(No Model.)

4 Sheets—Sheet 1.

C. SPIRO.

TYPE WRITING MACHINE.

No. 335,392. Patented Feb. 2, 1886.

Fig. 8.

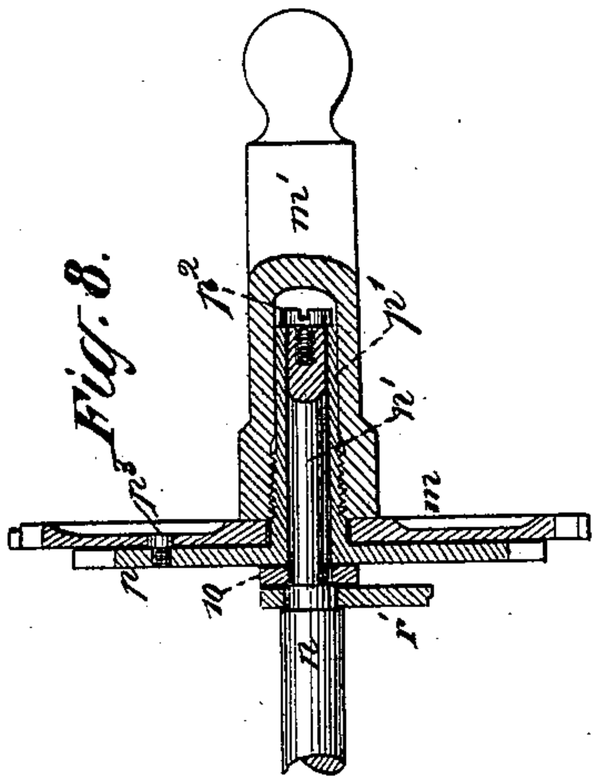
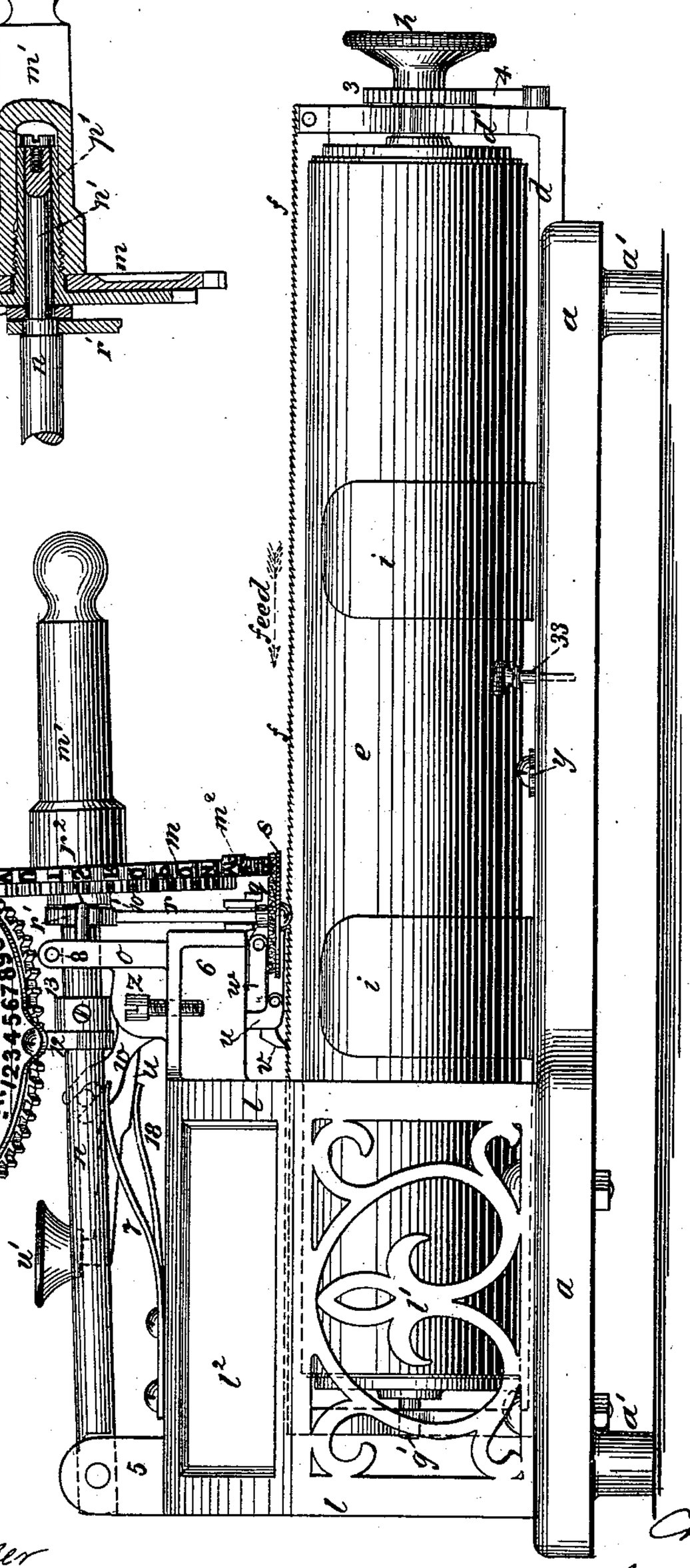


Fig. 1.



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(No Model.)

4 Sheets—Sheet 2.

C. SPIRO.

TYPE WRITING MACHINE.

No. 335,392. Patented Feb. 2, 1886.

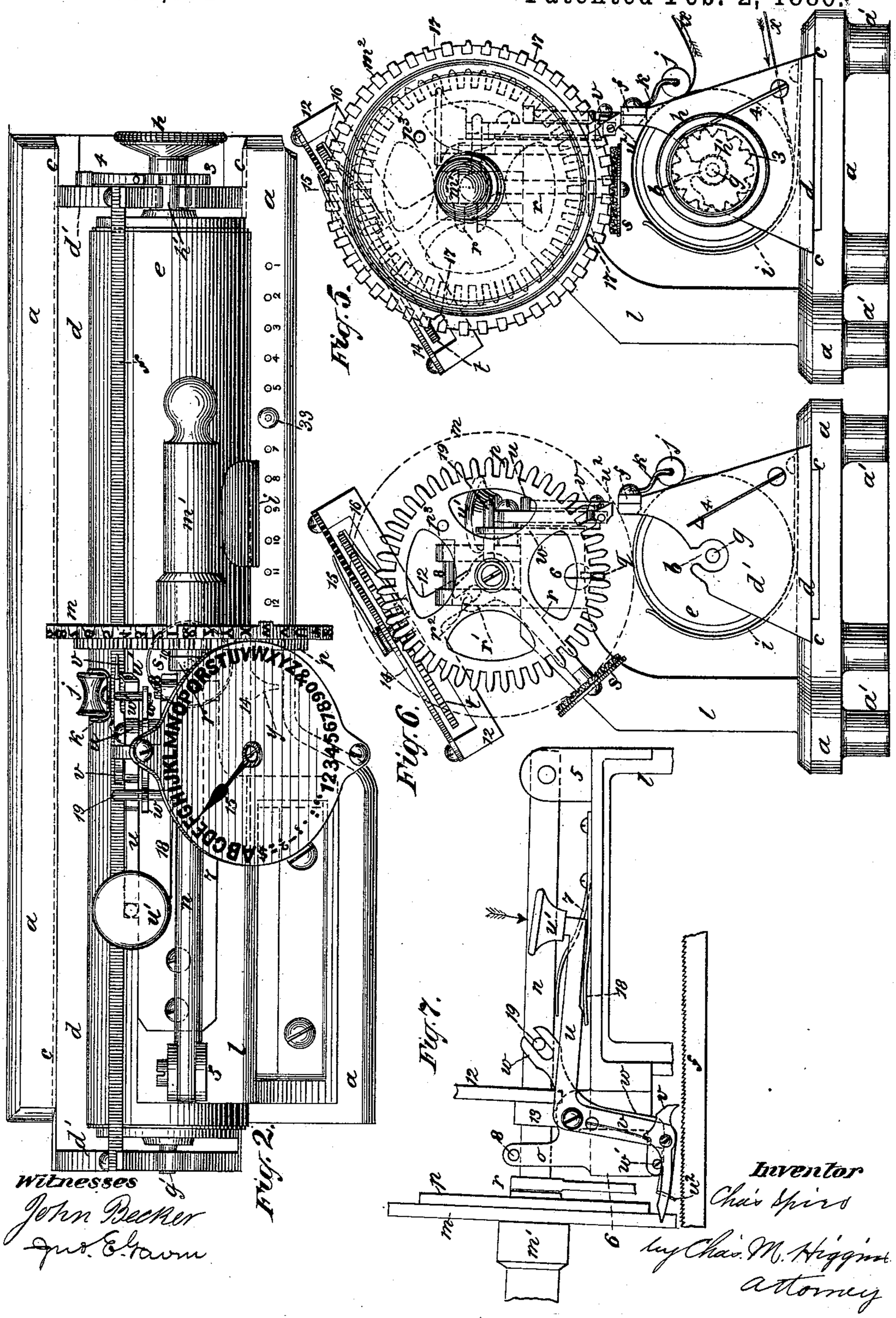

Fig. 1.

Fig. 3.

Fig. 6.

Fig. 2.

Fig. 7.

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(No Model.)

4 Sheets—Sheet 3.

C. SPIRO.

TYPE WRITING MACHINE.

No. 335,392. Patented Feb. 2, 1886.

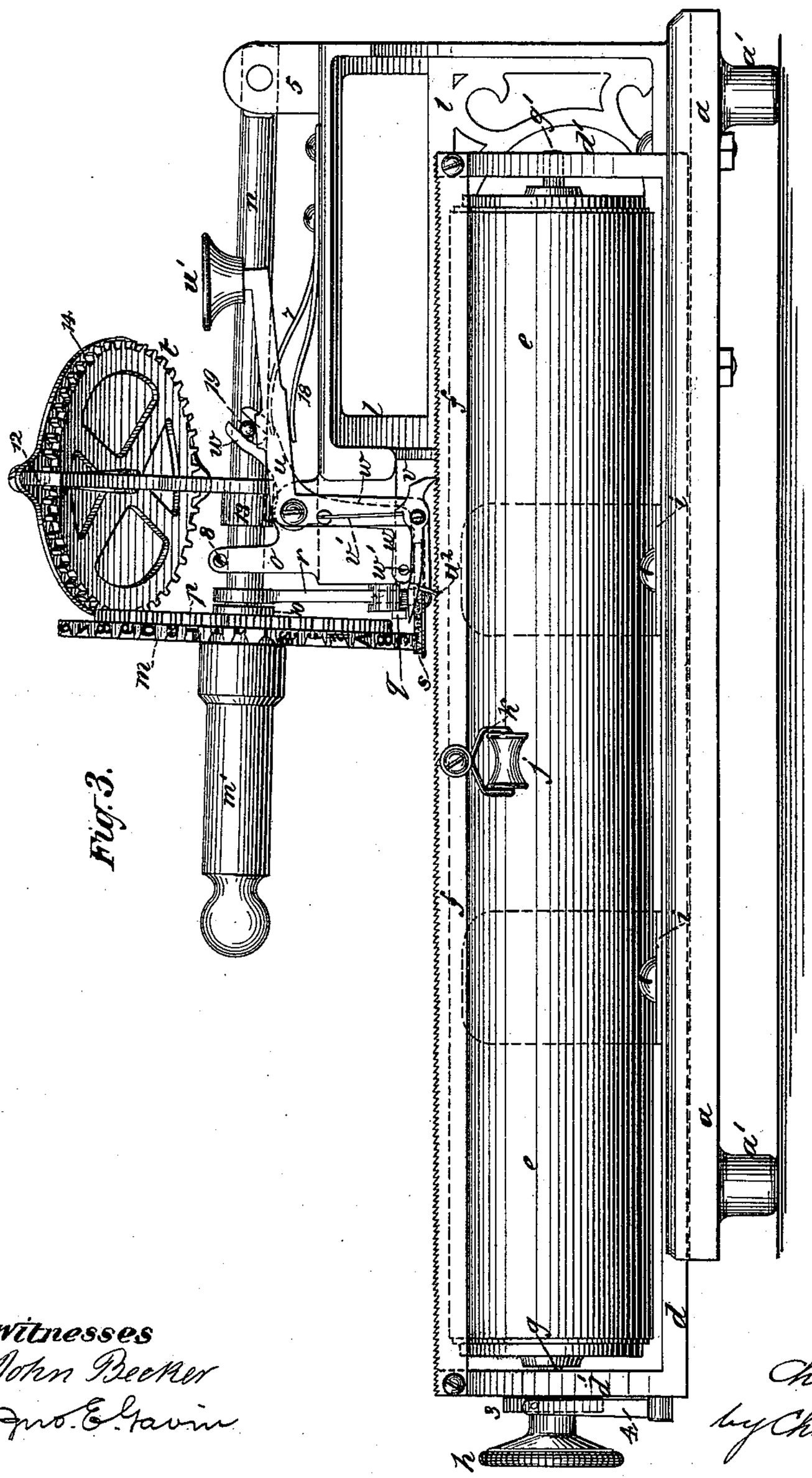

Fig. 3.

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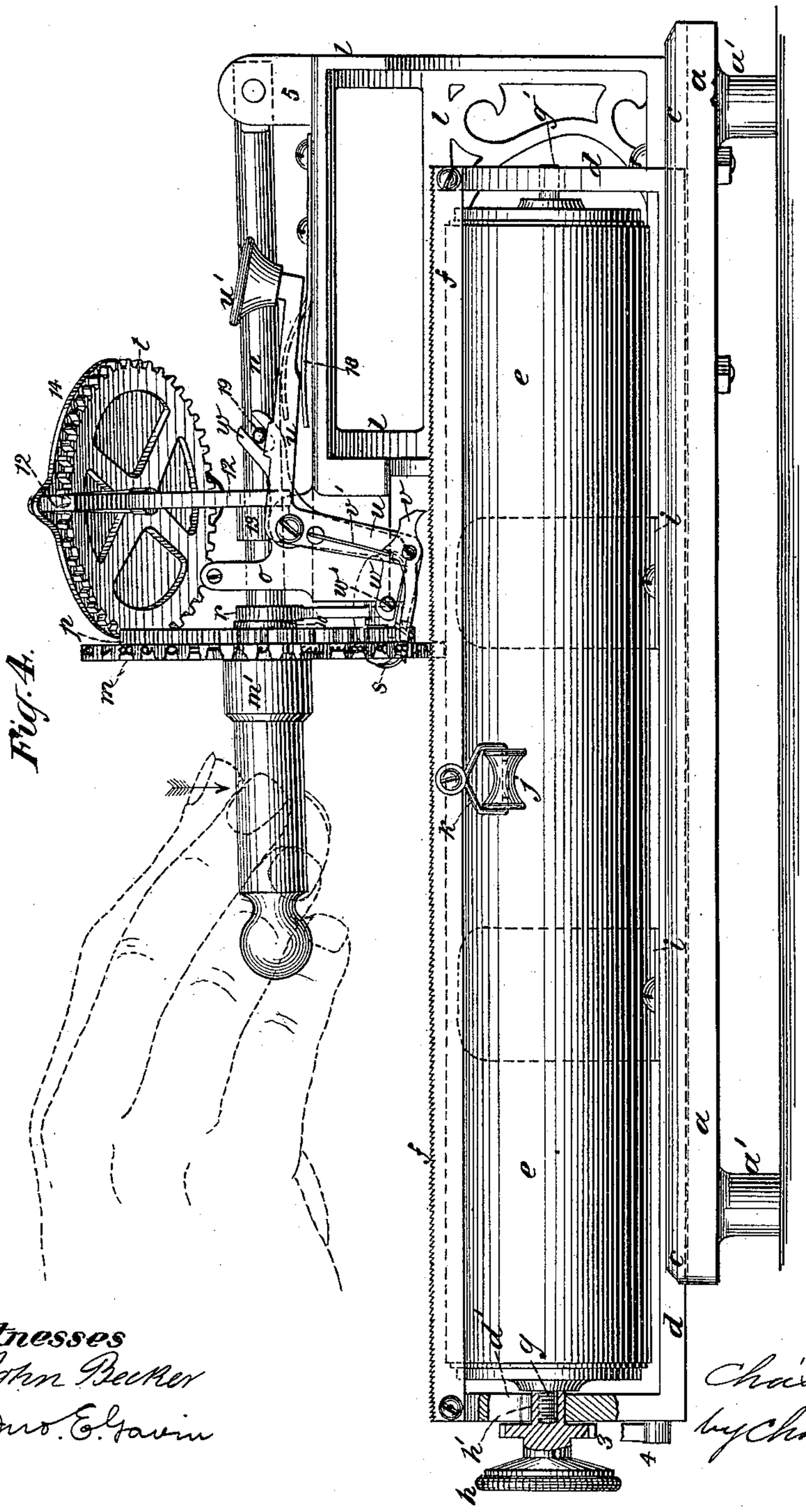
(No Model.) 4 Sheets—Sheet 4.

C. SPIRO.

TYPE WRITING MACHINE.

No. 335,392. Patented Feb. 2, 1886.



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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. 335,392, dated February 2, 1886.

Application filed September 26, 1884. Serial No. 144,014. (No model.) Patented in England November 8, 1884, No. 14,768; in France November 8, 1884, No. 165,263, and in Germany November 9, 1884, No. 32,539.

To all whom it may concern:

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

My invention relates to that class of type-writers which employ a rotary type-wheel mounted on a depressible lever arranged over a sliding paper-carriage, and provided with a central axial handle adapted to be twirled in the fingers to bring the desired letter into the printing position, after which the handle and wheel are depressed to print the letter. A type-writer of this class is shown in my former application, filed April 1, 1884, No. 126,354, and my present invention is an improvement upon the several features thereof. In this form of type-writer the sliding paper-carriage is provided with a longitudinal ratchet-rack, which is engaged by a feed-pawl worked by the depression of the type-wheel, and means are provided whereby the feed-space is varied in proportion to the varying width of the letter to be printed.

Part of my present improvement relates to the variable feed mechanism and to the construction of the type-wheel with reference thereto.

Other features of my improvement lie in an improved inking device, in index devices to indicate the movement of the type-wheel and the printing position of the types, in the special construction of the paper-carriage, and in other details hereinafter fully set forth.

In the drawings annexed, Figure 1 represents a longitudinal front elevation of my improved type-writer, and Fig. 2 represents a plan view thereof. Fig. 3 is a longitudinal rear elevation with the type-wheel in its raised or quiescent position, while Fig. 4 is a similar view with the wheel depressed in the printing position. Fig. 5 is a front end elevation, and Fig. 6 is a similar view with the type-wheel and its twirling-handle removed. Fig. 7 is a fragmentary rear elevation showing the feed and spacing mechanism. Fig. 8 is a sectional detail of the type-wheel and its attachments.

In the original drawings filed with this application my machine is represented of full size, and referring first to Figs. 1 and 2, *a* indicates the base of the machine, which is made in the form of an oblong casting formed with short feet *a'* on the bottom, on which the machine rests.

On the top of the base is formed a longitudinal dovetailed way, *c*, which extends the entire length of the base, as shown in Fig. 2, and in which is fitted the frame *d* of the paper-carriage *d e f*, which is capable of sliding freely in the way lengthwise of the machine, as will be readily understood from the drawings.

In bearings *d'*, at each end of the carriage-frame *d*, is mounted the paper-roller *e*, and the bearings are connected together by a ratchet bar or rack, *f*, which entends longitudinally parallel with the surface of the roller *f*, and close to the top of the same on one side of the carriage, as fully shown in Figs. 1, 2, 3, 4, and 5. The rear end of the paper-roller *e* is fitted with a small smooth pintle or journal, *g'*, which is received in a hole in the rear bearing, *d'*, of the carriage-frame, while the front end of the roller is provided with a threaded shank, *g*, as shown in Fig. 4, which is a loose fit for a large bearing socket or hole, *b*, in the front bearing, *d'*, of the carriage, as fully shown in Figs. 4 and 6, which bearing is slotted at the top, as seen in Fig. 6, to allow the threaded shank *g* to be lifted up, and thus permit the removal of the roller from the carriage, as will be readily understood. The operating-knob *h* of the roller *e*, however, has a round shank, *h'*, which nicely fits the bearing-socket *b* and screws onto the threaded shank *g*, as shown in Fig. 4 and in dotted lines in Fig. 5. Hence when the roller is placed in its bearings and the operating-knob *h* screwed in place, as shown in Figs. 4 and 5, the roller is held against displacement, yet is free to revolve, whereas when the knob is unscrewed, as shown in Fig. 6, the roller can be lifted out or replaced, as will be readily comprehended. Two thin broad springs, *i i*, are fixed at one end to the base of the carriage, and pass under and partly around the roller on one side, pressing lightly against the roller, as fully shown in Figs. 1, 2, 5, and 6. The paper sheet *x*, as shown in Fig. 5, on which the printing is to be done, is passed in under the roller, between the surface of the same and the springs *i*, and is thus curved around the roller under the springs and over the top of the

roller and out under the rack-bar *f*, and finally passes under a little pressure or guide roller, *j*, which is mounted in a spring-bearing, *k*, fixed to and depending from the outer side of the bar, as shown best in Figs. 3, 4, 5, and 6. The roller *j* has a deeply-concaved periphery, so that only its narrow flanged ends bear upon the paper, and this insures a better guiding action, while the spring *k* keeps the roller constantly pressed against the paper to hold it evenly and firmly on the paper-roller *e*. By turning the knob *h* the paper-roller will be turned to advance or feed the paper for the successive lines to be printed, as will be readily understood, and in order to provide a regular space for this line-feed, the knob is formed with a notched rim, 3, which is engaged by a click-spring, 4, as best shown in Figs. 2, 5, and 6; hence when the knob is turned to adjust the paper to the desired line the click 4 will fall into one of the notches, and thus hold the roller and its superposed paper in that position, and when it is desired to advance the paper for the next line the knob is turned one notch farther, when the click will spring out of the last notch and spring into the next, and thus allow the roller to be revolved in the desired successive steps, and yet always hold it at each step. The threads on the shank *h'* of the knob *h* are such as cause the knob to tighten in the direction in which it is revolved to feed the paper, and hence the knob has no tendency to unscrew in the direction in which the roller is turned to feed the paper.

The paper-carriage and its adjuncts having been now set forth, we will refer to the type-wheel and its adjuncts, which are mounted above the carriage on the top of the fixed frame or standard *l*, which arises from one side of the base and overhangs the paper-carriage, as shown well in Figs. 1, 2, 5, and 6. The side of the frame *l* is lightened by a lower open scroll-work panel, *l'*, and by an upper open panel, l^2, through which the printing on the paper-roller can be easily read. The type-wheel *m* is placed, as shown, centrally over the paper-carriage and revolves in a plane at right angles to the longitudinal movement of the carriage. This type-wheel is mounted on the end of a depressible rod or lever, *n*, which is pivoted at the fulcrum end to a lug, 5, on the top of the frame *l*, and the opposite end of the lever near the type-wheel is guided vertically between a forked guide, *o*, which rises from the narrow nose or beak 6 of the frame, which closely overhangs the paper-carriage and projects up close to the type-wheel. A spring, 7, between the top of the frame *l* and the depressible lever *n*, tends constantly to raise up the lever and keep the type-wheel elevated above the paper, as shown best in Figs. 1, 3, and 5, the up motion of the lever being limited by the stop-pin 8 on the forked guide *o*, while the down motion is limited by the adjustable stop-screw *z*. The type-wheel *m* is free to revolve on the end of the lever *n*, and is provided with a central twirling-handle, *m'*, which may be revolved or twirled between the fingers to bring any desired type to the under side of the wheel to the printing position, after which the handle is depressed to force the wheel down on the paper on the paper-roller to impress the desired type thereon, as indicated in Figs. 4 and 6.

The type-wheel is formed of a disk of hard metal having slots cut in its periphery, in which are inserted the types m^2, which usually include the alphabetic letters, with the numerals and points of punctuation, and this type-wheel is fixed at the back to a toothed locking-wheel, *p*, which revolves with the type-wheel on the end of the lever *n*, (see Fig. 8,) and its periphery is provided with teeth corresponding in number to the types on the type-wheel.

On the front of the beak 6 of the frame *l* a tooth, *q*, projects forward in the path through which the locking-wheel *p* moves when the lever is depressed, which tooth will therefore fit between two of the teeth in the locking-wheel when the type-wheel is depressed, as indicated in Figs. 4 and 6, thus locking the wheels against rotation when the selected type is being printed, and thereby insuring a good impression of the desired letter.

Behind the hub of the locking-wheel *p* a pendulous arm, *r*, is hung on the lever *n*, so as to swing freely thereon, which arm normally hangs down straight, as shown in Figs. 1, 3, and 5, and on the tip of this arm, just below the periphery of the type-wheel, is mounted an inking disk or roller, *s*, disposed preferably in a horizontal plane and contacting near its periphery with the typed rim of the type-wheel, as fully shown in Figs. 1, 3, and 5. This inking-roller is preferably made of a thin metal disk, having a central hub which turns freely on the end of the pendulous arm *r*, and faced on the top with a disk of felt, which is saturated with the ink and contacts with the rim of the type-wheel, as illustrated. The pendulous arm *r* has a short forked crank-arm, *r'*, projecting at right angles from its pivoted end and engaging a fixed pin, r^2, on the forked guide *o*, as shown in Fig. 1 and in dotted lines in Figs. 5 and 6. It will now be seen, by referring to Figs. 1, 3, and 5, that the pendulous arm and its inking-roller *s* normally gravitate to and assume a vertical position with the inking-roller, contacting with the type-wheel at its printing-point on the under side, and just over the paper-carriage. It will therefore be seen that when the type-wheel is revolved back or forth to bring the desired type to its printing position the ink-roller will be revolved over the successive types, and the surfaces thereof will become nicely inked preparatory to the impression. As soon, however, as the desired type is brought to the printing position, and the wheel then depressed to print the same, the depressing motion of the wheel will cause the pendulous arm and its ink-roller to be swung to one side, revolving slightly around the axis of the type-wheel,

as shown in Fig. 6, thus removing the inking-roller out of the way from the printing position of the wheel above the paper-carriage, and thus permitting the selected type to descend upon the carriage, as fully shown in Fig. 6. As soon as the wheel is allowed to rise after the impression the inking arm and roller are again swung back to the vertical position, as shown in Fig. 5. It will be therefore seen that the advantages of this inking device are that it is simple and effective and is very neat and compact in its construction, and while the inking-roller is kept normally in contact with the printing-point of the wheel, it is automatically swung out of the way when the desired type is printed, yet is kept in continual contact with the rim of the wheel, and a uniform and thorough inking of the types is thereby secured.

The manner in which the type-wheel and its adjuncts are mounted on the end of the depressible lever *n* is fully shown in Fig. 8. The end of the lever *n* is reduced to form a tenon or journal, *n'*, and the inking-arm *r* is first set on this journal up against the shoulder at the root thereof. A collar or washer, 10, is next slipped on the journal against the arm *n*, and the locking-wheel *p* is then slipped on the journal, up against the washer. This locking-wheel is formed with a long sleeve or hub, *p'*, which extends over the journal to the end thereof and is free to turn thereon, and in the end of the journal is screwed a small headed stud, p^2, which holds all the said parts in position, as will be readily understood. The type-wheel *m* is next slipped over the hub of the locking-wheel *p*, and fitted up close to the locking-wheel, a pin, p^3, on the locking-wheel engaging with a hole in the type-wheel, as shown in Figs. 8, 6, and 5, so as to engage the two together. The twirling-handle *m'* of the type-wheel, which is preferably made of hard rubber, is finally screwed over the sleeve of the locking-wheel, close up against the type-wheel, and the parts are thus held in position and made ready for operation.

Referring to Figs. 1, 3, 4, 5, and 6, *t* indicates a toothed index-wheel which gears with the locking-wheel *p* in a plane at about right angles thereto. This wheel is mounted to turn on a central pin in a frame or bracket, 12, having a hub, 13, at the base, which is fastened on the depressible lever *n*, by a clamping-screw or other fastening, just back of the forked guide *o*, as well shown in Figs. 1, 3, and 4.

On the bracket 12 is fixed a dial or index plate, 14, which covers the index-wheel *t*, and around the periphery of the dial are marked the different characters which the type-wheel carries, while an index-finger, 15, attached to the axis of the index-wheel, projects over the surface of the dial, as well illustrated in Figs. 1, 2, and 6. The parts described are of course so arranged that when any particular type on the type-wheel is at the printing-point at the bottom of the wheel the index-finger 15 will point to the corresponding character on the dial, as will be readily understood; hence by this means the operator is enabled to rapidly twirl the type-wheel to or fro to bring the desired letter to the printing position, and the index-finger will clearly show the position in which it may be found, and the position at which the wheel is to be depressed to print the desired letter, thus enabling the operator to perform quick and accurate work after a short experience.

The bracket 12 may be adjusted around on the lever *n*, so as to present the face of the dial at different inclinations to the operator, and thus enable him to adjust the dial to the best and most convenient reading angle, according to individual desires, as will be readily appreciated. A light click-spring, 16, is fixed to the bracket 12 beneath the index-wheel *t*, and the pointed tip of the spring falls between the teeth of the index-wheel as the same is revolved, and will thus serve to readily indicate when the wheels are turned to the desired letter, and will prevent the inadvertent turning of the wheels after the letter is selected and during the pressing motion to print the letter, as will be readily understood.

The feed mechanism whereby the paper-carriage is advanced one step after each letter is printed, and these steps varied in length according to the width of the letter to be printed, will be now described.

Referring first to Figs. 1 and 2, it will be seen that the types are arranged on the periphery of the type-wheel, with the left-hand side or edge of all the characters in line with each other, the feed motion of the carriage being also to the left, as indicated in Fig. 1. Now, on the periphery of the type-wheel, as best shown in Fig. 5, a recess, 17, is formed between each type, and each recess represents a particular character, and varies in depth according to the varying width of the characters, the widest letters—such as M and W—having the deepest recesses, as indicated by the two deep and somewhat oblique recesses shown in Fig. 5, while the narrowest characters, such as I, are represented by the shallowest recesses, as will be readily understood.

Referring now to the rear side of the machine shown in Figs. 3 and 4, *u* indicates an elbow-lever pivoted on the front end of the frame *l*, with its long arm projecting horizontally behind the lever *n*, and terminated with a depressing finger-knob, *u'*, for manual operation when required, while the short arm hangs vertically and is bent to overhang the ratchet-rack *f* of the paper-carriage and is terminated with a tooth, u^2, which normally engages with the back of one of the rack-teeth, and thus prevents the carriage from moving backward in its guides. The long or upper arm of the elbow-lever *u* is normally raised by a spring, 18, so as to keep the tooth u^2 in contact with the rack *f* and press the lever against a pin, 19, which projects from the lever *n* and bears upon the elbow-lever *u*, as fully shown

in Figs. 2, 3, and 4. The spring 18 is formed from the same sheet of steel as the spring 7 by simply slitting the sheet, and thus forming two spring-tongues which simultaneously tend to keep the depressed lever *n* and its type-wheel, and also the elbow-lever *u*, all raised into their normal positions. (Shown best in Fig. 3 and partly in Figs. 1 and 5.)

Now, referring again to Fig. 3, it will be noted that on the lower arm of the elbow-lever *u* a pawl-lever, *v*, is pivoted, having one arm reduced to a pawl-point to engage the teeth of the carriage-rack *f*, while the opposite arm or "tail" of the pawl projects horizontally above the rack toward the rim of the type-wheel and in line with one or other of the recesses therein, (see Figs. 5, 2, and 3,) the end of the tail being tapered to a narrow wedging-point, so as to readily enter said recesses, as fully shown in Fig. 3. The spring *v'* of the pawl *v* tends constantly to keep the point of the pawl in engagement with the rack *f* and to press the long tapering tail of the pawl against a stop-pin, *w'*, which projects from one arm of a secondary elbow-lever, *w*, pivoted behind the lever *u*, and having its upper arm forked to engage the pin 19 on the main lever *n*. It may now be seen by referring to Fig. 4 that when the lever *n* and its type-wheel is depressed to print the desired letter the pin 19 will sway the elbow-lever *u* in the position shown, and thus move the pawl *v* back over the teeth of the rack and bring the tapering tail of the pawl into one of the recesses on the type-wheel, the parts being so arranged that the recess which the tail of the pawl will enter will correspond to the letter being printed, as will be readily understood. It will now be understood, referring to Figs. 3 and 4, that during the depressing motion of the type-wheel and the back movement of the pawl on the rack *f*, as just described, the point of the pawl will remain pressed against the inclines of the rack-teeth, and will slip back over the same until the tail of the pawl has made contact with the bottom of the recess in the type-wheel, when the point of the pawl will then be lifted out of the teeth and will move the remainder of the stroke idly above the rack, as shown in Fig. 4. Now, it will be obvious that the deeper the recess in the wheel is the later will the pawl be lifted out of the rack and the greater the number of teeth over which it will slip, and vice versa. It will be also readily understood that as soon as the type-wheel is allowed to rise after making the impression the pawl will move back and will fall into the tooth out of which it was previously raised, and, the back motion of the pawl being now continued while engaged with the rack, it will now impart a feed motion to the carriage equal to the number of teeth over which the pawl slipped during the previous motion toward the type-wheel. Hence the depth of the recesses in the type-wheel determines the number of teeth over which the pawl will idly slip at the forward motion, and therefore the amount of feed motion which will be imparted to the paper-carriage at the back or feeding movement of the pawl, so that by this means the carriage will always be fed onward a step equal to the width of the letter last printed. Thus if the widest letter is equal to four teeth on the rack *f* and the narrowest is equal to one tooth, then the feed motions of the pawl *v* will vary from one to four teeth, in accordance with the varying depth of the recesses in the type-wheel representing the letters, thus producing a perfect and efficient feed motion, which regulates the feed of the paper automatically, according to the width of the characters printed, which is a very desirable feature, as it saves space on the sheet and greatly improves the appearance of the printing and renders it much more readable.

Referring to Fig. 3, it will be seen that when the type-wheel and feed devices rise or return to their normal positions, as illustrated in this figure, the fixed tooth u^2 on the pawl-lever will engage the rack *f* in one direction against forward motion, while the pawl *v* will engage it in the other direction against back motion, thus locking the carriage in the position into which it was last fed, and thereby preventing the momentum of the forward feed impulse from moving the carriage too far, and also preventing any displacement during the movements to selection of the next character for printing. Now, in order to feed the carriage forward to provide spaces between words or sentences, the knob *u'* may be depressed, in which case, by referring to Fig. 7, it will be seen that the pawl-lever *u* will be swayed independently of the main or type-wheel lever *n*, and also independently of the stop-lever *w*, which levers *n w* will remain at rest, as shown. Hence the tooth u^2 will not only be raised out of the rack *f*, but the pawl *v* will also be slipped back its full distance—say of four teeth—at which fourth tooth the tail of the pawl will be forced against the stop-pin *w'* in the now stationary stop-lever *w*, and thus be lifted out of the rack, as shown in Fig. 7. When, therefore, the knob *u'* is again released, the described parts will return to their normal positions, and the point of the pawl *v*, in entering the tooth which it previously left, and in pressing forward against the same, will thus move the carriage forward the space of four teeth, and thus provide the necessary feed-space between letters or words. By depressing the knob u^2 two or more times this space will of course be correspondingly increased as may be desired.

It will be noted from what has been already described and shown in Fig. 7 that the function of the lever *w* and its pin *w'* comes into action only when the knob is depressed for the spacing-feed, the lever and pin then affording a fixed stop to cause the pawl *v* to be lifted out of the rack *f*, as described. At all other times when the type-wheel and lever *n* are moved up and down and the regular auto-

matic feed movements produced the stop-le-lever w and pin w' move with the lever u and pawl v, and hence cannot affect the pawl v, and, in fact, perform no function, as the engaging and disengaging movements of the pawl are in this case determined entirely by the recesses in the type-wheel, and not by the pin w', as will be readily comprehended. It may be further noted that when the knob u' is fully depressed, as shown in Fig. 7, the feed-rack will be entirely freed from the feeding devices u^2 and v, and hence the carriage may be slid entirely out of the base, or shifted forward or backward to any desired position, so that a line may be commenced on any part of the sheet desired. By referring again to Fig. 7, it may be observed that when the knob u' is fully depressed to produce the spacing-feed shown the tail of the pawl v will not enter any of the recesses in the type-wheel at all; nor will it closely approach the rim of the wheel, for the reason that as the type-wheel is not itself depressed the vertical movement of the tail of the pawl will not be sufficient to bring it close to the rim of the type-wheel, as will be readily comprehended from Figs. 5 and 7. Now, in order that the carriage may be slid back at the end of each line to the same position at which the line was commenced, so as to preserve a uniform margin in the printing, the front edge of the base is graduated with a series of numbers, as shown best in Fig. 2, and an index point or finger, y, projects from the middle of the carriage out over the graduated edge of the base, said finger being shown in dotted lines in Fig. 2 and full lines in Fig. 1. Hence by starting the carriage with the index-finger at one of the numbers, according to the width of the margin desired, and always bringing the carriage back to the same number in commencing the next line, a uniform margin will be preserved. A series of holes are preferably bored in the edge of the base adjoining the graduated numbers, as shown, in any one of which may be fitted a stop-pin, 3 3, the distance of the pin from the first hole determining the width of margin, as will be readily understood, and it will be seen that when the carriage is slid back to commence the next line the finger y will strike against the pin, and thus determine automatically the point at which to commence each line, which will be a great convenience to the operator.

I do not claim in this application the springs i i, arranged as shown, but reserve my right to claim the same in my subsequent application, No. 159,514, filed March 20, 1885.

What I claim as my invention is—

1. In a type writing or printing machine, the combination of a rotary and depressible type-wheel having types around its periphery and recesses of varying depth between the types, and with a sliding feed-carriage provided with a ratchet-rack, and a feed-pawl reciprocated thereon to and from the type-wheel by the rise and fall of the type-wheel, the tail of said pawl being adapted to enter the recesses in the type-wheel at each reciprocation, substantially as set forth, whereby the active feed motions of the pawl are made to vary in accordance with the width of the letter printed, and in correspondence with the depth of the recess representing the same, substantially as herein shown and described.

2. The combination, with the sliding carriage and its rack f, and the depressible bar n and its rotary type-wheel m, of the feed-lever u and pawl v, and the stop-lever w and its stop w', with the pin 19, engaging the levers u w with the bar n, substantially as shown and described.

3. In a type writing or printing machine, the combination, with the type-wheel, of an inking-disk revolving against the periphery of the type-wheel in a plane at right angles thereto, and pivoted on a pendulous arm pivoted at or near the axis of the wheel, substantially as shown and described.

4. The combination, with a rotary and depressible type-wheel, of an inking-disk revolving against the periphery thereof and hung on a gravitating pendulous arm, with a connection between the axis of the wheel, the pendulous arm, and the fixed frame, whereby the pendulous arm and its disk are swung partly around the type-wheel and back again at each depression of the wheel, substantially as herein set forth.

5. The combination, with a rotary and depressible type-wheel, of the inking-disk s, revolving against the periphery thereof in a plane at right angles thereto with the pendulous arm r, on which said disk is mounted, pivoted near the axis of the type-wheel, and having a slotted radial arm, r', engaged with a point, r^2, on the fixed frame, substantially as and for the purpose set forth.

6. The combination, with the depressible lever n, formed with the journal n', of the toothed locking-wheel p, having the bearing-sleeve p', fitted on said journal, with the type-wheel m, slipped over said sleeve and engaged with the locking-wheel, and the twirling-handle m', fastened over said sleeve up against the type-wheel.

7. The combination, with the frame of the paper-carriage and the roller e, of the pintles g g', the bearings d' d', the enlarged and slotted bearing-socket b, and the operating-knob h, having a shank to enter said socket b and screw upon the pintle g, substantially as and for the purpose set forth.

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