(No Model.)

4 Sheets—Sheet 1.

J. W. MORRIS.

TYPE WRITING MACHINE.

No. 534,073. Patented Feb. 12, 1895.

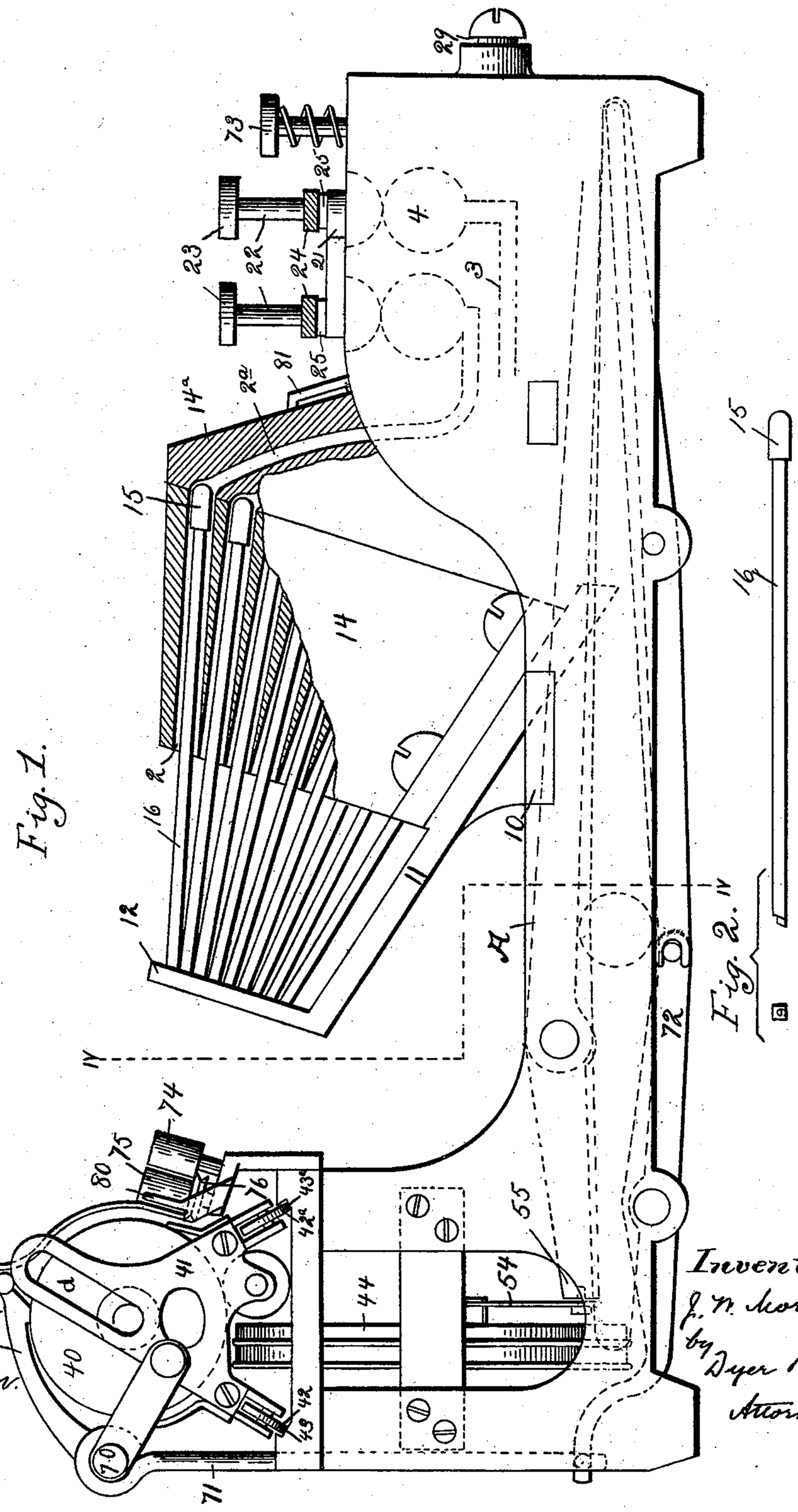

Fig. 1.

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Inventor.
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Attorneys

(No Model.)

4 Sheets—Sheet 2.

J. W. MORRIS.

TYPE WRITING MACHINE.

No. 534,073. Patented Feb. 12, 1895.

Fig. 3.

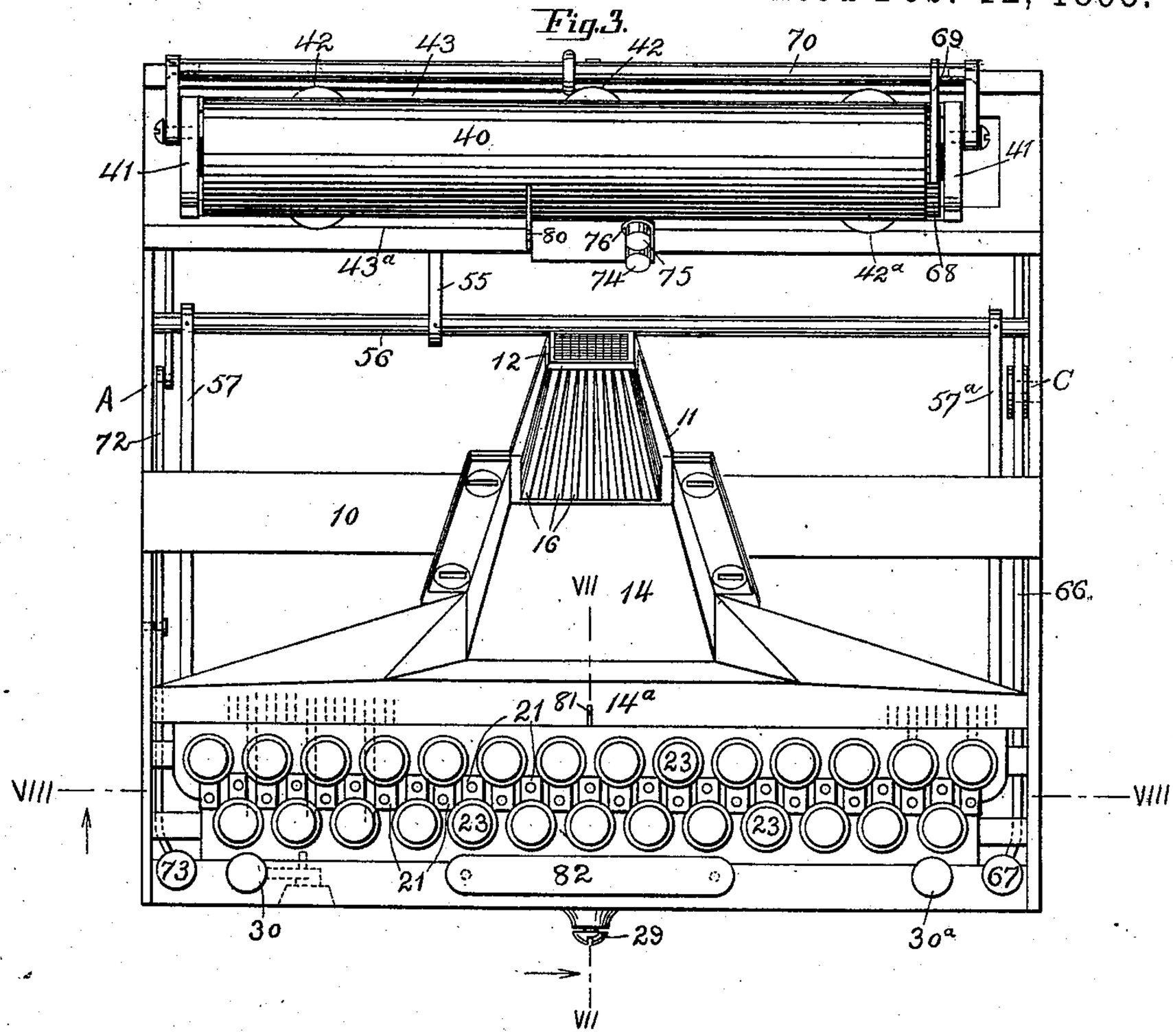


Fig. 4.

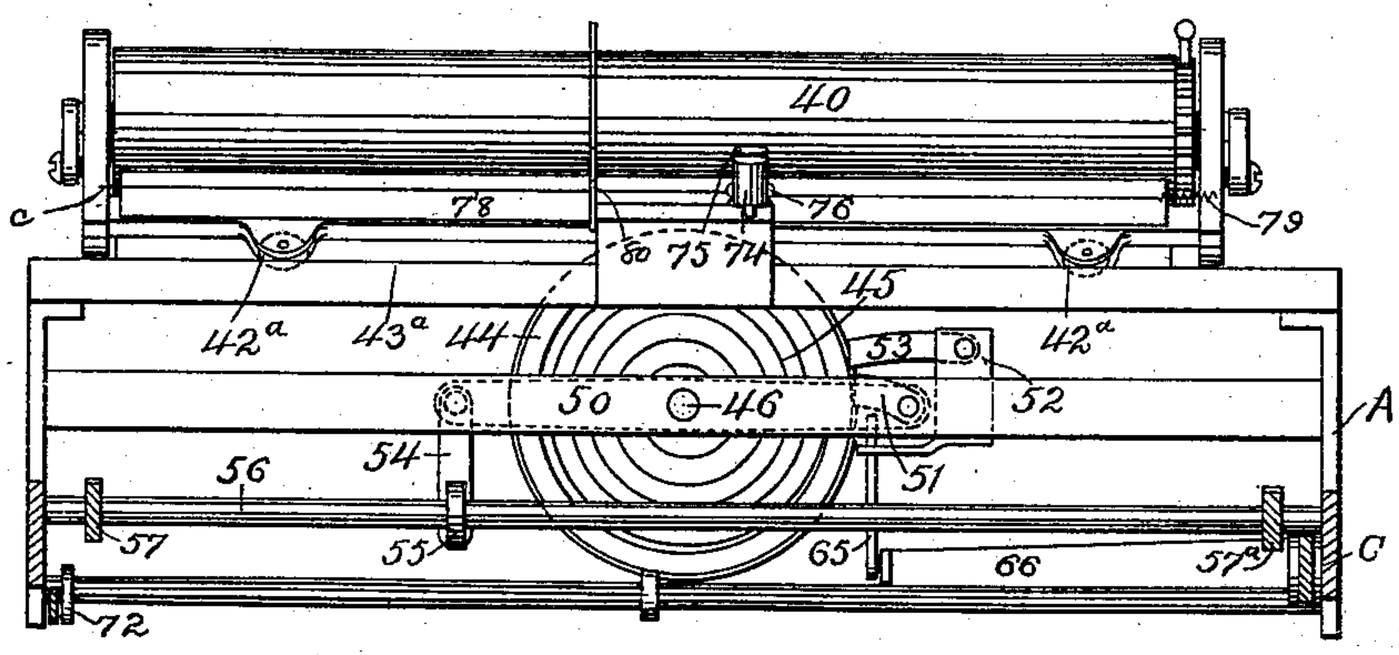
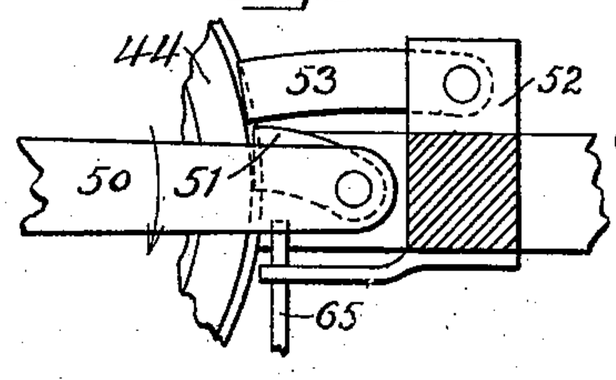


Fig. 5.



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(No Model.) 4 Sheets—Sheet 3.

J. W. MORRIS.

TYPE WRITING MACHINE.

No. 534,073. Patented Feb. 12, 1895.

Fig. 6.

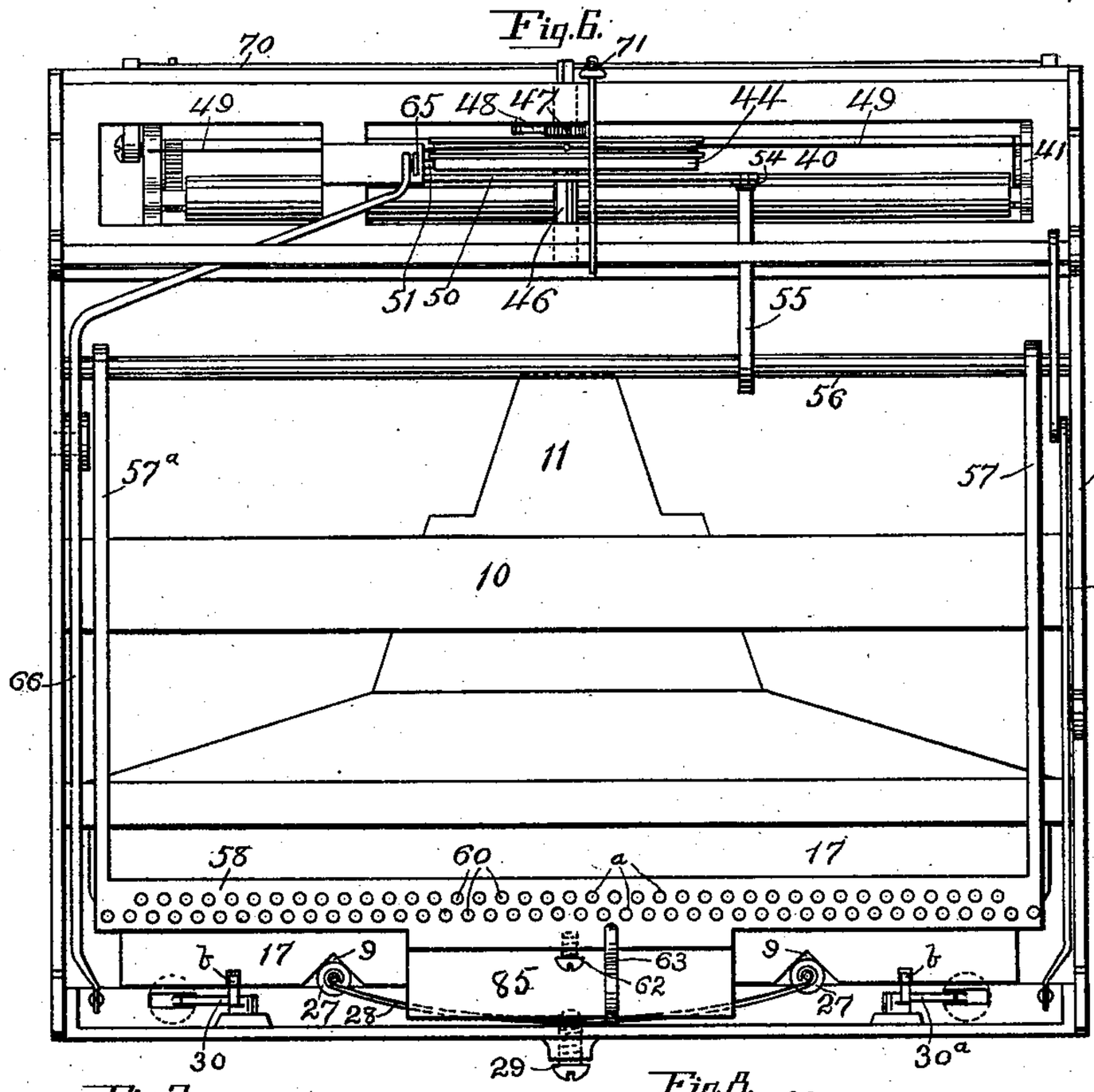


Fig. 7.

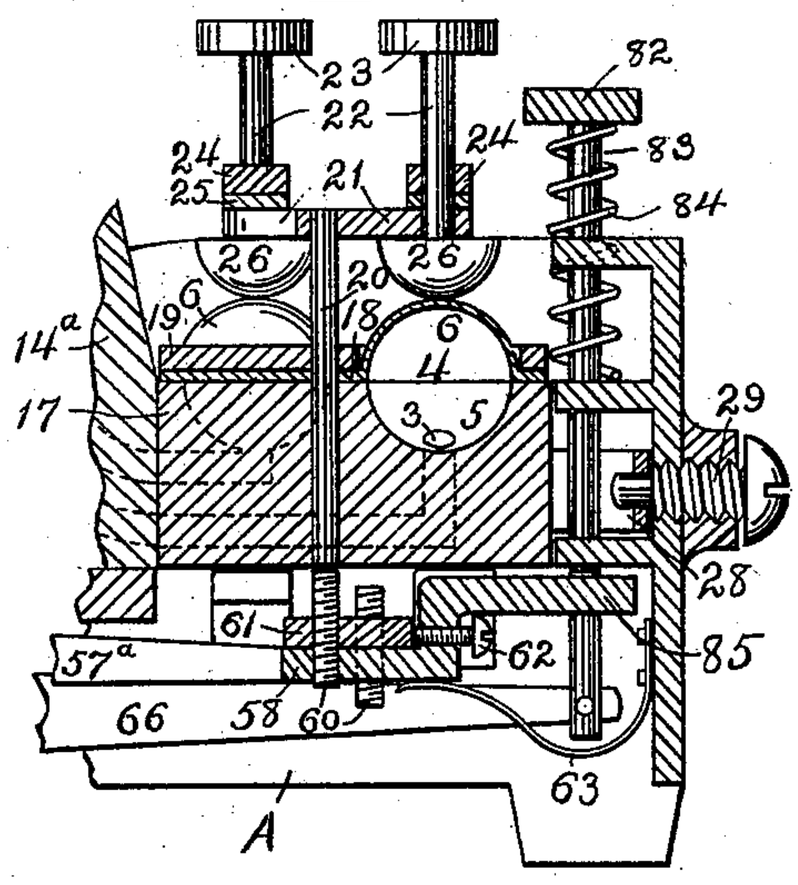


Fig. 8.

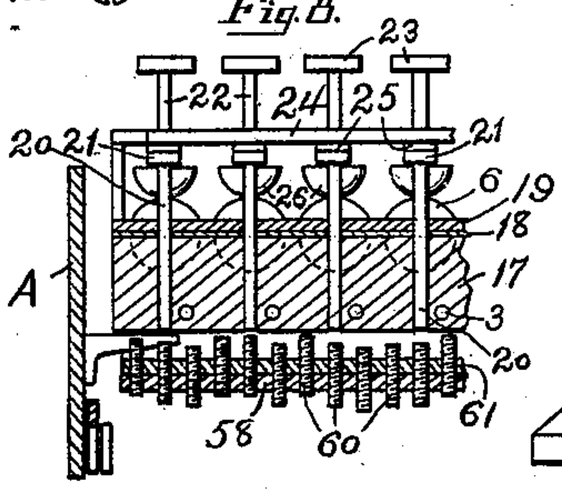


Fig. 9.

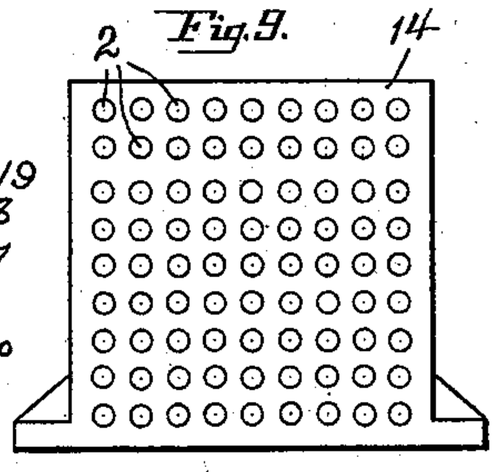


Fig. 10.

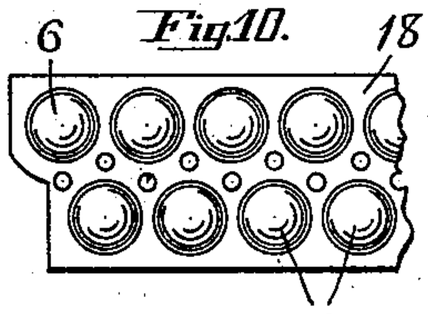


Fig. 11.

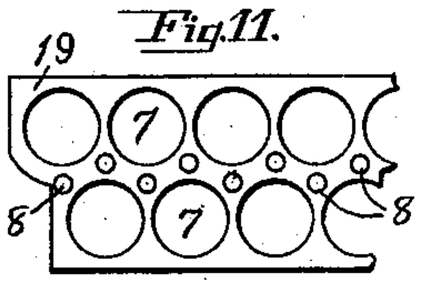
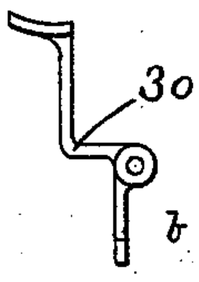


Fig. 12.



WITNESSES:

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ATTORNEYS

(No Model.)

4 Sheets—Sheet 4.

J. W. MORRIS.

TYPE WRITING MACHINE.

No. 534,073. Patented Feb. 12, 1895.

Fig. 13.

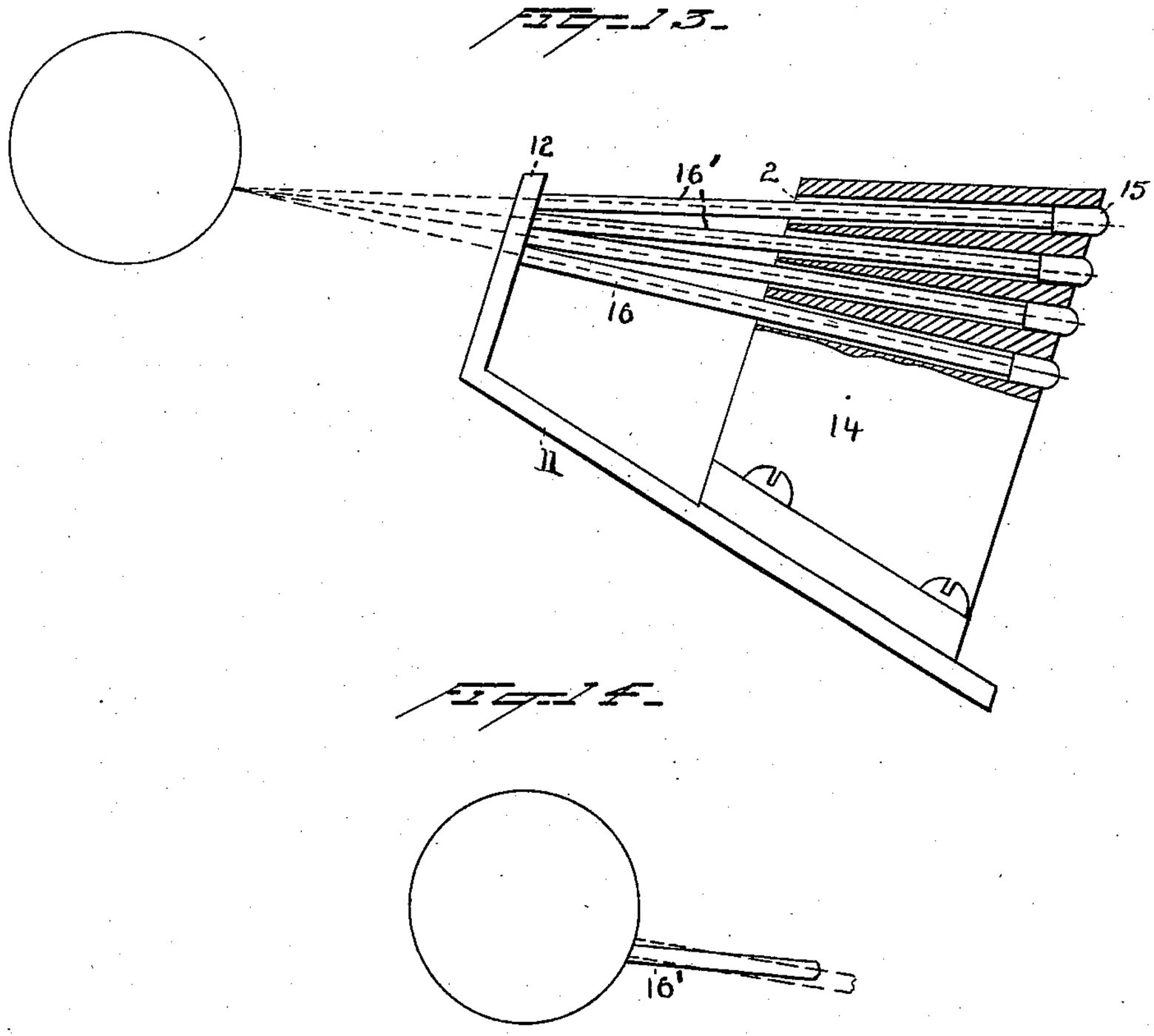

Fig. 14.

Witnesses
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P. O. Edmonds

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By his Attorneys Dyer & Seely

UNITED STATES PATENT OFFICE.

JAMES WILLARD MORRIS, OF PLEASANT VALLEY, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO PHILIP S. DYER, OF NEW YORK, N. Y.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 534,073, dated February 12, 1895.

Application filed September 3, 1891. Serial No. 404,614. (No model.)

To all whom it may concern:

Be it known that I, JAMES WILLARD MORRIS, a citizen of the United States, residing at Pleasant Valley, in the county of Bergen and State of New Jersey, have invented a certain new and useful Improvement in Type-Writing Machines, of which the following is a specification.

This invention has reference to typewriting machines of the class wherein the type are provided with pistons or plungers that ride in cylinders or ducts, means being provided for forcing a fluid into said cylinders or ducts and against said pistons or plungers.

The typewriting machine of the class referred to was described and claimed in my application for Letters Patent of the United States filed September 2, 1891, Serial No. 404,504, now pending in the Patent Office.

The purposes of my present invention are to simplify the construction of the machine by reducing the number of the keys whereby an exceedingly compact machine is produced, and to improve the platen controlling mechanism, all as will be hereinafter explained and specifically pointed out in the claims.

In the drawings, Figure 1 is approximately a full sized view of a typewriter organized to embody my invention, parts being broken away and parts being shown in section. Fig. 2 is a side and end view of a type-bar. Fig. 3 is a plan view of the machine, the view being given on a scale reduced about one-half from the scale of Fig. 1. Fig. 4 is a cross-sectional view, taken on line IV—IV of Fig. 1, looking in the direction of the platen. Fig. 5 is an enlarged view of a portion of the carriage feeding mechanism. Fig. 6 is an inverted plan view of the machine on about the same scale as Fig. 4. Fig. 7 is a longitudinal sectional view on line *vii.—vii.* of Fig. 3, on the same scale as Fig. 1. Fig. 8 is a cross-sectional view taken on line *viii.—viii.* of Fig. 3. Fig. 9 is a detail view illustrating the construction of the block in which the type-bar, pistons or plungers ride. Fig. 10 is a detail view illustrating the construction of the rubber or other elastic plate employed in the formation of the fluid chambers. Fig. 11 is a view of the plate employed to hold the rubber plate in position. Fig. 12 is a view of one of the shifting levers. Figs. 13 and 14 are detail views, illustrating in diagram the manner in which the type-bars are mounted.

In the specific construction illustrated in the drawings A represents the main frame of the machine, to which frame there is secured a cross-bar 10, formed or provided with an upwardly and forwardly extending arm 11, that carries a guide frame 12. Upon the bar 10 I mount a block 14, in which there are formed a number of ducts or passages 2, adapted to receive pistons or plungers 15 that control type-bars 16 and 16′, the forward ends of said bars being arranged within a frame 12 which serves as a guide for the outer rows of type bars, the inner bars being guided by one another and by the outer bars.

The ducts or passages 2 in the block 14 (except those in the two upper rows or series) are so arranged that they each and all converge toward a point on the platen 40; that is, they are arranged so as to conform with radii which extend from the printing point. Consequently, when the type bars 16 are severally forced forward to their printing position, each bar will strike against the same printing point. To secure a proper imprint, each bar has its type inclined at an angle such as to secure its striking the platen evenly.

The two upper series or rows of ducts or passages are preferably arranged on lines that extend at a slight angle above the radial lines, as by this arrangement the type bars 16′ from these passages or ducts will strike the platen just a little lower than those from the other passages, thus providing for a proper alignment of characters which have parts that extend below the normal line of print, without the necessity of forming the ends of the type-bars the full width of the distance from the top of a capital or tall small letter (as l) to the bottom of a letter which extends below the line (as p) as clearly shown in Figs. 13 and 14.

The construction here referred to is illustrated in detail in Figs. 13 and 14. Referring to the former, it will be seen that radial lines are drawn from the printing point upon the platen outwardly through the center of the ducts 2. Four type bars are shown, the ends of which operate in these ducts. It will be

seen that the longitudinal axes of the two lower bars are coincident with the radial lines extending from the platen, while the longitudinal axes of the type bars 16′ are at such an angle relatively to the type bars 16 and the radii that their printing points will strike the platen a trifle below the printing point of the type bars 16.

Just to the rear of the block 14 I mount a block 14ª, within which block there are formed as many passages 2ª as there are passages 2 in the said block 14, the two sets of passages registering, as is clearly shown in Fig. 1, and to the rear of the block I mount a transversely adjustable block 17 (see Figs. 3, 7 and 8) in which there are passages or ducts 3 that communicate with chambers 4 (see Fig. 1), said chambers being formed by making the block 17 with recesses 5 and by securing a plate 18 of elastic impervious material to the upper face of the block, said plate being by preference formed with dome-shaped projections 6 that register with the recesses 5.

Any proper means may be employed to hold the plate 18 in position, but I prefer to use a metallic plate 19 (see Fig. 11) that is formed with apertures 7 to receive the domes 6, and with other apertures 8 through which there are passed rods 20 that are connected to arms 21, said arms being, in turn, connected to standards 22, which carry the finger pieces or keys 23. The function of the rods 20 will be presently explained.

The keys are by preference arranged in two rows, and their standards are guided by bars 24 that are secured to the block 17, washers 25, of felt or other proper material, being disposed as shown. The lower ends of the standards 22 carry plates 26, preferably convex, which bear on the domes 6, so that when a key is depressed the collapsible wall of its chamber 4 will be forced inward and the air in the chamber will be forced bodily forward and by its impact will drive the registering type-bar outward to its printing position, from which position the bar will be drawn backward by the suction produced by the expanding of the dome the moment the pressure of the finger key is relaxed.

In constructing a typewriting machine it is desirable that there be as few finger pieces or keys as possible, and it is to this end that I provide the adjustable block 17 with but one-third the number of keys that there are type-bars 16. This block 17 bears closely against the rear face of the block 14ª, forming an air-tight joint, and in practice I have found that the best results are obtained by making the block 17 of glass and grinding that face which abuts against the block 14ª; but I desire it to be understood that any proper material could be employed in the formation of the block under consideration. The block 17 is normally held in a central position, from which position the lower case type-bars are operated, but provision is made for the shifting of the block to the right or left to bring it to a position such that the other type-bars may be operated. To hold the adjustable block as above set forth I form the bar with V-shaped recesses 9, that are entered by anti-friction rolls 27 carried by a spring 28, said spring being adjusted by means of a screw 29. The block 17 is engaged by the arms *b* of levers 30, 30ª, which levers are studded to the frame as best shown in Fig. 6, and in detail in Fig. 12.

Referring now to Figs. 3 and 6, it will be seen that if the lever 30 be depressed the block 27 will be moved to the right from the position in which it is shown in the drawings to a position such that its ducts or passages 3 will register with the series of passages 2ª to the right of the series with which the passages 3 normally register, and hence a new set of type-bars will be brought into play; and the third set of type-bars will be brought into play if the lever 30ª be thrown, as will be readily understood by an inspection of that portion of Fig. 3 in which portions of the passages or ducts 2ª and 3 are indicated by dotted lines.

The paper cylinder or platen 40 is mounted on a carriage 41, such carriage being supported by rollers 42, 42ª, that ride on ways 43, 43ª, and beneath this carriage I mount a drum 44, in which there is coiled a spring 45, one end of the spring being connected to a shaft 46, while the other end is connected to the drum body. In order that the tension of this spring may be regulated I provide the shaft with a ratchet 47 that is engaged by a pawl 48, and the outer end of the shaft I arrange so that it may be engaged by a winding key. (See Fig. 6.) The drum may be made to engage the carriage in any proper way, as for instance, by winding thereon a cord 49 that is connected at each end to the carriage 41. From the construction described it will be seen that if the spring within the drum is free to act the carriage will be thrown toward the right of the machine, but in order that the drum may be held and at the same time advanced step by step, I employ a feeding mechanism which will be now specifically described.

Upon the shaft 46 there is mounted a lever 50, which carries a pawl 51 that bears against the peripheral face of the drum; and to any fixed support, such as the standard 52, I attach a retaining pawl 53, which also bears against the peripheral face of the drum. The lever 50 is, through the medium of a flexible link 54, connected to the arm 55, which is rigidly connected to a rock-shaft 56, which carries two forwardly-extending levers 57, 57ª that are connected by a cross-bar 58, which said cross-bar is arranged directly beneath the rods or bars 20. In the bar 58 I form as many apertures *a* as there are rods or bars 20, and through these apertures I pass threaded pins 60, which also pass through a plate 61, in connection with which there is arranged a set-screw 62, the arrangement being such that after the pins have been adjusted to the de-

sired position they may be locked to place by turning the set-screw forward.

In order that acceptable work may be produced it is desirable that the carriage be fed forward a distance which shall vary with the width of the letter that is to be printed and it is to this end that I have provided the adjustable pins 60, my arrangement being such that if the pins 60 be thrown up close against the under side of the adjustable block 17 the downward movement of the keys will impart a greater movement to the bar 58 and hence a greater movement to the lever 50, the downward movement of the said bar 58 carrying the lever 50 in the direction indicated by the arrow shown in connection therewith in Fig. 5.

Now it will be noticed that the axis of the drum, the axis of the pivot which carries the pawl 51 and the axis of the connection between the lever 50 and the link 54 are all upon one straight line, and hence it follows that if the lever be moved as just above described the pawl 51 will slip downward along the peripheral face of the drum a distance in proportion to the movement of the bar 58, the drum at this time being held against all movement by the pawl 53, but when the pressure upon the finger key is relaxed a spring 63 will act to throw the bar 58 back to the position in which it is shown in Fig. 7, and as this movement takes place the pawl 51 will bite upon the drum and advance it the desired distance.

When it is desired to return the carriage to its position at the right of the machine, the pawls 51 and 53 are thrown upward and out of engagement with the drum through the medium of a pin 65 that is pivoted to a lever 66, which said lever is in turn studded to the frame at C and carries at its forward end a finger piece 67.

In order that the paper cylinder or platen may be fed forward after each line of print I provide such cylinder or platen with a ratchet 68 that is engaged by a pawl 69, said pawl being carried by a rod or bar 70 which extends the full length of the carriage and passes through a loop formed at the upper end of a link 71, the lower end of said link being connected to a compound lever 72, which carries a finger-piece 73.

Any suitable means for operating the inking ribbon may be employed. In practice I prefer using an endless ribbon passing between rolls 74, 75 through a guide slot 80 and thence to the rear of the block 14^a and through a stirrup or loop 81.

It is of course necessary that provision be made for spacing, and to this end I mount a space bar 82 in advance of the keys, such bar being provided with two downwardly-extending standards 83 and being supported by springs 84. The standards 83 bear upon a lug 85 that extends forward from the cross-bar 58 so that if the space bar 82 be depressed the carriage will be fed forward.

It will be noticed that the carriage 41 is provided with inclined slots d in which the paper cylinder or platen is journaled. The object of this is to provide for the introduction of a large number of sheets of paper with interposed carbon sheets.

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

1. The combination with a platen and its operating mechanism, of type-bars mounted in banks and on radial lines, other type-bars mounted at a slight angle to radial lines, the rear ends of said bars being above the said radial lines, and a type-bar operating mechanism.

2. The combination with a platen and its operating mechanism of type-bars mounted in banks and on lines which radiate from a common center, other type-bars also mounted in banks but not on radial lines, plungers in connection with the type-bars, ducts or passages in which the plungers ride, and a means for forcing air into said ducts or passages.

3. The combination with a carriage of a spring-actuated drum, a connection between the drum and the carriage, an advancing pawl which bears upon the peripheral face of the drum, a means for varying the throw of the advancing pawl, coincidently with the movement of the type actuating mechanism, and a retaining pawl, substantially as described.

4. The combination with a carriage of a spring-actuated drum, a connection between the drum and the carriage, a lever mounted on the drum shaft, a pawl carried by the lever and arranged to bear upon the drum, and to advance the drum step by step against the tension of the spring a means for throwing the lever and a retaining pawl, substantially as described.

5. The combination with a carriage of a drum, a connection between the drum and the carriage, a spring arranged in connection with the drum, a spring-regulating attachment, a pawl which bears upon the peripheral face of the drum, and which is adapted to advance the drum step by step against the tension of the spring a pawl-actuating mechanism, and a retaining pawl, substantially as described.

6. The combination with a carriage of a spring actuated drum for retracting the same and through which a step-by-step motion is imparted to said carriage in the direction opposite that in which it is retracted, a connection between said drum and the carriage, advancing and retaining pawls, which bear upon the drum, a pin 65, a lever 66 extending to a point adjacent to the key bed and a connection between the pin and lever whereby when the lever is thrown the pawls will be removed from engagement with the drum, substantially as described.

7. In a typewriting machine, a series of compressible air chambers operated by finger keys, downwardly extending rods connected with said keys, a carriage carrying a platen, mechanism for feeding said carriage

and adjustable pins carried by said mechanism beneath the key rods, substantially as described.

8. In a typewriting machine, a series of compressible air chambers operated by finger keys, downwardly extending rods, connected with said keys, a carriage carrying a platen, mechanism for feeding said carriage and pins carried by said mechanism and arranged beneath, and at varying distances from the key rods, substantially as described.

9. The combination with a platen-carrying carriage and a carriage-feeding mechanism of a series of finger keys provided with downwardly-extending rods, a lever frame by which the feed of the carriage is controlled, pins that are threaded to engage said lever frame, a plate through which the pins pass, and a set screw arranged in connection with the plate, the pins being arranged beneath the key rods, substantially as described.

10. In a typewriting machine, the combination with the type-bars thereof of plungers connected to said bars and mounted within ducts or passages, a block also formed with ducts or passages but with a less number than there are plunger receiving passages, a means for forcing air into the block passages, and a means for shifting the block transversely as and for the purpose stated.

11. In a typewriting machine, the combination with the type-bars thereof of plungers connected to said bars and mounted within ducts or passages, a block formed with one-third the number of ducts or passages that there are plunger receiving passages, a means for forcing air into the block passages, and shifting levers which engage the block whereby the block may be moved transversely in either direction as and for the purpose stated.

12. In a typewriting machine, the combination with the carriage and its feeding mechanism, of a paper cylinder or platen carried by the carriage, a rod 70, a pawl carried by the rod, a ratchet carried by the paper cylinder, said ratchet being engaged by the pawl, a link 71, having an eye through which the rod 70 passes, and a means for lowering the link, substantially as described.

13. In the type-writing machine the combination with the type bars thereof, of plungers connected to said bars and mounted within ducts or passages, a block also formed with ducts or passages, but with a less number than there are plunger receiving passages, a means for forcing air into the block passages and a means for shifting the block transversely as and for the purpose stated.

This specification signed and witnessed this 31st day of August, 1891.

JAMES WILLARD MORRIS.

Witnesses:

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