

(Model.)

9 Sheets—Sheet 1.

J. W. LUFKIN.

BUTTON HOLE SEWING MACHINE.

No. 337,273.

Patented Mar. 2, 1886.

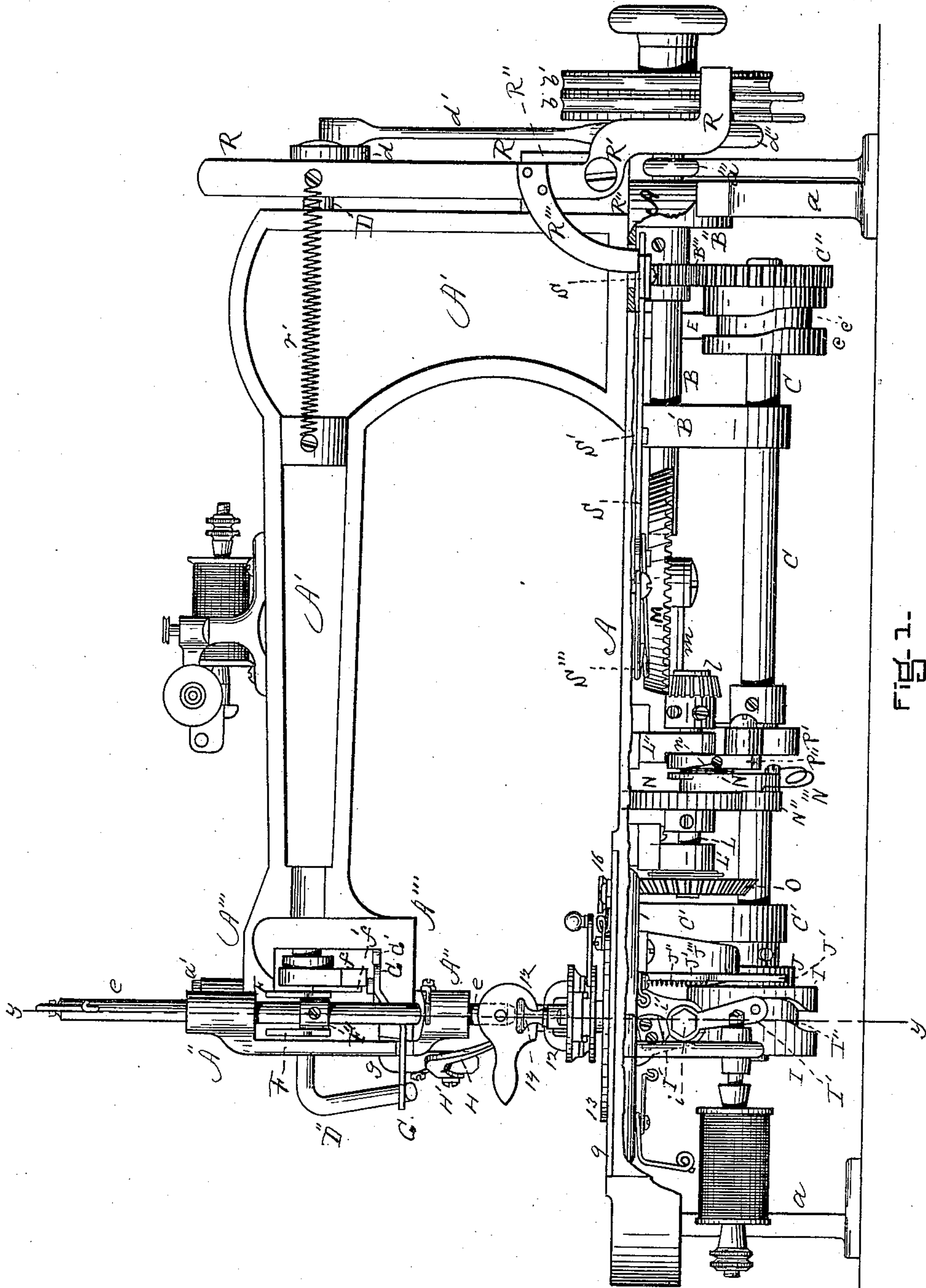


Fig. 1-

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(Model.)

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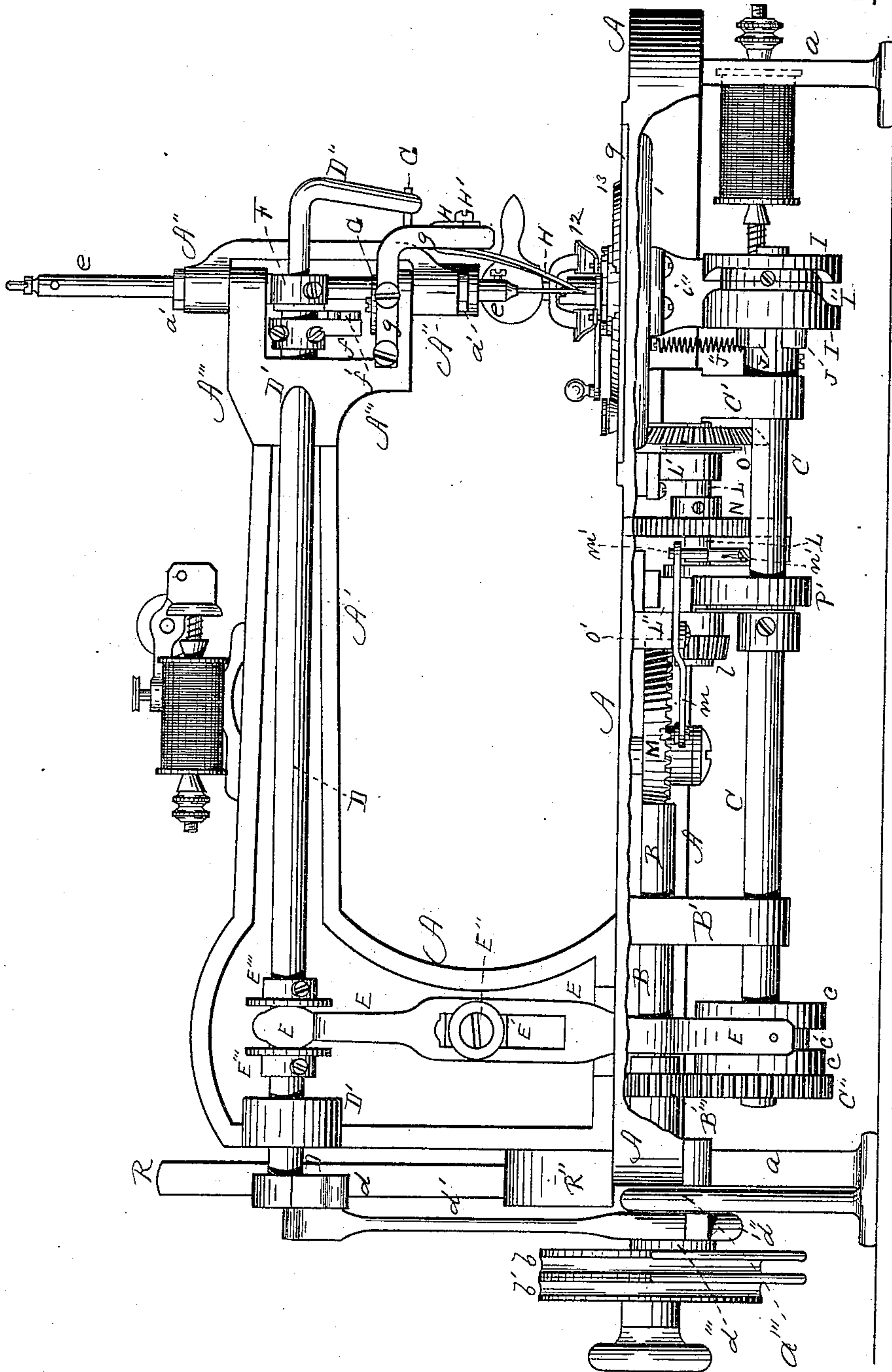


Fig. 2-

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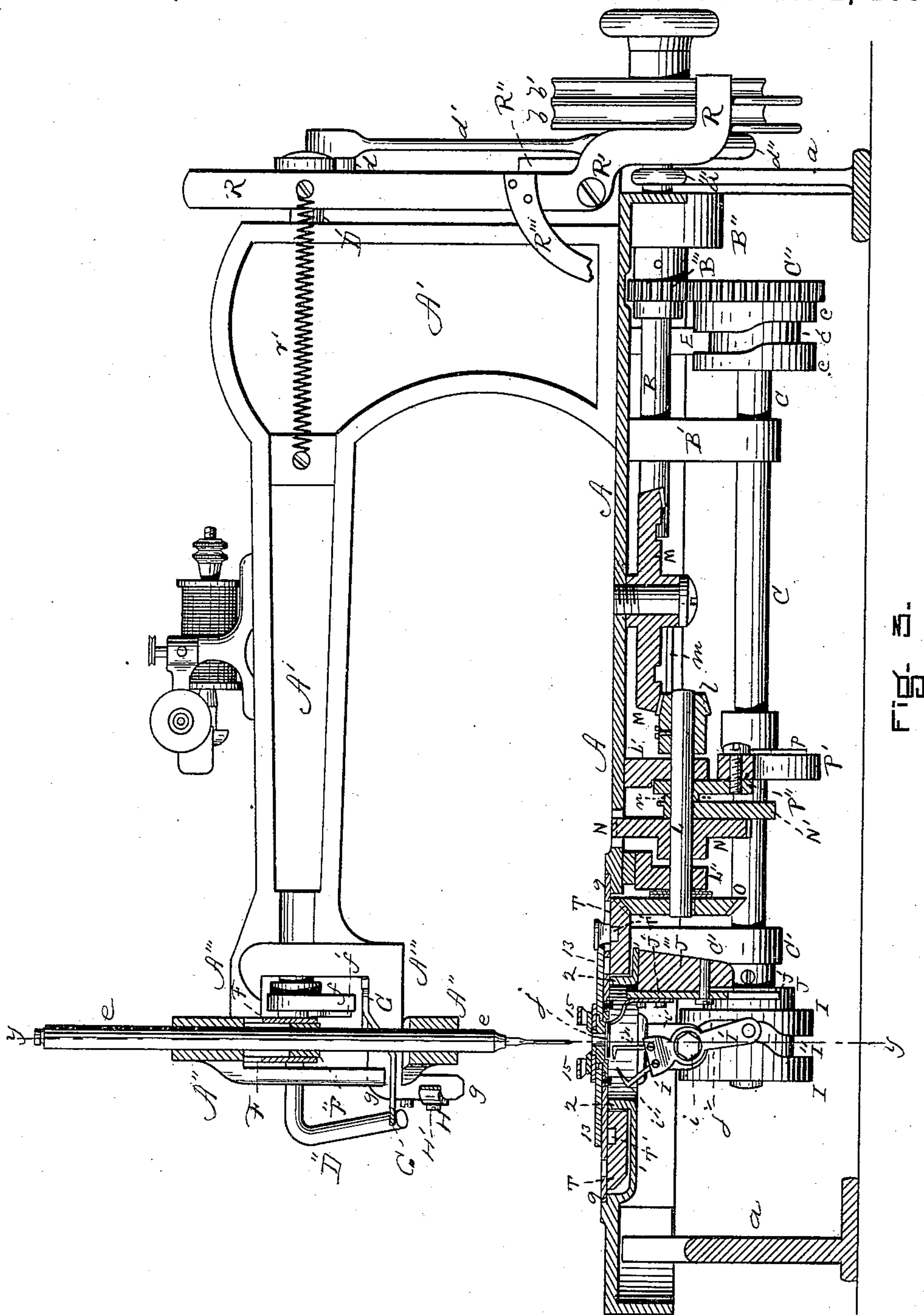
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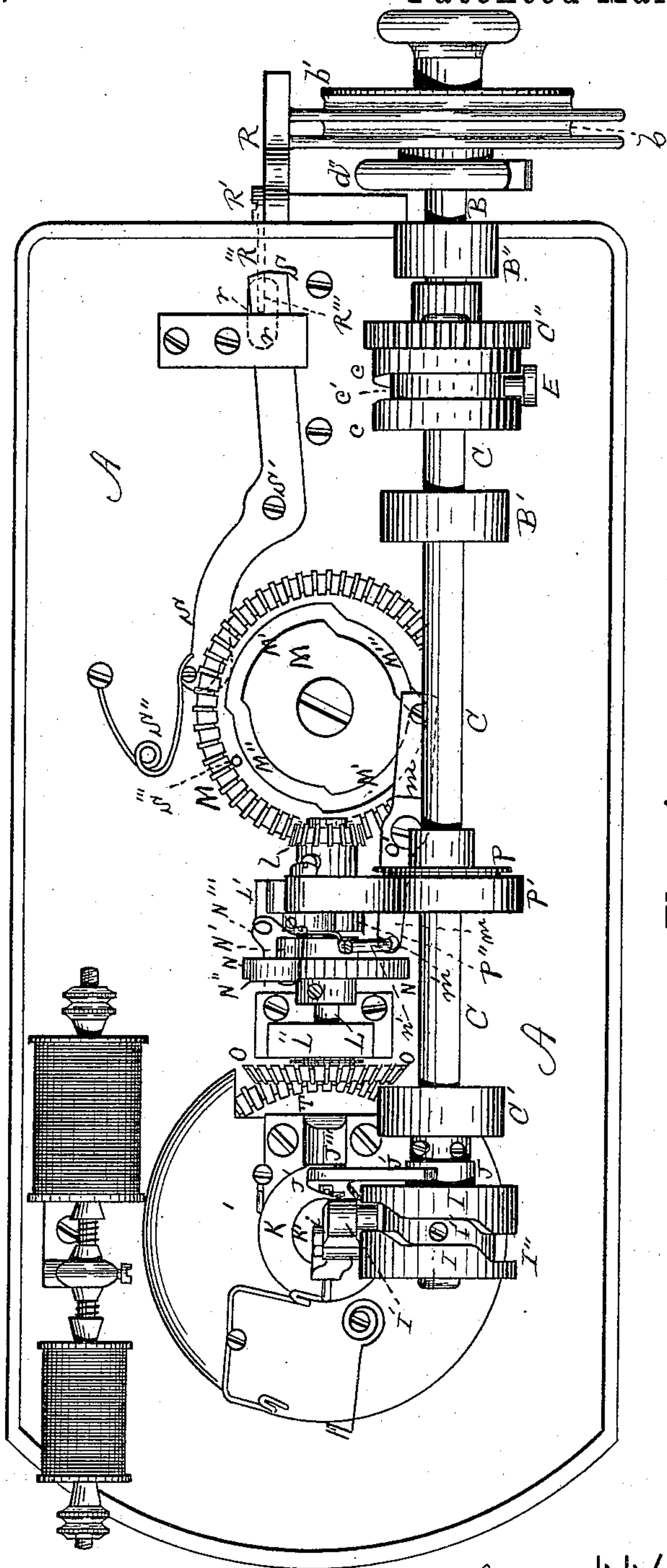


FIG. 4-

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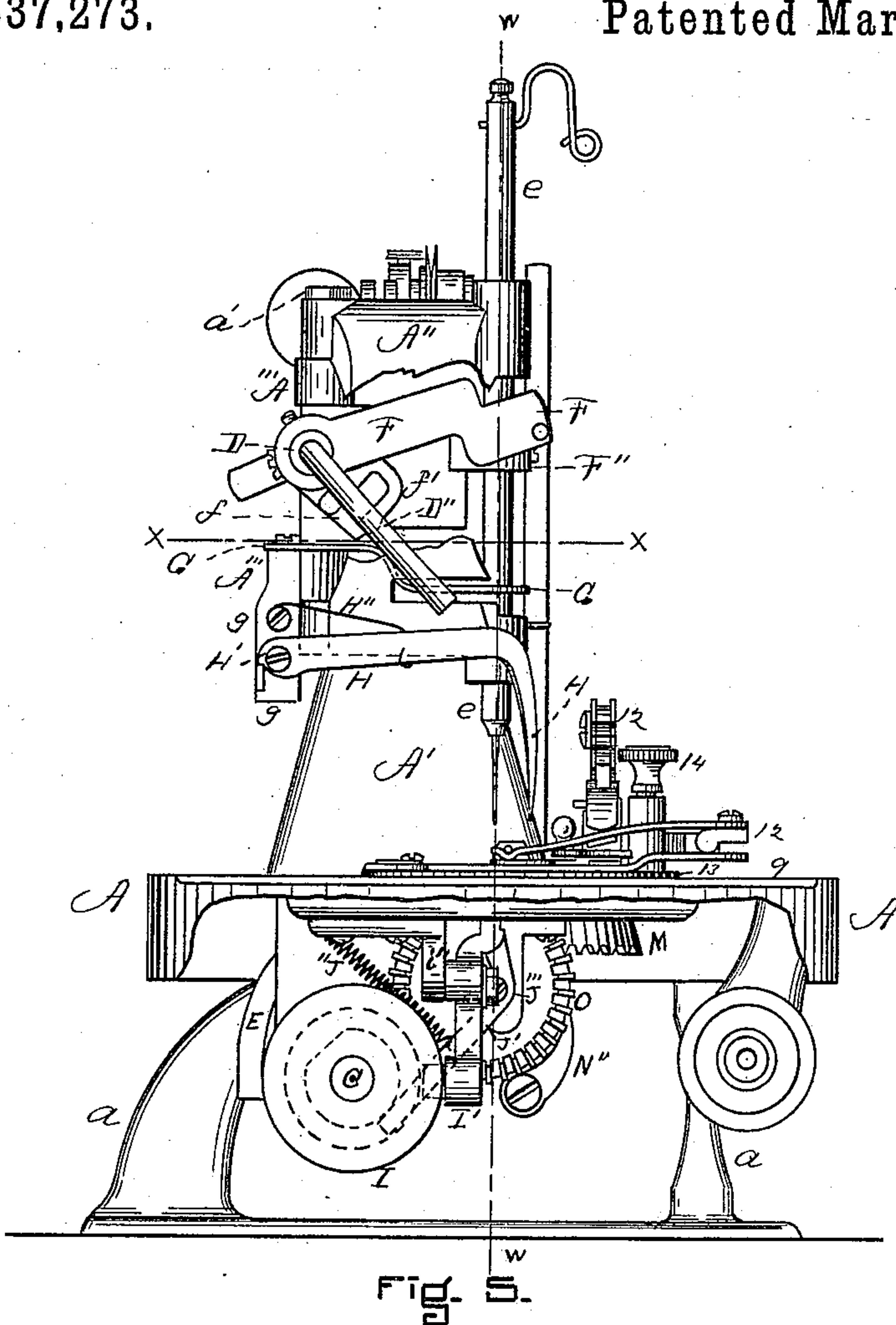


Fig. 5.

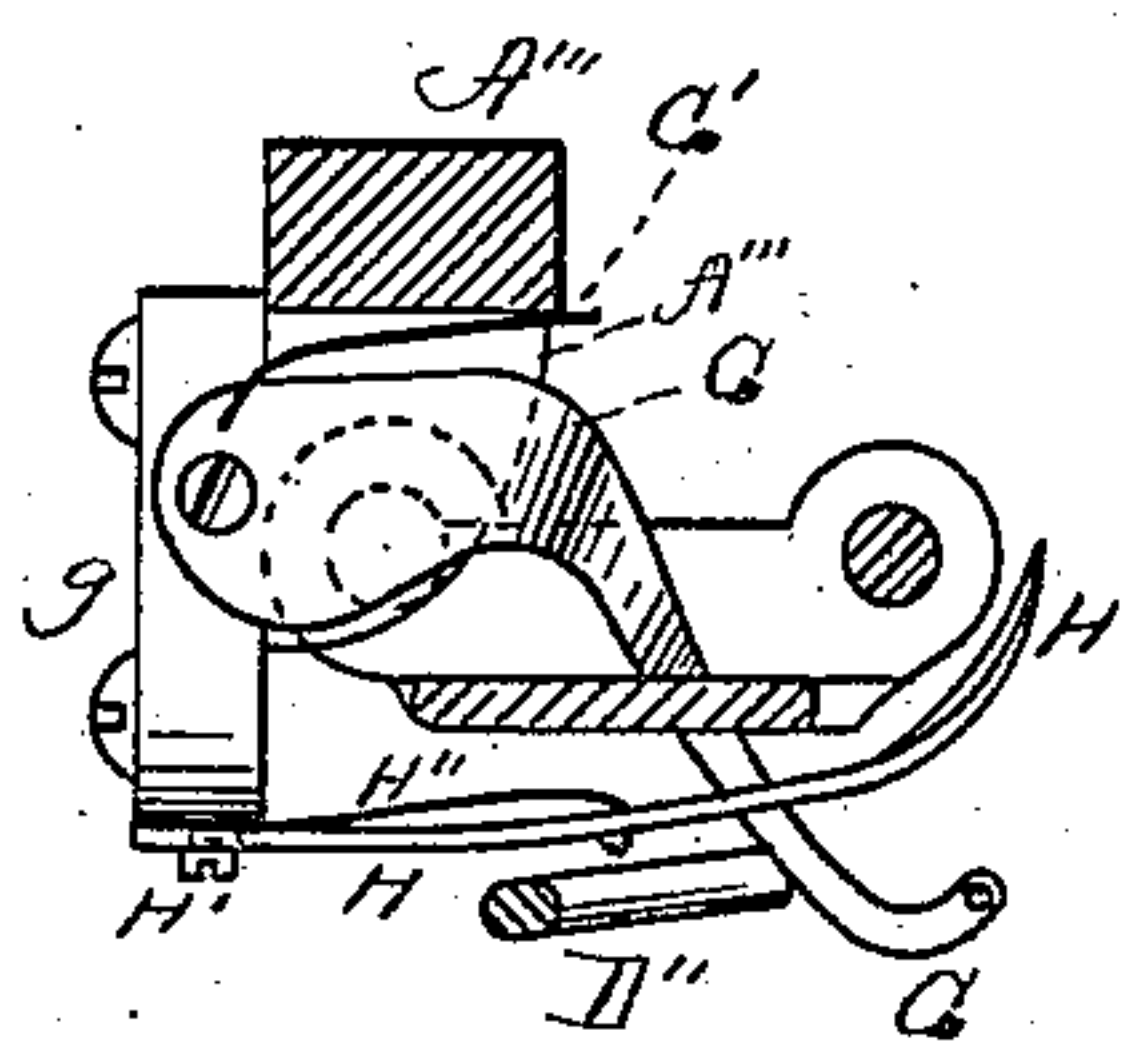


Fig. 6.

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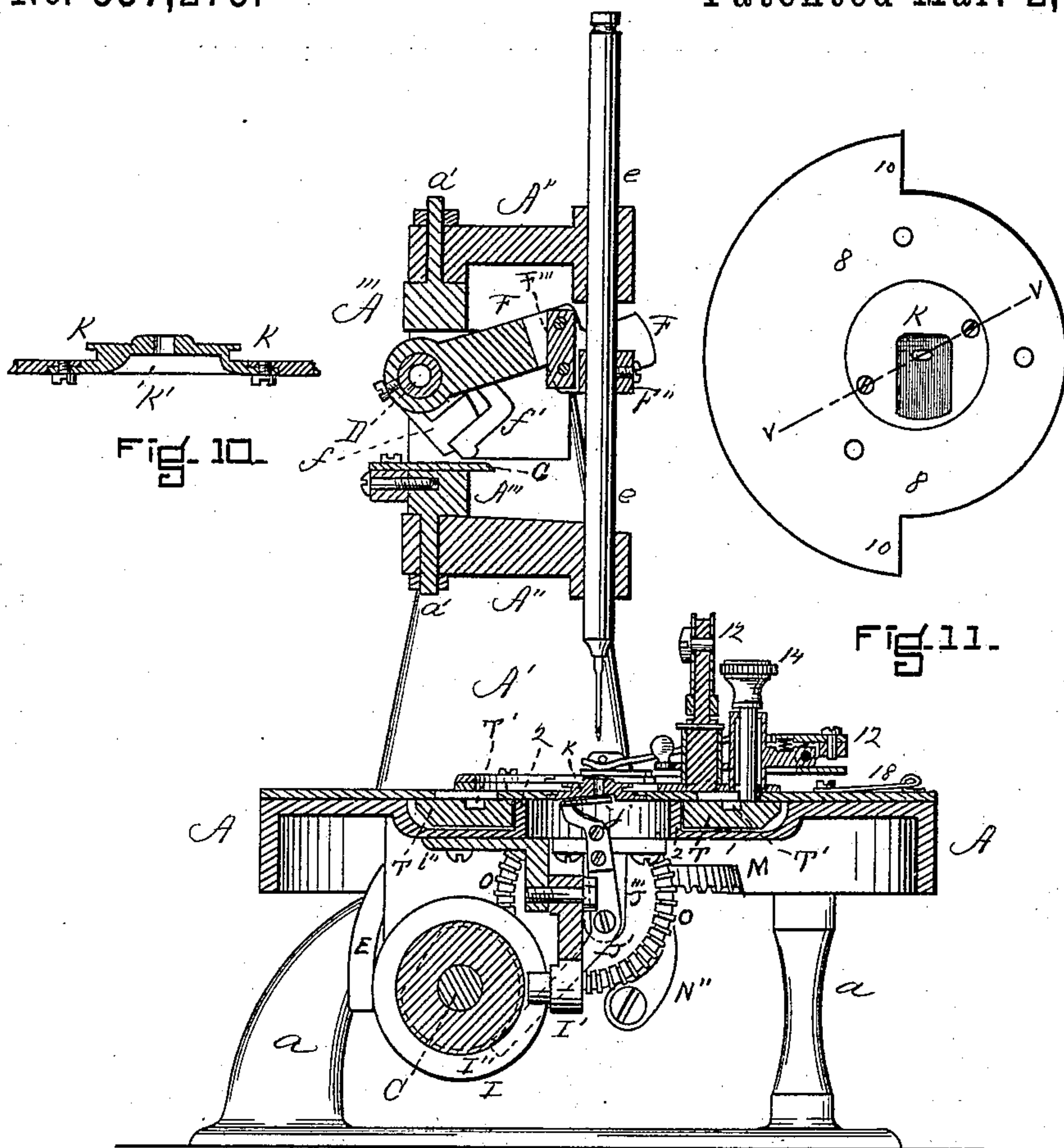


Fig. 7

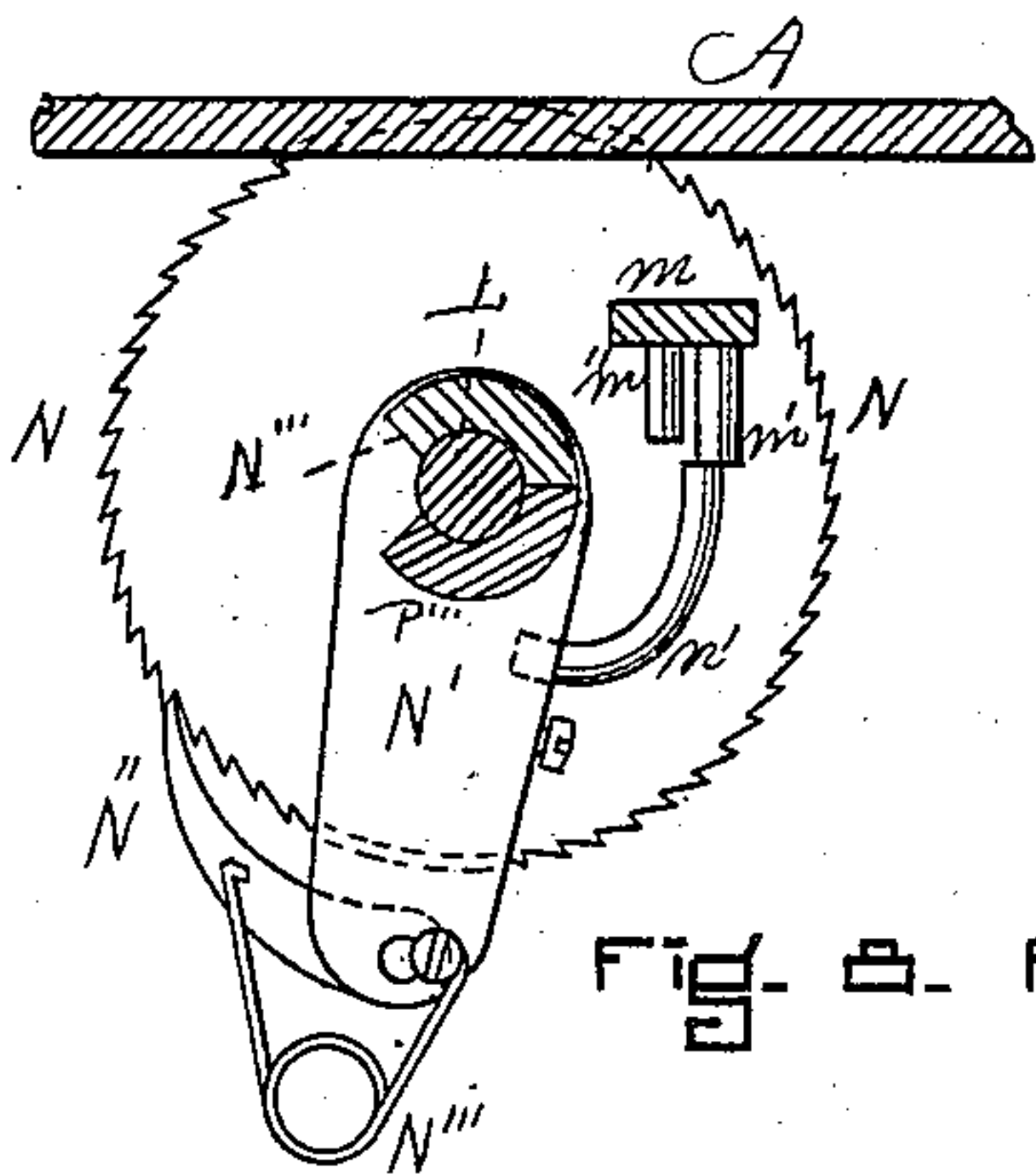


Fig. 8

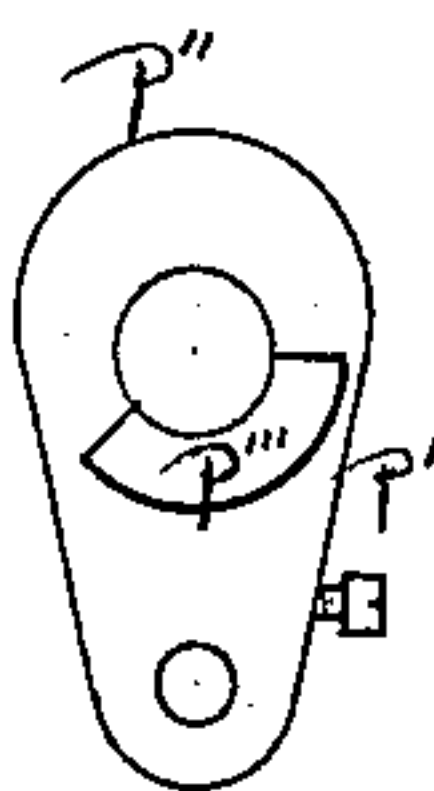


Fig. 9

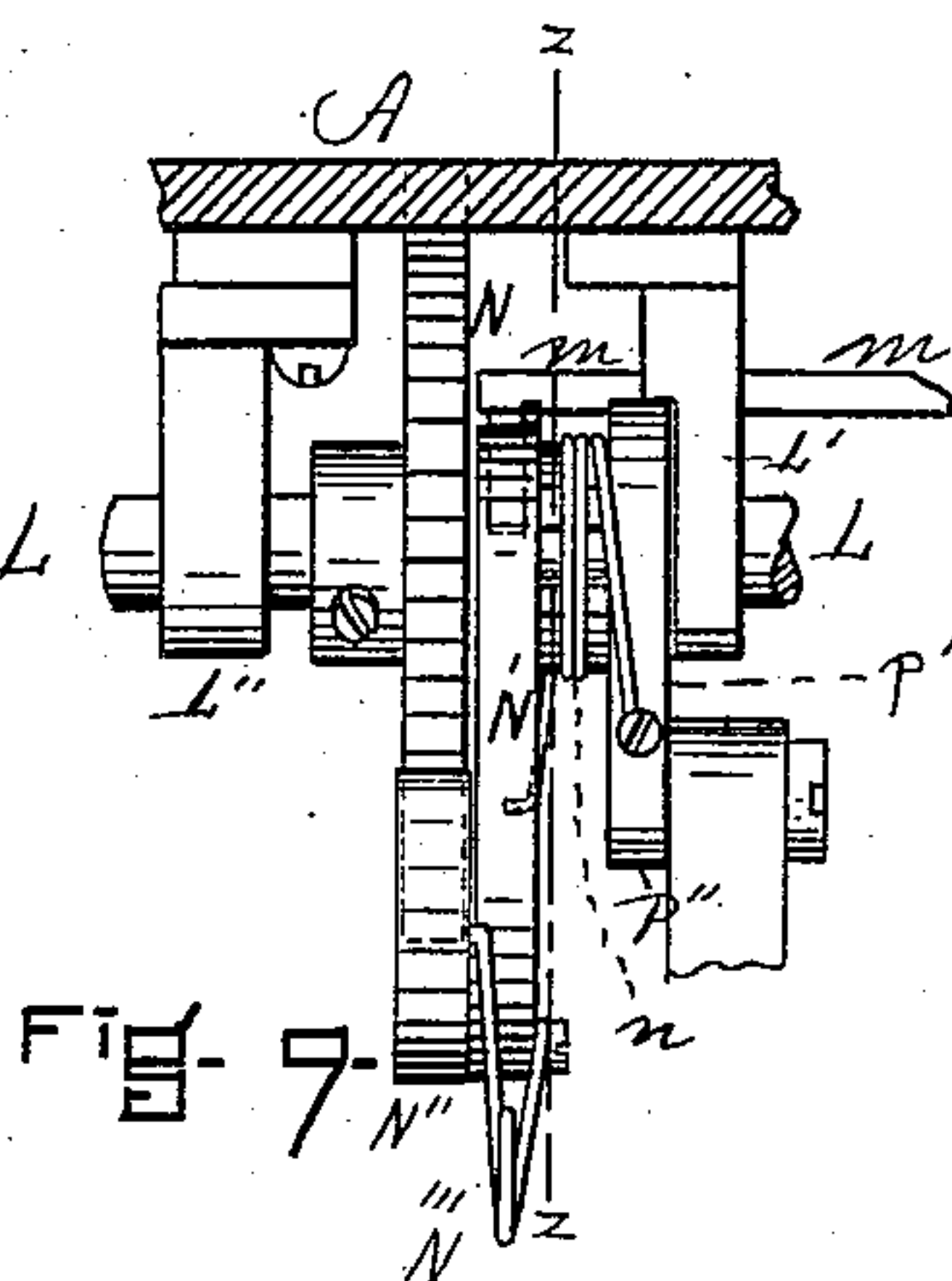


Fig. 10

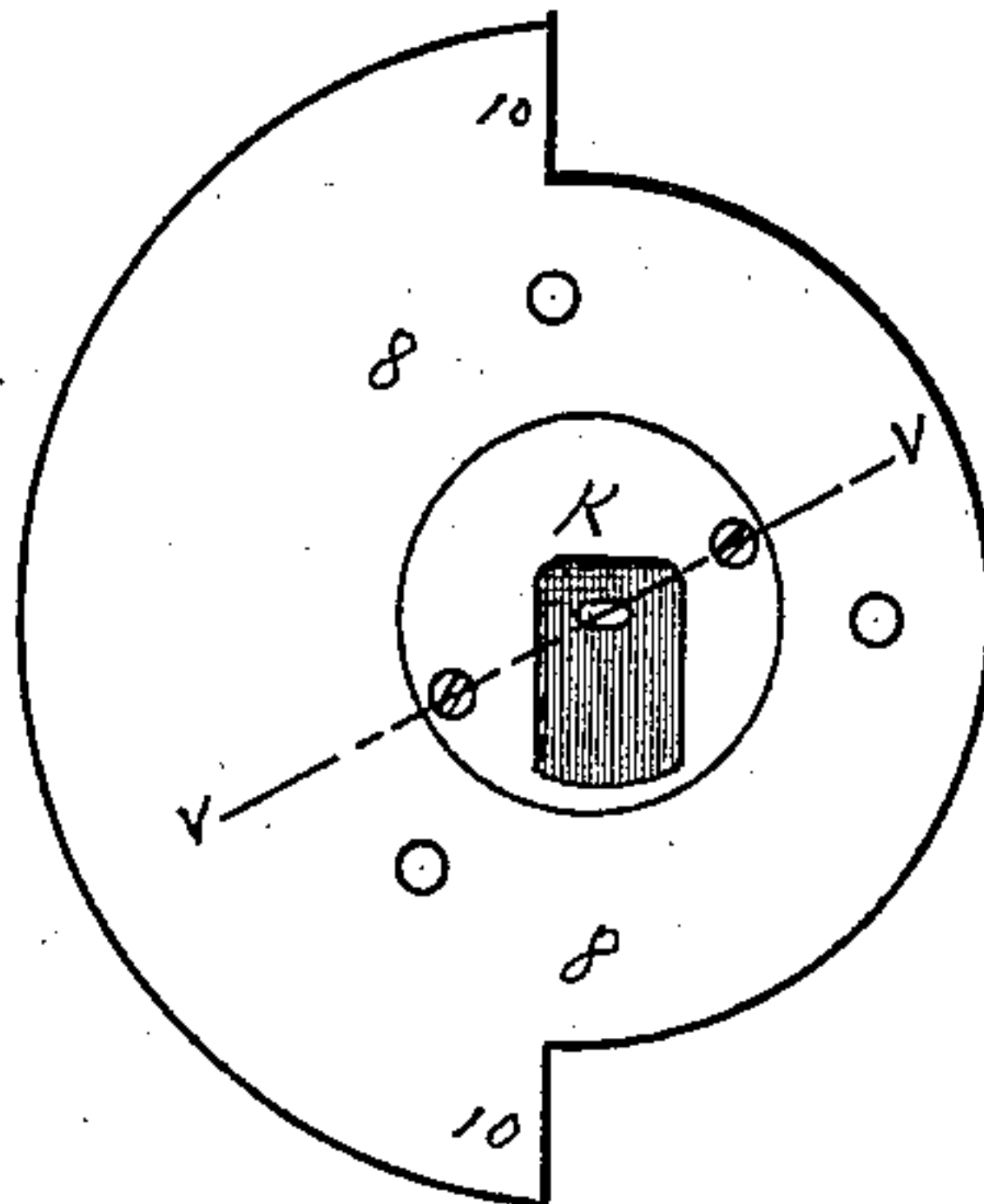


Fig. 11

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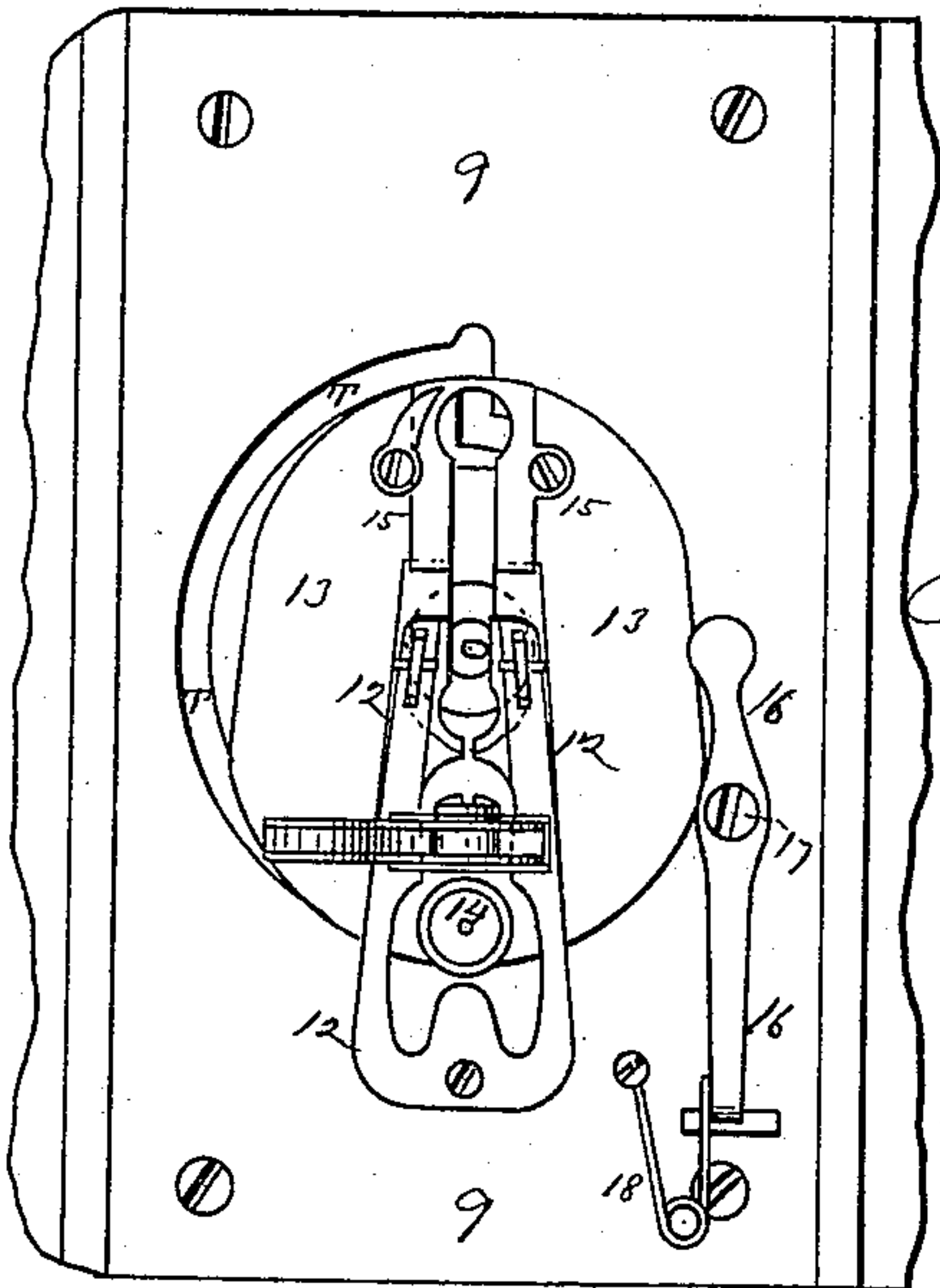


FIG. 12.

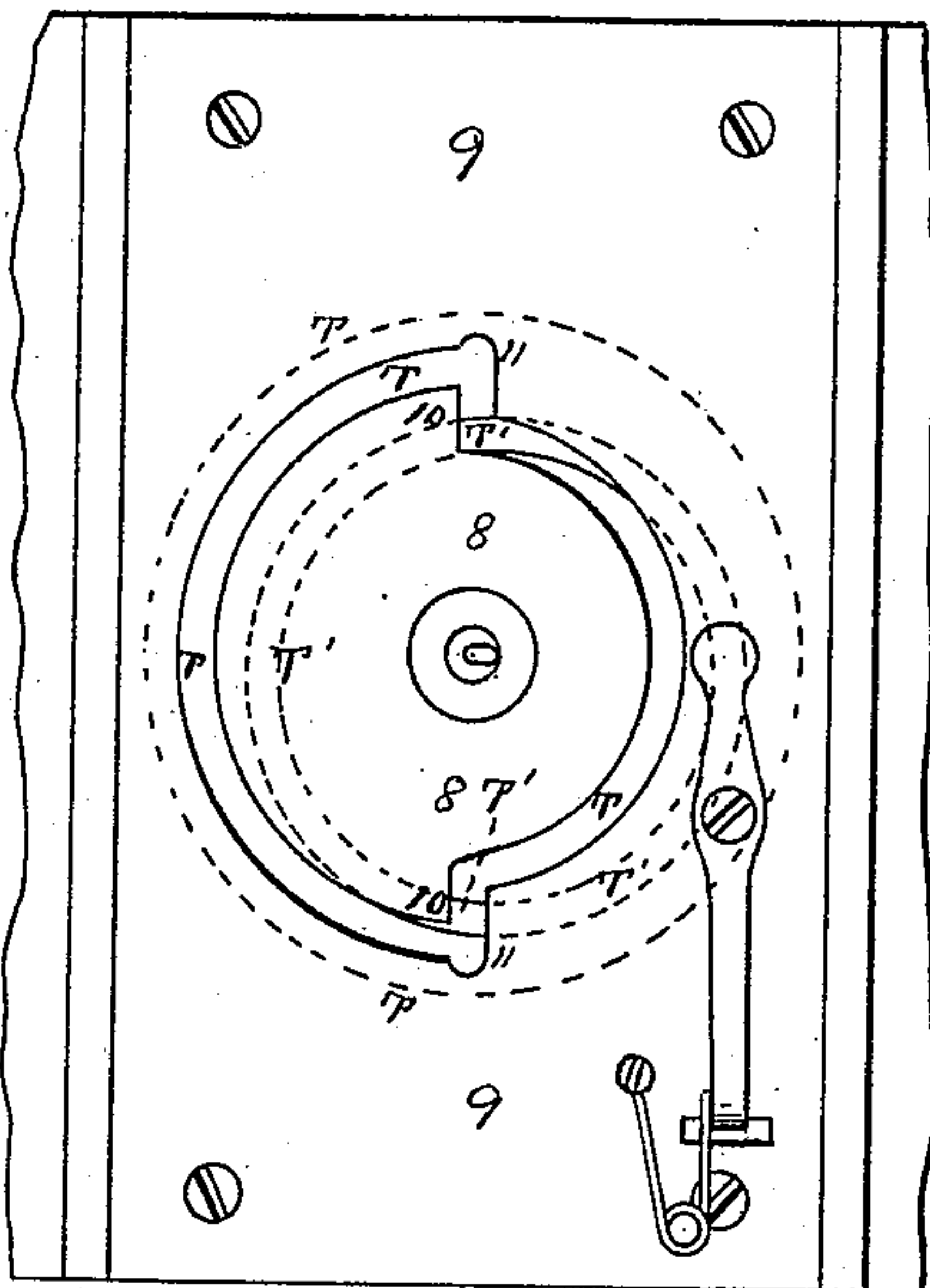


FIG. 13.

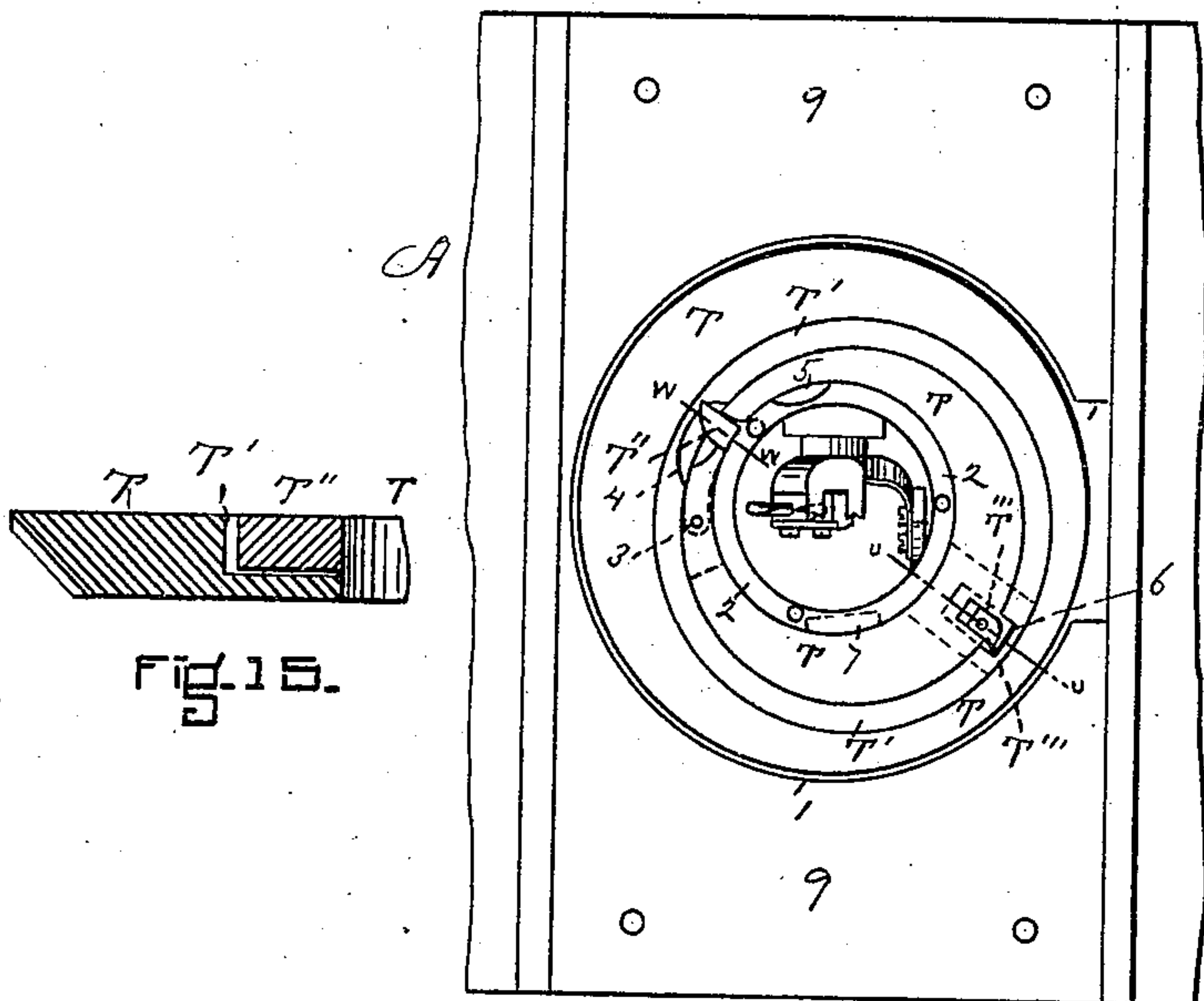


FIG. 14.

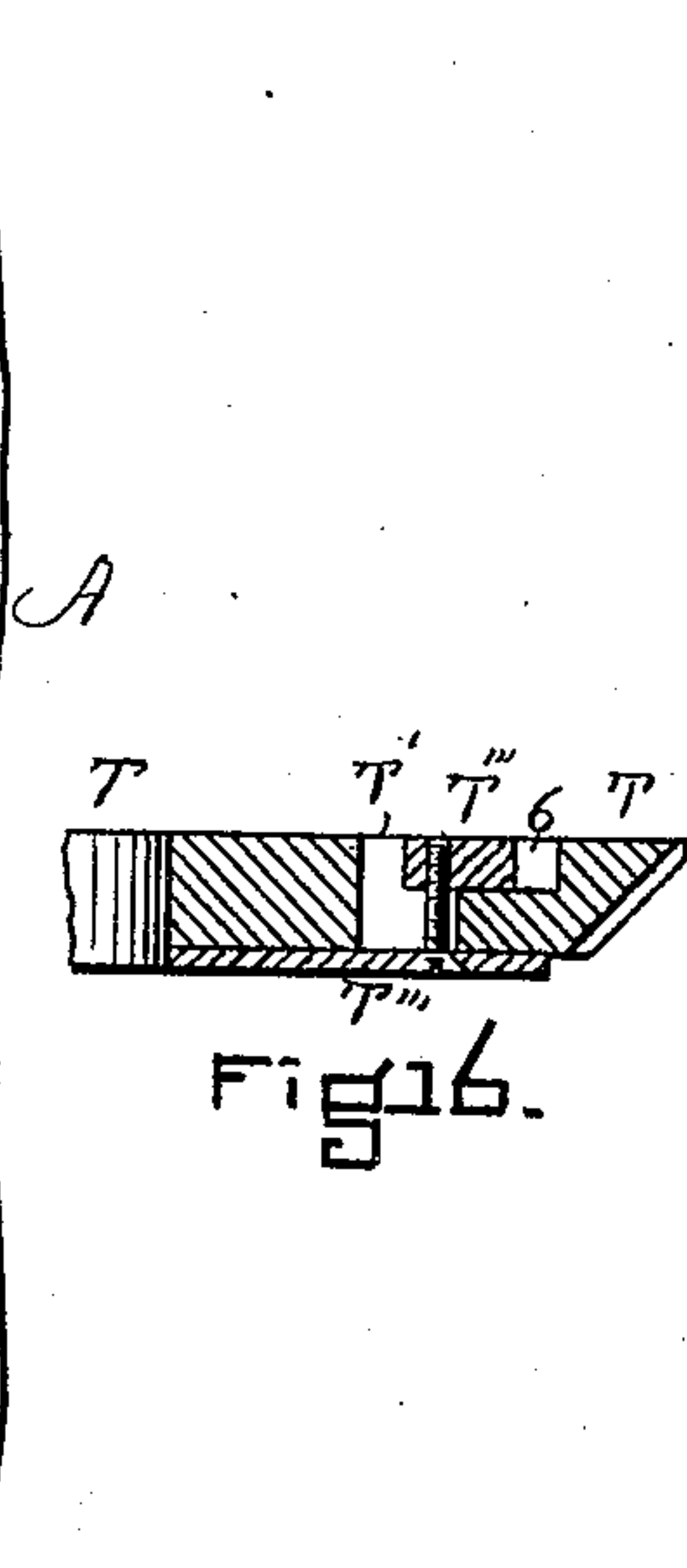


FIG. 15.

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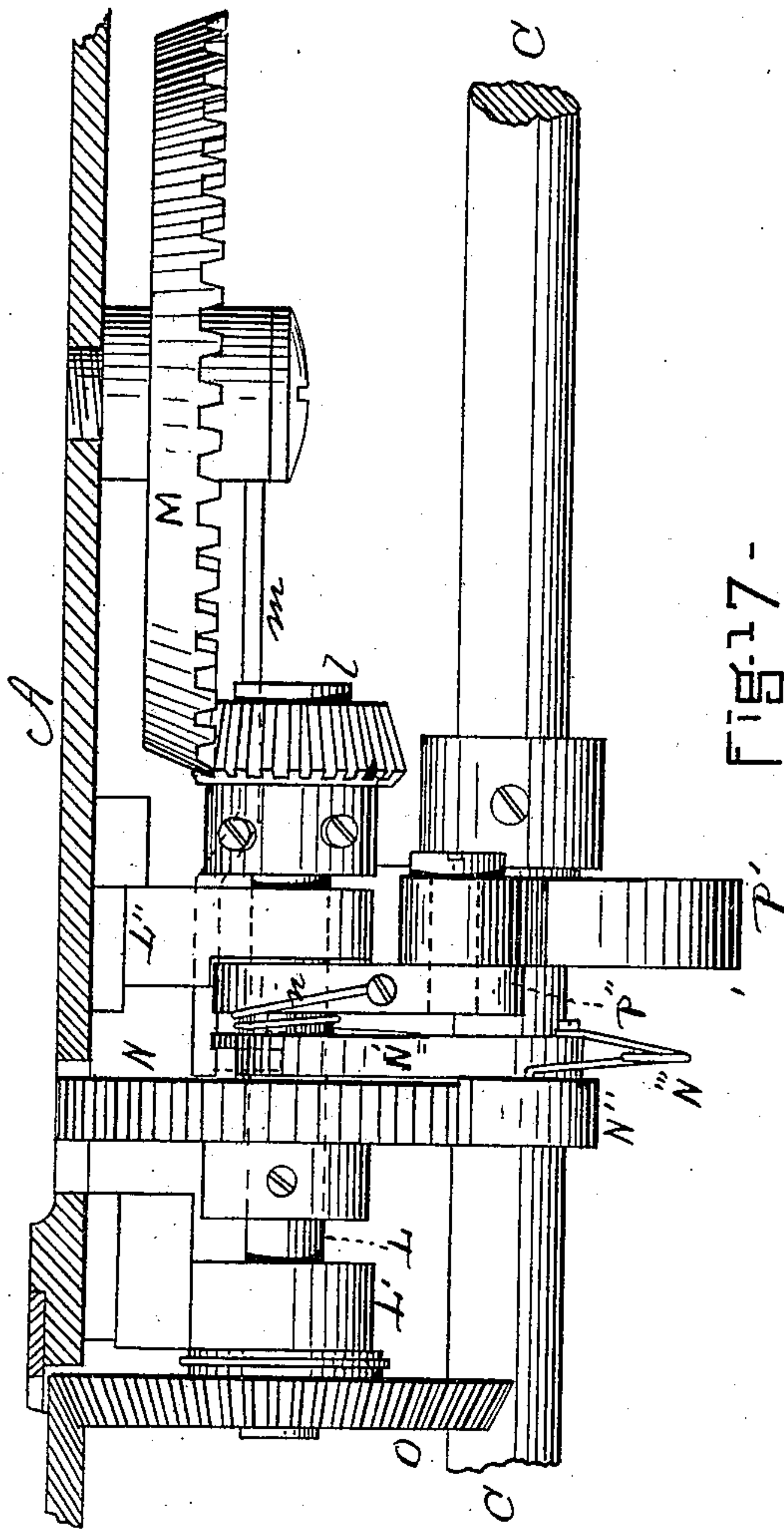
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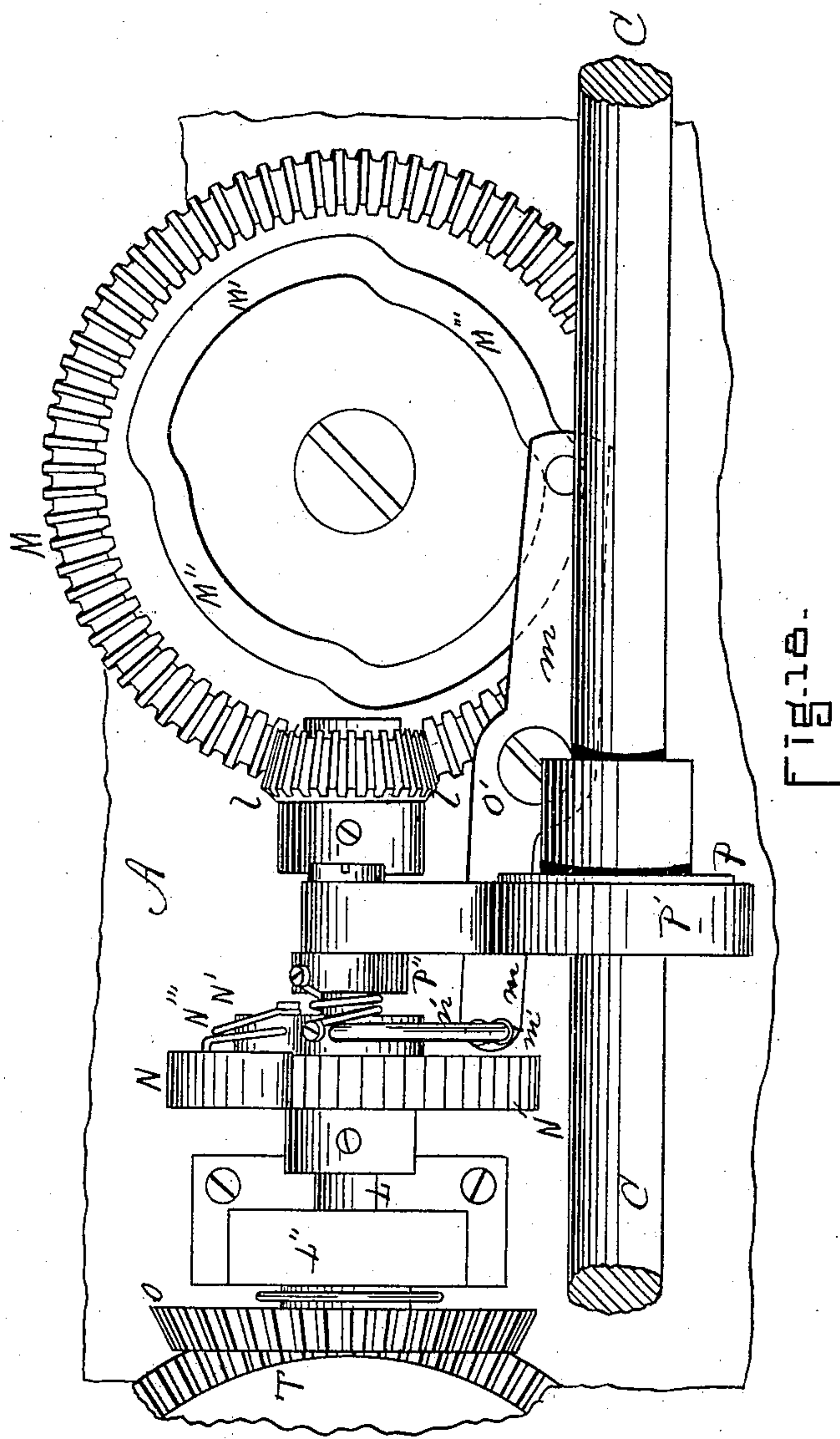
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UNITED STATES PATENT OFFICE.

JOHN W. LUFKIN, OF CHELSEA, MASSACHUSETTS.

BUTTON-HOLE SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 337,273, dated March 2, 1886.

Application filed November 17, 1884. Serial No. 148,100. (Model.)

To all whom it may concern:

Be it known that I, JOHN W. LUFKIN, of Chelsea, in the county of Suffolk and State of Massachusetts, have invented new and useful
5 Improvements in Button-Hole Sewing-Machines, of which the following is a specification.

This invention in button-hole sewing-machines is an improvement on that class of machines represented in United States Patents
10 Nos. 49,627, 115,857, 123,348, and 242,462, to which reference may be had.

In the accompanying drawings, in which similar letters of reference indicate like parts,
15 Figure 1 is a front elevation of a button-hole sewing-machine embodying my invention, a portion of the table being represented as broken out. Fig. 2 is a rear elevation of the same, also with a portion of the table represented as broken out. Fig. 3 is a longitudinal
20 vertical section of the machine, taken on line *w*, Fig. 5. Fig. 4 is a plan of the under side. Fig. 5 is an end elevation, with a portion of the table and head represented as broken out. Fig. 6 is a horizontal section or detail on line
25 *x*, Fig. 5. Fig. 7 is a transverse vertical section on line *y*, Figs. 1 and 3. Fig. 8 is a sectional detail on line *z*, Fig. 9. Fig. 8^a is a side view of the link *P* detached. Fig. 9 is a detail
30 front elevation of a portion of the feed mechanism beneath the table. Fig. 10 is an enlarged section of the button, taken on line *v*, Fig. 11. Fig. 11 is a plan of the under side of the center plate, 8. Fig. 12 is a plan view
35 of the bed-plate 9 with the clamp and clamp-plate in position. Fig. 13 is a plan of the bed-plate with the clamp and clamp-plate removed. Fig. 14 is a plan of the bed-plate with the clamp, clamp-plate, and center plate
40 removed. Fig. 15 is an enlarged section of a portion of the gear feed-wheel, taken on line *w*, Fig. 14. Fig. 16 is an enlarged section of a portion of the said feed-wheel, taken on line
45 *u*, Fig. 14. Fig. 17 is an enlarged longitudinal section of the table, showing certain of the parts below the same in elevation. Fig. 18 is a plan view of the under side, showing the same parts as in the preceding figure.

A is the table or frame, *a* its supports, and
50 A' the overhanging arm, constructed substantially as usual.

B is the driving-shaft having bearings in

the hangers B' and B'', said shaft being provided with the fast and loose pulleys *b* and *b'*, and having fixed thereupon the gear-wheel
55 B'', which engages the gear-wheel C'', fixed on the shaft C, said shaft having its bearings in the hangers B' and C', and being provided with the cam-wheel *c*. The wheel C'' is geared
60 to rotate at one-half the speed of the wheel B'', thus imparting a similar relative speed to the cam *c*.

D is a rocker-shaft (see Fig. 2) having its bearings at D', at the rear side of the arm A'. To one end of this shaft D is rigidly secured a
65 crank, *d*, to which is pivoted the connecting-rod *d'*, whose lower end, *d''*, embraces an eccentric, *d'''*, on the shaft B, said eccentric being made broad enough to allow of a certain
70 amount of side-play of the strap *d''* thereupon.

E is a lever slotted at E', and pivoted adjustably at E'' to the arm. The lower end of this lever lies in the groove *c'* in the cam-wheel *c*, said groove being of the shape shown
75 in Figs. 1 and 3, and the upper end lies between the collars E''', Fig. 2, adjustably secured to the shaft D. Thus it will be seen that with each rotation of the cam-wheel *c* the
80 rocker-shaft D is pushed forward and back longitudinally by the lever E, and the strap *d''* is correspondingly moved sidewise on the eccentric *d'''*. This longitudinal movement of the shaft D may be increased or diminished
by lowering or raising the adjustable pivot E''.

A'' is the swinging head, pivoted at *a'*, Fig. 85
7, to the stationary head A''' at the end of the overhanging arm. The needle-bar *e*, which passes through the swinging head, is held by the carrier F'', flattened on its sides, Figs. 5 and 7, pivoted to a link, F''', which is pivoted
90 to the bifurcated arm F, rigidly secured at its rear end to the shaft D. Rigidly secured to this same shaft is an arm, *f*, (see Fig. 3,) to which is fixed a U-shaped spring, *f*. (See Fig. 5.) This spring, when the arm *f* is swung
95 down by the shaft D, bears upon and presses slightly downward the take-up lever G, so as to hold it while the needle is making a loop.

From the end of the shaft D extends the bent arm D''.

H is the cutter-lever, (see Figs. 2, 5, and 6,) pivoted at H' to the bracket *g*, extending from the rear portion of the stationary head A'''. With each complete rotation of the cam-wheel
100

c, and as the shaft D is retracted in its longitudinal reciprocating motion, and with each second downward movement of the bent arm D'', the said bent arm presses down the cutter-lever H against the spring H'', (which holds it normally up, as shown in Fig. 5,) and makes an incision in the material in which the button-hole is being sewed, so as to make room for another pair of stitches. The machinery is so arranged and timed that the cutting-lever will follow the needle down with every second downward movement of the latter, the arm D'' operating upon the cutting-lever every second time it descends. This, of course, is due to the fact that the gear-wheel C'' rotates one-half as fast as the gear-wheel B''', as above explained. Thus it will be seen that the button-hole is not all cut at one operation, but is cut a little at a time, as it is needed by the needle, the cutter keeping pace with the needle in making and stitching the button-hole.

Rigidly secured to the shaft C, which, it will be remembered, is driven at one-half the speed of the driving-shaft B, is the cam-wheel I, provided with the groove I'', into which extends the lower end of the looper-lever I', pivoted at i to the bracket i'', secured to the under side of the table, said looper-lever carrying the loopers i'', of unequal lengths, curved so as to pass up under the button-chamber K', (see Fig. 10,) and each separately fast in the looper-lever, said loopers having the usual motion imparted to them by the shape of the cam-wheel I'', as shown in Figs. 1, 2, 3, and 4.

On the hub of the cam-wheel I a cam, J, is formed, of the shape shown in the first four figures, and the lower end of the bent spreader-lever J' (see Fig. 7) is held against it by the spring J'', said spreader-lever being pivoted at j', Fig. 3, to the bracket J'''. By being thus horizontally pivoted the spreader j carried by the spreader-lever is enabled to be reciprocated in the arc of a circle and move up into the recess or chamber K' in the button K, Figs. 4 and 10, thus allowing of a very short and correspondingly stiff needle.

L is a shaft having its bearings in the hangers L' and L''. (See Figs. 1, 3, 17, and 18.) Fixed on this shaft is the bevel-gear l, which engages the bevel-gear on the cam-wheel M, said cam-wheel (see Fig. 4) being arranged to rotate once with every four rotations of the wheel l. Also fixed to said shaft are the ratchet-wheel N and the bevel-gear feed-wheel O.

P (see Fig. 4) is an eccentric fixed on the shaft C, the strap P', embracing such eccentric, being pivotally connected with the link P'', loose on the shaft L, said link being provided with a lug or segment of a hub, P''', adapted to engage and lift, by means of a lug or segment of a hub, N''', the lever N', also loose on the shaft L, and provided with a pawl, N'', held by the spring N''' against the teeth on the wheel N.

n' (see Figs. 2 and 8) is a projection rigidly secured to the lever N', and forming a lift

adapted by means of the spring n (see Figs. 1 and 17) to come into contact with the cam-lever m, (see Figs. 2 and 18,) or with one of the steps m' or m'', (see Figs. 8 and 9,) built thereupon at different heights. This cam-lever m is pivoted at O' (see Fig. 4) beneath the table, and the opposite end from that on which are the steps lies in the groove on the face of the cam-wheel M. This groove has four distinct portions—viz., the portions M' M'' M' M'''—the effect of which is below described.

The operation of this feeding mechanism is as follows: The shaft L has intermittent rotary motion imparted to it by the eccentric P, which, through the strap P', link P'', lever N', and pawl N'', imparts such motion to the ratchet-wheel N. The amount of the motion imparted to said ratchet-wheel depends on the number of teeth which the pawl slips over just before it engages said wheel, and the number of teeth which it slips over depends on whether the lifting projection n' finds its seat when it is pulled back by the spring n on the cam-lever m direct or on one of the steps m' or m''.

It will be perceived by examining the drawings that when the cam-lever m is sliding in one of the portions M' of the cam-groove the said lever is in such a position that the lifting projection n' will find its seat on the highest step, m', (see Fig. 8,) thus of course reducing the motion of the ratchet-wheel, and hence the feed. When the cam-lever lies in the portion M'' of the groove, the lifting-lever finds its seat on the step m'', and hence a little more motion is given to the ratchet-wheel, and when the cam-lever is in the portion M''' of the groove the lifting projection n' finds its seat on the cam-lever m direct, thus causing the pawl to slip back over more teeth, and hence of course giving more motion to the ratchet-wheel when said pawl engages it. The reason why these different motions are desirable is, that when the cam-lever is in the portions M' of the groove the needle is stitching the sides of the button hole, and hence the feeding mechanism must be at its slowest movement. When the cam-lever is in the portion M'' of the groove, the needle is stitching around the large end or eye of the button-hole, and hence the feed must be more rapid; and when the cam-lever is in the portion M''' of the groove the needle is stitching the tail or small end of the button-hole, and hence the feed must be very rapid; and it will be observed from the shape of the groove in the cam that this machine rounds both the large and the small ends of the button-hole instead of making the small end square or pointed, as is now common.

R is a shipping-lever, (see Fig. 1,) pivoted at R' to the bracket R'' on the rear end of the arm A', and provided with an extension, R''', which passes down through an opening, r, in the table A. (See Fig. 4.)

S is a lever of substantially the shape shown, pivoted at S' to the under side of the table, and provided with the spring S'', adapted to

bear that end of the lever down behind the cam-wheel M, so as to come in contact with a pin, S''', projecting upward behind said cam-wheel. This pin is so placed that when the stitching of the button-hole is finished, the finishing-point being at the small end thereof, the said pin will strike the lever S, and, passing under it, will cause it to move on its pivot away from the opening *r*, (see Fig. 4.) so as to allow the extension R''', which bears normally on the upper surface of said lever S, (see Fig. 1,) to drop by said lever, and thus cause the spring *r'* (see Figs. 1 and 3) to pull the shipping-lever R so as to ship the driving-belt from the fast pulley *b* to the loose pulley *b'*, thus stopping the machine until the operator can move the material along so as to bring the next button-hole in position, when the shipping-lever is pulled against the spring *r'* by the operator, thus drawing the extension R''' up into the opening *r* and allowing the lever S to slip under it by the power of the spring S'', starting the machine.

T is the bevel-gear feed-wheel engaged by the bevel gear-wheel O, so as to run at one-half the speed of the same, and provided with the groove T'. (See Fig. 14.) This wheel lies in the bed 1 around the flange 2, extending upward from said bed. The wheel T is further provided with the followers T'' and T''', the former being hinged at 3 and adapted to move in and out of the recess 4 in the groove T', and in and out of the recess 5 in the outside of the flange 2, (see Figs. 14 and 15,) and the latter, which is placed at the peak of the heart, being adapted to slide in and out of the groove T' and in and out of the recess 6 in said groove T' and the recess 7 in said flange. (See Figs. 14 and 16.)

8 (see Figs. 11 and 13) is the center plate, secured to the flange 2, (see Figs. 3 and 14,) and provided with the button K, (see Fig. 10,) constructed as above described, and 9 (see Figs. 1, 2, and 3) is the bed-plate, secured to the table A. On opposite edges of the center plate, 8, are the shoulders 10, (see Figs. 11 and 13,) and on opposite inner edges of the bed-plate 9 are corresponding shoulders, 11.

12 is the clamp, constructed substantially as usual and rigidly secured to the clamp-plate 13, and 14 (see Fig. 12) is the spring-clamp pin extending down into the heart-shaped groove T', and being held therein by a suitable spring.

15 is the clamp-arm extension, constructed substantially as usual, and 16 is a lever pivoted at 17 to the bed-plate and held by the spring 18 against the clamp-plate 13. As the feed-wheel T rotates, it slips under the clamp-pin 14, which lies in the groove T'. This clamp-pin, and hence, also, the clamp and clamp-plate, is given the suitable reciprocating motion necessary to move the button-hole back and forth, in order to stitch the sides by the heart-shaped groove in which it lies, and it is enabled to turn, so as to allow the needle to stitch around the two ends of the button-

hole, by means of the followers T'' and T'''. The follower T'' carries the clamp-pin one-half around the groove, while the needle stitches around the eye or large end of the button-hole, when said follower is forced back by the pin into the recess 5 in the flange 2, and the pin slips by and travels between the edges 10 and 11 of the center plate and bed-plate, to allow the needle to stitch one side of the button-hole. Then the follower T''' catches the pin 14 and carries it half round the groove, while the needle is stitching the tail or small end of the button-hole, when the said follower is forced back by the pin into the recess 7 in the flange 2, and the pin slips by and travels in the groove between the opposite edges, 10 and 11, to allow the needle to stitch the other side of the button-hole.

In order that the table and machine may be tipped back without throwing the belt off the pulleys *b* and *b'*, I hinge it at each end (see *a'''*) upon its supports *a* on a line with a shaft upon which said pulleys are placed.

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

1. The needle-bar carrier F'', link F''', and bifurcated arm F, the latter rigidly secured to the shaft D, and the rocker-shaft D, provided with the collars E'', in combination with the lever E, adjustably pivoted at E'' to the arm, the cam-wheel *c*, and the crank *d*, connecting-rod *d'*, and eccentric *d'''*, substantially as and for the purpose set forth.

2. The needle-bar carrier-arm F, bifurcated or made in two parts, as shown, and provided with the needle-bar carrier and link F''', said two parts of the needle-bar carrier-arm extending, one on each side of the needle-bar, for communicating the desired sidewise motion to the latter, substantially as and for the purpose described.

3. The take-up lever G, pivoted to the stationary head A'', and provided with the spring G' and the arm *f*, rigidly secured to the shaft D, and provided with the spring *f'*, for nipping the take-up lever, in combination with the rocker-shaft D and means for imparting to the same longitudinal reciprocating and oscillatory motion, substantially as and for the purpose described.

4. The combination of the bent cutter-lever H, pivotally secured to the stationary head A'', and the shaft D, having oscillatory and longitudinally-reciprocating motion, and provided with a bent arm, D'', adapted to press down the cutter-lever with each second downward movement of the same, and said cutter-lever being of shape to cut a small portion only of the button-hole at a time, substantially as and for the purpose set forth.

5. The cutter-lever H, pivoted to the bracket *g* and provided with the spring H'', the stationary head A'', the rocker-shaft D, provided with the bent arm D'', and collars E'', in combination with the lever E, pivoted to the overhanging arm, the cam-wheel *c*, and gear-wheel

C'', the driving-shaft B, provided with the gear-wheel B''', rotating at double the speed of the gear-wheel C'', which it engages, and the eccentric d''', connected with said rocker-shaft, substantially as and for the purpose described.

6. The combination of the overhanging arm A', the stationary head A''', to which are pivotally secured the take-up lever G and cutter-lever H, the bent arm D, the swinging head A'', guiding the needle-bar, and the shaft D, to which are rigidly secured the carrier-arm F, the reciprocating eye-pointed needle, and the loopers and their operating mechanisms, and means for imparting to said shaft oscillatory and longitudinally-reciprocating motion, substantially as and for the purpose set forth.

7. The combination of the overhanging arm A', stationary head A''', the swinging head A'', guiding the needle-bar, and the shaft D, to which are rigidly secured the carrier-arm F and arm f, the take-up lever G, the spring f', the reciprocating eye-pointed needle, and the loopers and their operating mechanisms, and means for imparting to said shaft oscillatory and longitudinally-reciprocating motion, substantially as and for the purpose described.

8. The combination of the reciprocating eye-pointed needle, the looper-lever I', pivoted to the bracket i, the spreader-lever J', pivoted to the bracket J''' and provided with the spring J'', and the shaft C, provided with the cams I and J, substantially as and for the purpose set forth.

9. The combination of the shaft C, provided with the eccentric P and strap P', the link P'', loose on the shaft L, the lever N', also loose on said shaft, the pawl N'', and the ratchet-wheel N and bevel gear-wheels O and l, said ratchet-wheel and bevel gear-wheels being rigidly secured to said shaft, the said bevel gear-wheel O engaging the feed-wheel T, substantially as and for the purpose set forth.

10. The cam gear-wheel M, engaged by the bevel gear-wheel l on the shaft L and provided with the described groove, said groove consisting of four portions, M', M'', M', and M''', combined with suitable connections, whereby varying speed is imparted to the feeding mechanism, substantially as and for the purpose described.

11. The combination of the cam gear-wheel M, provided with the groove M', M'', M', and M''', the gear-wheel l, fixed on the shaft L, said shaft being provided with the ratchet-wheel N, the lever N', provided with the pawl N'' and lug N''', and operated by the lug P''' on the link P'' and lifting projection n', and the lever m, engaged by the cam and provided with the steps m' and m'', substantially as and for the purpose set forth.

12. The combination of the shaft C, provided with the eccentric P and strap P', the shaft L, to which are fixed the gear-wheels O and l and the ratchet-wheel N, and on which are loose the link P'' and lever N', said link

and lever being provided, respectively, with the lugs P''' and N''', and the latter lever provided with the lift n', the lever m, provided with the steps m' m'', and the cam gear-wheel M, substantially as and for the purpose described.

13. The combination, with the cloth-clamp operating and stitching mechanism, of the cam gear-wheel M, provided with the pin S'', the lever S, the shipping-lever R, provided with the extension R'', and the fast and loose pulleys b and b', substantially as and for the purpose set forth.

14. The gear feed-wheel T, provided with the groove T', and bed 1, provided with the flange 2, recessed at 7, in combination with the follower T'', adapted to slide in and out of said groove, and the cloth-clamp, substantially as and for the purpose described.

15. The gear feed-wheel T, provided with the groove T', and bed 1, provided with the flange 2, recessed at 5, in combination with the follower T'', adapted to swing in and out of said groove, and the cloth-clamp, substantially as and for the purpose set forth.

16. The combination of the gear feed-wheel T, provided with the groove T', recessed at 4 and 6, the bed 1, provided with the flange 2, recessed at 5 and 7, the followers T'' and T''', adapted to move in and out of said groove, the pin 14, and the cloth-clamp, substantially as and for the purpose described.

17. The combination of the cloth-clamp, the center plate, 8, having the shoulders 10, the bed-plate, 9, having the corresponding shoulders, 11, and the feed-wheel T, provided with the groove T', substantially as and for the purpose set forth.

18. The combination, with the clamp 12, provided with the pin 14, and the clamp-plate 13, of the bed-plate 9, provided with the shoulders 11, the center plate provided with the shoulders 10, feed-wheel T, provided with the recessed groove T' and followers T'' T''', and the recessed flange 2, substantially as and for the purpose described.

19. The combination of the fast and loose pulleys b b', the shipping mechanism operated by the pin S'', the cam-wheel M, and feeding mechanism, and the feed-wheel T', and mechanism for imparting motion to the clamp, all timed and constructed to operate substantially as and for the purpose set forth.

20. The combination of the driving-shaft B, provided with the gear-wheel B''', the shaft C, provided with the gear-wheel C'', the eccentric P, and cams I J, for giving desired movement to the looper and spreader levers, the shaft L, provided with the gear-wheel O and feeding mechanism, and the feed-wheel T, timed and constructed to operate substantially as and for the purpose set forth.

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Witnesses:

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