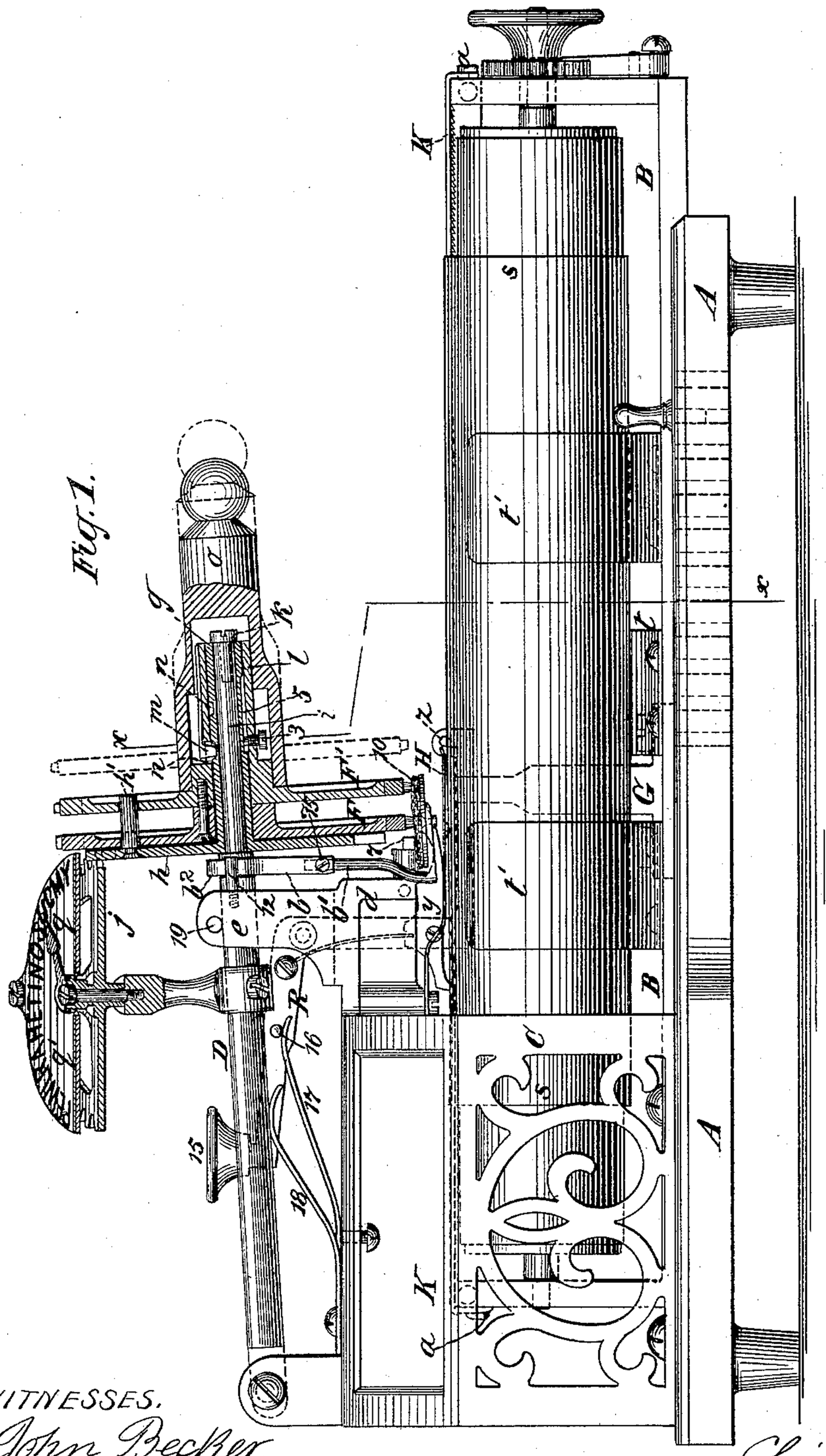
(No Model.) 3 Sheets—Sheet 1.

C. SPIRO.

TYPE WRITING MACHINE.

No. 395,799. Patented Jan. 8, 1889.

Fig. 1.



WITNESSES.
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INVENTOR
Chas Spiro
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(No Model.) 3 Sheets—Sheet 2.

C. SPIRO.

TYPE WRITING MACHINE.

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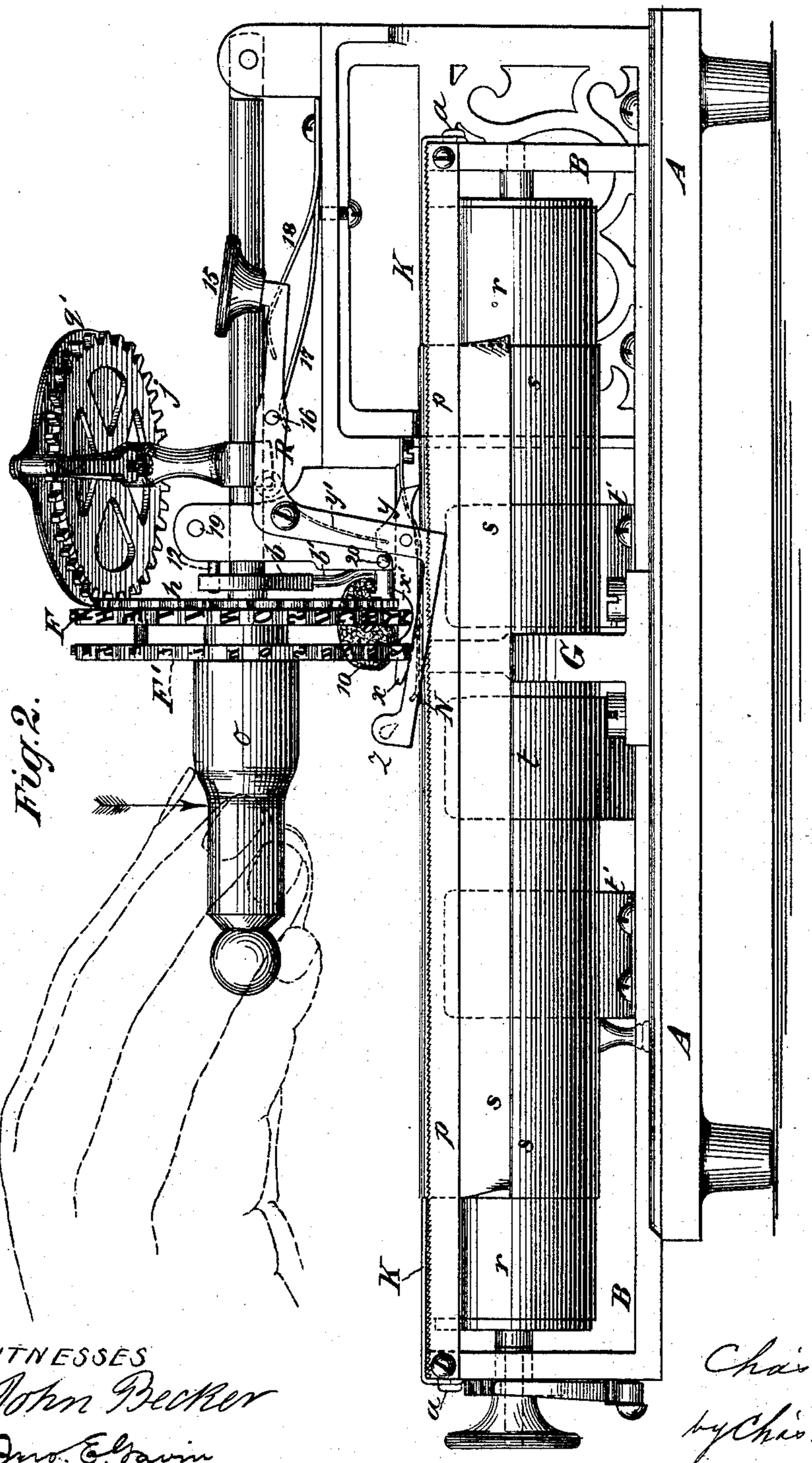

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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TYPE WRITING MACHINE.

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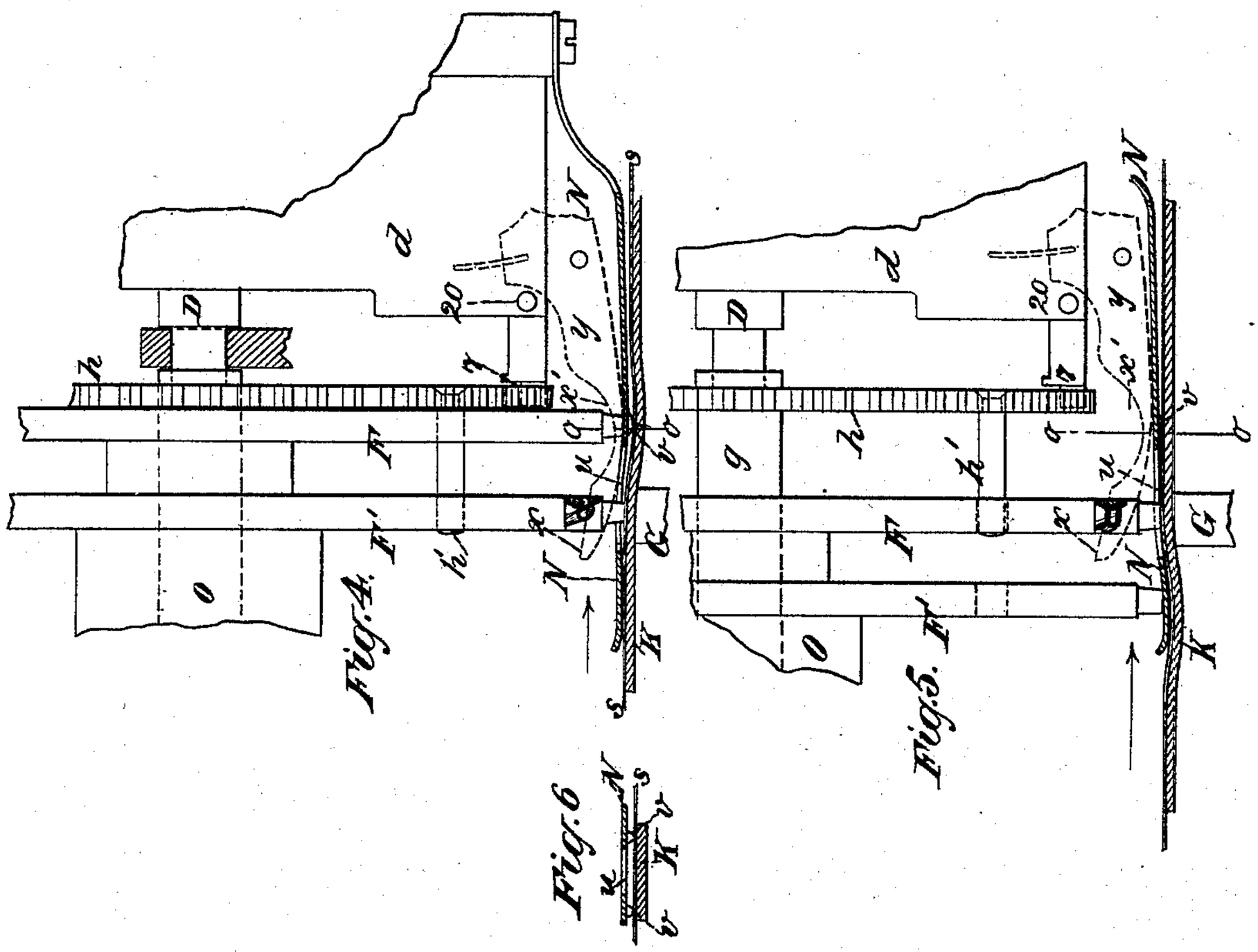

Fig. 4.

Fig. 5.

Fig. 6

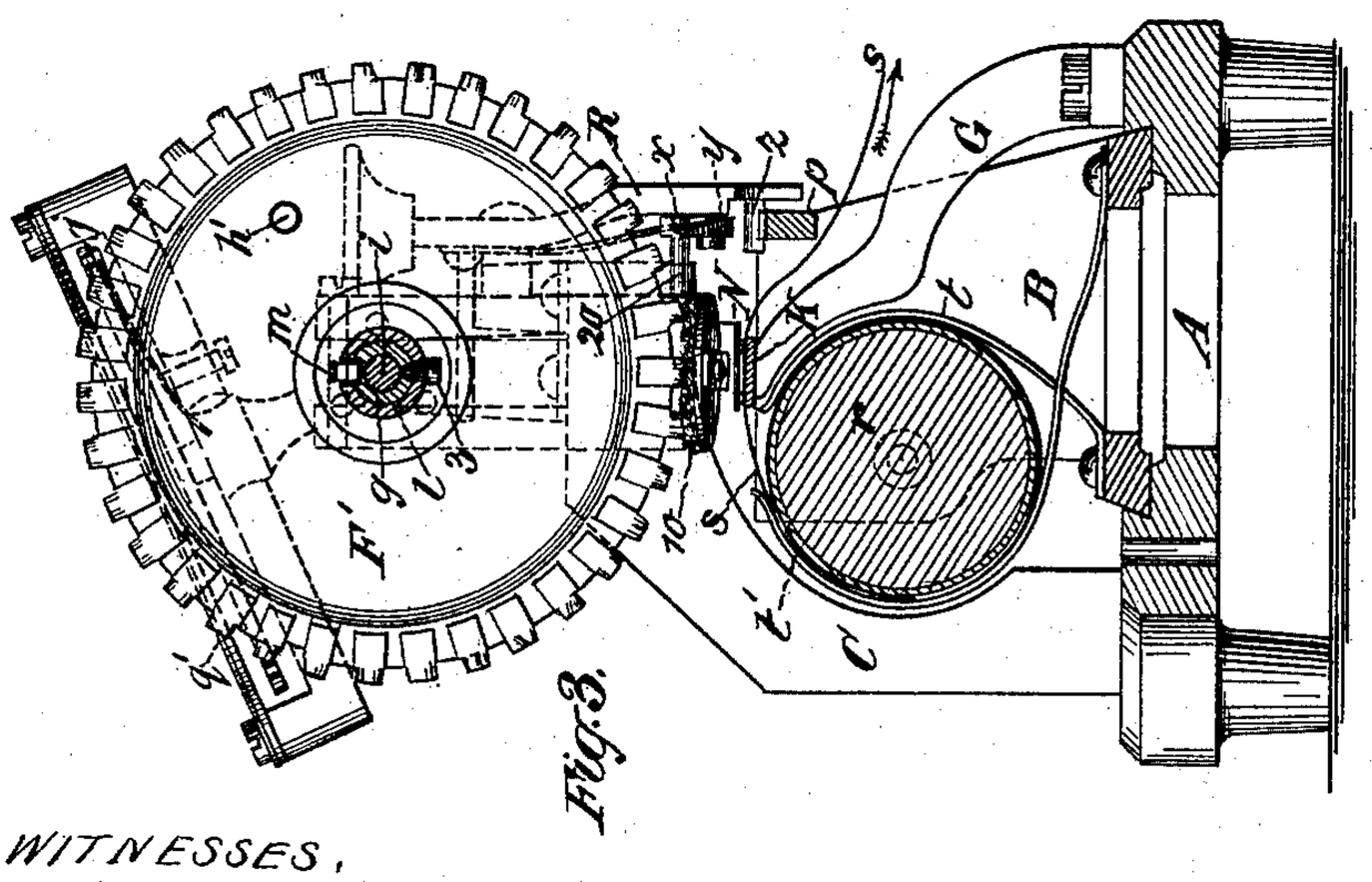

Fig. 3.

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UNITED STATES PATENT OFFICE.

CHARLES SPIRO, OF NEW YORK, N. Y.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 395,799, dated January 8, 1889.

Application filed March 20, 1885. Serial No. 159,514. (No model.)

To all whom it may concern:

Be it known that I, CHARLES SPIRO, of New York city, New York, have invented certain new and useful Improvements in Tpye-Writing Machines, of which the following is a specification.

My invention relates more especially to that style of type-writer shown in my patents, No. 322,989, July 28, 1885, and No. 335,392, February 2, 1886, in which a rotary and reciprocating type-wheel is employed having a central twirling handle mounted on the end of a depressible lever which is pivoted above the sliding paper-carriage, to which carriage a step-by-step feed motion is imparted at each depression of the type-wheel. Heretofore machines of this character have been made with a single type-wheel having but one style of letters or characters—usually capital letters—whereas the chief object of my present invention is to construct machines of this style with two or more type-wheels each having types of different styles—for example, upper and lower case—so that more perfect and elaborate printing may be effected. In applying two type-wheels to this kind of machine provision must be made for readily shifting one wheel or the other into action and for preventing the inactive wheel from making an impression on the paper when both wheels are depressed, and provision must also be made for altering the length of the feed-steps when the wheels are shifted in order to correspond to the wide or narrow letters of each wheel. These conditions have formed the problems of my present invention which call for material modifications in my former machine and are effectually accomplished by my present improvement. In my former machines the paper-roller was placed centrally under the type-wheel and the paper passed in on the under side of the roller; thence partly around the same and off on the upper side of the roller, and the type-wheel was depressed directly down on the paper on the roller, which thus supported the impression of the type. In my present invention, however, the roller is not placed directly under but a little to one side of the wheel and the blank paper is wound up spirally thereon and is led off the top thereof under the type-wheels and over a narrow stationary anvil or horn which rises up from the base of the machine directly under the center of the type-wheel, or in line with the printing-point, upon which horn the pressure of the impression is received when the wheel is depressed. A cushion-strap extending longitudinally on the carriage over the tip of the horn and under the paper sheet cushions the impression and prevents a harsh contact of the type with the horn. The two type-wheels are fixed to the twirling handle, and are capable of being shifted or slid a short distance in or out on the depressible lever, so as to bring either wheel to the printing-plane, and in order to insure that only the wheel which is at the printing-plane shall print when the wheels are depressed a small presser-foot or guard-plate projects out over the paper under the wheels, which foot has a slot at the printing-point through which the type of the active wheel will protrude to make its impression on the paper below, whereas the type of the inactive wheel will come down on the guard-plate at one end of the slot, and thus be prevented from making any impression on the paper.

My invention therefore consists, mainly, in the features here outlined, and also in certain details connected therewith, as set forth in full hereinafter.

In the drawings annexed, Figure 1 presents a longitudinal front or side elevation of my improved type-writer shown in section at the type-wheels with the parts in normal or quiescent positions. Fig. 2 is a rear elevation of the machine with the type-wheel depressed and the parts in the printing position. Fig. 3 is a cross-section on line *x x* of Fig. 1 in front of the type-wheels. Fig. 4 is an enlarged fragmentary rear side view showing the position of parts when the lower-case wheel is printing, and Fig. 5 is a similar view to show the position of parts when the capital-wheel is printing. Fig. 6 is a cross-section through the guard-plate paper sheet and cushion-strap, taken on the line *o o* of Figs. 4 and 5.

Referring to Figs. 1, 2, and 3, it will be noted that the general form and appearance of the machine are substantially the same as that shown in my former applications referred to.

A indicates the base of the machine, in which are planed longitudinal dovetailed ways

in which the dovetailed base of the paper-carriage B is fitted, so that said carriage is free to slide back and forth therein, as usual. From one end of the base rises the upright frame C, terminating in the overhanging nose or arm *d*, which projects out, as usual, over the paper-carriage, as shown in Figs. 1, 2, and 3.

D is the depressible type-wheel lever, pivoted at one end in the frame C and guided near the other end in a forked guide, *e*, on the overhanging tip *d* of the frame. On the outer end of the lever D are fitted the two type-wheels F F′, being separated a slight distance from each other, but secured firmly together at their hubs, as shown best in Fig. 1, and in such positions that corresponding characters on both wheels are in the same radial position, as seen in Fig. 3. The inner wheel, F, preferably contains capitals, while the outer wheel, F′, contains small letters, as shown in Fig. 2; but of course any other two distinct systems of characters may be employed, according to the special adaptation of the machine. The hubs of the type-wheels, as may be seen in Fig. 1, are not fitted directly onto the end of the depressible lever, but are slipped over the long sleeve or hub *g* of the usual toothed locking-wheel, *h*, which wheel *h* abuts up against a shoulder on the end of the lever D, while the sleeve *g* fits upon the tenon *i* at the end of the lever, and is held in place by the stud *k*. The locking-wheel *h* and its hub-sleeve *g* are therefore free to turn on the end of the lever D, but are restrained from endwise motion. The type-wheels are rotatively engaged with the locking-wheel *h* by a crank-pin, *h′*, which projects from the locking-wheel through holes in the type-wheels, as seen in Fig. 1, and the locking-wheel is geared with the index-wheel *j*, which works the index-finger *q* on the dial *q′*, so as to guide the operator in turning the wheels and show when the desired letter is at the printing-point in the usual manner.

A sleeve, *l*, projects from the hub of the outer type-wheel and fits over the sleeve *g* of the locking-wheel, and a stud, 3, projects from the sleeve *l* into a groove, 5, in the sleeve *g*, so that hence the type-wheels are rotatively engaged with the locking-wheel, and at the same time capable of being slid in or out a limited distance on the sleeve *g*. The twirling handle *o* is frictionally socketed on the hub of the outer wheel over the sleeves *g l*, and it will therefore be seen that by grasping the handle with the fingers it may be twirled to revolve the wheels to bring the desired letter to the printing-point, and may then be depressed to print the desired letter, at which point the teeth of the locking-wheel *h* will engage the fixed stop-tooth 7 to lock the wheels from rotating in the usual manner. Not only, however, may the wheels be revolved and depressed by operating the twirling-handle *o*, but they may also be shifted in or out on the sleeve *g* to bring either wheel into action, as seen in Figs. 4 and 5 and in dotted lines in Fig. 1, without altering the grasp of the fingers on the handle. It will therefore be seen, by referring to Figs. 1, 2, and 4, that when the wheels are slid inward, or in their normal position, the wheel F′, containing the small letters, will be at the printing-point, and therefore ready for action, while if the wheels are slid outward the wheel F′ will be removed from the printing-plane and the capital-wheel F brought into the same position, as seen in Fig. 5, so that capitals will now be printed when the wheels are depressed, instead of small letters, as before.

In order to unconsciously hold the wheels in either of the positions described, a small spring-catch, *m*, on the sleeve, as seen in Fig. 1, will automatically engage with either of two notches, *n*, in the sleeve *g* when the twirling handle, with its type-wheels, is slid in or out, as will be readily understood from Fig. 1. Hence by the constructions described either wheel may be shifted instantly to the printing-point to print either capitals or small letters without loss of time, and the wheels will be retained firmly in either of the desired positions so long as may be required without special thought or effort on the part of the operator.

Now, in order to prevent the wheel, which is shifted out of the printing-plane, from making any impression when both wheels are depressed, the construction of the carriage and the position of the paper-roller relatively to the type-wheels are materially changed and new features added, as shown best in Figs. 3, 4, and 5. The carriage is provided with the usual toothed rack, *p*, and paper-roller *r*, having the usual individual construction and arrangement, as shown in Figs. 2 and 3, except that the paper-roller is not placed centrally under the type-wheel, as heretofore, but at one side of the central point, as well shown in Fig. 3, so that the type-wheel is not depressed against the paper-roller, as heretofore, but against a narrow stationary anvil or horn-like pedestal, G, which rises from the middle of the base and projects up close to the carriage, directly under the center of the type-wheels or at the printing-point. The narrow top of said horn is level and of size sufficient to circumscribe any type on the type-wheels, and the paper sheet passes from the paper-roller between the type-wheel and the tip of the horn, and when the type-wheel is depressed upon the paper it is therefore supported upon the tip of the horn, as seen in Figs. 2, 3, 4, and 5, which thus receives the pressure of the imprint, instead of the paper-roller, as heretofore. In order, however, to prevent the hard or harsh imprint of the types directly against the metallic tip of the horn, a cushion-strap, K, preferably of vulcanized rubber, extends longitudinally of the carriage, parallel with the rack *p*, and passes snugly over the top of the horn, and as the carriage is moved step by step after each impression

the strap K moves, of course, with it and slides over the tip of the horn, always keeping the tip of the horn cushioned for each impression. The paper-roller *r* is embraced on each side by curved springs *t t'*, as shown in Figs. 1, 2, and 3, which are turned or pressed against the roller in opposite directions, and which enable the paper to be guided in around the roller and hold the paper in place thereon.

The paper sheet *s*, as seen in Fig. 3, is not simply passed partly around the roller, as heretofore, but is wound up spirally thereon, one end being first passed under the spring *t*, and thence about the roller under the spring *t'*, and thence wound spirally until the full sheet is wound up, except the starting-edge, which is finally passed over the strap K and out under the rack *p*, as shown best in Fig. 3. When the carriage moves step by step after each imprint, the paper sheet and the strap of course slide lengthwise over the horn G, which latter of course always remains at the printing-point to support the pressure of the imprint, as will be understood. When one line is printed, the paper-roller is then partly revolved to unwind part of the blank paper *s*, the printed part being then fed out over the strap K and under the rack *p*, as will be understood from Fig. 3.

Now, by referring to Figs. 4 and 5, in connection with Figs. 3, 2, and 1, the means for preventing the idle-wheel from printing on the paper when both wheels are depressed will be readily understood.

N indicates a guard-plate or presser-foot, preferably of thin flexible metal, attached to and projecting out from the overhanging arm *d* of the frame and lying over the strap K, under the type-wheels, and above the horn G, the paper sheet *s* being passed between this guard-plate and the strap, as fully shown in Figs. 4, 5, and 6. A slot, *u*, is formed through the guard-plate just over the horn G and in line with the acting-wheel, which is in the printing-plane, said slot being amply large to allow the type of either wheel, when shifted into the printing-plane, to project through the guard-plate and make its impression on the paper below, as shown in Figs. 4 and 5. It will therefore be now understood by referring to Fig. 4 that when the type-wheels are slid into their normal positions, the lower-case wheel F' being at the printing-plane, when the wheels are depressed the type of the wheel F will come down idly on the guard-plate at one side of the slot, and thus fail to make any impression on the paper. On the other hand, when the capital-wheel is slid into the printing-plane, as seen in Fig. 5, and the wheels depressed, the type of the capital-wheel will make its impression on the paper through the slot in the guard-plate, while the type of the other wheel will come down on the end of the guard-plate on the front side of the slot, as seen in Fig. 5, and make no impression on the paper. In either case it will also be seen that the contacts of the idle type with the guard-plate will be elastic, and therefore not injurious to the type, as the springy nature of the guard-plate and strap K will allow the said parts to yield and bend slightly under the pressure of the type on either side of the horn, as shown clearly in Figs. 4 and 5.

By referring to the arrow in Figs. 4 and 5 it will be seen that after each successive impression of the type-wheels the carriage, with the strap K and paper sheet *s*, is fed to the right; hence the freshly-printed part of the paper will pass under the middle part of the guard-plate, against which the type-wheel F is depressed, as seen in Fig. 4. In order, therefore, to prevent the freshly-printed letter from becoming blurred by contact with or rubbing against the plate, the under side of the plate is provided with two short feet, *v*, as seen best in Figs. 4 and 6, which are disposed in a position on each side of the printed line and directly under the position of the type-wheel F. Hence these feet *v* support the guard-plate slightly above the paper where the letters are freshly printed, and prevent the plate from being forced down against the fresh print when the wheel F is depressed against the plate, as will be readily understood from Figs. 4 and 6.

The devices for feeding the paper-carriage step by step and for regulating the length of the feed steps to correspond to the width of letter printed are substantially the same as shown in my former patents. The device for inking the type-wheel is also similar to my former device.

Referring to Figs. 1, 2, and 3, 10 is the inking-disk, which is a flat disk revoluble in a horizontal plane against the rim of the type-wheels and pivoted on a pendulous radial arm, *b b'*, which is hung loosely on the lever D behind the locking-wheel *h*, and has a cranked arm, b^2, which engages a fixed pin, 12, in the guides *e*. It hence follows from this arrangement that the inking device normally gravitates into the position shown in Figs. 1 and 2, where the pendulous arm *b b'* hangs straight down and the ink-disk 10 rests against the under or printing side of the wheel; but when the wheels are depressed the pendulous arm and its disk are swung around the wheel to one side, as shown in Fig. 2, the disk revolving against the types, and thus inking the same while the disk is removed from under the printing-point of the wheels to allow them to make the impression, as will be readily understood from Fig. 2, which inking device is substantially the same as shown in my former application. It will be seen, however, that in my present machine, where the two type-wheels are employed, the inking-disk 10 revolves in a plane slightly inclined to the horizontal, as seen in Fig. 1, so as to contact one side only with the type-wheel which is at the printing-line, the other wheel being practically out of contact with the disk. The pendulous arm is also made in two parts, *b b'*, the

part b', which carries the disk, being inserted into a tubular socket in the part b, and held by a set-screw, 75, so that by this means the disk and its arm b' may be easily removed for re-inking and as easily replaced, and the joint in the pendulous arm $b\,b'$, with its set-screw 75, enables the disk to be set or adjusted up to the type-wheel with the desired pressure for effective inking, as will be readily comprehended from Fig. 1.

Referring to Figs. 2, 3, and 1, R indicates the feed-lever, which is of elbow form, as usual, pivoted on the overhanging arm d, and having one arm provided with the finger-knob 15, and the other arm provided with the pawl y, which is pivoted thereto, and whose point tends constantly to engage the teeth of the ratchet-rack p by the action of the pawl-spring y'. A pin, 16, projects from the lever R over the spring-tongue 17 and under the depressible lever D, so that hence every time the lever D and its type-wheels are depressed to print the feed-lever R is likewise swayed, the spring 17 flexed, and the pawl y moved back over the teeth of the rack p. At the return motion the spring 18 raises the lever D with the type-wheels until stopped by the pin 19, and as the spring 17 returns the feed-lever R the pawl y now engages the rack p and feeds the carriage forward one step. The active stroke of the pawl or the length of the feed-step varies, however, according to the width of the letter printed, according to the principle shown in my former machine—that is, by referring to Figs. 2 and 3 it will be seen that the pawl y is formed with a long slender tail, x, which projects back toward the type-wheels and under and crosswise of the rim of the same, and is adapted to enter one of the recesses in the rim between the types (see Figs. 3 and 2) when the wheel is depressed. Now the recesses are of varying depth according to the width of the letter which they represent, the widest letter—such as W—having the deepest recess, and the narrowest letter—such as I—the shallowest recess; hence every time the wheel is depressed to print the desired letter, as seen in Fig. 2, the pawl y will be slipped back over the rack and its tail x will enter the recess corresponding to said letter, so that the pawl having clicked over a number of teeth will be finally tilted by contact with the bottom of the recess, and thus raised out of engagement with the rack, as seen in Fig. 2. On the return motion the pawl will of course be held out of engagement with the rack until it arrives at the tooth from which it was raised, when it will fall into engagement, and thus feed the rack forward during the remainder of its stroke; hence if the letter printed is a narrow one the recess which the tail of the pawl will encounter will be a shallow one and the pawl will be raised out of engagement early in its backward stroke, and will be let fall into the rack late in its advance stroke, and thus impart but a small motion to the paper-carriage suited to the narrow letter, whereas if the letter printed is a wide one the recess encountered by the tail of the pawl will be a deep one, so that the pawl will be raised out of the rack only at the end of the back-stroke and will be let fall into the rack at the beginning of its advance stroke, and thus impart a larger motion to the carriage, according to the particular width of the letter, thereby regulating the length of the feed-steps proportionately to the letter, and thus accomplishing a perfectly-spaced printing.

It will be readily seen by referring to Figs. 2, 4, and 6 that the tail of the pawl will engage only with the type-wheel which is at the printing-line, as the tail terminates at the printing-line, and it has a gap, x', cut in it to allow the capital-wheel F when shifted out of action to pass the pawl without contacting therewith. Now as each of the wheels F F′ will have recesses of a depth corresponding to its own types, the capital-wheel F having of course recesses of the greatest depth, it will therefore be seen that when either wheel is shifted into action it will engage the pawl in precisely the same way, and the feed motions produced will be exactly proportioned to the style of type which is printed without requiring any thought or attention on the part of the operator, thus automatically regulating the feed motions, whether wide or narrow or small or capital letters are printed.

Referring to Fig. 2, z indicates a detent-tooth on the prolonged extremity of the feed-lever R, which catches in the rack at the end of the forward or return motion, as seen in Figs. 3 and 1, so as to hold the carriage firmly and prevent the momentum of the feed-impulse or other cause from carrying the carriage beyond its proper point.

To produce the spacing-feed between words or sentences, the knob 15 is depressed one or more times, as usual. When, however, the knob is fully depressed, the pawl will be brought firmly against a fixed stop-pin, 20, projecting from the arm d, and the point of the pawl will be thus raised out of the rack, as seen in Fig. 2, thereby allowing the carriage to be slid back or forth freely to any point, after which the knob may be released and the feed devices will return to their normal positions, ready for further action.

Referring to Figs. 1 and 2, it may be seen that the cushion-strap K hooks at each end over hooked studs a on each end of the carriage, and may therefore be readily removed when worn out and replaced by a new strap.

What I claim as my invention is—

1. In a type-writer, two rotatable type-wheels fixed to a common twirling handle and mounted on a depressible support and capable of being shifted longitudinally to and fro, substantially as and for the purpose set forth.

2. In a type-writer, the combination, with a fixed support for the paper or printed sheet, of two distinct rotary and reciprocating type-wheels arranged to reciprocate to and from

said support and fastened together and to a common twirling handle, and capable of being shifted longitudinally to bring either wheel in the printing-plane, substantially as herein set forth.

3. In a type-writer of substantially the class described, a slotted guard-plate interposed between the shiftable type-wheels and the paper sheet and provided with feet to hold the plate out of contact with the freshly-printed character, substantially as herein shown and described.

4. In a type-writer substantially such as set forth, the combination, with the type wheel or wheels, and fixed anvil G, of the intermittently-moving paper-carriage provided with the cushion-strap K, moving over said anvil, substantially as and for the purpose set forth.

5. The combination, with the type-wheels F F′ and anvil G, of the intermittently-moving carriage having the cushion-strap K, with the guard-plate N, interposed between the wheels and strap, arranged and operating substantially as shown and described.

6. In a type-writer, the combination, with the two shiftable rotatable and reciprocating type-wheels F F′, having recesses or stops of varying depth on their rims, of the reciprocating feed-pawl y, with its tail x, arranged in the specified relation to the type-wheels, and with the rack p, and an intermittent paper-carriage to which said rack is fixed, substantially as and for the purpose set forth.

7. The combination, with two rotatable and reciprocating type-wheels fastened together, provided with a common twirling handle and mounted on a depressible support and shiftable longitudinally, of a yielding or snapping spring-catch arranged to engage the support at each end of the longitudinal motion to hold the wheels in either position.

8. In a type-writer, the combination, with the depressible lever D, of the two rotatable and reciprocating type-wheels F F′ and common twirling handle o, shiftable longitudinally on the end of the lever D, with the spring-catch m, and engaging recesses n n, arranged and operating substantially as and for the purpose set forth.

9. The combination, with the depressible lever D, locking-wheel h, crank-pin h', and sleeve g, of the type-wheels F F′ and twirling handle o, common to both wheels and shiftable on the sleeve g, substantially as set forth.

10. The combination, with the two rotatable reciprocating and shiftable type-wheels mounted on a depressible support, of the inking-disk 10, revolving in a plane inclined to the wheels, whereby the disk makes effective contact only with the active wheel, substantially as shown and described.

11. The combination of the two rotatable reciprocating and shiftable type-wheels F F′, pendulous inker-arm b, and inclined rotary ink-disk 10, bearing upon one of the wheels, substantially as shown and described.

12. In a type-writer, the combination, with a type-wheel and an inking-disk revolving against the typed rim of the wheel, of the radial or pendulous arm supporting the ink-disk and made in two adjustable telescopic sections, b b', with a fastening device, substantially as and for the purpose set forth.

13. The combination, with the shiftable type-wheels F F′ and intermittent paper-carriage, of the reciprocating feed-pawl y, arranged to operate the carriage, with its tail x projecting in the path of the type-wheels, and provided with the gap x' to permit the free passage of one of the wheels, substantially as and for the purpose set forth.

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J. FREUDENTHAL.