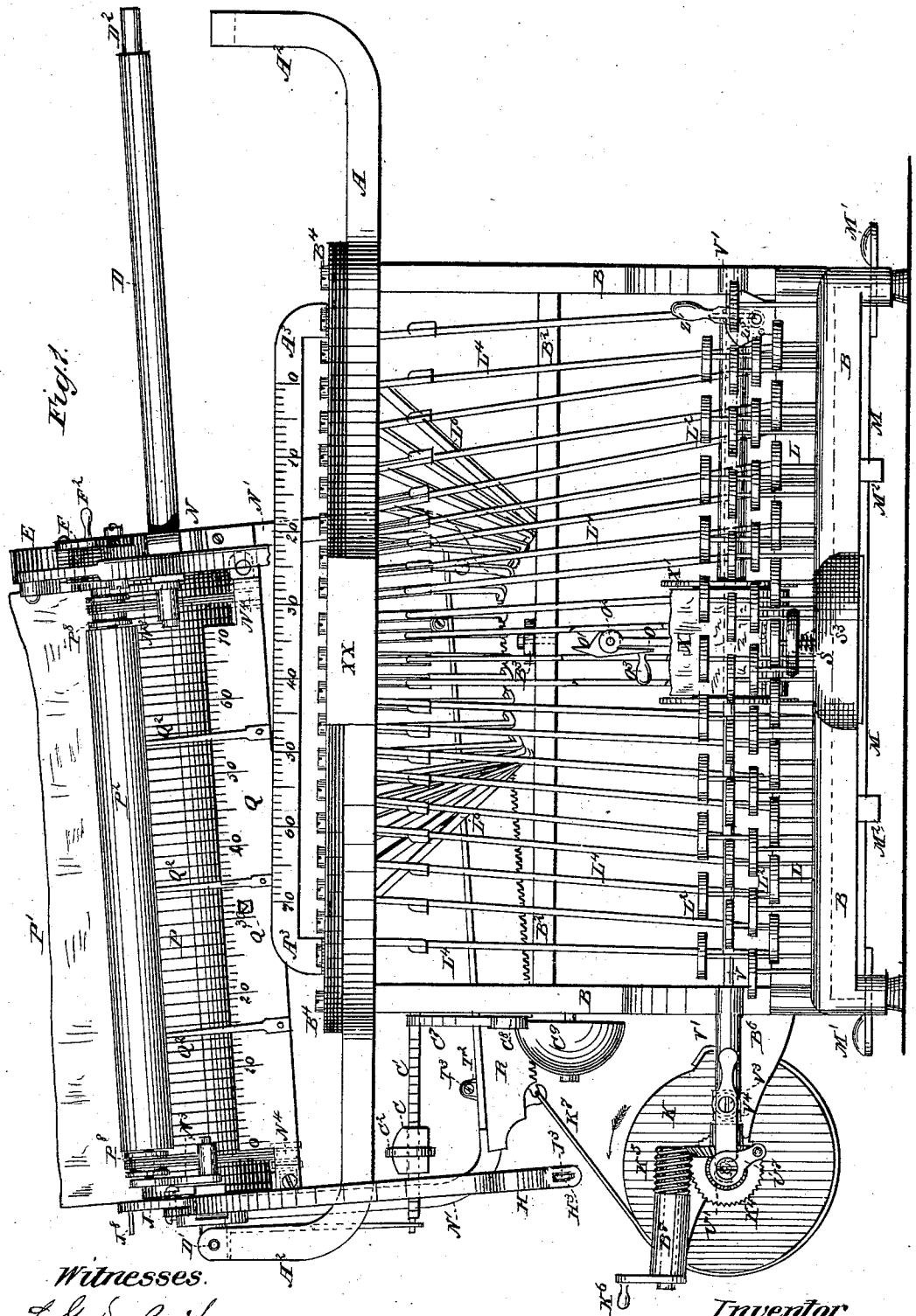
(Model.)

5 Sheets—Sheet 1.

G. W. N. YOST.

TYPE WRITING MACHINE.

No. 313,973. Patented Mar. 17, 1885.



Witnesses.
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(Model.)

5 Sheets—Sheet 2.

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TYPE WRITING MACHINE.

No. 313,973. Patented Mar. 17, 1885.

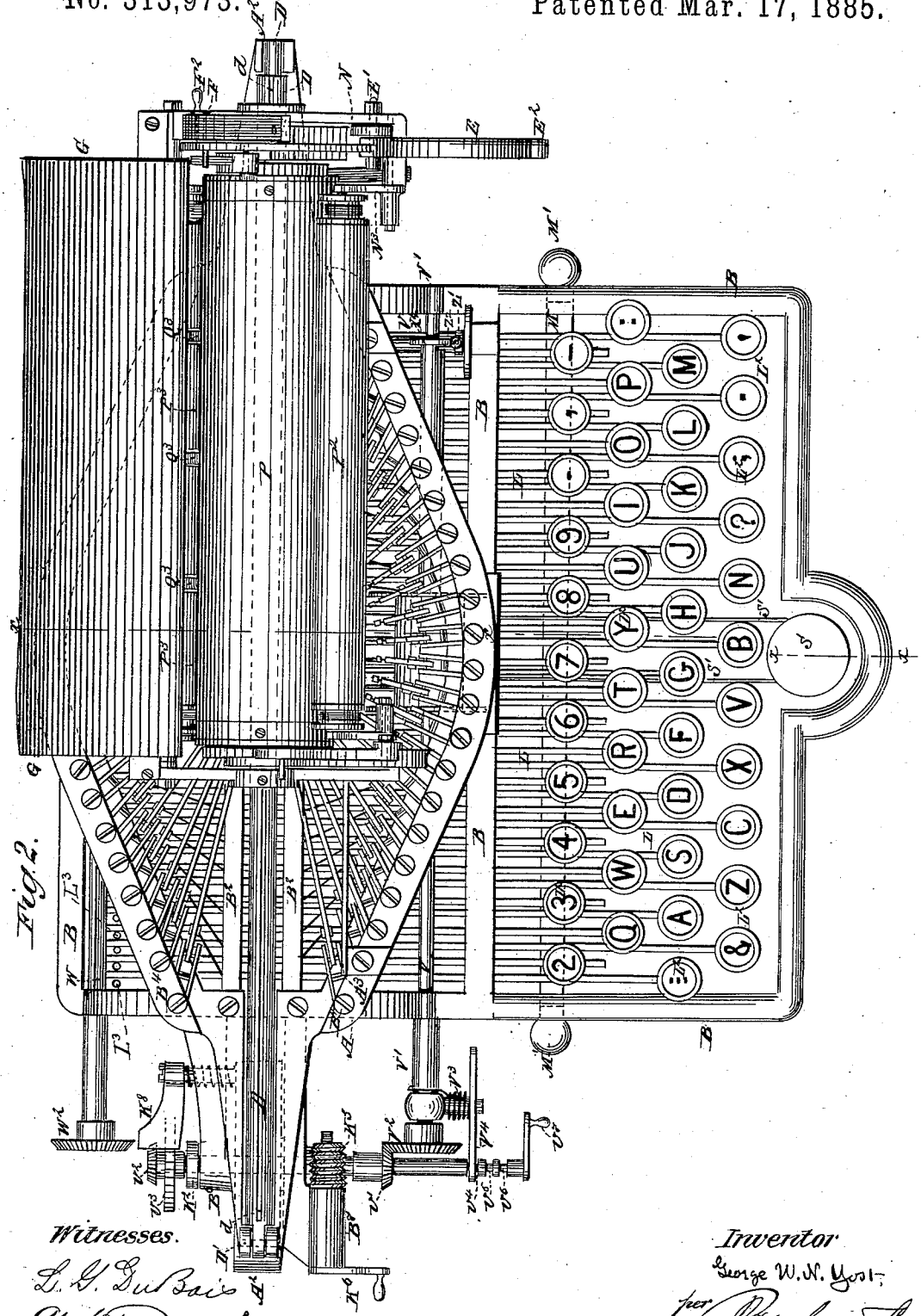

Fig. 2.

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(Model.) 5 Sheets—Sheet 3.

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TYPE WRITING MACHINE.

No. 313,973. Patented Mar. 17, 1885.

Fig. 3.

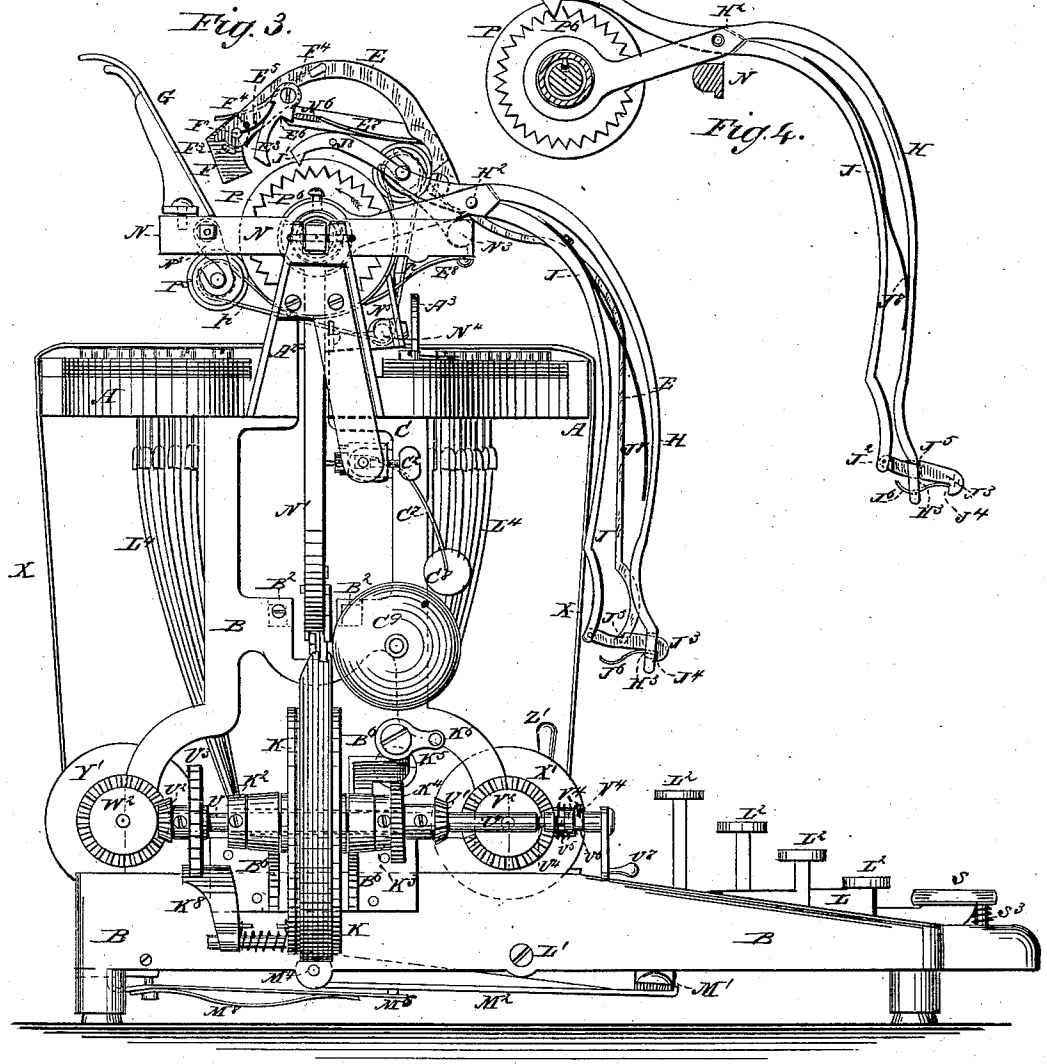
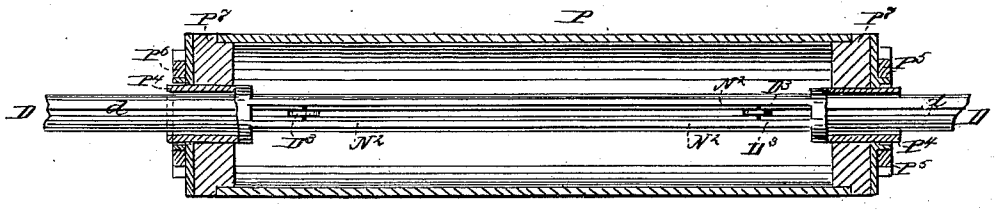


Fig. 4.

Fig. 5.



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(Model.) 5 Sheets—Sheet 4.

G. W. N. YOST.

TYPE WRITING MACHINE.

No. 313,973. Patented Mar. 17, 1885.

Fig. 6.

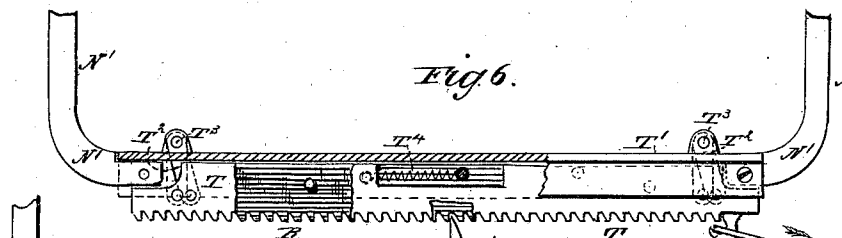

Fig. 7.

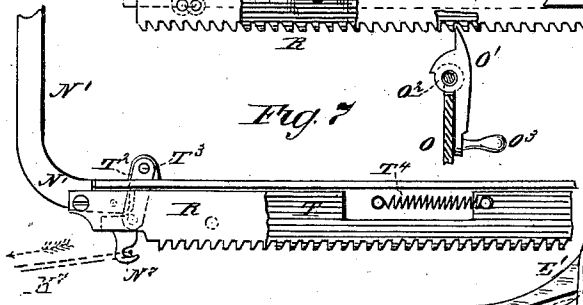

Fig. 8.

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(Model.) 5 Sheets—Sheet 5.

G. W. N. YOST.

TYPE WRITING MACHINE.

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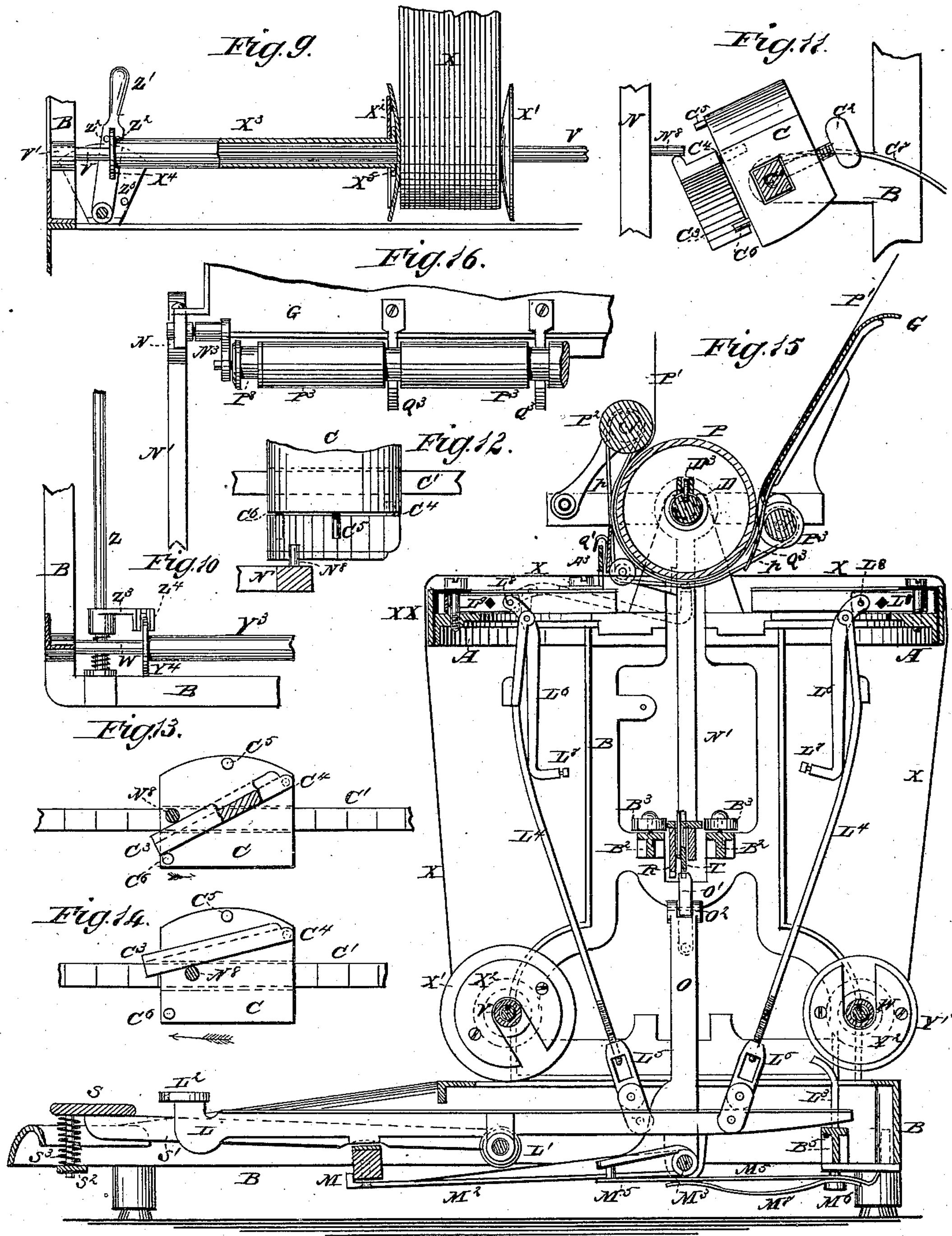

Witnesses.

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W. C. Parmenter

Inventor

George W. N. Yost,

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Attorney.

UNITED STATES PATENT OFFICE.

GEORGE W. N. YOST, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE AMERICAN WRITING MACHINE COMPANY OF NEW YORK.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 313,973, dated March 17, 1885.

Application filed June 28, 1880. (Model.)

To all whom it may concern:

Be it known that I, GEORGE W. N. YOST, of the city, county, and State of New York, have invented certain Improvements in Type-Writing Machines, of which the following is a specification.

The invention relates to that class of type-writing machines in which the successive depression and release of a series of keys, one after another, vibrate and throw a series of types against an inking substance and the substance to be written on, and after each depression and release of any key, and while the type and the key are going back to place, move the latter substance a type-space distance, and thus make impressions or write one letter or character at a time.

In the accompanying drawings, in which similar letters of reference indicate like parts, Figure 1 is a front elevation of a type-writing machine, the paper-carriage being swung up out of its normal position, and the lower part of the carriage-lever being broken off. Fig. 2 is a plan. Fig. 3 is an end view. Fig. 4 is a detailed view of the lever, pawl, and ratchet-wheel for rotating the platen up and back. Fig. 5 is a horizontal section of the platen, showing a plan of the guide-rail and paper-carriage supporting-wheels in the interior of the platen. Fig. 6 is a rear elevation, partially in section, of the letter-space racks attached to the paper-carriage. Fig. 7 is a similar front elevation. Fig. 8 is an end elevation, the frame being partially in section, on lines *x x*, Fig. 2. Fig. 9 is a rear elevation, partially in section, of one of the inking-ribbon spools and mechanism for shifting it. Fig. 10 is a plan of mechanism for shifting the other inking-ribbon spool. Fig. 11 is an end view, looking at the left-hand end of the machine, of the bell-trip stop. Fig. 12 is a top view of the same. Fig. 13 is a rear view of the same when the paper-carriage is on its forward movement. Fig. 14 is a rear view of the same when the paper-carriage is on its return movement. Fig. 15 is a vertical section of the machine on the lines *x x*, Fig. 2. Fig. 16 is a view of a portion of the rear pressure-roller, one of the hangers in which it is supported, and the rear guide-strips.

Referring to the drawings, A is the top plate of my improved machine, fastened to the frame B by the screws B^1. On each side of the machine the top plate, A, is extended and turned up to form supports A^2 for the guide-rail D, on which the paper-carriage and platen move. The guide-rail D has a groove, *d*, on its upper side, running its entire length, and is hinged about a pin, D′, at one side of the top plate, A, while the other end rests by its weight in the other side, A^2, of the top-plate.

N is the rectangular frame of the paper-carriage, which, with its attachments, is supported on the guide-rail D by a car, N′, and wheels D^3 in the interior of the platen P. The supporting-wheels D^3 run in the groove *d* as a track. The platen P, under which the material to be written on is moved, is composed of a cylindrical shell of hard rubber, supported on metal heads P^7. It turns on bushings P^4, between the ends of the frame of the paper-carriage, and rotates on them as bearings about the guide-rail D as an axis.

P^5 and P^6 are ratchet-wheels attached at each end of the platen P, and rotate with it.

G is a paper-table attached to the paper-carriage.

P^2 and P^3 are rolls which are pressed against the lateral surface of the platen P by elastic bands *p*, which pass over pulleys P^8 on the ends of the rollers P^2 P^3 and over guide-rolls N^4, supported in hangers N^5 on the carriage-frame. The journals of the rollers P^2 and P^3 run in the forks of hangers N^3, which swing about screws on the frame N of the paper-carriage. By overcoming the tension of the bands *p* the rollers P^2 P^3 may be lifted out of the forks of the hangers N^3. The lower part, N′, of the paper-carriage N projects vertically downward at either end of the carriage. At right angles to N′ hangers N^5 are screwed, which project toward the front of the machine, and support the guide-rolls N^4 and a graduated scale, Q. The scale Q is in front of and almost in contact with the surface of the platen P.

A^3 is a scale, graduated similarly, attached to the top plate, A, just in front of and parallel with the scale Q, its upper edge being below that of the scale Q, so that the graduation on

the latter is visible. At the center of the scale Q is a pointer, Q′, which extends over the graduation on the scale A^3.

Q^2 are guide-strips of thin metal, curved concentrically to the surface of the platen P, attached to the scale Q in front of the platen.

Q^3 are similar strips, attached to the paper-table G, behind the platen.

H is a lever of the second class, to rotate the platen P, and, if desired, to return it to its original position. Its fulcrum is at one end, where it surrounds the bushing P^4 on the guide-rail D, between the ratchet-wheel P^6 on the left-hand end of the platen and the frame of the paper-carriage. The other end of the lever H is bent down in front of the top plate of the machine a short distance above the keys. At a distance of about one-third the length of the lever from its fulcrum is attached a pawl, J, by the screw H^2, upon which it turns. One end, J′, of the pawl J engages with the teeth of the ratchet-wheel P^6. The other end is extended behind the curved arm of the lever H and nearly concentric with it. The extreme lower ends of both the lever and the pawl are curved, so they present convex surfaces to each other, the one to fit a thumb and the other a finger of the operator. The lower end of the pawl J is bifurcated. Between its forks, pinned at J^2 so as to swing at right angles to it, is a latch, J^3, which slips through a slot, H^3, in the lower end of the lever H.

J^7 is a spring, screwed to the front of the lower end of the pawl J, which bears against the under side of the lever H, and tends to keep the lever and pawl apart, as shown in Fig. 3. The front end of the latch J^3 has a projection, J^4, which prevents it from being drawn out of the slot H^3, and which also limits the distance which the lower arms of the lever and pawl can be moved apart.

J^6 is a spring, fastened to the under side of the latch J^3, which, when the lower arms of the lever and pawl are brought as near together as possible, and the end J′ of the pawl J engages with the teeth of the ratchet-wheel P^6, pushes up the latch J^3, and holds the lever and pawl fast, as is shown in Fig. 4.

J^8 is a pin driven in at right angles to the outer side of the pawl J, near its upper end. When the platen is rotated by the lever H and pawl J, as hereinafter described, the pin J^8 comes in contact with the upper edge of the frame of the paper-carriage, a short distance in front of the table G.

E is a lever of the first class, to reverse the paper-carriage and rotate the platen for "line spacing." Its fulcrum is on a screw, E′, attached to an upward projection in the right-hand front corner of the paper-carriage N. The lower arm, E^2, of the lever E is bent down in front of the top plate, A, and is curved at its extremity, so as it may be easily grasped by the finger of the operator. Its upper arm rises above the platen P, and is curved concentrically thereto.

F is a line-space regulator, attached by the screw F′ to the outer side of the carriage lever E at its upper end.

F^2 is a handle projecting at right angles from the line-space regulator F, by which the regulator F can be turned a quadrant about the screw F′ till its motion is checked by a stud, F^3, Fig. 3, on its back side, which strikes against projections on the end of the carriage-lever E.

F^4 is a spring fastened to the carriage lever E and pressing upon the upper surface of the line-space regulator.

E^3 is a pawl engaging with the teeth of the ratchet-wheel P^5 on the right-hand end of the platen, behind its axis, and turning about a screw, E^4, by which it is fastened to the inner side of the carriage-lever E.

E^5 is a spring rigidly inserted in the pawl E^3 near the screw E^4, which presses against a pin projecting from the carriage-lever E, and holds the pawl E^3 toward the teeth of the ratchet-wheel P^5.

E^6 is an angular projection on the under side of the pawl E^3, which, when the upper arm of the carriage-lever E is raised, bears against a projection, N^6, on the upper portion of the upright extension of the frame N of the paper-carriage, and holds the pawl E^3 out of contact with the ratchet-wheel, P^5.

E^7 is a spring fastened to the projection N^6, which bears upward against the under surface of the upper arm of the carriage lever.

E^8 is a spring-pawl fastened on the under side of the paper-carriage, which engages with the ratchet-wheel P^5 and tends to prevent its reverse rotation.

L is a series of levers of the first class on a rod, L′. These levers have keys L^2 on their front ends, and at the back rest on a bar, B^5.

L^3 is a series of reeds, set vertically in the bar B^5, between which the key-levers vibrate. L^4 are rods communicating the motion of the key-levers L to the type-bars L^6. Each connecting-rod is screwed into a nut, L^5, which is attached by a pin passing through projecting ears on its lower end to a key-lever. The upper end of each connecting-rod is soldered to a U-shaped strip of metal in the ends of the arms of which are bearings which fit upon trunnions on a type-bar.

L^6 are a series of type-bars, each pivoted at one end at L^8 in a hanger, L^9, attached to the top plate, and each carrying a type, L^7, in its other end. The type-bars are of different lengths, and the hangers in which they are pivoted are so arranged in two rows concave to each other that each type-bar, when raised, will cause a type to be impressed on the platen over a common point. The connecting-rods L^4 are attached to the type-bars a short distance from their fulcrum, so that the latter are levers of the third class.

M is a bar underneath the key-levers, in front of the rod L′.

M′ are keys attached at either end of the bar M, which project beyond the base of the machine.

M^2 are metal arms fastened by screws to the under side of the bar M, and rigidly attached to a rock-shaft, M^3, which is supported on pivots M^4 in the frame B beneath, and in the same vertical plane with the downward projecting portion N′ of the paper-carriage.

O is an upright arm attached to the rock-shaft M^3, between the arms M^2, and nearly at right angles to them.

O′ is a knife-edged dog, hinged on a pin, O^2, in the upper end of the arm O.

O^3 is a weight attached to the lower part of the dog O′, which tends to hold its lower arm in contact with the upright O and the knife-edge O′ perpendicular to the rock-shaft M^3. The dog O′ is capable of partial rotation in a plane at right angles to that of the arm O.

M^5 is a steel spring, attached on the under side of the bar B^5 by a screw, M^6, the free end of which presses on the under side of an arm on the rock-shaft M^3, in front of the rock-shaft, and acts to hold the arms M^2 and the bar M up against the bottom of the key-levers.

M^7 is a spring, similarly attached, which presses on the back of the spring M^5, and assists in regulating its tension.

S is a "space-key," so called, in the center of the front of the key-board, attached to a double lever, S′, which has its fulcrum, with the type-levers, on the rod L′. The under side of the lever S′ rests upon the space-bar M.

S^2 is a pin extending perpendicularly beneath the space-key S, and entering a hole in the frame of the machine. It serves as a guide for the key S and as a support for a spiral spring, S^3, which tends to hold the key S and lever S′ in their upward position.

R is a rack screwed with its teeth downward to the lower portion of the paper-carriage, parallel with and directly under the axis of the platen.

T′ is an angle-bar connecting the lower projections, N′, of the paper-carriage, fastened thereto by screws, and lying over and parallel to the rack R.

T is a rack having teeth similar to the rack R, suspended on two links, T^2, which are supported on screws T^3 in projections from the upper surface of the bar T′. The rack T is capable of a reciprocating movement parallel to the stationary rack R for a distance equal to that between two of its teeth.

T^4 is a small spiral spring, fast to the rack T at one end and to the rack R at the other, which acts to draw the rack T in the direction of the forward movement of the paper-carriage—viz., that of the arrow, Figs. 6 and 7. When the guide-rail and paper-carriage are in their normal position, the dog O′ engages with the rack T.

N^7 is a hook on the under side of the left-hand end of the paper-carriage, over which is passed the end of a strap, K^7, communicating with a spring-cam.

K is a cam in the same plane with the racks R and T, loose upon an axle which is supported in hangers B^6, projecting from the base of the frame.

K^2 K^3 are collars held on either end of the axle of the cam K, which prevent any end-play.

K^4 is a worm-gear on the front side of the collar K^3.

K^5 is a worm in a bearing on the hanger B^7, which meshes into the worm-gear K^4.

K^6 is a crank screwed on the end of the worm-shaft K^5, which also serves as a collar. Within the cam K is a coiled spring (not shown in the drawings) one end of which is fastened to the axle on which the cam K turns and the other end to the cam itself. The spring acts to turn the cam in the direction of the arrow, Fig. 1.

K^7 is a strap attached to the paper-carriage, which wraps around the periphery of the cam K, and transmits the motion of the cam to the paper-carriage.

U is a shaft running longitudinally through the center of the axle of the cam K and turning freely therein.

U′ is a beveled gear on the shaft U, a short distance in front of the collar K^3; U^2, a similar beveled gear on the shaft U, back of the collar K^2.

U^3 is a ratchet-wheel fast on the hub of the gear U^2.

U^4 U^5 U^6 are three grooves in the front part of the shaft U.

U^7 is a crank on the front end of the shaft U.

K^8 is a pawl which engages with the ratchet-wheel U^3, and turns on a stud which projects from the back side of the cam K, on which is a spiral spring which holds the pawl in contact with the ratchet-wheel U^3.

V and W are horizontal shafts supported in bearings V′ W′ in the frame B, just above the key-levers. The shaft V is in front of the rods L′, which connect the key-levers and the type-bars. The shaft W is behind them.

V^2 is a beveled gear on one end of the shaft V, into which the gear U′ on the shaft U may mesh.

W^2 is a similar gear on the end of the shaft W, into which the gear U^2 may mesh.

V^4 is a latch which turns on a stud, V^3, projecting horizontally from the bearing V′. A spiral spring on the stud V^3 presses the outer end of the latch V^4 upon the shaft U, at which point is a groove which fits into the grooves U^4 U^5 U^6 in the shaft U.

X′ and Y′ are spools, respectively on the shafts V and W, on which an inking-ribbon, X, is wound. The ribbon passes from the spool X′ over a flattened space, X X, on the front of the top plate, thence across the top plate to the spool Y′. The spools X′ and Y′ have each a spline which fits in a longitudinal groove in the shafts V and W, so that the spools rotate with the shafts, but may also move endwise thereon.

X^2 is a slotted disk, fastened by screws on the hub of the spool X′.

X^3 is a sleeve on the shaft V, having flanges X^4 X^5 on its ends. The flange X^5 is between the hub of the spool X′ and the disk X^2. This flanged sleeve forms an extension of the hub of the spool X′.

Y^3 is a similar sleeve, with flanges Y^4 and Y^5 on the rear shaft, W, connected with the spool Y′.

Z is a shaft running in bearings in the frame of the machine, transversely to the shafts V and W, at the right-hand side of the machine.

Z′ is an arm on the front end of the shaft Z, having a crotch, Z^2, inserted in it at right angles, between the arms of which the flange X^4 turns. The upper part of the arm Z′ terminates in a handle.

Z^3 is a similarly-projecting arm near the other end of the shaft Z, in front of the cylinder or sleeve Y^3.

Z^4 is a crotch on the arm Z^3, which embraces the flange Y^4.

Z^5 is a plate on the front bearing of the shaft Z, in front of the arm Z′, on the rear side of which are a series of holes in which a pin on the front side of the arm Z′ fits. The shaft Z is capable of a slight endwise motion, to allow the pin on Z′ to be withdrawn from one hole on Z^5 and inserted in another. A spring on the rear end of the shaft Z holds it forward against the plate Z^5.

C is a block called the "bell-stop," which slides on a square rod, C′, parallel with the line of movement of the paper-carriage, and just in front of it. The rod C′ is supported in a bearing on the frame at its right-hand end, and at its other end in a hanger below the extension of the top plate, and is capable of a slight rotatory movement therein.

C^2 is a set-screw by means of which the block C may be fastened at any desired point on the rod C′.

C^3 is a guide on the back side of C, which vibrates in a plane at right angles to the rod C′ on a stud C^4.

C^5 and C^6 are pins projecting from the back side of the stop C, one above and the other below the guide C^3.

N^8 is a pin projecting from the front of the lower part of the left-hand end of the paper-carriage, which, as the paper-carriage moves in either direction, near the end of its motion passes between the pins C^5 and C^6 and engages with the guide C^3.

C^7 is a flexible arm on the inner end of the rod C′, which carries a metal weight, C^8, capable of striking a bell, C^9. The bell C^9 is attached to the side of the frame B.

B^3 are friction-rolls on either side of the racks R and T, which guide the paper-carriage in its movement.

The operation of the devices mentioned is as follows: The paper-carriage N is supported on a single rail, D, on friction-wheels D^3 in the interior of the platen P. When writing is being done on the machine, it moves from right to left, as keys are successively depressed and released, being guided in a right line by the traveling wheels D^3, running in the groove *d*. The platen P rotates on bushings P^4 about the rail D as an axis. The paper to be written on, P′, rests upon the paper-table G, and is drawn between the guide-strips Q^3, the flexible bands *p*, and the under surface of the platen; thence it passes behind the guide-strips Q^2 on the front of the machine, and between the pressure-roller P^2, and the upper front surface of the platen. The types L^7 strike upon the inking-ribbon X, against the lower surface of the platen directly beneath the guide-rail D. The lower part of the paper-carriage N′ extends below the top plate of the machine in a vertical plane with the guide-rail D, so that the racks R and T, which are attached thereto, are also under the line of suspension of the paper-carriage. In the same plane, also, is the spring-cam K and the carriage-strap K^7. The tension of the spring in the cam K draws the paper-carriage toward the left of the machine whenever the dog O′ is vibrated. By the worm K^5 and the gear K^4 the tension of the spring in the cam K is increased or diminished, and the rapidity of movement of the paper-carriage is regulated. The guide-rail D being hinged at D′ may be turned up perpendicularly to the top plate, taking with it the paper-carriage, racks, and appurtenances, so that the top plate of the machine is cleared. The end D^2 of the guide-rail rests in the slot in the arm A^2, and is held therein by its own weight. After a line has been written, the paper-carriage is at the limit of its movement on the guide-rail, and must be moved back by hand for the commencement of the new line, and at the same time the platen must be rotated one or more teeth of the ratchet-wheel P^5 in the direction of the arrow, Fig. 8, in order that the new line may be a proper space below the one last written. To accomplish this, the operator pulls the front arm of the carriage-lever E, and thereby depresses its rear arm, and causes the pawl E^3 to engage with the ratchet-wheel P^5. As the depression of the lever E continues, the ratchet-wheel P^5, and consequently the platen, are rotated. The movement of the carriage-lever is terminated by the contact of the stop or line-space regulator F with the frame of the paper-carriage. The lever E having come to a rigid bearing, the operator easily pushes the carriage toward the right of the machine, the dog O′ turning on the pin O^2 and slipping over the teeth of the rack T. As soon as the rotation of the ratchet-wheel P^5 ceases, the spring-pawl E^8—which slips over the teeth of the wheel P^5 when it is rotated by the lever E—resists any reverse movement, so that the platen may not be moved by any slight jar or by the impact of the type, but may be moved in either direction by the application of sufficient force. When the operator releases the carriage-lever E, the spring E^7 causes it to return to its original position, and with it the pawl E^3, which slips over the teeth of the wheel P^5. Near the end

of the upward movement of the rear arm of the carriage-lever an angular projection, E^6, on the under side of the pawl E^3, strikes on a projection on the hanger N^6, and removes the pawl E^3 from contact with the ratchet-wheel P^5. A spring, E^5, presses the pawl E^3 toward the wheel P^5 when it is out of contact with the hanger N^6. It will be seen that the length of the arc of vibration of the lever E, after the pawl E^2 has engaged with the wheel P^5, determines the amount of movement of the platen, and, consequently, the distance between two consecutive lines of the writing. This arrangement of a carriage-lever and attachments secures the positive contact of the pawl E^3 with the ratchet-wheel P^5 soon after the commencement of the motion of the carriage-lever, and holds the pawl E^3 away from the wheel P^5 when the lever is in its normal position, so that only the slight resistance of the spring E^8 need be overcome to rotate the platen.

To vary the amplitude of the arc of vibration of the carriage-lever, the line-space regulator F is provided. This regulator is turned upon the screw F′ by the handle F^2, for the distance of a quadrant, till its movement is checked by the contact of the stud F^3 with projections on the end of the lever E. This line-space regulator is represented in Fig. 8 in its upward position when the lever E has a short arc of vibration, and the platen is turned a distance of one tooth of the ratchet-wheel P^5. When the regulator is moved into its second position, the lever E is shortened and vibrates over a greater arc, and the platen is moved a distance of two teeth of the wheel P^5. The two widths of line-spacing thus secured are found to be sufficient in practice. The spring F^4 rests upon the upper surfaces of the regulator F, and holds it in either one of the desired positions without the aid of any tightening-screw or similar device. In other machines a line-space regulator has been attached to the shaft on which the platen rotates and also on the carriage-frame in front of the platen. In the former construction every alteration of the line-spacing is liable to disarrange the platen, and in both, to tighten the regulator in position, a thumb-screw is necessary. The improved device is adjusted by one movement, and is in a position easy of access. The lever H, with its attachments, is used to rotate the platen in the direction of the arrow, Fig. 3, and to return it, if desired, to its original position. As the types strike on the under surface of the platen the writing is concealed from the view of the operator. It may be seen, it is true, by turning up the guide-rail D; but this is an inconvenient method. The present improvement allows the platen, with the paper, to be rotated, so as the line which is being written may be brought in full view of the operator, and then carried back to the exact place from which it was moved. When the lever H and the lower arm of the pawl J are pressed toward each other, the end J′ of the pawl J will be depressed, and will enter between two teeth of the ratchet-wheel P^6. At the same time the latch J^3 will be raised by the spring J^6, and the step J^5 will be brought in front of the lever H, so that the lever and pawl will be locked together. This position of the lever H and pawl J is shown in Fig. 4. If, now, the lower arm of the lever H is raised, it will turn about the guide-rail D, and will carry with it the ratchet-wheel P^6 and the paper-platen. This movement can continue until the pin J^8 on the pawl J strikes the frame of the paper-carriage. The pin J^8 is placed in such a position that the platen is turned a little more than a quadrant, and the paper is carried with it until the line which is being written is brought just above the scale Q. If desired, the platen may be left at this or at any intermediate point by depressing the latch J^3, and thereby removing the pawl J from the ratchet-wheel P^6; but if it is desired to continue writing in the same line, the lever is turned back until it rests upon the frame of the paper-carriage on the front side of the machine. This brings the paper into proper position for writing, and when the latch J^3 is released the platen is free to be turned by hand or by the line-spacing devices. The scales Q and A^3 are provided to enable the operator at any moment to determine the progress of the writing, or, in case an error is made, to enable the carriage to be set back for its correction. The scale Q is attached to the paper-carriage in front of the platen, below the position of the line which is being written when it is turned up for view. It is graduated from left to right, the unit of graduation being the distance between two consecutive letters, or the distance between two teeth of the racks R and T. The scale A^3, which is attached to the top plate of a machine, is correspondingly graduated, but from right to left. The pointer Q′, in the center of the scale Q, indicates on the scale A^3 the progress of the writing. If an error is to be corrected, or an omission supplied in the line which is being written, the operator will turn the line into view by the platen-rotating lever H, when the line will be just above the scale Q. By observing the number on that scale over which the fault exists, moving the paper-carriage so that the pointer Q′ is over the same number on the scale A^3, and returning the line to its position beneath the platen, the proper character may be inserted. To correct an error in the body of the writing, the same process will be gone through with, except it will be first necessary to turn the platen by hand, so as to bring the line in which the correction is to be made into position over the scale Q. The combination of a scale on the top plate with a reversely-graduated scale on the paper-carriage has been heretofore used, but the reversed scale has been placed under the platen and out of sight. My improvement consists in placing the two scales in juxtaposition, that their relative position may be ascertained at a glance. The guides Q^3, which are fastened to the paper-table G on the rear of the platen,

and extend beneath it and concentric to it nearly to the lowest point thereof, and the guides Q^2 on the scale Q, which extend above the platen, supplement the elastic bands *p* and pressure-rollers P^2 P^3, and hold the paper firmly against the surface of the platen. The front guides, Q^2, are especially serviceable when the last line on a sheet is brought up for view above the scale Q, for without them, when the platen is turned back the lower edge of the paper would be liable to stand off from the platen and catch on the scale Q. The trip-pin N^8 on the front of the lower left-hand end of the paper-carriage, when a line is nearly completed, trips and vibrates the hammer C^8 and causes the bell C^9 to sound. When a line is being written—that is, when the carriage is moving from right to left—the trip-pin N^8, near the end of the line, passes above the hinged trip C^3, and presses it against the pin C^6, as is shown in Fig. 13. As the movement of the paper-carriage continues the trip-pin will depress the hinged trip C^3 and partially turn the rock-shaft C', thereby raising the bell-hammer C^8. When the highest point of the trip C^3 is passed, the rock-shaft C' resumes its position, and the hammer strikes the bell. The trip-stop C is adjustable upon the shaft C', so the bell may be made to ring at any desired point near the end of a line. The shaft C' is graduated similarly to the scales Q and A^3. If the left-hand end of the stop C be set upon a given number, the bell will ring when a character is impressed at the same number on the scale Q. When the carriage is on its return movement—that is, from left to right—the trip-pin passes under the hinged trip C^3 and raises it, but does not move the trip-stop C or sound the bell. This is shown in Fig. 14, the arrow indicating the direction of motion of the paper-carriage. The depression of any one of the type-keys L^2 raises the rear end of its lever L and also the connecting-rod L^4 and the type-bar L^6, and causes a type, L^7, to be impressed against the paper on the under surface of the platen. Whenever any one of the type-keys or the space-key is depressed, the frame, made up of the bar M, the arms M^2 and O on the shaft M^3, and pivoted at M^4, is vibrated, and the dog O, which, when the frame is in its normal position is engaged with the reciprocating rack T, is brought forward between two teeth of the rack R. At this time, while the paper-carriage is held stationary, if a type-key be struck the type is impressed. Upon the release of the key the weight of the connecting-rod and type-bar, together with the action of the springs M^5 and M^7, return the type-key lever and the bar M to their original position, and the dog O' is moved out from between the teeth of the rack R into contact with the rack T, but in the meantime the spiral spring T^4 has drawn the rack T the distance between two of its teeth in the direction of the movement of the paper-carriage, and the dog O' will now enter the rack T one tooth farther to the left than before. The coil-spring in the cam K, acting through the strap K^7 on the paper-carriage, overcomes the comparatively feeble tension of the spring T^4 and draws the carriage one tooth toward the left. In this way the paper-carriage is fed to produce letter-spacing. When the carriage is moved reversely, the dog O' turns on the pin O^2 and slips over the teeth of the rack T. When the space-key S is struck, the carriage is moved one space and no character is impressed. The key-levers can only be depressed a distance sufficient to move the vibratory frame so that the dog O' shall engage with the rack R and release the rack T. It is desirable at times to release the paper-carriage entirely from the control of the dog O', so that it may move a number of letter-spaces at once. For this purpose the keys M' M' on either end of the bar M are provided. If one of these be depressed, the vibratory frame is moved over a greater arc than by the action of the key-levers, and the dog O' is brought in front of the rack R, and the carriage is free to be drawn by the spring-cam until the key M' is released, when the dog re-engages with the racks.

The combination of a stationary and a reciprocating rack with a single dog is not a part of my invention. My improvement in this respect consists in the employment of a hinged dog, a vibratory frame capable of being moved out of contact with the racks, and in the location of the combination relatively to the axle of the platen and the guide-rail on which the paper-carriage is supported. The pawl K^8, attached to the spring-cam K, turns the ratchet-wheel U^3 and the beveled gears U' and U^2, and one of the gears W^2 V^2 on the shafts W and V, on which are the inking-ribbon spools Y' X', whereby the inking-ribbon is moved whenever the spring-cam moves the paper-carriage. The shaft U is capable of a slight longitudinal movement, and may be held in three positions, according as the spring-latch is in either of the grooves U^4 U^5 U^6. When the spring-latch is in the groove U^6, as shown in Fig. 3, the gear U' is out of contact with the gear V^2, and the gear U^2 meshes into the gear W^2. The spring-cam then imparts motion to the ribbon-spool Y', and the ribbon X is wound upon the spool Y' and unwound from the spool X'. When the latch is in the groove U^4, the gear U' is thrown into contact with the gear V^2, and the ribbon will be wound upon the spool X' and unwound from Y'. When the latch is in the middle groove, U^5, both the gears U' U^2 are thrown out. The pawl K^8 in its backward movement slips over the teeth of the ratchet-wheel U^3, so that the inking-ribbon is not moved when the carriage is moved back after a line has been written. The rock-shaft Z, arms Z' Z^3, the projections from which, Z^2 Z^4, engage with the outer flanges of the sleeves X^3 Y^3 when moved by the handle Z', slide the inking-ribbon laterally, as desired. Whenever the ink is exhausted in one line-course, the slight endwise motion of the shaft Z, which enables the pin on the front side of the arm Z'

to be removed and replaced in the holes in the plate Z^6, enables a series of defined line-courses to be obtained on the inking-ribbon. The arms Z' and Z^3 are pointed in the same direction and move simultaneously, so as to keep the ribbon-spools always opposite one another.

The combination of a long shaft placed in the rear of the machine, with a pulley carrying the mainspring in the rear of said shaft, or carrying the operating mechanism in the rear of the type-bars connecting-rods, is not a part of my invention; neither is it my invention, broadly, to carry a cylinder upon a shaft with friction-wheels interposed. My improvement in this respect consists in the combination and arrangement of parts described and claimed, by which I prevent nearly all lateral motion of the carriage caused by the high speed at which writing-machines are run. I thus obtain what I call a "central draft," and the platen and paper run true and without lateral vibration, as I locate the carriage-driving power where it can be attached to the carriage at the center of resistance caused by said carriage and by the letter-spacing. By running the shaft to which the ratchet-wheel is attached through the hub of the spring-wheel I dispense with one shaft, the bearings for the same, and two bevel-wheels or equivalent devices for connecting the driving-power with ribbon-spools, and thus produce a simple and compact machine.

With a machine constructed as above described, the axis of the ribbon-shaft must be arranged parallel with the platen instead of at right angles, as formerly, and the parts reconstructed to meet this need. By my construction and use of the paper-guides described the paper cannot move or change its position on or against the platen when the latter is rotated to exhibit the writing, and this could not be obtained by the means heretofore in use.

What I claim is—

1. In a type-writing machine, the combination of the top frame thereof, type-levers of unequal lengths pivoted thereto, to strike the under side of the platen, and a platen having its axle hinged to the top frame at one end, with a paper-carriage hung on said axle of the platen, whereby the platen is adapted to turn on its axle for line-spacing, and with the paper-carriage, to move longitudinally thereon for letter-spacing, and be lifted, substantially as described.

2. In a type-writing machine, a line-space regulator, F, attached to the carriage-lever, and adapted to be rocked and held by a spring on said carriage-lever, substantially as described.

3. In a type-writing machine, an adjustable line-space regulator held in position by a spring, and secured to the end of the lever, extending forward and down, substantially as described.

4. A graduated scale attached to the frame of a type-writing machine, parallel to and nearly in contact with a reversely-graduated scale attached to the paper-carriage, substantially as described.

5. In combination with a rotating platen, a lever, pawl, and ratchet-wheel to rotate the platen in one direction, and to return it to its original position, substantially as and for the purpose described.

6. In combination with a trip-pin on the paper-carriage of a type-writing machine, an adjustable trip adapted to ring a bell, hinged so as to rise over the trip-pin on the reverse movement of the paper-carriage, substantially as and for the purpose described.

7. In combination with the frame and a graduated scale on a type-writing machine, to indicate the progress of the writing, the pivotal axle of the bell-hammer, provided with a similarly-graduated scale, on which a bell-trip may be adjusted, and be seen from the front of the machine, and a paper-carriage provided with a trip-pin, substantially as and for the purpose described.

8. In a type-writing machine, the combination of two parallel and straight racks attached to and extending the length of the paper-carriage, one of which is fixed, and the other capable of a slight longitudinal motion in a vertical plane passing through the axle of the platen, with a dog hinged so as to slip over the teeth of the racks when the paper-carriage is reversed, and the lever to which it is pivoted, extending under the key-levers, substantially as shown and described.

9. In a type-writing machine, the combination of the paper-carriage provided with pendent arms at each end, with a rack attached to said arms, and situated in a vertical plane passing through the axis of the platen, the whole forming an open frame for the passage of type-bars, substantially as and for the purpose described.

10. In a type-writing machine, the combination of a series of type-bars of unequal lengths, pivoted and arranged, as shown, in two rows, so as to cause type to be impressed at a common point, with a rack attached to arms adapted to pass between the rows of type-bars, and moving with the paper-carriage in a plane passing through the common impression-point, and a grooved guide-rail passing through the platen, on which rail the paper-carriage moves, substantially as shown and described.

11. In a type-writing machine, the combination of a series of type-bars pivoted in two rows, as shown, to impress type at a common point, a paper-carriage with pendent arms adapted to pass between said rows, and a rack secured to said arms, with a spring-wheel and strap adapted to impart motion to the paper-carriage, the arms, rack, and wheel being situated in a vertical plane with the axis of the platen, substantially as shown and described.

12. In combination with a spring-wheel to move the paper-carriage of a type-writing machine, a pawl, K^8, and ratchet-wheel U^3, to turn

the inking-ribbon spools, the shaft to which the ratchet-wheel is attached being supported in a bearing running through the hub of the spring-wheel, substantially as shown and described.

13. In a type-writing machine, inking-ribbon spools having their axes parallel with the axis of the platen, each having a flanged sleeve connected with the hub, in combination with arms Z' Z^3 and crotches Z^2 Z^4, substantially as shown and described.

14. In a type-writing machine, the combination of key-levers, each having its fulcrum on a common rod between its key and connecting-rod, with a vibratory frame adapted to vibrate, and two racks connected with carriage-frame by pendent arms, and a single dog pivoted to a bell-crank lever having one of its arms extending under the space-bar, forming a spacing mechanism to permit an intermittent movement of the paper-carriage when actuated by a key-lever, and to disengage the spacing mechanism from the paper-carriage when actuated by a special key, substantially as shown and described.

In testimony that I claim the foregoing improvement in type-writers, as above described, I have hereunto set my hand, this 25th day of June, 1880.

GEORGE W. N. YOST.

Witnesses:
WM. BRO. SMITH,
CHAS. C. GILL.