

(No Model.)

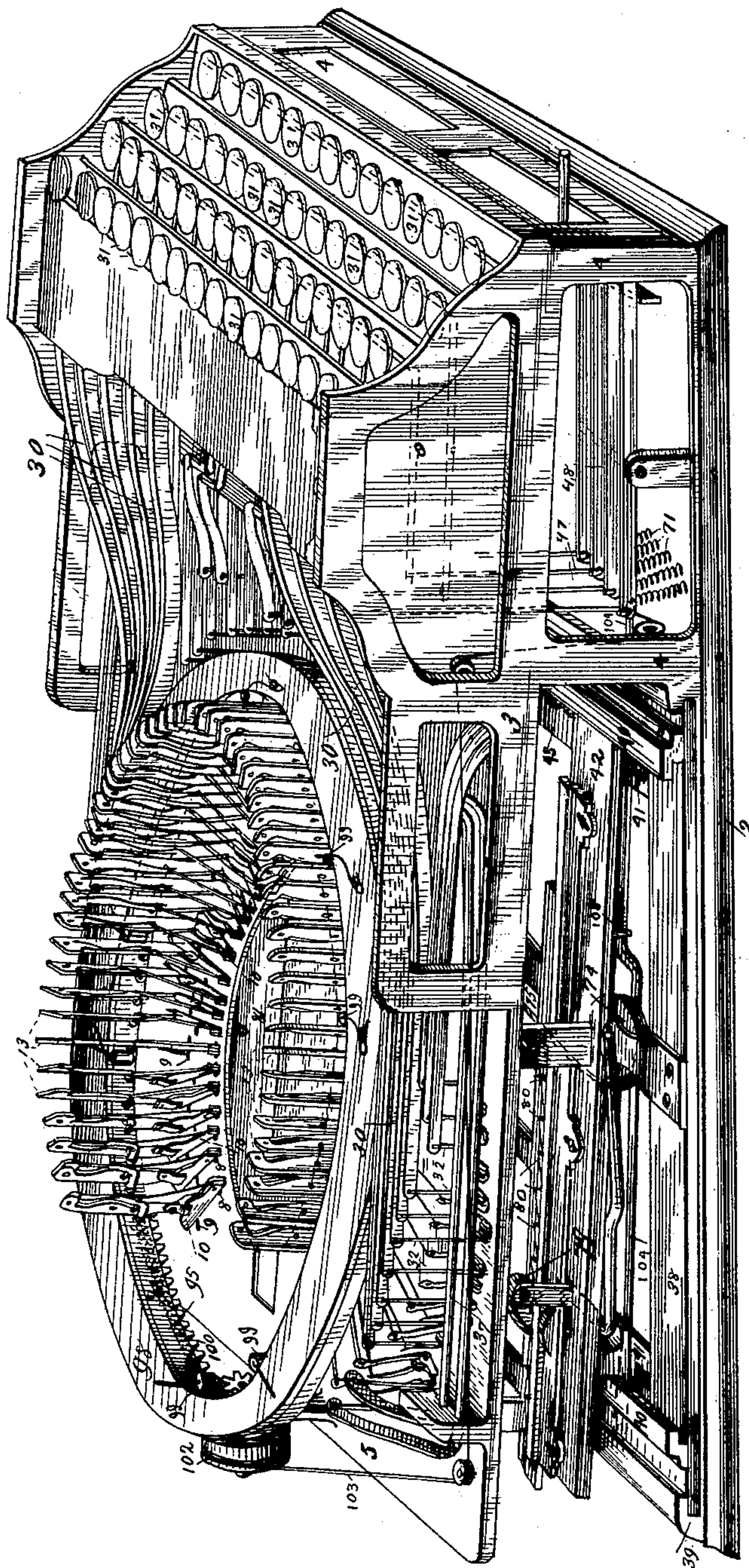
5 Sheets—Sheet 1.

W. H. ELLING.
TYPE WRITING MACHINE.

No. 407,185.

Patented July 16, 1889.

Fig. 1.



Witnesses
Wm M. Moore
Jesse L. Carey.

Inventor
William H. Elling
H. T. Fisher
Attorney

(No Model.)

5 Sheets—Sheet 2.

W. H. ELLING.
TYPE WRITING MACHINE.

No. 407,185.

Patented July 16, 1889.

Fig. 2.

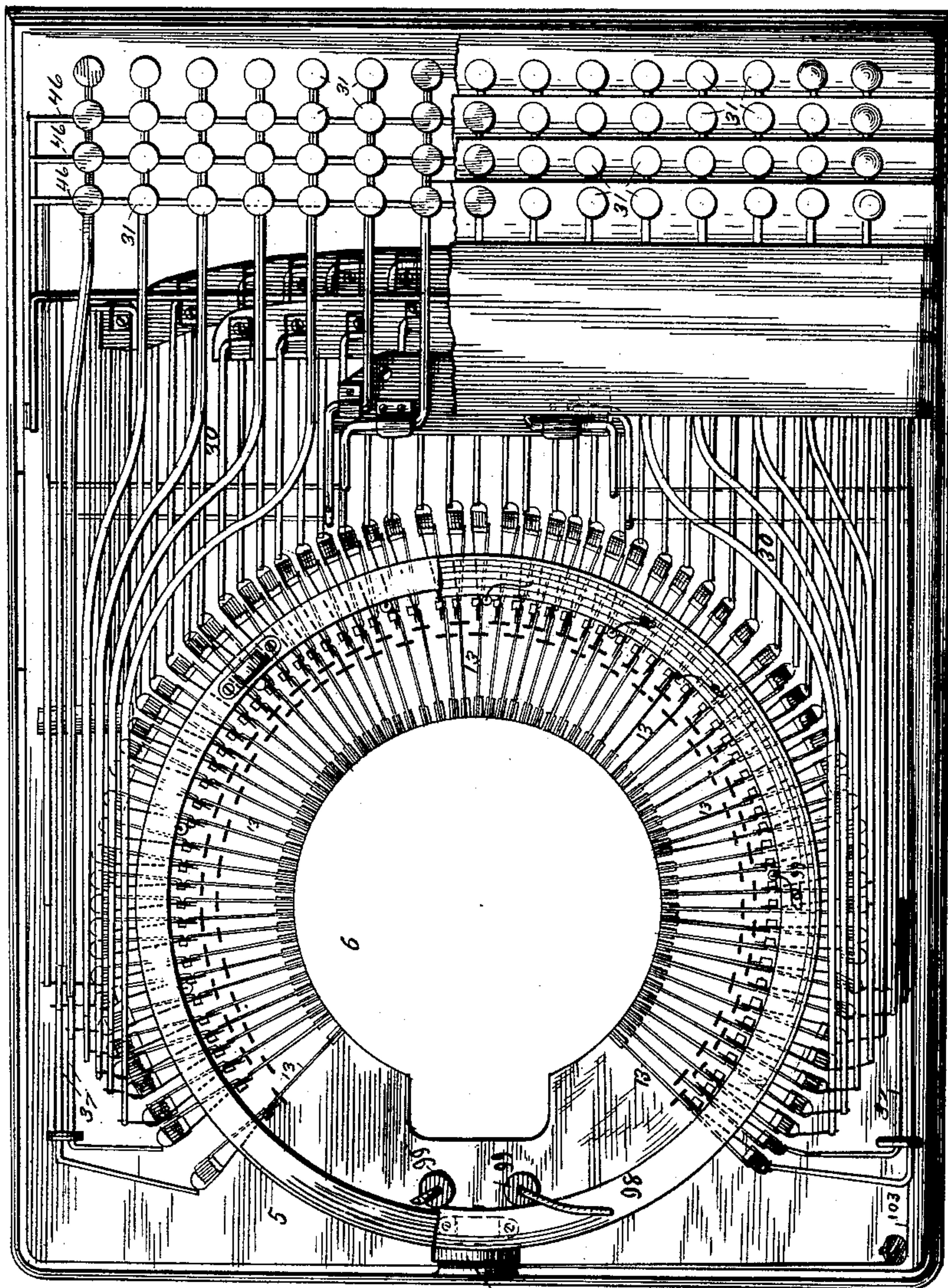
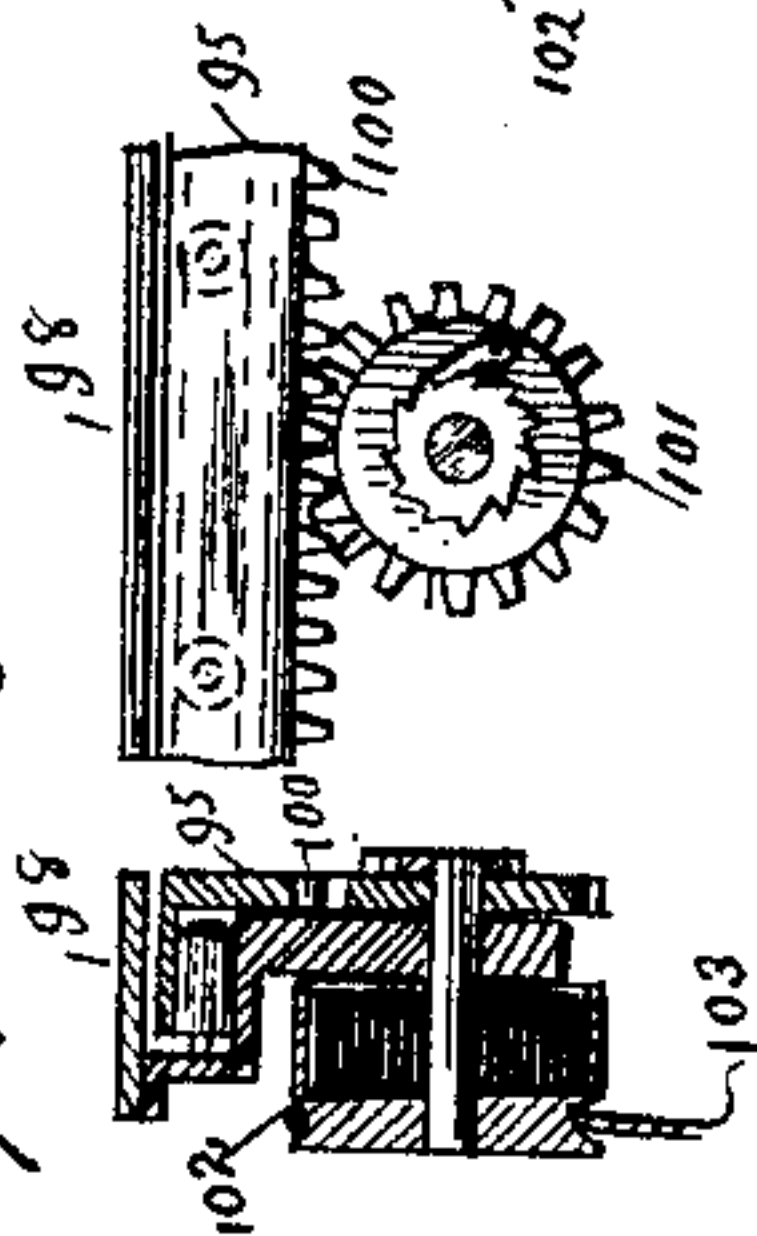


Fig. 11

Fig. 12



Witnesses
Mr. M. Monroe
Irene L. Corey

Inventor
William H. Elling
H. T. Fisher
Attorney.

(No Model.)

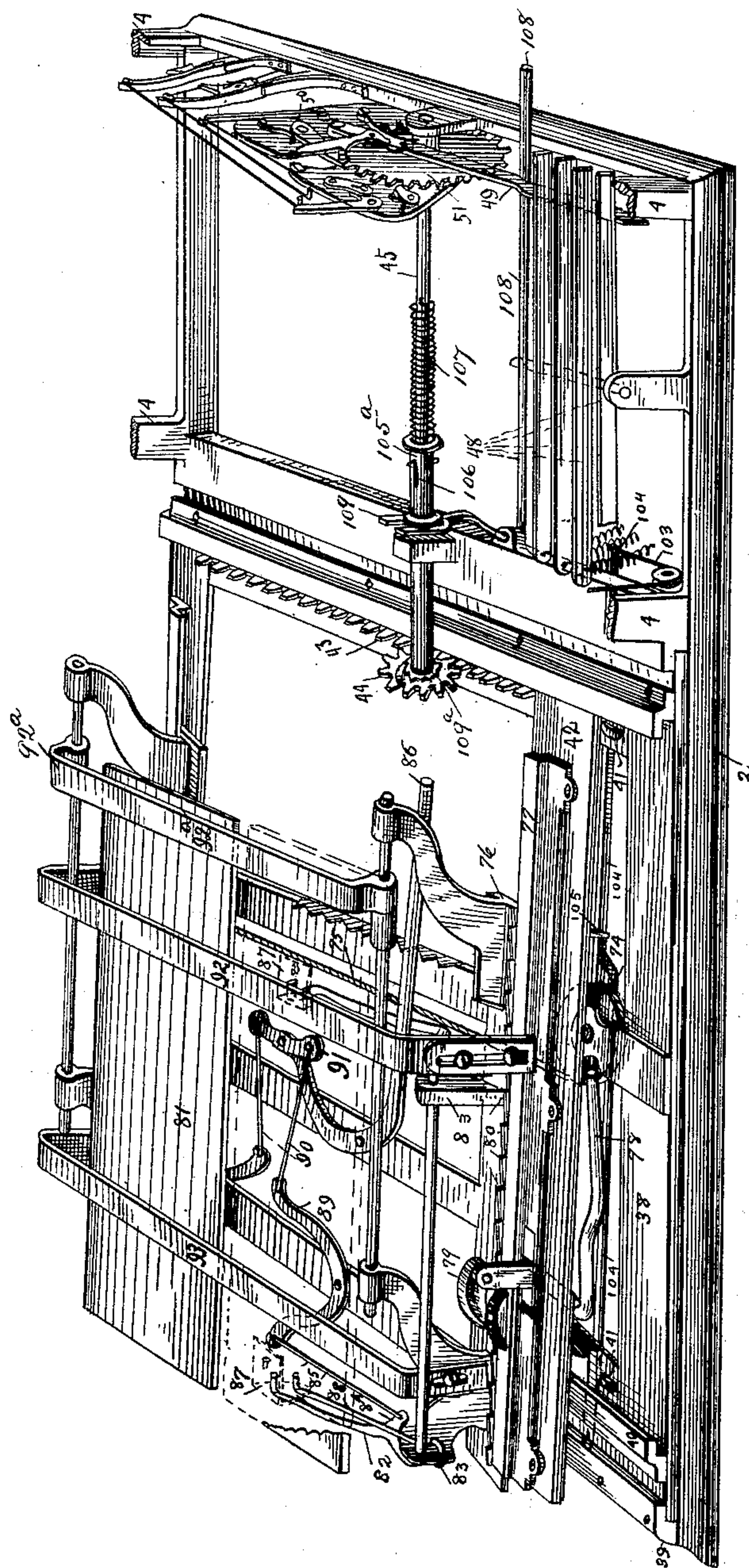
5 Sheets—Sheet 3.

W. H. ELLING.
TYPE WRITING MACHINE.

No. 407,185.

Patented July 16, 1889.

Fig. 3.



Witnesses
Wm. M. Monroe
Jesse L. Corey

Inventor
William H. Elling
by
H. T. Fisher
Attorney

(No Model.)

5 Sheets—Sheet 4.

W. H. ELLING.
TYPE WRITING MACHINE.

No. 407,185.

Patented July 16, 1889.

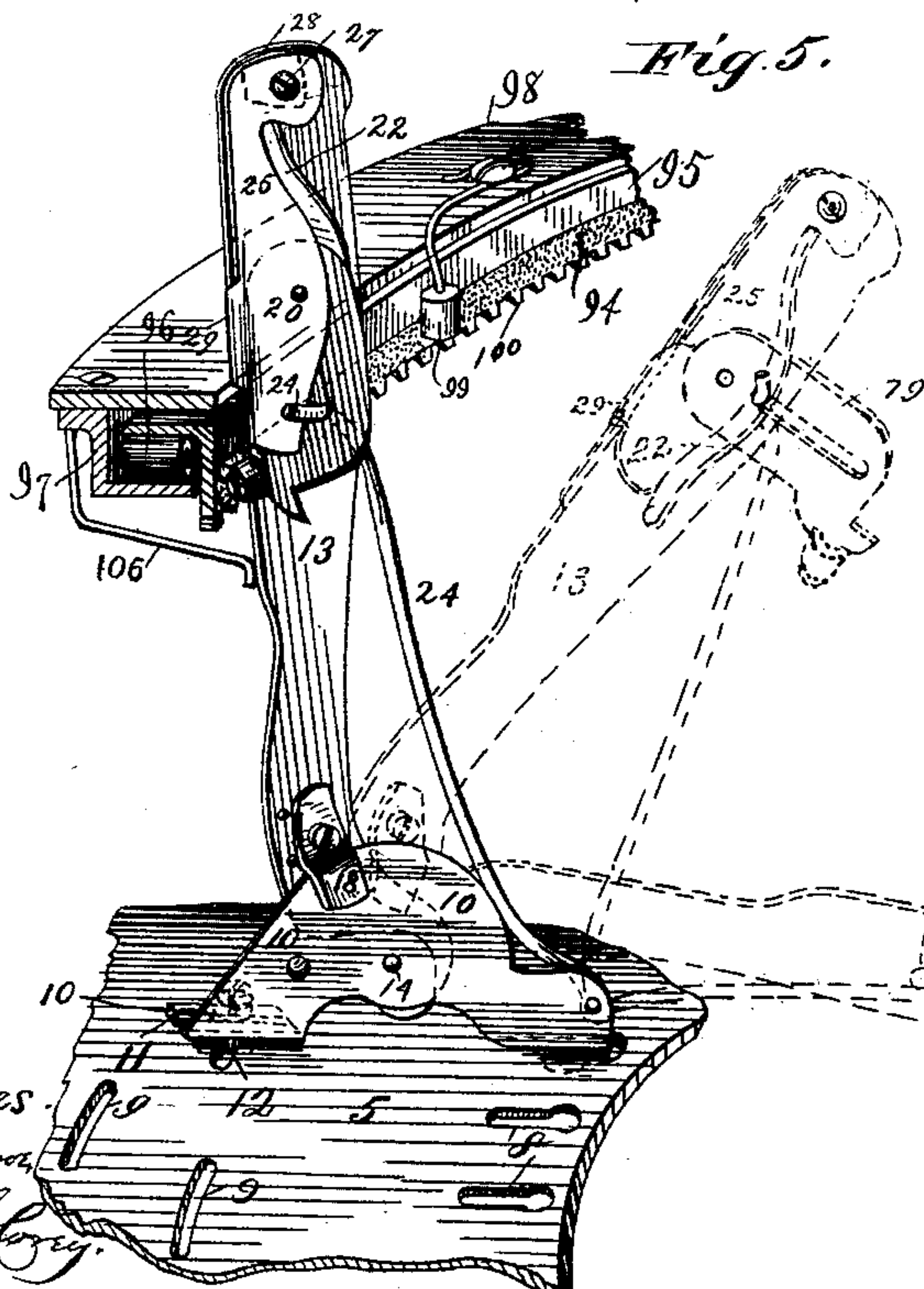
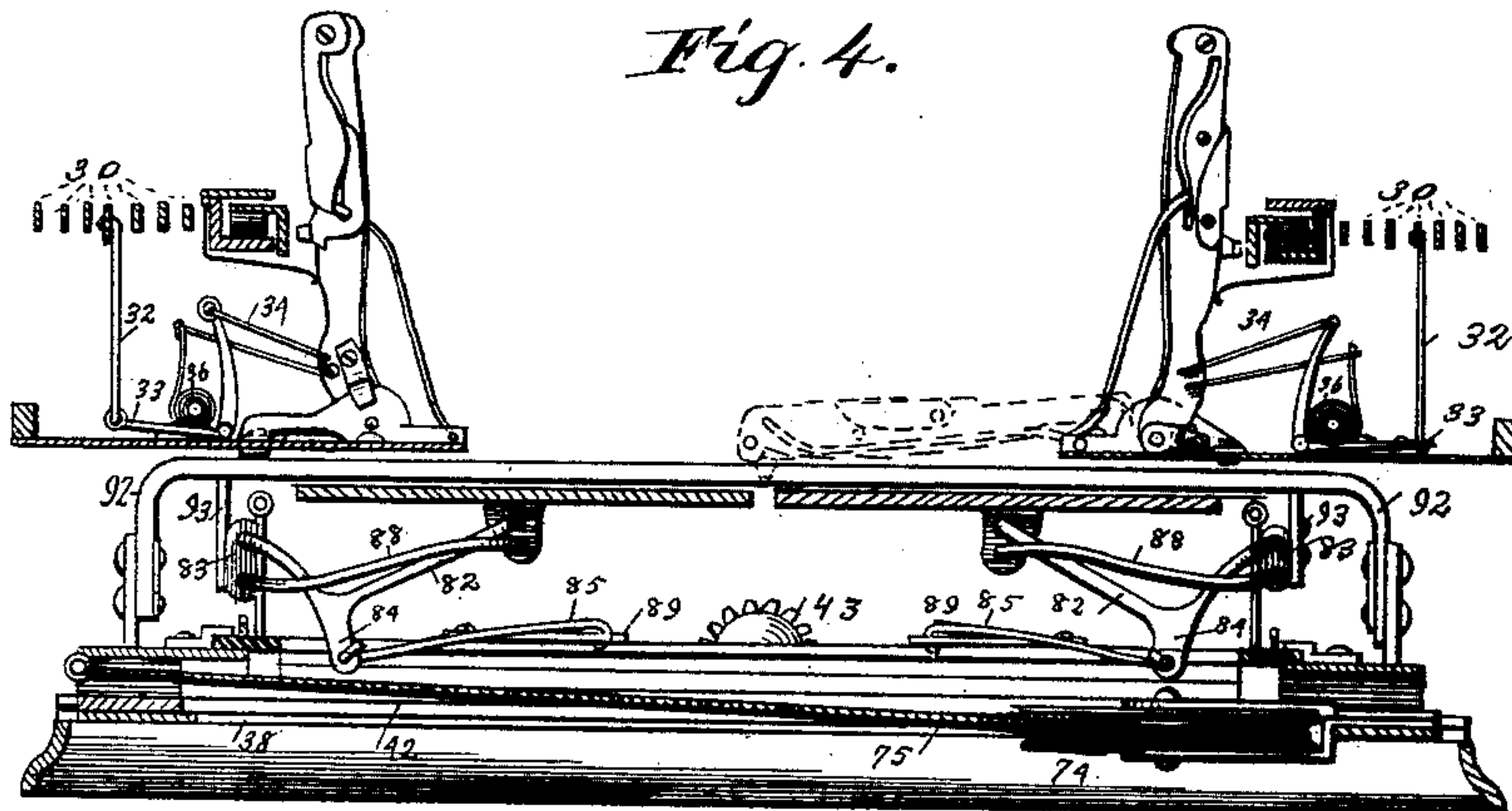
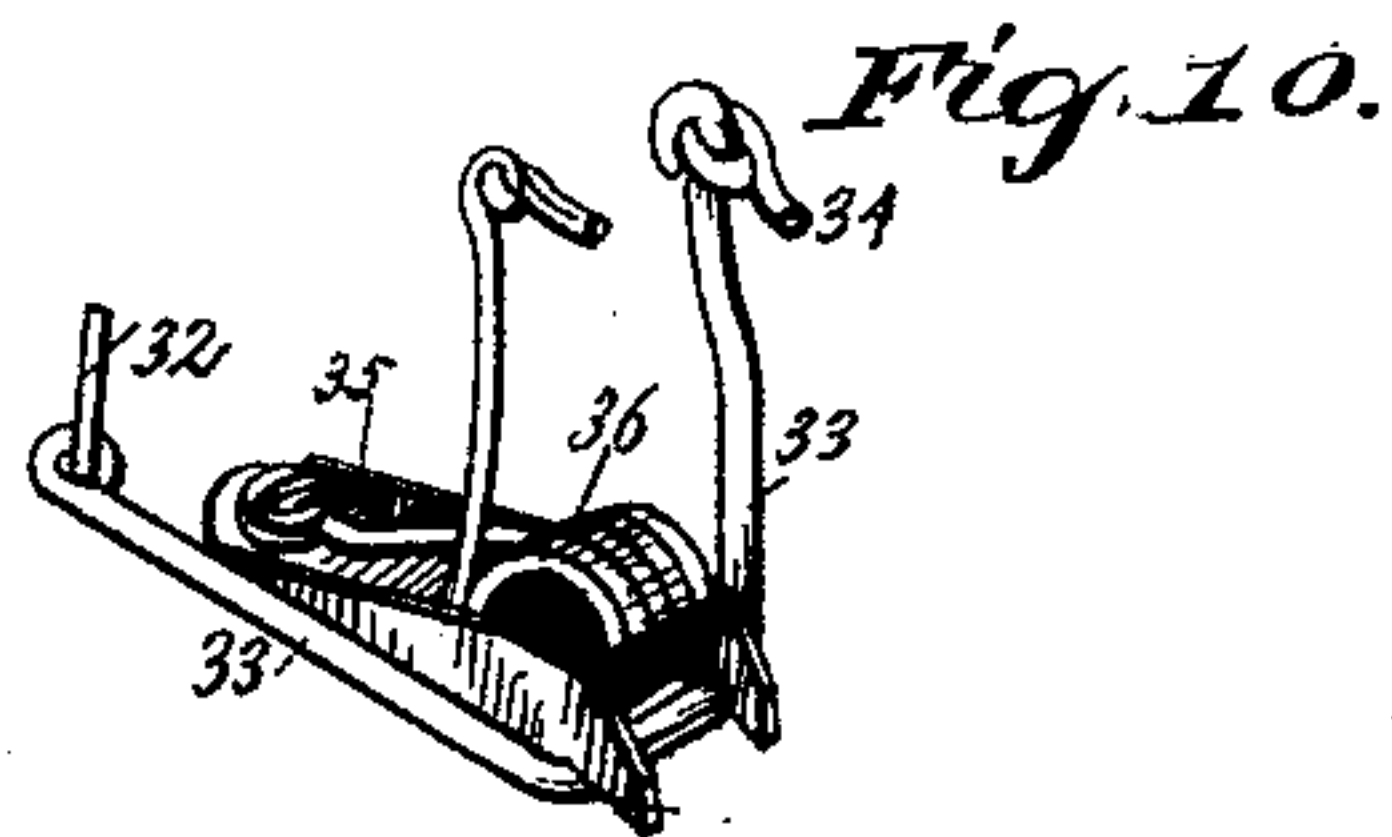


Fig. 6.

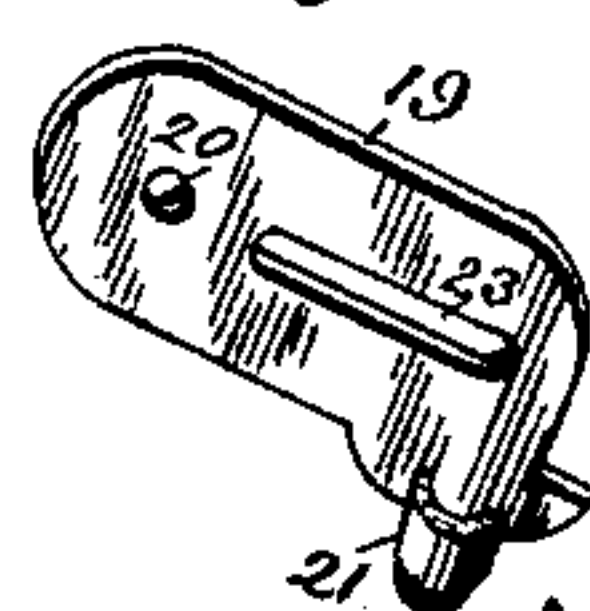
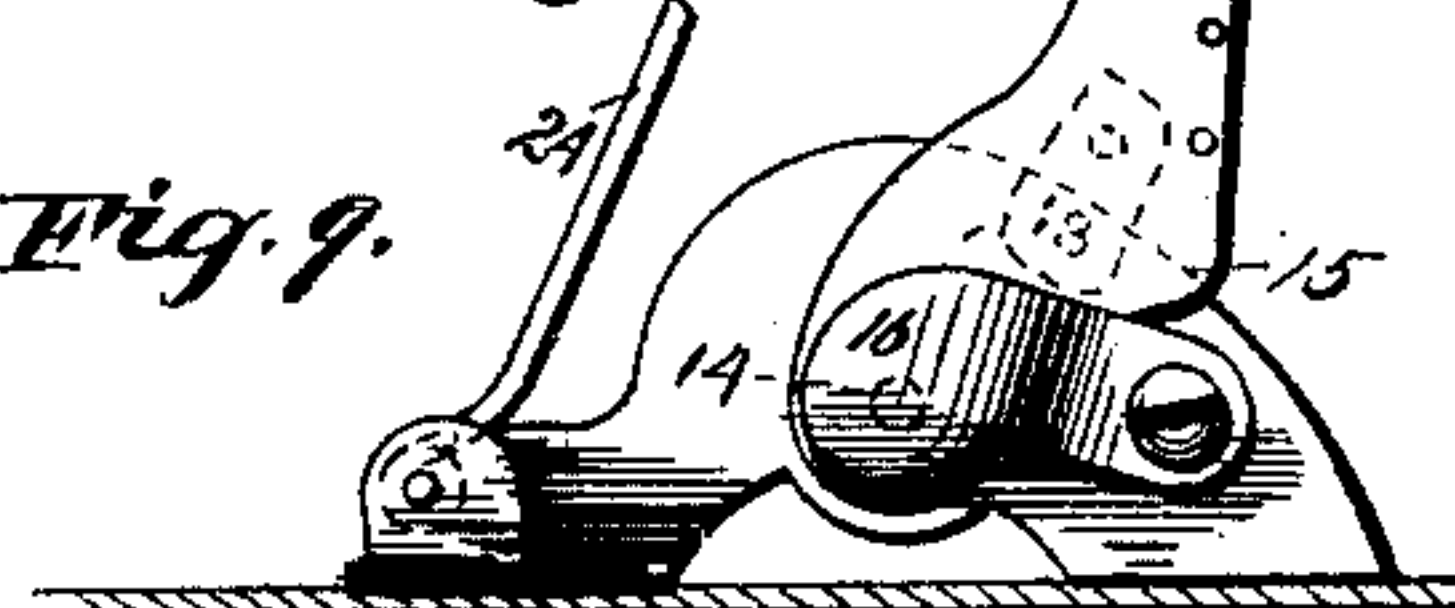


Fig. 9.



Witnesses:
Jm. M. M.
Jm. L. Long.

Inventor
William H. Elling
H. T. Fisher
Attorney.

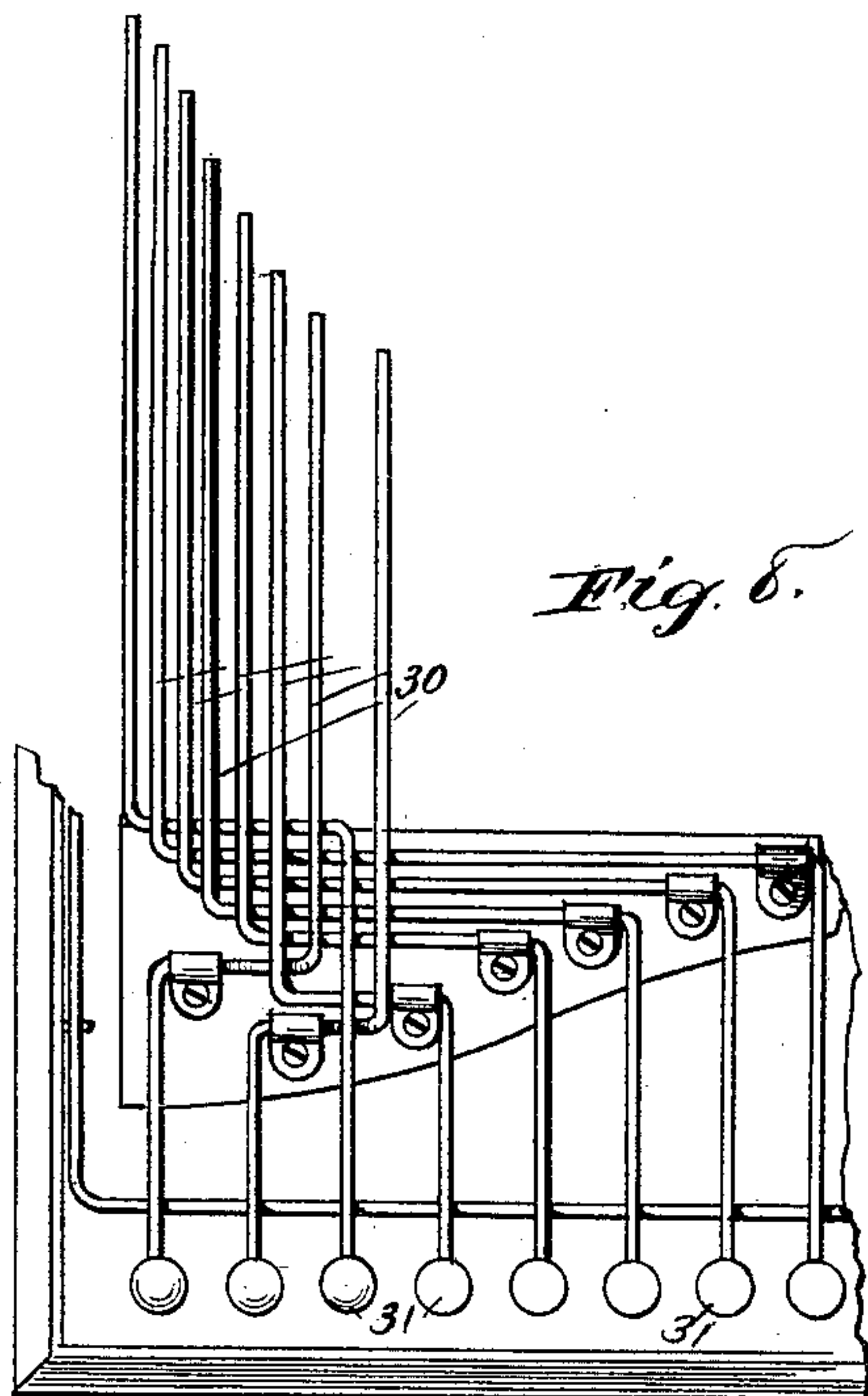
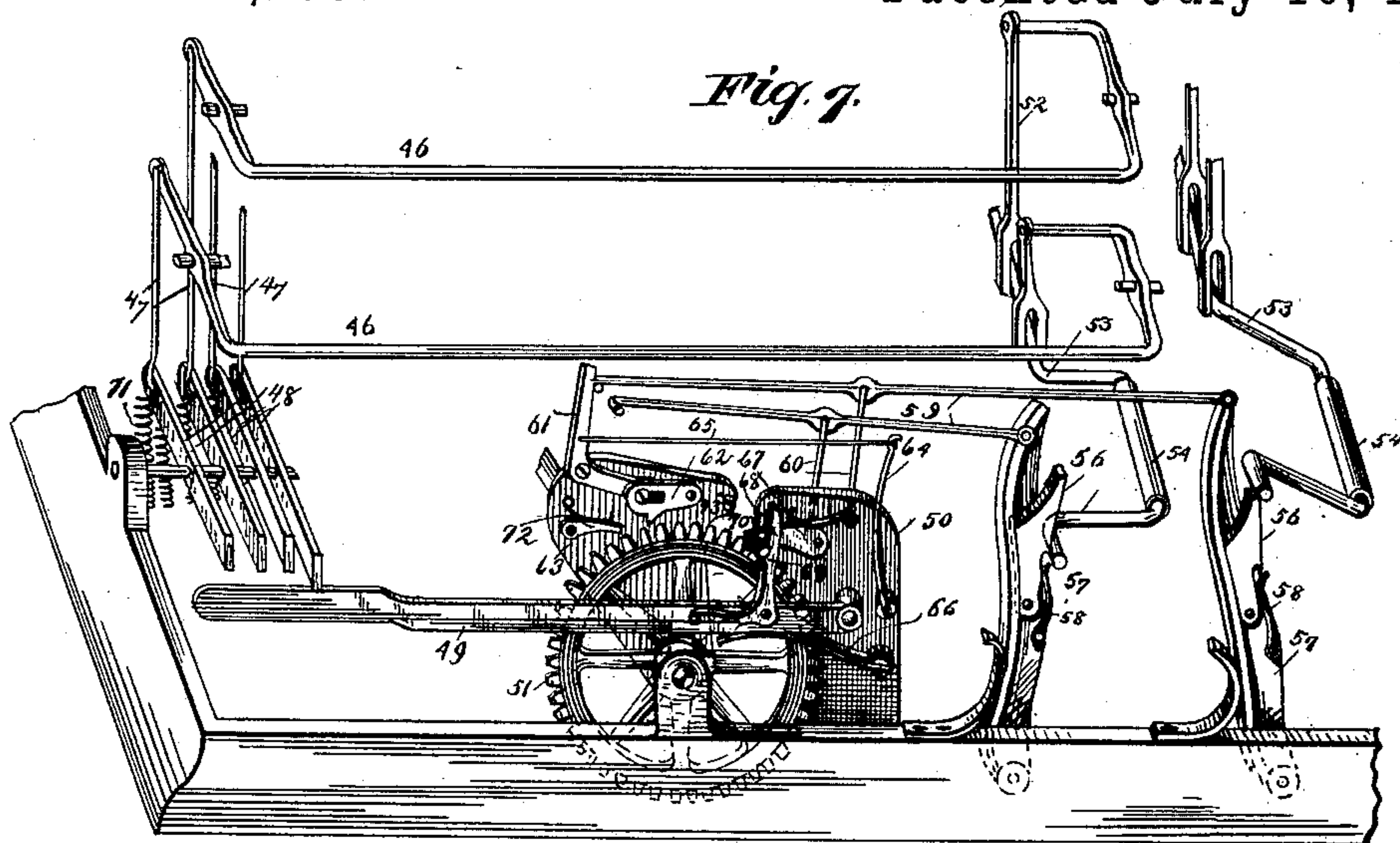
(No Model.)

5 Sheets—Sheet 5.

W. H. ELLING.
TYPE WRITING MACHINE.

No. 407,185.

Patented July 16, 1889.



Witnesses
Wm. M. Monroe
Jesse L. Corey.

Inventor
William H. Elling.
H. J. Fisher
Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM HEINRICH ELLING, OF CLEVELAND, OHIO.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 407,185, dated July 16, 1889.

Application filed January 24, 1887. Serial No. 225,408. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HEINRICH ELLING, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Type-Writing Machines; and I 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.

My invention relates to improvements in type-writing machines, and has for its object the construction of an improved machine in which are embodied the following distinctive capabilities: first, printing directly from the type without the use of intermediate tape or the like; second, printing on an exposed surface, so that the operator can read the printing as it occurs letter after letter; third, printing on plain sheets of paper, as in books, with varying thicknesses and unequal sides.

The invention consists in mechanism whereby these results and others of less importance may be attained, all as shown and described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a perspective view of my improved machine; Fig. 2, a plan view thereof. Fig. 3 is a perspective view of a horizontal section of the machine, disclosing the lower part thereof with the carriages and their actuating mechanism. Fig. 4 is a cross-section of the machine with certain parts omitted and designed to show the type-arms in different positions and the mechanism for raising and lowering the table which supports the paper in printing. Fig. 5 shows a type-arm in three positions and a section of the inking mechanism, and Fig. 6 is a detail of a type-hammer. Fig. 7 shows the escapement mechanism, and Fig. 8 a plan of the arrangement of certain other key-levers, as hereinafter more fully explained. Fig. 9 is a view of the lower end of the type-arm with the associated parts. Fig. 10 is an enlarged view of a bell-crank lever and its spring for controlling the type-arm. Figs. 11 and 12 are details of the drum and pinion connected with the inking-carriage.

The machine is built in a double-deck frame

2 3, the upper part 3 being supported on posts 4 at the front and side, as seen in Fig. 1. Extending across the part 3 back of the keys is a plate 5, having a circular opening 6 therein, also as seen in Fig. 1. This plate may be integral with the frame or a separate part fixed thereto, but is a firm and fixed member and forms a support for other mechanism.

The printing is done in or through the opening 6 by the type-arms arranged longitudinally and concentrically around said opening in the plate 5. In said plate I cut a series of radial slots 8 and concentric slots 9, and in these slots are adjustably secured standards 10. Each standard has at its head a right-angled foot 11, with slot and set-screw 12 from below the supporting-plate through slot 8 for adjustment back and forth. These screws hold the standard 10 firmly when fixed and serve to bring all the type-arms into position for alignment and the like.

The type-arms are pivoted to the standards 10 on pivot-pin 14, and each has at its lower end a broad heel 15, which slides upon the surface of the standard and insures the alignment of the arm. The keeper 16 serves also as a guide to the up and down movements of the arm in conjunction with guide-lip 18, attached to the arm so as to reach over and bear against the side of the standard 10, as plainly seen in Fig. 5. This mechanism insures accuracy and uniformity in the stroke of the type-arm.

The type-hammer 19 is pivoted near the top of the arm 13, Fig. 5, at pivot 20, and has a cavity at one end to hold the type. In front of the pivot-point 20 in arm 13 is a longitudinal curved slot 22, and in the hammer is a straight slot 23. A rod 24, pivoted on the inner extremity of standard 10, has its upper end bent and passed first through slot 22 and then through slot 23, and its end bent at right angles keeps the rod in its place and close fitting to the drum, yet leaving room to operate. Then upon the upper end of the arm I fix a plate 25, which is screwed on the arm at 27 through a small spacing-washer 28, and is held below by the pivot-pin of the type-hammer and an overhanging lip 29. The forward edge of the plate 25 is curved to the curvature of the slot 22. It follows in operation when

the arm is in its normal position the type-hammer is reversed, as in full lines, Fig. 5. When partly lowered, it is as seen in first dotted position, and when down and striking to make impression as seen in second dotted position.

The arms 13 are operated by levers 30, provided with keys 31 at the front of the machine. Owing to the peculiar construction of my machine I require intermediate mechanism between the key-levers and the type-arms to effectuate the strokes, and this varies somewhat according to the position of the levers and their respective arms, which also are either differently bent or are arranged to work vertically or rotate according to position. I attach no importance to this intermediate mechanism or construction, and any form or forms that will do the work may be adopted. In what is shown I have bent the key-levers in such manner as to best get back to their operating position, and so that they can play vertically and make connection through links 32 at their inner ends with bell-crank levers 33. These levers in turn are connected by links 34 with the type-arms a short distance above their pivot-points. The bell-crank levers 33 are pivoted in shoes 35, fastened to the base-plate 5, and retracting-springs 36 in the shoes 35 are attached to the said levers to withdraw the type-arms after each stroke. In case the type-arms are located well to the rear of the machine, as in the case of at least two on either side, (shown in Figs. 1 and 2,) a double system of levers may be needed. When this occurs, the long rods 37 shown would be arranged to rock, and the key-lever proper would engage with their bent ends, say, through bell-crank or equivalent means. On the lower portion of the main frame are the carriages for supporting and conveying the paper or book to be printed. Of these carriages there are two supported on a sliding or movable frame 38, which is held in transverse guides 39 in the main frame, and serves to convey the two superposed carriages bodily to one side of the machine by drawing said frame 38 laterally in its guides, thus making the carriages accessible to the operator. Finally, however, when the machine is at work, the frame 38 will be pushed in and rest within the main frame, substantially as seen in Fig. 1. This frame 38 itself has transverse guides, as 40, and anti-friction wheels, as 41, to guide and carry the letter-spacing carriage 42. By drawing the frame 38 out, say, half-way, and then drawing out the letter-spacing carriage half-way, or thereabout, in its guides on said frames, the two carriages are brought wholly outside the main frame. Along the front edge of this carriage 42 is a rack-bar or plate 43, spaced so that each tooth will represent the space between the letters, and meshing with this bar is a pinion 44, supported on a sleeve on a shaft 45, extending to the front of the machine beneath the keys. It is designed that with

each downward pressure of a key and its corresponding lever a single impulse shall be imparted to the letter-spacing carriage through the said rack and pinion and the impelling spring and pawl for carriages. To effect this many different kinds of devices may be employed, and it is not particular what kind is used. In this case I employ a rod 46 beneath each series of the keys, which rod has its ends bent at right angles and pivoted midway of the bends on the sides of the main frame. At the extremities of said ends at one side are links 47, Fig. 7, which connect with ends of the pivoted arms 48. These arms extend over and across the end of a lever 49, pivoted at its opposite extremity to a plate 50, attached to the main frame; also supported on posts or bearings fixed in the main frame is a toothed wheel 51. At their other ends the rods 46 are bent twice at right angles, as seen in Fig. 7, so as to bring the end back parallel to the body part. To the extremity of each end of these rods thus bent is a pivoted and slotted arm 52, which engages a rock-bar 53 in its closed slot, said bar being bent to give it a rocking bearing at 54, and have its near end bearing against a shoe 56 on spring-pressed post 57. The shoe 56 is pivoted on the said post and has a flanged portion above the pivot which bears against the edge of the post, so that when the end of the bar 53 has been rocked past the top of the shoe the said end will drop behind the flange thereon and permit the spring-pressing post 57 to force said post forward. Two such posts and rock-bars are here shown, with each of which two of the series of key-levers connect through the cross-rods 46.

Connected with the tops of posts 57 are rods 59, supported pivotally about midway on rods 60, and having their outer extremities bent at right angles to press against the upper arm of bell-crank lever 61 when either rod is moved inward as in operation. This bell-crank lever engages a pawl 62 in a slot therein and supported with said lever on the pivoted plate 63. Said plate normally is carried forward by a spring 64 and link 65, connecting with the bell-crank lever thereon, and rests with its edge against the edge of the post 50 on the main frame, which spring and link also hold the pawl in engagement when the pivoted plate is forward.

On post 50 is a spring 66, which extends beneath and supports the lever 49, and on this plate, also, is another pawl 67, which engages the teeth on wheel 51 at proper times, and on the lever 49 is a pivoted spring-pressed arm 68, which has a shoulder 69. This shoulder comes into engagement with pin 70 on pawl 67.

The operation of these parts is as follows: When a key-lever is pressed down, it bears upon the cross-rod 46, which is held up against said levers by counter-spring 71, and through arm 52 and the chain of mechanism extending to pawl 62 lifts said pawl and carries the

pivoted plate to which it is attached back as far as the rock shaft or bar 53 can force it. In the meantime the lever 49 is depressed by pivoted arm 48 at the other end, and the shoulder of the spring-pressed arm 68 is permitted to come in underneath the pin 70 of the pawl 67. Before, however, the key-levers are depressed to their limit of motion downward, the end of the rock-shaft 53 will have risen above the shoe-flange 56 and dropped behind said shoe-flange, which now permits spring-pressed post 57 to fall back, when the spring 64 will pull both on the elbow-lever 61 and the pivoted plate 63. Then it is that the dog 72 on said plate will engage a tooth on wheel 51, preventing the return of the pivoted plate unless the wheel moves with it. At the same moment that the dog comes into engagement with a tooth the elbow-lever also forces the pawl 62 down in front of a tooth on the wheel, and the pivoted plate is now locked to the wheel 51. Then, again, instantly as pressure is taken off the key-levers and the arms 48, the lever 49 will rise and bring the shoulder of the spring-pressed arm 68 into engagement with the pin 70 of the pawl 67, lifting the pawl out of engagement with the toothed wheel. It is now that the coil-spring drum 74 will pull the letter-spacing carriage 42 forward as far as the escapement-wheel 51 will allow—say one to three teeth, according to the distance the pivoted plate 63 has been set back. As this is done, a stud 73 on the front edge of the pivoted plate 63 strikes the top of the arm 68 and carries it back to release the pawl 67, when said pawl drops into engagement with the teeth of the wheel 51 preparatory for the next movement. Both pawls are then down and remain so till another key is struck and the parts are thrown first of all into position, as seen in Fig. 7. In this manner a forward movement is imparted to the spacing-carriage with each depression of a key-lever.

On the lower carriage is a coil-spring drum 74, which has a cable 75, connecting with the letter-spacing carriage to draw said carriage forward after it has been drawn back by hand, thereby winding up the spring ready to pull the carriage for letter-spacing the instant the escapement-wheel 51 permits it during the printing of a line. Then to produce the line-spacing I employ a carriage 76, which moves in suitable guideways 77, Figs. 3 and 4. A hand-lever 78 has a pawl 79 attached to a short arm thereon, which engages ratchet-teeth 80, whereby the said carriage is moved forward the required distance; but, as I stated at the outset, I have means to print on matter of varying thickness and evenness, for which purpose I employ a vertically-adjustable sectional table 81. The leaves of the table 81 are each separately attached to the arms 82 of a yoke supported in posts 83 on said carriage. At the rear end the yoke has a downward-projecting arm 84, to the lower end of which a link 85 connects it with the system

of levers beneath and controlled by the single hand-lever 86. The arms 82 are pivotally attached to ears 87 centrally beneath the ends of the leaves of the table. Rods 88, connecting below the ends of the yoke with said ears, extend outward and engage the posts 83 below the ends of the yoke, so that thereby a parallel-moving mechanism is produced which causes the table-leaves to rise evenly and horizontally.

The mechanism beneath the table for raising the leaves is exactly the same on both sides, each yoke-arm 82 at the rear end of the yoke engaging through link 85 with a lever 89, pivoted in a cross-bar of the main frame, and at its other end by link 90 with an evener 91, pivoted centrally on the curved inner end of hand-lever 86. Ordinarily the pull through the hand-lever and evener will be even on both sides and raise the two leaves together; but it is obvious that if pressure be brought on one side or leaf of the table the evener will yield on the opposite side when the lever is worked to raise it, so that one leaf may be carried up to the highest working-level while the opposite leaf is down. Then when the first leaf has been elevated the full height, say against the leveling-bars 92 and 93, and the hand-lever is carried still farther over, the other leaf will be raised to the same level or any desired intermediate level. In this manner an open book may be laid on the table and the great bulk of leaves rest upon either side, and yet be brought flush up on both sides to a common level beneath the leveling-bars. The bar 92 is vertically adjustable on standards on the letter-spacing carriage, and the bar 93 is adjustable and free to swing on its pivots supported on the line-spacing carriage, both said bars being adjustable to come up in their entire length to adjust them to the general impression-point to which the type-hammers have been set.

The sheet of paper, or whatever is printed upon, is brought up against the leveling-bars for support, and feeds along beneath the bar 92 as the top carriage is moved back line by line. The cross-bar 92^a, carried by the line-spacing carriage, is adjustable back and forth on the rods on which it is supported on the sides of said carriage, and is designed to hold down the paper or leaf on which printing is being done. Without this bar or its equivalent the end of a sheet of paper would be liable to curl or turn up. The adjustment adapts it to sheets or books of different lengths.

It has been observed that when the type arms and hammers are at rest the type-hammer is in inverted position and the type-faces to the rear. This enables me to ink the type by providing an inking-cushion 94 for this purpose. This cushion, of course, is circular, and is fixed on a circular carriage 95, supported by anti-friction rollers 96 on a track-frame 97, resting upon suitable supports on the bed-plate of the upper frame. A plate

95, preferably made in two or more sections, is secured by screws to the track-frame and extends over the inking-carriage flush with its inner surface, but is apart from the same, so as to give the carriage free movement. By removing this plate the carriage may be removed for any purpose. In order that the inking-carriage may do its work well, the cushion-carriage is rotated when the machine is at work, and ink-distributing rolls 99 at intervals help to spread and even the ink on the cushion.

Any suitable means for rotating the carriage may be employed. In this instance I show a toothed rack 100 on the lower edge of the carriage 95, which is engaged by a pinion 101 on a shaft carrying a coil-spring retracting-drum 102. Over this drum, Fig. 1, extends a cord 103, which can be traced by the eye to the front and side of the machine, where it is attached to the end of a horizontally-operating lever 104, Fig. 3, passing over sheaves on its way to avoid friction. The lever 104 is pivoted back on the lower carriage, and on the letter-spacing carriage is a stud 105, which engages the lever and carries it along in its transverse movement. Then when the carriage travels back, the spring-drum 102 operates to draw the said lever back by means of cord 103, and thus the inking-carriage is rotated and the ink is perfectly distributed. The type in their back action, after having made an impression, strike the inking-cushion and are inked for further work.

Beneath the inking-carriage and supported on a frame therefor each type-arm is provided with a spring 106, Fig. 5, against which the arm rests to keep the type out of normal contact with the inking-cushion, but of sufficient flexibility to permit contact on the back throw after impressions.

A pawl-and-ratchet connection is made between the pinion 101 and drum 102, so that when the spring in the drum recovers itself and winds up the cord thereon it does not rotate the pinion 101. The inking-cushion is thus made to travel round one way.

On the shaft 45 of the escapement mechanism is secured a sleeve 105^a. The ratchet-wheel 44 is fixed on this sleeve, which has a slot 106, a locking-pin, and a spring 107, by and through which the ratchet-wheel 44 is held normally in engagement with its rack. When for any reason it is desired to move the carriages without turning this wheel, the lever 108 serves this purpose. The arm 109 engages a shoulder on said sleeve, so that when the lever is moved to the left, Fig. 3, the ratchet-wheel can be thrown out of gear, and when it is released the said wheel will be forced back into gear.

A ratchet 109^a on the wheel 44 enables said wheel to turn one way without turning the shaft 45 and the connected escapement mechanism.

Having thus described my invention, what I

claim as new, and desire to secure by Letters Patent, is—

1. In a type-writer, the main frame, a movable frame supported in transverse guides on said main frame, a letter-spacing carriage supported in transverse guides on the movable frame, and a line-spacing carriage supported in longitudinal guides on the letter-spacing carriage, all combined and operating substantially as set forth.

2. In a type-writer, a letter-spacing carriage and a line-spacing carriage supported in guides at right angles to one another, in combination with a printing-table formed in two separate sections supported on the line-spacing carriage, and levers, as 89, pivoted beneath said table and connected by levers and links with the sections of the table to raise and lower the same, substantially as set forth.

3. In a type-writer, a letter-spacing carriage and a line-spacing carriage one upon the other, in combination with a sectional printing-table, main lever, as 86, levers, links, and evener, as 89 90 91, respectively, a yoke with arms and links connecting the leaves of the table and the levers 89, and the cross-bars 92 and 93, substantially as set forth.

4. In a type-writer, a letter-spacing carriage having a cross-bar, as 92, attached thereto, and a line-spacing carriage having a bar, as 93, attached thereto, in combination with a printing-table formed in sections longitudinally, and levers, as 89, and connecting-links, with a main operating-lever to operate the same for pressing the printing-table up to the cross-bars 92 93, substantially as set forth.

5. In a type-writer, a printing-table, a fixed plate having an opening over said table, and a series of radial and concentric slots 89 about said opening, in combination with a standard adjustable in said slots, type-arms pivoted on said standards having heels, as 15, keepers, as 16, and lips, as 18, to guide them on the standards, substantially as set forth.

6. In a type-writer, a fixed plate above the printing-table, with an opening over said table, said plate having radial and concentric slots 8 9, standards secured to said plate through said slots, in combination with type-arms pivoted to said standards, stops and guides for said arms connected with said standards, type-hammers on said arms having each a longitudinal slot, and a rod working in said slot, and a slot in the type-arm for reversing said hammer when lowered to strike, substantially as set forth.

7. In a type-writer, a type-arm and a type-hammer pivoted to the said arm, in combination with an inking-carriage, and an inking-pad behind said hammer, and a spring attached to the inking-carriage frame to engage the type-arm and hold the type normally out of contact with the inking-pad, substantially as set forth.

8. In a type-writer, a type-arm having a

curved slot, as 22, in combination with a type-hammer having a slot, as 23, and pivoted on said arm, and a rod having one end bent and passing through said slots, substantially as set forth.

9. In a type-writer, a supporting-frame, an inking-carriage supported on rollers in said frame and having an inking-pad on its outside and gear along its edge, in combination with an actuating-wheel meshing with the gear on said carriage, and connections between said gear and the spacing-carriage, whereby the inking-carriage is rotated by the spacing-carriage, substantially as set forth.

10. In a type-writer, a type-arm having a curved slot 22, in combination with a type-hammer pivoted, as at 20, and having a straight slot 23, and a rod pivoted on a different center from the type-arm and having its end working in said slots, substantially as set forth.

11. In a type-writer, the combination of a track-frame, as 97, of circular form, a circular carriage thereon, anti-friction rollers 96, supporting the carriage, removable plate 98 on the frame, inking-pad 94, and gear 100 on the

said carriage, pinion 101, meshing with the said gear, retracting-drum 102, and a cord on the drum actuated by the line-spacing carriage, substantially as set forth.

12. In a type-writer, the letter-spacing carriage and the line-spacing carriage, one supported on the other, in combination with a printing-table formed in sections longitudinally, and having means to operate the same, consisting in yoke-arms 82, connecting posts 83 and ears 87 on the table-sections, links 88, likewise connecting said parts below the yoke-arms, main lever 86, levers 89, and links 90, and evener 91, connecting said levers, and links 85, uniting levers 89, and projecting yoke-arms 84, substantially as set forth.

13. In a type-writer, a circular inking-pad constructed to be rotated around its axis, type-levers with reversed type striking against said pad, and ink-distributing rolls at intervals between said type-levers, substantially as set forth.

WILLIAM HEINRICH ELLING.

Witnesses:

JACOB BAESEL,

THEODORE SCHULTE.