(No Model.) 4 Sheets—Sheet 1.

A. G. DONNELLY.

TYPE WRITING MACHINE.

No. 365,370. Patented June 28, 1887.

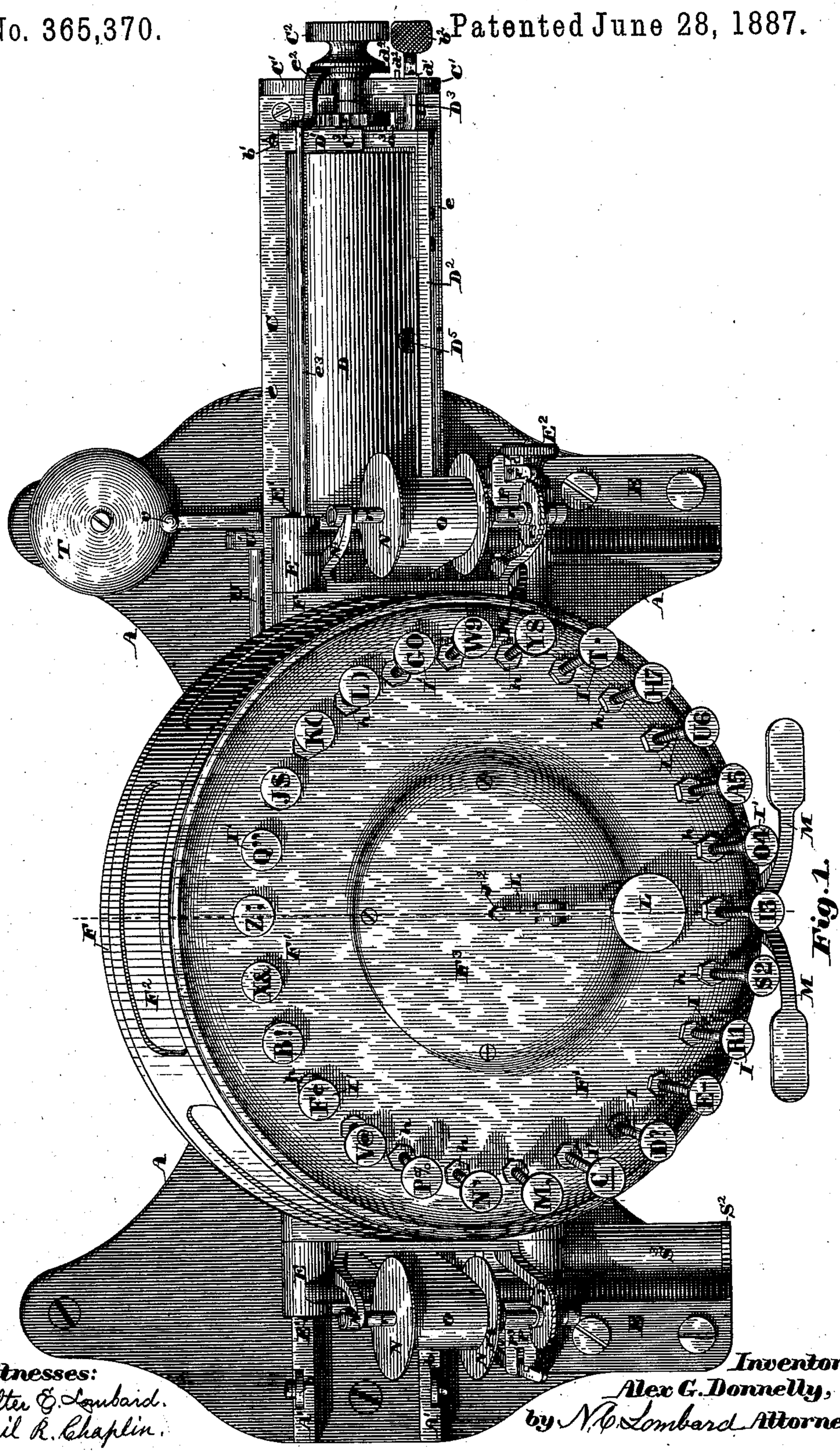

Fig. 1.

Witnesses:
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Orril R. Chaplin.

Inventor:
Alex G. Donnelly,
by N. C. Lombard Attorney.

(No Model.) 4 Sheets—Sheet 2.

A. G. DONNELLY.

TYPE WRITING MACHINE.

No. 365,370. Patented June 28, 1887.

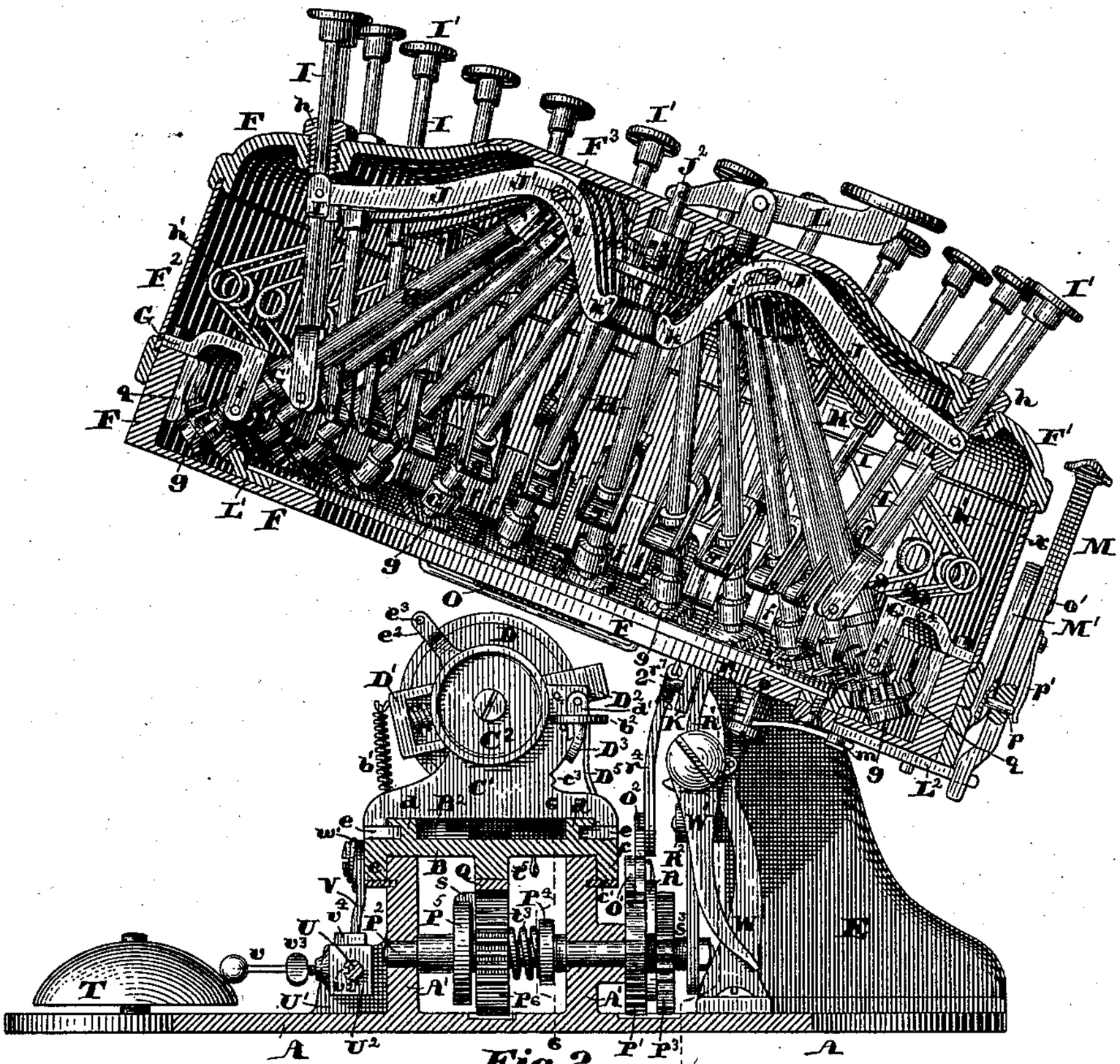

Fig. 2.

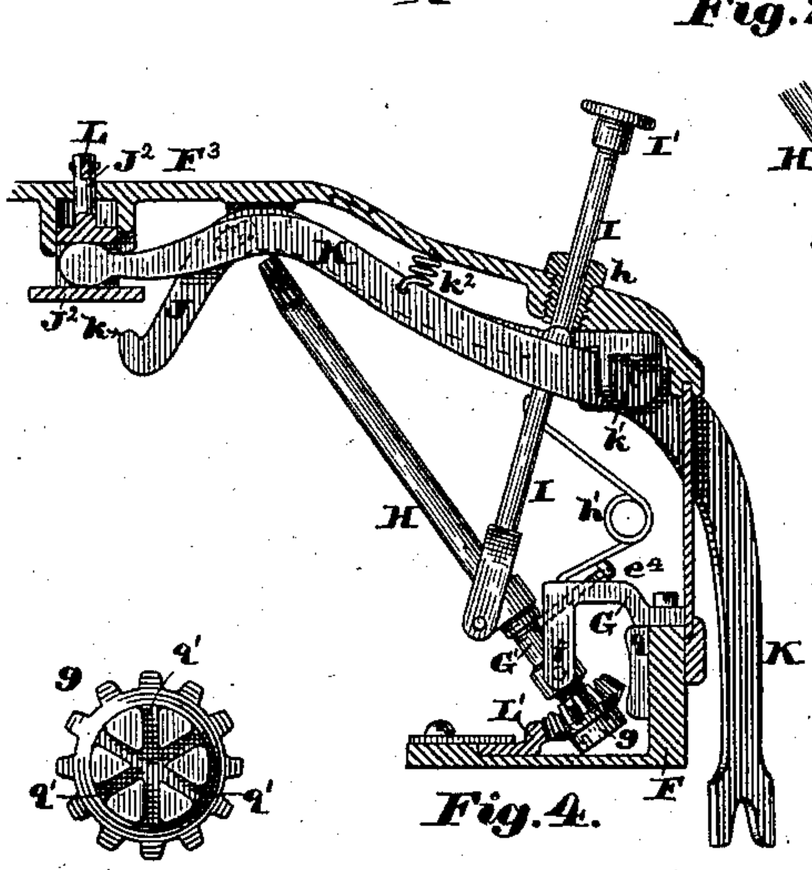

Fig. 4.

Fig. 5.

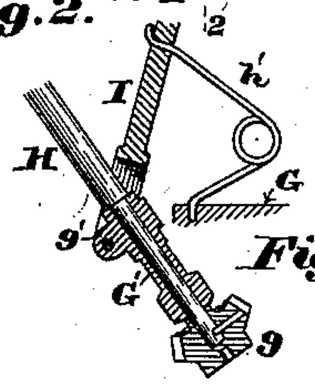

Fig. 6.

Fig. 3.

Witnesses:

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Attorney.

(No Model.) 4 Sheets—Sheet 3.

A. G. DONNELLY.

TYPE WRITING MACHINE.

No. 365,370. Patented June 28, 1887.

Fig. 14.

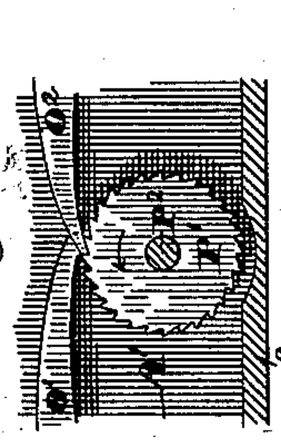

Fig. 10.

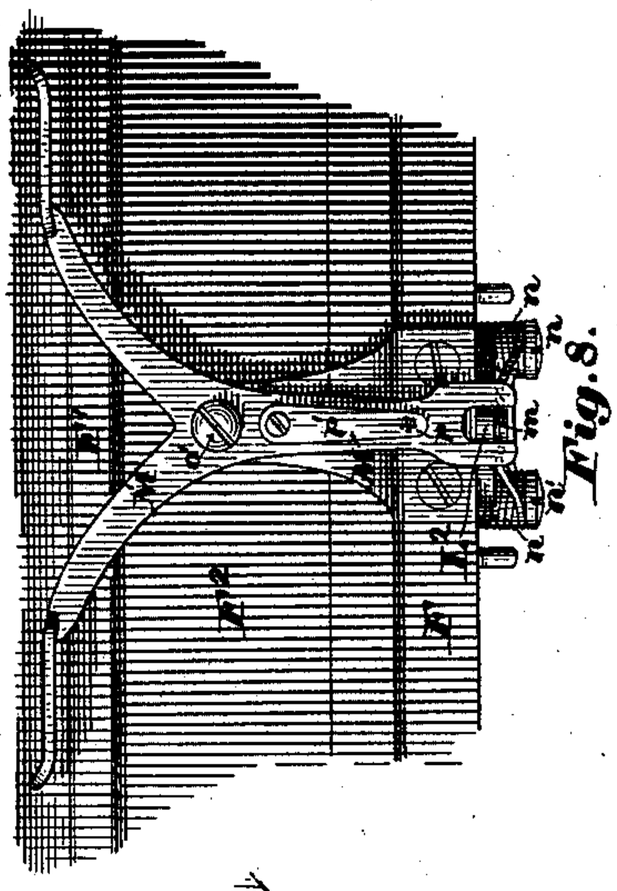

Fig. 8.

Fig. 16.

Fig. 15.

Fig. 7.

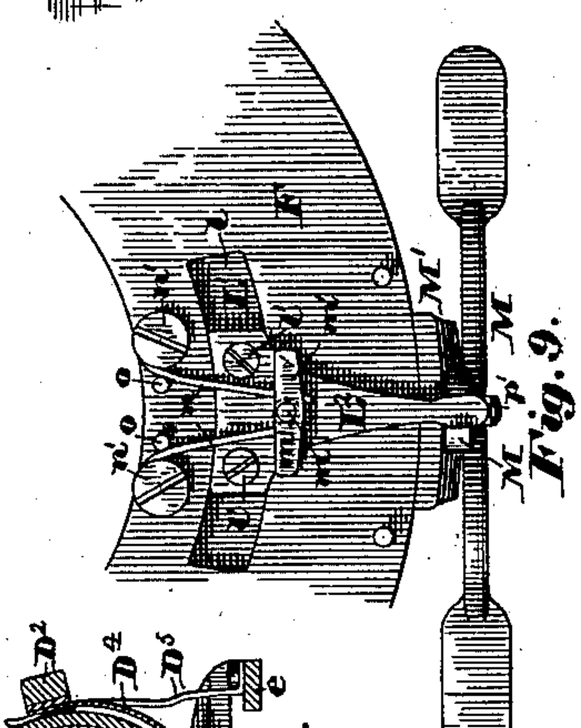

Fig. 9.

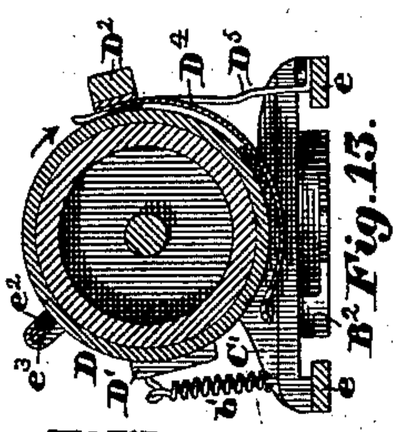

Fig. 13.

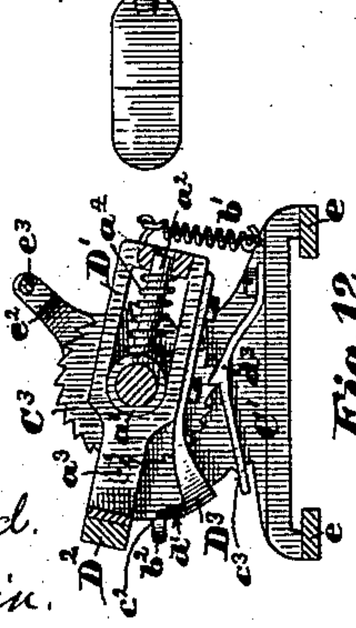

Fig. 12.

Fig. 11.

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Alex G. Donnelly,

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(No Model.)

4 Sheets—Sheet 4.

A. G. DONNELLY.

TYPE WRITING MACHINE.

No. 365,370. Patented June 28, 1887.

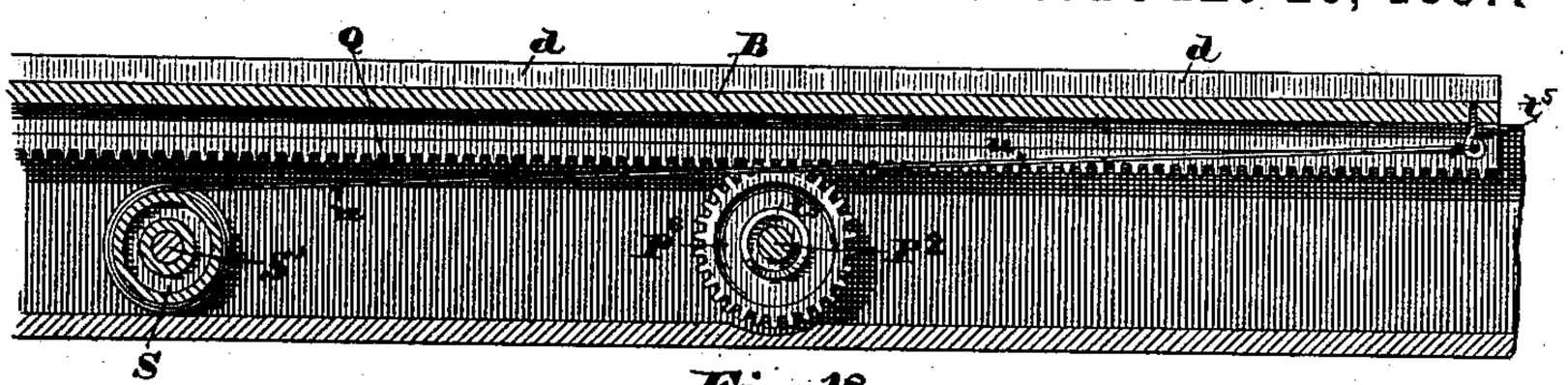

Fig. 18.

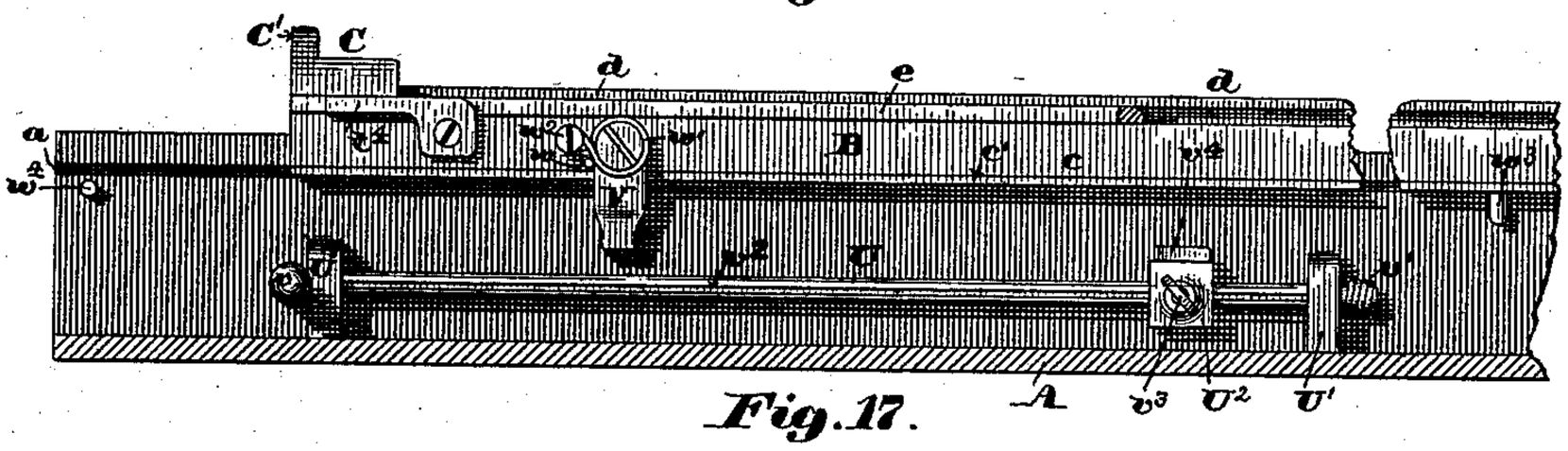

Fig. 17.

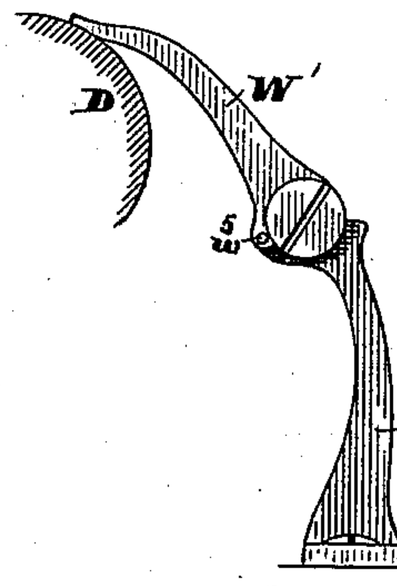

Fig. 20.

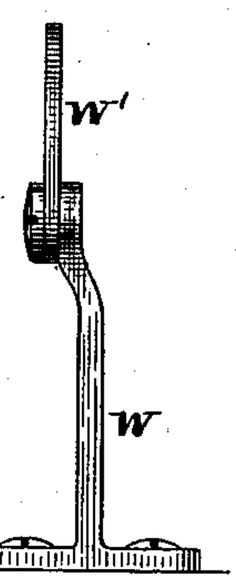

Fig. 19.

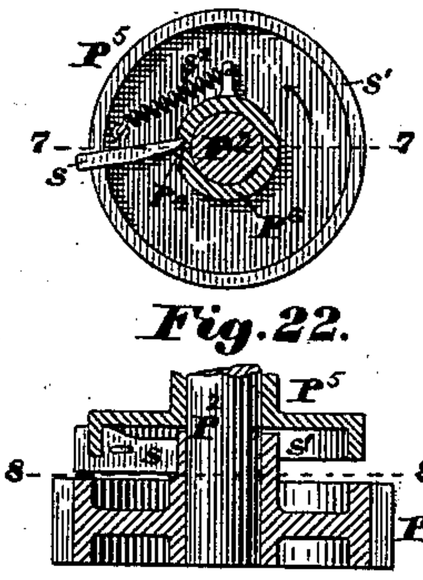

Fig. 22.

Fig. 21.

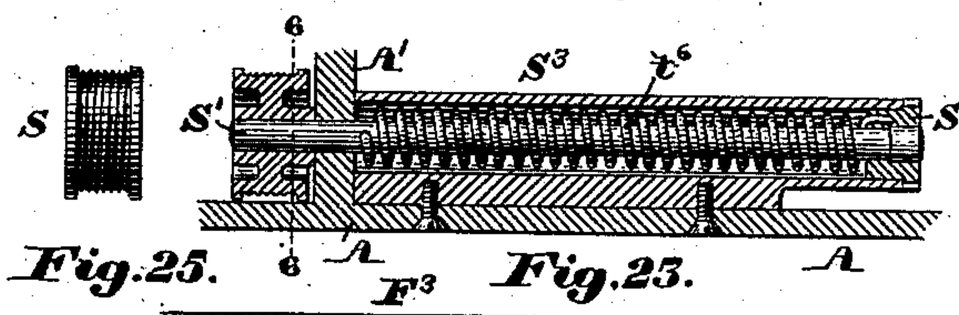

Fig. 25.

Fig. 23.

Fig. 24.

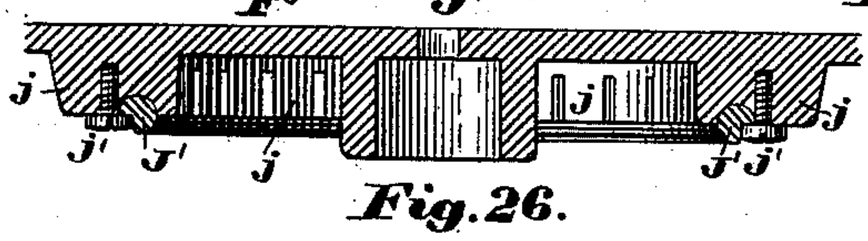

Fig. 26.

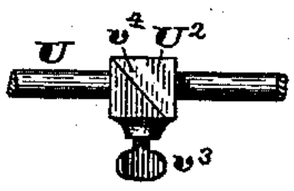

Fig. 28.

Fig. 27.

Fig. 29.

Witnesses:

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Orril R. Chaplin.

Inventor:
Alex G. Donnelly,
by N. C. Lombard
Attorney.

UNITED STATES PATENT OFFICE.

ALEXANDER G. DONNELLY, OF NEW YORK, N. Y.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 365,370, dated June 28, 1887.

Application filed January 25, 1886. Serial No. 189,565. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER G. DONNELLY, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Type-Writing Machines, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to type-writing machines, and is an improvement upon the invention described in another application of mine, filed October 17, 1884, and numbered 145,749; and it consists in certain novel features of construction, arrangement, and combination of parts, which will be readily understood by reference to the description of the drawings, and to the claims to be hereinafter given.

In the drawings, Figure 1 is a plan of a machine illustrating my invention, with the paper-carrying roll and its carriage in position for commencing a line of type-writing. Fig. 2 is a vertical transverse section through the bed, lower carriage, and the pivoted upper portion or head of the machine, and showing the upper carriage and paper-carrying roll in end elevation. Fig. 3 is a sectional plan of a portion of the pivoted upper part or head of the machine, the cutting-plane being through the outer casing on line *x x* and through the space-feed-operating spindle at the point of the connection therewith of the letter-feed lever, and showing the type-bars and the levers for operating the carriage to give the letter or space feed in plan. Fig. 4 is a vertical section on line 1 1 on Fig. 3, and showing one type-bar, one key, one key-operated lever, and the main space-feed lever in elevation. Fig. 5 is an end elevation of one of the bevel-gears for rotating the type-hammers. Fig. 6 is a sectional elevation of a portion of one of the type-bars and its accessories, to be hereinafter referred to. Fig. 7 is a vertical longitudinal section through the bed, the goose-necks, and a small portion of the base of the pivoted inclined head of the machine, the cutting-plane being on line 2 2 on Fig. 2, and showing the duplex carriage, paper-roll, and ink-ribbon carrying and operating mechanism in elevation. Fig. 8 is a front elevation of a portion of the inclined head of the machine and the apparatus for operating the ring-gear to rotate the type-bars when it is desired to change the case. Fig. 9 is an inverted plan of the same parts. Fig. 10 is a partial sectional elevation of the bed and ratchet or cam wheel and levers for operating the ink-ribbon feed. Fig. 11 is a transverse sectional elevation of the upper carriage and paper-roll, the cutting plane being on line 3 3 on Fig. 7. Fig. 12 is a vertical transverse section on line 4 4 on Fig. 7, looking toward the left of said Fig. 7. Fig. 13 is a vertical transverse section on line 5 5 on Fig. 7, looking toward the right of said Fig. 7. Fig. 14 is an inverted plan of a portion of one end of the upper carriage, showing a lipped socket for engaging with a headed pin on the lower carriage, as will be hereinafter described, a portion of said socket being cut in section. Fig. 15 is a longitudinal section through one of the ink-ribbon rolls and its spindle, and Fig. 16 is a transverse sectional elevation of the same. Fig. 17 is a sectional elevation of a portion of the bed and the bell-striking mechanism. Fig. 18 is a vertical longitudinal section of a portion of the bed and the lower carriage on line 6 6 on Figs. 2 and 23, and showing the cord-connection for moving the carriage. Figs. 19 and 20 are respectively a front elevation and a side elevation of a pivoted index or registering finger, the purpose of which will be hereinafter described. Fig. 21 is a horizontal section of the grip-clutch for connecting the carriage-operated pinion to the shaft of the escapement-wheel, the cutting-plane being on line 7 7 on Fig. 22. Fig. 22 is a section on line 8 8 on Fig. 21. Fig. 23 is a central longitudinal section through the casing of the spring for actuating the carriage-feeding drum. Fig. 24 is an end elevation of said casing and the ratchet-wheel and stop-pawl for use in winding the spring contained in said casing. Fig. 25 is an elevation of the carriage-feeding drum. Fig. 26 is a vertical section of the central and upper portion of the casing of the pivoted and inclined head, and illustrating the manner of securing the ring-bearing in position for supporting the series of key-operated levers for imparting motion to the main carriage-feed lever at each operation of the key. Fig. 27 is an inverted plan of a portion of the same. Fig. 28 is a plan of the cam-block for operating the bell-hammer, and Fig. 29 is a plan of the guide-stand for hook-pawl for rotating rib-

bon-drum. Figs. 21, 22, 26, and 27 are drawn to an enlarged scale.

In the drawings, A is the base-plate or bed of the machine, provided with the two upwardly-projecting ribs A′ A′, each having formed in its outer vertical face a shallow longitudinal groove, *a*, and a series of circular recesses, in each of which recesses is mounted upon a suitable stud or journal an anti-friction truck, *b*, so arranged that its periphery projects slightly above the upper edge of said rib, and its outer face is sunk into said rib to a point at or near the bottom of the groove *a*, as shown in Fig. 1 at the left hand thereof.

B is a carriage, consisting of a rectangular plate which rests upon the anti-friction trucks *b b* and is provided with two downwardly-projecting ribs, *c c*, each having formed thereon or secured thereto the inwardly-projecting lip *c′*, which fits into the groove *a* and serves to guide said carriage in its movements to and fro upon the bed. Said carriage B is also provided with two upwardly-projecting ribs, *d d*, in the outer vertical face of each of which is formed a longitudinal groove to receive the inner edge of a longitudinal bar, *e*, of the upper carriage, C, in suitable bearings, C′ C′, of which is mounted the paper-carrying roll D, having its periphery covered with rubber or other suitable elastic material in a well-known manner.

E E are two goose-neck-like stands secured upon the base-plate A, and to the rear ends of which the casing of the head of the machine is pivoted at E′ and locked in a fixed position by the bolt E² in the same manner as described in my before-cited prior application, except that the pivots for said head are at a greater distance above the base plate than the locking-bolt, so that when locked in its normal position the base of said head and the plane occupied by the finger-keys shall be inclined toward the front of the machine, as shown in Fig. 2, for the purpose of rendering the keys more conveniently accessible to the operator.

The casing or frame of the head of the machine is composed of the base-ring F, the cap-ring F′, the thin sheet-metal panels or middle section, F², and the central cap-plate or cover, F³, as shown in Fig. 2. Upon the upper edge of the base-ring F are secured a series of twenty-six brackets, G, each provided with two downwardly-projecting ears, *f f*, between which is pivoted the short sleeve G′, so that it may be moved in a vertical plane only. In each of said sleeves G′ is fitted, so that it may be moved about its axis, but cannot be moved endwise in said sleeve, a type-bar, H, provided with a shoulder to abut against one end of said sleeve and having secured upon its outer end a bevel-pinion, *g*, the hub of which abuts against the other end of said sleeve, as shown in Fig. 6. The inner end of the type-bar H is made triangular in cross-section, and has formed thereon in relief a capital letter, a small letter, and a figure, punctuation-point, or other character, substantially in the same manner as described in my before-cited application. The inner end of each of the sleeves G′ is provided with the downwardly-projecting ear *g′*, to which the bifurcated lower end of the key-spindle I is pivoted, as shown in Figs. 2, 4, and 6. The spindles I are fitted to bearings in the screw-bushings *h*, set in the cap-ring F′, and have secured upon their upper ends the key-buttons I′, said keys and spindles being arranged in a circle and equidistant from each other, as shown in Fig. 1. The keys and type-bars are maintained in their normal or elevated positions by the wire springs *h′*, one end of each of which is set in a hole in or secured to one of the brackets G, and the other end is inserted in a hole extending transversely through a spindle, I, as shown in Fig. 6. Each spindle I is slotted just below the bushing *h* to receive one end of a lever, J, which is pivoted thereto, and is provided with a slot, *i*, through which passes the wire ring-like fulcrum-pin J′, common to the whole series of said levers, said fulcrum-ring being fitted to a circular groove formed in the under side of a series of downwardly-projecting lugs *j*, formed upon the under side of the central cap-plate, F³, and so shaped as to serve as guides to separate and keep at equal distances apart the levers J, said fulcrum-ring being secured to said lugs by means of screws *j′*, set in certain of said lugs *j*, with one side of their heads bearing in recesses formed in the outer side of said fulcrum-ring, as clearly shown in Figs. 26 and 27. The inner ends of the levers J are curved downward, and terminate in upwardly-projecting noses or tips *k*, which, when the key I′ is depressed, come in contact with the lower end of the short central spindle J² and move it upward in its bearing in the cap-plate F³. The spindle J² is provided with an annular flange at its lower end, and has formed therein a slot to receive the inner end of the lever K, which is pivoted to the ears *k′*, cast upon or secured to the under side of the cap-ring F′, and has its lower end forked and its inner end pressed downward by the spring *k²*, all as shown in Fig. 4.

L is the space-key lever, pivoted to a stud set in the cap-plate F³ and to the upper end of the spindle J², so that by depressing said key the spindle J² and lever K may be operated to feed the carriage independently of the operation of the type-bars whenever it is desired to leave a space between words.

By virtue of the slot *i* in each lever J and the positive connection of the outer end of said lever to the key-spindle I, the nose *k* of said lever will move very nearly in a straight vertical line when the key is depressed, thereby materially reducing the friction between said nose and the spindle J².

L′ is an annular or ring-gear fitted to a suitable bearing on the base-ring F, and with which each bevel-pinion *g* engages when its type-bar is in its normal or elevated position, as shown in Figs 2 and 4. The base-ring F is provided with the curved slot *l*, directly

beneath the ring-gear L′, through which the radially-projecting arm L^2 is secured to said ring-gear by the screws l' l', as a means of moving said ring-gear a limited distance in either direction about its axis, for the purpose of partially revolving all of the type-bars simultaneously. The arm L^2 has set in its under side a pin, *m*, provided with a head composed of two long laterally-projecting arms, *m′*, sufficiently removed from contact with the under surface of said arm to permit the insertion between said parts of the free ends of the two wire springs *n*, secured to the under side of the base-ring F, by the screw-studs *n′ n′*, around which said springs are coiled in such a manner as to press with considerable tension against opposite sides of the pin *m*, as clearly shown in Figs. 2, 8, and 9, by virtue of which arrangement of parts the arm L^2 is maintained in its normal position centrally of the slot *l*, unless forced in one or the other direction therefrom, which action increases the tension of the spring upon the side toward which said arm is moved, the other spring being prevented from following up the pin *m* by coming in contact with the pin *o*; and when the pressure or force is removed from the arm L^2 the spring immediately returns the arm L^2 to its normal or central position. When the arm L^2 is in its normal or central position, the type-bars are in position to print the small or lower-case letters if they are depressed. If the arm L^2 be moved in one direction from said central position all the type-bars will be rotated one-third of a revolution and bring the capital-letter faces of said bars into position to print when said bars are depressed, and if said arm L^2 is moved in the other direction from said central position the type-bars will be rotated one-third of a revolution in the opposite direction and bring the faces of said bars upon which are formed the figures, punctuation-points, &c., into position to print when the said bars are depressed.

M is a three armed lever pivoted at *o′* to the stand M′, secured to the exterior of the base-ring F, at the front side of the machine, the lower arm of which is bifurcated and embraces the outer end of the arm L^2, and the other two arms, extending obliquely to the right and left of the pivot, about which it may be vibrated, are each provided with a suitable broadened pad-like surface in a convenient position to be pressed by the thumb or finger of the operator to move the ring-gear in either direction to partially rotate the type-bars. The lever M is provided with a pin, *p*, set in a bearing therein, with a spring, *p′*, arranged to press said pin into a detent notch in the stand M′ when said lever M is in its normal or central position, as shown in Figs. 2 and 8.

Upon the inner face of the upright portion of the base-ring F are formed or secured a series of inwardly-projecting vertical ribs, *q*, the inner edges of which are curved to an arc of a circle struck from the pivotal axis of the type-bar, the number of said ribs corresponding to the number of type-bars used, and the center of each rib being in the same vertical plane as the axis of a type-bar. Each bevel-pinion on a type-bar has formed in the outer end of its hub three grooves, *q′ q′ q′*, crossing each other at the axis of said gear, as shown in Fig. 5, with one of which a rib, *q*, on the inner face of the base ring F engages whenever a type-bar is depressed for the purpose of correcting any inaccuracy in the movement of the type-bar about its axis in changing from small letters to capitals or figures, or vice versa, said grooves being made slightly flaring at the periphery of the hub to insure engagement with the ribs *q*.

N N are two flanged drums mounted upon shafts *r r*, so as to be movable lengthwise thereon and revolve therewith, said shafts having bearings in the stands N′ N′, secured to the base-ring F, one upon the right-hand and the other upon the left-hand side of the head of the machine, as shown in Figs. 1 and 7. Each drum N has formed upon one end a hub, n^2, in a radial hole in which is set the loose pin n^3, upon the outer end of which presses the curved leaf-spring n^4, secured by one end to said hub, and the inner end of said pin n^3 extends into the spline-groove *r′*, formed in the shaft *r*, to cause said drum to revolve with said shaft, and said pin also engages with one of a series of detent-notches, r^2, formed in the bottom of the groove *r′*, to hold said drum in any desired position upon said shaft relative to its length, all as shown in Figs. 15 and 16. Each shaft *r* has mounted thereon a ratchet-wheel, r^3, having teeth so arranged that the hook-pawl r^4, engaging with said teeth upon the outer side of said wheel when moved downward, will rotate its drum so as to wind the ink-ribbon O upon the upper side thereof.

O′ and O^2 are two pawl-like levers pivoted, respectively, at r^5 and r^6, and each having pivoted to its outer end a hook-pawl, r^4, the upper end of which is drawn toward the ratchet-wheel by the spring r^7. (Shown in Fig. 7.)

P–P are two stands, secured one to each of the goose-necks E, and each having cut in its outer end two open slots, p^2 and p^3, of different depths, the slot p^2 being designed to guide and steady the upper end of the pawl r^4 when it is in engagement with the ratchet-wheel r^3, as shown at the right of Fig. 7, and the slot p^3 being designed for holding said pawl out of engagement with the ratchet-wheel, as shown at the left of Fig. 7. By this arrangement of pawls and ratchet-wheels the ink-ribbon O may be intermittently and automatically wound upon the drum at the right-hand side of the machine until it is all unwound from the opposite drum, when, by simply placing the right-hand pawl r^4 in the slot p^3 and the left-hand pawl r^4 in the slot p^2, the ribbon will be automatically wound upon the left-hand drum, the pawls r^4 being moved up and down by the vibrations of the levers O′ and O^2, caused by the action upon their inner ends of the teeth of the ratchet-wheel P′

as it is intermittently rotated in the direction indicated by the arrow on Fig. 10, the inner end of the lever O^2 being formed and arranged to abut against the shoulders of the teeth of the ratchet-wheel P′ like an ordinary pawl, and the inner end of the lever O′ having formed thereon a hook or shoulder to engage with the same tooth of said ratchet-wheel as the end of the lever O^2 engages with, whereby said levers O′ and O^2 are made to serve the double purpose of stop-pawls to prevent a backward movement of the ratchet-wheel P′, and to inmittently move the ink-ribbon in one or the other direction, as above described.

P^2 is a horizontal shaft mounted in bearings in the ribs A′ A′ of the base A, and having firmly secured thereon the escapement-wheel P^3, the ratchet-wheel P′, the collar P^4, and the clutch-disk P^5, and loosely mounted thereon, so that it may be revolved freely in one direction thereon, the toothed gear-wheel P^6, all as shown in Fig. 2. The gear-wheel P^6 engages with a toothed rack, Q, formed upon or secured to the under side of the carriage B, so as to be rotated by the movement of said carriage, and is connected to the clutch-disk P^5 by means of the grip-dog *s*, the inner end of which rests in a detent-notch, p^4, formed in the hub of the gear-wheel P^6, and having formed in its edge, near its outer end, a transverse parallel-sided notch or slot to receive and embrace the annular lip *s*′ on the clutch-disk P^5, said dog being made to grip the said lip by the tension of the spring s^2, and any attempt to move the gear-wheel about its axis in the direction indicated by the arrow on Fig. 22 will cause the shaft P^2 to rotate about its axis a distance equivalent to one tooth of the escapement-wheel P^3, provided the escapement is so operated as to permit such movement.

R is the escapement bar or plate, forked at one end, so as to embrace and be guided in its movements by the hub of the escapement-wheel P^3, and connected at its other end to the stud s^3, set in a slot, s^4, formed in the lower end of the upright lever R′, pivoted to the stand R^2, and provided at its upper end with the pin s^5, to engage with the forked lower end of the lever K, through which the motion of a type or space key is transmitted to the escapement-bar to cause the escapement-pins *t* and *t*′ to alternately engage with the teeth of the escapement-wheel upon opposite sides thereof. It will be observed that a peculiarity of this escapement is that the escapement-pins move substantially in right lines, and both move in the same direction, and the throw of said pins may be varied by adjusting the stud s^3 in the slot s^4 to a greater or less distance from the fulcrum of the lever R′. The gear-wheel P^6 is lightly pressed toward the clutch-disk P^5 by the tension of the spiral spring t^3, surrounding the shaft P^2, between said gear-wheel and the collar P^4, as shown in Fig. 2.

The carriage B has secured thereon the detent-spring t^4, constructed and arranged to engage with a notch formed in one of the bars *e* of the carriage C, for the purpose of connecting said carriages B and C, so that they will be moved together when force is applied to the lower carriage, B, while at the same time the upper carriage, C, may be moved independently of the lower carriage. To the under side of the carriage B, at t^5, is secured one end of a cord, *u*, preferably of catgut, the opposite end of which is secured to and wound upon the periphery of the spirally-grooved drum S, firmly secured upon the inner end of the shaft S′, mounted in bearings in one of the ribs A′ of the base A and in the toothed hub S^2, fitted to revolve in the outer end of the fixed sleeve or casing S^3, secured to the base-plate A, said shaft having wound thereon within the casing S^3 the spiral spring t^6, the inner end of which is made fast to the shaft S′, and the outer end to the toothed hub S^2, so that by rotating the hub S^2 the spring t^6 may be made to exert a torsional strain upon the shaft S′, which it operates, every time the escapement releases a tooth of the escapement-wheel, to move the carriages B and C and the paper-roll D from the right toward the left a letter space, or the distance from one letter to the next, or a space between two words. When the paper-roll has been fed a distance equal to the length of the line being printed, and the carriages are drawn back to commence a new line, the unwinding of the cord *u* from the drum S winds up or sets the spring t^6 again ready to feed the carriages and paper-roll for printing another line, the toothed hub S^2 being prevented from revolving with the shaft S′ by the spring stop-pawl *u*′, secured to the bed-plate A, as shown in Fig. 24.

T, Fig. 2, is a bell upon which the hammer *v* strikes just before the end of a line is reached. The hammer *v* is secured upon one end of the shaft U, mounted in bearings U′ U′, cast upon the base-plate A, and has wound upon its opposite end the torsional spiral spring *v*′, as shown in Fig. 17. The portion of the shaft U between its bearings has formed therein a longitudinal groove, v^2, and has adjustably secured thereon, by means of the thumb-screw v^3, the point of which enters said groove v^2, the block U^2, upon the upper side of which is formed the cam or wedge surface v^1, with which the lower end of the arm V, pivoted to the carriage B, engages to turn the shaft U and raise the hammer *v* against the tension of the spring *v*′, which, when the arm V has passed the cam-surface v^1, causes the hammer *v* to strike the bell T as a signal to the operator. The arm V is prevented from moving about its axis, when acting upon the cam-surface to raise the hammer, by the stop-pin *w*, against which it is held by the tension of the spring *w*′, connecting said arm to the pin w^2; but when the carriage B is moved back after the bell has been struck, the arm V strikes against the end of the cam v^1 and is moved about its axis until it can pass over the top of the cam, when the tension of the spring *w*′ causes it to assume its normal position, as shown in Fig. 18.

In the under side of the carriage B is set the downwardly-projecting pin w^3, which engages with the pin w^4, set in and projecting horizontally from the rib A′ of the base A for the purpose of limiting the movement of the carriage B in that direction.

The toothed hub S^2 is provided with two holes in its outer face to receive the pins of a forked key for turning said hub to adjust the tension of the spring t^6, as shown in Fig. 24.

W is a stand secured to the base-plate A in front of the carriages B and C, and having pivoted to its upper end the index-finger W′, provided with the laterally-projecting stop-pin w^5, which engages with the upper end of the stand W to limit the movement of said finger about its axis of motion in either direction. The index-finger W′ is designed to be kept folded by the side of the stand W, as shown in Fig. 2, except when used to register the position of the carriage when it is desired to correct an error in the printing. The construction and position of the stand W and finger W′ are such that the end of the finger, when turned up into the position shown in Figs. 19 and 20, will mark the exact spot where the next type-hammer will strike upon the paper. If, upon examining the matter printed, the operator finds that an error has been made by printing a wrong letter or misspelling a word, he turns the finger W′ into the position shown in Fig. 20, and moves the two carriages together endwise upon the bed till the defective letter or word is under the point of said finger, and then draws out the carriage C to the left till the defective place is exposed, when he erases the letter or word, as the case may be, and returns the carriage C to its normal position on the carriage B, turns down the finger W′, lowers the head of the machine to its normal position, (said head having previously been raised to permit the movement of the finger W′,) and prints the correct letter or word.

The paper-carrying roll D, mounted in bearings C′C′ of the carriage C, has secured upon each end of its shaft outside of said bearings the milled head C^2, for use in moving said roll and carriage endwise by hand and rotating said roll when putting in or taking out the paper. The shaft of said roll also has firmly secured thereon, just inside each bearing C′C′, a ratchet-wheel, C^3, and between said ratchet-wheel and the end of the roll has loosely fitted thereto a short sleeve or thimble, a', firmly secured to one end of the rod a^2, the opposite end of which has a bearing in the slotted arm D′, which embraces said thimble and has secured to its front end the bar D^2, to which is secured the upper edge of the curved sheet-metal guide-plate D^4, the purpose of which is to facilitate the insertion of the paper between the bar D^2 and the roll D. Each arm D′ has formed thereon an outwardly-projecting lug or dog, a^3, the inner face of which is beveled to fit the inclined faces of the teeth of the ratchet-wheel C^3, with which it engages and upon which it acts as a pawl to move the roll D about its axis a distance corresponding to the desired distance between the lines of printing, a spring, a^4, surrounding the rod a^2, between one end of the slot in the arm D′ and the thimble a', serving to hold said dog in engagement with the teeth of the ratchet-wheel C^3 and permit a slight outward movement of said dogs, with the arms D′ and bar D^2, whenever the bar D^2 is depressed, so that said dogs may pass to and engage with the next tooth of the ratchet-wheel C^3. A spiral spring, b', is connected by one end to the rear end of each of the arms D′ and by its other end to the carriage C, said spring serving to move the arms D′ about the axis of the roll D in one direction and maintain the bar D^2 in its elevated position until depressed by the operator by pressing his thumb or finger upon the pad b^2 of the bent arm D^3, secured by its opposite end to the under side of the arm D′, as shown in Fig. 12. The front edges of the end pieces or bearings, C′ C′, are provided each with two shoulders, c^2 and c^3, the portions of said bearing or end pieces between said shoulders being made concentric with the axis of the roll, and the arms D^3 extend across the front edge of said end pieces between said shoulders and in close proximity to said concentric surface, as shown in Figs. 11 and 12. The distance between the shoulders c^2 and c^3 is equal to twice the distance apart of the lines of printing plus the width of the arms D^3 where they pass said end pieces, C′ C′.

In order to adapt this mechanism to feed the paper in the direction of the circumference of the roll D a distance equal to the desired distance between two lines of printing or twice that distance, I pivot to the outer faces of the end bearing pieces, C′ C′, the movable stop d', which hangs pendent from its pivotal axis, with its lower end a distance of a line space below the shoulder c^2 and in position to intercept the upward movement of the arm D^3, as shown in Fig. 11. When it is desired to feed the paper a distance equal to two line spaces, the pendent stop is turned upward till it rests against the pin d^2, when the tensions of the springs b' b' will cause the bar D^2 to move upward, moving the roll D about its axis till the upper edge of the arm D^3 strikes the stop c^2.

When a line has been completed, and the operator desires to move the paper-roll so as to place it in position for commencing a new line, he places a finger of his left hand against the end of the carriage B and his thumb upon the pad b^2 of the arm D^3 and presses downward with the thumb till the lower edge of the arm D^3 strikes the shoulder c^3, thus causing the dog a^3 to engage with a new tooth of the ratchet-wheel C^3, and at the same time he moves the carriages B and C and the roll D to the right by pressing upon the carriage B. When he removes the pressure from the pad b^2 of the arm D^3, the springs b' b', reacting upon the arms D′, will cause the arms D′ and D^3 D^3 to be moved upward till the arms D^3 come in contact with the pendent stop d' or the shoul-

der c^2, according as to whether it is desired to feed the paper one or two line spaces. A spring stop-pawl, d^3, is secured at one end to one of the end pieces, C′, in position to engage by its shoulder with the teeth of the ratchet-wheel C^3, the free end of said pawl extending beyond its shoulder to a point beneath the arm D^3, with its upper surface on a level with the outer corner of the shoulder c^3, as shown in Fig. 12.

Whenever for any cause it is desired to turn the paper-roll backward, the operator presses down upon the pad b^2, and at the same time presses slightly forward thereon until the arm D^3 passes the shoulder c^3 and striking the spring-pawl near its free end disengages the shoulder of said pawl from the teeth of the ratchet-wheel C^3, the spring a^4 yielding sufficiently to permit the requisite forward movement of the arms D′ upon the thimble a' to allow the arm D^3 to pass below the shoulder c^3 and release the dogs a^3 from engagement with the ratchet-wheel C^3.

Just inside the milled head C^2, and between it and the bearing C′ upon each end of the shaft of the roll D, is mounted a disk, d^1, provided with the curved slot e' and the outwardly-projecting arm e^2, the outer ends of said arms e^2 being connected together by the rod e^3, as shown in Figs. 1, 11, 12, and 13. A pin, e^4, set in each of the bearing end pieces, C′, projects into the curved slot e' in the disk d^1 to serve as a stop to limit the movement of the rod e^3 about the roll D in either direction. The object of the rod e^3 is to hold down the rear portion of the paper which is passed beneath it.

When it is desired to introduce a sheet of paper into the machine preparatory to printing thereon, the rod e^3 is moved about the roll D from the position shown in Fig. 11 to a position in close proximity to the bar D^2. The sheet of paper is passed between the roll D and the curved guide-plate D^4 from the rear until it enters the bight between the roll D and the springs D^5 D^5, secured upon the carriage C and projecting upward through the guide-plate D^4 and between the roll D and the bar D^2, when the roll D is rotated in the direction indicated by the arrow on Fig. 13. When the paper has reached the desired point, the rod e^3 is moved back into the position shown in Fig. 11.

In each of the brackets G (see Figs. 2, 3, and 4) is fitted a set-screw, e^4, to serve as an adjustable stop to limit the upward movement of the type-bar H.

It will be observed, by reference to Fig. 7, that the plate of the carriage B extends beyond the ribs c and d and has set in its upper side the headed pin B′, and by reference to Fig. 14 that the carriage C is provided at the opposite end and its under side with the lipped socket B^2, open upon its inner side, which engages with the head of the pin B′ when the carriage C is drawn toward the left hand to the limit of its movement in that direction, when the carriage C may be moved about the pin B′ as a pivot into a position at right angles, or nearly so, to the carriage B, the object of which is to render the placing of the paper upon the roll more convenient than with said carriage C in its normal position upon the carriage B.

If for any purpose it is desired to remove the carriage C entirely from the carriage B, after it has been brought into engagement with the pin B′ and turned at right angles, or nearly so, to the carriage B, the operator has only to move the carriage slightly to the rear to disengage the socket B^2 from the pin B′.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination, in a type-writing machine, of a paper-carrying roll constructed and arranged to be intermittently moved about its axis and in the direction of its length, a series of radially-arranged vibrating type-bars or hammers located above said paper-carrying roll, with their pivotal axes in a plane inclined to a horizontal plane, and a series of keys connected with said type-bars and arranged in a circle with their pads in a plane also inclined to a horizontal plane, substantially as shown and described.

2. The combination of a paper-carrying roll, a carriage for supporting said roll, and a second carriage constructed and arranged to support said roll-carrying carriage and to be reciprocated therewith upon a fixed bed, and means, as set forth, of connecting said carriages together, so that they may be moved together, or the upper carriage may be moved independently of the lower carriage, but in the same direction as said carriages are fed, to give the letter and word space, substantially as described.

3. The combination of the bed A A′ A′ of the carriage B, provided with the detent-spring t^1, and the carriage C, provided with a notch to engage said spring when said carriages are constructed and arranged to be moved only in the direction of their lengths, substantially as described.

4. The reciprocating carriage B, provided with the headed pin B′, in combination with the carriage C, fitted to slide upon the carriage B, and provided with a lipped socket, B^2, to engage with said headed pin on the carriage B when the carriage C is drawn nearly off of the carriage B, substantially as and for the purposes described.

5. A series of type-bars arranged radially to a common center, each mounted and revoluble in a pivoted sleeve, a pinion secured to the outer end of each of said type-bars, a ring-gear arranged to be moved to and fro about said common center and to engage with said pinions when the type-bars are raised, and a finger-key connected to each of said sleeves, all arranged and combined substantially as and for the purposes described.

6. The combination of a type-bar having a plurality of letters upon different sides thereof

and mounted near its outer end in a bearing in a pivoted sleeve, a pinion secured to the outer end of said type-bar and having formed in its outer end as many diametrical grooves as there are characters on said type-bar, a reciprocating gear arranged to engage said pinion when the type-bar is raised and to be disengaged therefrom when the type-bar is depressed, a key connected with said sleeve to vibrate it and its type-bar in a vertical plane, and a fixed vertical guide-lip constructed and arranged to engage with one of the grooves in the end of the hub of said pinion when the type-bar is depressed to print a character, substantially as and for the purposes described.

7. In combination with a vibrating type-bar, a finger-key and stem connected therewith, a bent lever pivoted to said stem by its outer end and provided with a slot to receive its fulcrum-pin, a flanged spindle arranged above the inner end of said lever in position to be acted upon thereby, and a lever connected with and operated by said spindle for imparting a step-by-step motion to the paper-roll-carrying carriage, substantially as described.

8. In combination with a series of type-bars arranged radially to a common center and each provided with a toothed pinion, and a ring-gear arranged to engage with all of said pinions and to be moved to and fro about said common center, and provided with a radially-projecting arm extending outside of the inclosing-casing, a pin set in the under side of said radially-projecting arm, two springs secured to the casing of the head of the machine and arranged to bear one upon each side of said pin, a three-armed lever pivoted to the front of the casing and having its lower or vertical arm forked to embrace the projecting end of said radial arm and its two upper or oblique arms provided with finger-pads by which it may be oscillated about its axis in either direction, substantially as described.

9. In combination with the three-armed lever for operating the ring-gear and the springs for assisting the same, a pin set in said lever, a spring for pressing said pin toward the casing of the head, and a detent-notch to receive the inner end of said pin when said lever is in its normal or central position.

10. The cap F^3, provided on its under side with the downwardly-projecting and radially-slotted annular rib j, having formed in its under side a circular groove having a semi-circular cross-section, in combination with the wire ring J′, secured in said groove by the screws j', and the series of levers fitted in said radial slots and fulcrumed upon said wire ring, as set forth.

11. In combination with a paper-roll-carrying carriage provided with a toothed rack, a spring for moving said carriage endwise, an escapement-wheel, and a clutch-disk firmly secured upon a common shaft, a toothed wheel mounted loosely upon said shaft and engaging with said rack, a grip-pawl connecting said wheel with the clutch-disk, and a reciprocating bar provided with two pins, one upon each side of the escapement-wheel, and arranged to alternately engage therewith for the purpose of imparting to the carriage and roll a step-by-step movement, as set forth.

12. The combination of the key-lever L, the flanged spindle J^2, the lever K, provided with an open slot or fork at its lower end, the lever R′, provided with the pin s^5, the escapement-bar R, provided with the V shaped pins t and t', the shaft P^2, the escapement-wheel P^3, the pinion P^6, the clutch-disk P^5, the grip-pawl or dog s, the carriage B, provided with the rack Q, and a spring for moving the carriage endwise in one direction, substantially as described.

13. In combination with the carriage B, provided with the rack Q, the shaft P^2, the gear-wheel P^6, the clutch-disk P^5, the grip-dog s, the cord u, the drum S, the shaft S′, the toothed hub S^2, the pawl u', the fixed casing S^3, the spring t^6, the escapement-wheel P^3, and the reciprocating escapement-bar R, provided with the V-shaped pins t and t', all arranged and adapted to operate substantially as described.

14. The combination of the shaft r, mounted in suitable bearings and provided with the longitudinal groove r', having detent-notches r^2 formed in its bottom, the ribbon spool or drum N, the pin n^3, set radially in the hub of said drum, and the spring n^4, arranged to press said pin inward, substantially as described.

15. The combination of the ribbon-drum N, its shaft r, the ratchet-wheel r^3, the hook-pawl r^4, the spring r^7, the lever O′, and the ratchet-wheel P′, all arranged and adapted to operate to intermittently move the inking-ribbon in one direction, substantially as described.

16. The combination of the two ribbon-drums N N, each provided with a ratchet-wheel, r^3, two hook-pawls, r^4, two springs, r^7, the lever O′, having a hook upon its inner end, the lever O^2, having a plain ratchet-pawl-shaped inner end, and the intermittently-revolving ratchet-wheel P′ and the two stands P, each provided with the two open slots p^2 and p^3, all arranged and adapted to operate substantially as described.

17. In combination with the paper-carrying roll and its carriage, the pivoted index-finger W′, constructed, arranged, and adapted to operate substantially as and for the purposes described.

18. In combination with the paper-carrying roll of a type-writing machine, the pivoted and oscillating bar D^2 and the curved guide-plate D^4, all arranged and operating substantially as described.

19. In combination with the paper-carrying roll of a type-writer, two ratchet-wheels mounted upon its shaft, the thimbles a', provided with the rods a^2, the springs a^4, the slotted arms D′, each provided with the dog a^3, the bar D^2, the bent arm D^3, attached to an

arm, D′, and the shoulders c^2 and c^3, for limiting the movement of the roll about its axis, substantially as and for the purposes described.

20. In combination with the paper-carrying roll of a type-writer, two ratchet-wheels mounted upon its shaft, the thimbles a', provided with the rods a^2, the springs a^4, the slotted arms D′, each provided with the dog a^3, the bar D^2, the bent arms D^3, attached to the arms D′ and provided with the pads b^2, the shoulder c^3, and the movable pendent stop d', all constructed, arranged, and adapted to operate substantially as and for the purposes described.

21. In combination with the paper carrying roll of a type-writer, the two ratchet-wheels C^3, the thimbles a', provided with the rods a^2, the springs a^4, the slotted arms D′, each provided with the dog a^3, the bar D^2, the bent arms D^3, attached to the arms D′ and each provided with the thumb-pad b^2, a stop for limiting the movement of the arms D^3 in an upward direction, the shoulder c^3, and the spring stop-pawl d^3, all constructed, arranged, and adapted to operate substantially as and for the purposes described.

22. The combination of a series of pivoted and rotatable type-arms, each carrying at its free end a plurality of type of different characters, a series of keys for vibrating said type-arms, and means, substantially as set forth, for imparting to all of said arms a simultaneous movement about their axes.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 16th day of November, A. D. 1885.

ALEX. G. DONNELLY.

Witnesses:
N. C. LOMBARD,
WALTER E. LOMBARD.