

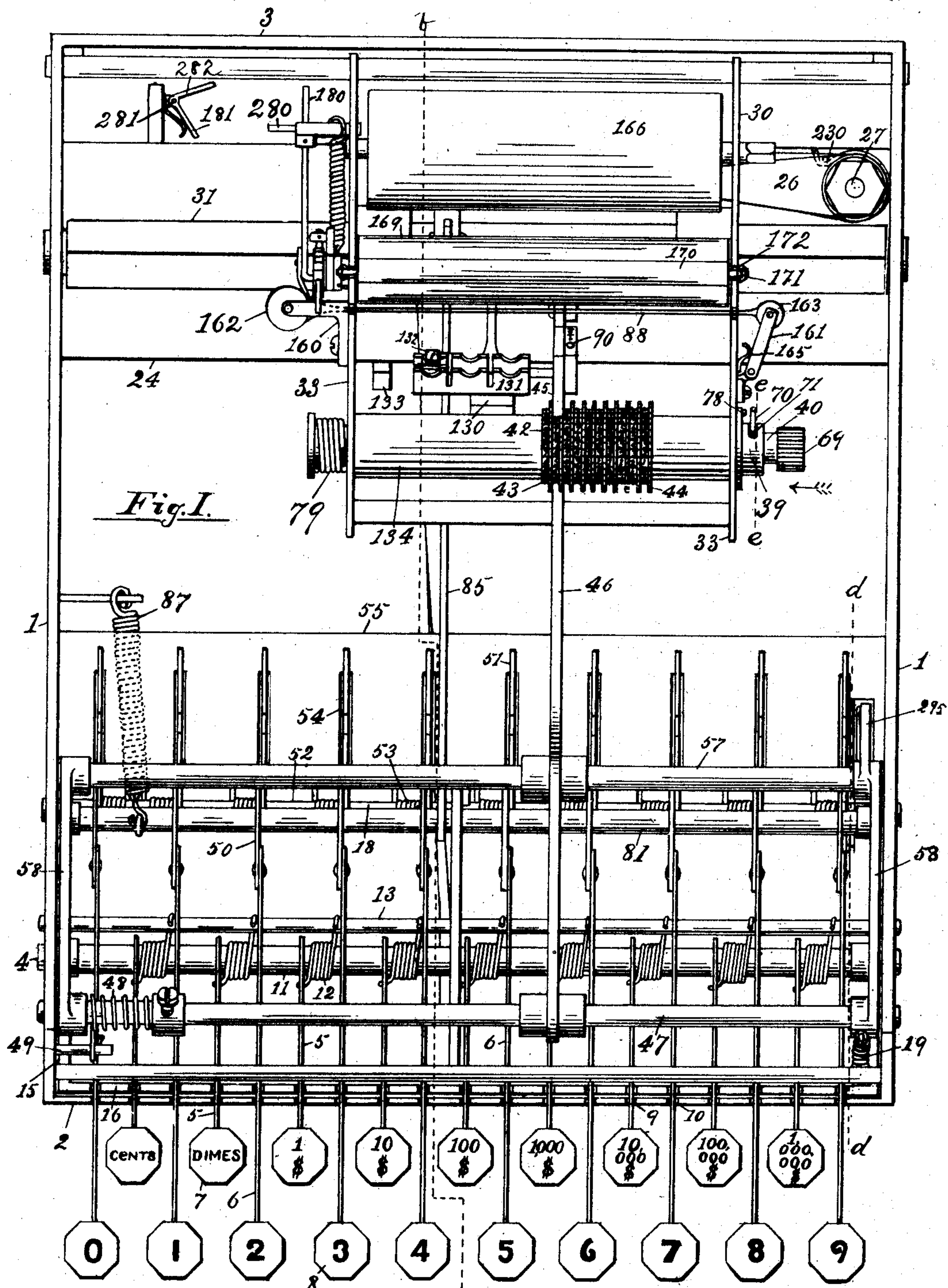
A. HOCH.

ADDING AND PRINTING MACHINE.

(Application filed Apr. 30, 1898.)

(No Model.)

5 Sheets—Sheet 1.



Witnesses.

K. Lockwood Nevins

A. J. Bolting

Inventor.

Adam Hoch

A. HOCH.

ADDING AND PRINTING MACHINE.

(Application filed Apr. 30, 1898.)

(No Model.)

5 Sheets—Sheet 2.

Fig. II.

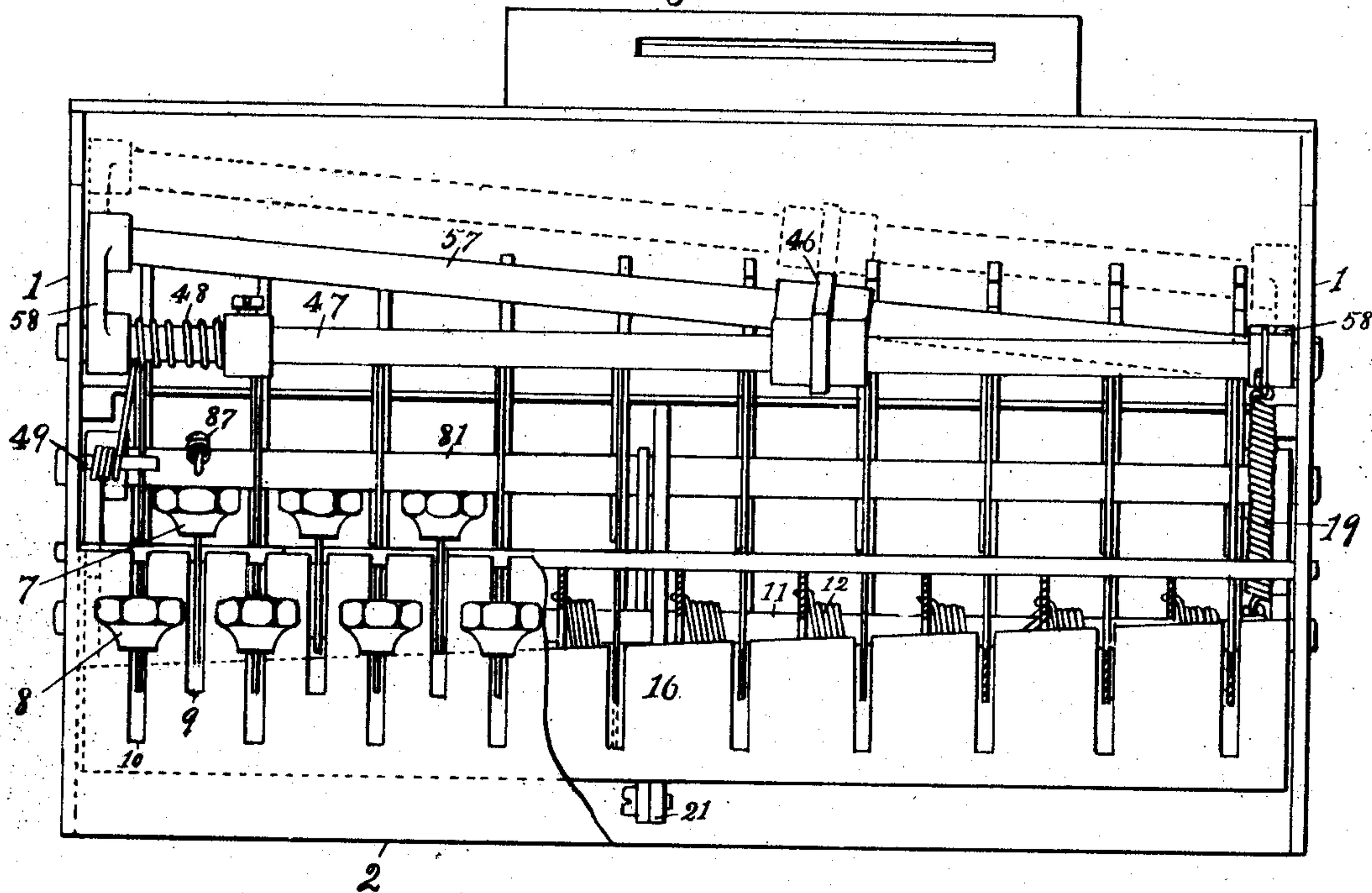
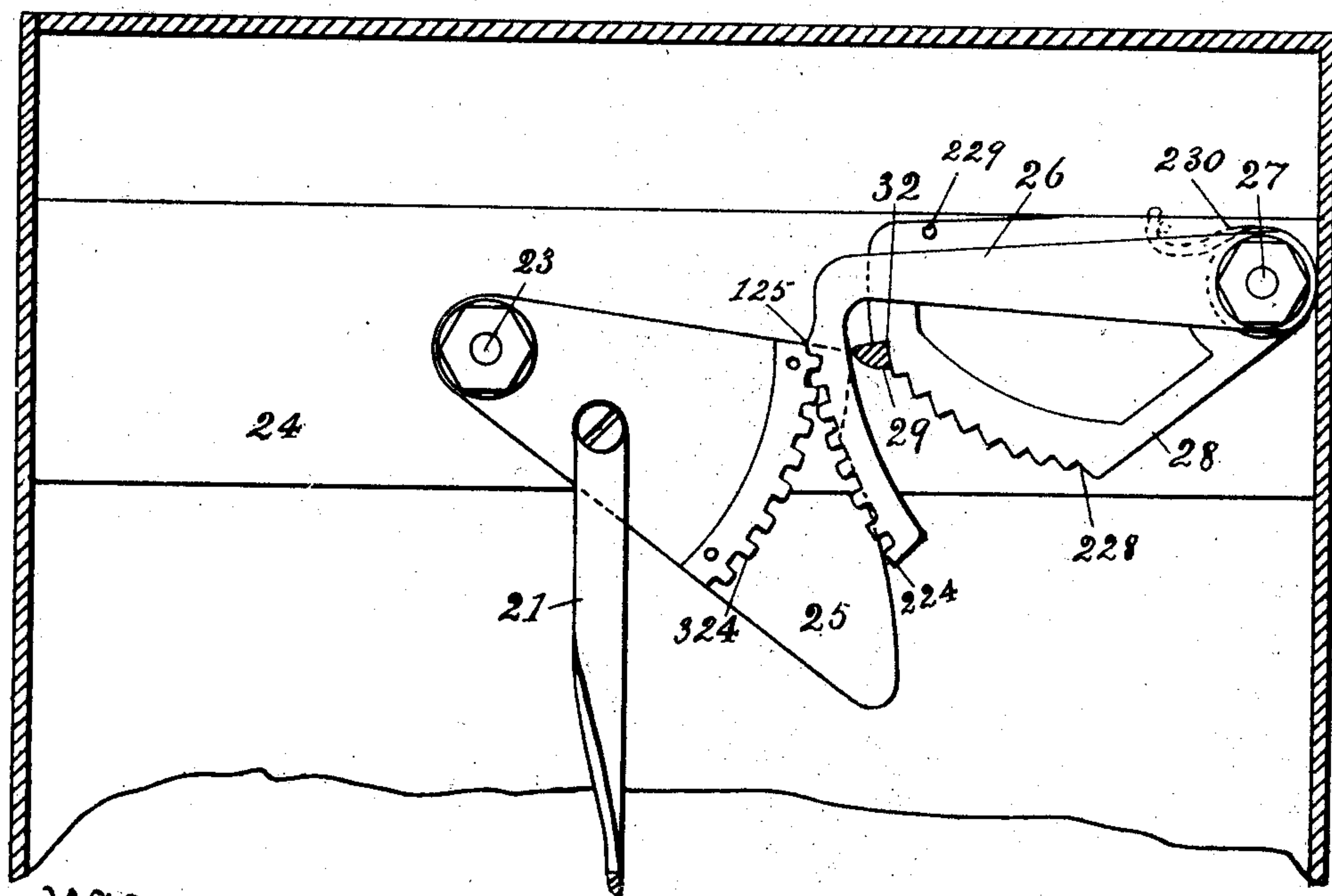


Fig. III.



Witnesses

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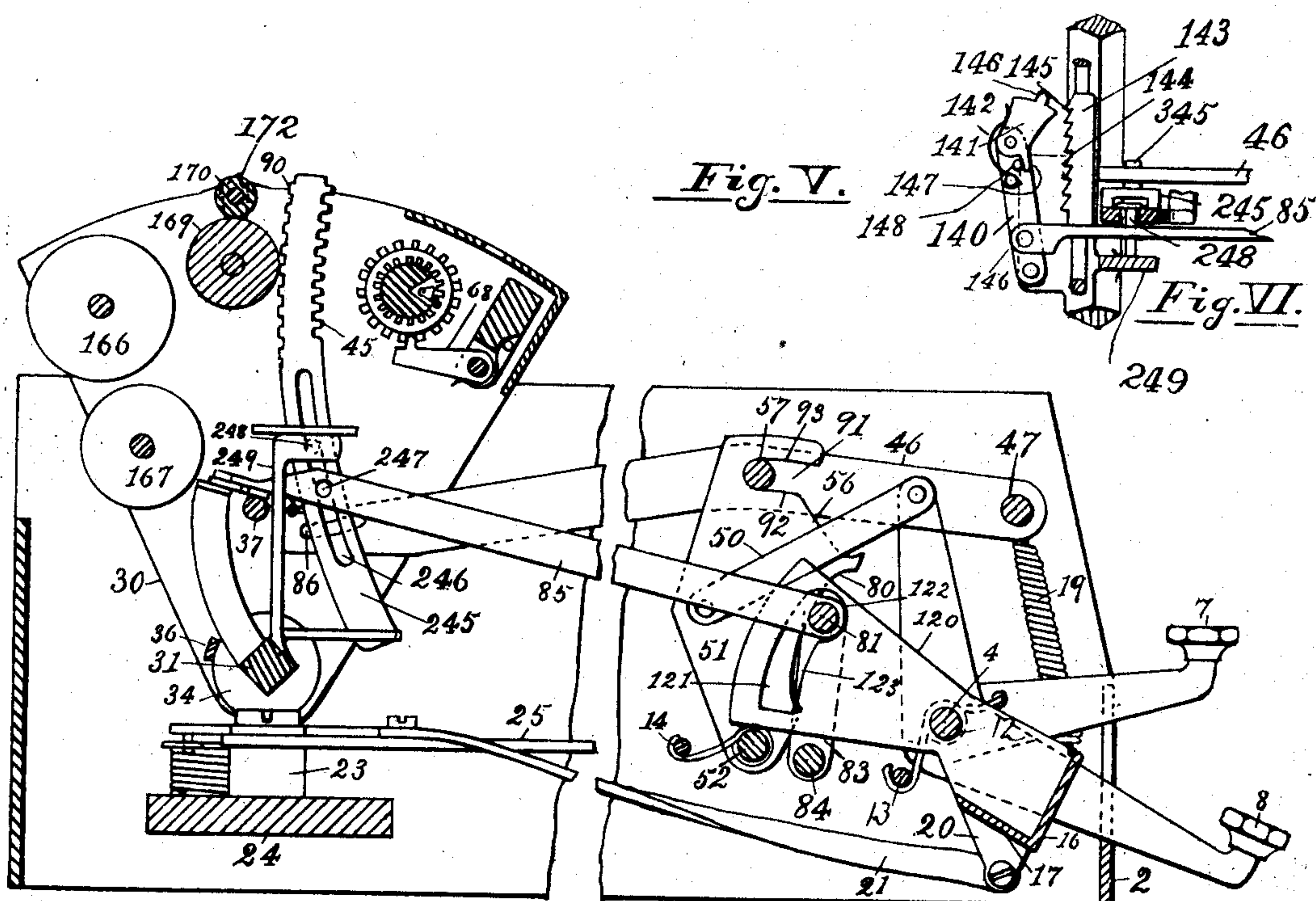
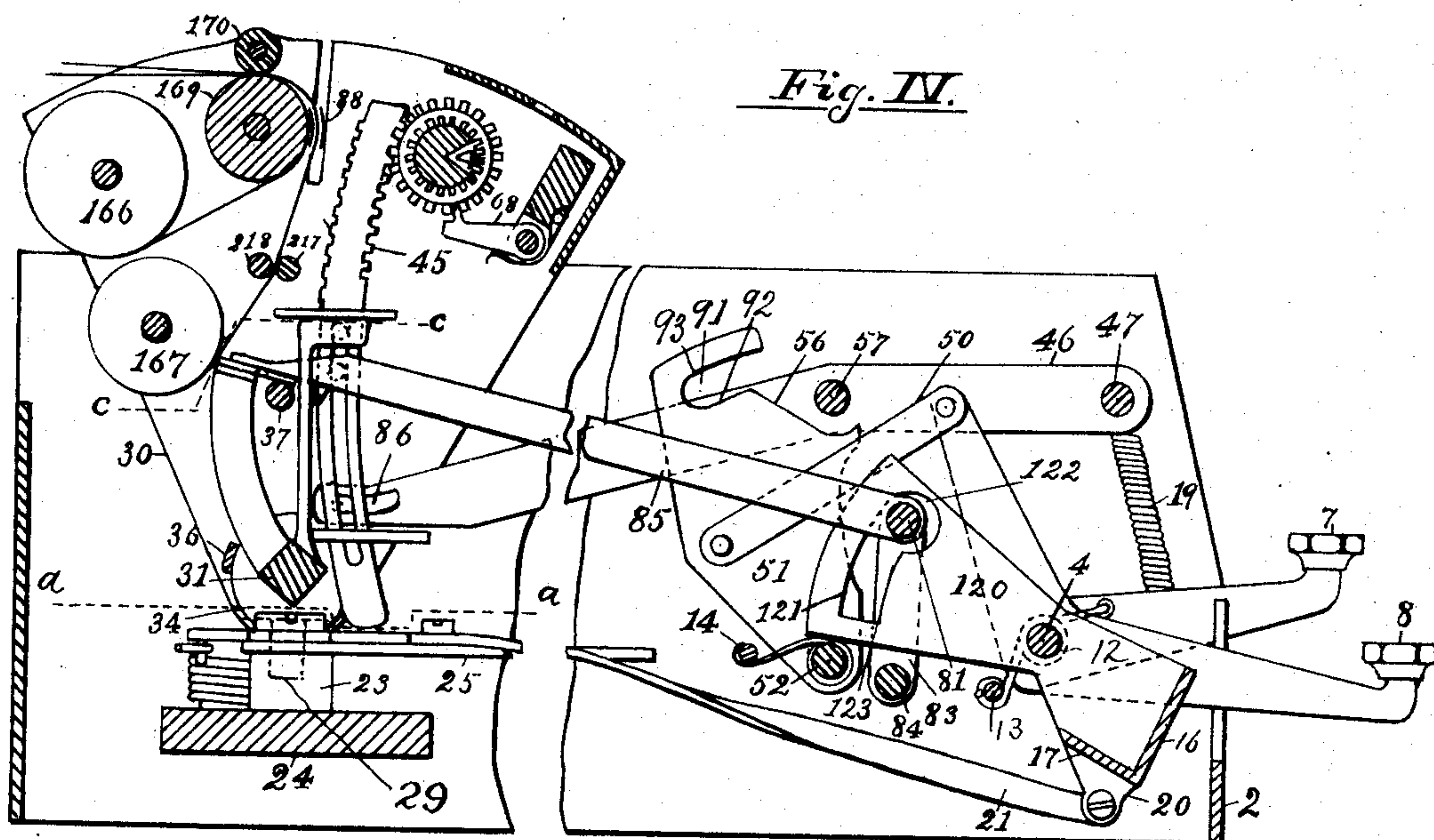
A. HOCH.

ADDING AND PRINTING MACHINE.

(No Model.)

(Application filed Apr. 30, 1898.)

5 Sheets—Sheet 3.



Witnesses...

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No. 669,167.

Patented Mar. 5, 1901.

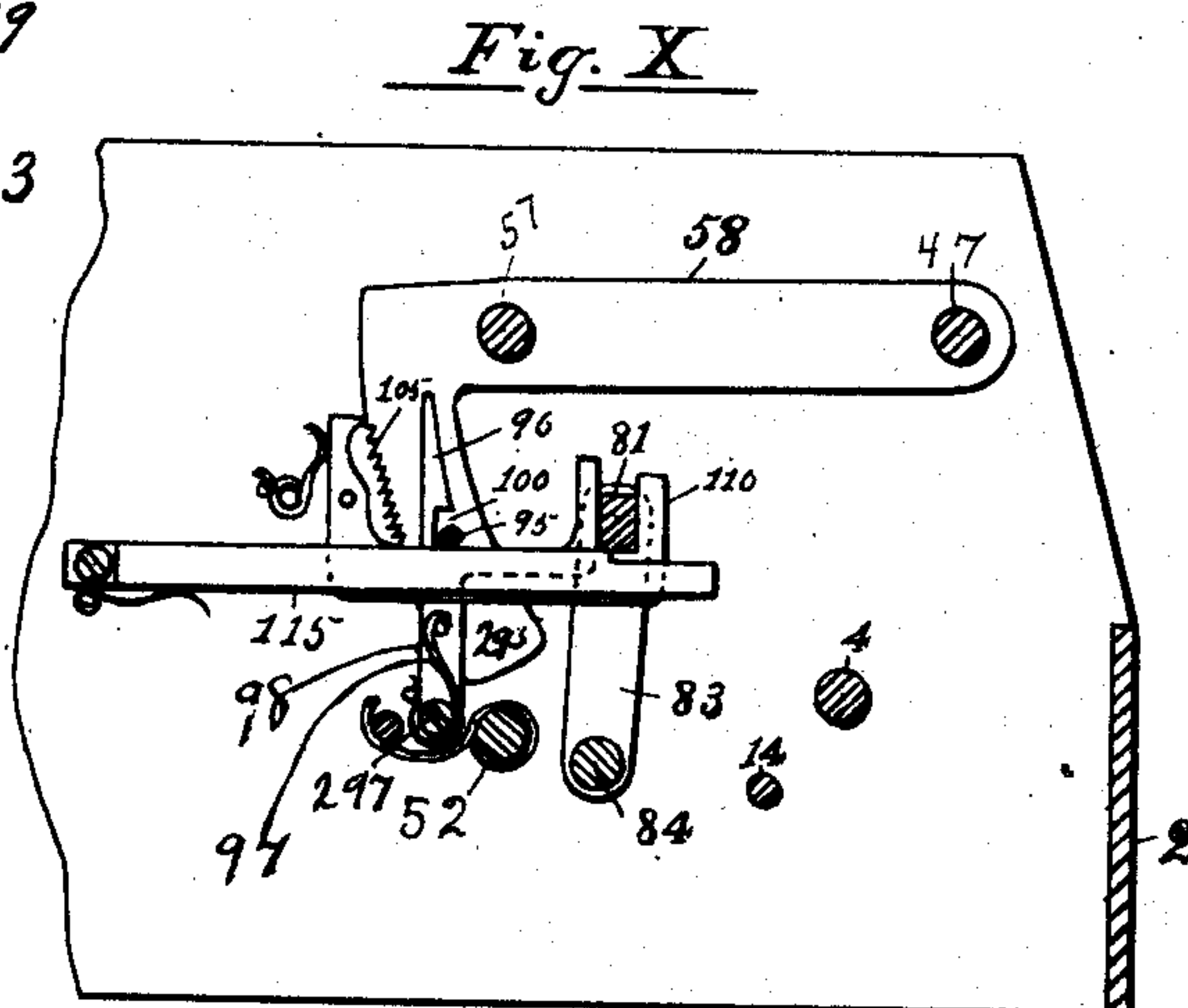
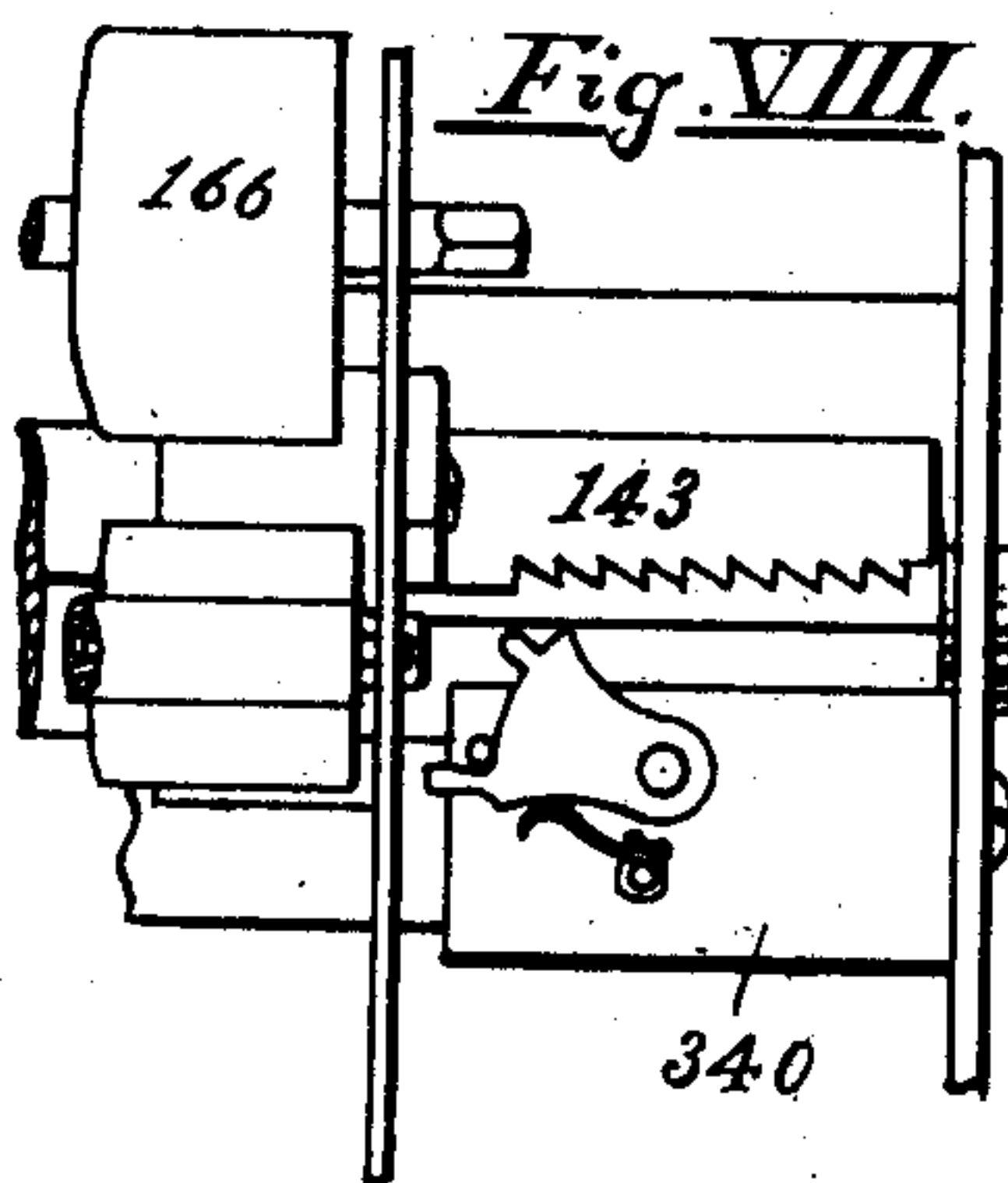
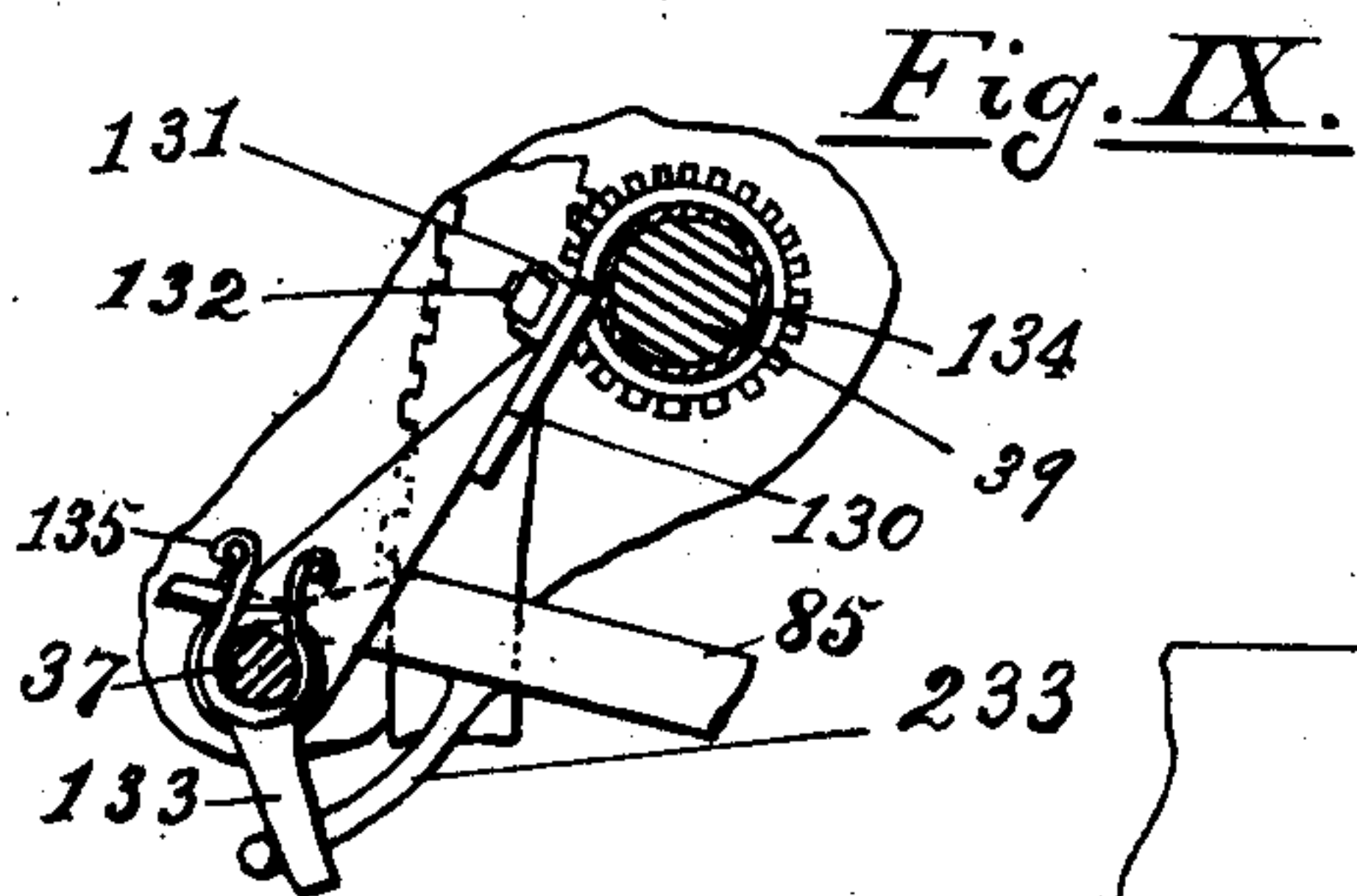
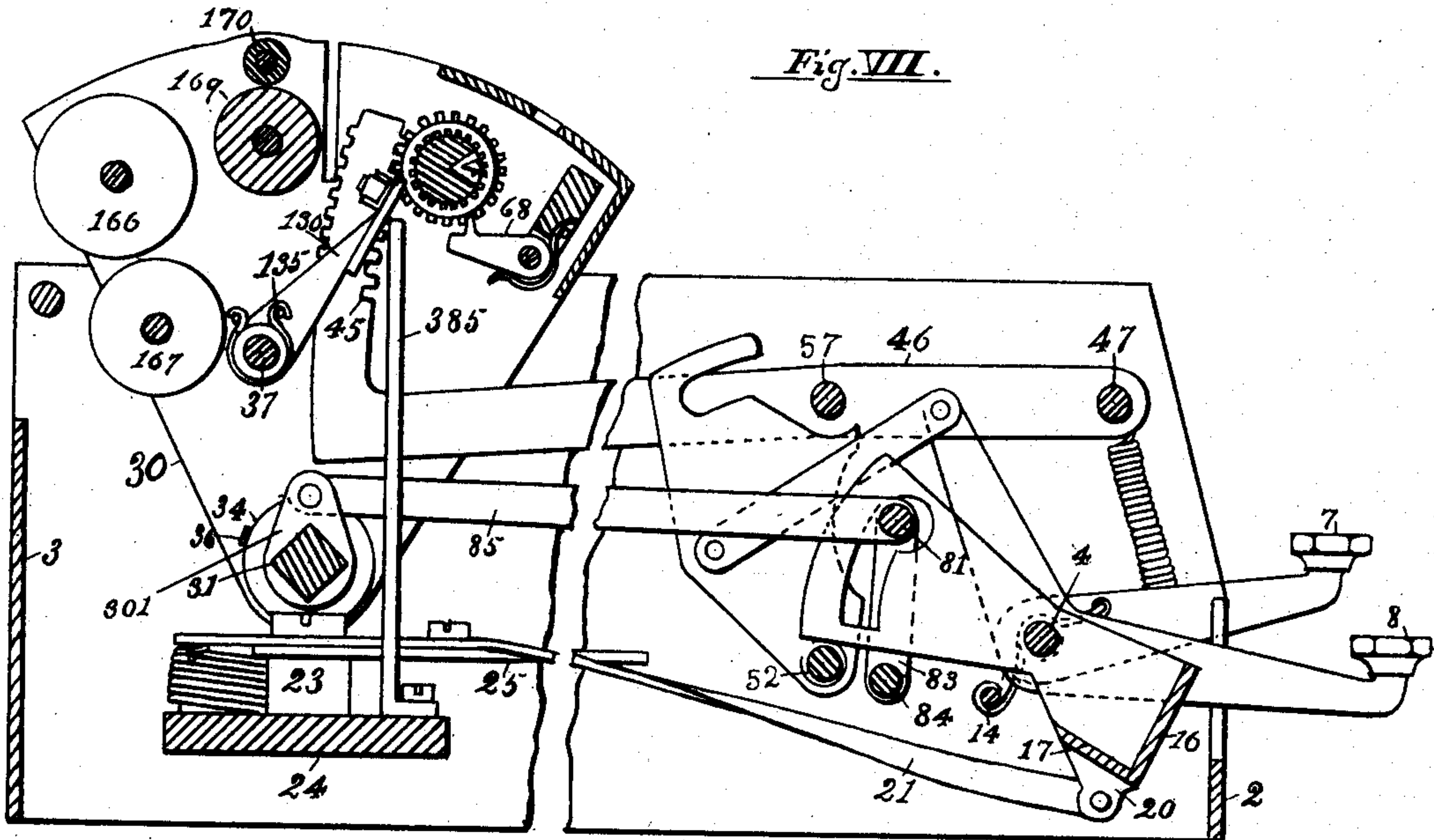
A. HOCH.

ADDING AND PRINTING MACHINE.

(No Model.)

(Application filed Apr. 30, 1898.)

5 Sheets—Sheet 4.



Witnesses
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ADDING AND PRINTING MACHINE.

(Application filed Apr. 30, 1898.)

(No Model.)

5 Sheets—Sheet 5.

Fig. XI.

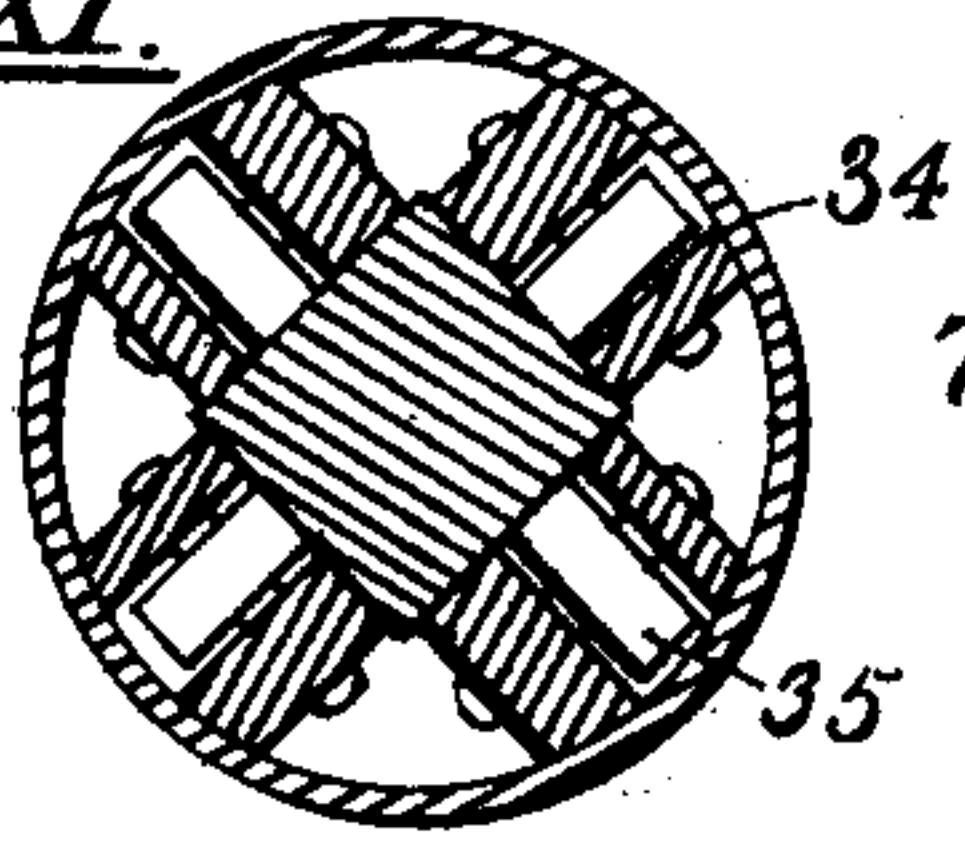


Fig. XIII.

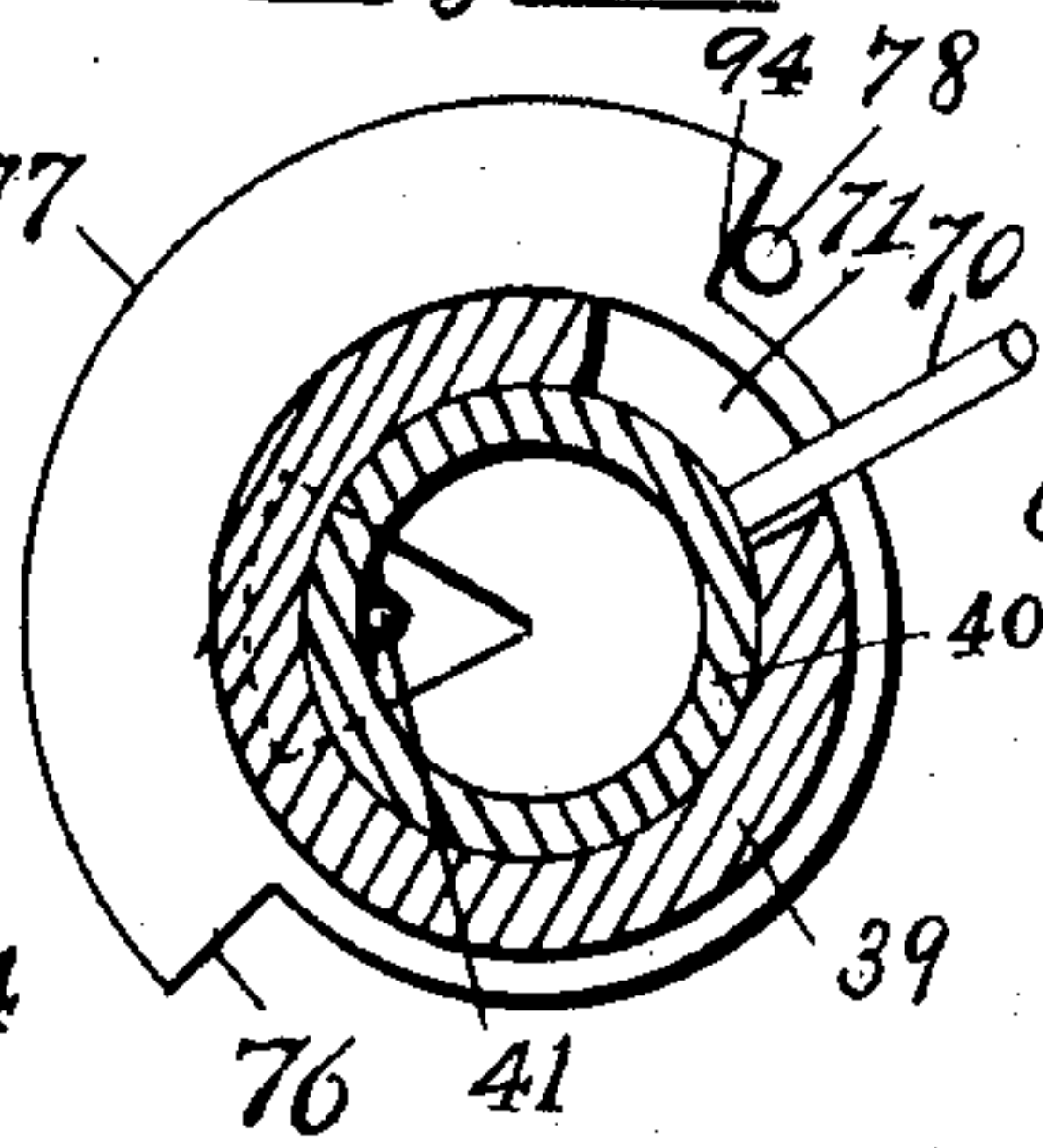


Fig. XIV.

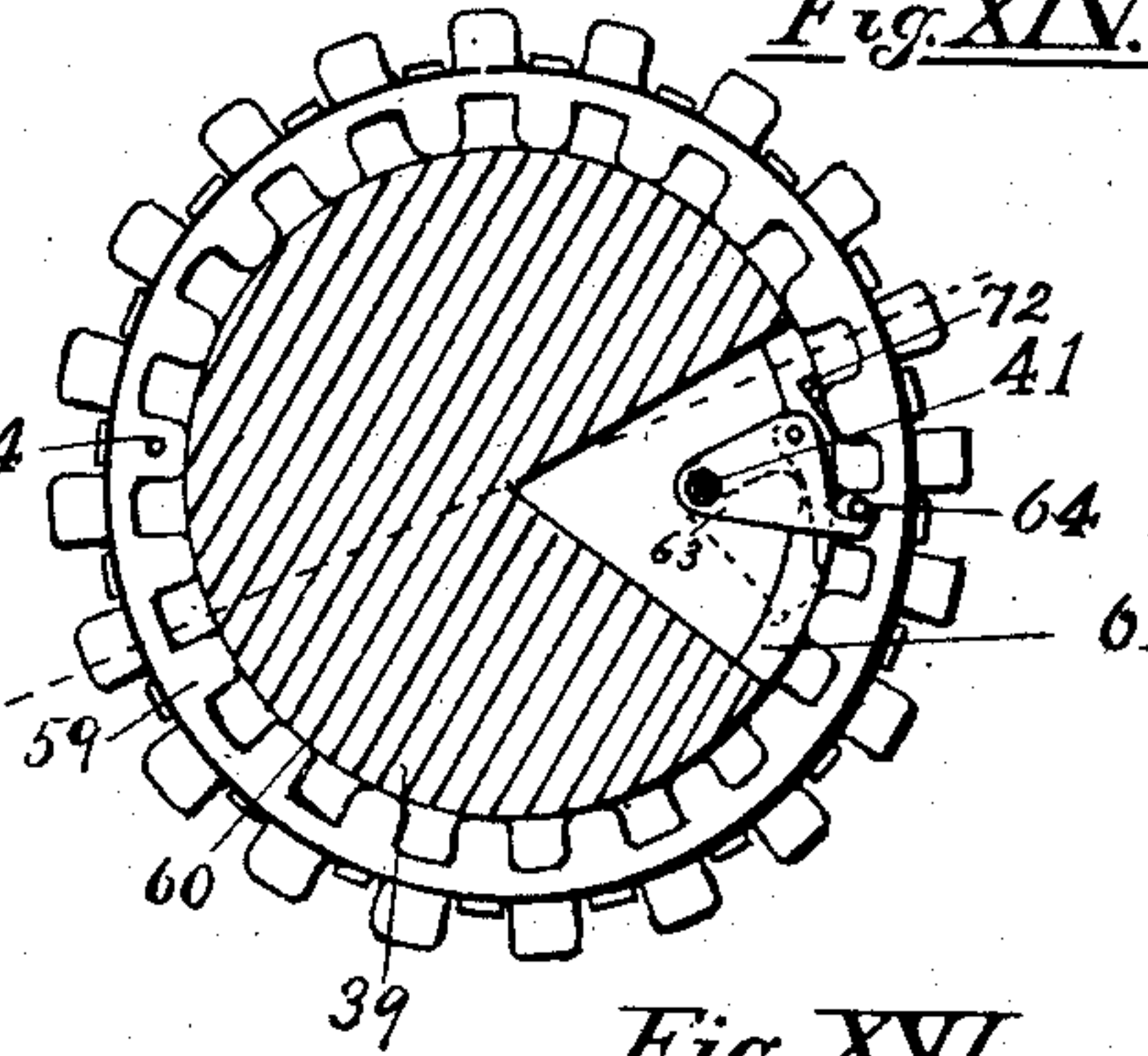


Fig. XII.

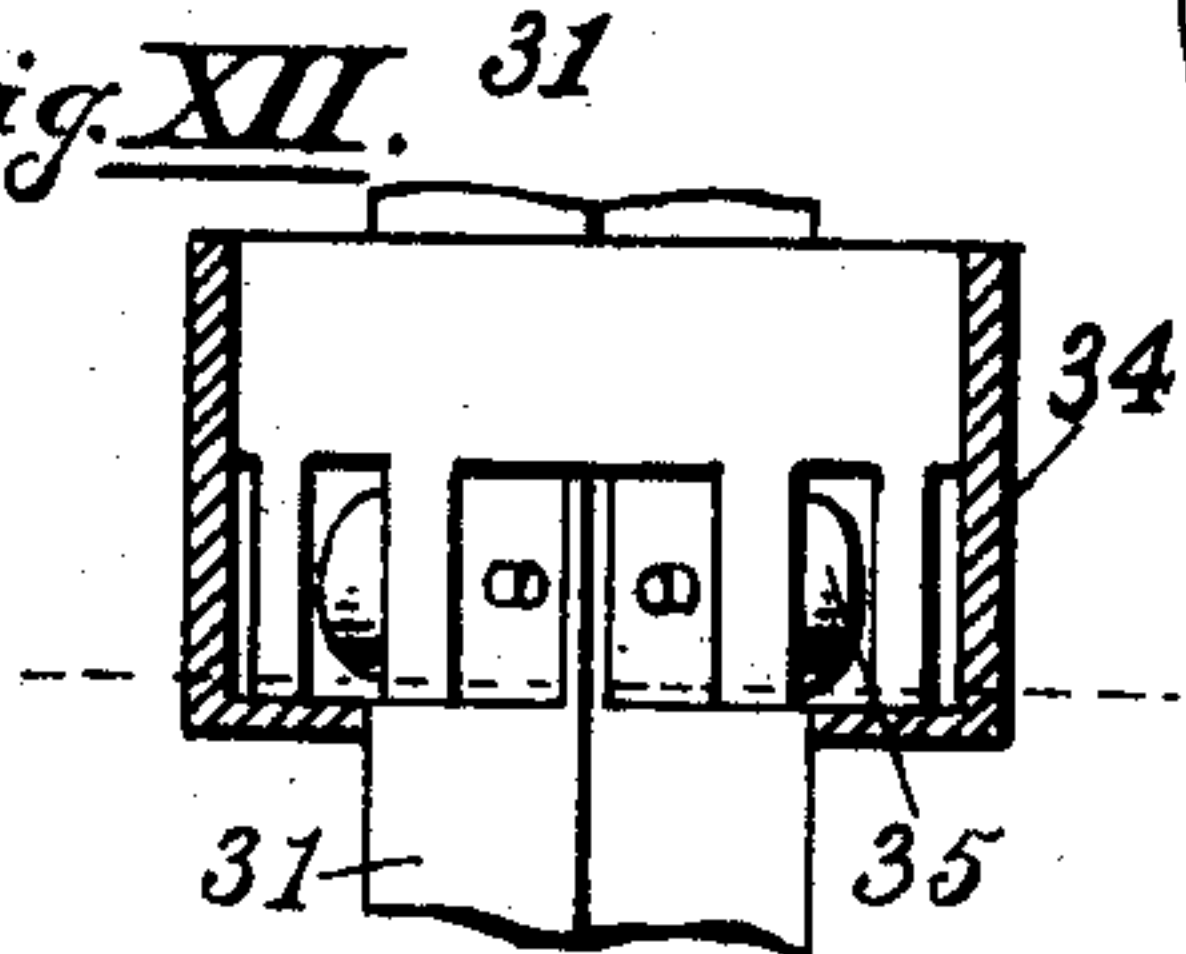


Fig. XV.

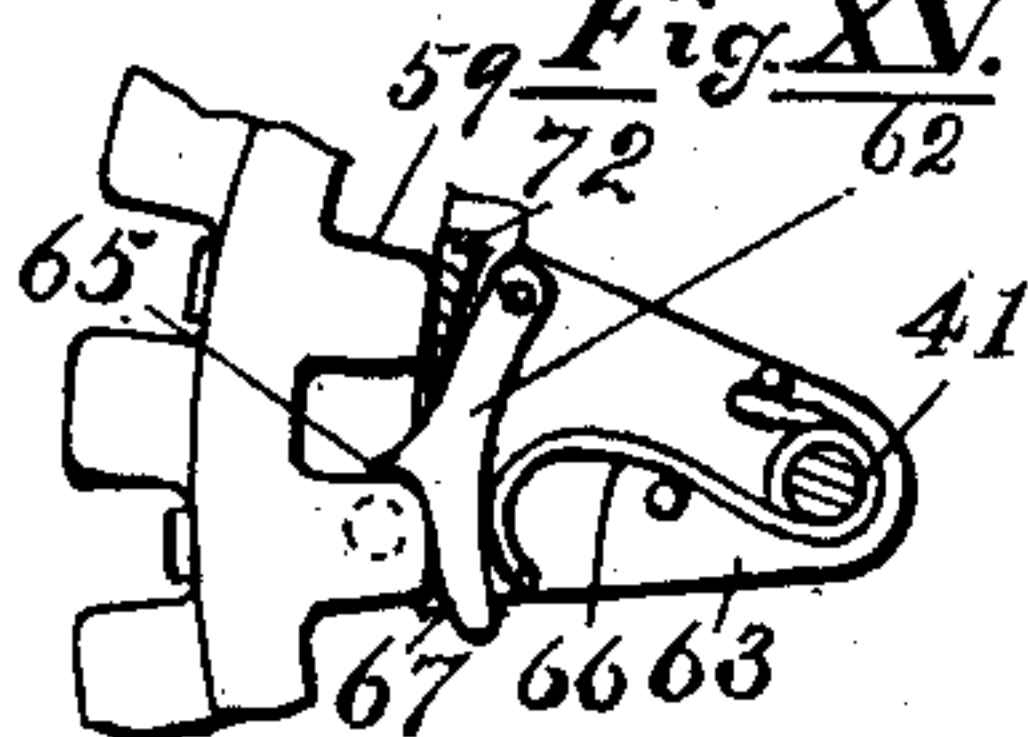


Fig. XVI.

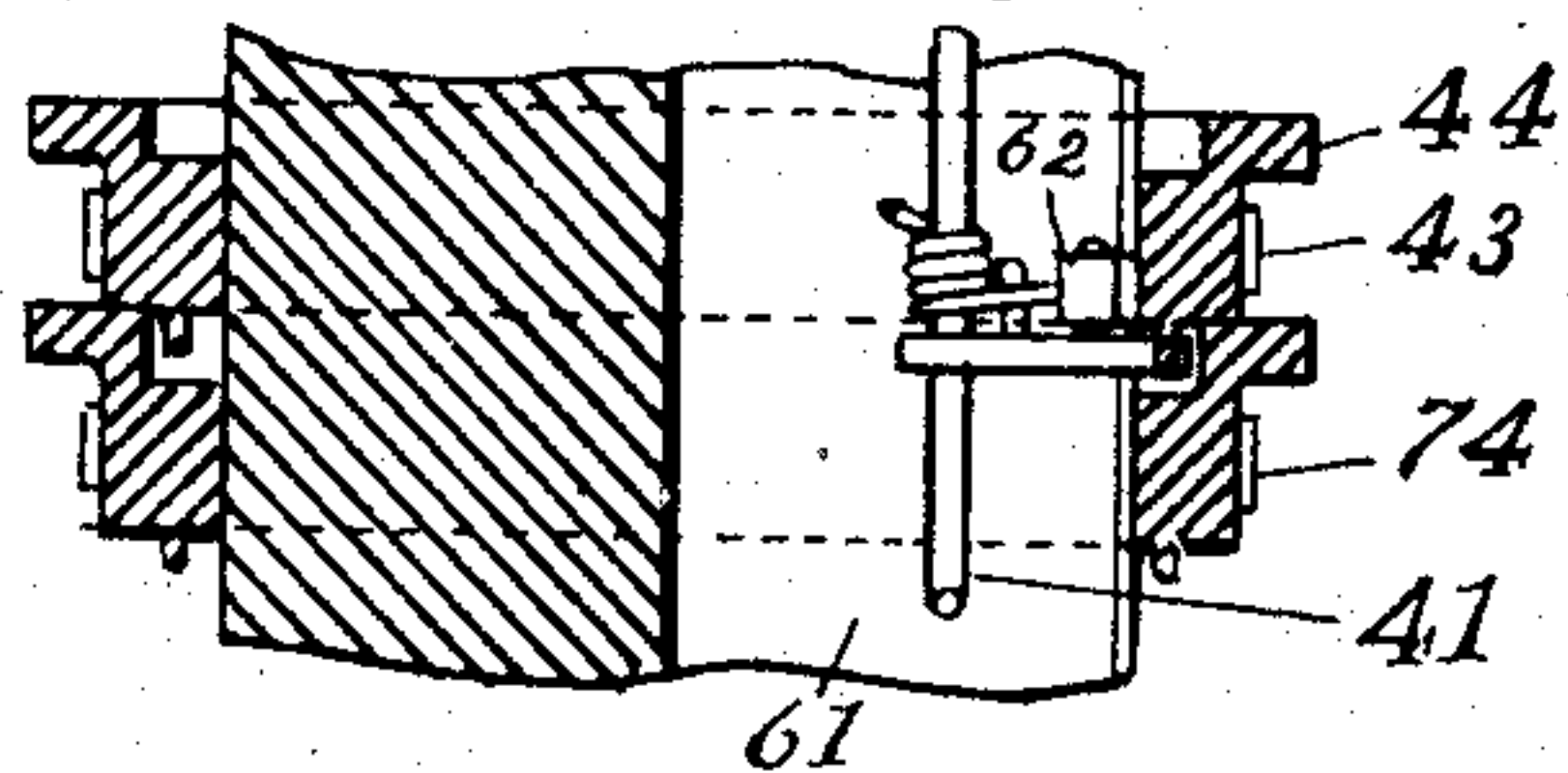


Fig. XXII.

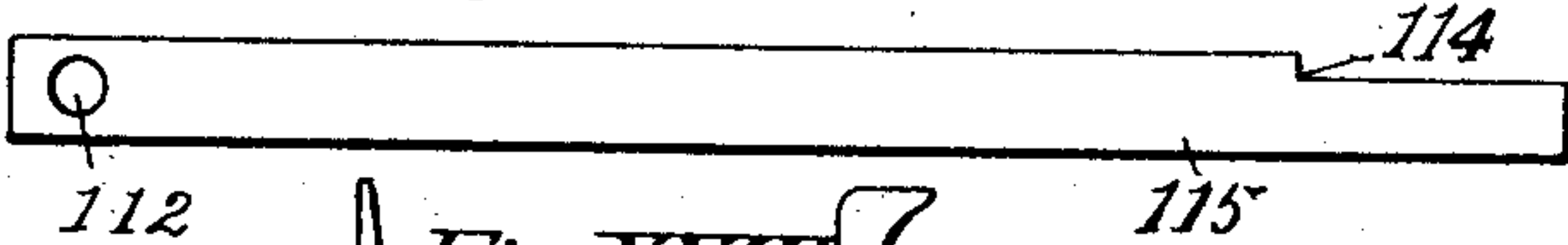


Fig. XXIII.

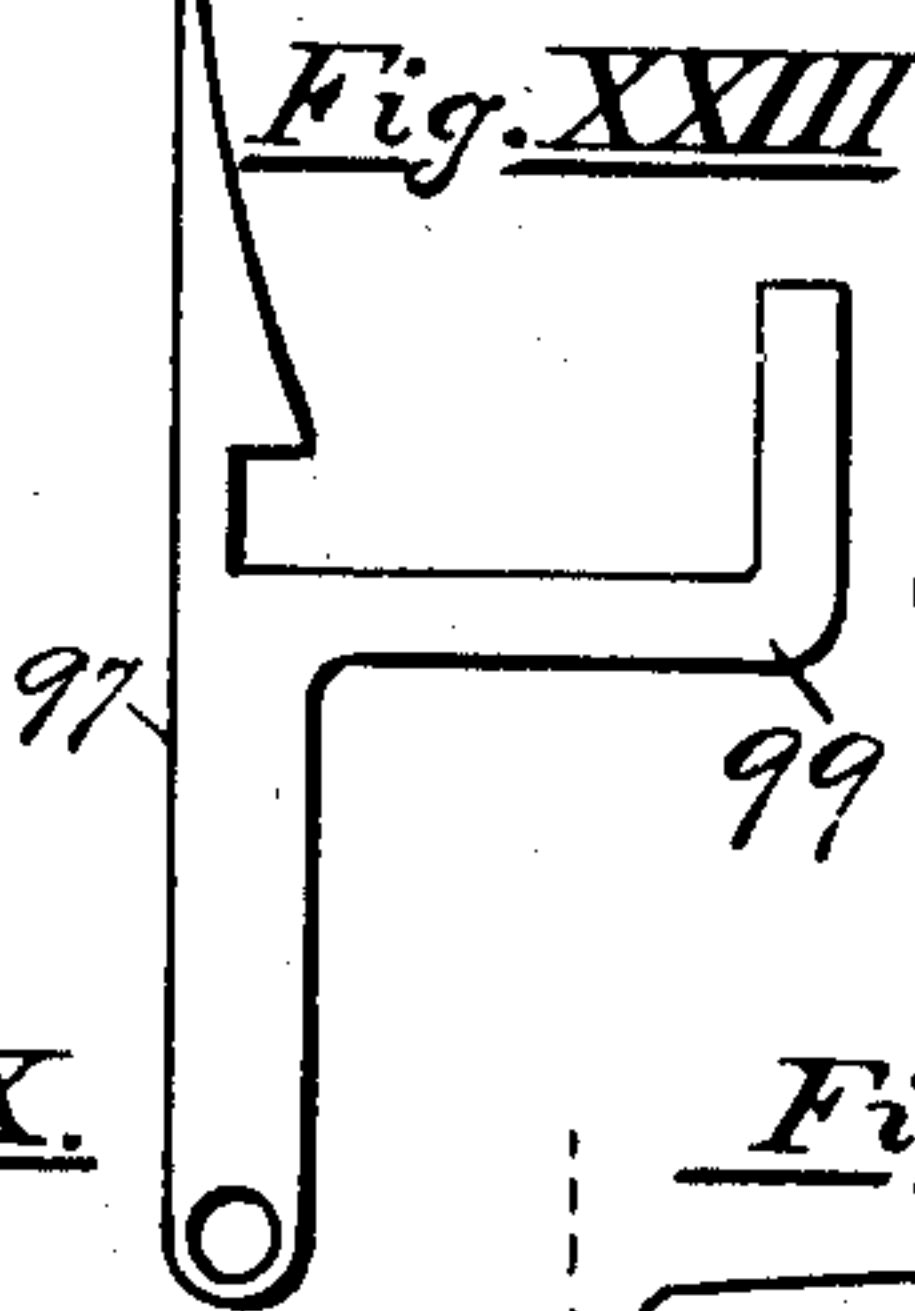


Fig. XXIV.

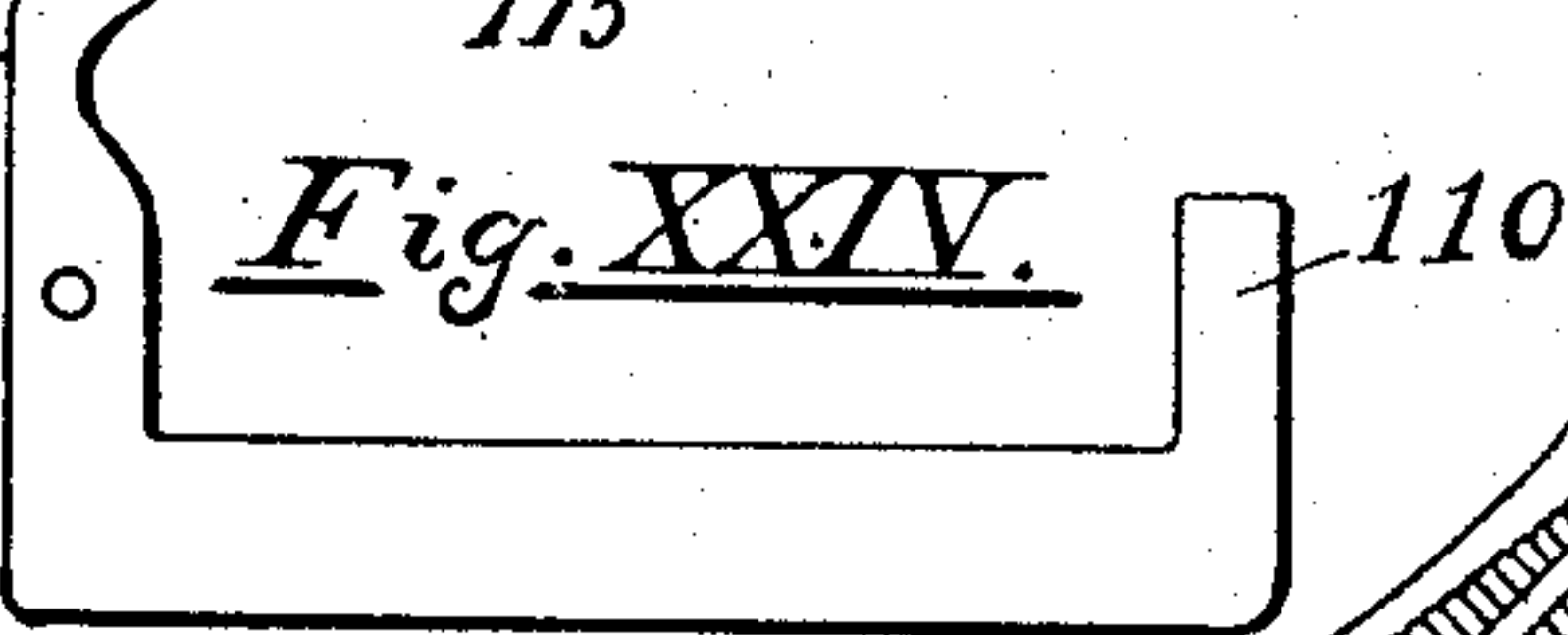


Fig. XVII.

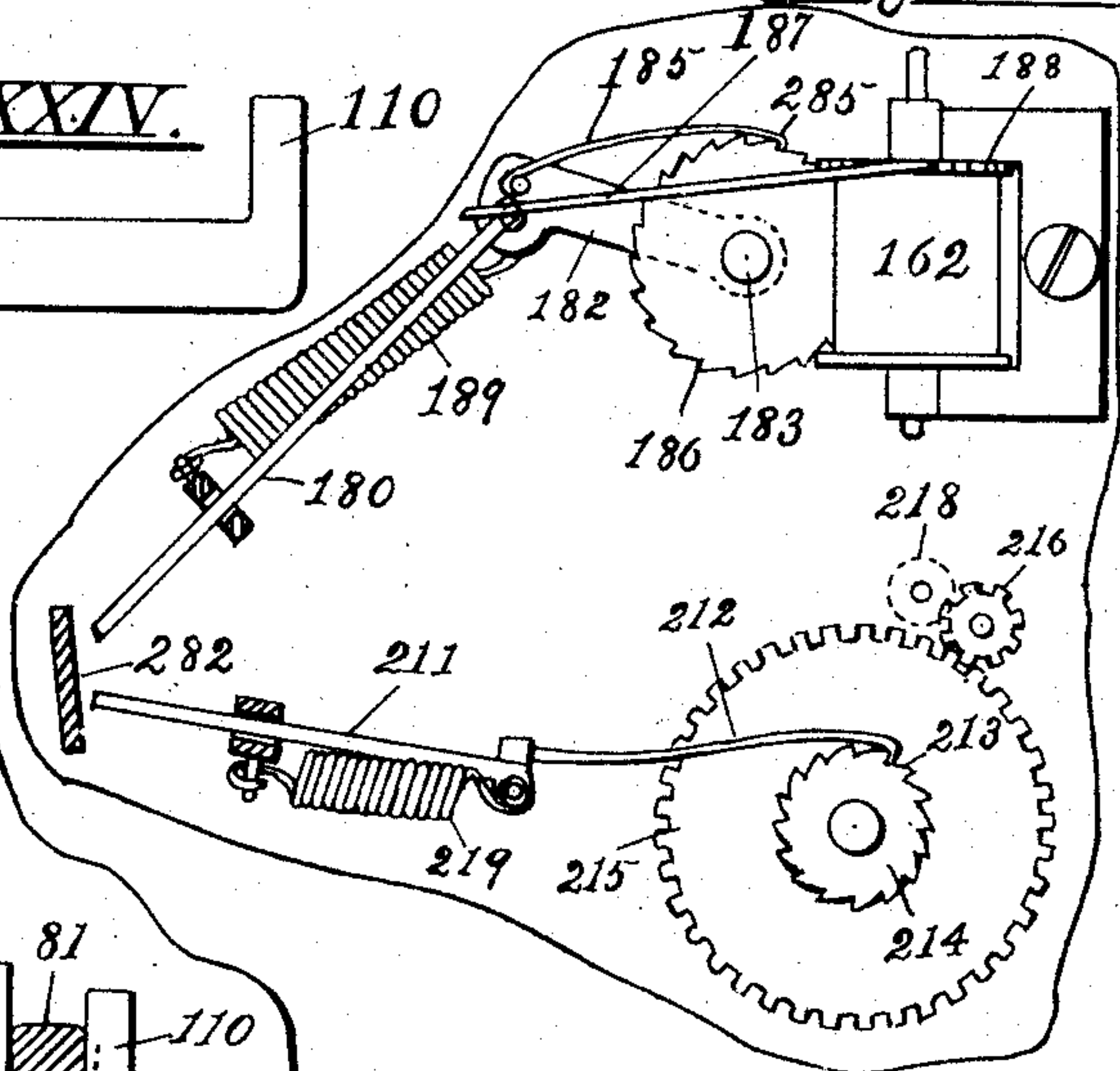


Fig. XX.

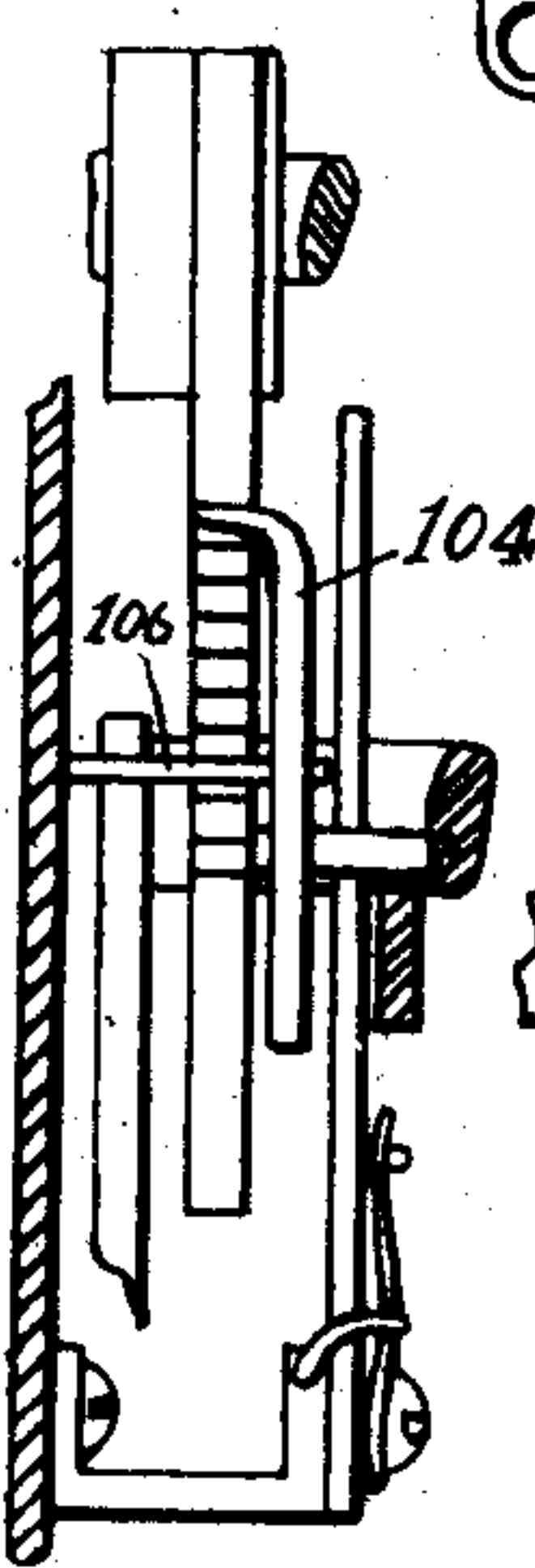


Fig. XXI.

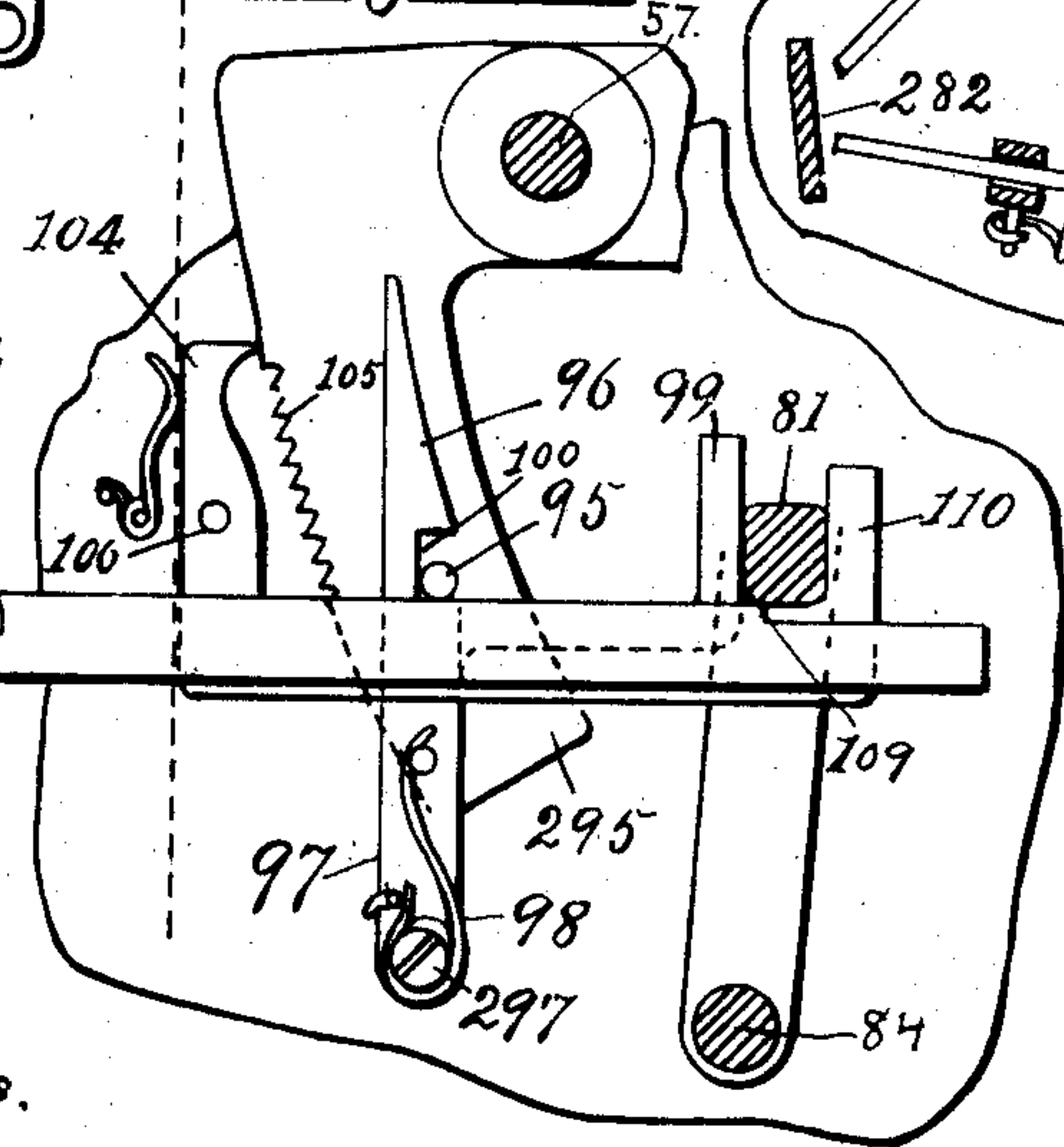


Fig. XVIII.

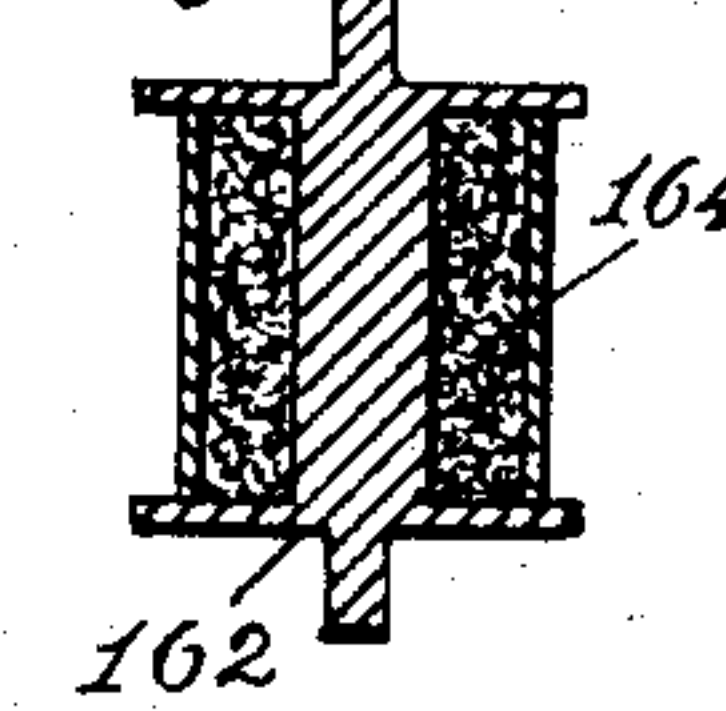
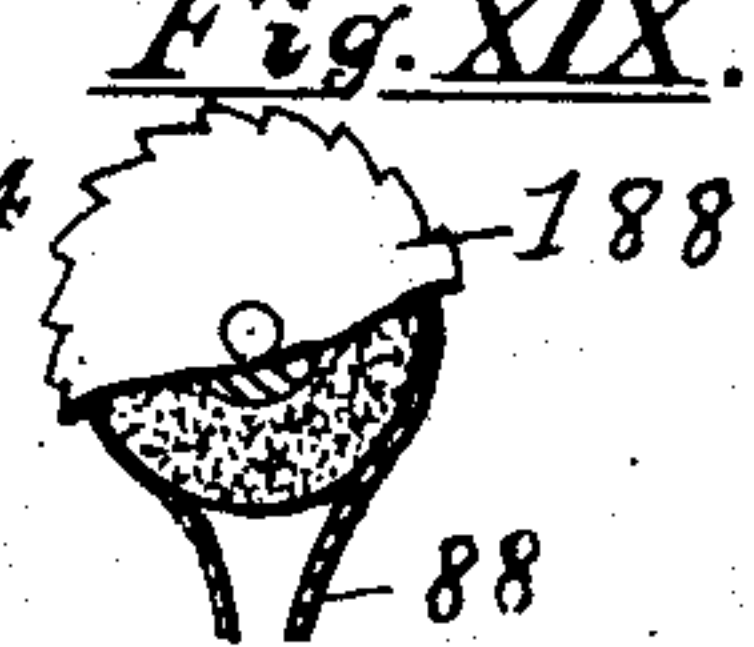


Fig. XIX.



Witnesses,

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Inventor.

Adam Hoch

UNITED STATES PATENT OFFICE.

ADAM HOCH, OF ALAMEDA, CALIFORNIA.

ADDING AND PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 669,107, dated March 5, 1901.

Application filed April 30, 1898. Serial No. 679,362. (No model.)

To all whom it may concern:

Be it known that I, ADAM HOCH, a citizen of the United States, residing at Alameda, in the county of Alameda and State of California, have invented certain new and useful Improvements in Adding and Printing Machines, of which the following is a specification.

My invention relates to improvements in adding and printing machines, the object of my invention being to provide a machine for this purpose which shall automatically record or print each number or sum of money as it is added by the machine, so as to preserve a list of such sums and check the same, one, moreover, which shall be simple and economical in construction and easy to operate, and which shall comprise comparatively few parts, not liable to get out of order, and readily repaired.

My invention therefore resides in the novel constructions, combinations, and arrangements of parts devised for the above purpose hereinafter fully specified, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of the machine, the upper casing being removed. Fig. 2 is a front elevation. Fig. 3 is a horizontal section on the line *a a* of Fig. 4. Fig. 4 is a longitudinal vertical section on the line *b b* of Fig. 1, the dating mechanism being removed. Fig. 5 is a view similar to Fig. 4, showing the parts in the position they assume at the moment of printing. Fig. 6 is a detail horizontal section through the line *c c* of Fig. 4. Fig. 7 is a longitudinal vertical section of a modification. Fig. 8 is a plan view of a detail of said modification. Fig. 9 is a partial vertical section showing the dating mechanism. Fig. 10 is a longitudinal section on the line *d d* of Fig. 1. Fig. 11 is an enlarged vertical sectional detail. Fig. 12 is a horizontal section of the same. Fig. 13 is an enlarged vertical section on the line *e e* of Fig. 1. Figs. 14, 15, and 16 are enlarged sectional details of the adding mechanism. Fig. 17 is an enlarged end elevation of the paper and ribbon feeding mechanism. Figs. 18 and 19 are enlarged details of the inking device. Figs. 20 and 21 are enlarged views of the locking devices of the adding and print-

ing mechanisms, and Figs. 22, 23, and 24 are views of detached portions of the latter.

The frame of the machine comprises side plates 1, connected by a front plate 2 and a rear plate 3. Between the side plates 1, near the front end, is fixedly secured a shaft 4, upon which are pivoted the two rows of key-levers 5 and 6. The levers of the two rows are alternated with each other, as shown, the levers being provided with suitably-marked keys 7 8, of which the keys 7 on the levers 5 may be designated as the "carriage-shifting" keys, while the keys 8 on the levers 6 are designated as the "adding-keys."

The levers 5 and 6 are guided in vertical slits 9 10 in the front plate 2, the slits 10 corresponding to the levers 6 being deeper than those corresponding to the levers 5, as shown in Fig. 2, and they are spaced on the shaft by the sleeves or washers 11. Around the washers 11 are wound the coiled springs 12, one end of each spring being held by being passed under a rod or bar 13, extending between the side plates 1, adjacent to the shaft 4, and the other end being secured to the lever 5, the tendency of the spring being to resist the downward pressure on the lever and to return the lever to its normal position when the pressure has been removed. Mounted on the same shaft 4 is a yoke or frame, extending transversely under the key-levers, having a limited rocking movement on that shaft in a vertical arc. This yoke is composed of the quadrant-shaped side pieces 15 15 and the angle-plates 16 17, united rigidly to the side pieces and extending horizontally across the machine under all the levers of both sets of keys. The upright plate 16 of this member of the yoke has vertical slots under all the levers of the lower set of keys 8, so that any one of the keys 8 may be depressed without affecting the yoke; but, on the other hand, the downward movement of any key in the upper set will depress the front side of the yoke by the contact of the key-lever with the top edge of the angle-plate 16, and consequently the length of stroke or downward movement of the front plate 16 will vary, according to the particular key in the upper set that is depressed at the time, the rocking movement of the yoke thereby produced be-

ing the greatest when the first key on the left of the keyboard is pressed down and from that side regularly decreasing in length of movement as each successive key is depressed until the last key on the right is reached, whose downstroke gives the shortest oscillating movement to the yoke. A spring 19, attached to a fixed point on the frame and to the yoke, returns this part to position when pressure is removed from the key. The function of this variably-rocking yoke is to shift the carriage one, two, or more spaces or intervals sidewise, and thereby set it in working position with reference to the printing-arm, according to the number of figures contained in the horizontal row or line to be printed. To that end connection between the yoke and the carriage is made through the following mechanism: On a vertical stud 23 on the stationary cross-bar 24 of the machine-frame is mounted a sector-plate 25, having its peripheral edge formed with a concentric portion and an eccentric portion arranged in working position to engage a pin 29, depending from the bottom of one of the side pieces of the carriage 30, hereinafter described, the said pin being set to clear the concentric portion, but to engage the curved edge of the plate that extends beyond the concentric edge, so that in the backward movement of the plate 25 the pressure against the pin 29 will move the carriage sidewise on the square rod 31. Such backward throw of the plate 25 is produced by connecting the plate 25 to the yoke by means of the rod 21, that is attached to the front plate 16 of the yoke at 20, and extending rearwardly from that point is attached to the sector-plate 25 and to one side of the pivot 23. Thus by pressing down any one of the shifting-keys 7 the yoke is depressed at the front and the sector-plate 25 is forced backward against the pin 29 on the carriage with a greater or less extent of throw, moving the carriage transversely to a corresponding distance. The form of the eccentric edge of the sector-plate is such that the carriage travels sidewise one, two, or more units of space, according to the particular key selected and pressed down. Upon the cam-plate 25 is secured a segmental gear 324, which meshes with a gear 224, carried by an arm 26, pivoted on a shaft 27, on which shaft is also pivotally mounted a plate 28, having notches 228 cut in the edge thereof. These notches are for the purpose of preventing the carriage traveling forward beyond the desired distance, which it would otherwise be apt to by reason of its momentum. The face of the stud 29, which is engaged by the cam-plate 25, is rounded, but the other side is squared, as shown at 32, to engage any one of the notches on the plate 28, and thus arrest the impetus of the carriage. The plate 28 is operated from the plate 25 by the arm 26 striking a pin 229 on the plate 28, and said plate 28 has a resilient resistance to said motion, derived from a spring 230.

The carriage 30 comprises the end plates 33, having hubs 34, within which are mounted rollers 35 to run upon the four sides of the squared rod 31. Said plates are connected together at the bottom by a bar 36, secured to both of said hubs, and at a higher point by a rod or bar 37. Near the forward side of the upper end of said plates is mounted the adding mechanism. This comprises an inner rod 39, in the ends of which are mounted tubes 40, connected by a rod 41, and upon the tube 39 are placed the registering dial-wheels 42, of which I have shown ten in number, permitting the enumeration to be carried to billions, if desired. Said dial-wheels have each on the outer face a dial-face 43 and at the side thereof a toothed wheel 44. Said toothed wheels 44 are adapted to be engaged by an internal segmental rack 45, operated by a lever 46, pivoted on a shaft 47, counteroperated by a coiled spring 48, attached to and around said shaft and to a fixed point 49 on the frame of the machine. The engagement of the rack 45 with the lever 46 is such as to permit the rack to be vibrated upward to actuate the adding-wheels and then also rearward to print. For this purpose the lever 46 is formed at its end with a curved slot 86, in which moves a stud 345 (see Fig. 6) on the rack 45. To operate said lever, there are provided adding-levers 6 and keys 8, pivoted on the shaft 4 and connected by links 50 to plates 51, pivoted on a shaft 52, spaced by washers 18 and counteroperated by springs 53, held by a rod 14, said plates moving in slits 54 in a plate 55, extending across the machine. Said plates 51 have oblique edges 56, and whichever of the adding-keys 8 is operated the corresponding oblique edge 56 will bear against the central bar 57 of a yoke having arms 58 pivoted on the shaft 47, said bar passing through the lever 46. Said bar 57 inclines downward from left to right, as shown in Fig. 2, so that the distances through which the lever 46 travels increase in an arithmetic progression as the keys are operated from left to right. This produces a corresponding movement of the adding-wheel 44, which is being engaged by said rack. Thus when the adding-key numbered "5" is depressed the rack will travel a sufficient distance to carry the dial-wheel engaged thereby through five figures, and so for the other keys.

The addition is automatically carried from units to tens, tens to hundreds, &c., by the following mechanism: Each dial-wheel 42 carries, preferably, a double series of the numbers "0" to "9," and each such wheel has internal teeth 59. Said teeth have surfaces 60, adapted to rest and travel upon the rod 39; but said rod has a longitudinal slot 61 cut therein of length corresponding to the whole series of dial-wheels. Said slot permits access to said internal teeth 59 of pawls or dogs 62, pivoted to levers 63, fulcrumed on one of the rods 41. Each wheel 42 has two pins 64, and the pins are arranged to

impinge in succession upon the lever 63 and vibrate it to a sufficient distance to carry the dog 62 therewith, the nose 65 of said dog engaging a tooth 60 of the next dial-wheel and rotating said dial-wheel through one tooth. A spring 66, secured around the rod 41 and abutting against the lever 63 and dog 62, keeps them to their work; but the dog 62 has a lip 67, which rests upon the surface 60 of the preceding tooth 59 and prevents the spring 66 pressing the nose 65 of the dog too far into the space between the teeth. A spring-actuated pawl 68 is provided for each wheel 44 and engages the exterior teeth of said wheel to oppose reverse movement thereof. To set the wheels back to zero, the tube 40 is provided with a milled head 69 on the outer end for rotating it, and the tube 40 and shaft or rod 39 are connected together by a pin 70, fixed in the tube and projecting through a slot 71 in the rod 39, so that by turning the tube the rod is moved with it. The inner edge of the tube carries a wedge 72, having its point set toward and in close relation to the back of the pivoted dog 62, the tooth 65 of which engages the teeth of the wheel. As the tube 40 is rotated the wedge on its end is brought against the dog 62, pressing it away from the tooth-wheel and throwing it out of action. Said rod 39, end tubes 40, rods 41, and dogs 62 and levers 63, carried thereon, are then free to move until the advancing face of each lever 63 impinges upon one of the pins 64 of its corresponding wheel 42. Said wheel is then carried along by said pin, and so in succession each pin 64 of each wheel is caught up and carried along by its corresponding lever 63 until all the wheels are brought to unison. Not more than one-half of a revolution will be necessary to effect this. The continued revolution of the rod 39 will bring all the wheels to such a position that all the figures 74 on the dial-faces will read zero on a line convenient for inspection parallel with the front of the machine. This occurs when a shoulder 76 on a flange 77 on the rod 39 strikes a stop 78 on the carriage, preventing further movement. A coiled spring 79, secured to the carriage and the rod 39, will reverse the movement of said rod when released, first moving said rod 39 over the end tubes 40 and carrying the wedge 72 out of engagement with the dogs 62 until the pin 70 has traveled back along the slot 71, to the rear end thereof, when the end tubes and the dogs 62 and levers 63, supported thereby, will likewise be carried back by said spring until a second shoulder 94 strikes the stop 78, when all the parts will be arrested in proper position for operation, the dial-wheels being all set at zero.

The plates 51, which when drawn forward by the links 50 and adding-keys 8 raise the bar 57 and so actuate the adding mechanism, are so conformed as to be used to subsequently effect the printing by a continuation of the same movement. For this purpose said plates

have edges 80, which when the plates are drawn farther forward bear against a rod 81 of a yoke having arms 83, pivoted at 84 on the side plates of the machine, and from said rod 81 there extends a link 85 to the lower portion 245 of the rack 45, said portion 245 having a slot 246, in which a pin 247 on the end of the link 85 moves as the rack is vibrated up and down by the lever 46. Said slot 246 also moves on a fixed stud 248, mounted between two guide-plates 249, between which the rack 45 is raised. The slot 246 is made sufficiently long to permit the rack to be moved through the greatest stroke required, which is that for adding the number "9," and at the same time to provide a leverage from the pin 247 to the stud 248. A spring 87 resists the forward movement of the rod 81, and thus tends to engage the rack 45 with the teeth 44. Thus the continued forward movement of any one of the plates 51 corresponding to any adding-key will rock the rack rearwardly upon its shaft 248 and will bring against the inking-ribbon 88 and impression-roller 169 the type 90, formed upon the rear face of the segmental rack 45, so that a figure will be printed corresponding to the distance through which the rack has been moved and the dial-wheel has been rotated. While the plate 51 has been moved forward the latter part of its vibration, its upper portion must hold up the bar 57 in the precise position to which it has been raised, so as to maintain the segmental rack and the corresponding dial-wheel in position until the printing is effected, and for this purpose said plate has formed in said upper portion a curved slit or recess 91, into which the bar 57 passes, said bar moving snugly in said slit, and the edges of said slit are formed in arcs of circles having the pivot of the plate as center. The purpose of the lower arc 92 is, as has been stated, to maintain the rack in the precise position to which it has been raised, while the rack is moved rearwardly for printing, and the purpose of the upper edge 93, formed in a similar arc, is to prevent the bar 57 and the segmental rack moved thereby from being carried upward by their momentum, and so turning the dial-wheels one or more spaces farther than is proper.

The machine is so constructed that no adding can be done without printing and no printing of any figures can be done without operating the adding mechanism. For the latter purpose it is provided that the segmental rack 45 shall never be raised without operating one of the adding-wheels—that is, it shall never be raised unless it is in engagement with the teeth of one of the wheels 44. For this purpose a stud 95 extends from the side of a curved arm 295, extending downward from the arm 58, and when said lever and arm are raised by the operation of one of the adding-keys said stud moves in close proximity to the inner edge 96 of a vertical arm 97, pivoted on a stud 297, extending from the

side of the machine and pressed forward by a spring 98. Limiting the forward position of the said arm 97 is a forwardly-extending elbow 99, the vertical member of which abuts against the rod 81. When said rod has been moved as far toward the rear of the machine as possible, so that the rack is in engagement with the teeth 44, said rod 81 presses against the elbow 99 and forces the arm 97 away from the stud 95, so that said stud is no longer engaged by a knot 100 in said arm; but should the rack be moved rearwardly in any degree, so that the teeth 44 of the adding mechanism are none of them in engagement with the rack 45, then the stud 95 will be engaged and held by the said notch 100. The movement of the rack to the front will, through the medium of the elbow 99, withdraw said notch from said stud 95 simultaneously with the engagement of the rack 45 with the teeth 44 of one of the adding-wheels.

The means will now be disclosed which are employed to prevent any adding being done without printing the figures added. Suppose the adding-lever which should be used to add the number "9" to be pressed down, not the entire distance, but such distance only as carries the segmental rack 45 and the toothed wheel actuated thereby through, say, four spaces only instead of nine. Under these circumstances no printing can be effected and the machine is locked until the lever No. 9 has been pressed down the full distance, for a spring-actuated dog 104, pivoted on a stud 106, extending from a side plate of the machine, engages that one of a series of ratchet-teeth 105 arranged on the rear face of the arm 295, which has passed above said dog and prevents the descent of the lever 46 and rack 45. The wheel 44 has been turned through four spaces and the adding mechanism has been correspondingly changed, and were not suitable provision made the adding mechanism would not correspond with the figures printed on the paper. However, the dog 104 prevents reverse movement of the rack and will so prevent it until the rack has been raised to the full extent corresponding to the depression of the particular adding-lever operated and until the printing has been effected thereby. The dog is only released from the tooth 105 after the rack has been fully rocked rearward for printing, and when that has occurred the rod 81, which was pressed forward to actuate the rack 45 in the rearward direction for printing, has come into contact with a finger 110, extending forwardly and upwardly from the dog 104 and rocks said dog on its pivot, thus disengaging it from the tooth 105 of the arm 295 and allowing the rack 45 to descend. The rack is not, however, at once permitted to move entirely to the front before falling, for if it did so it would come into engagement with the teeth 44. This is prevented by a notch 114 on a dog 115, extending from a stud 112 on the side of the machine, engaging a squared shoulder

109 on the rod 81 and preventing the rearward movement of said rod 81. The dog 115 is made resilient to throw it upward, so that the notch 114 will immediately engage said shoulder 109 as soon as the latter has passed in front of said notch. In this position the rod 81 is held while the rack falls, clear of the teeth of the wheels 44, until the rack has fallen substantially its entire distance, when the stud 95 on the arm 295 strikes downwardly upon the edge of the dog 115 and depresses the same, thus drawing the notch 114 out of engagement with the shoulder 109 and permitting the rack to be rocked to its extreme forward position, and thus bringing the teeth of that one of the wheels 44 which is opposite to the rack 45 into engagement with said rack ready for another operation of the adding-key.

It has been shown how the operation of a shifting-key shifts the carriage by means of the cam-plate 25; but since the rack 45 is immovable laterally of the machine and normally engages the teeth of one of the wheels 44, which wheels are shifted laterally with the carriage, it is necessary that said teeth be disengaged from said rack before the shifting is effected. For this purpose the plate 16, which is depressed by any one of the shifting-keys, has attached thereto a vertical plate 120, formed at its outer end with a slot 121. Through the slot 121 passes the rod 81, which is attached by the link 85 to the rack and moves it rearwardly. The upper portion of the slot 121 is so formed as to bear against the rod 81 and actuate it to draw the rack out of engagement with the wheels 44 and clear of them before any shifting takes place, and for this purpose also the cam-plate 25 is formed with a portion 125, which is an arc of a circle with the pivot of the cam-plate as center, so that no cam action takes place on the stud 29 of the carriage until the rack has been drawn clear of the teeth of the wheels 44. When the shifting takes place, the rod 81 moves along the remaining portion 123 of the slot 121 without being actuated thereby, it being the arc of a circle around the line of the pivot 4 as center, and thus the rack is held out of engagement with the teeth while said teeth and carriage are being shifted past the rack.

It being desirable to have means for printing any desired memoranda, as the date of the transaction or other matter, opposite to each line of numbers, there is provided an arm 130, pivoted on the bar 37 and carrying fixed type-holders 131, within which are removably inserted type 132. Said arm is adapted to come in front of a pin 233, extending from the side of the link 85, when the carriage arrives at its terminal position and before the last figure is printed, and when the link 85 is drawn forward to print the figure in the units-column said pin 233 engages said extension 133, and thereby operates the arm 130 simultaneously with the printing of the last or units figure. The arm normally rests

against a tube 134 (which surrounds the rod 39) and is held against said tube 134 by a spring 135.

A feed movement for the machine consists of a bracket 140, pivotally mounted at the end of an extension from the rod 31 and vibrated by the link 85, on which bracket is pivoted a dog 141, actuated by a spring 142 to move the dog toward a ratchet-bar 143, mounted on the carriage, said dog having a nose 144, arranged to enter the teeth 145 of the ratchet-bar, and a lip 146, lying on said teeth. The dog is also provided with a tongue 147, arranged to impinge upon a stop 148 on the bracket and limit the movement of the dog. Upon each rearward movement of the link the dog will be moved forwardly by the spring as far as permitted by the stop 148, so that when the link is moved back to the front the nose of said dog will enter the succeeding notch between the ratchet-teeth and the carriage will be moved thereby through the space of one notch.

The machine is provided with means for printing in duplicate, and for this purpose there are supported on brackets 160 161 at the ends of the carriage ribbon-spools 162 163, of which the spool 162 contains a covering of felt or other absorbent material 164, filled with ink. The bracket 161, containing the spool 163, is pivoted on the end of the carriage and is pressed outward therefrom by means of a spring 165. An endless piece of ribbon 88 passes around said spool and is held at the proper tension therebetween. The paper passes from the rollers 166 167, one roll of paper between the two portions of the ribbon and the other between the ribbon and the impression-roller 169, passing thence between said roller 169 and the tension-roller 170, held to said roller 169 by means of the springs 171, the journals of the roller passing through slots 172 in the end plates of the carriage. The paper is fed forward each time the carriage arrives at the end of the line by means of a rod 180, which will then abut against an arm 181 of a bell-crank lever 281, the other arm 282 of which strikes the rod 180, attached to the arm 182 on the axle 183 of the impression-roller. The arm 182 carries a spring-pawl 185, engaging the ratchet-wheel 186 on the shaft 183. Thus when the carriage arrives at the end of the line the pawl 185 will engage another tooth of the ratchet-wheel, and after the last figure has been printed by the arm the ratchet-wheel will be turned the distance of one tooth and the impression-roller will move the paper a proper distance for the next row of figures. The ratchet-wheel is prevented from turning backward by the hook 285 on the pawl 185. The ribbon is also caused to travel a short distance at the end of each line to provide a newly-inked surface. This is effected by means of a spring-pawl 187, secured to the rod 180 and engaging a ratchet-wheel 188 on the spool 162. The second paper-roller 167 is rotated in like man-

ner as the first by a rod 211, abutting against the end of the arm 282, and thus being actuated when the carriage has arrived at the end of its travel to carry a spring-pawl 212 over a tooth 213 of the ratchet-wheel 214, said ratchet-wheel being secured to a gear-wheel 215, which meshes with a pinion 216 on a roller 217, between which and an adjacent roller 218 the paper is caused to travel. A spring 219 moves the pawl back when the pressure of the arm 282 against the rod 211 has been removed, and in so doing it moves the ratchet-wheel through the distance of one tooth.

The slight modification illustrated in Figs. 7 and 8 provides for moving the carriage to bring it into contact with the paper and also to disengage its rack from the adding-wheels while the rack is held in stationary position at such time. For this purpose the link 85 is connected to an arm 301, extending upward from the shaft 31, and that shaft instead of being stationary is mounted to rock in bearings in the stationary side plates of the machine. The feed mechanism is also slightly changed, the pivoted latch that carries the dog being mounted on an extension 340, projecting from the stationary frame, while the ratchet-bar 143 is mounted on the carriage. By this means the ratchet-bar is thrown forward against the pivoted dog by the forward oscillation of the carriage, and the dog engaging a tooth of the bar causes the carriage to move transversely to the left a distance equal to one tooth of the ratchet-bar. In this modification also the means for printing dates or other memorandums is slightly changed, the arm 130 being operated by a standard 385, extending upward from the base 24 and brought in contact with that arm by the forward oscillation of the carriage. In such movement the arm 130 comes behind the standard and being arrested by it while the carriage moves toward the printing devices the dating-types are brought against the paper.

I claim—

1. The combination of a series of shifting-keys, a swinging yoke adapted to be moved a greater or less distance by any one of said keys, a reciprocating carriage, an oscillating cam engaging said carriage adapted to reciprocate the same, and a link connecting the yoke with said cam, substantially as described.

2. The combination of a carriage, a horizontal guide on which said carriage travels, a stud on said carriage, an oscillating cam engaging said stud to move the carriage, a shifting-key, and an operative connection between the key and the cam, whereby the depression of the key moves the carriage, substantially as described.

3. The combination of a carriage, a guide on which said carriage travels, a stud on said carriage, an oscillating cam engaging said stud to move the carriage, a series of shift-

ing-keys, a movable bar operated by any one of said keys and having an inclined edge whereby the stroke of said bar is varied according to the relative position of the key along said edge, and an operative connection between said bar and said cam, substantially as described.

4. The combination of a carriage, a guide on which said carriage travels, a series of shifting-keys, a movable bar operated by any one of said keys and having an inclined edge whereby the stroke of said bar is varied according to the relative position of the key along said edge, and an operative connection between the bar and the carriage, whereby the movement of the bar shifts the carriage to a greater or less extent according to the key operated, substantially as described.

5. The combination of adding-levers, pivoted plates, links connecting said levers and plates, a rocking yoke vibrated to a greater or less extent by any one of said plates, a lever correspondingly actuated by said yoke, a rack carried by said lever, and adding-wheels having teeth adapted to be engaged by said rack to rotate the same, substantially as described.

6. The combination of a series of adding-wheels having internal teeth and a pin projecting radially inward, a bar passing through said wheels, a lever for each wheel pivoted on said bar and adapted to be actuated by the pin in the revolution of said wheel, and a dog pivoted on said lever, and engaging the teeth on the next wheel and operating said wheel when said lever has been actuated by the pin of the former wheel, substantially as described.

7. The combination of a series of adding-wheels having internal teeth and a pin projecting radially inward, a bar passing through said wheels, a lever for each wheel pivoted on said bar and adapted to be actuated by the pin in the revolution of said wheel, a dog pivoted on said lever and engaging the teeth of the next wheel, a tube on which said wheels rotate, said tube being movable relatively to said bar, and an inclined lip on the edge of the slot in said tube adapted to engage said dogs when said tube is so moved to disengage them from the wheels and permit free rotation of the latter, substantially as described.

8. The combination of adding-levers, pivoted plates, links connecting said levers and plates, a rocking yoke vibrated to a greater or less extent by any one of said plates, a lever correspondingly actuated by said yoke, a vibrating rack carried by said lever, a carriage, a series of adding-wheels supported on said carriage, an impression-roller likewise supported thereon, said rack passing between said wheels and roller and having on one side teeth adapted to engage said wheels and on the other side type for printing against said roller, a movable bar adapted to be operated by any one of said plates in its continued movement, and a link connecting said bar

with said rack for vibrating the latter, disengaging the toothed wheels from the rack and pressing the type against the roller and an inking device for said type, substantially as described.

9. The combination of a carriage, an impression-roller and adding-wheels on said carriage, a rack carrying type and adapted to operate any one of said adding-wheels, a series of adding-keys, and mechanism, variably operated by said keys which first actuates said rack to correspondingly move an adding-wheel, and then presses said impression-roller against said type and an inking device for said type, substantially as described.

10. The combination of a carriage, an impression-roller and adding mechanism on said carriage, a rack carrying type and adapted to operate said adding mechanism, a series of adding-keys, mechanism variably operated by any one of said keys, which first actuates said rack to operate the adding mechanism, and then presses said type against said roller, and means for maintaining said rack in working position while so operating said rack to print, substantially as described.

11. The combination of a carriage, an impression-roller and adding-wheels on said carriage, a rack carrying type adapted to operate said adding-wheels, a series of adding-keys, mechanism variably operated by said keys which first actuates said rack to correspondingly move the adding mechanism and then brings the type against the impression-roller, and means for arresting the momentum of the rack after each movement.

12. The combination of a carriage, an impression-roller and adding mechanism on said carriage, a rack carrying type and adapted to operate said mechanism, means for actuating said rack, means for disengaging said rack from the wheel to print thereby, and locking means for holding the rack in engagement with the adding mechanism until it has been operated to actuate the same, substantially as described.

13. The combination of a carriage, an impression-roller and adding mechanism on said carriage, a rack carrying type and adapted to operate said mechanism, means for disengaging said rack therefrom to print thereby, and locking means for preventing the reverse movement of said rack until it has moved through its full stroke, substantially as described.

14. The combination of a carriage, an impression-roller, an adding mechanism on said carriage, a rack carrying type and adapted to operate said adding mechanism, means for actuating said rack to operate said adding mechanism, means for disengaging said rack therefrom to print thereby, locking mechanism for preventing the reverse movement of the rack until it has been moved through its full stroke, means for oscillating said rack to produce an impression from the type and means for releasing said locking mechanism

when said rack has been so oscillated, substantially as described.

15. The combination of a carriage, an impression-roller, adding mechanism on said carriage, a rack carrying type and adapted to operate said adding mechanism, means for actuating said rack to operate said adding mechanism, means for disengaging said rack therefrom to print thereby, locking mechanism for preventing the reverse movement of the rack until it has been moved through its full stroke, means for oscillating said rack to produce an impression from the type, means for releasing said locking mechanism when said rack has been so oscillated, and means for arresting the complete return movement of the rack in said oscillation, substantially as described.

16. The combination of a reciprocating carriage, an impression-roller and adding mechanism on said carriage, a rack carrying type and adapted to operate said adding mechanism, means for shifting the carriage widthwise of the machine, and means for automatically disengaging the rack from the adding mechanism before so shifting said carriage, substantially as described.

17. The combination of a carriage, an impression-roller and adding mechanism on said carriage, a carriage-shifting device, a rack carrying type and adapted to operate said adding mechanism, a series of operating-keys, and a lever, variably operated by any one of said keys, which first actuates said rack to disengage it from the adding mechanism and then actuates the carriage-shifting device, substantially as described.

18. The combination of a reciprocating carriage, an impression-roller and adding mechanism on said carriage, type mechanism, a series of keys for variably operating said adding and type mechanism, a type-carrier and type therein, and means actuated together with the adding and type mechanism, when the carriage arrives at a definite point in its reciprocation, to operate said type-carrier to print therewith, substantially as described.

19. The combination of a reciprocating carriage, an impression-roller and adding mechanism on said carriage, type mechanism, a series of keys, and an operative connection therefrom for variably operating said type mechanism, and a type-carrying lever adapted to be brought into position to be engaged by the operative connection and vibrated thereby when the carriage reaches the end of its reciprocation, substantially as described.

20. The combination, with a type-carrying bar and a series of keys and connecting mechanism for variably actuating said bar; of a

carriage having an impression-surface and means for feeding paper thereon, a series of adding-wheels connected with the carriage to be moved in unison therewith and into position with relation to the type-carrying bar, means for setting the carriage into operative position with respect to the type-carrying bar and to bring the same into contact with the paper to imprint the character of the type-bar thereon, and means connecting the type-carrying bar with the adding-wheels to actuate the wheels by the same keys that operate the type-carrying bar.

21. The combination, with a reciprocating carriage having an impression-surface and paper-feeding devices; of adding-wheels mounted on said carriage, a printing-arm adapted to contact with the paper and imprint its characters thereon, a series of keys and mechanism individually connecting the same with the carriage for variably setting the carriage in operative position with said printing-arm, and a second series of keys and mechanism individually connecting them with the printing-arm whereby the said arm is first set in position to bring a given one of its characters in line with the paper and is afterward brought into contact with the paper by the stroke of a single key of the second series, and means actuated by the same key to throw the printing-arm into operative engagement with the adding-wheels.

22. The combination of a type-carrying bar, cooperating printing mechanism, adding mechanism, a carriage controlling said cooperating printing mechanism and adding mechanism, a series of finger-keys variably operating said type-carrying bar, and a feed for the carriage controlled with the type-carrying bar, substantially as described.

23. The combination of adding-wheels, a single printing device common to all of said wheels and adapted by engagement with said wheels to register on said wheels the characters it is about to print, means for setting said printing device in operative relation with an adding-wheel at each time of printing and a series of finger-keys and mechanism connecting said keys with the printing device to variably set the same to print given figures or characters in successive order whereby the printing device registers on the adding-wheels the character it is about to print and afterward print the figure or character by the movement of one key.

ADAM HOCH.

Witnesses:

FRANCIS M. WRIGHT,
K. LOCKWOOD-NEVINS.