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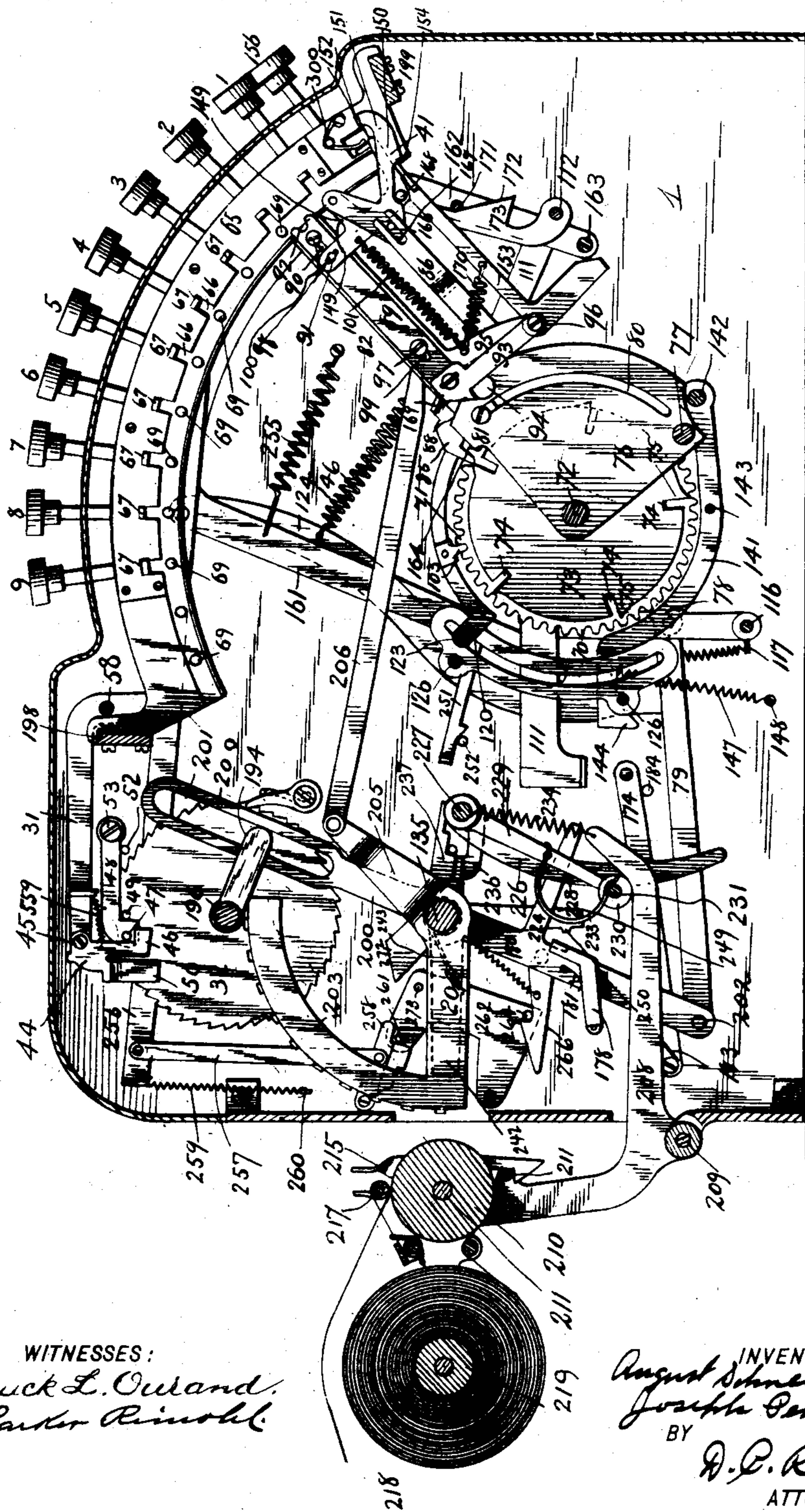
COMPUTING MACHINE.

(Application filed May 3, 1900.)

(No Model.)

10 Sheets—Sheet 1.

Fig. 1.



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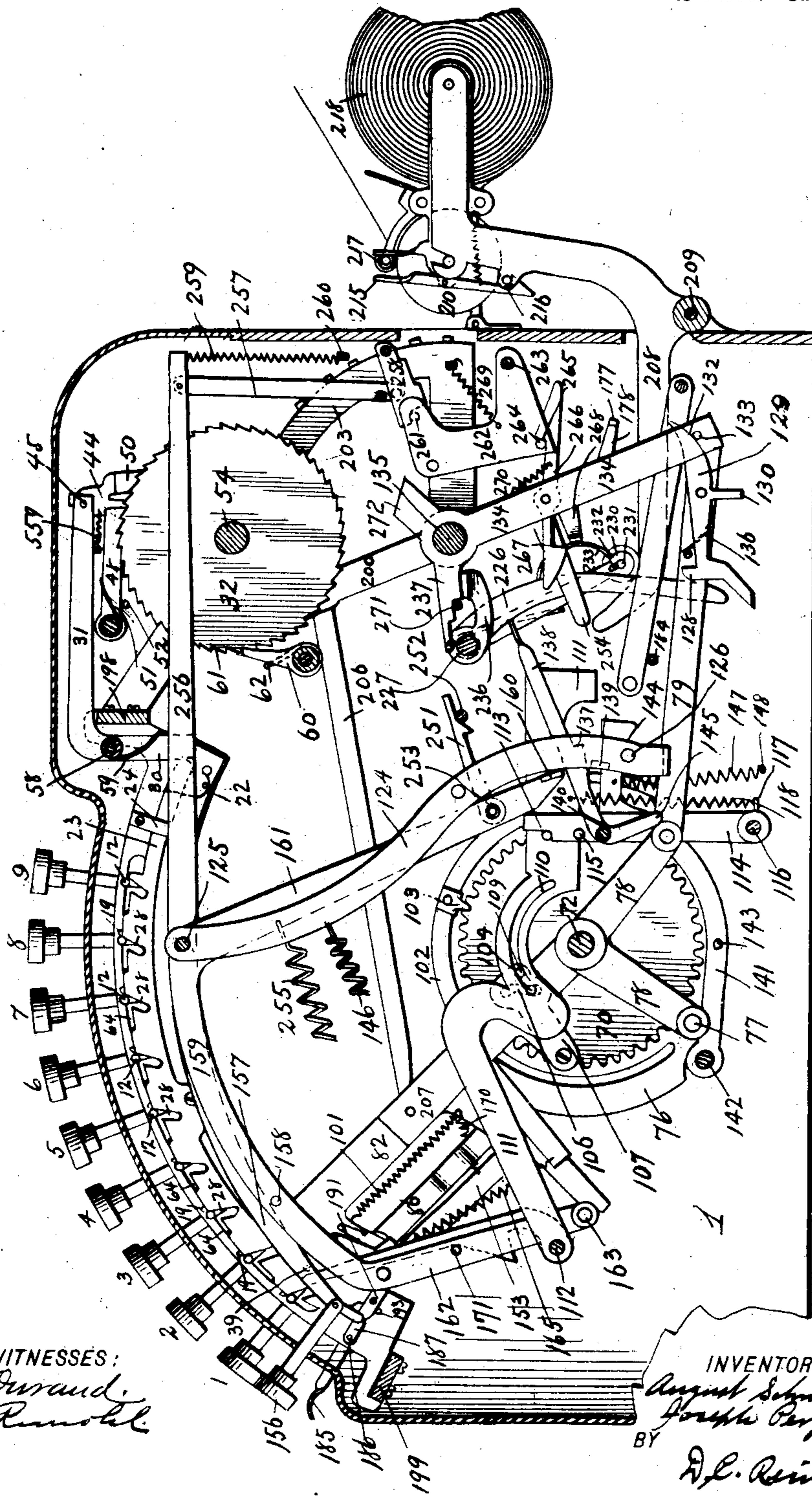
COMPUTING MACHINE.

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Fig. 2



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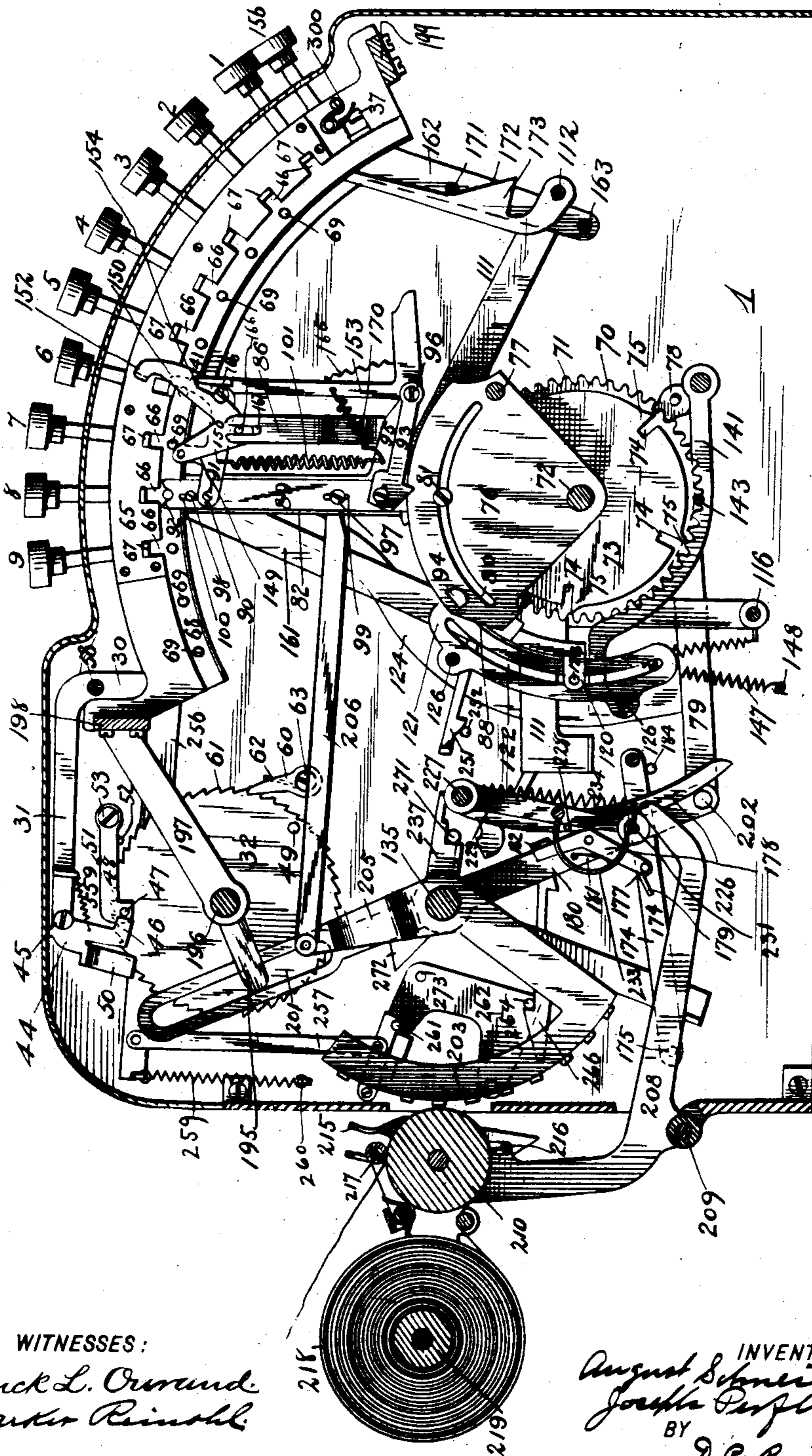
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10 Sheets — Sheet 3.



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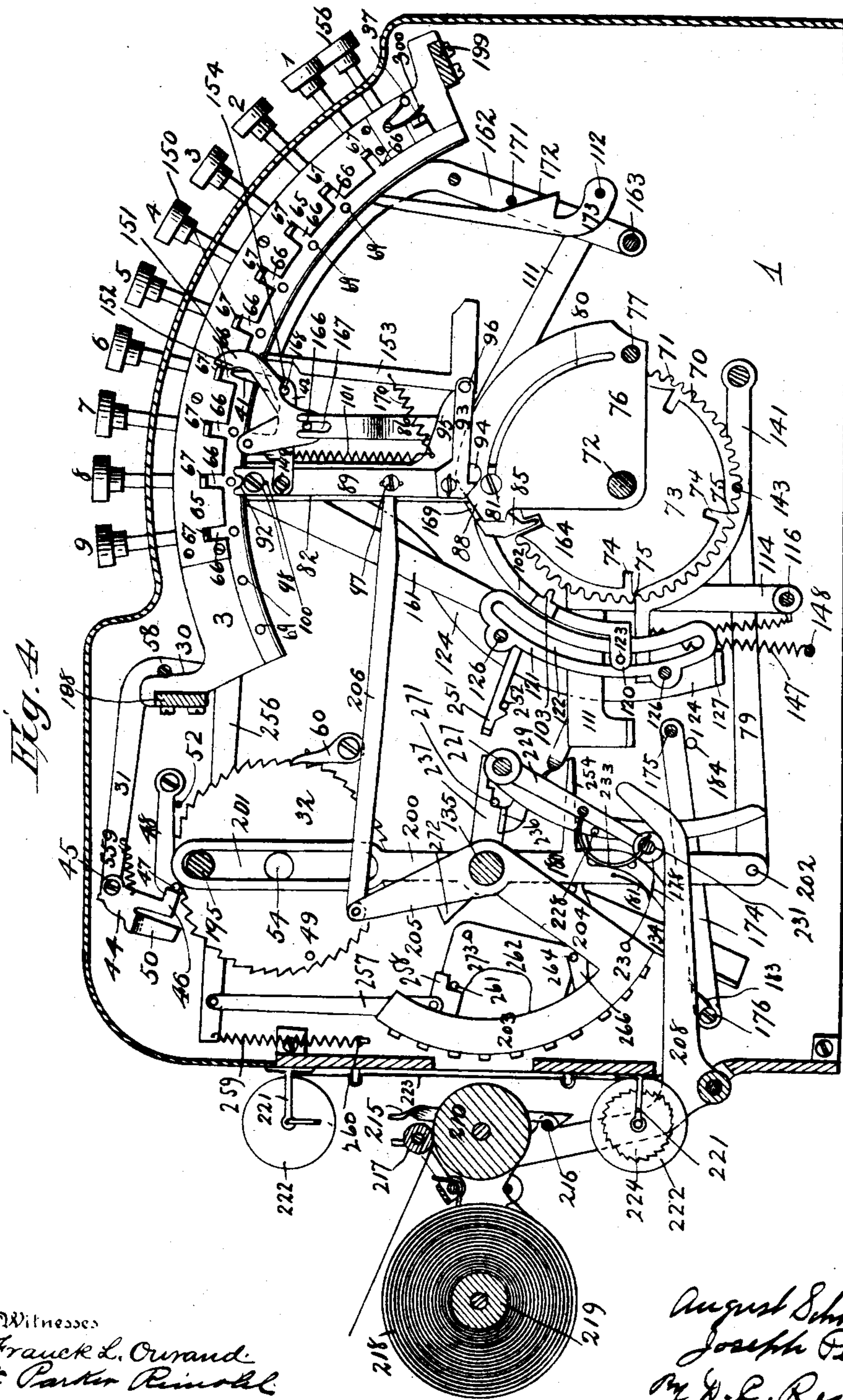
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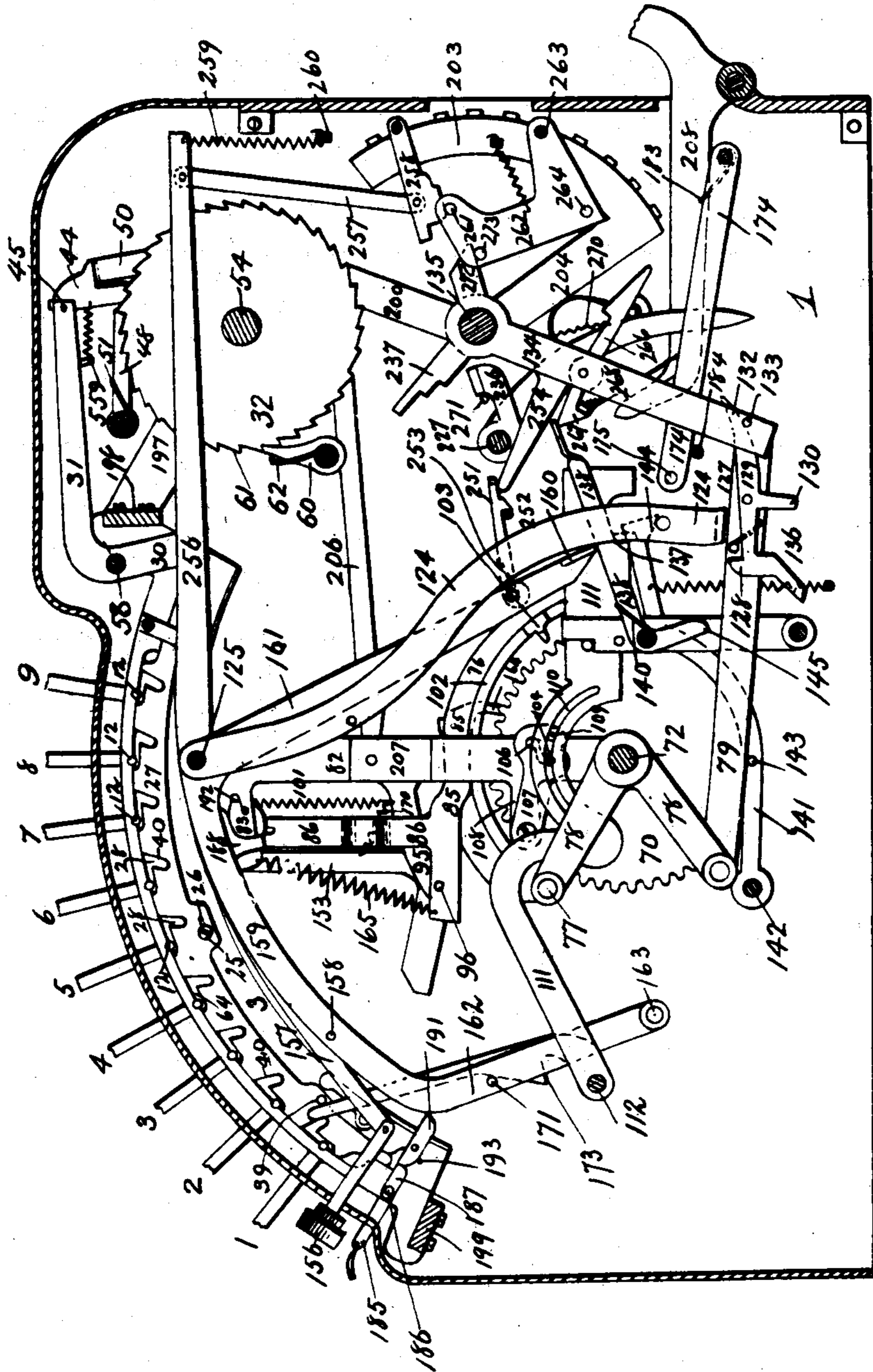
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COMPUTING MACHINE.

(Application filed May 8, 1900.)

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Fig. 5.



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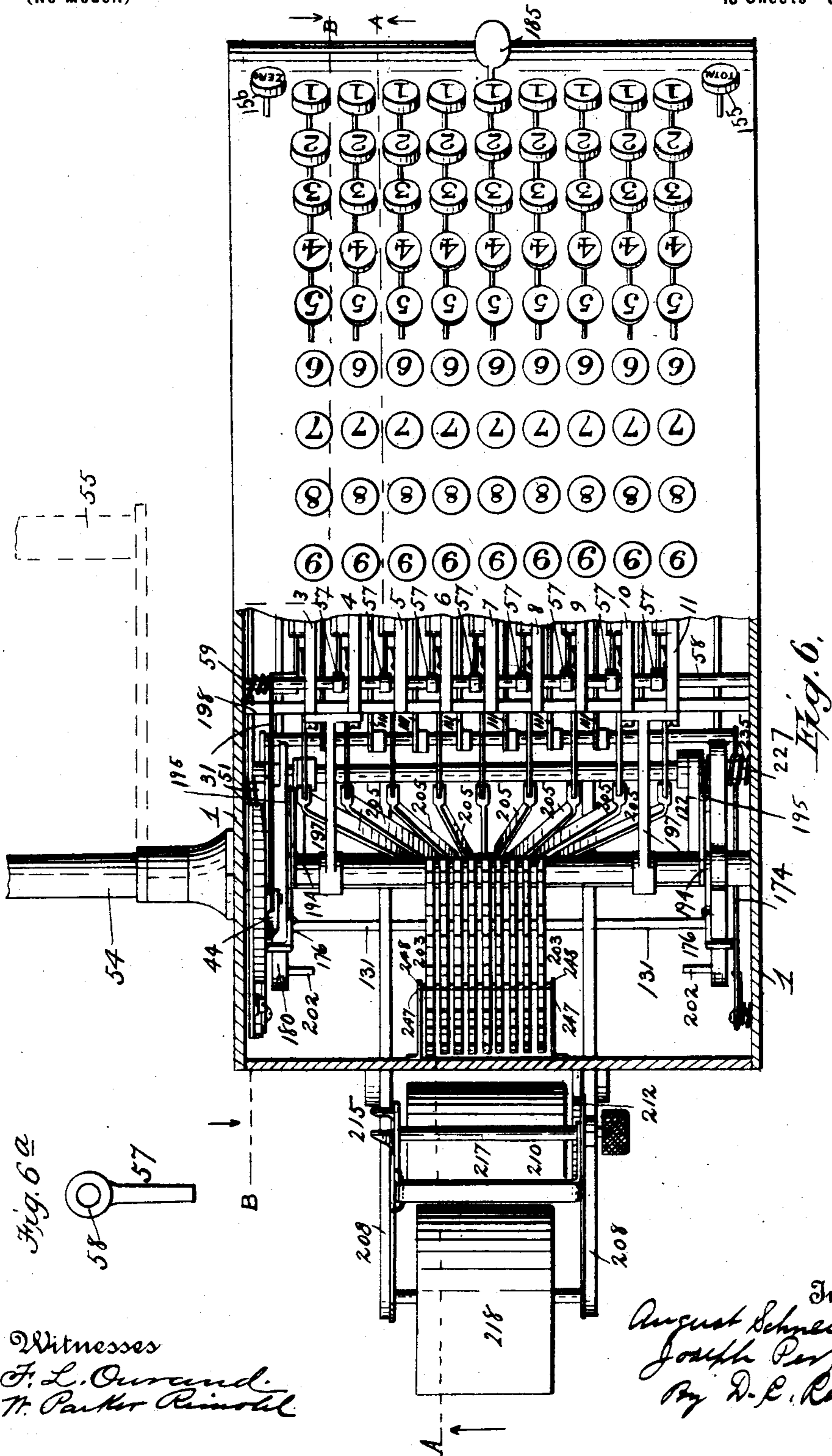
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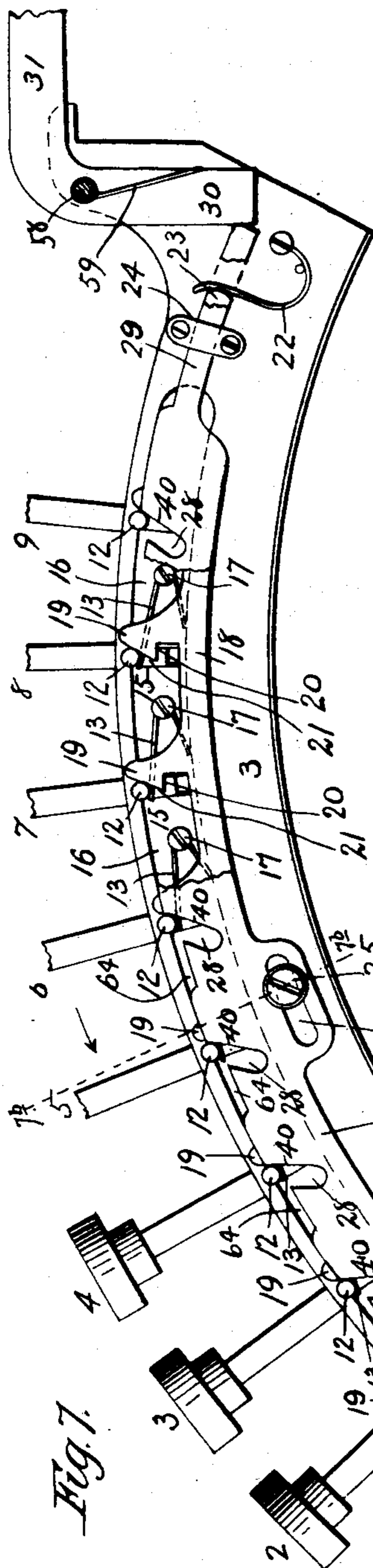


Fig. 7.

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Fig. 7b.

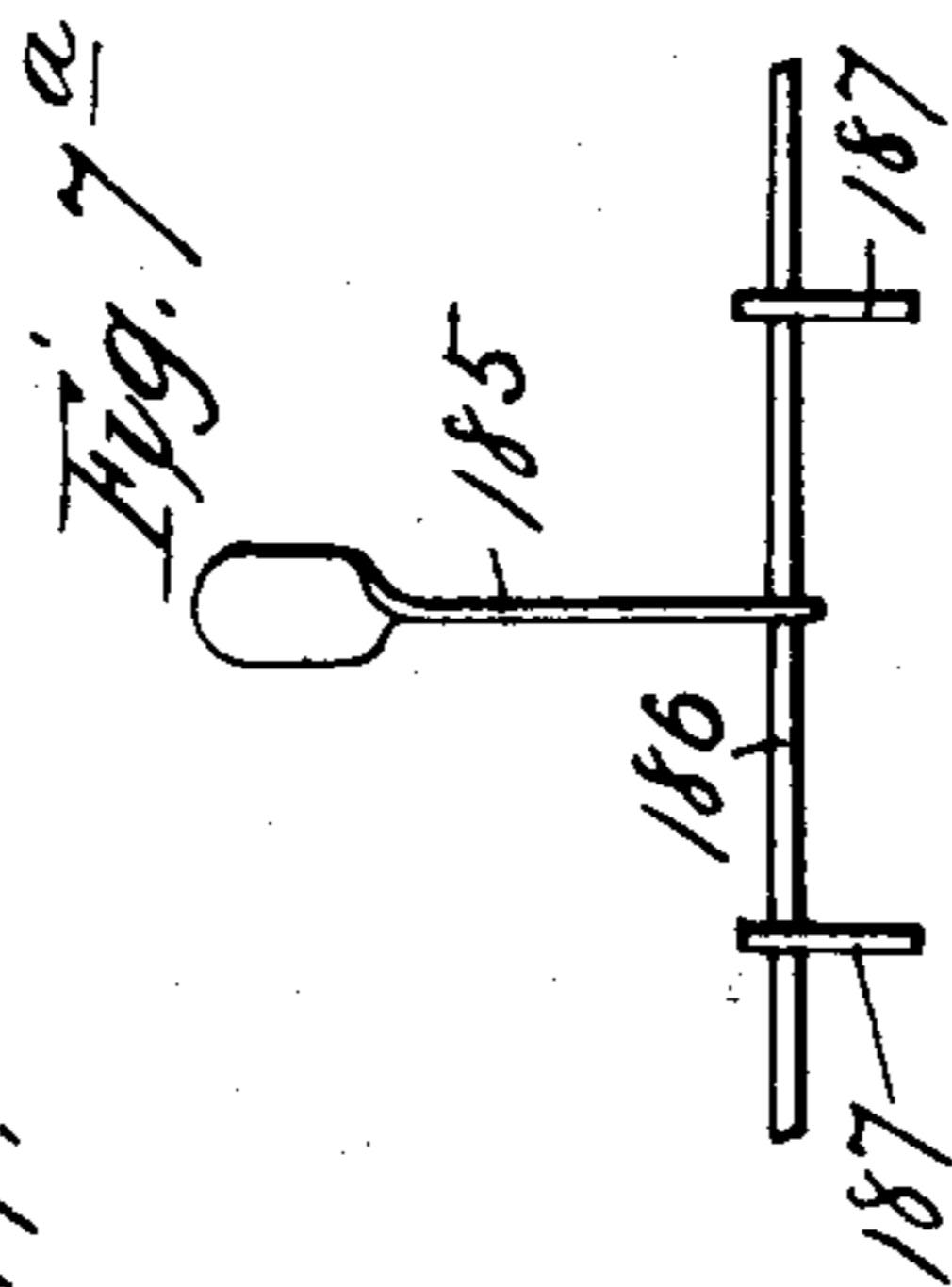


Fig. 7a.

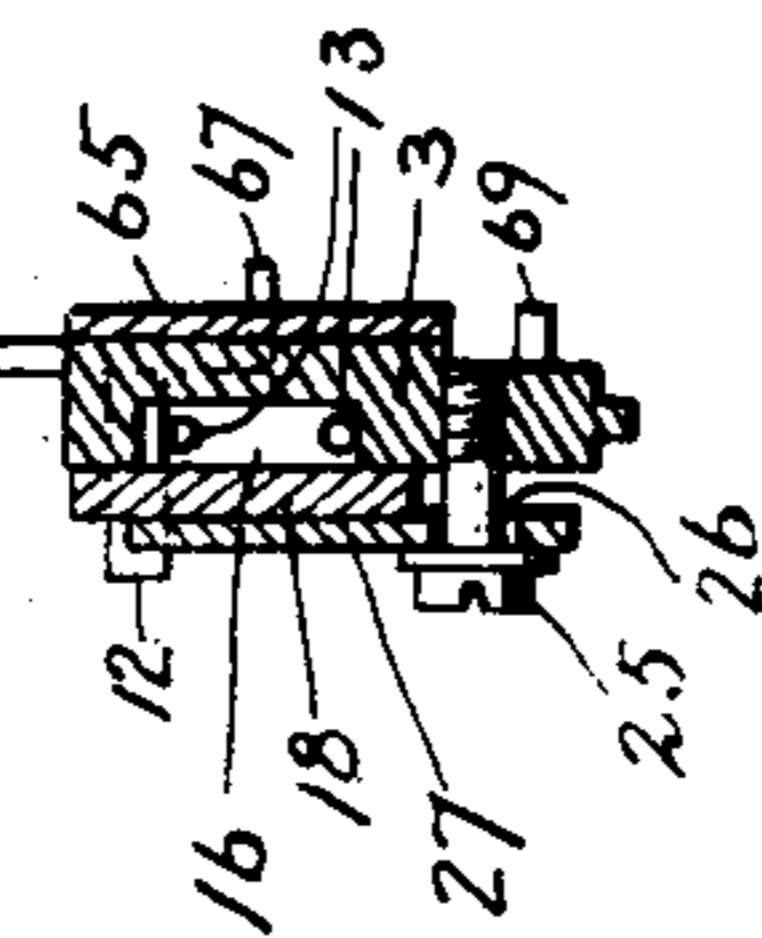


Fig. 7c.

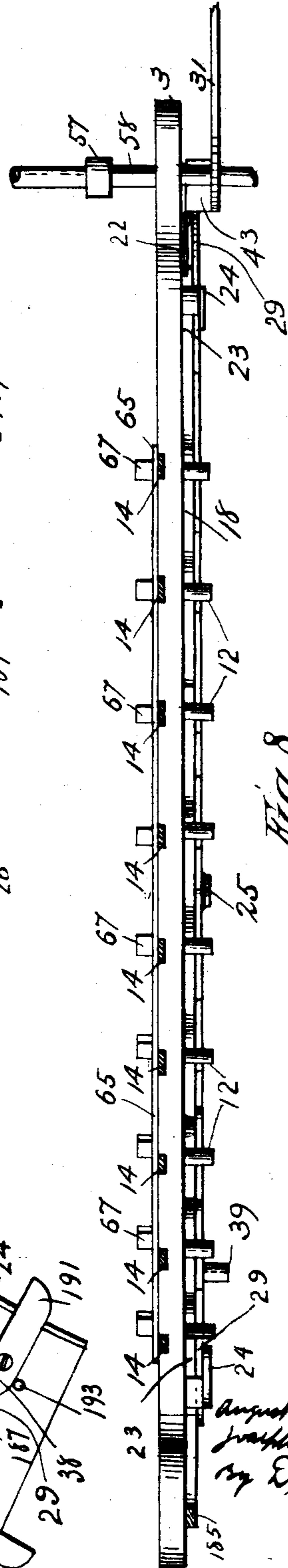


Fig. 8.

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Fig. 15.

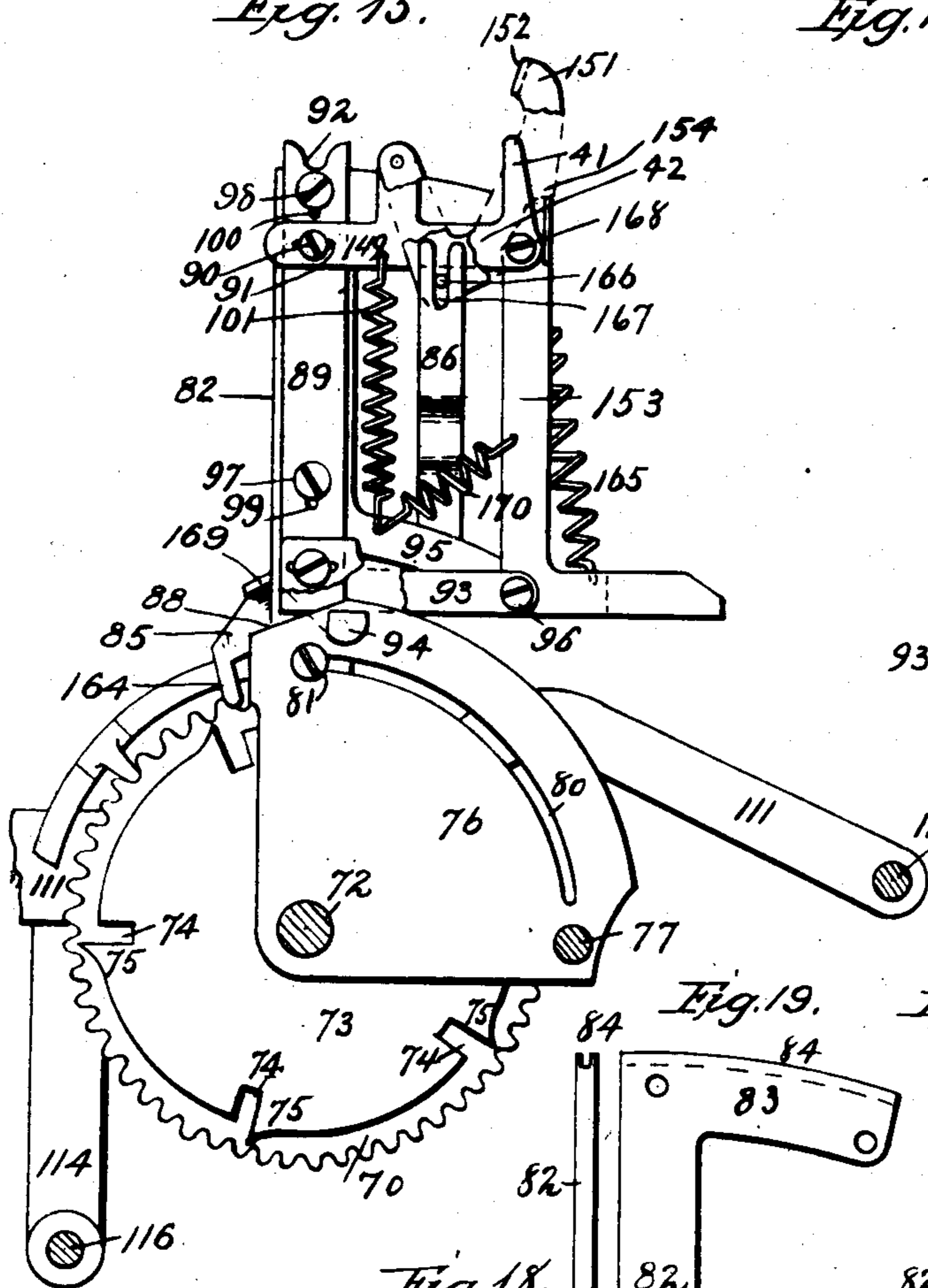


Fig. 16.

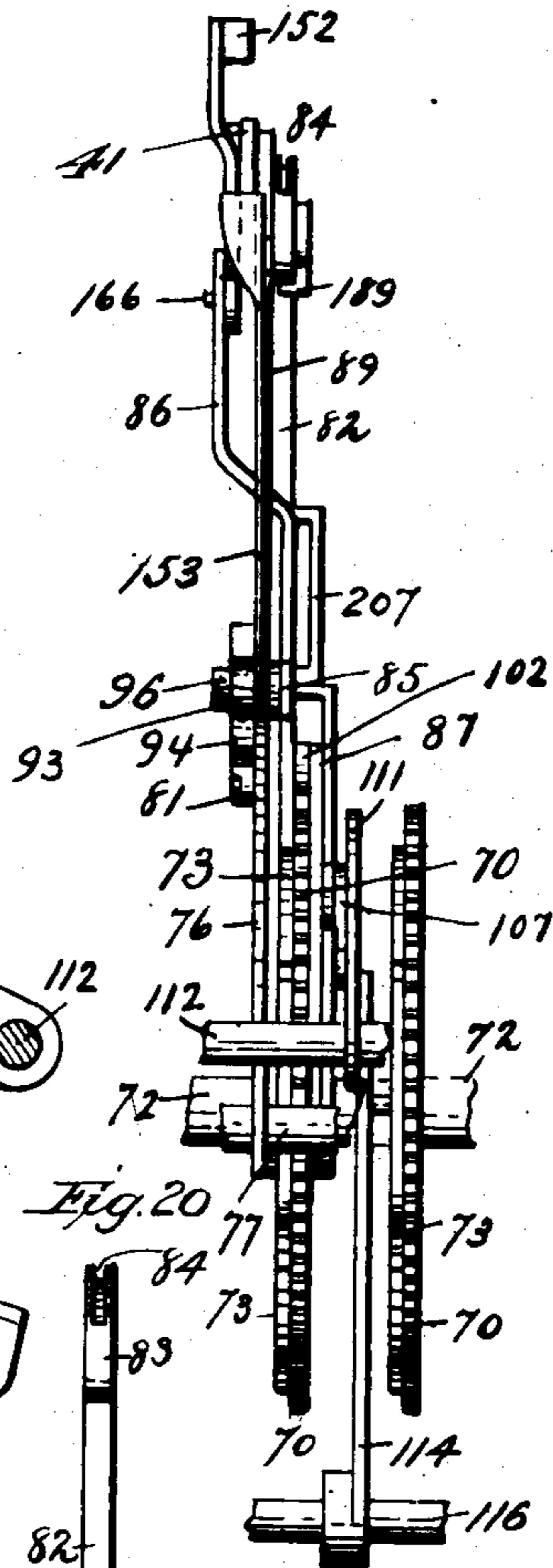
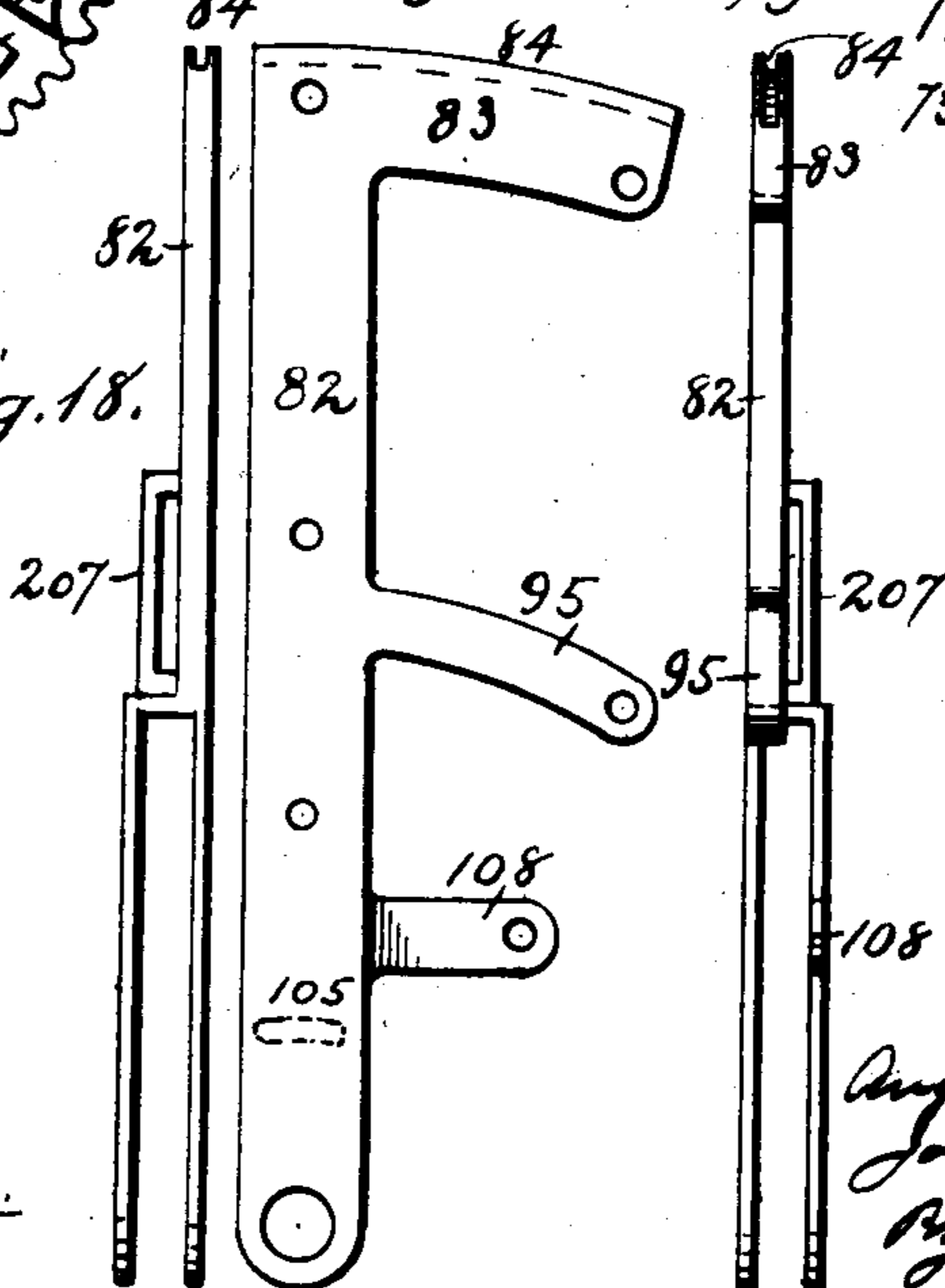
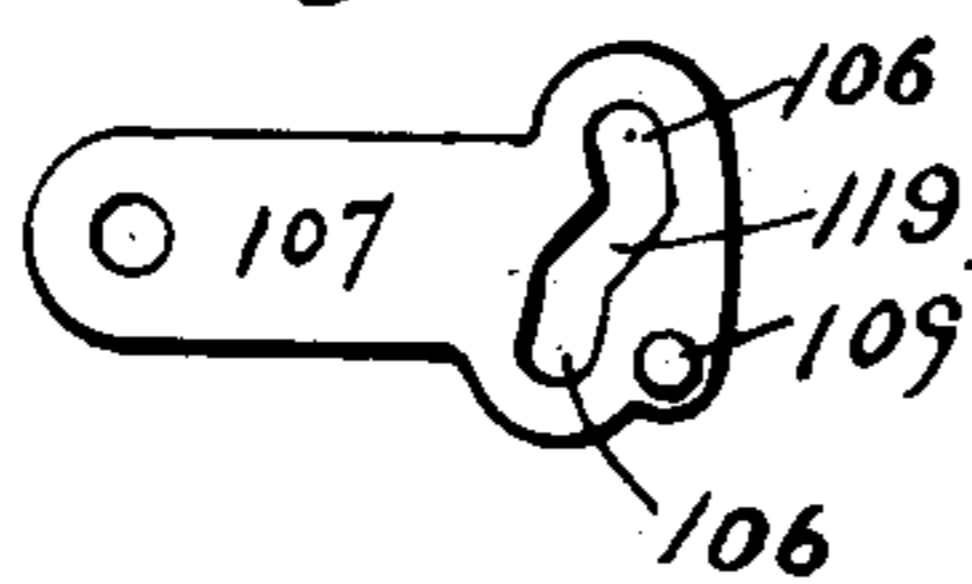


Fig. 19.

Fig. 20.

Fig. 18.

Fig. 17.



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Fig. 24.

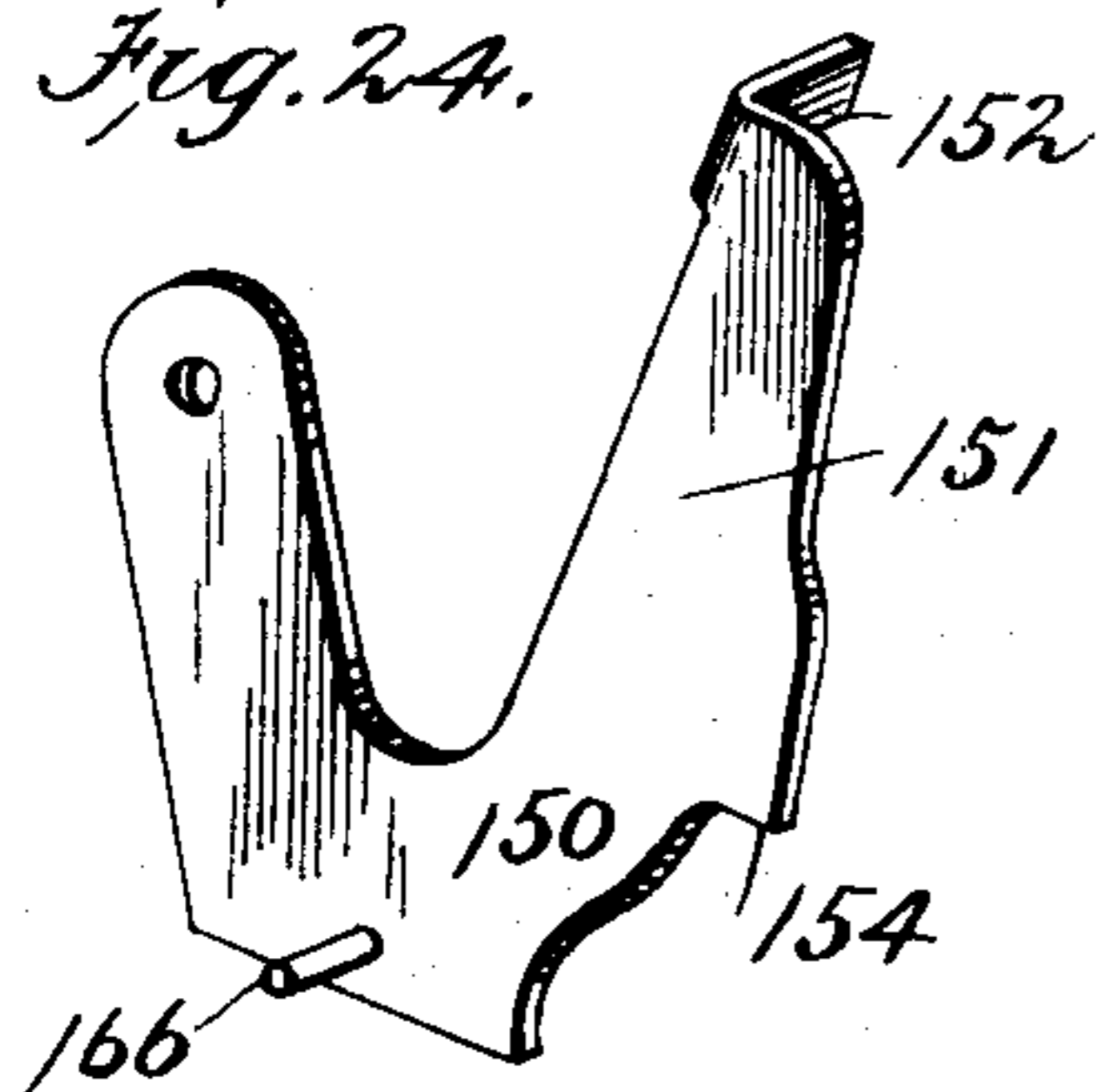


Fig. 21.

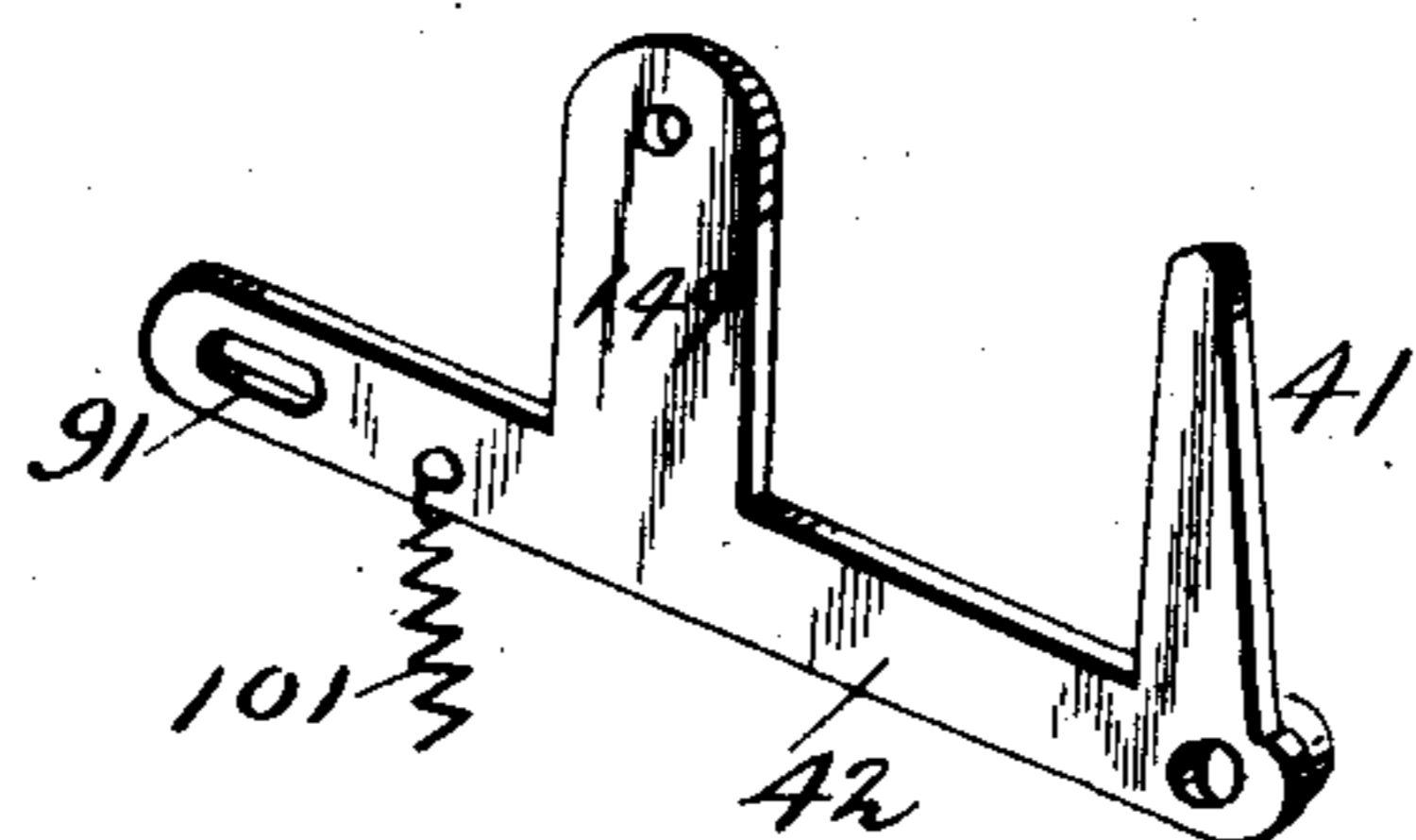
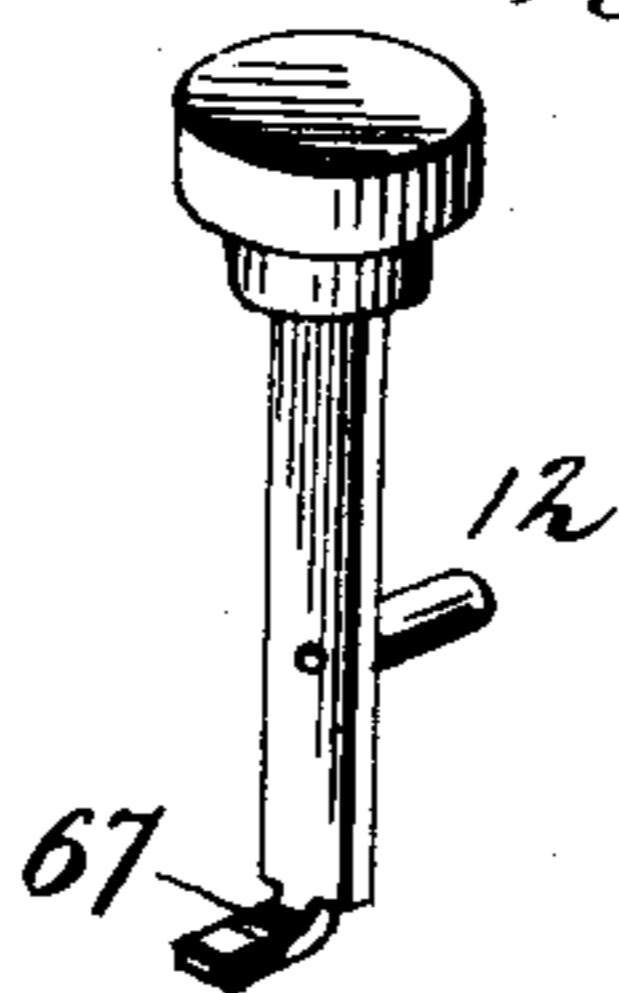


Fig. 25.

Fig. 22.

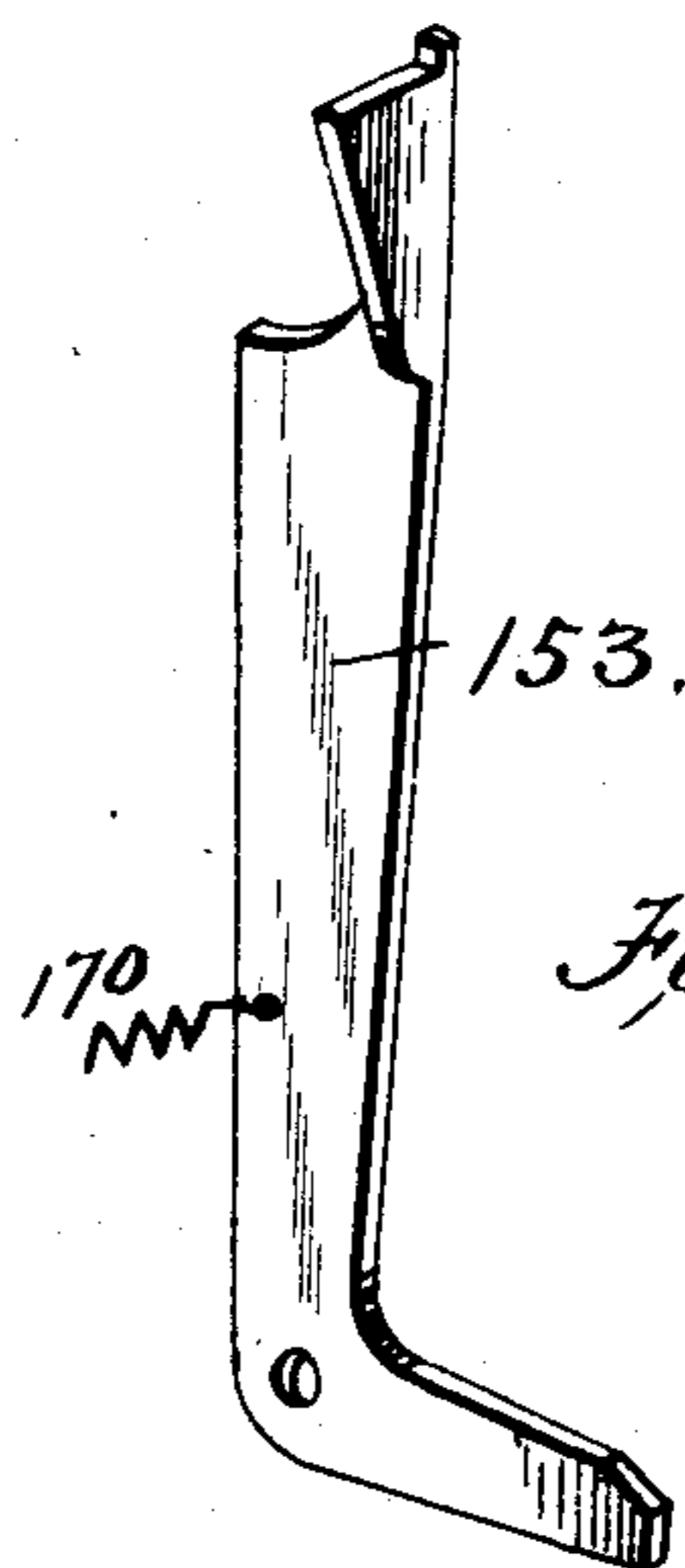
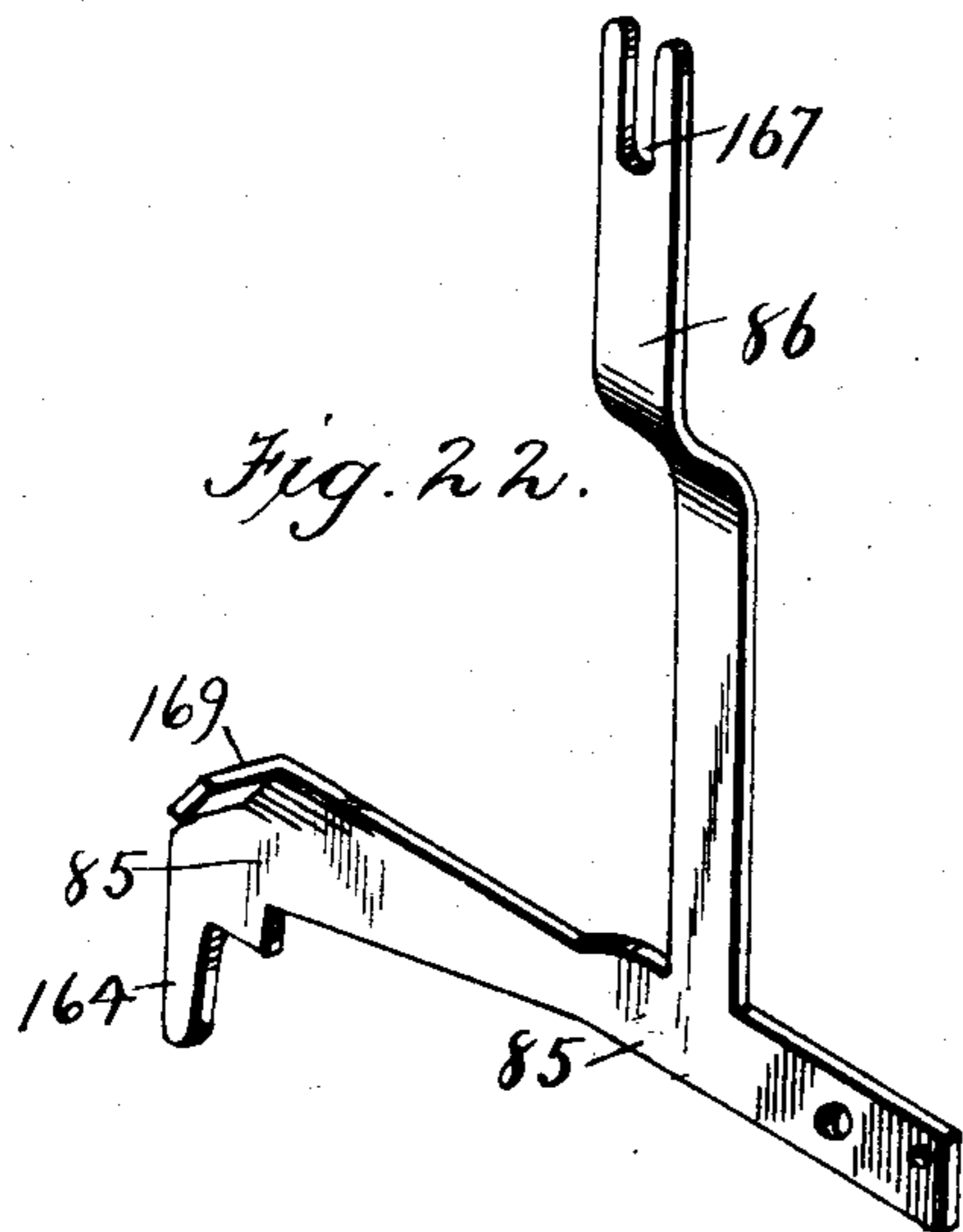
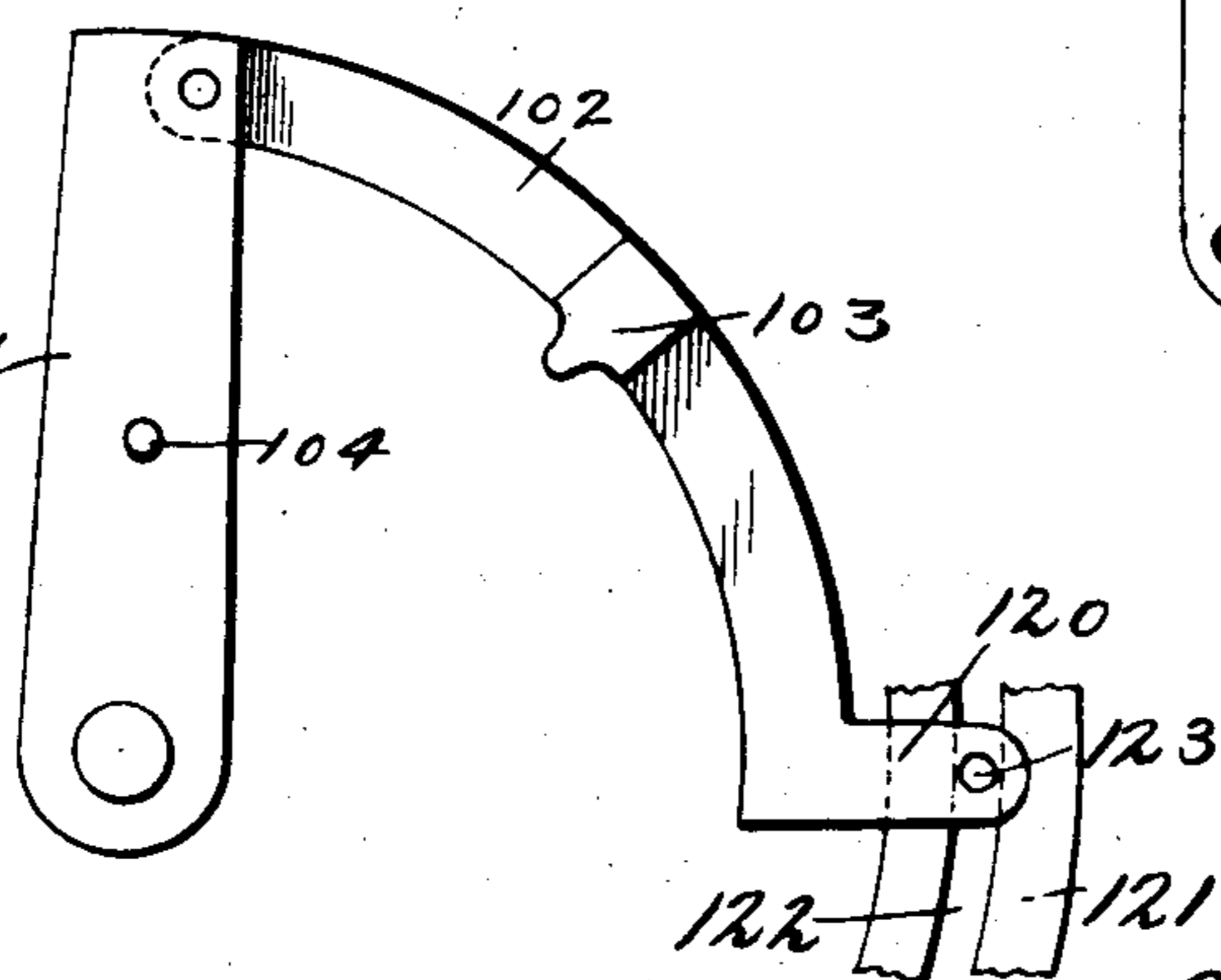


Fig. 23.

Fig. 26.



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UNITED STATES PATENT OFFICE.

AUGUST SCHNEIDER AND JOSEPH PERFLER, OF COLUMBUS, OHIO,
ASSIGNORS OF ONE-THIRD TO LEWIS FINK, OF SAME PLACE.

COMPUTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 682,755, dated September 17, 1901.

Application filed May 3, 1900. Serial No. 15,294. (No model.)

To all whom it may concern:

Be it known that we, AUGUST SCHNEIDER and JOSEPH PERFLER, citizens of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Computing-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to computing-machines, has for its object the simplification of the operating parts, and consists in certain improvements in construction, which will be fully disclosed in the specification and claims.

In the accompanying drawings, which form part of this specification, Figure 1 is a vertical section on line A A, Fig. 6, looking in the direction of the arrow and showing one bank of keys and connections with the several parts of the machine in their normal position; Fig. 2, a like view on line B B, Fig. 6, looking in the direction of the arrow and showing the cipher-key in front and the next adjacent bank of keys removed to disclose the carrying mechanism, the several parts also being in their normal position; Fig. 3, a like view on line A A, Fig. 6, showing the parts disclosed in Fig. 1 with the key of the numeral "6" depressed and the mechanism in corresponding position; Fig. 4, a like view on line A A, Fig. 6, showing the several parts in position preparatory to recording the sum-total; Fig. 5, a like view on line B B, Fig. 6, showing position of parts of mechanism with the cipher-key depressed, said position of the mechanism being that assumed preparatory to bringing the machine to zero; Fig. 6, a top plan, part of the casing of the machine being broken away; Fig. 6^a, an enlarged end view of one of the arms 57; Fig. 7, a side elevation, on an enlarged scale, of one bank of keys. Fig. 7^a is a detail or end view of the shaft 186, shown on the left end of Fig. 7; Fig. 7^b, a transverse section through one of the key-frames; Fig. 8, a top plan view of the same; Fig. 9, an enlarged detail of mechanism for automatically putting ciphers in position to print; Fig. 10, a top plan of the same; Fig. 11, a section on line C C, Fig. 9; Fig. 12, an elevation

of the lower arm of the bell-crank levers for throwing out the ciphers; Fig. 13, a detail of the carrying mechanism for carrying from a lower to a higher number; Fig. 14, a side elevation of the platen and its accessories. Fig. 15 is a side elevation, on an enlarged scale, showing the adding-wheel and the means for connecting it with the key-frame. Fig. 16 is an end view of the same looking from the right; Fig. 17, an enlarged view of the locking-arm 107; Fig. 18, a side view of arm 82; Fig. 19, a front elevation of the same arm, and Fig. 20 a side elevation opposite to that shown in Fig. 18; Fig. 21, a perspective of one of the keys on an enlarged scale; Fig. 22, a like view of lever 86; Fig. 23, a like view of the bell-crank 153; Fig. 24, a like view of the swinging latch 150; Fig. 25, a like view of the bell-crank 42, and Fig. 26, a side elevation of the arm 87 and curved bar 102 connected thereto and engaging link 121.

Reference being had to the drawings and the numerals thereon, 1 indicates a casing, within which are supported upon transverse bars 198 199 key-frames 3, 4, 5, 6, 7, 8, 9, 10, and 11, (shown in Fig. 6,) each frame supporting a bank or series of keys, the keys in each bank being numbered from "1" to "9" and increasing in power from right to left, the unit-column being on the right. The key-stems are each provided with a laterally-projecting pin 12, which engages a spring 13 when depressed, and which spring returns the key to its normal position when the key has been released. On one side of the key-frame are slots 14 to receive the stems of the keys, and the pins of the keys enter slots 15 and extend through a longitudinal recess 16 in the frame, and the springs 13 lie in said recess, are secured by a screw 17, and are covered by a rack-bar 18 on the side of the frame, which is provided with locking-teeth 19, having shoulders 20, with which the pins 12 engage when the key has been depressed, there being a tooth 19 for each key on the key-frame, and as the pin 12 of the key moves down over the inclined face 21 of the tooth 19 the rack-bar 18 is pushed back and returned by a spring 22, so that the shoulder 20 of the tooth engages the pin on the key to hold it down, the rack-bar having a free

longitudinal movement on the frame, the rack-bar being provided with extensions 23 at opposite ends thereof, which engage bearings or supports 24 on the side of the frame, and is also supported in the center by a screw 25, engaging a slot 26 in the rack-bar, as shown in Fig. 7.

Outside of and adjacent to the rack-bar 18 is a lock-bar 27, having inclined slots 28. One for the stud 12 of each key is provided with extensions 29, one at each end, which correspond with the extensions on the rack-bar and are supported in the bearings 24 and on screw 25, which engages slots 26 in both bars, and the inner end of said lock-bar normally engages the arm 30 of a lever 31 of the locking device which controls the operating-wheel 32. On the lower edge of the lock-bar is a projection 33, which engages a head 34 on one end of a lever 35, pivoted to the key-frame 3 at 36, and one end 37 of the lever is bent at a right angle to the plane of the lever and extends through an opening 38 in the key-frame, and on the projections 33 is a pin 39, for a purpose hereinafter described. The head 34 normally rests in engagement with the projection 33 on the lock-bar 27, and on the depression of any key in its series or bank the stud 12 on the stem of the key depressed engages the inner wall 40 of the slot 28, pushes said lock-bar forward or away from the operator, the projection 33 pressing the head 34 on lever 35 downward, raising the opposite end, which projects through the opening 38 in the key-frame, and permits one arm 41 (see Fig. 1) on the inside of the bell-crank lever 42 to pass and bring the adding mechanism into position for work, the lever 35 being held in its normal position by a spring 300, secured to the opposite side of the key-plate with its free end resting upon the extension 37. The bell-crank 42 is pivotally connected to the lateral projection 83 of arm 82 by a shoulder-screw 168, as shown in Figs. 3, 4, and 15. This arm 41 is shown in dotted lines on the bell-crank lever 42 in Figs. 1, 3, and 4 and in full lines in Fig. 16. Simultaneous with the foregoing operation the lock-bar by its projection 29 pushes against the right-angled extension 43 (see Fig. 8) of the arm 30 on lever 31, raises lever 31, on whose outer end is a head 44, pivoted to the lever at 45, and is provided with a lateral extension 46, which engages a pin 47 on hook 48 and disengages the hook 48 from the pin 49 on the inner face of the operating-wheel 32 and allows the wheel to start in making a revolution to communicate motion to the several parts of the machine in a cycle of its operation. The arm 50 of the head 44 is bent inward toward the wheel to bring it in a vertical plane coincident with the path of travel of the pin 49, which strikes said arm, swings it out, and disengages the extension 46 from the pin 47 on hook 48 and allows the hook to fall to its normal position assisted by spring 51, which spring is coiled on screw

53, said hook resting upon pin 52 and in position again to be engaged by pin 49 on the wheel 32 and arrest the forward movement of the wheel after it has made one complete revolution. The hook 48 is pivotally connected to the frame of the machine on screw 53, and the operating-wheel is supported upon a shaft 54 and turned by a crank 55.

The lever 31 is secured to the shaft 58, which extends through the machine and is supported in the sides thereof, and the arm 30 of said lever is struck only by the lock-bar of the first bank or series of keys, motion being communicated to said lever from all the other banks of keys by the lock-bar of each bank striking an arm 57, secured rigidly to a shaft 58 at the end of the key-frame and in line with the lock-bar of each bank, to which shaft the lever 31 is rigidly attached, and all the arms 57 and lever 31 are returned to their normal position by spring 59, and the head 44 on the lever 31 is returned to its normal position by a spring 559.

As heretofore stated, the operating-wheel 32 makes a complete revolution in each cycle of the machine, and when the revolution is completed the wheel and the operative parts of the whole machine are securely locked by the pin 49 and hook 48, preventing the wheel turning forward, and the pawl 60, engaging the teeth 61, preventing it turning in the opposite direction, the pawl being held in engagement with the teeth by spring 62, supported upon a shoulder-screw 63, connected to the frame of the machine, as shown in Figs. 1, 2, 3, 4, and 5.

As the locking-bar is projected forward by the depression of a key, as heretofore described, to disengage or unlock the operative parts of the machine it also locks all the remaining keys of its bank or series in their elevated position by the recess 64 adjacent to each slot 28 in the lock-bar being brought under the pin or stud 12 on the stems of the keys.

Referring to Figs. 3 and 4, 65 indicates a plate provided with slots 66 to receive the right-angled projection or extension 67 on the inner ends of the key-stems and serves to hold the keys in the slots 14, as shown in Fig. 8, and is secured to the key-frame by screws in the usual manner. In the side of said key-frame is formed a rabbet 68, and in said rabbet are pins 69 of a length about equal to the depth of the rabbet and equally spaced on the key-frame for the purpose of locking the adding mechanism under each key of a series, respectively.

The adding mechanism comprises a wheel 70, having fifty teeth 71 on its periphery and is supported upon a shaft 72, which extends across the machine, and the shaft is supported in the sides of the frame, there being an adding mechanism to each bank or series of keys, each being an exact duplicate of the other, and on one side of the wheel and secured thereto is a disk 73, having a track on its pe-

riphery and provided with radial slots 74, of which there are five, separating the teeth on the wheel 70 into equal numbers of ten each, and on the track and adjacent to one side of each slot is a raised portion 75, which constitutes part of the carrying mechanism, which will hereinafter be fully described. Rotatably mounted upon the shaft 72 and adjacent to one side of the arm 82 is a sector-shaped cam 76, which is attached to a shaft 77, which connects all the sector-shaped cams in the machine, while the shaft 72 supports all the adding-wheels, their disks, and sector-shaped cams, and on each side of the machine, adjacent to the frame and mounted upon said shaft 72, is a bell-crank 78, one arm of which is attached to shaft 77, and the other arm is attached to one end of a connecting-rod 79, as shown in Figs. 1, 2, and 3, the bell-cranks being connected by said shaft 77 and constitute an oscillating frame, which imparts an oscillatory motion to the sector-shaped cam 76. The cam 76 is provided with a slot 80, formed in the arc of a circle, and in said slot is a screw 81, sliding loosely in said slot and connected to the arm 82. This arm 82 is supported upon shaft 72 and extending up to and engaging the lower edge of the key-frame, as shown in Fig. 13, the arm 82 having a lateral extension 83 and a groove 84, formed in the upper end of said arm and its extension, as shown in Figs. 16 and 19, the object of the groove being to secure the arm against lateral displacement on the key-frame. By reference to Figs. 16, 18, and 19 it will be observed that the arm 82 is bifurcated at its lower end and that the wheel 70, the disk 73, the arm 85 of the lever 86, and the arm 87 are between the bifurcations of said arm. Said elements 85, 86, and 87 will be hereinafter explained.

On the side of the sector-shaped cam 76 is a pin 94, with which the hook 93 engages to draw the arm 82 and the parts attached thereto forward. It will be understood that wherever the terms "forward" and "backward" are used to describe motion of the parts of the machine we mean away from or toward the operator. The cam 76 is also provided with an initial dwell or working part 88, which engages the lower end of the locking-bar 89. The upward motion of said bar begun by the bell-crank 42, which is loosely connected to said bar by a shoulder-screw 90, which engages a slot 91 in the arm 42, is completed by cam 76. This puts the seat or groove 92 in the upper end of the locking-bar in engagement with any one of the pins 69 in a series, thereby securely locking the arm 82 to the key-frame. The hook 93 is raised out of engagement with the pin 94 just prior to the dwell 88 of the cam 76 having raised the arm 89. The hook 93 is pivotally connected to an extension 95 on the arm 82 at 96, as shown in Figs. 1, 3, and 4. The locking-bar 89 is connected to the arm 82 by shoulder-screws 97 and 98 in slots 99

and 100, so that the locking-bar 89 may rise and fall freely thereon to engage with and disengage from the pins 69 in the key-frame, the latter movement being effected by the spring 101, connected to the arm 42 of the bell-crank at one end and to the extension 95 of the arm 82.

The arm 87, supported upon shaft 72 on one side of the wheel 70, has a curved bar 102 pivotally secured to the upper end thereof and supports a tooth 103, which engages the teeth 71 of said wheel, as shown in Figs. 1, 2, and 13. Referring to the latter figure, it will be seen that arm 87 is provided with a pin 104, which projects through a slot 105 in one of the bifurcations of arm 82 and engages slot 106 in a locking-arm pivotally connected to the outer end of an arm or extension 108 of arm 82, and is provided with a pin 109, which engages a curved slot 110 in bar 111, which is pivotally secured at one end upon a rod 112, which extends through the machine and is supported at its ends in the frame of the machine. On the horizontal extension of bar 111 is a pin 113, which in its normal position (shown in Fig. 2) rests upon a shoulder in the upper end of the latch-bar 114, which is provided with a pin 115 and is pivotally connected at its lower end to a rod 116, also extending through the machine, and from the lower end of the latch extends a pin 117, to which one end of a spring 118 is attached, the opposite end of the spring being connected to said horizontal extension of the bar 111, as shown in Figs. 2 and 13. The pin 115 is in the path of and is struck by the raised portions 75 on the periphery of disk 73 of the next lower order to disengage the latch 114 from pin 113, causing bar 111 (actuated by spring 118) to fall and move the wheel 70 forward one tooth. This movement is effected by the slot 110 in bar 111 engaging pin 109 on arm 107, causing said arm to be drawn down, and in its downward movement it moves arm 87, which operates bar 102 and its tooth 103 through pin 104, being forced forward by the inclined part 119 of slot 106. The slot 106 is curved in the same direction at both its ends and the curves struck from the same center—namely, the pivot of the arm—but of different radii, the two ends being connected by an inclined portion 119, which, with the pin 104 on arm 87, completely locks the arm 87 to the arm 82 when the tooth 103 is in engagement with any of the teeth 71, and the arm 87 is held in its normal position in relation to arm 82 regardless of the position of arm 82 with respect to the keys and also securely locks arm 87 to arm 82 after arm 87 has carried adding-wheel 70 forward one tooth through its connection with bar 102 to prevent the tooth 103 while in engagement with the teeth 71 of the adding-wheel being moved without giving effect thereto in the work of adding. The opposite end of curved bar 102 is provided with a lateral extension 120, which is slotted at its end

and engages both sides of a link 121, having a curved slot 122 therein, by a pin 123 engaging the sides of the extension and passing through the slot, the link being connected to a swinging frame composed of side bars 124 on each side of the machine pivoted to the frame by short shoulder-screws at 125 and connected by transverse bars 126, on which the links are suspended, as shown in Figs. 1, 3, and 4. The lower ends of the bars 124 of the frame are bent inward and form lugs 127, which are engaged by hooks 128 on one end of a lever 129, pivoted on one side of the connecting-rods 79, and these levers are connected from both sides of the machine by an arm 130 on each lever and a transverse bar 131. (Shown in Figs. 2, 5, and 6.) The forward end of the right-hand lever 129 is bent upward to form a cam 132, (shown in dotted lines in Figs. 2 and 5,) and said cam is engaged by a pin 133 on an arm 134, which arm is mounted upon shaft 135 and holds the lever in position with the hook 128 depressed or out of engagement with lugs 127 as the connecting-rods move forward in setting the adding-wheels of all the series to zero preparatory to starting a new problem on the machine. When the rods 79 move backward, the lever 129, having the cam 132, is released from pin 133, the hook 128 is thrown up by the spring 136, in which position the lever is carried backward until the hooks 128 meet with lugs 127, which trip the levers 129 and allow the hooks to pass to the opposite sides of the said lugs, when the hooks are again raised by the spring 136 and engage the lugs, at which time the machine has made one-half of its cycle of operation and is ready to start forward, and in the forward movement the frame carrying the links 121, through the medium of the curved bar 102, disengages the tooth 103 thereon from the teeth 71 of the adding-wheel, the frame being held at this point in the operation by projections 137 on the bell-cranks 138, which bell-cranks in their normal position rest on projections 139 on one side of the bars 124, as shown in Fig. 2, the projection being shown in dotted lines.

As the frame is drawn forward, as heretofore explained, the bell-cranks 138 are forced downward through the action of spring 140, which causes the projections 137 on the bell-cranks to engage with the projections 139 on the side bars 124, thus holding the frame out. The forward movement of the link-supporting frame operates to lock all the adding-wheels simultaneously through the medium of a swinging frame, which we designate as a "locking-frame," as shown in Figs. 1, 2, 3, 4, and 5. The frame consists of curved side bars 141, pivotally supported upon the shaft 142, extending across the machine, and said bars are located on opposite sides of the machine and support a rod 143, which engages with the teeth 71 of the wheel 70, the frame being raised and the rod 143 put in engagement with the teeth 71, the cams 144 on the

outer ends of the side bars 141 engaging the lower rod 126 of the link-supporting frame.

The object of releasing the teeth 103 from the teeth 71 on wheel 70 (through the medium of the link-supporting frame) is to return the adding mechanism, except the adding wheels and disks 73, of all the series to their normal position in the operation of adding. Another object is to print the sum-total without disturbing the adding-wheels, when said teeth will be held out of engagement with the wheels in both the forward and backward movements of the adding mechanism.

The locking-frame is released from the wheels 70 by the following operation: After the machine has made a half a revolution or cycle and the link-supporting frame has been drawn out and locked in position, as heretofore described, the arm of the bell-crank 78, connected to the rod 79 in its forward movement, will come in contact with the lower arm 145 of bell-crank 138, (see Fig. 2), which will raise the upper arm thereof and release the projection 137 from projections 139 on the sides of the bars 124 of the link-supporting frame, when the latter frame, actuated by springs 146 on each side of the machine, will be returned to its normal position and rod 143 of the locking-frame will be disengaged from the wheels 70, said locking-frame being drawn downward by the action of springs 147, connected to bars 141 at one end and to a rod 148 at the opposite end, which rod extends through the machine from side to side.

For the purpose of registering the sum-total and setting the machine to zero there is pivotally connected to the vertical arm 149 (see Figs. 1, 2, 4, and 15) of the bell-crank 42 a swinging latch 150, having on the upper end of its free arm 151 a lateral projection 152, (see Fig. 16,) which when said latch is in its lowest position engages the right-angled projection 67 on the end of the key-stems when in their elevated position and also with the extension 37 of the lever 35 when the extension is raised into the same plane as the projections 67. In its normal position the latch 150 is supported by the upper end of the vertical arm of the bell-crank 153 by a shoulder 154 on the latch, and in this position the projection 152 will pass above the extension 37 and the projections 67 when the key-stems are in their normal position and the adding mechanism is being adjusted upon the key-frame in response to the depression of one of the keys of a series.

To engage the extension 37 or either of the projections 67, the end of the vertical arm of the bell-crank 153 is removed from the shoulder 154 on the swinging latch 150 by the depression of the sum-total key 155 or the zero-key 156. (Shown in Fig. 6.) Either of which keys when depressed operate the link-supporting frame, the connections between the latter key 156 being shown in Figs. 2 and 4, in which the lower end of the key is connected to a lever 157, fulcrumed on shaft 125 and when

depressed strikes a pin 158 on the side bar 159 of an auxiliary swinging frame, which communicates motion to the link-supporting frame by a projection 160 on the lower end of the arm 161 on the side bar 159, and the sum-total key is connected in like or any preferred manner to the side bar 159 on the opposite side of the machine, but not shown in the drawings, as they may be duplicates one of the other, and therefore require no further elucidation. To remove the vertical arm of the bell-crank 153 from the shoulder 154 of the swinging latch 150 by the depression of the key 155 or 156, the arm 162 at the front end of the auxiliary swinging frame, which is also depressed by the zero or total key in its depression, the rod 163 in the ends of the arms 162 strikes the horizontal arm of the bell-crank 153, thus tripping the arm upon which the latch rests, and when released the latch is carried down part of its stroke by the lever 86, whose arm 85 is provided with a finger 164 and is pivoted to extension 95 at 96. (See Figs. 1 and 13.) The end of the finger 164, resting upon the periphery of disk 73, travels thereon until in the forward movement of the adding mechanism the finger is brought opposite either one of the slots 74, when it (the finger) will fall into the slot, actuated by spring 165, and carry with it the arm 86 and complete the downward movement of the latch 150 by the pin 166 on the latch engaging the slot 167 in the upper end of the arm 86, as shown in Fig. 4, in which position the shoulder 154 of the latch rests upon screw 168 and is now ready for engagement with the extension 37 or the projection 67 in its respective bank or series of keys, when it will lock the adding mechanism to the key-frame, as heretofore described, and as the sector 76 continues its forward movement it will raise arm 85 by the dwell or working part 88 engaging the lateral projection 169 on the arm 85, which will raise the latch 150 and permit the upper arm or end of vertical lever 153 to again be brought in contact with the shoulder 154 by the spring 170.

In the downward movement of the arms 162 of the auxiliary swinging frame a bar 171, secured in said arm, engages an inclined seat 172 on levers 173, fulcrumed at their lower ends on rod 112, the upper ends of said arms being brought into engagement with pins 39 on the lock-bars 27 of each key-frame on the machine, pushing said levers 173 back and causing said lock-bar to move forward, unlock the operating-wheel, lock each of the keys in its series in its elevated position, and also raise projection 37 of lever 35, as heretofore described.

We have heretofore described how the carrying mechanism of one series is released by the projections 75 on the periphery of the disk 73 on the adding-wheel in the next lower series striking pin 115 on lever 114, causing the upper end of said lever to be thrown out of engagement with pin 113 on arm 111, Fig.

13. To restore the carrying mechanism to its normal position, a vertically-swinging frame having side bars 174 connected at their ends by rod 175 and pivoted to each side of the frame at 176 (see Figs. 1, 2, 3, 4, and 5) is raised by a pin 177 on the lower end of a vibrating lever 178, (see Fig. 3,) which engages an inclined lateral projection 179 on the side of bar 174, the lever 178 being pivotally connected to the lower arm 180 of a rocking bar supported upon a shaft 135 and is held in its normal position by a spring 181, which returns the lever after it has passed the projection 179, and is prevented moving too far by a lateral projection 182, resting on the edge of arm 180. The foregoing parts operating upon side bars 174 are duplicated on both sides of the machine. As the arm 180 moves forward pin 177 engages projection 179 and raises the swinging frame, which in its upward movement engages the outer and depending ends of the horizontal part of bars 111, raising said bars high enough to permit the upper end of latch-bar 114, actuated by spring 118, to engage with pin 113 and again lock the carrying mechanism in its normal position. This operation is effected after the teeth 103 are thrown out of engagement with the teeth 71 on wheels 70, and after the operation has been effected the frame is restored to its normal position by springs 183 and rests upon pins 184 in the side frames of the machine, as shown in Figs. 1, 2, 3, 4, and 5.

In the event that a wrong key has been depressed in any bank or series of keys the key or keys may be restored to its or their normal and elevated position without recording the value of the key or keys by pushing back the rack-bar 18 by means of a lever 185, secured to shaft 186, which passes through the outer end of all the key-frames and is supported in the side frames of the machine, said shaft being provided with arms 187 for each key-frame and arranged to engage at their lower ends with the outer extension 23 of the rack-bars 18, as shown in Figs. 5, 7, and 7^a, and as the lever 185 is drawn out the arms 187 engage the extensions 23 and push them forward, thus unlocking all the depressed keys, which will be restored to their elevated position by the spring 13 of each key, the rack-bars being returned to their normal position by springs 22. After each operation of adding the keys are restored to their normal position by a trip 188, Figs. 13 and 16, which is pivoted to the lateral extension 83 of the arm 82, its upward movement being limited by a lateral projection 189 on the lower arm of the trip, (shown in Fig. 16,) and as the adding mechanism of each series is returned the upper arm 190 of the trip engages the lower end of a lever 191, pivoted on the outer end of each key-frame and on the side thereof, and swings the lever backward at its lower end and with its upper end in engagement with the extensions 23 of the rack-bars push said bars forward and release the keys. In the

stroke of the trip the arm 190 passes under the lever 191, and in the opposite movement the arm 190 again passes under the lever 191 and is then restored to its normal position by spring 192, the lever 191 being held against being thrown back at its upper end by a pin 193 on the key-frame.

The adding mechanism for each series or bank of keys is operated from the operating-wheel 32 by a crank 194, connected thereto by a wrist-pin 195, (see Figs. 1, 3, and 4,) the shaft 196 being supported in hangers 197, supported on the transverse bar 198, which also supports the inner ends of the key-frames, the outer ends of said frames being supported upon a like bar 199, which bars are secured to the sides of the frame of the machine. On the wrist-pin 195, secured to the operating-wheel, and on a like free wrist-pin 195 at the opposite end of the shaft 196 are arms 200 of the rock-bar supported on shaft 135, the wrist-pins engaging a slot 201 in said arm, the lower arm 180 of said rock-bar being attached to connecting-rod 79 by a pin 202, which extends inward for a purpose hereinafter described. On shaft 135 are supported sector-shaped type-frames 203 by their arms 204 engaging the shaft, and the inner angular arm 205 thereof is attached to a rod 206, connecting the type-frame with the strap 207 on arm 82 of the adding mechanism, as shown in Figs. 1, 3, 4, 6, 16, 18, and 20, to bring the type on the type-frame in position to print a number corresponding with the position of the adding mechanism with relation to the keys in its series. The type-frames, of which there is one for each series of keys and adding mechanism, support type representing numerals from "0" to "9," inclusive. The arms 205 being set at an angle, as shown in Fig. 6, the type-frames 203 are cut out on their rear side, leaving an open space to accommodate and clear the angular arm of the adjacent series. Should the type-frame thereof be in a position that would otherwise interfere with the frame being operated—for example, if one type-frame were elevated to its full stroke and the adjacent one were required to be depressed to the extent of its stroke—this action could not be had if there were not a free and unobstructed space in rear of the type-frame to receive the angular arm of the adjacent type-frame.

Referring to Fig. 3, it will be seen that key 6 of one of the series has been depressed, the adding mechanism carried forward and locked to the key-frame, as heretofore described, and the corresponding number "6" on the type-frame 203 is brought into position to print, and the type-frame is locked in position by its connection with the adding mechanism, which, as above stated, is locked to the key-frame.

On a frame having side bars 208, Figs. 1, 2, 3, 4, 5, 6, and 14, which is pivotally connected to the rear end of the machine at 209, is supported a platen 210 on a revoluble shaft

211, and on which shaft is a ratchet-wheel 212, engaged by a pawl 213, pivotally secured to the frame of the machine (see Fig. 14) and supported in horizontal position by a spring 214, and the platen is locked in position on said arms by a latch 215, which engages a pin 216, and above the platen is a paper-feed roll 217, which bears upon the platen with sufficient force to produce the friction required to feed the paper 218 from the roller 219 to receive the impressions of the type. The feed-roll 217 is raised out of engagement with the paper on the platen by a lever 220, and on the rear end of the machine are brackets 221, which support spools 222, provided with inked ribbon 223, which is moved by a ratchet 224 on the lower spool, operated by a tooth or pawl 225, pivoted to one of the side bars 208. The frame supporting the platen and the paper is moved inward at its upper end and the paper pressed against the type, with the inked ribbon between the paper and the type, by arms 226, (only one of which is shown,) which are loosely supported on shaft 227 and are provided with a pin 228, on the side thereof, and arranged in the path of pins 202 on the lower end of arms 180 of the rocking bars, as shown in Figs. 1, 3, and 4. As the rock-bars travel toward the front of the machine the pins 202 strike the lower ends of the arms 226 and carry the arms with them, which motion causes the pins 228 to come in contact with the edges of the side bars 229 of a swinging frame suspended on shaft 227 and carries rollers 230 on the revoluble shaft 231 at their lower ends, which rollers engage the upturned inner ends of the side bars 208 and depress the front ends of said side bars and produce an impression or registry of the work of the machine. To provide for variable pressure of the platen against the type-frames when more or less type are in position for printing or registering, the shaft 231 is supported in elongated bearings 232 in the side arms 229, as shown in Fig. 2, so that the rollers 230 may rise and fall under pressure of the springs 233, and thus protect the type against excessive wear.

To return the swinging frame carrying the platen to its normal position after each operation of printing, springs 234 connect the upturned ends of side bars 208 to shaft 227, and said springs draw the frame into the normal position shown in Fig. 1. Simultaneously with the foregoing operation the frame carrying the rollers 230 and the arms 226 will be returned to their normal position by spring 235, (shown in Fig. 6,) which is wound around shaft 227, secured thereto at one end, the opposite end engaging the side arm 229 of the frame carrying the rollers. As said frame is returned an extension 236 of one of the arms 226 engages a lateral extension 237 of the arm 134 and prevents further movement of the frame and also the arms 226.

It is our purpose to put the cipher-type in position automatically to print as required,

which we accomplish in the following manner: On the lower end of the type-frame 203 is pivoted at 238 a swinging cipher-type 239, (see Fig. 9,) which in its normal position is held back from the face of the type-frame by a spring 240, secured to the frame, and resting at its free end against the type, and on the rear edge of the type is a cam 241, engaged by one arm 242 of a bell-crank, which is supported on shaft 135, and one supplied between each two adjacent type-frames, and on said shaft is a spring 243, bent around the lower edge of the arm 242 of each bell-crank for the purpose of raising said arm and releasing the swinging type after it has made an impression. From the upper edge of the arm 204 of each type-frame extends a hook 244, which engages a slot 245 in a detent 246, the body of which is supported directly over and in line with the bar 242, while the fingers are bent laterally to pass between the bars 242 and the adjacent type-frame, said detents being supported on shaft 247, which is supported in two brackets 248, one on each side of the type-frames, (see Fig. 6,) the brackets being attached to the rear end of the machine. On the lower arm 249 of the bell-crank are formed lateral extensions 250, which overlap the arm 249 of the bell-crank of the adjacent type-frame. As the type-frame is pushed downward, as heretofore described, it carries with it its detent 246 of the next lower order of keys, causing the body of said detent to depress the arm 242 of said next lower order with it, then through engagement with the lateral projection 250 on arm 249 to depress the arms 242 of all the bell-cranks of the other lower orders, this depression causing the cipher-type 239 to be projected by said arms 242 operating on cams 241 on said type of all orders lower than the key depressed and placing them in line with the other type on the frame and in position to print. After pin 244 of the type-frame has been carried out of slot 245 in its downward course detent 246 is held in its lower position (shown in full lines in Fig. 9) by the action of springs 243, causing the upper edge of arm 242 to be pressed against the body of the detent 246 and holding the same in position to engage the pin 244 of the type-frame in its upward movement and restoring the detent to its normal position and permitting springs 243 to return arms 242 of the bell-cranks of the preceding type-frames and releasing the ends of the arms 242 from the cams 241 of the cipher-type, which will then be carried back to their normal position by springs 240, as shown in dotted lines.

The operation of all the series of the machine being the same, it is sufficient to describe the operation of but one of the series to be understood by those skilled in the art of operating this class of machines. Referring to Fig. 3; key 6 is shown depressed, having unlocked the machine, as heretofore described, the operating-wheel 32 is revolved by crank 55, which imparts motion to the adding mechanism

by causing the oscillatory frame, which carries sectors 76, to which is locked the adding mechanism forward, until hook 41 strikes against projection 67 of the depressed key 6, at the same time adding-frame carrying with it the type-frame of the series. The contact 41, with 67, causes the adding mechanism to be released from the sector 76 and securely locked to the key-frame, said sector continuing its forward movement, while hooks 128 on connecting-rods 79 slide under the projections 127 of the link-supporting frame 124. In this movement the printing-frame, with its platen, is brought against the type-frame by the action of pins 202 in the lower arm of the rock-bar 180 coming in contact with the lower ends of arms 226, as heretofore described. The operating-wheel 32 by this time has made half a revolution and the machine one-half of its cycle of operation, and the parts are in the position shown in said Fig. 3. On the return stroke of the machine the hooks 128, engaging lugs 127 of the link-supporting frame, draw said frame, and with it tooth 103, out of engagement with the teeth 71 of the adding-wheel 70. The said forward movement of the link-supporting frame also brings bar 126 into engagement with cam-faces 144 of the side bars 141 of the locking-frame, thus locking the adding-wheel. This forward movement of the link-supporting frame also permits projection 137 on the arm 138 of bell-crank to engage lug 139 of said frame, holding the same out after it has been released by hooks 128. The rock-arm continues its movement, carrying back with it the sectors, until the rear end of the slot 80 engages the screw 81, when the adding mechanism will be released, as described, and carried back to its normal position. This latter movement also causes arms 78 of bell-crank to raise the upper arm 138 of bell-crank by striking the lower arm 145, thus releasing link-supporting frame, which will then be returned to its normal position by springs 146. This same movement also causes the upper arm of the trip 188 to be engaged with the lower end of lever 191, which pushes the rack-bars 18 forward, thus releasing the depressed key of its series, which is then returned to its normal position by spring 13.

We now have "6" on the machine, and the operation of printing the sum-total is the same whether one or all the series of the machine have been used and is as follows: Depress sum-total key 155, which unlocks the machine, as described, and also brings the upper end of arm 153 of the bell-crank out of engagement with shoulder 154 of latch 150, which is then carried downward by lever 86 until the finger 164 rests on the periphery of disk 73, riding thereon until it reaches one of the slots 74, into which it falls, causing latch 150 to engage projection 67 of the key 6, which is now in its elevated position, as shown in Fig. 4. The depressing of the sum-total key 155 has also pushed forward the link-sup-

porting frame, disengaging the tooth 103 from the wheel 70 and causing the latch 251 on the arm 161 to engage pins 252 in the frames on each side of the machine, said latches being
 5 held in engagement with said pins by spring 253, thus holding the link-supporting frame in the position it assumed when the tooth 103 was disengaged from the wheel 70, as it is de-
 10 sired to hold the tooth out of engagement with the adding-wheel 70 in both the forward and backward movements of the adding mechanism in order to retain the sum on the add-
 ing-wheel undisturbed should it be necessary to reprint the sum total, the printing mech-
 15 anism operating in this instance as in the adding. The latches 251 during this operation hold out link-supporting frame until the machine has started on its backward stroke, when the arm 78, connected to the rod 79, will be
 20 drawn away from the arm 145 of the bell-crank, permitting the projection 137 on the upper arm 138 to be thrown in engagement with lug 139 on the side bars 124 of the link-supporting frames, which also then lock said
 25 frame in its elevated position, permitting the hooks 128 on rods 79 to pass freely under the lower ends of the bars 124 of the link-supporting frame without engaging therewith. As the rock-arm continues its movement the
 30 projection 254 on the arm 181 of the rock-bar is brought into contact with the latches 251, raising them out of engagement with pins 252 and permitting the auxiliary swinging frame to be returned to its normal position, actu-
 35 ated by springs 255, and with it the sum-total key 155; but the link-supporting frame is still held in its elevated position by projections 137 and lugs 139. As the machine continues its movement the arm of the bell-cranks con-
 40 nected to the bars 79 will be brought into contact with the lower end of the arms 145, when the link-supporting frame will be released and returned to its normal position, as heretofore described.
 45 Preparatory to beginning a new problem in addition it is necessary to bring all the adding-wheels to zero, which operation we will now describe by referring to Fig. 6. By depressing the zero-key 156 the same effect
 50 is produced upon the adding mechanism, including the link-supporting frame, as that produced by depressing the sum-total key, and in addition thereto the arm 134 is locked to the lower arm 180 of the rock-bar, vir-
 55 tually making them travel as one. By reference to Fig. 2 it will be seen that the zero-key 156 is connected at its lower end to one end of a lever 256, fulcrumed on pin 125 on one side of the machine, and the opposite end
 60 of said lever is provided with a link 257, pivotally connected thereto and engaging at its lower end with a latch 258, which is pivotally connected to the frame of the machine, and the lever 256 is provided with a spring 259,
 65 connected at its opposite end with a lug 260 on the frame of the machine, and the latch 258 engages with a pin 261 on a detent 262,

pivotally connected to the frame at 263, and is provided with a pin 264, which engages the hook 265 at one end of a lever 266, pivoted on
 70 arm 134, and the opposite end of said lever is provided with a reverse hook 267, which engages a right-angled projection 268 on the arm 180 of the rock-bar. In the operation which has just taken effect the detent 262 is
 75 drawn upward, disengaging its pin 264 from hook 265 by spring 269, and the lever 266 is raised by spring 270 and the hook 267 engaged with the right-angled projection 268. Now upon depressing the zero-key these several
 80 parts just described assume the position shown in Fig. 5 and produce the locking effect referred to between the arms 134 and 180. During the operation of restoring the machine to zero the printing mechanism is inoperative,
 85 as no registering is required. The zero-key having been depressed, the operating-wheel 32 is revolved, which transmits motion to the rock-bar. The adding mechanism is carried forward and locked to the key-frame, as in
 90 the operation of printing the sum total. As the arm 134, which is now locked to the arm 180, continues its movement it draws away the lateral projection 237 on the arm 134 from engagement with the extension 236 on one of
 95 the arms 226, permitting said arms 226 to be raised at their lower ends out of the path of pins 202 in the lower end of the arms 180 of the rock-bars, and thus not operating the printing-frame. This upward movement of
 100 the arm 226 is limited by pin 271 in one of the sides of the machine. As the rock-bar continues its movement the upper end of hook 267 and the extension 254, respectively, engage
 105 the extreme outer end of arm 138 and latch 251, raising both synchronously and releasing the link-carrying frame, which will then be restored to its normal position, carrying with it the bars 102 and the teeth 103 into en-
 110 gagement with the adding-wheels 70 throughout the entire machine. It will also be noticed in this operation that the hooks 128 on the levers 129 are held out of engagement with the lugs 127 of the link-supporting frame in both the backward and forward motions of
 115 the connecting-rod 79.

The teeth 103 being now in engagement with the adding-wheels, the adding mechanism of each series is returned to its normal position, carrying with it the adding-wheels of
 120 all the series. In this same movement the lateral extension 237 restores the arm 226 to its normal position by engagement with extension 236 and causes extension 272 on arm 134 to engage with pin 273 on detent 262, forcing de-
 125 tent down until latch 258 engages with pin 261, again locking the detent, which will then put pin 264 of said detent in position to release hook 267 on lever 266 from projections 268 on rock-arm 180 and lock hook 265 of le-
 130 ver 266 to detent 262. The zero-key is returned to its normal position by spring 259.

Having thus fully described our invention, what we claim is—

1. In a computing-machine, a key-frame having a plurality of keys, a longitudinally-movable latch-bar and a longitudinally-movable lock-bar engaging all the keys in the series and constructed to lock a depressed key and all the remaining keys in elevated position.

2. In a computing-machine, a key-frame having a plurality of keys, a longitudinally-movable latch-bar having teeth engaging said keys, and a longitudinally-movable lock-bar having slots also engaging the keys, constructed to lock a depressed key and all the remaining keys in the series in elevated position.

3. In a computing-machine, a key-frame having a plurality of keys provided with laterally-extending pins, a latch-bar having teeth provided with shoulders to engage the pins on the keys, and a lock-bar adjacent to the latch-bar and having inclined slots to engage said pins, constructed to lock a depressed key and all the remaining keys in the series in elevated position.

4. In a computing-machine, a key-frame having a plurality of keys provided with laterally-extending pins, a longitudinally-movable latch-bar having teeth provided with shoulders to engage the pins on the keys, a longitudinally-movable lock-bar adjacent to the latch-bar and slots to engage said pins, whereby said bars are operated by the depression of any key in its series to lock said key in its depressed position and all the remaining keys in the series in elevated position.

5. In a computing-machine, a key-frame having slots in one side thereof to receive the stems of the keys and a longitudinal recess in the opposite side, a plurality of keys having laterally-extending pins, springs in said recess engaging said pins, a latch-bar having teeth provided with shoulders, engaged by said pins, and a lock-bar adjacent to the latch-bar having inclined slots engaging said pins, whereby said bars are moved longitudinally by the depression of any key in its series to lock said key in its depressed position and all the remaining keys in the series in elevated position, and means for automatically returning said bars to their normal position.

6. In a computing-machine, a key-frame having a plurality of keys, each key-stem being provided with a pin and an extension on opposite sides of the stem, one to engage a locking mechanism for the keys and the other to move into the path of and engage the adding mechanism.

7. In a computing-machine, a key-frame having a plurality of keys, a longitudinally-movable lock-bar, and a lever pivotally secured to the side of the key-frame at one end thereof, extending through said frame and engaged by said lock-bar.

8. In a computing-machine, a key-frame having a plurality of keys, a longitudinally-

movable lock-bar engaged by said keys, and a lever pivotally secured to one side of said frame and having a bent end extending through the frame, and engaged and operated by the lock-bar.

9. In a computing-machine, a key-frame having a plurality of keys, and slots for the stems of the keys, each key-stem being provided with a pin on one side of the stem, a rack-bar and a lock-bar engaged by said pin, an extension at the end of the stem and on the side opposite said pin, and a plate provided with slots to receive said extensions and secured to the key-frame.

10. In a computing-machine, a key-frame having a plurality of keys, a longitudinally-movable latch-bar and a longitudinally-movable lock-bar operated by any key in the series to lock said keys, and means for returning said locking mechanism to its normal position and unlocking the keys.

11. In a computing-machine, a key-frame having a plurality of keys whose stems are provided with lateral extensions, and pins on the side of said frame, and an adding mechanism, the extensions and the pins constructed and arranged to be engaged by the adding mechanism.

12. In a computing-machine, a plurality of key-frames each having a plurality of keys, a longitudinally-movable key-locking mechanism supported on each frame and operated by the keys to lock all the keys in its series, and a pivoted lever secured to each frame in the path of a trip secured to the locking mechanism to release all the keys.

13. In a computing-machine, a plurality of key-frames each having a plurality of keys; in combination with an operating-wheel, a latch-bar and a lock-bar, an adding mechanism and means engaging the operating-wheel and operated by any key of a series to lock all the keys in said series, and unlock the operating-wheel and the adding mechanism.

14. In a computing-machine, a plurality of series of keys, a latch-bar and a lock-bar for each series, an adding mechanism for each series, and an operating-wheel provided with means for locking said wheel in its normal position; in combination with means operated by any key of any of the series for unlocking the operating-wheel.

15. In a computing-machine, a plurality of series of keys, a latch-bar and a lock-bar for each series, an adding mechanism for each series, and an operating-wheel having ratchet-teeth on its periphery, a pawl engaging said teeth, a pin on one side of the wheel, and a hook engaging said pin; in combination with means actuated by any key in either series for disengaging said hook.

16. In a computing-machine, a plurality of series of keys, a latch-bar and a lock-bar for each series, an adding mechanism for each series, and an operating-wheel common to all the adding mechanisms and provided with a pin on one side thereof, and a hook engaging

said pin; in combination with a swinging head pivotally connected to a lever actuated from any key in either series for disengaging the hook.

5 17. In a computing-machine, an adding-wheel, a series of keys for said wheel, means for supporting the keys, and connections between the keys and the adding-wheel; in combination with a bar and a tooth thereon for
10 each wheel to engage the teeth on said wheel, and means for locking said bar with the tooth in engagement with the wheel.

18. In a computing-machine, an adding-wheel, a series of keys for said wheel, means
15 for supporting the keys, and connections between the keys and the adding-wheel; in combination with a bar and a tooth thereon for each wheel to engage the teeth on said wheel and means for locking said bar with the tooth
20 out of engagement with the wheel.

19. In a computing-machine, an adding-wheel, a series of keys for said wheel, means for supporting the keys, and connections between the keys and the adding-wheel; in combination with a bar, and a tooth for each
25 wheel to engage the teeth on said wheel, and means for locking said bar with the tooth in or out of engagement with the wheel.

20. In a computing-machine, an adding-wheel, a series of keys for said wheel and connections between the keys and the adding-wheel; in combination with a bar and a tooth
30 thereon for each wheel to engage the teeth on said wheel, and a pivotally-supported locking-arm having a pin projecting from one side thereof and engaging with the adding
35 mechanism and means for locking the bar and its tooth in engagement with said wheel.

21. In a computing-machine, an adding-wheel, a series of keys for said wheel, and connections between the keys and the adding-wheel; in combination with a bar having a
40 tooth thereon, a swinging link engaged by one end of said bar, and means for throwing said link to engage said tooth with said wheel and disengage it therefrom.

22. In a computing-machine, an adding-wheel, a series of keys for said wheel and connections between the keys and the adding-wheel; in combination with a bar and a tooth
50 thereon to engage the teeth on said wheel, a swinging link connected to one end of said bar and a frame supporting said link.

23. In a computing-machine, an adding-wheel, a series of keys for said wheel, and connections between the keys and the wheel; in combination with a bar and a tooth thereon
55 for each wheel to engage the teeth on the wheel, means for throwing said tooth in and out of engagement with the teeth on the wheel, means for revolving the wheel, and means for locking said wheel.

24. In a computing-machine, an adding-wheel, a series of keys for said wheel, and
65 connections between the keys and the wheel; in combination with a bar and a tooth thereon to engage the teeth on the wheel, a link con-

nected to said bar for throwing said tooth in and out of engagement with the teeth on the wheel, a swinging frame for locking the wheel, 70 and a frame supporting the link and operating the former or locking frame.

25. In a computing-machine, an adding-wheel having a disk on the side thereof provided with radial slots and having a peripheral track, and an arm having a finger to engage
75 said slots; in combination with means for engaging said finger with said slots and disengaging it therefrom.

26. In a computing-machine, an adding-wheel having a disk on the side thereof provided with radial slots, a peripheral track having raised portions adjacent to said slots, an arm having a finger to engage the slots, and a key-frame provided with keys, and projections on one side thereof; in combination
85 with a carrying mechanism and means for engaging said mechanism with the key-frame.

27. In a computing-machine, a key-frame provided with keys having stems provided
90 with lateral extensions, a lever pivoted on said frame with one end extending through the frame, and pins on one side of the frame; in combination with an adding-wheel, a carrying mechanism, one member of which is
95 grooved at its upper end and engages said key-frame, an arm, and a latch pivotally supported on said arm to engage the extensions on the keys when depressed.

28. In a computing-machine, a key-frame, 100 an arm connected to the key-frame at its upper end and supporting a trip pivotally secured to said arm, keys having pins on one side thereof, a longitudinally-movable latch-bar engaging said pins, and a lever pivotally secured to said frame with one end in the path
105 of said trip and the opposite end in engagement with the extensions of the latch-bar; in combination with an adding-wheel, and means for imparting motion thereto. 110

29. In a computing-machine, a bank or series of keys, an adding-wheel, and a carrying mechanism; in combination with an operating-wheel, a rock-bar connected to the operating-wheel, a connection between the shaft
115 of the rock-bar and the adding-wheel, and the carrying mechanism.

30. In a computing-machine, a key-frame and its keys, an adding-wheel and connections between said frame and said wheel, and
120 an operating-wheel; in combination with a rock-bar connected to said operating-wheel and to said adding-wheel, and a type-frame supported on the shaft of the rock-bar and oscillated thereby. 125

31. In a computing-machine, a bank or series of keys, an adding-wheel, an operating-wheel, and connections between said keys and wheels; in combination with a rock-bar connected to the operating-wheel, a type-
130 frame supported on the shaft of the rock-bar and oscillated thereby, and a platen supported upon a frame operated from the lower end of said rock-bar.

32. In a computing-machine, a type-frame, a cipher-type pivotally secured thereto, a bell-crank, one arm of which engages said type and the opposite arm is provided with a lateral extension which overlaps a like arm on an adjacent bell-crank, a hook on the arm of the type-frame and a detent engaging said hook.

33. In a computing-machine, a sector-shaped type-frame having a supporting-arm engaging a shaft, with an open space between the frame and the arm and said arm terminating in an angular member; in combination with an adding mechanism, and a connection between the type-frame and the adding mechanism.

34. In a computing-machine, a plurality of series of keys, a sum-total key, and means operated thereby for locking all the keys in all the series in their elevated position; in combination with an operating-wheel, a locking mechanism therefor, and means operated by said key for unlocking said wheel.

35. In a computing-machine, a plurality of series of keys, a sum-total key, and means operated thereby for locking all the keys in all the series in their elevated position; in combination with an operating-wheel, a locking mechanism therefor, means operated by said key for unlocking said wheel, a plurality of adding-wheels, and means operated by said key for locking the adding-wheels.

36. In a computing-machine, a plurality of series of keys, a zero-key, and means operated thereby for locking all the keys in all

the series in their elevated position; in combination with an operating-wheel, a locking mechanism therefor, and means operated by said key for unlocking said wheel.

37. In a computing-machine, a plurality of series of keys, a zero-key, and means operated thereby for locking all the keys in all the series in their elevated position; in combination with an operating-wheel, a locking mechanism therefor, means operated by said key for unlocking said wheel, a plurality of adding-wheels and means operated by said wheel for locking the adding-wheels.

38. In a computing-machine, a plurality of series of keys, a sum-total key, and means operated thereby for locking all the keys in all the series in their elevated position; in combination with an operating-wheel, a locking mechanism therefor, means operated by said key for unlocking said wheel, a plurality of adding-wheels, means operated by said key for locking the adding-wheels, a plurality of type-frames, and means for operating the type-frames which have been used in the adding of a given sum to bring them into position to print the sum-total, and means for locking the type-frames which have not been used.

In testimony whereof we affix our signatures in presence of two witnesses.

AUGUST SCHNEIDER.

JOSEPH PERFLER.

Witnesses:

GEO. D. JONES,

G. C. URLIN.