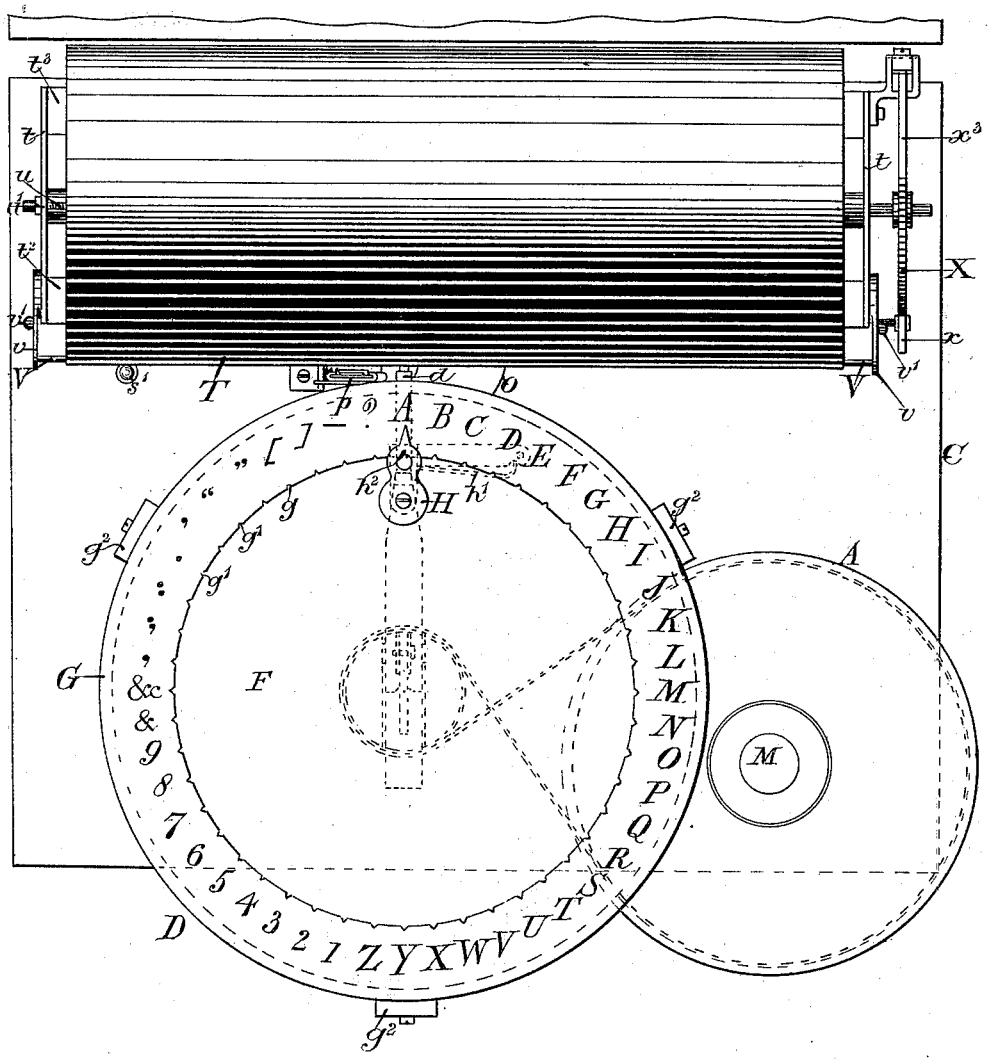
(No Model.) 4 Sheets—Sheet 1.

F. N. COOKSON.

TYPE WRITING MACHINE.

No. 344,627. Patented June 29, 1886.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

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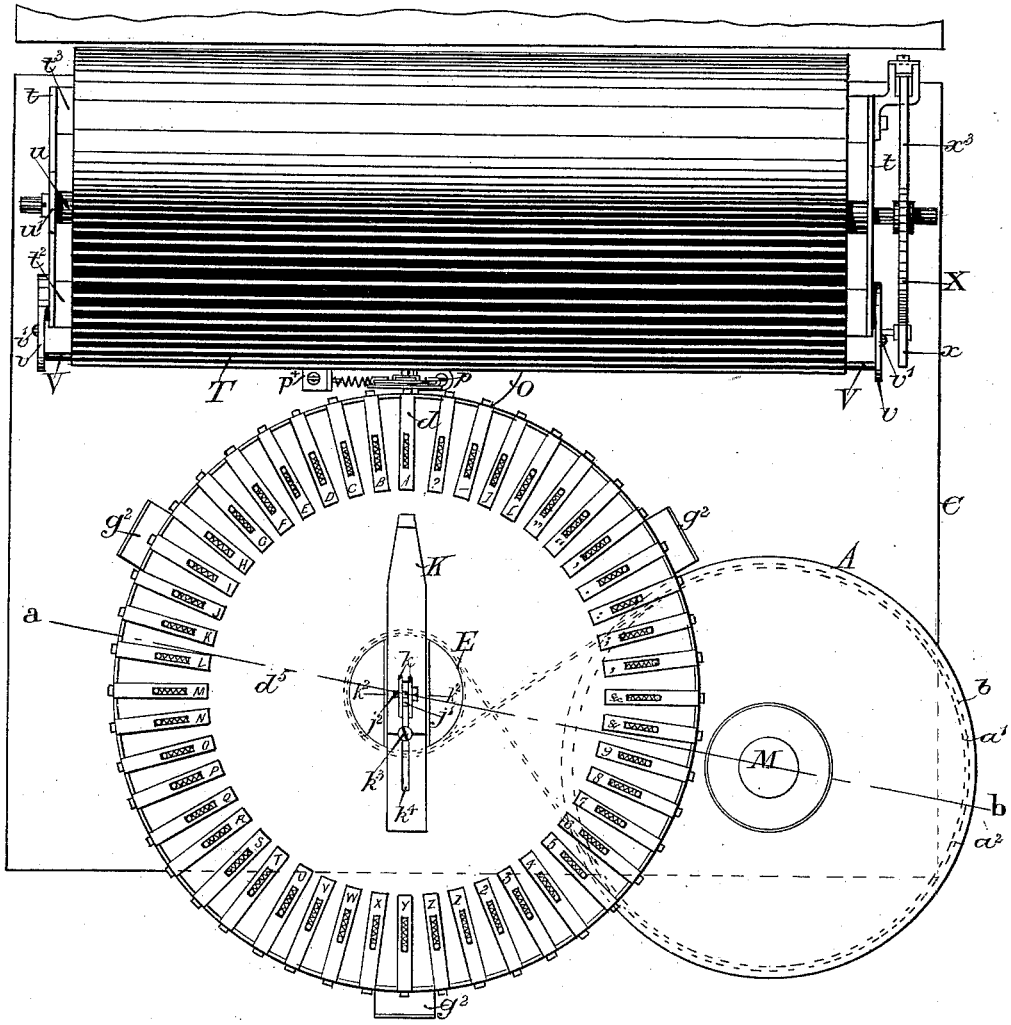
TYPE WRITING MACHINE.

No. 344,627. Patented June 29, 1886.

Fig. 2.



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(No Model.)

4 Sheets—Sheet 3.

F. N. COOKSON.

TYPE WRITING MACHINE.

No. 344,627. Patented June 29, 1886.

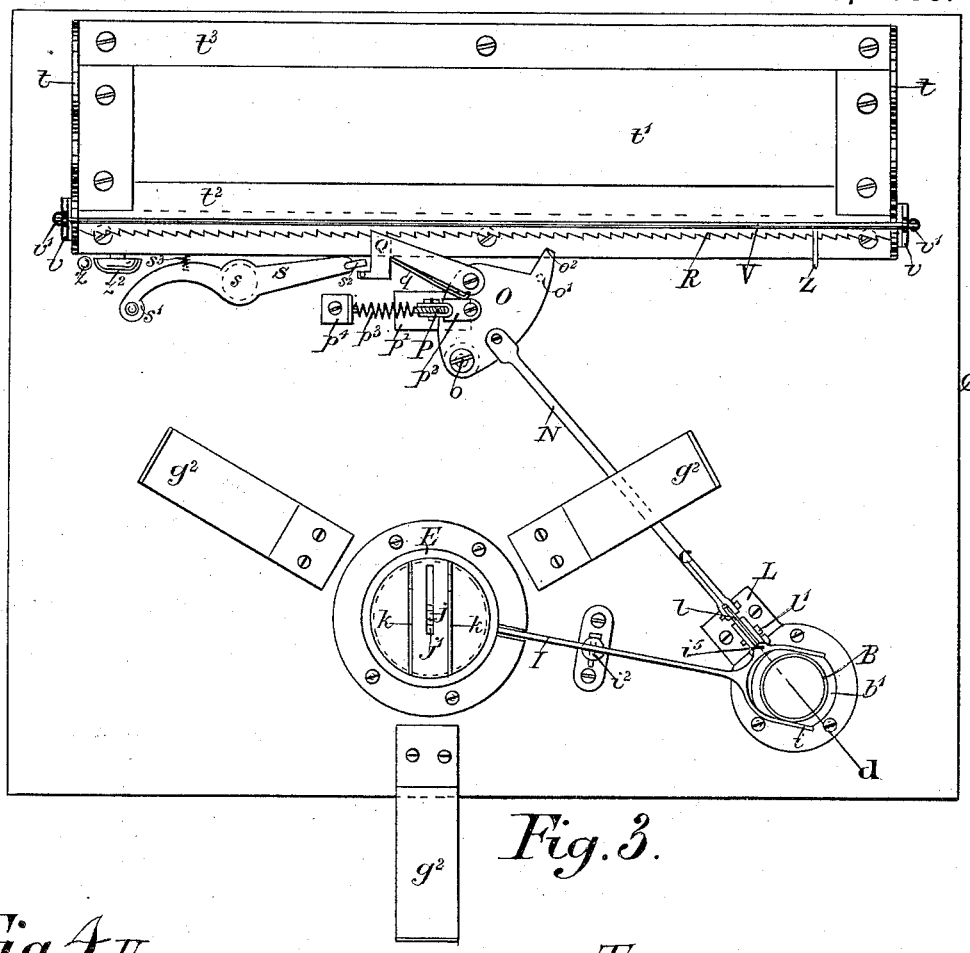
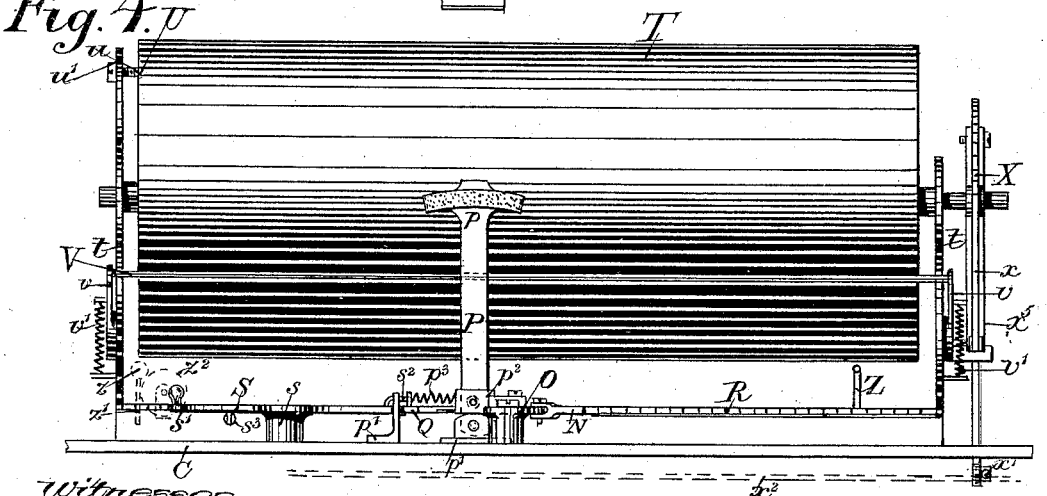


Fig. 3.

Fig. 4.



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(No Model.) 4 Sheets—Sheet 4.

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TYPE WRITING MACHINE.

No. 344,627. Patented June 29, 1886.

Fig. 5.

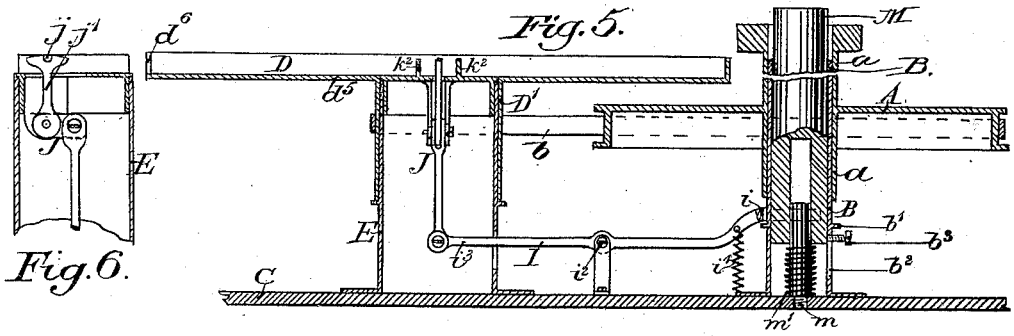

Fig. 6.

Fig. 8.

Fig. 9.

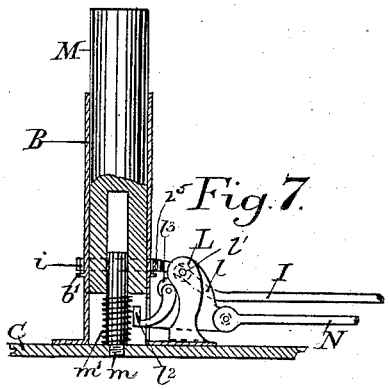

Fig. 7.

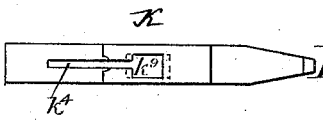

Fig. 11.

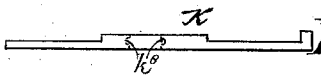

Fig. 12.

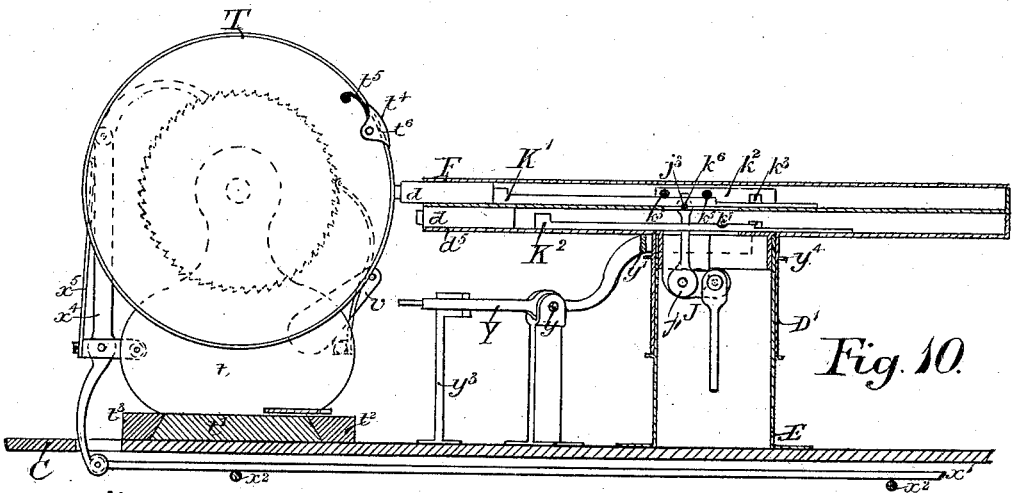

Fig. 10.

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UNITED STATES PATENT OFFICE.

FREDERICK NESFIELD COOKSON, OF WOLVERHAMPTON, COUNTY OF STAFFORD, ENGLAND.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 344,627, dated June 29, 1886.

Application filed August 1, 1885. Serial No. 173,255. (No model.) Patented in England May 27, 1885, No 6,452.

To all whom it may concern:

Be it known that I, FREDERICK NESFIELD COOKSON, a subject of the Queen of Great Britain, residing at Wolverhampton, in the county of Stafford, England, have invented an Improved Type-Writer, (for which I have made application for Letters Patent in Great Britain, No. 6,452, dated May 27, 1885,) of which the following is a specification.

My invention in type-writers has for its object the concentration of the devices for bringing the type into the proper position for printing, as well as of that for producing spaces in the printed line into one plane and round a common center, thereby considerably facilitating the working of the writer, making it almost a single-handed instrument, at the same time allowing the matter as it is typewritten to be easily seen by the operator as he continues at his work without its being necessary for him to stop the instrument or move any part of it.

In order that my invention and the means by which it may be put into successful operation may be thoroughly understood, I hereby describe the same in detail, referring in so doing to the accompanying drawings, which are to be taken as part of this specification and read therewith, and in which each separate part is marked throughout the figures in which it appears with the same reference letter.

Figure 1 is a plan of my invention at work and in the act of making an impression. Fig. 2 is a plan of the instrument at rest with dial ring and cover of the type-turret removed. Fig. 3 is a plan of the under mechanism of the instrument. Fig. 4 is a front elevation of the inking and letter and word spacing mechanism in a state of rest. Fig. 5 is an elevation, partly in section, of the printing mechanism taken at the line *a b* on Fig. 2. Fig. 6 is a sectional elevation of the bell-lever of the printing mechanism. Fig. 7 is an elevation taken at the line *c d* on Fig. 3, and shows how the driving-pulley and spacing-push actuate the letter and word spacing mechanism. Figs. 8 and 9 are longitudinal sections of a type in the act of printing and in a state of rest, respectively. Fig. 10 is a sectional elevation of a duplex turret in position for operating the types in the upper tier of the turret. Figs. 11 and 12 are respectively plan and elevation of an intermediate striker of my multiple turret.

A is the driving-pulley, the hollow spindle *a* of which is carried by the hollow pillar B, fixed to the base-plate C of the type-writer.

D is the type-turret, out of the under side of which projects a concentric tube, D′, embracing the upper part of a hollow pillar, E, fixed to the base-plate and upon which the turret is rotated. The diameters of tube and pillar are regulated so as to insure the steady rotation of the turret. A driving-cord, *b*, is connected by one end to any point, *a′*, in the periphery of the pulley A, and after being wound two or three times round the tube D′, to give it "bite," is fastened by its other end to the periphery of the driving-pulley at a point, a^2, close to the point of connection *a′*. The pulley A is shrouded to prevent the cord slipping off. I do not confine myself to the use of a driving-cord, inasmuch as spur-gearing, a flat driving-band, as shown in Fig. 5, or any equivalent device may be adopted. The relative diameters of pulley and type-turret are, conveniently, four to six, although I do not confine myself to this ratio, inasmuch as it may be modified in either direction as may be required. The type-turret D is fitted with a complete alphabet, numerals, signs of punctuation, and abbreviations, either upper or lower case, and all lying in one plane, the total number being regulated by the circumference of the turret and the size of the type. Each type *d* has a hollow body, *d′*, provided with slots d^2 at top and bottom, and a pin, d^3, arranged in said slots and engaging in any suitable manner the bottom d^5. Each type is as thick as the turret is deep internally, and is arranged radially within said turret. The front end of the body of each type is flush with the periphery of the type-turret, the face d^8 alone projecting so long as the type-writer is at rest. A withdrawing-spring, d^4, is inserted within the body of each type, acting between the pin d^3 and the inner end, d^7, of the body. The types, being secured to the turret, as indicated, may obviously be removed singly by simply lifting them off the bottom; consequently a damaged one can be

easily and economically replaced, or the operator can exchange the font at will by simply providing himself with the desired font, emptying the turret, and putting in the new font in the proper way, which is described at length hereinafter. Thus any change of font, from upper to lower case, Roman to Italic, script to engrossing, Roman to Greek or Hebrew, music or stenographic, is practicable without being at any charge beyond the cost of the additional font and the time—a short one at most—occupied in making the change in the turret. This ready exchange of fonts is as practicable with the double-turret typewriter, illustrated in Fig. 10, and described farther on, as with the single-turret typewriter now being described.

G is a ring-dial having the alphabet and numerals, with as many other characters and signs as are in the turret marked thereon. These signs are marked on the dial, preferably in the usual order; but the types are arranged in the turret in an order always the reverse of that marked on the dial. This reversed sequence of the dial-signs and types, respectively, in its bearing upon the utility of my typewriter, will be explained farther on, when I explain the operation of the instrument as a whole.

I do not confine myself to the strictly-alphabetical order of the index-letters on the ring-dial, nor to putting the numerals in the order of their respective values, commencing with the lower one, inasmuch as they, as well as the other index-signs, may be placed in any order; but whatever order may be adopted for the dial, the reverse order must be followed in the turret, and vice versa.

Fig. 1 represents the letters and numerals arranged on the dial in their usual order. This does not interfere with rapidity of manipulation, inasmuch as the motion of the operator's hand is a simple circular one through a smaller or larger arc round the axis of the driving-pulley, instead of being one in various right lines at various angles with each other along and up or down a key-board, and the ratio of peripheral speed between pulley and turret is such that the novice finds his fingers exerting too much, rather than too little, energy. The advantage, too, of having the index-signs on the ring-dial in the normal and well-known order is very great. The learner is spared the trouble of learning a new arrangement, no matter how ingenious such a one might be in itself or useful under certain circumstances—*e. g.*, with the ordinary compositor's case. He brings with him the knowledge of his letters, and so forth, as he acquired it in his early school-days, and is at once ready for immediate practice with my type-writer as such, the rotation of the familiar signs before his eyes in the old familiar order being a useful guide to him in stopping the type-turret at the right moment. The interior edge of the ring G has notches g formed in it opposite the center of each index-sign thereon. The sides g' of these notches are all at the same angle, with the respective radii bisecting their angles, which are sufficiently obtuse to facilitate the entrance of the nose h^2 of the index, and also its withdrawal, but not to quite the same extent as its entrance, for the reason explained hereinafter. The ring itself is carried by three brackets, g^2, the sign "A" being conveniently in the center nearest to the paper-roller—*i. e.*, bisected by a diameter of the ring drawn at right angles to the axis of the paper-drum.

F is the cover of the turret, fitted down close upon the periphery. The bottom d^5 and top F of the turret, pins d^1, and ports d^6, compel the types to advance and return in right and radial lines. An index, H, is fixed upon the cover F of the type-turret, over the type "A," and works in a plane conveniently above the the dial-ring. It is pressed outward by a spring, h', (see dotted lines, Fig. 1,) so that the nose h^2 will readily enter the notches g as it passes them, thus facilitating the stoppage of the index opposite the desired sign when the impulse given to the turret may have been rather too much or rather too little to cause the index to stop exactly opposite the center of said sign. The index is not limited to being over the type "A," though such a position is a convenient one, since with the number of types illustrated in the figures it might be over "Y"—the type which is diametrically opposite to it—and "A" and "Y" being also the two signs on the ring-dial under which their corresponding types can be at one and the same moment, in consequence of the reversed order in which they are relatively arranged. The hollow spindle a bears upon the forked end i of a lever, I, which has its fulcrum at i^2. A stop, b', is provided to limit the downstroke of this lever and spindle. The other end, i^3, enters the pillar E, where it is connected by the bell-lever J with the striker or hammer K. A spiral spring, i^4, is provided to return the lever I to its position of rest. Two plates, k, project from the upper surface of the striker, through which, and at the proper point to secure a due projection of striker in front of the nose of the bar j', is passed a cross-head, j^3, which is received in the slot j in the top of said bar j'. The slot j is of sufficient depth to allow the nose of said bar j' to make its full stroke without tending to lift the striker from off the bottom d^5. The striker itself is guided in its stroke by two guide-plates, k^2, springing from the face of the pillar E. The length of its stroke is limited by a stop, k^3, passed through a slot, k^4.

L is a bracket in which works a bell-crank lever, l, having its fulcrum at l'. One end connects with the inking and spacing mechanism, while the other end is actuated by either or both the driving-pulley A and the spacing-push M. The former reaches said bell-lever by an extension, i^5, of the lever I, bearing in its descent upon the roller l^3, and the push by bearing upon the extension l^2, which enters the pillar B. A slot, b^2, and screw b^3 serve as

a stop to the stroke of the push. A spiral spring, *m*, on a pin, *m'*, is provided for raising the push M to its normal position.

N is a connecting-bar from the bell-crank lever *l* to the quadrant O working on the pin *o*.

P is a rocking bar carrying the inking-pad *p*. It is centered in the bracket *p'* and actuated through the connecting-bar p^2 by the quadrant O. A spiral spring, p^3, resting against the bracket p^4, is provided to expedite its return to its normal position and to prevent it sticking. The ink-pad itself may be made of any suitable material, and is carried sufficiently close to the type-turret to ink the particular type about to be struck as it is pushed by the stroke of the quadrant O past the face and out of the way of said type. The quadrant also carries the pawl Q and its spring *q*, bearing conveniently against the pin of the connecting-bar p^2. The pawl engages into the rack R, moving it one tooth to the left at each stroke of the quadrant, and carrying the paper along with it, so that the next type may strike at the proper distance from the impression made by the preceding one. The quadrant O carries on its under surface a stop-pin, *o'*, striking against the front motion-bar, t^2, its heel o^2 entering between two teeth of the rack, thereby sufficing to move it for the proper distance to the left, even should the pawl fail to perform its proper function, and also preventing the paper-drum being carried too far in its spacing-travel by its own momentum.

S is the releasing-lever for disengaging the pawl from the rack when the operator wishes to move the paper-drum to the right hand again for a fresh line of matter. It has its center on the pin *s*, *s'* being an extension producing a convenient thumb-piece. s^2 is its operating end, and s^3 a small spiral return-spring.

The paper-drum T, constructed of any material having a suitably-hard surface, is carried in bearings in two uprights, *t t*, springing from the bottom plate, *t'*, which slides between the two motion-bars t^2 t^3. The paper-clip t^4 works in two centers projecting from the ends of the drum, and is pressed to said paper-drum by two springs, t^5. The ends t^6 of the clip are suitably shaped to receive the pressure of these springs to advantage, and also to pass the bar V when necessary. In one end of the drum I produce a circular line of perforations, U, the distance between each two producing the distance between the lines of matter on the paper. A pin, *u*, with a tapered end and carried by a spring-bar, *u'*, enters a perforation in the end plate of the paper-drum as the latter is revolved, from which it is forced by slight tangential pressure brought to bear thereupon, only to enter the next perforation of the series, in which it presses with sufficient force to keep the drum steady while the next line of matter is being worked off.

Instead of or in conjunction with the mechanism for rotating the paper-drum for producing the spaces between the lines of type-written matter described in the preceding paragraph, I may use the ratchet mechanism illustrated in plan in Fig. 1, partly so in Fig. 2, in front elevation in Fig. 4, and in side elevation in Fig. 10.

X is a ratchet-wheel mounted on the end of the paper-drum. Any desired pitch can be given to this wheel; but for the purpose of my invention I prefer that the pitch given to it be equal to the smallest space it is probable that the operator may require to separate the lines of his work. With a ratchet-wheel pitched in this way a wider spacing can always be secured, as may be required by the varying circumstances of the particular work my type-writer may be require to execute, by simply turning the wheel more than one tooth after the completion of a line. The ratchet-wheel is fitted with a stop-spring, *x*. It is conveniently actuated by a rod, *x'*, passing under the base of the type-writer and riding on transverse bars x^2 as the drum is moved from right to left and back again. The complementary members of this ratchet mechanism are the pawl x^3, the pawl-lever x^4, and a returning-spring, x^5.

The warning-bell, which is sounded just before the end of a line, to prevent the operator from running into the right-hand margin, is shown in Figs. 3 and 4.

Z is a pin fixed at a proper distance from the end of the rack R. As the end of the line is being reached, the nose of the pin pushes the clapper *z* back, and this being carried by a vibrating rod, *z'*, the bell z^2 is sounded.

The bar V is carried by brackets *v v*, and kept to its work by springs *v' v'*.

My type-writer is operated as follows: The inking-pad *p* having been carefully charged with ink, and the proper font or fonts placed in the type-turret, the paper, of the proper width and of any length, is clipped by its top edge under the paper-clip, t^4, care being taken to place it squarely thereunder. The paper-drum is then rotated backward until the clip t^4 has passed under the bar V up to a level which will leave a suitable margin at the top of the sheet, the bottom of which projects behind under the drum. The pressure of the bar V during the rotation of the drum keeps the paper smooth during the operation of the machine until there is no longer any risk of it becoming wrinkled or running awry. The drum is next adjusted between the motion-bars to produce the proper left-hand margin on the paper, and the ratchet mechanism set to produce the proper distance between the lines; and by "ratchet mechanism," as just mentioned, I mean the ratchet-wheel X and its complementary parts hereinbefore referred to, or any equivalent well-known mechanism for line-spacing. Closing his hand upon the driving-pulley A, the operator rotates it until the index H is over the dial-sign—*e. g.*, "A" of the character it is desired to produce upon the paper. The pulley is pressed down smartly, swinging the inking-pad past the type and

inking its face, moving the paper-drum one space to the left and producing the impression. The pressure is then taken off the pulley, and the mechanism is returned to a position of rest by the various springs furnished for that purpose; but the operator's hand need not be taken off the pulley. Suppose the next letter to be printed is B. It has been already pointed out that the types in the turret are arranged in the reverse order to that of the dial-signs. The type "B" is therefore to the left of the dial-sign "A," and will be brought in front of the striker by rotating the turret until the index points to the sign "B". If "C" were the next letter to be printed, the index must be brought over the sign "C" to bring the type "C" in front of the striker, and so on throughout. The production of single letters is continued until a word is completed, when the spacing-push M is depressed, and the paper-drum is moved to the left by the space of one tooth for each depression of said push accordingly, the type-actuating mechanism remaining idle the while. Each impression is exposed to the full view of the operator as the next one is about to be made, and so on until the end is reached, the whole having come into view letter by letter and remained legibly visible until the weight of the paper has bent the paper backward over the paper-drum and carried the written matter out of sight.

The type-writer described above is illustrated as fitted with a single turret capable of holding only one font at a time. Now, my invention extends to the production of a double turret capable of receiving two fonts—*e. g.*, upper and lower case—known outside the printing-trade as capitals and small letters. This construction is illustrated in Fig. 10. F is the cover; d^5, the bottom; D′, the concentric tube; E, the supporting-pillar, and j' the bar to actuate the striker. The pillar E and tube D′ not only impart steadiness to the rotation of the double turret, but also serve as a guide to it during its elevation or depression. These parts are duplicates of those illustrated in Figs. 1 to 5, the connection of the end of the bar j' with the two strikers K′ K² being, however, slightly modified, as hereinafter explained. With the exception of this modification, the internal arrangement of such turret is that already described in detail. The cross-head j^3, corresponding to the pin j^2 of the single-turret instrument, is fixed in the end of the bar j', the top striker, K′, having a notch, k^6, in its under face, and the bottom striker, K², a similar one, k^7, on its upper face, to receive it, according to which striker (or, in other words, which font, capitals or small letters) is to be used. The plane in which either striker can propel a type being fixed and passing through the center of either turret, according as to which may be in the type-writing plane, I provide for the alternate elevation or depression of such turret to bring its type into the type-writing plane by the lever Y, to be actuated by the hand of the operator working on the fulcrum y, and embracing the tube D′ by its forked end y', acting between the under side of the turret and a collar, y^4. A retaining-bar, y^3, is provided to receive and hold the outer end of the lever Y when either capitals or small letters are being used in succession without a change. I do not confine myself to this lever mechanism for raising or depressing the above-described type-turret, inasmuch as it may be replaced by any other equivalent, such as an eccentric or cam mechanism. There is only one dial-ring to my double or multiple turret, some of the spaces containing two or more signs, according to the number of fonts in the turret. The extra accommodation afforded by the non-necessity of having two fonts of marks of punctuation and numerals permits of the introduction of a number of abbreviations, fractions, or mathematical signs, as may be desired.

Figs. 11 and 12 are respectively plan and elevation of the striker used in the intermediate tiers of my multiple-turret type-writer—*e. g.*, one capable of holding four fonts, with an increased number of abbreviations, signs, and the like. The cross-head j^3 engages in one of the notches k^8, according as to whether the striker is being driven forward or backward. An opening, k^9, is formed to allow the cross-head pasisng through to engage with either top or bottom striker.

The strikers of the top and bottom tiers of a multiple turret may be of the construction illustrated in Fig. 10, or of that illustrated in Figs. 11 and 12.

The strikers of my double or multiple turrets may be kept in their respective planes by cross-pins k^5, extending between the guide-plates k^2, as shown in Fig. 10, or the strikers and guide-plates may be made with **V** edges.

An extension of the raising and lowering device illustrated in Fig. 10 is applied to my multiple turret to raise and lower the same, the number of notches in the retaining-bar y^3 or its equivalent corresponding with the number of strikers in the turret.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is, in a type-writer—

1. The combination of slotted body d', rear end, d^7, face d^8, and spring d^4, and pin d^3, producing one separate and removable type, substantially as described.

2. The combination of the driving-pulley A, the type-turret D, connected therewith, hollow spindle a, pillar B, fork-lever I, returning-spring i^4, bell-lever J, bar j', cross-head, and hammer or type-striking mechanism, substantially as described.

3. The combination of driving-pulley A, capable of a reciprocating vertical motion upon the column B, the bell-crank lever l, lever I, having projection i^5, contact-roller l^3, and connecting-bar N, and the paper-carriage feed mechanism, substantially as described.

4. The combination of spacing-push M, bell-lever *l*, its extension l^2, returning-spring *m*, and connecting-bar N, with the feed mechanism and the paper-drum, substantially as described.

5. The combination, with the type-wheel, of rocking bar P, swinging in a plane at right angles with the plane in which the types are worked and carrying the inking-pad *p*, bracket p', bar p^2, and spring p^3, and the connecting-bar N, substantially as described.

6. The combination of the turret-revolving and type-actuating pulley A and the spacing-push M with the inking and spacing mechanism, and connections, substantially as described, whereby the latter is actuated either by the pulley or the spacing-push, substantially as described.

7. The type-turret D, revolving in a plane passing through the axis of the exposed paper-drum, and provided with movable types, in combination with the inking-pad, the quadrant O, a rocking bar connecting the pad and quadrant, and type-operating devices, substantially as and for the purpose described.

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