

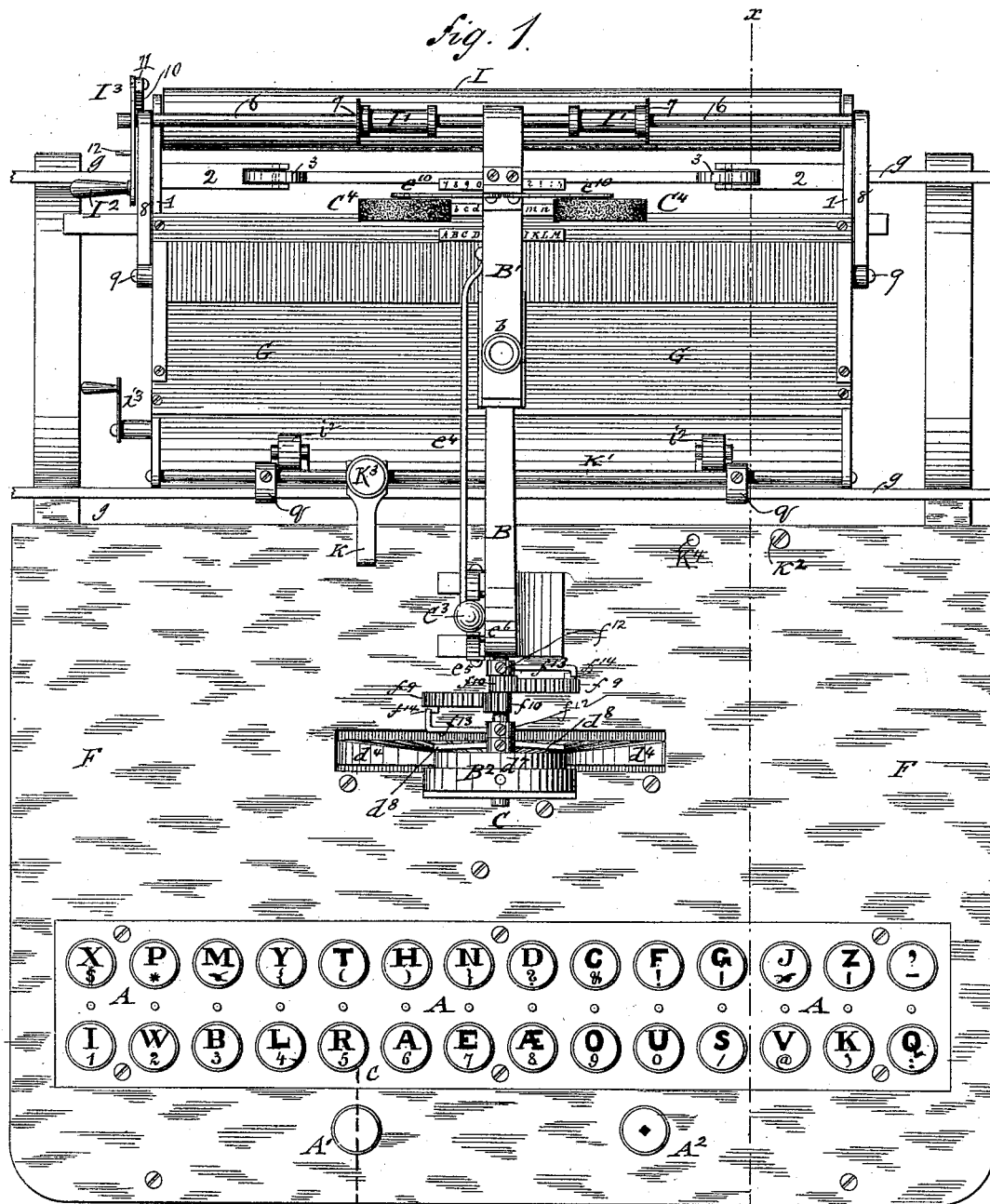
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5 Sheets—Sheet 1.

A. WIRSCHING.
TYPE WRITING MACHINE.

No. 422,276.

Patented Feb. 25, 1890.



WITNESSES:

A. Schuhl.
Sidney Mann

INVENTOR

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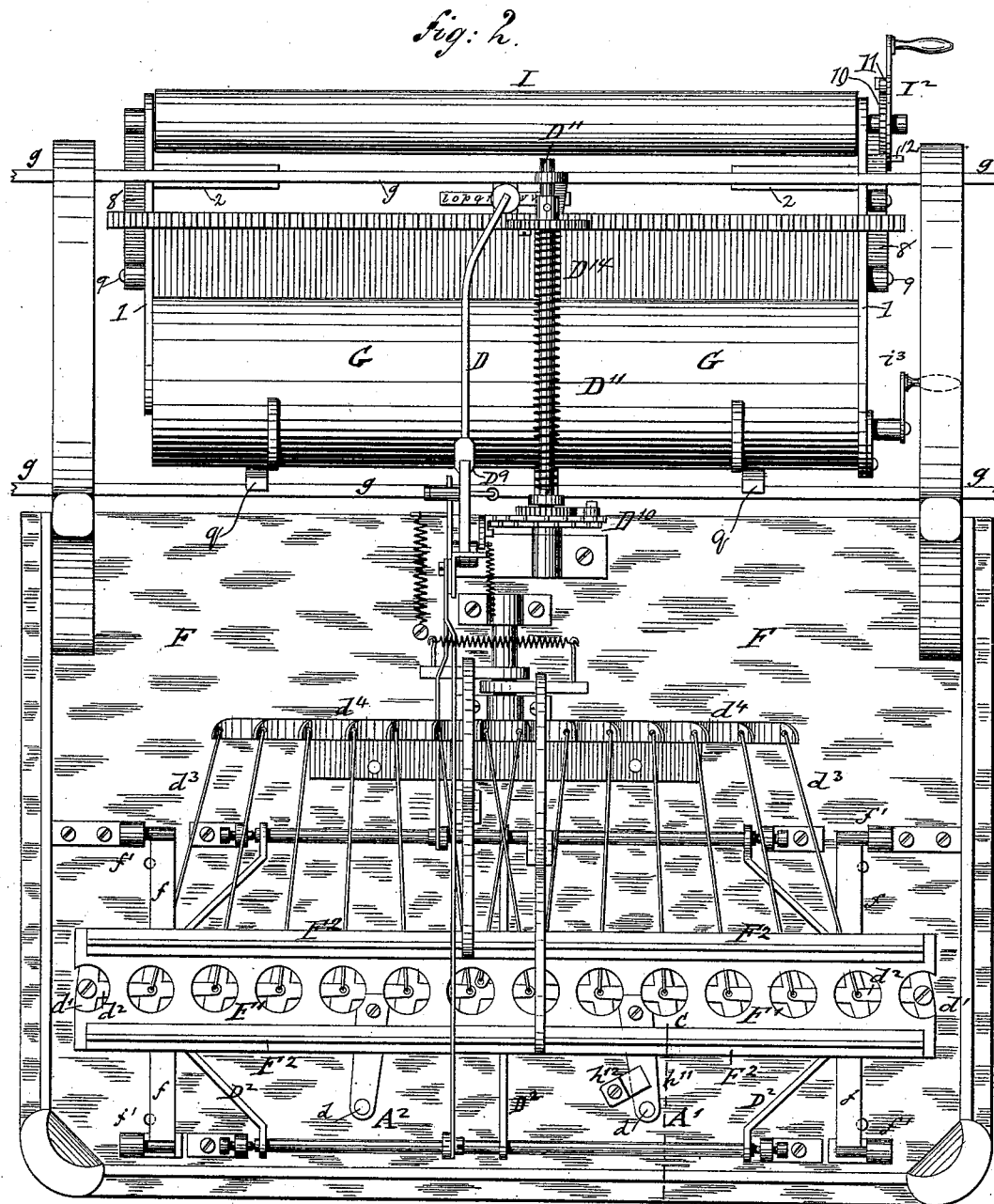
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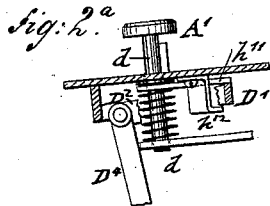
A. WIRSCHING.
TYPE WRITING MACHINE.

No. 422,276

Patented Feb. 25, 1890.



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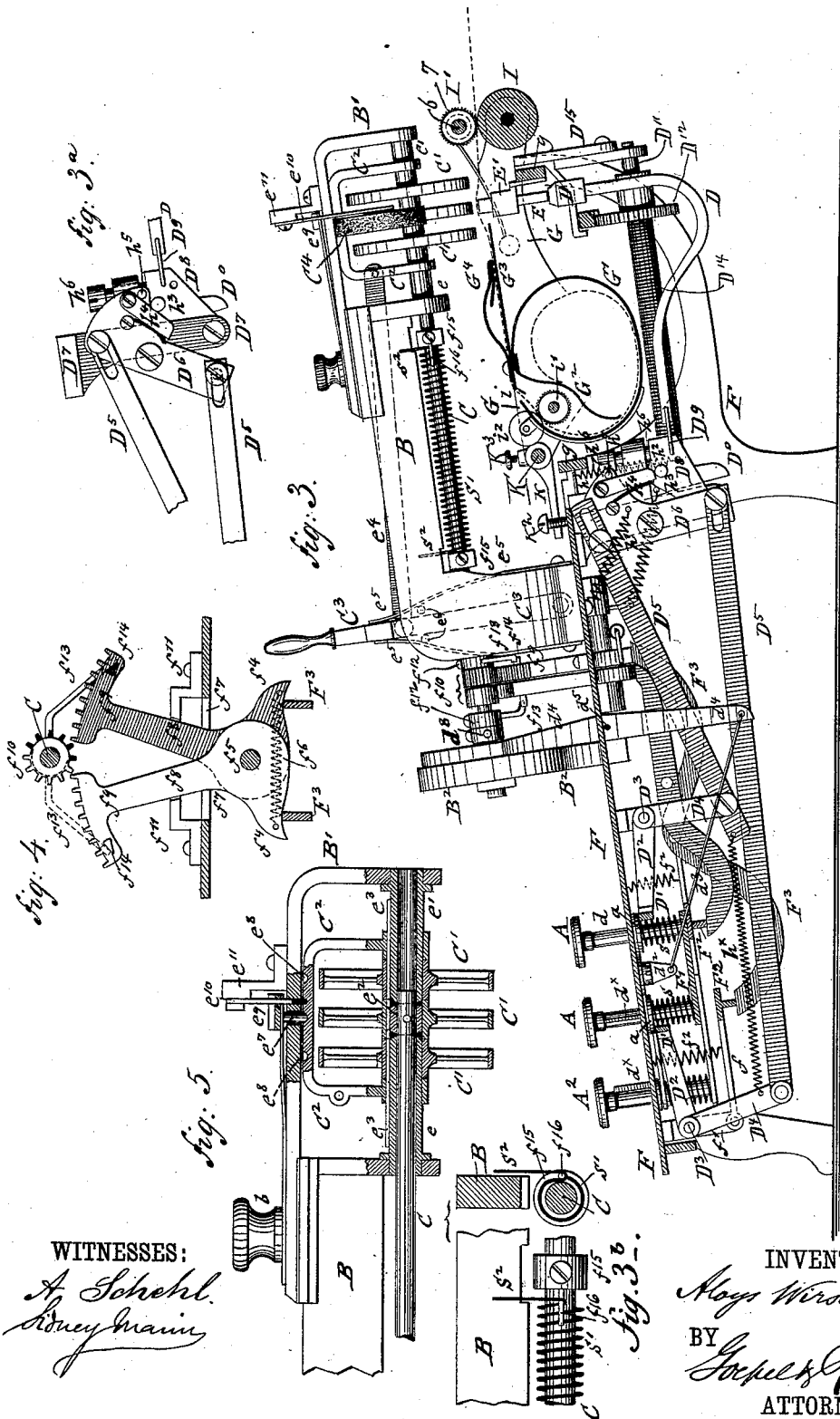
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A. WIRSCHING.
TYPE WRITING MACHINE.

No. 422,276.

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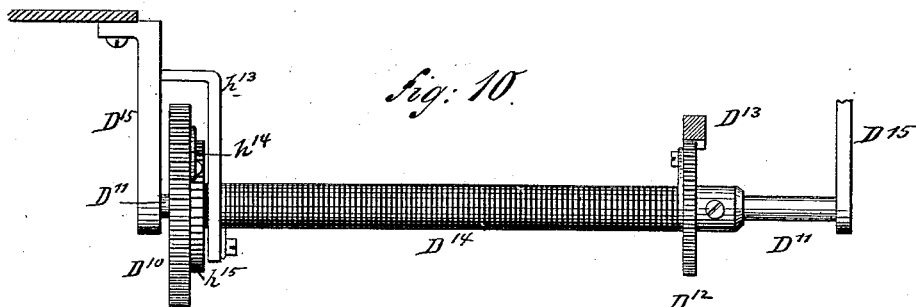
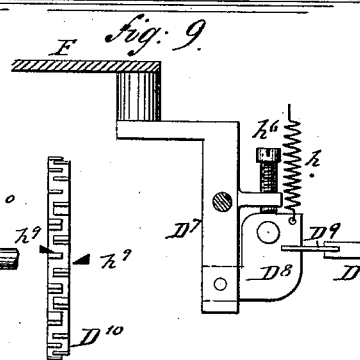
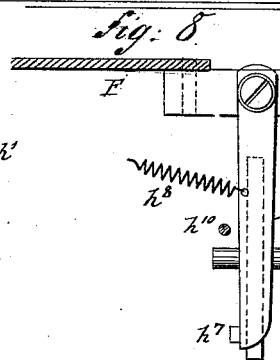
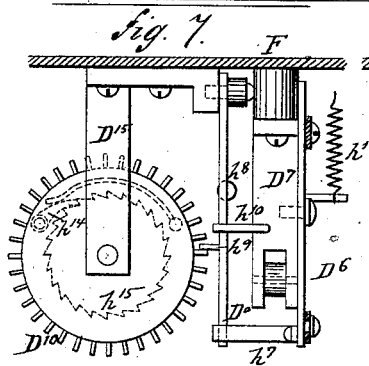
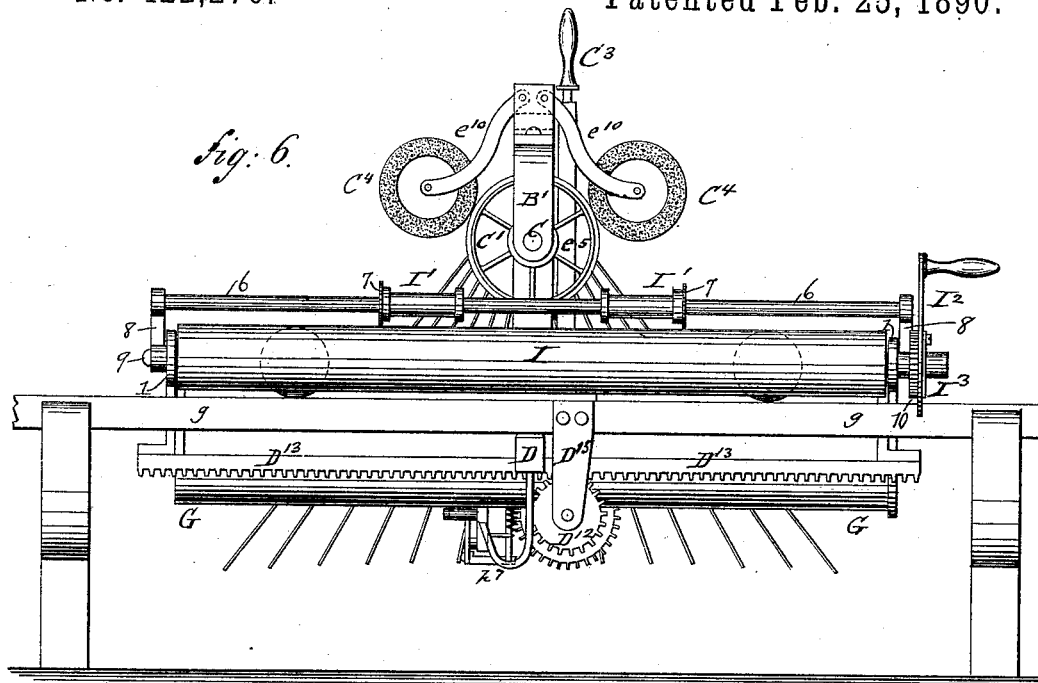
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5 Sheets—Sheet 4.

No. 422,276.

Patented Feb. 25, 1890.



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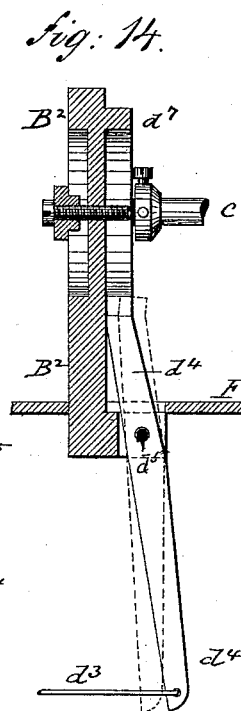
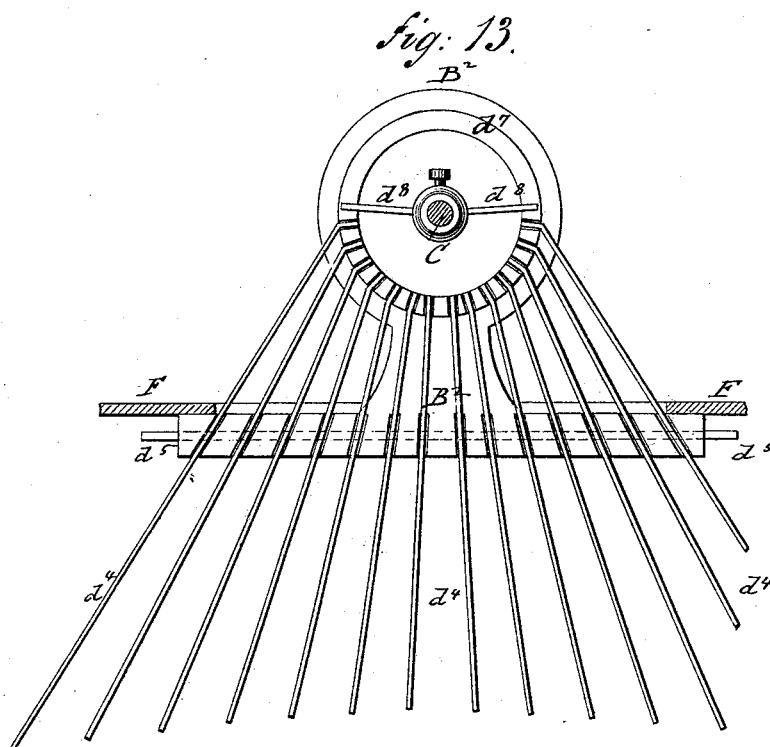
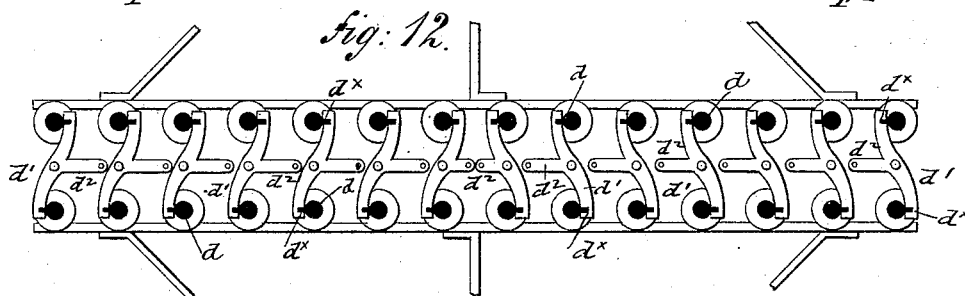
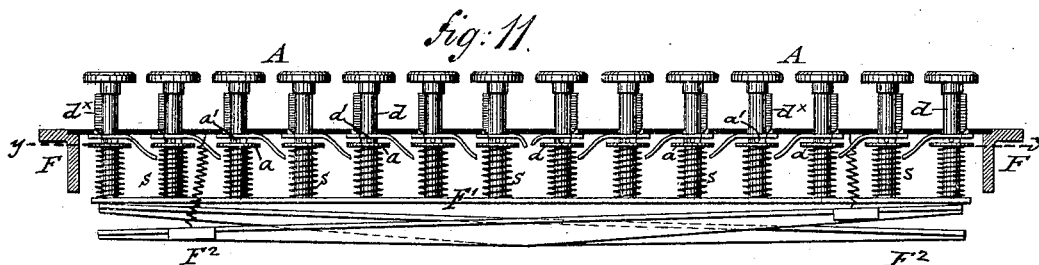
(No Model.)

5 Sheets—Sheet 5.

A. WIRSCHING.
TYPE WRITING MACHINE.

No. 422,276.

Patented Feb. 25, 1890.



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UNITED STATES PATENT OFFICE.

ALOYS WIRSCHING, OF BROOKLYN, NEW YORK, ASSIGNOR OF THREE-FOURTHS TO JAMES F. RANDOLPH, THOMAS M. F. RANDOLPH, LUCY F. RANDOLPH, AND EDGAR F. RANDOLPH, ALL OF MORRISTOWN, NEW JERSEY.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 422,276, dated February 25, 1890.

Application filed May 27, 1884, Serial No. 132,905. (No model.)

To all whom it may concern:

Be it known that I, ALOYS WIRSCHING, of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

This invention has reference to certain improvements in type-writing machines of that class in which the paper is fed backward below one or more longitudinally-shifting and axially-rotating type-wheels which are operated by a system of keys and intermediate lever mechanisms, so that any letter or figure thereon can be brought in position above a fixed printing-point, so as to print on the paper by the action of a printing-hammer that is actuated by the keys and intermediate lever mechanism.

The machine consists in its general outlines of two rows of keys which impart by intermediate mechanism axially-rotating motion to a type-wheel shaft, the keys of one row turning the shaft in one direction and the keys of the second row in opposite direction from a normal position. The type-wheels are guided on fixed sleeves and an intermediate sleeve on the type-wheel shaft, so that either type-wheel can be shifted on the sleeve of the type-wheel shaft and rotated with the same. The type-wheel shaft is locked in normal position and arrested when the type-wheel arrives at the required position for printing. The keys also operate by intermediate lever mechanisms an oscillating hammer that is arranged below a vertically-sliding printing part or platen, said mechanisms being adapted to release simultaneously a laterally-traversing paper-carriage, so as to admit it to move forward for the space required between the letters.

The machine consists, further, of certain details of construction, which will be fully described hereinafter, and finally be pointed out in the claims.

In the accompanying drawings, Figure 1 represents a top view of my improved type-writing machine; Fig. 2, a bottom view of the same; Fig. 2^a, a detail section on line *c c*, Figs. 1 and 2, showing the space-key; Fig. 3,

a vertical transverse section of the machine on line *x x*, Fig. 1; Fig. 3^a, a detail side view of a portion of the mechanism for operating the printing-hammer. Fig. 3^b is a detail of the spring that actuates the type-wheel shaft. Fig. 4 is a detail view of the oscillating toothed segments by which axially-rotating motion is imparted to the type-wheel shaft. Fig. 5 is a detail vertical longitudinal section of the type-wheels and the mechanism for shifting the same. Fig. 6 is a rear elevation of the same. Figs. 7, 8, 9, and 10 are details showing the means by which the traversing paper-carriage is intermittently actuated. Figs. 11 and 12 are a side elevation and a horizontal section on line *y y*, Fig. 11, of the actuating-keys; and Figs. 13 and 14 are details of the mechanism by which the type-wheel shaft is locked in position when the same has arrived at the proper point of its axial rotation.

Similar letters of reference indicate corresponding parts.

In my improved type-writing machine the keys *A A* are arranged in two lines at the front part of the supporting-frame *F*. Besides the two series of keys there are arranged two auxiliary keys *A'* and *A''*, of which the key *A'* serves to impart the proper spacing between the words, while the key *A''* is preferably used to print that character which is arranged at the central or starting point of the type-wheel, and which is, by preference, a dot or full stop. The frame *F* is provided at its rear part with two transverse rods *g*, which serve as guideways, on which the paper-carriage *G* traverses. The side bars 1, constituting a part of the frame of the carriage, are provided near their rear ends with inwardly-projecting arms 2, in which rollers 3 have their bearings. These rollers move on the rear guideway *g* and serve to support the rear of the carriage. The front bar *K'* of the frame of the carriage is provided with arms *g*, which serve to support the front of the carriage, these arms being recessed or grooved to receive the front guideway *g*.

The traversing carriage *G* is actuated in

one direction by the unwinding of a spiral spring D^{11} and its adjusting mechanism, as hereinafter described, and returned in opposite direction by hand, which motion winds up the spiral spring, as customary in type-writing machines.

A rigid arm B rises at a point in the center line of the machine and is bent at right angles and extended over the paper-carriage G. It is provided with a detachable extension-arm B' , that is, guided in suitable ways of the fixed arm and secured thereto by a clamp-screw b . Both the fixed arm B and the detachable arm B' are provided with sleeve-shaped bearings for the shaft C of the type-wheels C' , which shaft extends in forward direction through a perforation of the fixed arm B into a center bearing of a disk-shaped standard B^2 , which is located immediately between the fixed arm B and the keys A A.

The shanks d d of the keys A A are guided in holes of the frame F and of an auxiliary guide-plate F' , that is rigidly supported on fixed posts below the frame F. Spiral springs s are interposed between the auxiliary guide-plate F' and loose washers a , that are pressed by the springs against cross-pins d' of the key-shanks d , as shown clearly in Fig. 11.

Every key A of one series actuates, when depressed to its full extent, a transverse bar F^2 , that is hung by arms f f to fixed posts f' at the under side of the frame F. The keys of the second series actuate a second cross-bar F^2 , that is arranged below the shanks of the second series of keys A A. The cross-bars F^2 are acted upon by spiral springs f^2 , which return them instantly as soon as the pressure of the key is released. The cross-bars F^2 are not supported parallel to the auxiliary plate F' , but arranged at a slight angle of inclination thereto in such a manner that they extend parallel to, but in a diagonally-opposite direction to, each other from the ends of the guide-plate F' and slope gradually downward, so that their opposite ends are farthest away from the end of the plate F' , as shown clearly in Fig. 11. Each cross-bar F^2 presses, when actuated by a key, upon the rear end of a lever F^3 , that is fulcrumed to the under side of the frame F and extended backward, the rear end engaging a laterally-extending heel f^4 at the lower end of an oscillating toothed segment f^9 . The second lever F^3 engages a second symmetrically-arranged heel f^4 of a second oscillating segment f^9 , the shank f^8 of which turns like the shank f^8 of the first segment loosely on a short shaft f^5 , supported in bearings at the under side of the frame F. The heels f^4 are connected by a spiral spring f^6 , by which the segments are returned into their normal positions after they have been lifted by one of the fulcrumed transmitting-levers F^3 . The shanks f^8 of the toothed segments f^9 pass through a transverse slot f^7 in upward direction, the segments f^9 engaging mutilated

pinions f^{10} , that are arranged on the type-wheel shaft C, as shown in Fig. 4. The mutilated pinions f^{10} are arranged sidewise of each other on the shaft C, so as to be engaged, respectively, by the toothed segments f^9 when they are oscillated, but clear the same when they are returned into their normal position, as shown in Figs. 3 and 4. The segments f^9 are moved by the connecting-spring f^6 of their heels in opposite directions until their shanks abut against fixed stops f^{11} at the top of the supporting-frame F, as in Fig. 4. By the intermeshing of the segments f^9 with the pinions f^{10} the type-wheel shaft C is turned on its axis in one or the opposite direction. In the normal position of the segments f^9 the type-wheel shaft C and the type-wheel upon the same are also at their normal position, so that the starting-point of the type-wheel C' (represented by a full stop) is then located vertically above the platen. From this point the type-wheel is rotated in one or the opposite direction, it being provided at its circumference with as many letters as there are letters in the alphabet. The distance of said letters on the circumference of the type-wheel from the normal or starting point or full stop is arranged to correspond with the variable depression of the inclined cross-bars, caused by the uniform dip of the keys and the corresponding greater or smaller oscillations of the intermediate toothed segments f^9 . When either one of the toothed segments f^9 is returned into its normal position, (shown in Fig. 4), it is entirely out of mesh with its mutilated pinion f^{10} . The type-wheel shaft C on arriving at its normal position is locked, so as to prevent vibratory motion by radial arms f^{13} , that are applied by collars and set-screws f^{12} to the type-wheel shaft C, the bent outer ends of said arms resting then on the upper side of projections or lugs f^{14} of the segments f^9 .

To impart an endwise return motion to the type-wheel shaft C in each direction, a spiral spring s' is loosely placed around the same, the ends s^2 of which are bent up, so as to abut at opposite sides of the fixed arm B. The spiral spring s' is confined between fixed collars f^{15} , and its ends engaged by pins f^{16} , as shown in Figs. 3 and 3^b, one pin imparting on the turning of the shaft by one of the segments a tension to the spring s' in one direction, the other pin a tension in the opposite direction, so that whatever the direction of motion of the type-wheel shaft C imparted by the segments f^9 , the spiral spring s' receives a sufficient amount of tension to cause the return of the type-wheel shaft and complete its motion until the full stop of the same is obtained by the abutting of the arms f^{13} against the stops of the segments f^9 . Each segment f^9 is returned into normal position against its stops f^{11} by the spiral spring f^6 . This spring also has a tendency to cause the return motion of the type-wheel shaft C by means of one of the segments f^9 and one of the mutilated pinions

f^{10} . The return motion of the shaft C is facilitated and accelerated by the action of the spiral spring s' on the shaft C. This spring also serves to complete the motion of the shaft C and bring it to its normal position after the actuating-segment f^9 is out of mesh with its pinion f^{10} . As soon as the teeth of the segment f^9 have left the teeth of the pinion f^{10} , the spring s' alone acts on the type-wheel shaft and continues the endwise motion of the same, so that one of the radial arms f^{13} passes the stop f^{14} of its segment, and then abuts on the top of said stop, while the other arm f^{13} simultaneously abuts against the stop f^{14} of the other segment, as shown in Fig. 4, so that the shaft C is locked into normal position.

Whenever the type-wheel shaft C and its type-wheel C' have been turned on their axis by the depression of a key to such an extent that the type corresponding to the key is brought vertically above the platen, the type-wheel shaft has to be locked rigidly in this position, so as to hold the type firmly in position for printing. The locking mechanism used for this purpose is worked by the keys A, the shanks of which are provided with side tongues d^x , that are beveled at their lower ends. The tongues d^x are guided in corresponding recesses of the frame F, and serve at the same time to prevent the keys from turning on their axes.

At the under side of the frame F are arranged a series of bell-crank levers d' , which are engaged at their opposite ends by the tongues d^x of the key-shanks, and which are fulcrumed to the frame F at points midway between the two rows of shanks. The tongues d^x of one line of keys A are arranged at one side of the shanks, and the tongues d^x of the second line of keys at the opposite side of the shanks, as shown in Figs. 11 and 12, so as to engage the ends of the fulcrumed levers d' at opposite sides and impart thereby on the depression of any key a lateral motion to its lever d' . The fulcrumed bell-crank levers d' are provided at their center with laterally-projecting arms d^2 , which are connected by pivot-rods or wires d^3 , with the lower ends of radially-arranged locking-levers d^4 , that are fulcrumed to a common pivot-pin d^5 at the base of the disk-shaped standard B². The levers d^4 move in recesses of the base of the standard B², as shown clearly in Figs. 13 and 14 and are extended through an opening of the frame F toward a raised circular flange d^7 on the face of the disk-shaped standard B², said flange being provided with radial recesses, in which the correspondingly bent upper ends of the levers d^4 are guided. At the moment when a key A is depressed the beveled lower end of the tongue d^x of its shank moves the fulcrumed lever d' sidewise, whereby, by the connecting wire or rod d^3 , the locking-lever d^4 is moved forward, as shown in dotted lines in Fig. 14. In this position it projects beyond the face of the raised

circular flange d^7 , so as to be in the path of two radial arms d^8 , that are secured to the type-wheel shaft and extended in opposite directions, the same as shown in Figs. 13 and 14. One arm d^8 is stopped by the projecting end of the fulcrumed lever d^4 when the type-wheel shaft is rotated in one direction on its axis, while the other arm is stopped by the same end when the type-wheel shaft is rotated in opposite directions. As one of the series of keys moves the type-wheel shaft in one direction and the other series of keys in the opposite direction, and as the intermediate levers d' are operated by the shanks of both series of keys, only one set of locking-levers d^4 is required for both series of keys, and thereby a reliable stop is made for the type-wheel shaft when the required type arrives above the printing-point. The depression of a key of either series will turn the type-wheel for the distance required by the type to be printed by means of the intermediate lever mechanism, and simultaneously bring one of the radial stop-arms d^8 in contact with the projecting locking-lever d^4 , that corresponds to that type and key. The same operation takes place when the adjoining key of the other series is depressed. In one case the radial stop-arm d^8 forms contact with one side of the locking-lever d^4 , while in the other case the other stop-arm d^8 forms contact with the other side of the same locking-lever d^4 .

From the foregoing it appears that the keys of one row turn the type-wheel shaft and its type-wheel in one direction from a normal point, while the keys of the second row turn the type-wheel and its shaft in opposite direction from a normal point. The depression of the key also actuates the locking mechanism by which the type-wheel shaft is locked when the required type is above the printing-point, while on the release of the key the type-wheel shaft is returned to its normal position and locked in this position.

When the type corresponding to the key that has been depressed is above the printing-point, the printing takes place by the action of the platen and printing-hammer, as will be described hereinafter.

To provide not only lower-case letters, but also capitals, punctuation-marks, &c., the type-wheel shaft is preferably arranged with three type-wheels. The hubs of the type-wheels C' are accurately fitted to three guide-sleeves e e' e^2 , which are arranged in line with each other. The outer sleeves e e' are respectively secured to the end of the main arm B and to the end of the auxiliary detachable arm B', while the intermediate shorter sleeve e^2 is keyed near the end of the type-wheel shaft C, so as to turn with the same in one or the opposite direction, as the case may be. The shaft C passes through the sleeve e and extends partly in the sleeve e' . The sleeves e e' e^2 are provided with longitudinal tongues or splines e^3 in line with each other,

along which the grooved hubs of the type-wheels C' are moved by means of a U-shaped shifting bail or yoke C², that is guided like the hubs of the type-wheels C' by grooved end sleeves on the tongues or splines e³ and sleeves e e' e². The shifting-bail C² is connected by a pivot-rod e⁴ with a lever C³, that is pivoted at its lower end to the side of the main arm B and acted upon at opposite sides by band-springs e⁵, which are of sufficient strength to return the lever C³, shifting-bail C², and the type-wheels C' into their normal position with the central type-wheel on the sleeve e² of the type-wheel shaft and the outer type-wheels, respectively, on the sleeves e e'. In the central position of the shifting-lever C³ the central type-wheel C' is vertically above the platen; but when the lever is moved by the left hand in backward direction the type-wheels C' are moved backward on the sleeves e e' e², so that thereby the innermost type-wheel C' is placed upon the sleeve e² of the type-wheel shaft, while the central and outermost type-wheels are both placed on the sleeve e'. The innermost type-wheel is thereby in such a position that it can be rotated with the type-wheel shaft. As long as the shifting-lever C³ is held in position the innermost type-wheel turns with the shafts. When, therefore, the central type-wheel is arranged for lower-case letters and the innermost type-wheel for capital letters, the depression of any key will print the capital letter corresponding to said key, as the innermost type-wheel has been shifted into a position vertically above the platen. By moving the shifting-lever C³ in a forward direction the type-wheels are shifted forward, and thereby the outermost type-wheel placed on the sleeve of the type-wheel shaft, so that on turning the latter by the depression of any key the outer type-wheel turns with the same and prints the characters arranged on the outer type-wheel, such as figures, punctuation-marks, &c. The moment the shifting-lever C³ is released it is returned by one of the springs e⁵ into its central position. The type-wheels are simultaneously shifted back into their normal position, with the central type-wheel above the platen. In the central position of the lever C³ the springs e⁵ rest against stop-pins e⁶ of the main arm B. When the lever C³ is shifted from a central position, one of the stops e⁶ prevents one spring e⁵ from following the motion of the shifting-lever, while the other spring is actuated by the motion of the lever C³ in one or the opposite direction.

To hold the type-wheels in proper position on the sleeve of the type-wheel shaft C, a spring-actuated locking-pin e⁷ projects through a hole of the auxiliary arm B' and takes into one of three notches e⁸ of the shifting-bail C². When the locking-pin e⁷ engages the middle notch e⁸ of the bail, the middle type-wheel is in position on the sleeve e² of the type-wheel shaft, while when the locking-

pin e⁷ is in engagement with the outer notches e⁸ one of the outer type-wheels is placed in position on the sleeve e² on the type-wheel shaft C. The raising and lowering of the spring of the locking-pin e⁷ also actuates, by means of a transverse piece e⁹, the arms e¹⁰ of the inking-wheels C⁴, which are pivoted to a support e¹¹ on the extension-arm B'. The inking-wheels C⁴ are thereby lifted, so as to clear the type-wheels while they are shifted in one or the opposite direction. The moment the pin e⁷ drops into one of the notches e⁸ of the bail C² the inking-wheels C⁴ are lowered at the same time, so as to form contact with the circumference of that type-wheel which is then above the platen.

The inking-wheels C⁴ are arranged equidistantly from the type-wheels, one at each side of the same, and are preferably made of the same construction as the inking-wheels in printing-telegraph instruments.

When the auxiliary arm B' is detached from the main arm B by loosening its clamp-screw b, the fixed sleeve e' of the same clears simultaneously the type-wheel shaft C. An open space is thereby formed between the end of the type-wheel shaft C and the outer end of the shifting-bail C², so that by shifting the type-wheels forward one after the other can be removed for cleaning or for being replaced by a new set of type-wheels having different characters or types. To assist this exchange of type-wheels, the bail C² is shifted forward by the shifting-lever C³, which is placed in the same position when replacing the type-wheels in reverse order on the shaft C.

The printing-hammer D is actuated by the depression of each key A, and also by the key A², whenever a full stop is required to be produced. The mechanism for operating the printing-hammer D consists of transverse bars D', that are arranged sidewise of the shanks of the keys A, and directly below the washers a of the same. The bars D' are connected by fixed crank-arms D² to transverse shafts D³, that turn in bearings at the under side of the frame F. An arm secured to the shank of the key A² also engages one of the transverse bars D'. The keys A depress the bars D' by their washers whenever they are depressed, while the key A² depresses the bar D' by the connecting-arm just mentioned. The shafts D³ are connected by rigid crank-arms D⁴ and connecting-rods D⁵, respectively, with the upper and lower ends of a lever D⁶, that is fulcrumed to a fixed downwardly-extending arm D⁷ at the under side of the frame F. The rear ends of the connecting-rods D⁵ are slotted, so as to provide for the oscillating motion of the fulcrumed lever D⁶, as one of the rods D⁵ is at rest when the other is operated. The crank-arms D⁴ of both shafts D³ are connected by a spiral spring h^x, whereby the bars D' are held in contact with the washers of the key-shanks until one of the keys is depressed. The lever D⁶ is also acted upon by a strong spring h', connected to the frame

F, so as to be returned into normal position when the pressure on the key is released.

To the lower end of the fixed arm D^7 is pivoted the butt-end D^8 of the shank of the printing-hammer D. The shank is connected by a spring-plate D^9 to the butt-end D^8 . The pivoted butt-end D^8 of the printing-hammer is drawn in upward direction by a spring h^2 , and is provided with a laterally-projecting pin h^3 , that is engaged by a spring-actuated dog h^4 , pivoted to the fulcrumed lever D^6 . The dog h^4 is pressed by its spring against a fixed stop-pin h^5 , which stop-pin keeps the dog in engagement with the pin h^3 of the butt-end D^8 , so as to actuate the printing-hammer D when the fulcrumed lever D^6 is oscillated. As soon as the lever D^6 is depressed far enough so that the dog h^4 clears the pin h^3 of the butt D^8 of the printing-hammer D, as shown in Fig. 3^a, the pressure on the butt-end is released and the hammer thrown suddenly with considerable force against the platen E, as shown in Fig. 3. The spring-plate, by which the butt-end D^8 is connected with the shank of the printing-hammer, imparts a quick motion to the hammer D and a sudden blow to the platen E, while the hammer is just as quickly returned after the blow is given. The platen E drops instantly by its own weight the moment after the blow has been given, so as not to interfere with the type-wheels or the paper on the paper-carriage G. The butt-end of the printing-hammer D is stopped in its upward motion by an adjustable stop-screw h^6 on the fixed arm D^7 , as shown in Figs. 3^a and 9, the sudden stop imparting in connection with the spring-plate an accelerated speed to the printing-hammer and the sudden recoil of the same. The moment the printing-hammer has imparted its blow and the pressure on the key is relaxed the fulcrumed lever D^6 returns into its normal position by the action of its spring h^7 , which brings the dog h^4 back into position above the pin h^3 of the butt-end D^8 . The same lever mechanism by which the motion is imparted to the printing-hammer D also imparts an intermittent step-by-step motion to the traversing paper-carriage G. For this purpose the fulcrumed lever D^6 engages by a lateral arm h^7 at its lower end an escapement-lever D^0 , that is pivoted to a lug at the under side of the frame and retained in contact with the arm h^7 by a spring h^8 . The lever D^0 is oscillated by the fulcrumed lever D^6 , so that one or the other of its beveled pallets h^9 engages with the alternating teeth of an escapement-wheel D^{10} , the shaft D^{11} of which is supported in bearings of fixed arms D^{15} , applied, respectively, to the frame F and to the outermost guideway g of the traversing carriage G, as shown in Figs. 3 and 10.

Whenever any one of the keys A or the spacing-keys A' or the full-stop key A² are depressed, the arm h^7 of the fulcrumed lever D^6 is moved away from the oscillating lever

D^0 , which latter follows the arm h^7 by the action of its spring h^8 until stopped by the fixed pin h^{10} of the supporting-arm D^7 . One of the pallets h^9 is thereby released from the teeth of the escapement-wheel D^{10} , but the other thrown into engagement with the next tooth. By the return motion of the fulcrumed lever D^6 the pivoted lever D^0 is taken along by the lateral arm h^7 , and thereby the last pallet thrown out of and the first pallet thrown into engagement with the next tooth of the escapement-wheel D^{10} , which is thereby intermittently stopped by the pallets h^9 . A gear-wheel D^{12} on the shaft D^{11} of the escapement-wheel D^{10} has an intermittent rotary motion corresponding to the intermittent movement of the shaft. This gear-wheel D^{12} meshes with a rack D^{13} of the paper-carriage G, and imparts thereby a step-by-step motion to the same, whereby the proper space between the letters is obtained. The shank of the spacing-key A' is provided with a fixed arm h^{11} , which extends backward and bears on one of the transverse rods D^7 , so as to actuate the lever mechanism by which the escapement-wheel D^{10} is operated when the key A' is depressed. When the key A' is depressed, the arm h^{11} abuts against a stop h^{12} , (shown in Figs. 2 and 2^a), which prevent it from making as full a dip as the other keys, but lowers the bar D^7 sufficiently to cause the working of the pallets of the escapement-wheel, and thereby the intermittent forward motion of the paper-carriage. The partial dip of the key A' is, however, not sufficient to release the printing-hammer D from the dog h^4 for a full blow, so that the platen E is not raised whenever the spacing-key A' is operated for producing the required space between the words.

A strong spiral spring D^{14} is attached at one end to the shaft D^{11} and at the other end to a bracket-arm h^{13} of a fixed arm D^{15} , as shown in Fig. 10, so that by moving the traversing carriage G laterally by hand on its guideways the spring D^{14} is rewound by the action of the rack D^{13} and gear-wheel D^{12} . A spring-pawl h^{14} is pivoted to the escapement-wheel D^{10} , and engages a ratchet-wheel h^{15} , that is keyed to the shaft D^{11} . As the escapement-wheel D^{10} is placed loosely on the shaft D^{11} , the ratchet-wheel h^{15} clears the pawl h^{14} when the spring D^{14} is wound up while it is in engagement with the pawl h^{14} , so as to admit the turning of the escapement-wheel D^{10} and the laterally-traversing motion by the action of its spring D^{14} , as customary in type-writing machines.

The shank of the platen E is guided vertically above the hammer D in a fixed sleeve E', secured to one of the ways g of the paper-carriage G, as shown in Fig. 3. It is raised by the blow of the hammer D, so as to lift the paper and press it against the type which is at that time vertically above the platen E. The moment the printing-hammer is released the platen is dropped, so as not to interfere

with the backward motion of the paper on the carriage G.

The interposition of the movable platen E between the hammer D and the paper forms one of the essential features of this invention.

The paper is supported on the traversing paper-carriage G, which is constructed of a sheet-metal shell G' of tubular shape, that is provided with a transverse opening *i*, through which the paper is introduced to the interior of the shell. An interior apron G² guides the paper at the inside of the shell and coils it, as shown in dotted lines in Fig. 3. The paper passes between an interior roller *i'* and small exterior contact-rollers *i''*, then through the opening *i* to the outside of the shell, next between a plate G³, attached to the top of the shell G', and a spring-pressed top plate G⁴ in backward direction past the platen E, and then through between the feed-rollers I I'. These feed-rollers are operated by means of a crank I² and a pawl-and-ratchet device I³, applied to the shaft of one of the feed-rollers I I', the crank moving the paper backward for producing the spacing between the lines. When the paper is to be placed in position in the shell G, it is inserted into the opening *i*, so as to be placed between the contact-rollers *i'* *i''*. By turning said contact-rollers with a hand-crank I³, applied to the shaft of one of said rollers, the sheet of paper is quickly drawn into the tubular shell G', after which the outer edge of the same is passed through between the fixed plate G³ and the spring-plate G⁴ and the feed-rollers I I', the paper being then in a position for printing.

When the traversing paper-carriage G is moved back after finishing a line for the purpose of winding up its actuating-spring and bringing it into position to take a new line, its movement is arrested when it reaches its normal position by contact of an arm K on the carriage with a stop K² on the frame F. The arm K is adjustable on the rod K' at the front of the carriage by means of a set-screw K³, and the screw-stop K² may be adjusted at different points on the frame, holes K⁴ being located along the margin of the frame F for this purpose.

The general operation of the machine is the same as in type-writing machines heretofore in use.

The paper-carriage is released and moved laterally step by step at each depression of one of the keys, so as to produce the spacing between the letters and between the words. When the printing of a line is completed and the paper-carriage returned to its normal position, the paper is moved backward for line spacing by the feed-rollers I I', between which the paper runs at the rear of the machine. The roller I is journaled in the side bars 1 of the frame of the carriage, and the rollers I' are supported on a transverse rod 6, which is parallel with the roller I. The rollers I' are provided with spur-wheels 7, which engage the paper and press it into contact with

the roller I. The rod 6 is supported at its opposite ends by spring-arms 8, which are attached to studs 9 at the sides of the carriage. The shaft of the roller I is provided at one end with a ratchet-wheel 10 and with a crank I², which latter turns loosely on said shaft. The arm of the crank I² is provided with a pawl 11, which engages the ratchet-wheel 10, for turning the main feed-roller I. A stop 12 projects from the carriage and serves to arrest the movement of the crank at the proper point for the spacing of a line. The feed-rollers are actuated for the spacing of a line by turning the crank into contact with the stop 12. By the action of the keys and type-wheels line after line is printed in clear legible characters. The type-wheels are rigidly locked after each type is brought into proper position above the printing part, so that the paper receives the imprint of the type when lifted by the platen, owing to the quick blow of the printing-hammer. A large number of characters may be printed with a comparatively small number of keys, whereby the construction of the machine is simplified and cheapened and a light, portable, and compact machine obtained. As the printed letters are always within sight, it can be readily controlled without removing or lifting any part of the mechanism.

I do not claim in a type-writing machine the specific combination of gear-arms, a type-wheel shaft, a pinion carried by said shaft, said arms being brought independently in gear with said pinion to rotate said type-wheel in either direction from a fixed point and subsequently to return said type-wheel to its initial point, substantially as described in an application of Byron A. Brooks, Serial No. 229,758, filed March 5, 1887.

I do not claim the specific combination in a writing-machine of the letter-wheel, the shaft carrying the fixed wheels, the letter-keys and levers, and the key-board, all substantially as set forth in an application of John H. Forrest, Serial No. 217,746, filed November 1, 1886.

I do not claim in a type-writing machine the specific combination of a pinion on the shaft of the type-wheel and a plurality of gear-arms which are out of gear with said pinion when at rest, combined with a device for holding the type-wheel in its initial position substantially as described in said application of Brooks.

I do not claim the specific combination, in a type-writing machine, of the fixed wheel, the ratchet, the transverse bar, the levers, and the type-wheel geared to the shaft substantially as shown in said application of Forrest.

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

1. The combination of two rows of keys, two independent lever mechanisms, each actuated, respectively, by the keys of one row, a

type-wheel shaft, a type-wheel supported on said shaft, toothed segments operated by said lever mechanisms, and mutilated pinions on the type-wheel shaft, whereby the type-wheel shaft is rotated in either direction from a normal position, substantially as described.

2. The combination of two rows of actuating-keys, two sets of transmitting-lever mechanisms, each operated by the keys of one row, a type-wheel shaft, a type-wheel supported on said shaft, toothed segments oscillated by said lever mechanisms, mutilated pinions on the type-wheel shaft, and radial stop-arms secured to said shaft, said arms engaging stops on the segments so as to lock the type-wheel shaft in a normal position, substantially as described.

3. The combination of two rows of actuating-keys, an inclined transverse bar below each row of keys, a fulcrumed lever operated by each transverse bar, laterally-oscillating and toothed segments operated by said levers, a type-wheel shaft having mutilated pinions meshing with said segments, and a type-wheel supported on said shaft, substantially as described.

4. The combination of two rows of keys, intermediate fulcrumed bell-crank levers actuated by the keys of both rows, fulcrumed stop-levers connected to said bell-crank levers, and a type-wheel shaft having stop-arms that form contact with one of the stop-levers, so as to arrest the type-wheel shaft when rotated in either direction from a normal position, substantially as described.

5. The combination of two rows of actuating-keys having tongued shanks, fulcrumed bell-crank levers actuated by the keys of both rows, a series of fulcrumed stop-levers connected to said bell-cranks, a standard having a slotted circular flange, a type-wheel shaft having stop-arms that form contact with one of the stop-levers, so as to arrest the type-wheel shaft when rotated in either direction from a normal position, substantially as set forth.

6. The combination of a type-wheel shaft, means, substantially as described, for rotating the same in either direction, a spiral return-spring placed loosely on the shaft between fixed collars, the ends of said spring abutting at opposite sides of the shaft-supporting arm, and pins affixed to said collars and adapted to engage the ends of said spring, so that tension is imparted thereto when the shaft is turned in either direction, substantially as set forth.

7. The combination of a fixed supporting-arm, a detachable extension-arm, each having a fixed guide-sleeve, a type-wheel shaft having a fixed intermediate guide-sleeve, type-wheels adapted to slide longitudinally on said sleeves, and means, substantially as described, whereby the type-wheels are shifted in either direction, so as to place either one of said type-wheels on the type-wheel shaft, substantially as set forth.

8. The combination of a fixed supporting-arm, a detachable extension-arm, each having

a fixed guide-sleeve, a type-wheel shaft having an intermediate guide-sleeve, type-wheels adapted to slide longitudinally on said sleeves, means, substantially as described, whereby the type-wheels are shifted longitudinally in either direction, and means, substantially as described, whereby either one of said type-wheels is locked in position on the type-wheel shaft, substantially as specified.

9. The combination of a fixed supporting-arm, a detachable extension-arm, fixed guide-sleeves secured to said arms, a type-wheel shaft having an intermediate guide-sleeve, type-wheels guided longitudinally on said sleeves, a shifting-bail, also guided on said guide-sleeves, and a spring-pressed hand-lever connected to said shifting-bail, whereby the type-wheels are moved in either direction by the hand-lever, substantially as set forth.

10. The combination of a fixed supporting-arm, a detachable extension-arm, fixed sleeves attached to said arms, a type-wheel shaft having an intermediate guide-sleeve, type-wheels guided longitudinally on said sleeves, a shifting-bail, a hand-lever connected to said bail, and a locking spring-catch engaging recesses of the bail, substantially as described.

11. The combination of a type-wheel shaft, type-wheels adapted to be longitudinally shifted thereon, pivoted arms carrying inking-wheels, and means, substantially as described, for locking either one of said type-wheels to its shaft, said locking means being adapted to raise or lower the inking-wheels and their supporting-arms so that they are clear of or in contact with the type-wheels, substantially as described.

12. The combination of two rows of spring-seated keys, two independent sets of lever mechanisms, substantially as described, operated by each row of keys, an oscillating hammer operated by both rows of keys, and a platen actuated by said hammer, substantially as described.

13. The combination of two rows of spring-seated keys, two sets of intermediate lever mechanisms, substantially as described, actuated, respectively, by said rows of keys, a printing-hammer having a spring butt-end oscillated by either lever mechanism, and means, substantially as described, whereby the butt-end of the printing-hammer is stopped, substantially as and for the purpose set forth.

14. The combination of two rows of keys, intermediate lever mechanisms, substantially as described, an escapement-lever actuated by either lever mechanism, an escapement-wheel released intermittently by said escapement-lever, and a spring-actuated traversing paper-carriage to which a lateral step-by-step motion is imparted at each oscillation of the escapement-lever, substantially as described.

15. The combination of a series of actuating-keys, intermediate lever mechanisms, substantially as described, an escapement-lever

operated by said lever mechanisms, an escapement-wheel released intermittently by said escapement-lever, a spring-actuated escapement-shaft connected by a pawl and ratchet
5 with the escapement-wheel, and a traversing paper-carriage actuated by a rack and gear-wheel from said shaft, substantially as described.

16. The combination of a rock-shaft, type-
10 segments arranged side by side and capable of longitudinal movement on said shaft, and a locking device, substantially as described, whereby one of the segments is locked on said shaft to turn therewith, while the other seg-
15 ments are free, substantially as set forth.

17. The combination of type-segments provided with grooves in their hubs, a rock-shaft on which the segments are loosely mounted, a projection formed on the shaft, and a shift-

ing-bar whereby the segments are moved on
the rock-shaft to engage with said projection,
substantially as set forth. 20

18. In a type-writing machine, the combination of two or more type-wheels shiftable on
a driving-shaft, a shifter for shifting said
25 wheels, a spline or clutch for engaging one of said wheels at a time with the shaft at a given point, and a second spline or clutch for holding the other wheel or wheels from turning
with said shaft. 30

In testimony that I claim the foregoing as my own I have signed my name in presence of two witnesses.

ALOYS WIRSCHING.

Witnesses:

LOUIS C. RAEGNER,
SIDNEY MANN.