

No. 619,855.

Patented Feb. 21, 1899.

M. A. WIER.
TYPE WRITING MACHINE.

(Application filed Jan. 11, 1897.)

(No Model.)

4 Sheets—Sheet 2.

Fig. 5.

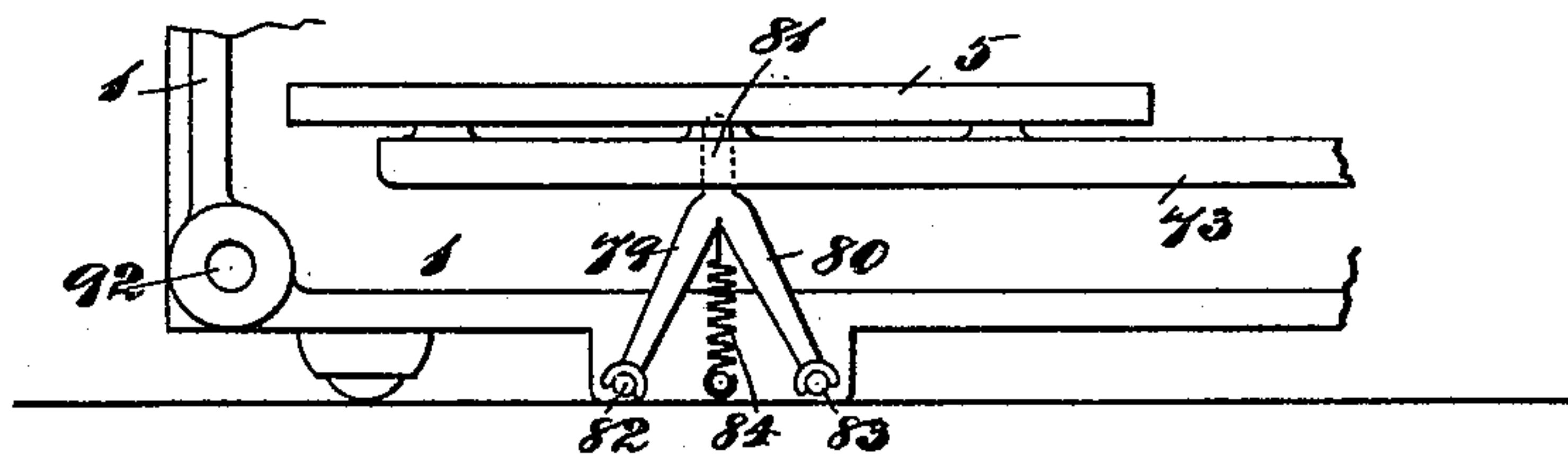
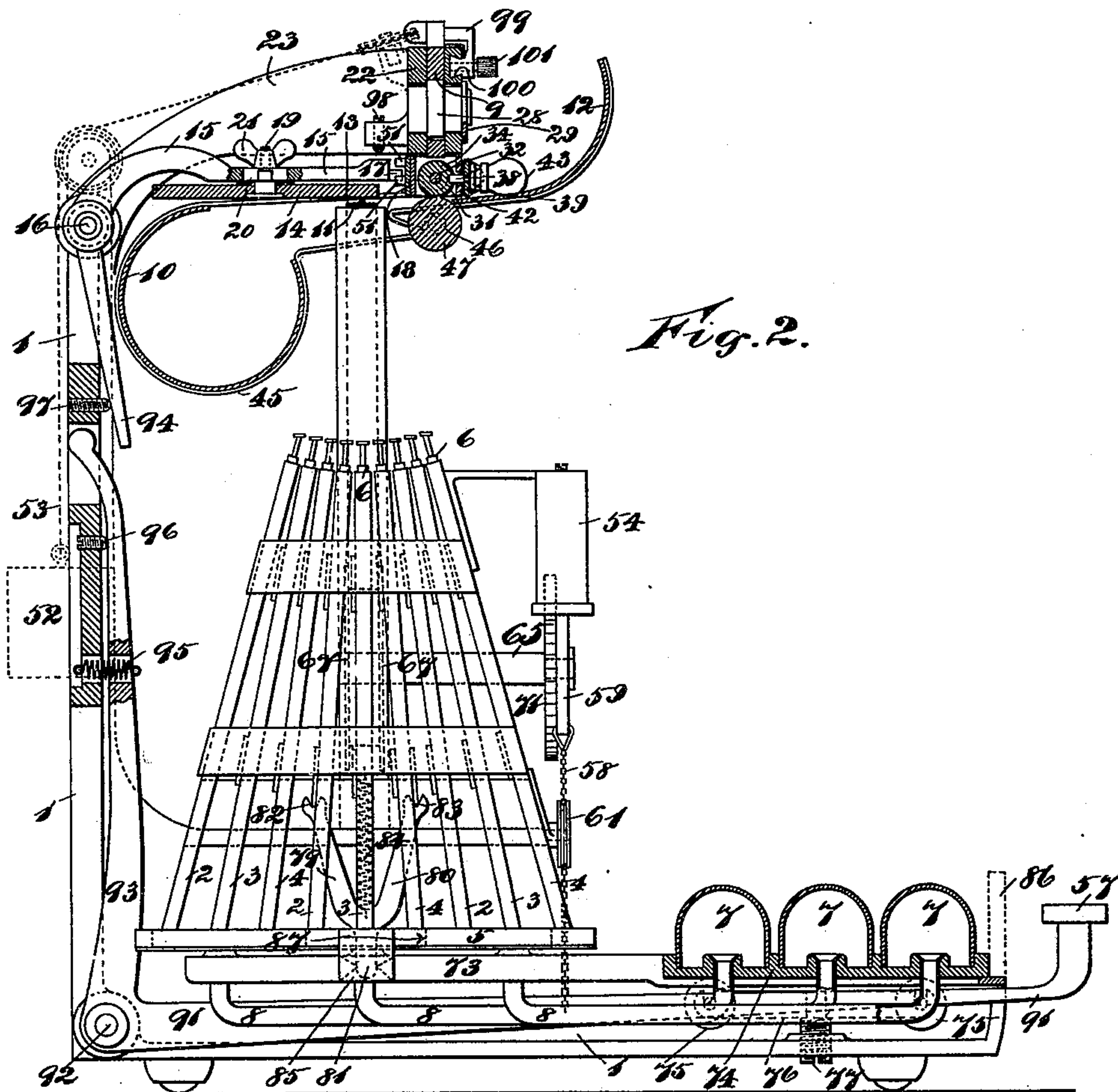


Fig. 2.



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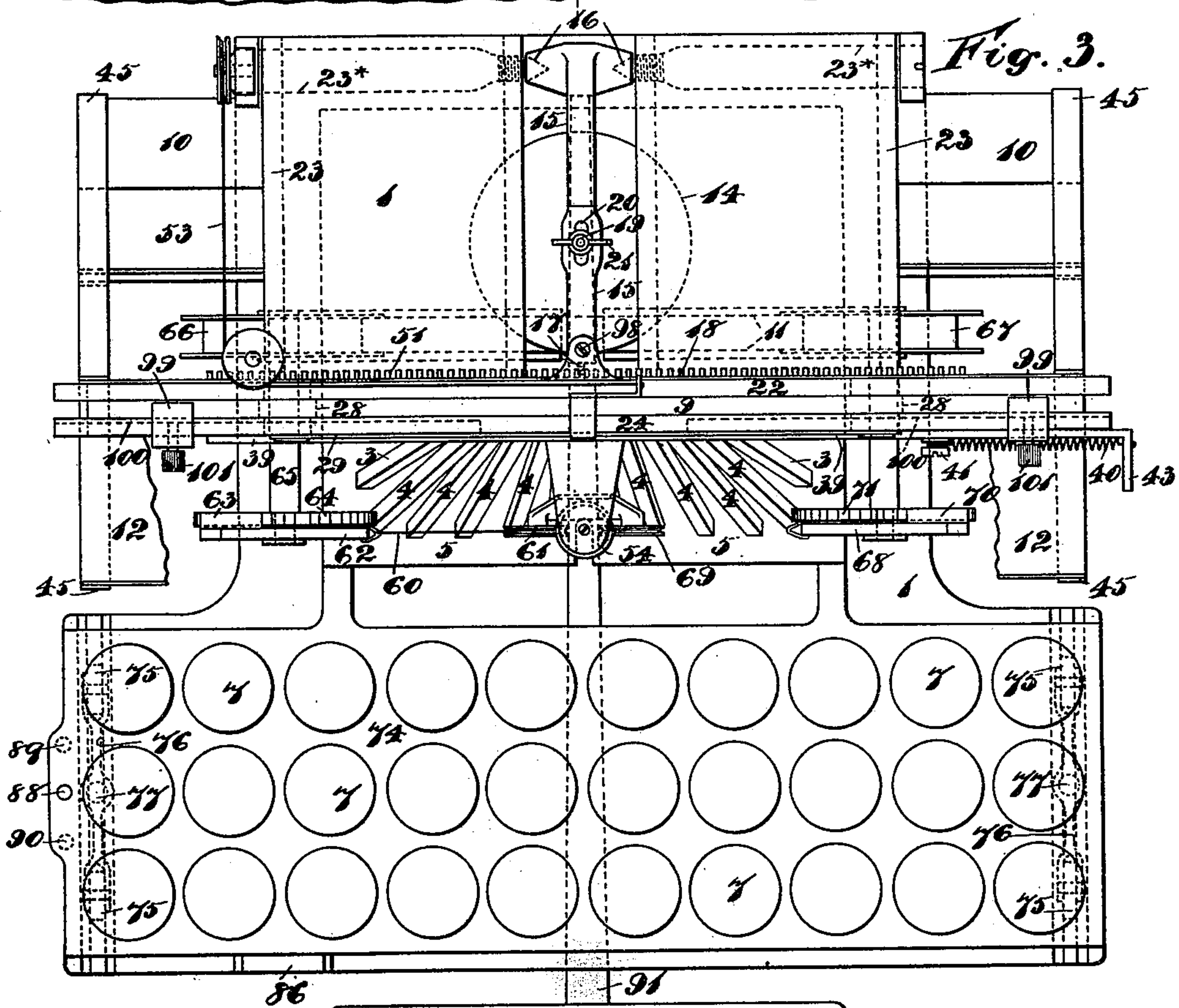
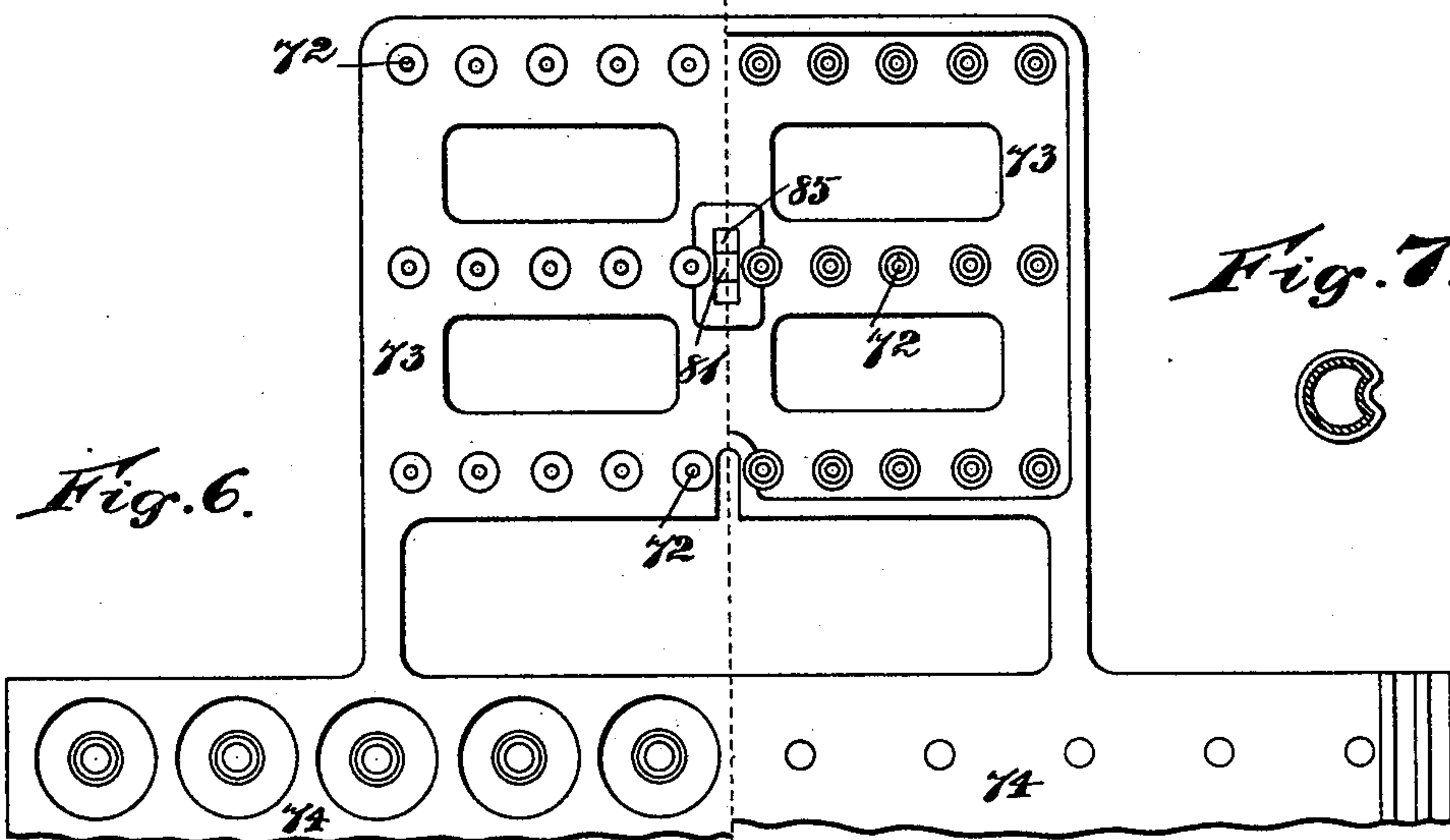
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4 Sheets—Sheet 3.



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4 Sheets—Sheet 4.

Fig. 8

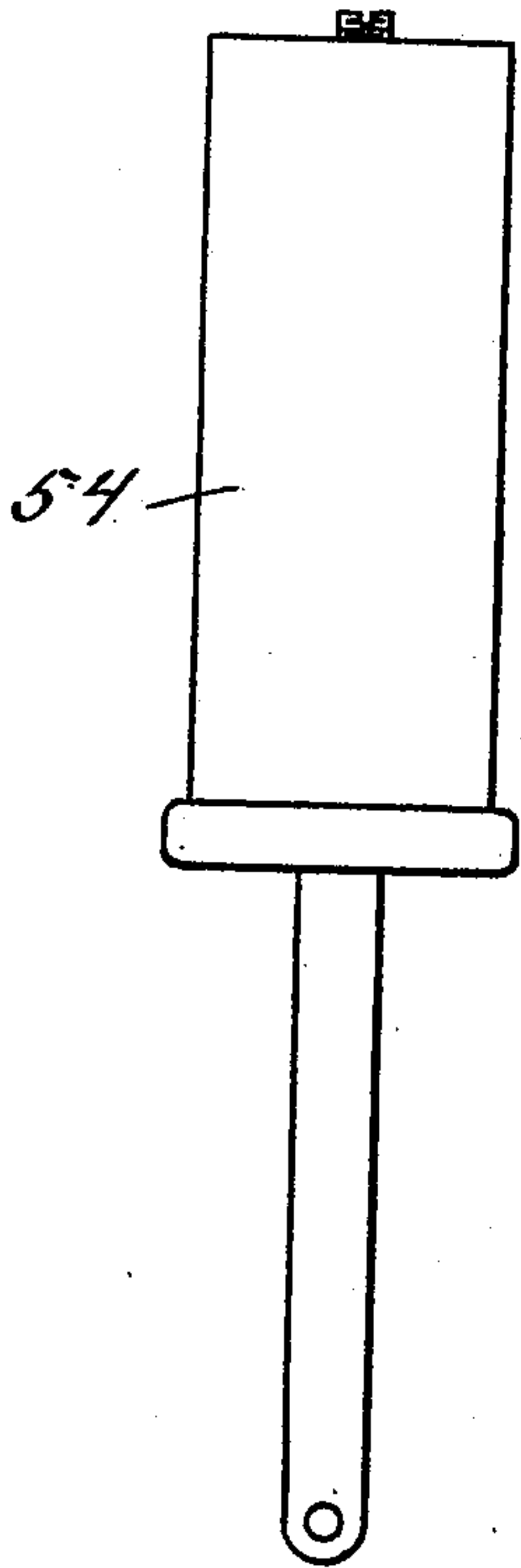


Fig. 9

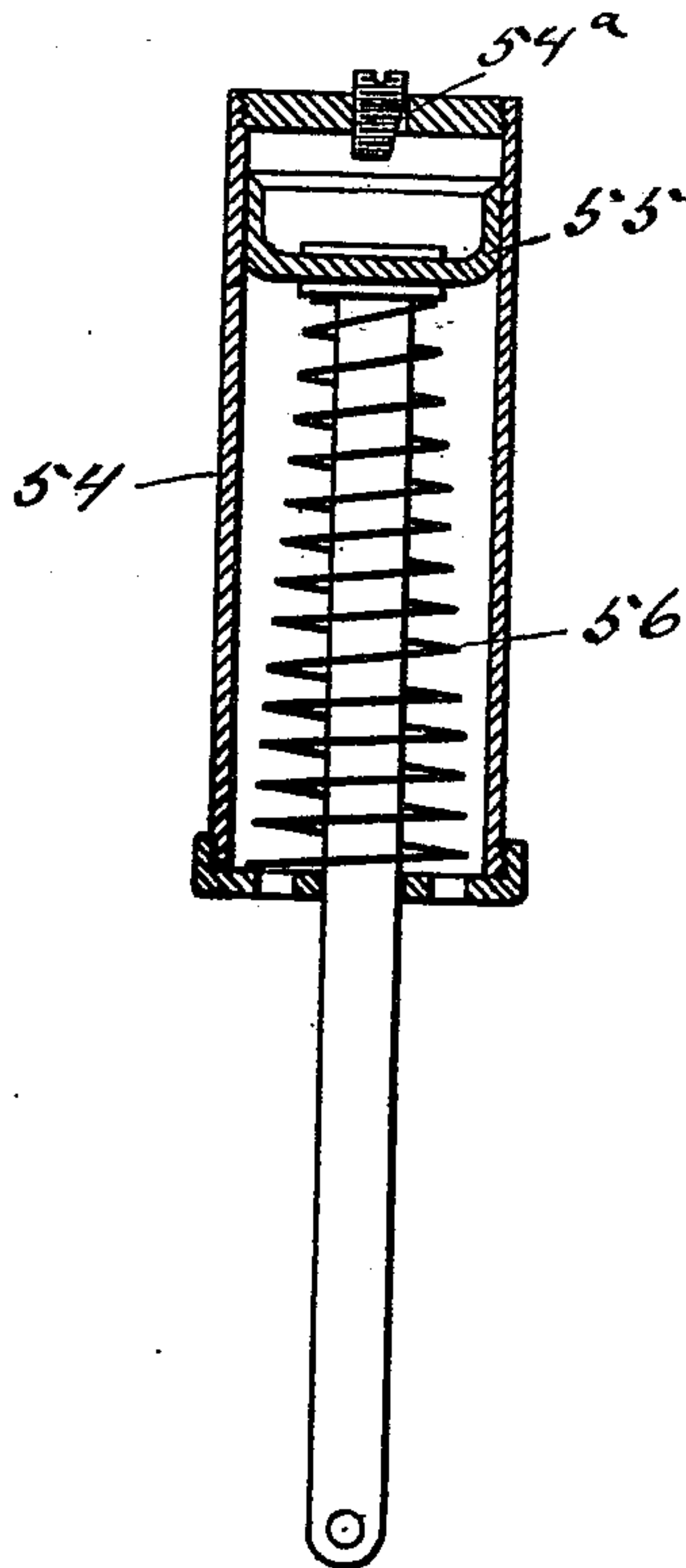
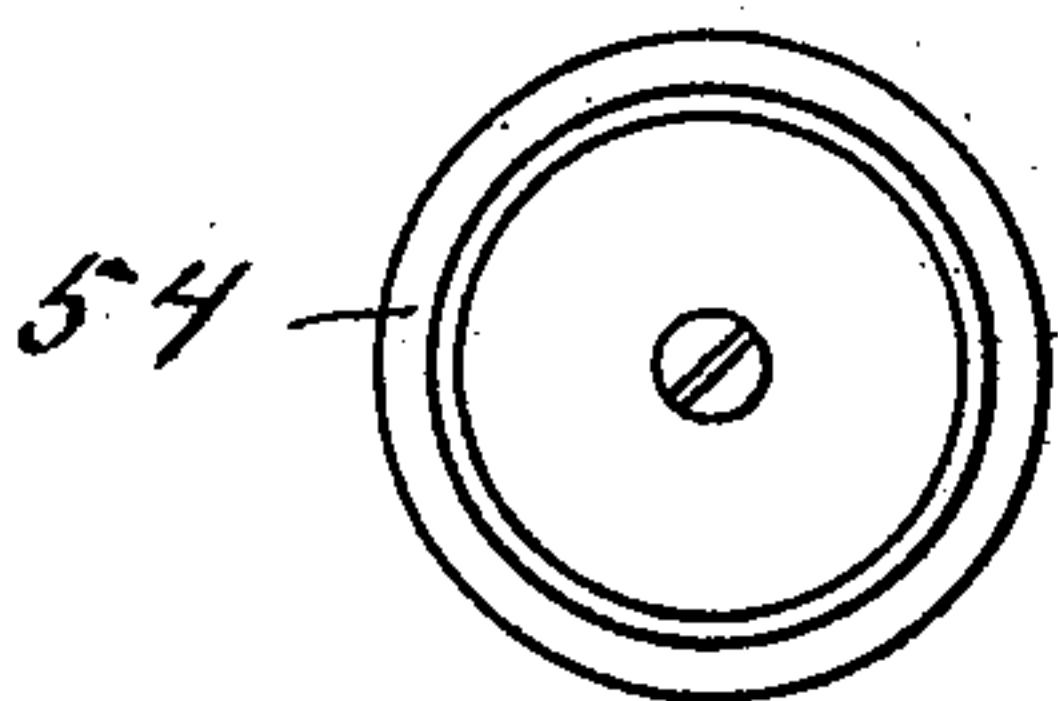


Fig. 10



— WITNESSES —

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UNITED STATES PATENT OFFICE.

MARSHALL ARTHUR WIER, OF KINGSTON-UPON-THAMES, ENGLAND.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 619,855, dated February 21, 1899.

Application filed January 11, 1897. Serial No. 618,849. (No model.)

To all whom it may concern:

Be it known that I, MARSHALL ARTHUR WIER, engineer, a subject of the Queen of Great Britain, residing at Elm Bank Place, Kingston-on-Thames, in the county of Surrey, England, have invented a certain Improvement in Type-Writing Machines, of which the following is a specification, this invention having been patented to me in Great Britain November 7, 1893, No. 21,184, and April 20, 1896, No. 7,896.

This invention relates more particularly to what are known as "pneumatic" type-writing machines; but parts of the invention are also applicable to other kinds of type-writing machines.

In the accompanying drawings, Figure 1 is a front elevation of a pneumatic type-writing machine constructed in accordance with my invention. Fig. 2 is a sectional side elevation of the same; Fig. 3, a plan of same. Fig. 4 is a view, as seen from behind, of the paper-carriage. Fig. 5 is an elevation of some of the parts shown in Fig. 2 slightly modified. Fig. 6 is, as to the left-hand side of the figure, a half plan and, as to the right-hand side, a half under side view of the keyboard and of the device connected therewith for changing the character of the writing from small letters to capitals or italics, for example. Fig. 7 is a section, to an enlarged scale, of one of the parts of the machine. Figs. 8, 9, and 10 are enlarged detail views of the piston 55, Fig. 8 being a side elevation, Fig. 9 a section, and Fig. 10 a plan view.

1 is the general framework of the machine; 2 3 4, the type-tubes, arranged in the form of a pyramidal block, mounted on a base-plate 5 in the usual way; 6, the type-bars or rods working in the type-tubes; 7, the pneumatic pushes or keys for actuating the said type-bars, the said pushes or keys being connected to the type-tubes by means of tubes 8.

9 is the carriage for supporting the paper to be printed on, which latter is either allowed to hang down freely or is rolled up and supported in a celluloid trough 10, its end being conducted over the printing-ribbon 11 and between the paper-rollers mounted on the carriage 9, the curved plate 12 serving to bend the paper upward as it is printed on and moved forward by the line-spacing devices

and to guide it over toward the back of the machine out of the way.

I utilize the blow of the type against the paper for effecting the spacing of the letters, and for this purpose I place at the common printing-point 13 of the type a printing-platen 14, consisting of a disk of hard rubber or other suitable material mounted on an arm 15, so pivoted at 16 that it yields and moves upward when the type on the upper ends of the type-bars 6 strike the paper which passes below the platen, between it and the ink-ribbon 11. This yielding movement of the platen with its arm 15 causes an escapement-piece 17 on the end of the said arm to release one tooth of the spacing-rack 18, fixed on the paper-carriage 9, every time a type strikes the paper. The disk 14 turns loosely on its pivot 19 by the friction of the paper against it, so that a fresh surface is brought around for each successive type to strike against, and when a ring-shaped part of the surface of the disk becomes worn by the constant action of the type the disk 14 can be adjusted forward or backward to a certain extent on the arm 15 by sliding its pivot 19 in the slot 20 of the said arm, the said pivot being secured by the wing-nut 21. By these means I am enabled to dispense with a number of mechanical parts necessary for effecting the letter-spacing in type-writing machines, especially of the pneumatic kind, as heretofore constructed.

The carriage 9, carrying the paper, is made in the form of an extremely light frame and without any platen mounted on it. This frame slides between two plates or frames 22 and 24, the plate or frame 22 being secured to arms 23, pivoted on fulcrum-screws 23*, and the plate or frame 24 to the plate or frame 22 by screws 25, passing through the front plate 24 and tapped into a part 26 of the plate or frame 24 which projects through opening 27 in the carriage 9 and forms a guide upon which the said carriage slides in its movements from left to right and from right to left. The carriage 9 runs on friction-rollers 28, which are kept at a certain distance apart by means of a yoke-piece 29, provided with a hook at each end that takes over a journal on the end of each roller 28. These rollers may be made of the same diameter throughout; but for convenience of keeping

them in place I prefer to make them, as shown, somewhat larger in diameter at the middle than at the two ends and to make the opening 27 in the carriage 9 to receive this middle part of the roller correspondingly wider than the openings 30 in the plates 22 24, which receive the ends of the rollers. By this means a groove is formed in which the middle part of the roller is guided and retained, the only difference in the action being that the carriage 9 will travel rather more than twice the distance traveled by the rollers, whereas if the rollers were the same in diameter throughout the carriage would travel just twice the distance traveled by the rollers.

The paper-frame 9 carries a bracket 31 at each end, and a spindle 32 is arranged to rotate in holes in these brackets. Rollers 33 are fixed on the spindle 32, and between these two rollers is placed on the spindle, and so as to be free to turn thereon, the roller 34, one end of which is provided with ratchet-teeth 35, adapted to take into corresponding ratchet-teeth formed on the adjacent end of one of the rollers 33, the roller 34 being normally pressed toward the said roller by a spring 36. The roller 34 is provided with a helical groove 37, into which takes a pin 38, fixed on a sliding bar 39, which is constantly drawn toward the left in Fig. 1 by a spring 40, fixed at one end to a screw 41, tapped into the fixed plate 42, and at the other end to the thumb-piece 43, by means of which the said bar 39 can be drawn to the right when the paper is to be fed forward for making a line-space. The spindle 32 is provided with a milled head 44, by means of which it can be turned backward if and when desired. 45 are bent springs fixed at one end to the carriage 9 and bent at 46 so as to serve as bearings for the pivots of a roller 47, which is constantly pressed upward by the action of the springs 45 against the rollers 33. The other ends of the springs 45 are curved up, so as to form supports for the curved celluloid or other smooth plate 12, while the rear parts of the said springs 45 are adapted to receive and support the curved trough made of celluloid or other smooth-surfaced material. The pivots of the roller 47 are provided with milled heads 48, by means of which the said roller may be turned around by hand if and when required. If preferred, one of the rollers 33 may be dispensed with, the one roller 33 and the roller 34 being together long enough to suit the width of paper used.

It will now be understood that the paper to be printed upon being rolled up into a roll and introduced endwise into the trough 10 and its end brought forward between the rollers 33 and 47 its movement forward for line-spacing is effected by pressing the thumb-piece 43 to the right in Fig. 1. This causes the pin 38 to turn the roller 34 to a certain extent by its action on the helical groove 37. The partial rotation of roller 34 turns the rollers 33 by means of the ratchet-

teeth 35, and this moves the paper forward between the rollers 33 and 47. Then when the thumb-piece 43 is released the bar 39 is drawn to the left by the spring 40, and the pin 38, acting on the helical groove 37 in the contrary direction, turns the roller 34 backward in readiness for another forward movement, the ratchet-teeth 35 slipping past those on the roller 33 without turning the latter backward by reason of the yielding action of the spring 36. The width of the line-spacing may be regulated by inserting a pin 49 through the slot 50 in the bar 39 in one or other of a series of holes in the plate 42, thereby limiting the travel of the bar 39, and consequently of the pin 38, in the helical groove 37. The thumb-piece 43 on the sliding bar 39 also serves for moving the carriage 9 to the right when a fresh line is to be commenced, so that the feeding forward of the paper and the said movement of the paper-carriage are effected at one operation.

The carriage 9 has a toothed rack 18 formed thereon or fixed thereto for effecting the spacing between the letters and words of the printing. This rack has a double row of teeth 51, of triangular shape, projecting from its surface, as shown clearly in Figs. 2 and 4, and the escapement-piece 17 on the end of the platen-arm 15 is of triangular shape, as shown at 17 in Fig. 4. Each time the platen 14 is caused to move upward by a blow of one of the type against the paper the escapement-piece 17 is raised out of the space between the teeth of the lower row of teeth and into the space between two teeth of the upper row, thereby allowing the rack to be drawn to the left in Fig. 1 or to the right in Fig. 4 by the weight 52 and cord or chain 53 to the extent of one tooth. Then when the platen moves downward again the escapement-piece 17 enters between the next two teeth of the lower row of teeth on the rack 18 and holds the latter and the carriage until the platen 14 is again raised by the type striking the paper. The paper-carriage and paper can be turned up on the fulcrum-screws 23* to enable the printing to be examined, as in other type-writing machines.

The inking-ribbon 11 is caused to travel automatically from one bobbin to the other across the printing-point 13 of the type and platen by means of a cylinder 54, a piston 55, and a spring 56 for the purpose of imparting a slow more or less continuous uniform motion to the ribbon during the whole time a word is being printed instead of a comparatively sudden motion at the end of each word, as is usually practiced at present. The piston 55 is drawn away from the end of the cylinder in opposition to the action of the spring 56 each time the word-spacing key 57 is depressed by means of the chain or cord 58, attached at one end to the said spacing-key and at the other end to the rod 59 of the piston 55. This movement of the piston draws air into the cylinder through a valve, which air is

gradually expelled from the cylinder through a small hole 54^a, provided for that purpose, by the spring 56 forcing the piston back. The piston is connected by a suitable device—such as a chain or cord 60, passing under a guide-pulley 61—with a lever 62, carrying a pawl 63. This pawl engages with the teeth of a ratchet-wheel 64 on the axis 65 of the bobbin 66, on which the ribbon is wound, so that as the piston 55 moves slowly back under the action of its spring it rotates the ribbon-bobbin 66 slowly, winding the ribbon 11 onto the bobbin 66 and off the other ribbon-bobbin 67. The direction of motion of the ribbon and of the bobbins is reversed when nearly all the ribbon has been wound onto the bobbin 66 by transferring the end of the chain or cord 60 from the pawl-lever 62 to the pawl-lever 68, passing the said chain or cord under the guide-pulley 69 instead of under the guide-pulley 61, by which means the pawl 70 will operate the ratchet-wheel 71, so that the ribbon-bobbin 67 will be turned in the reverse direction as compared with the ratchet-wheel 64 and ribbon-bobbin 66. The pawl 63 or 70, as the case may be, is drawn back after each forward movement by its own weight or by means of a spring or weight connected to it for that purpose. The pawl of the ratchet-wheel not in action for the time being is turned over out of gear with the ratchet-teeth, as shown in dotted lines in connection with the pawl 70, Fig. 1, to allow the bobbin to be turned backward in order to unwind the ribbon from it.

When applying my invention to type-writing machines, I use the block of type tubes and bars as described in the specification of a British patent granted to me bearing date the 7th day of September, 1891, No. 15,107; but instead of connecting each type-tube 2 3 4 to its pneumatic push or key 7 by means of a flexible tube, as heretofore practiced, I make the connection by means of a rigid metal tube 8, and instead of making the connection direct from the said pushes or keys to the type-tubes each push or key is connected by its tube 8 with a corresponding hole 72 in a valve-plate 73, arranged to slide air-tight against the rear or lower end of the type-block, so that each row of the holes 72, standing parallel to the keyboard 74, can be brought to coincide with either of three rows of type-tubes in order to introduce capitals, italics, &c.—that is to say, to change to upper or lower case when required—the thirty pushes or keys 7 of the keyboard 74 being thus made to operate the type-bars in three times that number of type-tubes—that is to say, the type-bars in three rows of type-tubes 2 for small characters, the type-bars in three rows of type-tubes 3 for capitals, and the type-bars in three rows of type-tubes 4 for italics. The valve-plate 73 and keyboard 74 are made in one piece or are connected together and are arranged to slide forward and backward on the frame 1, the front end being supported

on friction-rollers 75, pivoted in frames or carriages 76, supported on adjusting-screws 77, tapped into the framing 1 and the rear end pressed up against the under face of the base-plate 5, through which the lower ends of the type-tubes 2 3 4 open by means of springs 78. The valve-plate is normally held in position so that the holes 72 in it (and to which the tubes 8 are connected) coincide with the rows of type-tubes 3 by means of a three-armed lever 79 80 81, having two different fulcra 82 and 83, toward both of which it is pressed by a spring 84 or by a suitably-disposed weight. This three-armed lever is connected to the valve-plate 73 by one of its arms 81 taking into a slot 85 in the said valve-plate, so that when the latter is moved away from the central or normal position (shown in Fig. 2) into the position in which the holes 72 of the valve-plate coincide with the type-tubes 2 by pushing it and the keyboard 74 to the left in that figure—for example, by means of the thumb-piece 86—the three-armed lever turns on the fulcrum 82 against the action of the spring 84; but when the valve-plate is released again the spring 84, acting on the three-armed lever, restores the valve-plate 73 to its central or normal position, and when the valve-plate is moved away from the central or normal position in the opposite direction into the position in which the holes 72 of the valve-plate coincide with the type-tubes 4 by pulling it and the keyboard to the right in Fig. 2 by means of the thumb-piece 86 the three-armed lever turns on the other fulcrum 83 against the action of the spring 84, and when the valve-plate is again released the said spring 84, acting on the three-armed lever, restores the valve-plate again to its central or normal position. The movement of the valve-plate in either direction is limited in the arrangement shown by the arm 81 of the three-armed lever coming against the end of the slot 87 in the base-plate 5, through which the said arm passes in order to reach the slot in the valve-plate. The valve-plate may be held in the extreme backward or forward position as long as may be required by passing a pin through a hole 88 in the keyboard into the hole 89 in the frame 1 of the machine for holding it in the backward position or into the hole 90 in the frame for holding it in the forward position. In the arrangement shown in Fig. 5 the three-armed lever is placed below the valve-plate, but the action is similar to that above described.

The word-spacing is effected by the word-spacing key 57. This key is carried at the end of one arm 91 of a bell-crank lever pivoted at 92, the end of the other arm 93 acting upon an arm 94 of the platen-lever 15, so that when the key 57 is depressed the platen-lever 15 is raised and the escapement-piece 17 releases a tooth of the rack 18 and the paper-carriage 9 is drawn forward by the weight 52 a distance equal to the pitch of the teeth 51.

When the word-spacing key 57 is released, it is returned to its normal position by a spring 95, acting on the arm 93, the backward movement of the latter being regulated by an adjusting-screw 96. The downward movement of the platen-arm 15 is also regulated by an adjusting-screw 97 and the upward movement of same by an adjusting-screw 98. The travel of the paper-carriage 9 to define the length of line printed is regulated by two stops 99, which fit into a dovetail groove 100 in the front of the plate 24 and can be clamped in any desired position therein by means of the clamping-screws 101.

Instead of making the tubes 2 3 4 in the type-block of square section and the type-bars 6 moving in the same square to correspond, in order to prevent the type-bars from turning around in the type-tubes, as heretofore generally practiced, I make the tubes of circular section, with an internal V-shaped projection, and the type-bars of corresponding circular section with a V-shaped groove, which passes over the V-shaped projection in the tube, as shown clearly, to an enlarged scale in Fig. 7. By making the type-tubes and type-bars of circular section they can be made much easier and truer than when made square, and the V-shaped projection and groove are quite sufficient to prevent the type-bar from turning around in the type-tube.

I claim—

1. In a pneumatic type-writing machine, the combination of a block of type-tubes, a valve-plate provided with holes corresponding to the rear or lower ends of the type-tubes, devices for moving the said valve-plate from an intermediate position into either of two side positions in order to bring the holes through it into connection with various rows of type-tubes, tubes connecting the holes in the valve-plate with corresponding pneumatic pushes or keys on the keyboard, devices for keeping the valve-plate pressed air-tight against the rear or lower end of the block of type-tubes, and for restoring the same to its normal position in coincidence with the type-tubes of one set of type-bars when it is released after having been moved into coincidence with the type-tubes of another set of type-bars comprising a three-armed lever having one arm connected with the plate and the other two diverging arms removably seated on stationary fulcra, and a spring for holding said lever with both said diverging arms normally seated against said fulcra, substantially as described.

2. In a pneumatic type-writing machine, the combination of a block of type-tubes, a valve-plate at the rear or lower end thereof for the purpose of changing to upper or lower case, a keyboard formed with or connected to said valve-plate and moving therewith, pneumatic pushes or keys on the said keyboard,

and tubes connecting the pushes or keys with the valve-plate, substantially as described.

3. In combination, the platen, the type with means for operating them, the space-key, the ribbon and ribbon-spools, a motor, a connection from the space-key to the motor whereby power is stored in it on each depression of the space-key, and means for gradually imparting the power to the ribbon-spools and ribbon during the operation of the type-keys, substantially as described.

4. A ribbon mechanism for type-writers comprising the spools and ribbon, the air-cylinder, the spring-pressed piston, connections from said piston to the space-key of the type-writer whereby the depression of the space-key will move said piston to compress the spring, and connections from the piston to the ribbon-spools whereby the movement of the piston due to the expansion of the spring will operate said spools, substantially as described.

5. In a type-writing machine devices for causing the inking-ribbon to travel automatically and continuously across the printing-point or common point of convergence of the type-bars on the paper or platen during the whole time a word is being printed, which consist of an air-cylinder, a piston, a spring, ratchet-gear in connection with the inking-ribbon bobbins, devices for communicating the motion in one direction of the said piston to the ratchet-gear, and devices for communicating motion to the said piston in the opposite direction from the word-spacing key or lever, substantially as described.

6. In a type-writing machine, devices for utilizing the blow of the type against the paper to space the letters, comprising double rack carried by the carriage, the pivoted arm extending transversely to the rack and having a tooth at its forward end engaging the said rack, and the platen suspended from said pivoted arm between its pivot-point and toothed end, substantially as described.

7. In a type-writing machine, the combination with the carriage carrying the paper of feed-rollers one of which consists of a roller or rollers fixed on a spindle, a roller loose on said spindle and having clutch-teeth pressed into gear with similar teeth on the adjacent roller by means of a spring, said loose roller having also a helical groove, a sliding bar having a pin to engage with the said helical groove and a spring for returning the bar to its normal position, substantially as described and for the purpose set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

MARSHALL ARTHUR WIER.

Witnesses:

STEPHEN EDWARD GUNYON,
WILLIAM ANDERSON SMITH.