward, as shown in Fig. 1, then the shifter S' is moved out of the path of the switch R^8 and the latter is engaged, on the first movement of the carriage C to the right, by the fixed shifter S and moved into a lowermost position, whereby the bars R^5 R^6 and the sections R^4 are simultaneously drawn downward to open the upper ends of the fixed side cams R' and R^2 for the needles to make their full stroke for common ribbed work. The sections R^4 remain in this position during the further forward and backward traveling of the carriage C.

When it is desired to make cardigan-work, the lever S^2 is thrown upward, so that the shifter S' is moved into the path of the switch R^8 , and on the next movement of the carriage C to the left the said switch R^8 engages the said shifter and is then moved upward, thereby shifting the sections R^4 into an uppermost position, as shown in Fig. 10, to close the upper ends of the side cams R' R^2 , so that the needles move but a part of the full stroke for producing cardigan-work, as above explained.

In order to prevent the cardigan-cam sections R^4 from accidentally moving out of the respective positions they are in at the time, I provide each bar R^5 R^6 with a transverse pin engaged by the double ends of a lever T' , fulcrumed at T^2 to the carriage C and pressed on by a spring T^3 , as is plainly shown in Figs. 10 and 12.

The cam devices J' and J^3 for the needles on the rear needle-plate F' are of ordinary construction, as plainly indicated in Figs. 11 and 13—that is, each device is provided with a cam-plate U, having cams U' U^2 and the middle or V-shaped cam U^3 .

The cam devices J J' J^2 J^3 are all provided at their cams with a device for adjusting the cams to increase or decrease the sliding motion of the needles according to the length of the loop desired on the fabric. Each such device V is of the ordinary construction, as more fully described in the application for Letters Patent of the United States previously referred to, so that further description of the same is not deemed necessary.

Upon shifting the needle-plate F a distance between two needles it is evident that different needles in the two needle-plates F F' work in conjunction with each other at each stroke to vary the work, as above explained, and additional variations can be had by the use of the cardigan-cam section to produce cardigan-work. The throw of the needle-plate is limited between adjustable stop-pins F^2 , screwing in the ends of the frame A. (See Fig. 7.)

The arrangement shown in Fig. 6 is for operating a cardigan-cam having a movable sec-

tion on the ordinary Lamb machine, the bar W, carrying the section, being provided with a switch W' , adapted to be engaged by a fixed shifter W^2 at the right hand of the frame and a pivoted shifter W^3 on the other end of the machine. For ordinary ribbed work the shifter is thrown out of the path of the switch W' ; but for cardigan-work it is moved into the position shown in the said figure to engage and actuate the switch and cardigan-section to move the same into a closed position, as previously explained.

It is understood that the eccentric is so arranged relatively to the crank-disk D' that the pawls K' K^2 actuate the ratchet-wheel and cam-wheel at the time the carriage is at or near the end of the stroke.

In order to prevent the carriage from springing up off the needles in case knots run in the work or the needles get bent, I provide the carriage C with a friction-roller C' , swung on the under side of a longitudinal bar A' , forming part of the main frame A.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A knitting-machine, comprising two sets of needles, means for operating them, a sewing-needle arranged between the two sets of needles to join the fabrics produced by them, mechanism for imparting to said sewing-needle, a partial stroke so as to cause it to receive a second yarn before casting off its old loop, and means for causing said sewing-needle to complete its stroke with one of the said sets of needles.

2. A knitting-machine, comprising two sets of needles, means for operating them, a sewing-needle arranged between the two sets of needles to join the fabrics produced by them, mechanism for imparting to said sewing-needle first a partial stroke so as to cause it to receive a second yarn before casting off its old loop, and means for causing the said sewing-needle to complete its stroke with two yarns and to cast off both loops at the end of the stroke.

3. A knitting-machine, provided with needle-plates, sets of needles on the said plates, yarn-carriers for carrying the yarn to the corresponding sets of needles, a sewing-needle between the two sets of needles on one of the needle-plates, for joining the fabrics formed by the said sets of needles, means for imparting movement to the said sets of needles and the sewing-needle, and mechanism for shifting the sewing-needle into a preliminary position for receiving the second yarn from one of the carriers, without causing said sewing-needle to cast its old loop substantially as shown and described.

4. A knitting-machine, provided with a needle-plate, two sets of needles in the said plate, means for actuating the said needles, yarn-carriers for the said needles, a sewing-needle adapted to be actuated by the means for actuating one set of needles, and mechanism

for moving the sewing-needle into a preliminary position, to receive the second yarn from the other carrier without causing said sewing-needle to cast its old loop, substantially as shown and described.

5 A knitting-machine, provided with two needle-plates, a set of long needles and a set of short needles on each of the said plates, one of the needles in one of the said sets being
10 a sewing-needle, a yarn-carrier for each set of needles, means for actuating the said needles regularly, to form two adjacent fabrics, and means for moving the sewing-needle
15 into a preliminary position, to receive the thread from the carrier for the other set of needles, without causing said sewing-needle to cast its old loop substantially as shown and described.

6. A knitting-machine, provided with a needle-plate, mechanism for imparting a sliding
20 motion thereto, the said mechanism comprising a yoke fitted to slide and connected with the said plate, a pattern-wheel for imparting motion to the said yoke, a ratchet, a pawl
25 mechanism for the ratchet-wheel for imparting an intermittent rotary motion to the said ratchet-wheel and pattern-wheel, and dogs interposed between the said pattern-wheel and the said yoke, substantially as shown and
30 described.

7. A knitting-machine, provided with a needle-plate, mechanism for imparting a sliding motion thereto, the said mechanism comprising a yoke fitted to slide and connected with
35 the said plate, a pattern-wheel for imparting motion to the said yoke, a ratchet, a pawl mechanism for the ratchet-wheel for imparting an intermittent rotary motion to the said ratchet-wheel and pattern-wheel, the said
40 pawl mechanism being provided with a push-pawl and a pull-pawl adapted to be thrown independently in and out of mesh with the said ratchet-wheel, a lever on which the said
45 pawls are fulcrumed, and an eccentric for imparting a rocking motion to the said lever, substantially as shown and described.

8. A knitting-machine, provided with a needle-plate, mechanism for imparting a sliding motion thereto, the said mechanism comprising
50 a yoke fitted to slide and connected with the said plate, a pattern-wheel for imparting motion to the said yoke, a ratchet, a pawl mechanism for the ratchet-wheel for imparting an intermittent rotary motion to the said
55 ratchet-wheel and pattern-wheel, the said pawl mechanism being provided with a push-pawl and a pull-pawl adapted to be thrown independently in and out of mesh with the said ratchet-wheel one of said pawls having
60 a lug projecting therefrom, a lever on which the said pawls are fulcrumed, an eccentric

for imparting a rocking motion to the said lever, and a ratchet-disk connected with the said ratchet-wheel, but having one-half the number of teeth as that of the said ratchet-wheel, the teeth of the disk being adapted to be engaged by the lug on one of the said pawls, substantially as shown and described.

9. A knitting-machine, provided with a needle-plate, a shifting device therefor, and having a ratchet-wheel and a ratchet-disk rigidly connected with each other, the ratchet-disk having one-half the number of teeth that the ratchet-wheel has, and a push-pawl adapted to engage the said ratchet-wheel, and having
75 a lug adapted to ride on the teeth of the said disk, substantially as shown and described.

10. A knitting-machine, provided with mechanism for producing two fabrics, a sewing-needle for joiningsaid fabrics, and a mechanism for moving the sewing-needle into a preliminary position for receiving the second yarn, the said mechanism comprising a rock-shaft, an arm on the said rock-shaft, a pawl carried by the arm, and a slide for engaging
85 the sewing-needle, to move the latter into the said preliminary position, substantially as shown and described.

11. A knitting-machine, provided with mechanism for producing two fabrics, a sewing-needle for joiningsaid fabrics, and a mechanism for moving the sewing-needle into a preliminary position for receiving the second yarn, the said mechanism comprising a rock-shaft, an arm on the said rock-shaft, a pawl
95 carried by the arm, a slide for engaging the sewing-needle, to move the latter into the said preliminary position, and means for returning the pawl immediately after the needle is in the desired position, to allow shifting of the needle by its cam device, substantially as shown and described.

12. A knitting-machine comprising a plurality of oppositely-arranged needle-plates, sets of long and short needles fitted to slide
105 in the said plates, the short needle between the sets on one plate being a sewing-needle, a yarn-carrier for the sets of short needles, a second yarn-carrier for the sets of long needles, a reciprocating carriage over the said
110 plates, cam-actuating devices for the said sets of needles on each side of the carriage, and means for moving the sewing-needle into a preliminary position, to receive the yarn from the yarn-carrier for the long needles without causing the sewing-needle to cast its old loop, substantially as shown and described.

ISAAC W. LAMB.

Witnesses:

LEWIS WHITMAN,
L. C. WATKINS.