

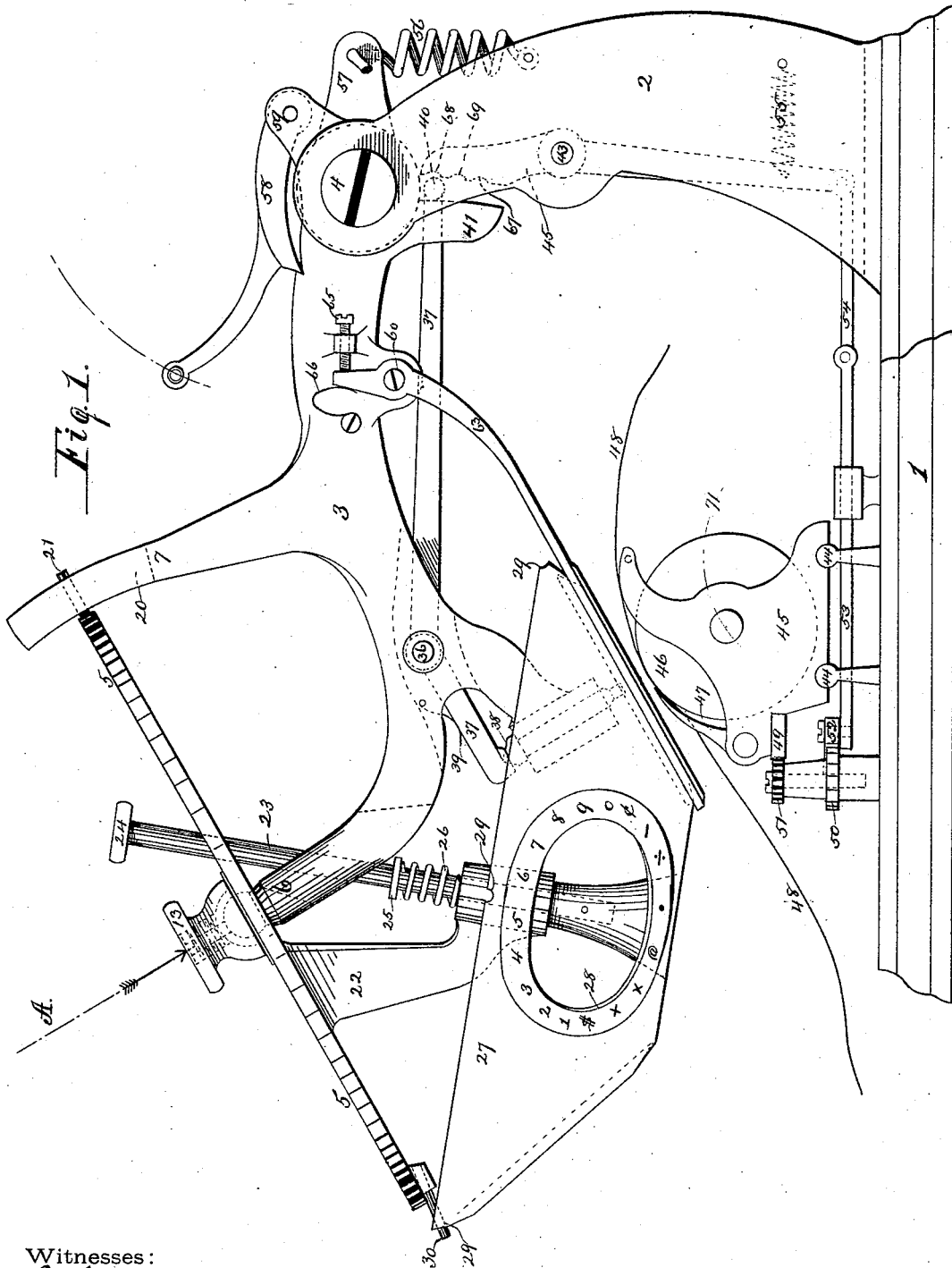
(No Model.)

4 Sheets—Sheet 1.

F. LAMBERT.
TYPE WRITING MACHINE.

No. 306,761.

Patented Oct. 21, 1884.



Witnesses:

John Thomson.
Charles E. Barton

Inventor.

J. Lambert

(No Model.)

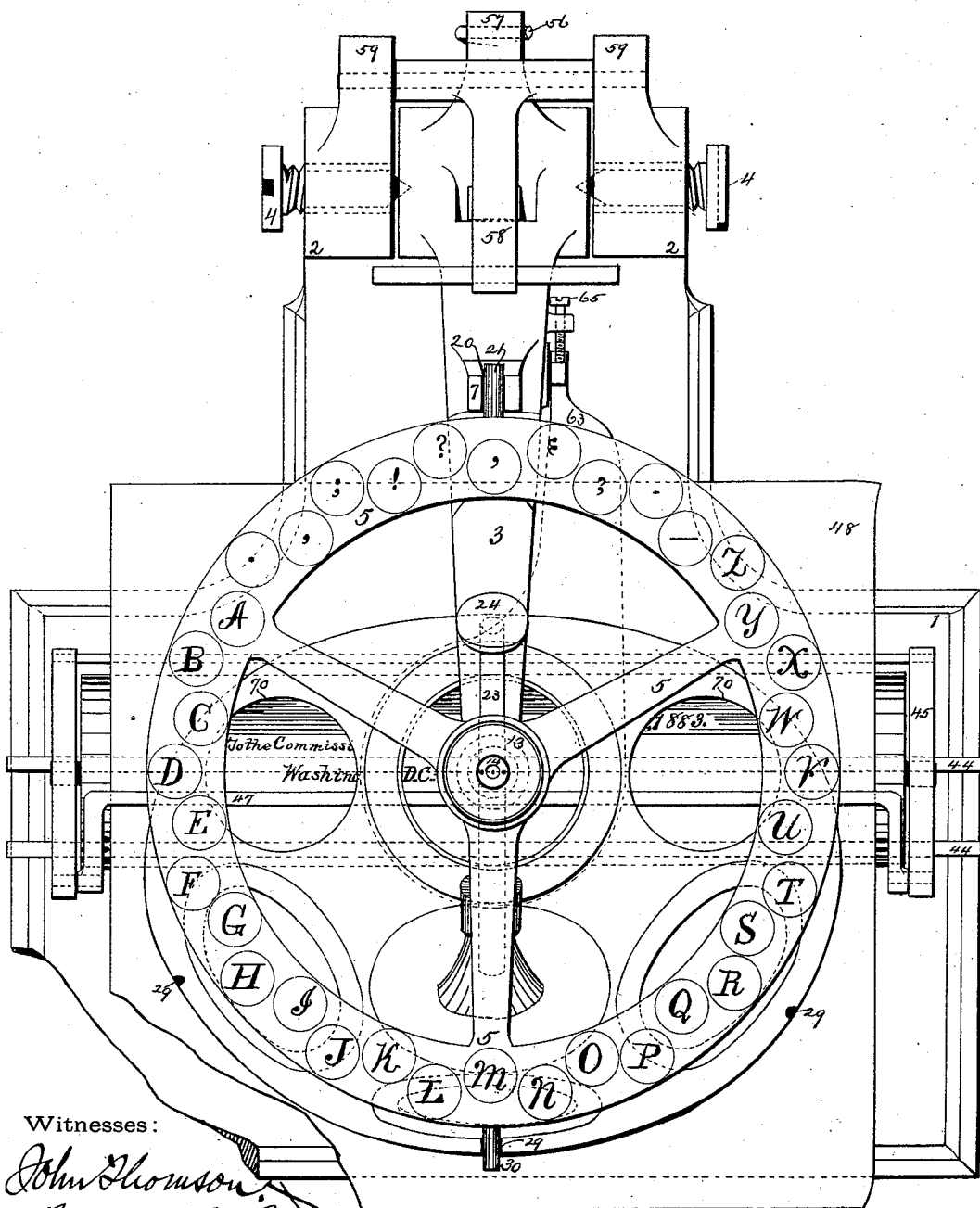
4 Sheets—Sheet 2.

F. LAMBERT.
TYPE WRITING MACHINE.

No. 306,761.

Patented Oct. 21, 1884.

Fig. 2.



Witnesses:

John Thomson,
Charles C. Barton

Inventor.

Frank Lambert,

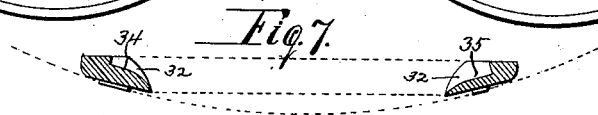
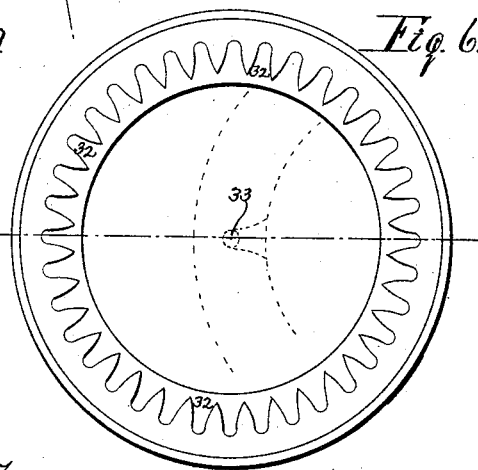
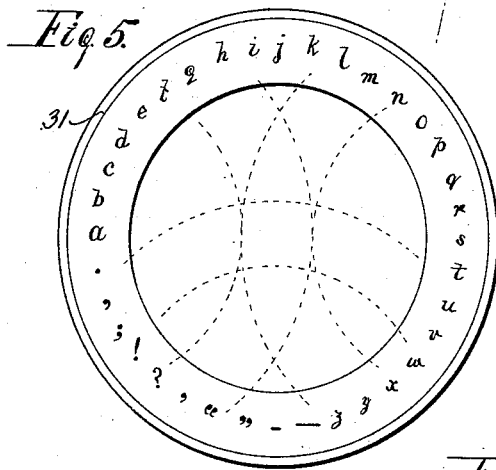
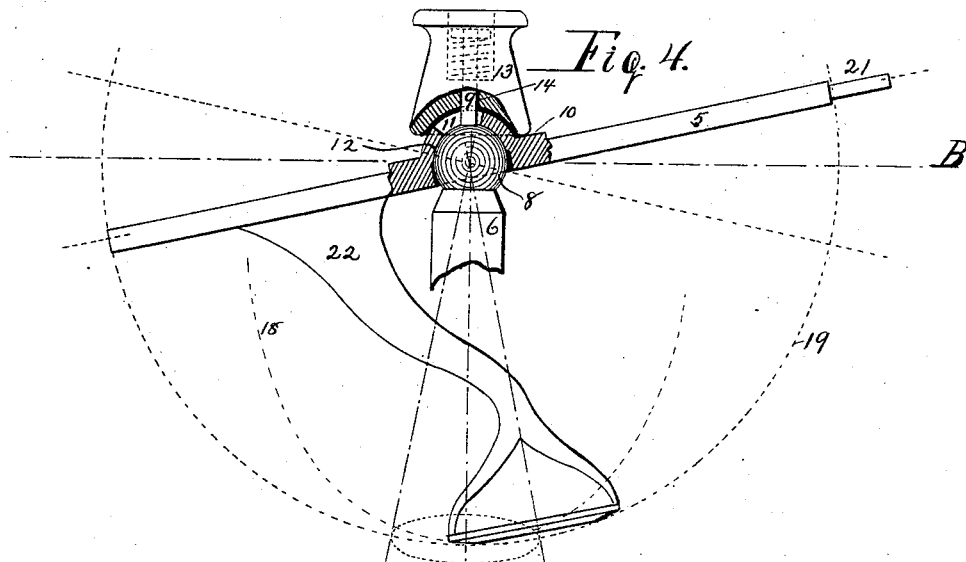
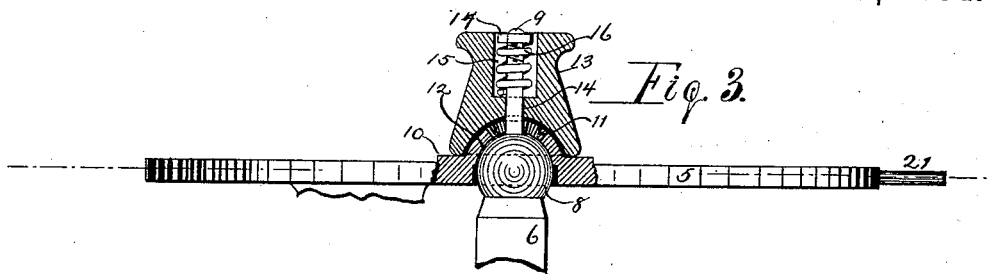
(No Model.)

4 Sheets—Sheet 3.

F. LAMBERT.
TYPE WRITING MACHINE.

No. 306,761.

Patented Oct. 21, 1884.



Witnesses:

John Thomson.
Charles E. Barton.

Inventor.

Frank Lambert

(No Model.)

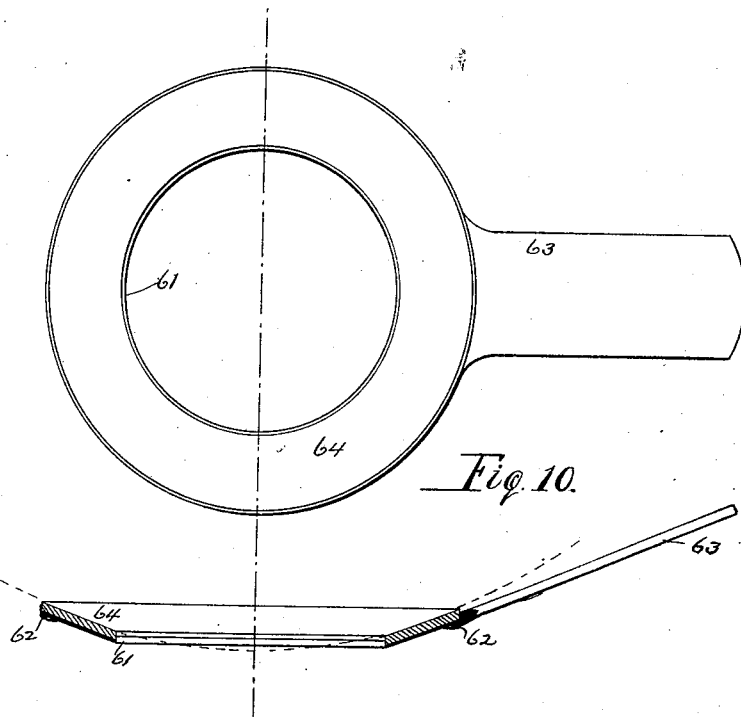
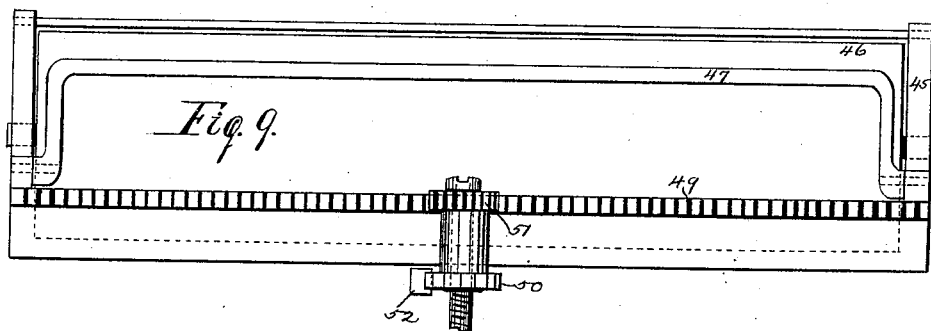
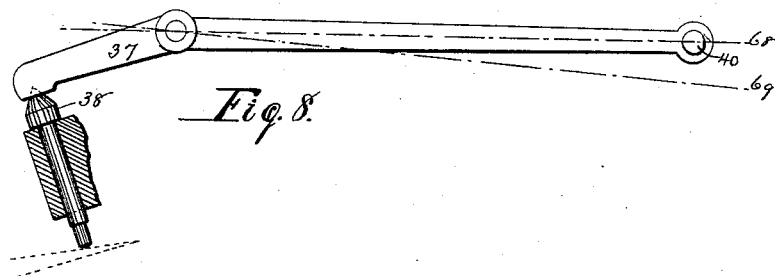
4 Sheets—Sheet 4.

F. LAMBERT.

TYPE WRITING MACHINE.

No. 306,761.

Patented Oct. 21, 1884.



Witnesses:

John Thomson.
Charles E. Patton

Inventor.

Frank Lambert

UNITED STATES PATENT OFFICE.

FRANK LAMBERT, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO JOHN THOMSON, OF SAME PLACE.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 306,761, dated October 21, 1884.

Application filed August 17, 1883. (No model.)

To all whom it may concern:

Be it known that I, FRANK LAMBERT, of the city, county, and State of New York, have invented an Improvement in Type Writing and Printing Machines, of which the following is a specification.

My invention relates to type writing and printing machines, and has for its object the production of an instrument that shall be more simple in its parts, easier to master and to operate, more rapid and perfect in execution, wider in range and adaptability, and much cheaper to manufacture than the machines of this class made heretofore.

This invention consists, primarily, in the following elements, arranged in proper mechanical order for operation as a whole:

First. In a discal tablet, to be herein termed a "multiple key," mounted upon an arm by means of a ball and socket, and arranged in such manner as to prevent rotation in the plane of the tablet. Upon the outer portion of the multiple-key, and preferably at equal distances apart, are disposed the characters to be reproduced.

Second. In a downwardly-projecting arm attached to the under portion of a multiple key, and upon which is mounted a ring or a series of rings having formed upon them the printing-characters, each of which lies in the same meridian as the corresponding character upon the key.

Third. In an improved inking pad or ribbon, which is caused to bear upon said characters.

Fourth. In improved means beneath the printing-characters for holding the sheet to be printed, and for properly actuating the same to give to each letter its proper relative space.

Fifth. In a pivoted arm, upon the outer extremity of which is the ball, upon said ball being mounted the key, printing-ring, &c., the normal position of said arm and its appurtenances being maintained by a spring or counter-weight.

The principle of action of the key and printing-ring is that of a hemisphere suspended at the point corresponding to the center of the sphere, free to be rotated in any plane but that of rotation upon its vertical axis. It will therefore be apprehended that the depression

of the multiple key at any meridian marked by a character will first swing a corresponding character on the printing-ring exactly to any point of common stop, and that, second, the continued movement of the key will cause the arm to vibrate upon its bearing against the tension of the spring or counter-weight, thus forcing the character on the printing-ring downward upon the paper, reproducing the same.

The special features in the instruments of this class to which my improvements refer and the order in which the description to follow will be given may be collated as follows: First, the adaptation of a single part (a multiple key) for the key-board system; second, means for readily changing the style of characters to be printed, as from letters to figures; third, the construction of the printing-ring, adapting it to the movement of the multiple key; fourth, the spacing of the printed characters properly with respect to their width, generally termed "variable spacing;" fifth, the general design of the parts of the instrument and conveyance of the sheet in such manner that the characters as produced upon the said sheet may be seen by the operator during the progress of the work; sixth, the means for inking, whereby the characters impinge directly against the paper; seventh, convenience of access to the parts for inserting the sheet to be printed and for resetting the impression-cylinder.

Of the drawings, Figure 1 is a side elevation of my invention, and Fig. 2 is a plan of the same as viewed from the line of sight A of Fig. 1. Fig. 3 is a detached edge view of the multiple key, with ball-and-socket joint in section; and Fig. 4 is the same, showing two extremes of movement, and also the adaptation for a single printing-ring. Figs. 5 and 6 are enlarged inverse plan views of printing-ring, and Fig. 7 is a cross-section of same. Fig. 8 is a detached view of device for obtaining variable spacing of printed characters. Fig. 9 is a detached front elevation of paper-cylinder and carriage, and Fig. 10 is a plan and cross-section view of inking device.

In the figures, 1 is the bed-plate; 2, the standard, upon which the vibrating arm 3 is mounted by the pivot-screws 4; and 5 is the

discal tablet, the latter constituting the multiple key. The main arm 3 ends in two branches, the multiple key being mounted at 6 and secured against axial rotation in the plane of its surface at 7, as will be hereinafter described. The ball 8 and slide-pin 9 (see Figs. 3 and 4) are a part of the vibrating arm. In the center of the multiple key is formed a socket corresponding to the convexity of the ball, and having a circular flange, 10, projecting from its outer surface. The center or crown of the socket is bored out, as at 11, thereby leaving a circumferential bearing, 12, upon the ball. The rider 13 rests upon the plane surface 10, and is held and guided central to the ball by the slide-pin 9 passing through the bearing formed in the rider. The bore through the crown of the socket 11 is sufficiently large to permit the free action of the pin 9 in any or all directions. The "rider" is counterbored, as at 15, and in the cavity is placed a spring, 16, the whole being secured in relative position by the nut 17 upon the extremity of the slide-pin. The thrust of the spring, being exerted between the nut and the rider, tends to force the rider downward, and causes the multiple key to always resume the normal position shown in Fig. 3; but upon the depression of any of the edges of the key the rider will simply be forced upward upon the slide-pin, as shown at Fig. 4, and will again act when relieved to instantly reset the key to its normal position. It is clear that to make practical use of this universal movement, the action of the multiple key or discal tablet must be restricted to certain like meridians of movement, as 18 19, Fig. 4. To this end I prevent the tablet from rotary movement on its vertical axis by the pin 21, Figs. 1 to 4, secured to the periphery of the discal tablet at a right angle to the said vertical axis.

The operation is as follows: In the branch of the arm at 7 is formed a slot, 20, within which projects the freely-fitted pin 21. This pin is secured to the multiple key exactly at a right angle, B, (see Fig. 4,) or the horizontal axis to the vertical axial line A. The action of the pin within the slot is either one single movement or a combination of two movements, as this: Depress the front or back of the tablet, as at the letter M, or sign of interrogation, Fig. 2, and the pin will rise or fall within the slot. Depress at letters D or V, and the pin will simply turn within the slot; but depress the tablet at any of the points intermediate to those named—say at the letters H S Z—and the pin will partake of both motions, rising or falling and also rotating upon its horizontal axis. From this construction it will be seen that each and every key, however frequently or rapidly the tablet may be depressed, can only travel in a single plane or meridian of movement.

Projecting downward from the discal tablet is an arm, 22. Through a bearing formed in said arm passes a shaft, 23, projecting outward slightly beyond the face of the multiple

key, and provided at this extremity with a button or milled head, 24. Upon the shaft is a collar, 25, between which and the upper face of the bearing in the arm is a spring, 26, the tension of which tends to thrust the shaft upward. Upon the lower extremity of the shaft is secured in its central axis a light shell, shaped like the frustum of a cone or pyramid, 27, having inserted in each of the quadrants of its side a ring upon which are formed the characters to be reproduced, each of said quadrants bearing different characters—upon the first one, say, figures and mathematical signs, as 28. Upon the second and third are upper and lower case types, and upon the fourth large capitals or special types. In the upper edge of the cone, at equal distances, are four slots, 29, and at the front and under side of the discal tablet a stop-pin, 30. The function of this pin is to prevent the shell from rotating on its center, the slots being caused to engage with the stop-pin by the action of the spring. The form of the shell and its relative mounting with respect to the printing-rings and the discal tablet are such that by depressing the milled head 24, which will compress the spring and disengage the shell from the stop-pin, and imparting to the shaft a quarter of a revolution, any one of the printing-rings will be brought successively exactly central to the vertical axis A of the multiple key.

The printing-ring, (see Figs. 5, 6, and 7,) whatever its distance from the center of the ball 8, is formed as if cut from the crown of a sphere whose center is that of the ball and socket. Upon the outer spherical surface of such an annulus, 31, are formed the printing-characters, each of which lies in the same meridian as the corresponding character on the key. On the inner surface of this annulus, exactly opposite from and terminating at the center of each character, is formed a series of grooves, 32, all of which converge to the lower pole of the sphere or center of the annulus 33, and are wider at their inner than at their outer extremities. Between the faces of certain of the printing-characters and the bottom of the converging grooves the thickness of the separating material varies, the grooves being formed of different depths, as 34 35, or in proportion with the width of the characters to be printed.

Pivoted on the arm 3 at 36 is the variable spacing-lever 37, and in a bearing, also formed in the main arm, is a plunger, 38, whose longitudinal axis is exactly in the vertical axis of the sphere. This plunger, Fig. 8, is formed with a shoulder on its upper end, which is caused to impinge against its bearing by the spring 39, acting through the lever. At the longer end of said lever is a stud, 40, that projects between the spur 41 of the main arm and the carriage-actuating lever 45, the latter being pivoted at 43 in the standard 2, and having at its upper end several notches, preferably three, 67, 68, and 69, with either one of

which the stud 40 may be made to engage, as explained further on.

Mounted upon a pair of tracks, 44 44, is a carriage, 45, upon which is the impression-cylinder 46 and the tension or clamping bail 47, for causing the sheet 48 to adhere to the surface of the cylinder. On the carriage, Fig. 9, is a rack, 49, extending longitudinally. Mounted upon a vertical shaft on the bed-plate 10 is a ratchet-wheel, 50, and a pinion, 51, the latter engaging the rack. Engaging the ratchet-wheel is a pawl, 52, connected by means of a slide-rod, 53, and link 54 to the actuating-lever 45, the whole being held to normal position by the spring 55 within the main stand- 15 ard. The multiple key, main arm, shell, printing-rings, &c., are held in proper relative position by the main spring 56, mounted between the standard and the projection 57 of the main arm, the pull of the spring being limited by the pawl 58, said pawl being mounted at 59 upon the standard 3. Also attached to the main arm, as by the stud-screw 60, is the inking apparatus. This is in the form of a pad, 25 the shell of which, 61, Fig. 10, contains an annular recess, the diameter and general shape conforming to that of the printing-rings. In the outer portion of the recess is formed a groove, 62, and projecting from the shell is a 30 supply-reservoir, 63. Within the said recess, and projecting slightly above its wall, I place absorbent material 64, as felt, satin, &c. On supplying the reservoir the ink will gravitate to the groove, flow entirely around the recess, 35 and be absorbed by the felt, the supply being proportionate to the evaporation or use of the ink from the face of the pad. The pad is properly adjusted to the face of the printing-characters by the screw 65 and spring 66.

40 The operation is as follows: The motion of the multiple key is twofold—first, a vibration upon the ball and socket, and, second, a vibration upon its pivot-bearings of the main arm and its parts. The consequences of this combined action are these: Assume that the 45 letter M is to be printed. The depression of the key at this point will swing the character on the printing-ring inward until the ring is stopped by the point of the plunger. As this 50 letter requires the widest space upon which to be printed, the thickness of the body of the ring at this point is correspondingly increased, which will have the effect of raising the plunger and depressing the longer end of the 55 spacing-lever, carrying the stud downward between the spur and the carriage-actuating lever to the lowest point, 67. Continued pressure on the key will now carry the main arm and the entire structure suspended by it downward, and will thus cause the character on the printing-ring to be reproduced 60 upon the sheet. Meantime the spur, acting upon the stud and carriage-actuating lever, forces the ratchet-wheel forward, which in turn, communicating through the pinion of 65 the rack, gives the proper shift to the cyl-

inder just before but terminating at the instant of impact of the character. It will be seen that the function of the stud is simply to increase or decrease, by engaging in the prop- 75 er slot, as 68 69, the throw of the actuating-lever; hence the exact and proper amount of spacing required for each letter, as i, a, or m, is thereby obtained. Means for producing three degrees of spacing are shown in the 75 drawings, as this covers the majority of letters or characters used in printing. Instantly following the removal of manual pressure upon the key, the entire combination will be at once reset to the normal position assumed 80 in Figs. 1 and 3—the multiple key by the rider and its spring, and the main arm and its appurtenances by the main spring. The movement of the printing-ring from circumference to center, and vice versa, also effects the prop- 85 er inking of the characters to be reproduced, as it will be seen that the consequence of this action is to keep the printing-surface of the ring continually wiping itself upon the surface of the pad; hence all of the characters are 90 being constantly inked, while there can be no accumulation or incrustation of ink on any character, however seldom it may be used; and, furthermore, that the quality of work thereby produced may fairly be termed “let- 95 ter-press.”

The multiple key or discal tablet, as shown in the present instance, Fig. 2, is formed of a thin ring suspended by three arms. In this 100 way the weight of the key is reduced to a minimum, and in consequence also of the openings through the shell, as 70, and the fact, furthermore, that the sheet being printed travels transversely across the instrument, as shown, the work being done by the operator is open to 105 view during its progress.

To place a sheet in position upon the cylinder, or to get access to it for any analogous purpose, it is simply necessary to unlatch the pawl 58, when the entire upper structure may 110 be swung back. Likewise, to reset the cylinder at the termination of a line, it is simply necessary to swing it back, as indicated by dotted lines at 71, Fig. 1, out of engagement with the pinion and slide it back to the re- 115 verse position. To determine the width of the lines, any ratchet-and-click device may be used to limit the rotation of the cylinder during this movement. It will be observed that the multiple key is inclined toward the feeder. 120 This position is preferable in consequence of bringing the characters into more perfect line of sight, and also in being more convenient to operate. Of course any arrangement of characters may be made upon the key most con- 125 ducive to rapid work, as that those characters used most frequently might be grouped upon the front, &c.

I claim—

1. A multiple key consisting of a plate bear- 130 ing characters and having type connected thereto, substantially as set forth, pivotally

supported and capable of a vibrating movement in every direction except in the plane of the plate.

2. A multiple key consisting of a plate bearing characters and having type connected thereto, substantially as set forth, pivotally supported and capable of vibrating in every direction except in the plane of the plate, and means, substantially as described, for preventing the key from vibrating in said plane, substantially as described.

3. A multiple key consisting of a plate bearing characters and having type connected thereto, substantially as set forth, pivotally supported by means of a ball-and-socket joint, in combination with means for resetting the plate to its normal position.

4. A multiple key consisting of a plate bearing characters and having type connected thereto, substantially as set forth, pivotally supported by a ball-and-socket joint, in combination with a spring-actuated rider for resetting the key, substantially as described.

5. The combination of a multiple key consisting of a plate bearing characters and having type connected thereto, substantially as set forth, pivotally supported by a ball-and-socket joint, a pin projecting from the ball, a rider for resetting the key, and a spring surrounding the pin and actuating the rider, substantially as described.

6. The combination, with a multiple key, of an arm, as 3, having an extension supporting the said key, and another extension provided with means, substantially as described, for limiting its rotary movement in the plane of the key, as set forth.

7. The combination, with a multiple key, of an arm, as 3, having an extension, as 6, connected to the key by a ball-and-socket joint, and an extension, as 7, provided with a slot engaging with a pin on the key, whereby the key is prevented from vibrating in its plane, substantially as described.

8. The combination, with a multiple key bearing characters, as set forth, of a printing-ring positively connected thereto and operated thereby, substantially as described.

9. The combination, with a multiple key, of a printing-ring positively connected thereto, the printing-surface of which is formed as if cut from a crown of a sphere, the center of the sphere being coincident with the working center of the ring, substantially as described.

10. The combination, with a multiple key, of a printing-ring connected to the key, the printing-characters on the ring being in the same meridian as the like characters on the key, substantially as described.

11. A printing-ring having printing-characters upon one of its faces and a series of radial grooves of varying depths upon the opposite face, the number of grooves corresponding to the number of printing-characters, substantially as described.

12. A printing-ring having printing-charac-

ters upon one of its faces and a series of radial grooves corresponding to the characters, in combination with means co-operating with the grooves for limiting the motion of the ring, substantially as described.

13. A printing-ring having printing-characters and a series of radial grooves of varying depths corresponding to the characters, in combination with a paper-carrier and means, substantially as described, for operating the same so that the movement of the carrier will correspond with the varying depths of the grooves.

14. A printing-ring having printing-characters and a series of radial grooves of varying depths corresponding to the characters, in combination with a paper-carrier, a plunger operated by the printing-ring and connections, substantially as described, between the plunger and carrier, whereby the carrier is moved varying distances corresponding to the depth of the grooves, substantially as described.

15. A shell shaped substantially like a frustum of a cone or pyramid, having a number of printing-rings of various styles of characters attached thereto, substantially as described.

16. A shell shaped substantially like a frustum of a cone or pyramid, having a number of printing-rings of various styles of characters attached thereto, in combination with means, substantially as described, whereby the rings may be brought into operative position successively, substantially as described.

17. The combination, with a multiple key, of a frustum of a cone or pyramid having a number of printing-rings of various styles of characters attached thereto, means for connecting the cone to the key, and a means, as the pin 30 and slot 29, for retaining the cone in the desired relative position.

18. The combination, with a printing-ring shaped substantially as described, of an inking apparatus consisting of an annular metallic shell containing an absorbing material, corresponding to the shape of the ring, substantially as described.

19. The combination, with a suitable support, of a spring-actuated arm pivoted to the support and carrying a multiple key, printing-ring, inking apparatus, and justifying-lever, and a locking-pawl for limiting the upward movement of the spring-actuated arm.

20. The combination of a pivoted arm, a multiple key pivoted to the arm, and a printing-ring connected to the key, the arrangement being such that upon depressing the key the desired character is first brought into position and then impressed upon the paper, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

Witnesses: FRANK LAMBERT.
JOHN THOMSON,
CHARLES C. BARTON.