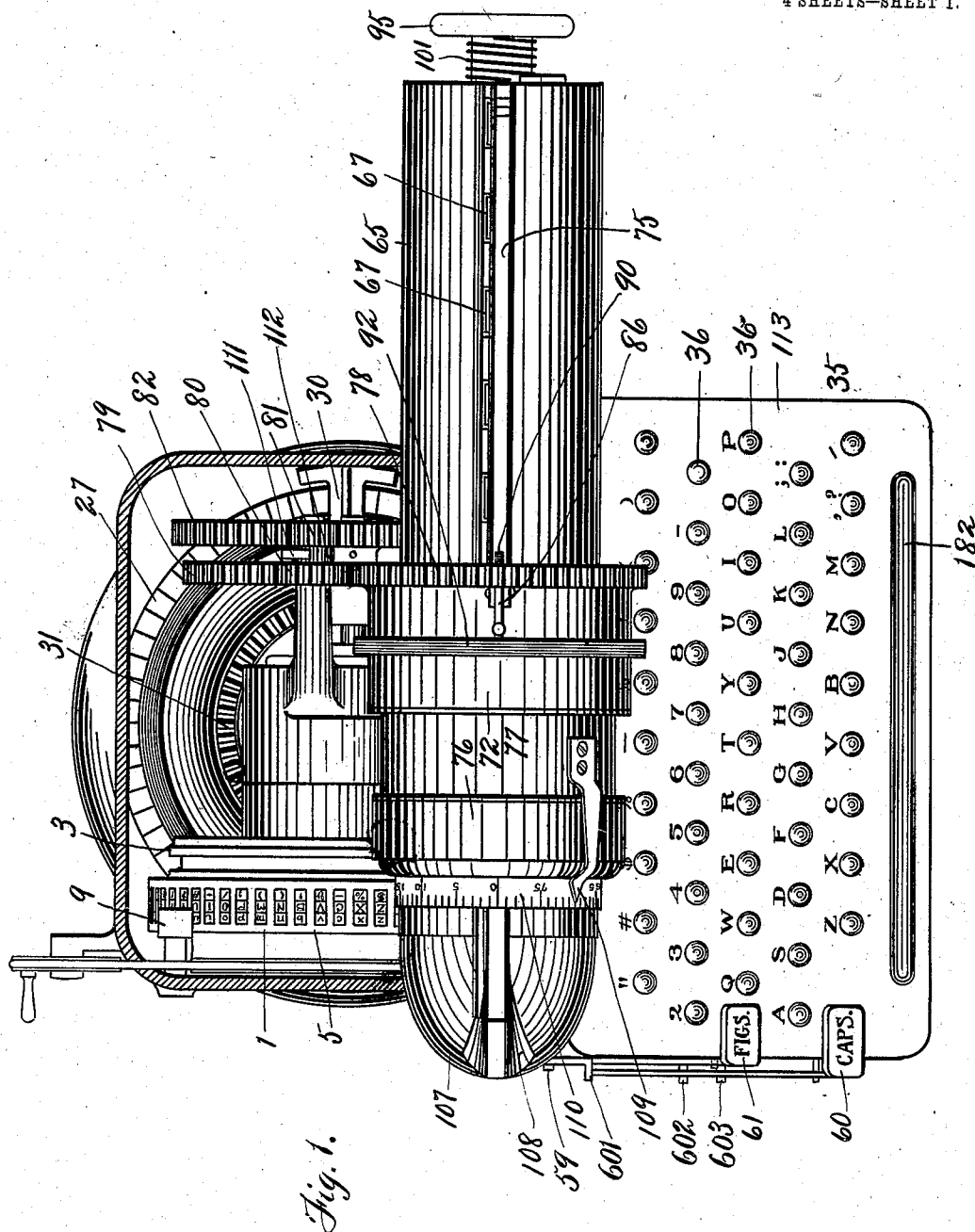


No. 867,868.

PATENTED OCT. 8, 1907.

E. V. BEALS.
TYPE WRITER.
APPLICATION FILED APR. 18, 1901.

4 SHEETS—SHEET 1.



WITNESSES;

Howard E. Savage
C. C. Stecker

INVENTOR

E. V. Beals

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4 SHEETS—SHEET 2.

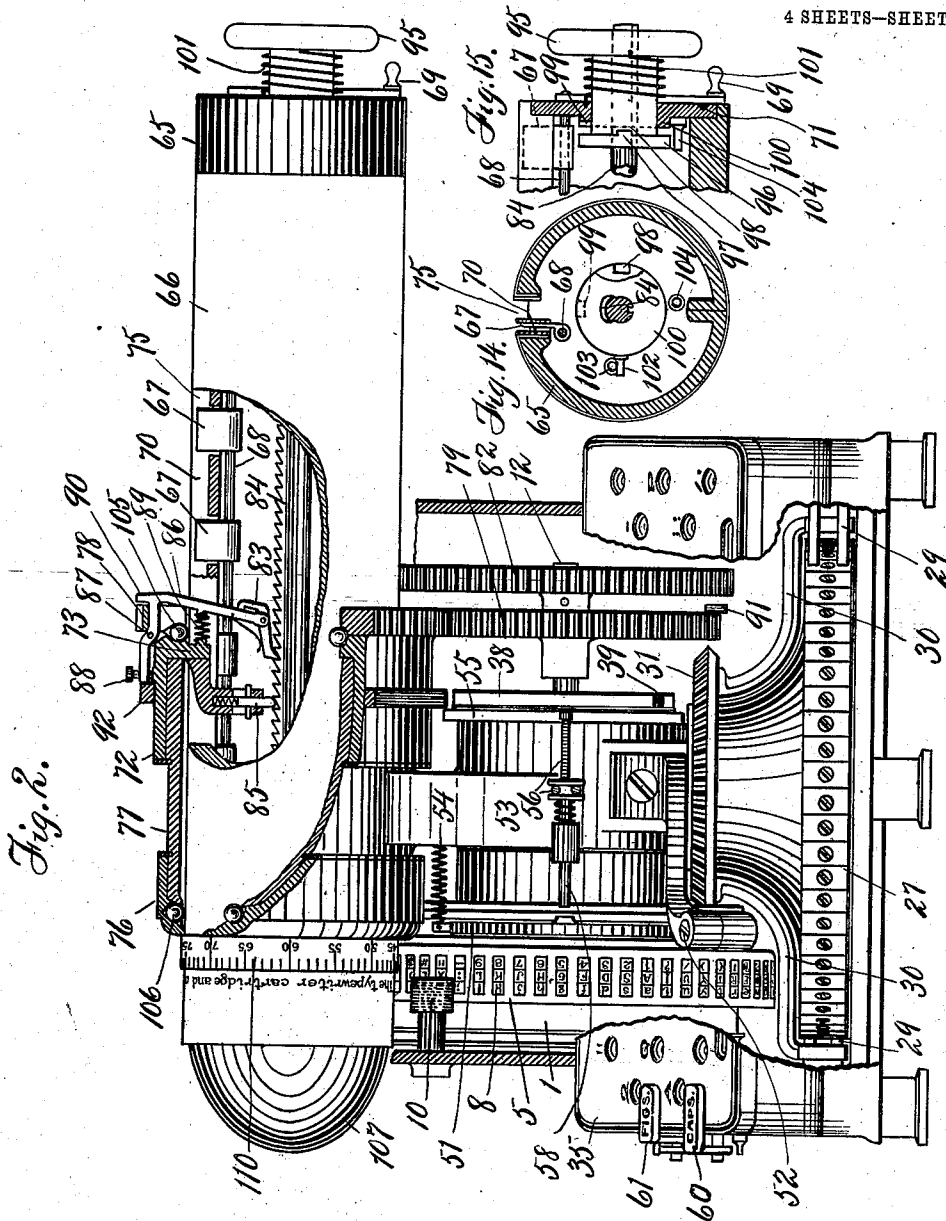


Fig. 2.

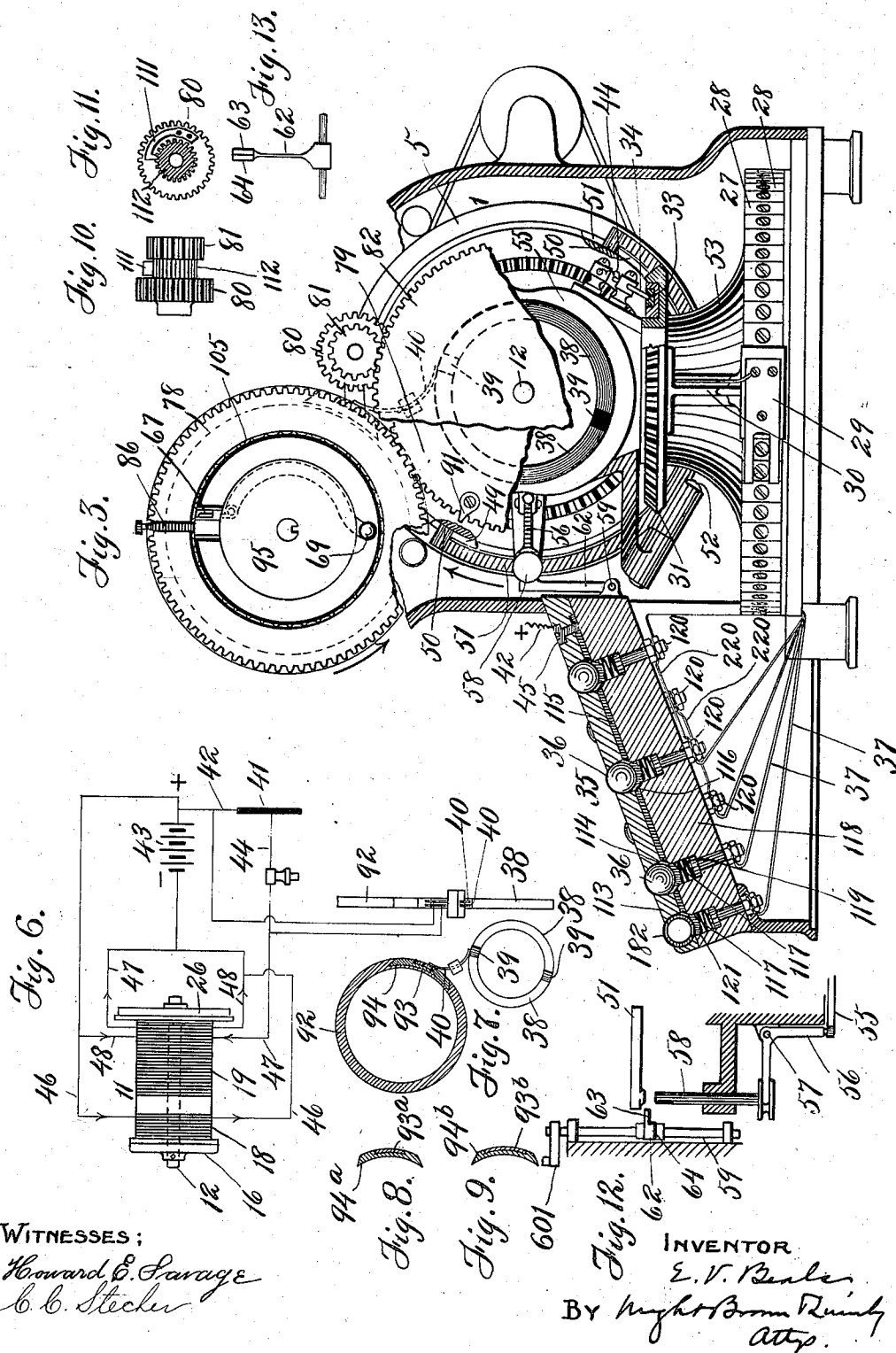
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E. V. BEALS.
TYPE WRITER.

APPLICATION FILED APR. 18, 1901.

4 SHEETS—SHEET 3.



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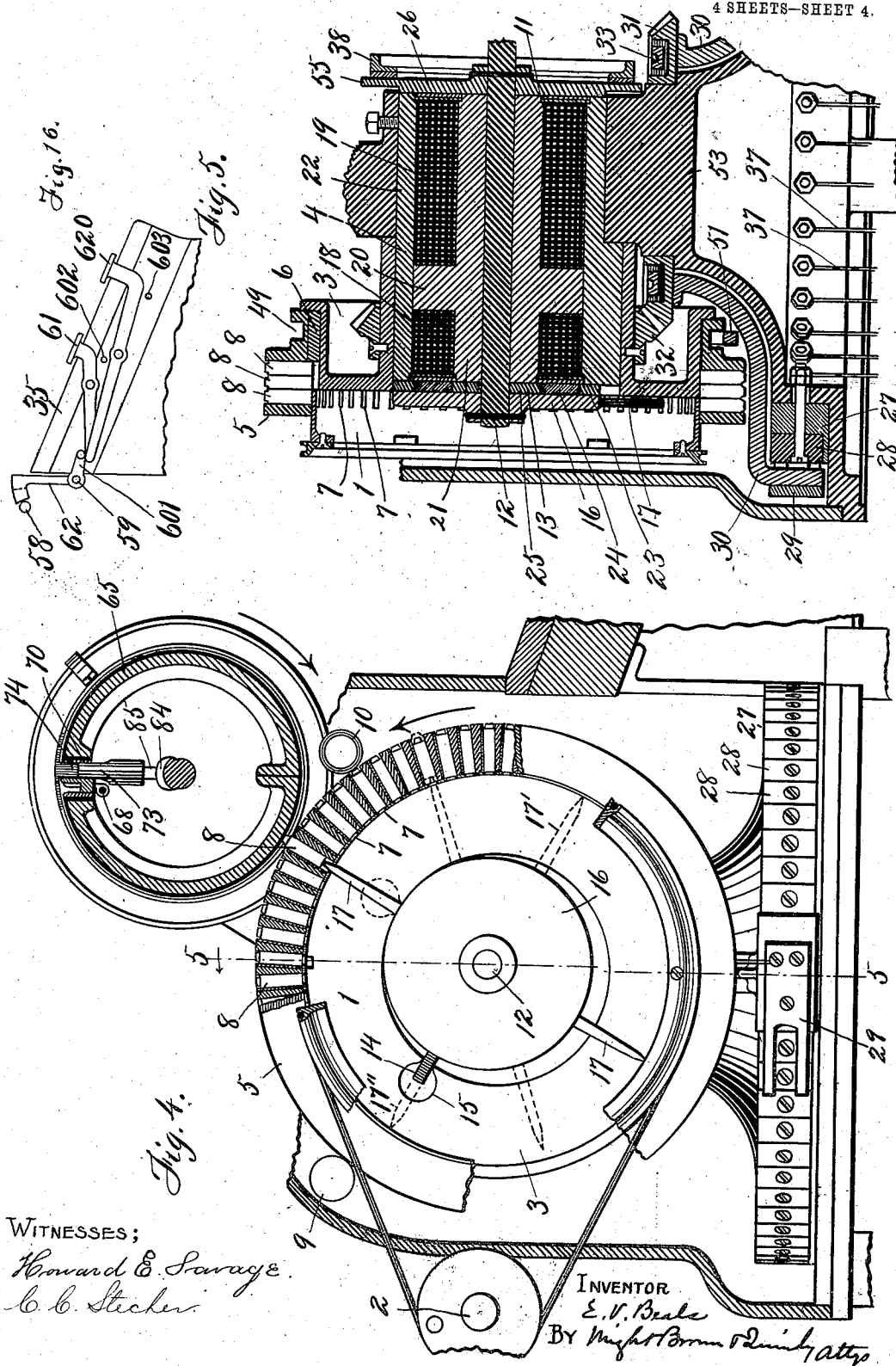
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4 SHEETS—SHEET 4.



WITNESSES;
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INVENTOR
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UNITED STATES PATENT OFFICE.

ERL V. BEALS, OF BOSTON, MASSACHUSETTS.

TYPE-WRITER.

No. 867,868.

Specification of Letters Patent.

Patented Oct. 8, 1907.

Application filed April 18, 1901. Serial No. 56,387.

To all whom it may concern:

Be it known that I, ERL V. BEALS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Type-
5 Writers, of which the following is a specification.

This invention relates to typewriters, and consists in certain novel features of construction and arrangement which I shall now proceed to describe and claim.

Of the accompanying drawings, forming a part of
10 this specification,—Figure 1 represents a plan view of a typewriter constructed in accordance with my invention. Fig. 2 represents a front elevation, partly broken away, and in section. Fig. 3 represents a right hand
15 end elevation, partly broken away and in section. Fig. 4 represents a left hand end elevation, partly broken away and in section. Fig. 5 represents a section on line 5—5 of Fig. 4. Fig. 6 represents a diagrammatic view of the electrical connections. Fig. 7 represents a sectional view of a contact device employed. Figs. 8 and
20 9 represent sectional views, showing alternate parts adapted to be substituted in said device. Figs. 10 and 11 represent respectively a side elevation and a section of a slipping device employed. Fig. 12 represents a plan view, partly in section, showing a device
25 for shifting the type-wheel. Fig. 13 represents a front elevation of a part of said device. Fig. 14 represents a transverse section taken near the right hand end of the platen-roll. Fig. 15 represents a longitudinal section of said end of the roll. Fig. 16 represents an end
30 elevation of the keyboard, showing the shift-keys.

The same reference characters indicate the same parts in all of the figures.

Referring to the drawings, 1 represents a type-wheel continuously rotated by any suitable power, as by
35 belted connection with a driving-shaft 2, and comprising a part 3 adapted to rotate upon a fixed stud or bearing 4, and a part 5 which constitutes a type magazine and is made axially movable with respect to the part 3 by being connected thereto with a spline 6. The
40 part 3, which may be termed a templet ring, is provided with a series of holes 7, 7, and the part 5, which may be termed the magazine ring is provided with a series of radial pockets for the types 8, 8, three rows of which
45 are here shown, each type pocket being in register with a hole 7. The types are frictionally held in their pockets and are normally leveled or brought to retracted positions after being projected into a printing position by means of a fixed roll 9 adapted to impinge
50 against the outer ends of the types as the type-wheel revolves. The types are inked by a fixed ink-roll 10.

Fixed within the stud 4 and eccentric to its outer cylindrical surface is a double electro-magnet member 11, through the center of which runs a shaft 12 capable
55 of rotation, and on this shaft close to one of the end faces of the magnet is loosely mounted a plate 13 constituting a clutch-member, and continuously revolved by the

type-wheel through a connection therewith comprising a radial lug or projection 14 on the disk 13 entering a recess 15 in the templet ring 3, said recess being formed with a contracted neck which fits the lug 14 closely, and
60 an outer portion enlarged to permit the lug to assume the different angular positions due to its eccentricity of rotation with respect to the type-wheel. The other and normally stationary member of the clutch is a disk or plate 16 which is also the armature of the left hand end
65 or magnet of magnet-member 11, and is fixed to the shaft 12. Said disk 16 carries a pair of radially projecting arms 17, 17 which constitute strikers or type-actuators having such a length that when either of them coincides with the shortest radius from shaft 12 to templet
70 ring 3, its end will project into some one of the holes 7 and push a type 8 from the corresponding pocket into printing position; while, when either actuator 17 is in a position at right angles to this shortest radius it will be withdrawn from the holes and will clear the inner
75 surface of templet ring 3. This latter is its normal position of rest. The magnet-member 11 has two windings 18, 19, separated by a flange or partition 20 formed on an inner core 21 which extends from one end to the other of the magnet-member and is paralleled by an
80 outer sleeve or case 22 inclosing the windings 18, 19, and its left hand end constituting the bearing stud 4. The core and outer case are made of soft iron, and at each end of the magnet-member they present two opposite poles. The disk 13 is made up of an outer soft
85 iron ring 23 coinciding with the casing 22, an adjacent non-magnetic ring 24 coinciding with the winding 18, and an inner soft iron ring 25 coinciding with the core 21. It will be noted that the magnetic lines of force tend to flow from one pole of the left-hand magnet by
90 way of one of the soft iron rings of disk 13 into the armature 16 and out of said armature by way of the other soft iron ring of disk 13 to the other magnet pole, and any attraction exerted by said magnet has a tendency to draw the armature 16 toward that end and magnetic-
95 ally lock it to the disk 13. Theoretically some longitudinal movement of shaft 12 is necessary in order to permit this, but in practice such movement may be made infinitesimal in amount. At the opposite end of the double magnet-member 11 is a soft iron armature
100 disk 26 fixed to shaft 12. It is obvious that should the force of the left-hand electro-magnet predominate over that of the right hand magnet, armature disk 16 will be drawn against and locked with the revolving disk 13 so as to be revolved thereby, and if the right hand magnet
105 predominates, armature 16 will be released from the revolving disk 13 and brought to rest by the magnetic locking of armature disk 26 against the right end magnet poles.

27 is a fixed commutator consisting of segments 28, 110 28, and 29, 29 are two revolving brushes carried by arms 30, 30 fixed to the under side of a bevel gear 31 in mesh

with a bevel gear 32 of equal size secured to the hub of the type-wheel. The brushes 29 accordingly rotate in contact with the commutator in synchronism with the type-wheel 1. These brushes are both electrically connected with a continuous conductive insulated contact ring 33 on the upper side of the gear 31, from which current passes to the magnet, as hereinafter explained, through a brush 34.

35 is a keyboard having a series of depressible keys 36, 182 controlling circuit wires 37, 37 connected with the respective segments 28 of the commutator. The commutator 27 and brushes 29 constitute a controller or circuit-selector whereby every one of the key-circuits is twice in a revolution of the type-wheel put into condition to be operated, and if any key 36 or 182 is depressed long enough for one of the brushes 29 to pass over the commutator segment corresponding to that key, the key circuit belonging to that key will be operated or energized.

On the shaft 12 is mounted a pair of nearly semi-circular contact segments 38, 38 separated by insulating segments 39, 39, and forming therewith a ring which is in constant contact with a pair of fixed brushes 40, 40. In the diagram of the circuits shown in Fig. 6, the solid rectangle 41 represents the keyboard and the circuit-selector. Current goes into said devices from the positive pole of a battery 43 by way of a wire 42 connected with a binding post 45 shown in Fig. 3, and goes out by way of a wire 44 connected with the brush 34. The brushes 40, 40 are in parallel with the wires 42, 44. The left hand magnet-winding 18 has its terminals 46, 46 connected with the respective poles of the battery 43 and a current therefore constantly flows through this winding. The right hand magnet-winding 19 is composed of two circuits of equal resisting and electromagnetic qualities and having terminals 47, 47, and 48, 48. The circuit 48, 48 is connected directly with the opposite poles of the battery 43 and the current flows through it continuously. When acting alone it creates a magnetism at the right hand magnet poles which predominates over the magnetism at the left hand poles created by the winding 18. The circuit 47, 47 is a neutralizing circuit in parallel with the keyboard circuits and the brushes 40, and so connected with the battery 43 as to receive current in the opposite direction to the current in circuit 48, 48, as plainly indicated by the arrows, so that if both circuits are energized at the same time, they will completely neutralize each other and no polarity will be created in the right hand magnet. As the brushes 40, 40, are in parallel with the member 41 representing the key circuits through the key contacts and the circuit-selector, completing the circuit through said brushes has the same effect as completing it through any of the key circuits.

The non-printing condition of the machine is with the type-wheel 1, clutch disk 13, and brushes 29 revolving in synchronism, and the actuators 17 stationary at right angles to their position shown in Fig. 4, magnetically locked in said position by contact of the armature 26 with the right hand magnet poles, this contact being due to the fact that the magnet circuit 47, 47 is open. Now let a key 36 be depressed and held down an instant until the brushes 29 have had time to make practically half a complete revolution. The speed of the brushes and type-wheel is such that this

period of time is very short. Contact will be made by one or the other of the brushes 29 with the commutator segment corresponding to the depressed key at the same instant as the type character in the type-wheel corresponding to that key comes opposite one of the actuators 17. The same character will at this instant be opposite each of the two type actuators, since there are duplicate sets of characters in the two halves of each row of types in the type-wheel, that is, in each row there are two complete alphabets or other sets of characters. At the instant that the key circuit is completed, the right hand electro-magnet winding becomes neutralized and the armature disk 16 is locked to the revolving disk 13. The actuators 17 are accordingly carried around with the type-wheel and the one which starts at the dotted position 17' moves into the templet hole 7 opposite which it has arrived and pushes out the proper type 8 into printing position. After the said actuator has moved through an angle of 180° and reached the position 17'' it is arrested and magnetically locked by the breaking of the magnet circuit 47, and the type which has done the printing is pushed back into place by passing under the roll 9. The energizing of the magnet circuit 47, 47 by the closing of a key circuit through the key contacts and the commutator segments is merely momentary, but it serves to start the shaft 12 in rotation, and in so doing it carries one of the insulating segments 39, which is normally at rest underneath the brushes 40, out from under said brushes and brings the latter into contact with the succeeding conductive segment 38, whereby the circuit is immediately maintained and the continued rotation of the shaft 12 is insured. The circuit 47 becomes broken as soon as the brushes 40 pass off from the segment 38 on to the other insulating segment 39, which occurrence takes place in exactly a half revolution of all of the described revolving parts from the time when the key circuit was energized.

The magazine ring 5 is provided with a circumferential groove 49 engaged by two studs 50, 50 on the end of a forked lever or yoke 51 pivoted at 52 to the machine frame 53. A spring 54 (Fig. 2) attached to said lever normally holds the type magazine in its right-hand-most position with the "lower-case" row of types in register with the type actuators 17. The lever is capable of being oscillated to the left to successively bring the middle or "upper-case" row and the right hand or figure row of types in the magazine ring into register with the type actuators and the holes 7, 7, and such oscillation is controlled from the keyboard in the following manner: 55 is a cam formed by the edge of the armature disk 26 and having two similar protuberant portions which operate against one arm of a bell-crank lever 56 pivoted at 57 to the machine frame and having its other arm pivotally engaged with a sliding shifter-rod 58 so as to reciprocate said rod once for each half revolution of the shaft 12. The cam is so shaped as to project the rod 58 toward the left immediately when the shaft 12 begins to rotate, and keep it in this left-handward position until just before said shaft completes its half revolution. 59 is a rock-shaft adapted to be oscillated to different degrees by two pivoted shift keys 61, 620 whose inner ends engage an arm 601 on the end of shaft 59, the outer ends of said shift-keys abutting against stop-pins 602, 603 which

permit angular movements of different extent to the two shift-keys. Attached to the shaft 59 is an arm 62 provided with two abutments 63, 64 of different thickness. The depression of shift-key 61 oscillates the rock-shaft 59 to a certain degree so as to bring the thin abutment 63 between the shifter-rod 58 and the yoke 51, and on the next left-handward reciprocation of the shifter-rod it will oscillate the yoke and shift the magazine ring 5 so as to bring its middle row of types opposite the type actuators 17. The depression of shift-key 620 oscillates the rock-shaft 59 to a further degree and brings the thick abutment 64 between the shifter-rod 58 and yoke 51 which causes the magazine ring to be shifted to a further degree to bring its right-handmost row of characters into register with the type actuators. The shank of arm 62, as shown in Fig. 13, is made thin and resilient so as to permit the upper end of the arm having the abutments 63, 64 to move with the rod 58 while the rock-shaft 59 remains axially immovable. When neither of the abutments 63, 64 is between the rod 58 and yoke 51 the rod on its left-handward reciprocation approaches the yoke, but does not oscillate it. Thus it will be noted that while the type-wheel 1 has a stationary printing position, yet its magazine ring may be shifted axially to alternatively associate any of its rows of types with the type actuators and with the keyboard circuits, which include the segments of the circuit-selector. It will be observed that as a consequence, a given number of key circuits and commutator segments controls a multiple of that number of alphabets and other sets of characters on the type-wheel. I may employ more or less than two sets of characters in the periphery of the type-wheel and a corresponding number of type-actuators and selector brushes. 65 is a cylindrical platen-roll mounted with its axis parallel to the axis of the type-wheel 1 and adapted to receive a rotary movement to cooperate with the type-wheel in printing the characters, and to space the characters and words, and an axial or longitudinal movement to space the lines. The web or paper 66 is secured by one of its longitudinal edges to the platen-roll by means of a clamp consisting of a series of fingers 67 mounted within the platen-roll on a rock-shaft 68, which runs longitudinally thereof and is provided with a handle or lever 69 on its right hand end. The opposite edge of the paper is left free. When swung to the right from the position shown in Fig. 3, the lever 69 opens the clamp so as to release the paper from between the fingers 67 and the opposed wall 70 of the platen-roll, forming one side of a slot in which the clamp is located, and when swung to the left to close the clamp, a stud 71 formed on said lever engages a notch in the end of the roll and holds the clamp in closed position. 72, 76 designate two sleeves constituting a rotary platen-roll holder in which the roll 65 is mounted and to which it is attached in a manner to permit axial movement but to prevent rotary movement of the roll within the holder, by two spline-keys 73, 74 (Figs. 2 and 4) formed on the respective sleeves 76, 72 and operating in a slot 75 extending for the length of the platen-roll. The two sleeves rotate about a hollow bearing 77 formed on the machine frame 53, and the sleeve 72 is provided with a gear 78 connected by gears 79, 80, 81 with a gear 82 fixed to the shaft 12, the gear 79 being loosely mounted on shaft 12. The relation between the pitch diameters

of gears 78 and 82 is such that a half rotation of the shaft 12 imparts to the roll-holder and platen-roll one complete rotation and an additional fraction equal to a character space. In printing a line therefore, each depression of a character key results in starting the platen from a position of rest, which always corresponds to the position 17' of the actuator and is about 90° from the printing point, and carries it through a complete rotation back to the point where it started, plus one character space, thereby leaving the roll in position to receive the next imprint in the space following the last printed character. For spacing between words a space-key 182 is provided on the keyboard, controlling a circuit which corresponds with a portion of the type-wheel periphery on which there are no types.

The line-spacing axial feed of the platen-roll 65 is effected by a pawl 83 mounted on the sleeve 72 and cooperating with the teeth of a central ratchet rod 84 mounted on the roll 65. 85 is a yielding check-pawl attached to the sleeve 72 and engaging the teeth of ratchet-rod. The pawl 83 is carried by a lever 86 pivoted at 87 to the sleeve 72 and having its return throw adjustable by means of a set-screw 88, said lever having a spring 89 which retracts the pawl, and a radially projecting lug 90. On the gear 79 is a lug 91 adapted to engage the lug 90 and oscillate the lever 86 so as to feed the ratchet 18 and the platen-roll to the left to space between lines. The relative pitch diameters of the gears 78, 79 are, however, such that the lug 91 comes in contact with the lug 90 only once in the length of a line, at or just before the beginning of said line. As often, therefore, as a line is completed around the platen by the operation of the printing and character-spacing mechanism, the platen automatically shifts to the left and goes on to a new line without any attention or act of the operator. Provision is made whereby, when the end of a line is approached to within a certain number of character spaces, the platen-roll will automatically remain in rotation until it has spaced out the remainder of the line and automatically shifted to a new line, said provision being as follows:—92 is an insulating ring secured to the periphery of sleeve 72 and having continuous contact with those ends of the brushes 40, 40 which are opposite to the ends contacting with the rings 38, 39. In this ring 92 is mounted a metallic contact segment 93 of a length corresponding to a certain number of character spaces, say five, and so located that its absolute rotary position, or position between printing cycles of the platen-roll, does not bring it underneath the brushes 40, 40 until the end of the line is approached. The segment 93 never comes to rest underneath the brushes, for as soon as the platen-roll has an absolute rotary position which would bring the segment to rest under the brushes after the next rotation, the completion of that rotation finds the circuit 47, 47 still completed through the brushes 40, 40 by way of the segment 93 and compels the platen-roll to remain in rotation until the segment 93 is no longer under the brushes 40 in the natural position of rest of the platen-roll. It follows from what has been said that as the end of a line is approached, the operator has merely to depress the spacing key 182 and hold it down until the segment 93 would come under the brushes 40 at the end of its next rotation, after which he may release the key and the machine will automatically space out the

line and shift to a new one. The segment 93 is embedded in an insulating segment 94 which is removably mounted in a dove-tailed groove in the ring 92, and the extra equipment of the machine preferably includes a number of substitute segments 94^a, 94^b (Figs. 8 and 9) having contact segments 93^a, 93^b corresponding in length to different numbers of character spaces, said substitute segments being adapted to be inserted in ring 92 in place of the segment 94, so as to start the automatic spacing earlier or later in the line. By adjusting the stop-screw 88, the throw of pawl 83 may be varied so that it feeds one or more teeth of the ratchet rod at each stroke, thereby varying the spacing between lines.

The ratchet rod 84 is rotatively mounted in bearings at its ends and is provided at its right hand end outside of the roll 65 with a handle-sleeve 95 splined to the rod. Within the roll 65 the sleeve 95 is provided with a clutch plate 96 having a tooth or projection 97 adapted to enter either of two notches 98, 99 formed in a fixed clutch plate 100. A spring 101 normally presses the sleeve to the right and also tends to rotate it and the ratchet rod in a direction to bring the teeth of the ratchet rod into their normal position of engagement with the pawls 83 and 85, and the tooth 97 into engagement with the notch 98. The sleeve 95 may, however, by being pressed inwardly to disengage the tooth 97 from the notch 98, be rotated and the ratchet rod turned out of engagement with the pawls and held in its new position by the tooth 97 entering the notch 99. The platen-roll being thus disengaged from its axial feed mechanism may be moved by hand to any new line position and reengaged with the feed by returning the rack into engagement with the pawls. A pin 102 on the plate 100 engaging fixed pins 103, 104, limits the rotary movements of the rack.

Each sleeve 72, 76 is provided with a circular row of anti-friction spherical rollers or balls 105, 106 adapted to ease the axial movement of the platen-roll and the paper through the said sleeves. The platen-roll is provided with a rounded or tapered nose 107 at its left-hand end adapted to guide it during its insertion within the holder sleeves 72, 76, and the left-hand end of the slot 75, as shown at 108 in Fig. 1, is made flaring to guide said slot into engagement with the keys 73, 74.

At about 90° backwardly removed from the printing point between the platen-roll and type-wheel, which 90° point is the position of rest of the printing point on the platen-roll, is a pointer 109 fixed to the bearing 77 and cooperating with a circular index 110 on the sleeve 76 to indicate character spaces on the platen-roll. When the platen-roll is at rest the pointer 109 indicates the position on the paper where the next printed character or space will come. Figs. 10 and 11 represent a slipping device consisting of a spring pawl 111 on the side of gear 80 engaging the teeth of a toothed wheel 112 on the hub of gear 81. The frictional engagement of the pawl and toothed wheel is sufficient to prevent relative rotation of the gears 80, 81 during the ordinary rotary movements of the platen-roll imparted by the rotation of the shaft 12, but permits such relative rotation when the operator grasps and forcibly twists the platen-roll. This permits the platen-roll to be manually rotated to bring it to any point in a line independently of its rotary feed mechanism.

The keyboard 35 is of novel construction, as follows:—

It is provided with a smooth surfaced finger board 113, of vulcanite or other suitable insulating material, having circular outwardly converging sockets 114 in which the keys 36 are mounted, said keys being metallic and of spherical shape and normally projecting slightly above the surface of the board 113, the sockets 114 constituting outer key-seats of smaller aperture than the diameter of the keys so as to retain the keys. Below the board 113 is a conductive plate 115 of copper, or other suitable material, having holes 116 registering with the sockets 114, but too small to permit the downward escape of the keys, the edges of said apertures constituting inner key-seats. To this plate is carried the wire 42. Underneath the keys 36 are small metallic plungers 117, spherically concave on their upper sides to fit the keys, and located in sockets in a thick insulating plate 118, said plungers being pressed upwardly by metallic springs 119 bearing against binding-posts 120 connected with the wires 37. The spacing-key 182 which is elongated and cylindrical, is preferably supported at a plurality of points along its length by plungers 121 which are cylindrically concave on their upper sides. The keys 36 and 182 are normally pressed upwardly by their springs out of contact with the plate 115, and when any of them is depressed the corresponding key circuit is completed through the plate 115, key 36 (or 182), plunger 117 (or 121), spring 119, and binding-post 120. The keys 36, 182 and their inner key-seats 116 constitute the electrodes of the key-circuits. The spring pressure under the keys is very light and the distance through which they have to move is small. The particular object of this design of keyboard is to permit the keys to be operated by a wiping movement of the operator's fingers in contact with the finger-board, thereby avoiding noise and excessive finger action. Said movement in whatever direction made will tend to rotate the spherical keys 36, and if made in an approximately forward and backward direction, will tend to rotate the spacing-key 182. The contacting conductive surfaces are thereby rubbed and kept bright at all times. Another advantage of the wiping movement over the striking movement for operating the keys is to permit two or more keys which may be adjacent to each other and in line any where on the board to be included in one movement of the finger. Characters which occur in often-used groups can be associated on the board so as to effect by this wiping movement a considerable saving in time, labor, and movement on the part of the operator.

As shown in the drawings there are five rows of character-keys on the keyboard, the lower three rows being devoted to the alphabet and the upper two rows to numerals and other characters. There are, however, only as many key-circuits as there are keys in the lower three rows. The binding-posts 120 of the upper two rows are connected by cross-wires 220, 220, with the binding-posts 120 of the next two rows, and when the shift-key 61 for figures is depressed, the operator uses the upper two rows.

I claim:—

1. In a typewriter, a type-wheel, a platen roll arranged to make a complete rotation and an additional character spacing part of a rotation for a printing cycle of the type-wheel, and a keyboard controlling the printing.

2. In a type-writer, a type-wheel comprising a holder, a series of types frictionally held therein and movable into and out of printing position, a keyboard controlling the projection of said types into printing position, and a stationary abutment to effect their retraction.

3. In a typewriter, a continuously-moving type-holder having a series of types movable thereon into and out of printing position, a type-actuator adapted to be brought into operative relation with said types in succession by the movement of said type-holder, a series of key-circuits, and an electrical selector adapted to bring the particular key-circuit which is actuated into operative relation with the actuator.

4. In a typewriter, a continuously-rotated type-wheel comprising a holder and a circumferential series of types movable thereon into and out of printing position, a normally inactive type-actuator, a series of key-circuits, and an electrical selector adapted to bring the particular key-circuit which is actuated into operative relation with the actuator.

5. In a typewriter, a continuously-rotated type-wheel comprising a holder and a circumferential series of types movable thereon into and out of printing position, a normally-inactive rotary type-actuator, and key-board controlled means to bring said actuator into projecting relation with any of the types of said series.

6. In a typewriter, a continuously-rotated typewheel having a circumferential series of types movable thereon into and out of printing position, a normally non-rotating type-actuator, a continuously-rotating driver synchronous with the type-wheel, and key-controlled clutching means to connect said driver and actuator.

7. In a typewriter, a rotary type-wheel having movable types, an actuator for projecting said types, a stationary eccentric for imparting actuating movement to said actuator, and key-controlled means to effect an intermittent revolution of said actuator.

8. In a typewriter, a continuously rotated type-wheel comprising a holder and a series of types radially movable thereon into and out of printing position, a normally stationary type-actuator mounted to rotate eccentrically of said type-wheel, and keyboard-controlled means to rotate said type-actuator in angular projecting relation with any of said types.

9. In a typewriter, a continuously-rotated type-wheel, a platen, a circuit selector having a continuously rotating member synchronous with the type-wheel, a series of keyboard circuits controlled by said selector, and means controlled by said circuits for bringing the type-wheel and platen into printing relation without stopping the type-wheel.

10. In a typewriter, a continuously-rotated type-wheel comprising a holder and a series of types movable thereon into and out of printing position, a circuit selector having a rotating member synchronous with the type-wheel, a series of key-circuits controlled by said selector, a type-actuator, and a clutch controlled by the key-circuits and adapted to bring said actuator into projecting relation with any of the types.

11. In a typewriter, a continuously rotated type-wheel having movable types, a normally inactive rotary type-actuator, a normally stationary platen-roll mounted to rotate in unison with said type-actuator during its actuating cycle, a circuit selector having a member synchronous with the type-wheel, a clutch controlling said type-actuator and platen-roll, and a series of key-circuits controlling said clutch and governed by said selector.

12. In a typewriter, a continuously rotated type-wheel having movable types, a normally inactive type-actuator, a clutch comprising an electro-magnet having an armature member attached to said type-actuator and constituting a clutch member, and a complementary clutch member synchronous with the type-wheel and mounted to rotate between said magnet and its armature, and a keyboard controlling said magnet.

13. In a typewriter, a continuously rotated type-wheel having movable types, a normally inactive type-actuator, a clutch comprising an electro-magnet having an armature member attached to said type-actuator and constituting a clutch member, and a complementary clutch member synchronous with the type-wheel and mounted to rotate be-

tween said magnet and its armature, a keyboard controlling said magnet, and a platen-roll rotated by said armature.

14. In a typewriter, a normally stationary platen-roll, an electro-magnetic clutch having a member adapted to rotate said roll and a continuously rotated member, a circuit selector having a rotating member synchronous with the continuously rotated clutch-member, and a series of keyboard circuits controlled by said selector and controlling said clutch.

15. In a typewriter, a normally inactive member of a printing mechanism, a continuously operating motor member, a device movable in one direction to connect the first said member to the motor member and in a contrary direction to release and arrest the first said member, electro-magnetic means controlling said device, and a series of keyboard circuits controlling said means.

16. In a typewriter, a normally inactive member of a printing mechanism, a continuously operating motor member, oppositely acting propelling and arresting electro-magnets adapted respectively to connect the first said member to the motor member and to release and arrest the same, the said magnets having continuously energized circuits of which that of the arresting magnet has the greater magnetic effect, a neutralizing circuit for said arresting magnet, and a series of keyboard circuits controlling said neutralizing circuit.

17. In a typewriter, a printing device having a plurality of sets of movable characters, a key-controlled actuator adapted for alternative operative co-action with the different types of each set, an eccentric by which the actuator is operated, and means to associate said actuator alternatively with the different sets.

18. In a typewriter, a type-wheel having a plurality of rows of movable types, a type-projecting actuator adapted for alternative operative co-action with the different types of each row, an eccentric by which the actuator is operated, and means to associate said actuator alternatively with the different rows.

19. In a typewriter, a continuously-rotated type-wheel comprising a holder having a plurality of rows of movable types, a type-actuator, and means to relatively shift one of said members to register the actuator with the different rows, said means comprising a reciprocating shifter synchronous with the actuator, and a key-controlled abutment adapted to be interposed between said shifter and the shiftable member.

20. In a typewriter, a shiftable printing-device having a plurality of rows of types, a power-reciprocated shifter, an abutment adapted to be interposed between said device and shifter and having steps corresponding to different ones of said rows, and a plurality of keys adapted respectively to bring the different steps into operative position.

21. In a typewriter, a printing device having a plurality of sets of movable types, type-actuating means, a series of key-circuits controlling said actuating means, a circuit-selector having divisions corresponding to the key-circuits, and means to associate said type-actuating means alternatively with the different sets of types.

22. In a typewriter, a type-wheel having duplicate sets of characters in successive segments of its circumference, a single set of keyboard circuits controlling said sets of type-wheel characters, and a circuit selector controlling said circuits and having duplicate brushes.

23. In a typewriter, a continuously-rotated type-wheel having duplicate sets of movable types in its circumference, a normally inactive type-actuating member having duplicate type-actuators, and a single set of keyboard circuits controlling said actuating member.

24. In a typewriter, a type-wheel having duplicate sets of characters in successive segments of its circumference and capable of a corresponding number of printing cycles for each rotation, a rotary platen having a complete rotation for each printing cycle of the type-wheel, and a keyboard controlling the printing.

25. In a typewriter, a series of types, a general type-actuator for the said series a platen-roll having a cycle synchronous with that of the type-actuator, and a keyboard controlling said type-actuator and platen-roll.

26. In a typewriter, a continuously rotated type-wheel, a normally stationary rotary type-actuator and a normally

stationary platen-roll having synchronous cycles, and a keyboard controlling said type-actuator and platen roll.

27. In a typewriter, a continuously rotated type-wheel, a normally inactive type-actuator having a predetermined actuating cycle, and a normally stationary platen-roll arranged to make a complete rotation and an additional character-spacing fraction thereof for each cycle of said actuator.
28. In a typewriter, a series of types, a normally inactive rotary type-actuator, key-controlled means for effecting a type-actuating cycle of said actuator, a device to magnetically lock said actuator in inactive position and a circuit controlling said device and controlled by the rotary position of the actuator.
29. In a typewriter, a type-wheel, a clutch, an intermittently-acting device for cooperation with said type-wheel driven by the engagement of said clutch, means to effect an initial engagement of the clutch, and means controlled by the position of said part for continuing said engagement.
30. In a typewriter, a type-wheel, a clutch, an intermittently-acting device for cooperation with said type-wheel driven by the engagement of said clutch, means to effect an initial engagement of the clutch, and means controlled by the position of said part for continuing and terminating such engagement.
31. In a typewriter, an electro-magnetic clutch, a part rotated by the engagement of said clutch, a series of keyboard circuits adapted to effect an initial engagement of said clutch, and a contact device controlled by the rotary position of said part for continuing such engagement.
32. In a typewriter, an electro-magnetic clutch, a part rotated by the engagement of said clutch, a circuit selector comprising a relatively rotating commutator and brush, a series of keyboard circuits including the respective segments of the commutator and adapted to effect an initial engagement of the clutch, and a contact device controlled by the rotary position of said part for continuing such engagement.
33. In a typewriter, a series of types, an electro-magnetic clutch, a type-actuator and a platen-roll rotated by the engagement of said clutch, a series of keyboard circuits adapted to effect an initial engagement of the clutch, and a contact device controlled by the rotary position of said type-actuator and platen-roll for continuing such engagement.
34. In a typewriter, a series of types, a type-actuator and a platen-roll connected to rotate together, a contact device controlled by the rotary position of said type-actuator and platen-roll, a series of keyboard circuits, and an electro-magnetic clutching and locking device adapted to rotate said type-actuator and platen-roll and to arrest the same after rotation, said clutching and locking device being initially controlled by the key-circuits and finally controlled by said contact device.
35. In a typewriter, a type-wheel, a platen-roll arranged to make a complete rotation and an additional character-spacing part of a rotation for a printing cycle of the type-wheel, a key-board controlling the printing, and means controlled by the absolute rotary position of the platen-roll for automatically effecting a relative axial line-spacing movement of said type-wheel and platen-roll.
36. In a typewriter, a printing device, a platen-roll, provisions whereby the printing is effected in lines extending circumferentially of the platen, a key-board controlling the printing, and means for automatically effecting a plurality of rotations of said roll at a predetermined point in a line.
37. A platen, cooperating printing means, a key-board controlling the printing, and means for automatically exposing the printed character or space at a distance from the printing point greater than that corresponding to a character or space after each single printing or spacing operation.
38. In a typewriter, a platen-roll, a key-board controlling the same, and provisions for rotating said roll through an arc greater than that corresponding to a character or space at each actuation of a character-key or space-key.
39. In a typewriter, a platen-roll and a type-wheel

adapted to print by rolling together, a key-board controlling the printing and provisions for rotating said platen-roll through an arc greater than that corresponding to a character or space at each actuation of a character-key or space-key.

40. In a typewriter, a sleeve-shaped rotary platen-roll holder, and a platen-roll mounted within and connected to rotate with said holder and adjustable axially thereof.
41. In a typewriter, a platen-roll having a longitudinal spline-slot, a sleeve-shaped rotary holder for said roll, and a spline-key on said holder occupying the slot.
42. In a typewriter, a sleeve-shaped rotary platen-roll holder, and a platen-roll removably mounted therein and having a tapered inserting end.
43. In a typewriter, a platen-roll, a rotary platen-roll holder, a longitudinally-disposed ratchet on the roll, a ratchet-feeding pawl on the roll-holder, and means automatically actuated through rotation of the roll for producing a ratchet-feeding movement of said pawl.
44. In a typewriter, a hollowed platen-roll, a longitudinal feed-ratchet axially held within said roll, a holder for said roll, and a feed-pawl mounted on said holder and cooperating with said ratchet.
45. In a typewriter, a sleeve-shaped rotary platen-roll holder, a platen-roll mounted in said holder and having a spline slot and an internal longitudinally-disposed feeding device exposed through said slot, a spline on the holder occupying said slot, and feeding means on the holder reaching said feeding device through said slot.
46. In a typewriter, a platen-roll, a rotary platen-roll holder having a line-writing movement composed of a plurality of rotations, a device on the roll-holder movable to impart an axial feed movement to the roll, and means operative after a predetermined plurality of rotations of the roll-holder for actuating said device.
47. In a typewriter, a platen-roll, a rotary platen-roll holder, having a gear and a device movable radially inward with respect to the roll-holder to impart an axial feed movement to the roll, and a gear meshing with the holder gear and having a member for actuating said device, said gears being so related as to bring the device and its actuating member into contact after a predetermined number of rotations of the roll-holder.
48. In a typewriter, a platen-roll, a rotary platen-roll holder, co-acting axial-feed members on said roll and holder, and means to throw said members into and out of engagement.
49. In a typewriter, a platen-roll, a rotary platen-roll holder, co-acting axial-feed members on said roll and holder, and means at one end of the roll for throwing said members into and out of engagement.
50. In a typewriter, a platen-roll, a rotary platen-roll holder, a longitudinally-disposed feed ratchet on the roll, a feed pawl on the holder, and provisions for rotating said ratchet to throw it into and out of engagement with the pawl.
51. In a typewriter, a sleeve-like rotary platen-roll holder, a platen-roll movable longitudinally therein, and anti-friction rollers interposed between said holder and said roll.
52. In a typewriter, a platen-roll, a driving device therefor, a positive geared connection between said device and roll, and a frictional slipping device included in said connection and adapted to normally transmit motion to said roll but capable of slipping to permit manual rotation of the roll in any rotary position thereof.
53. A keyboard for typewriters comprising an outer insulating plate having a series of outer key-seats, an inner conductive plate having a series of inner key-seats constituting electrodes, a series of keys movable between said seats and constituting electrodes, and means normally projecting said keys toward the outer seats.

In testimony whereof I have affixed my signature, in presence of two witnesses.

ERL V. BEALS.

Witnesses:

R. M. PIERSON,
C. F. BROWN.