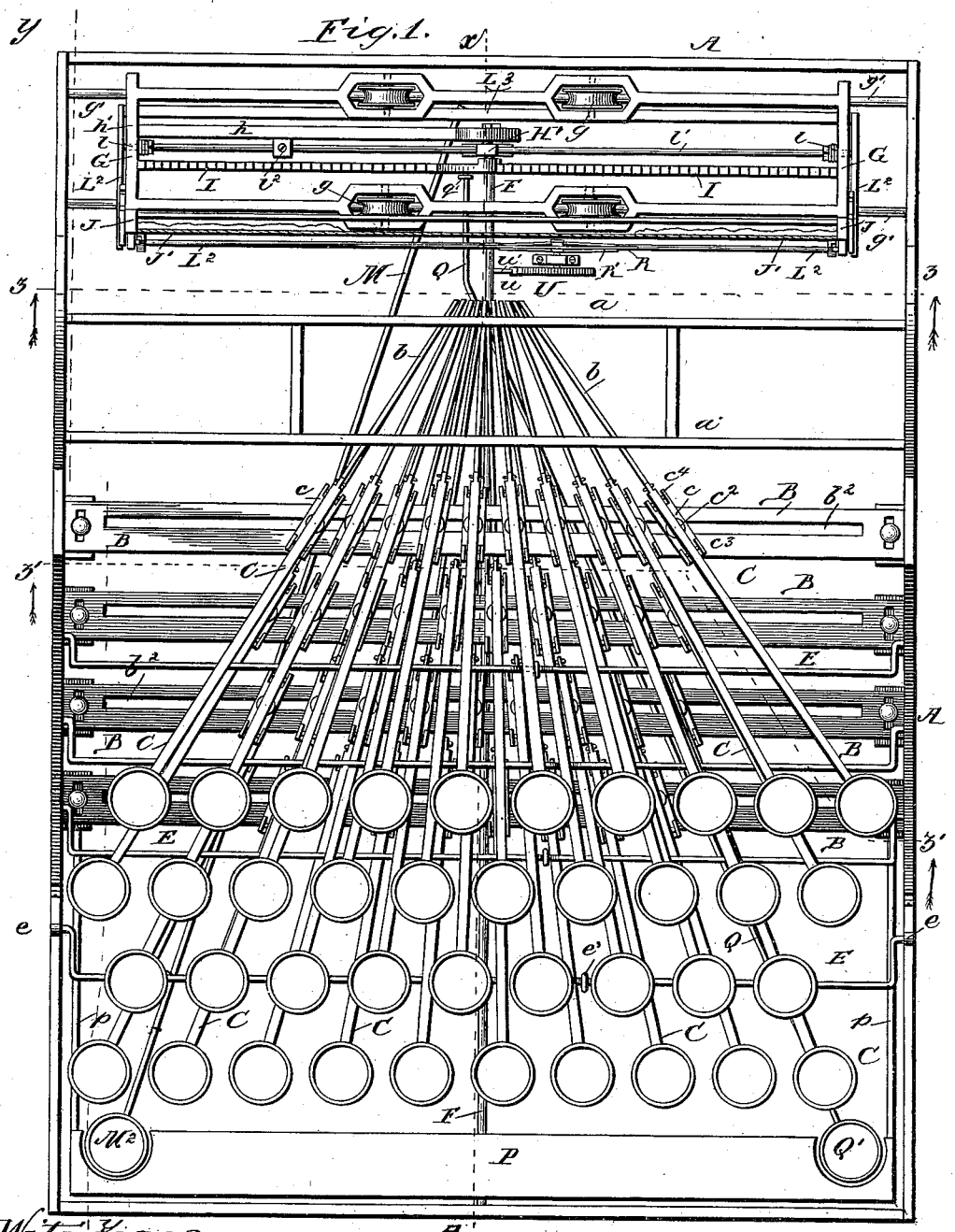
(No Model.) 3 Sheets—Sheet 1.

B. GRANVILLE.

TYPE WRITING MACHINE.

No. 382,036. Patented May 1, 1888.

Fig. 1.



Witnesses.
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(No Model.) 3 Sheets—Sheet 2.

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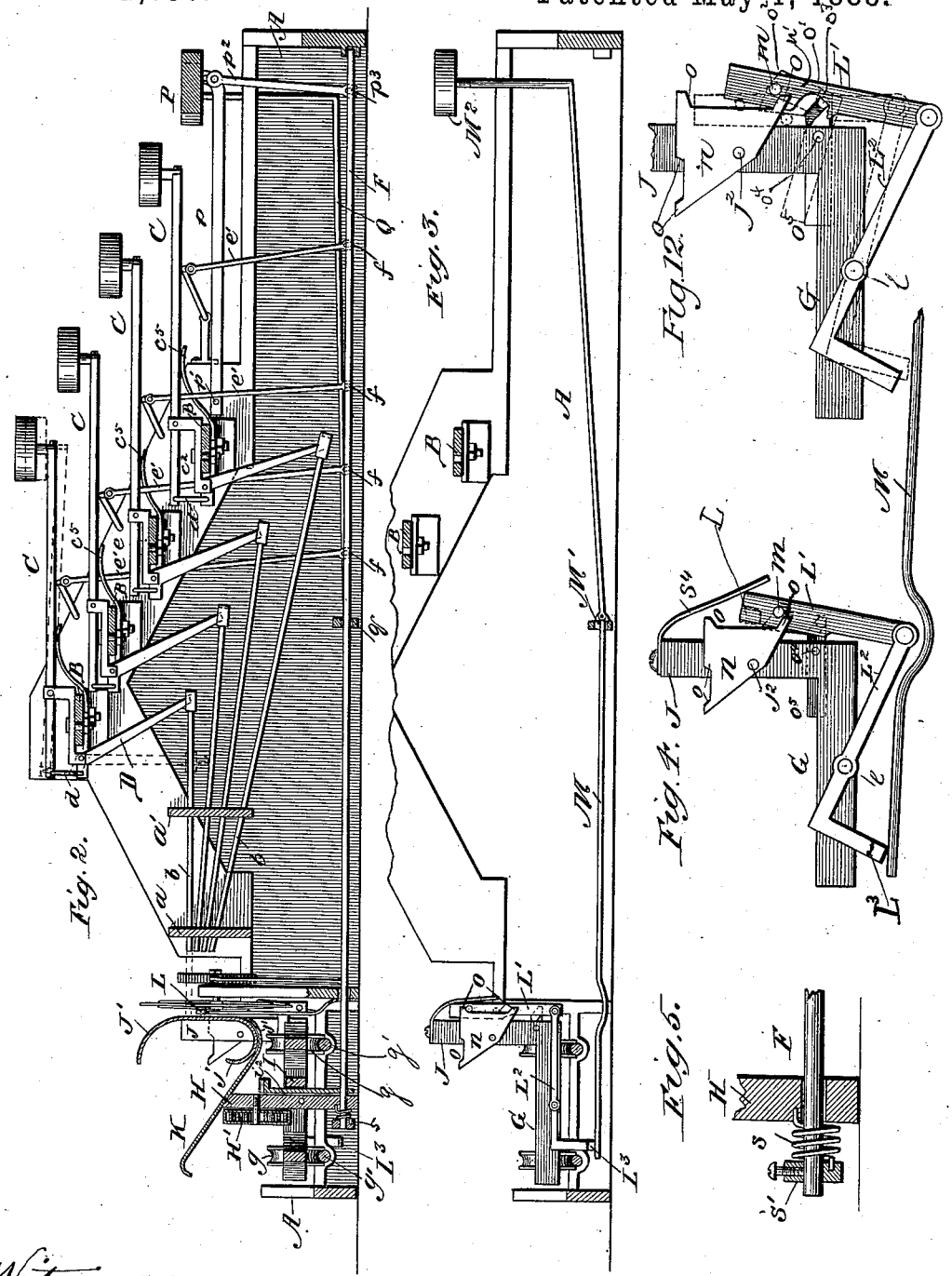

Fig. 2.

Fig. 3.

Fig. 12.

Fig. 4.

Fig. 5.

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(No Model.) 3 Sheets—Sheet 3.

B. GRANVILLE.

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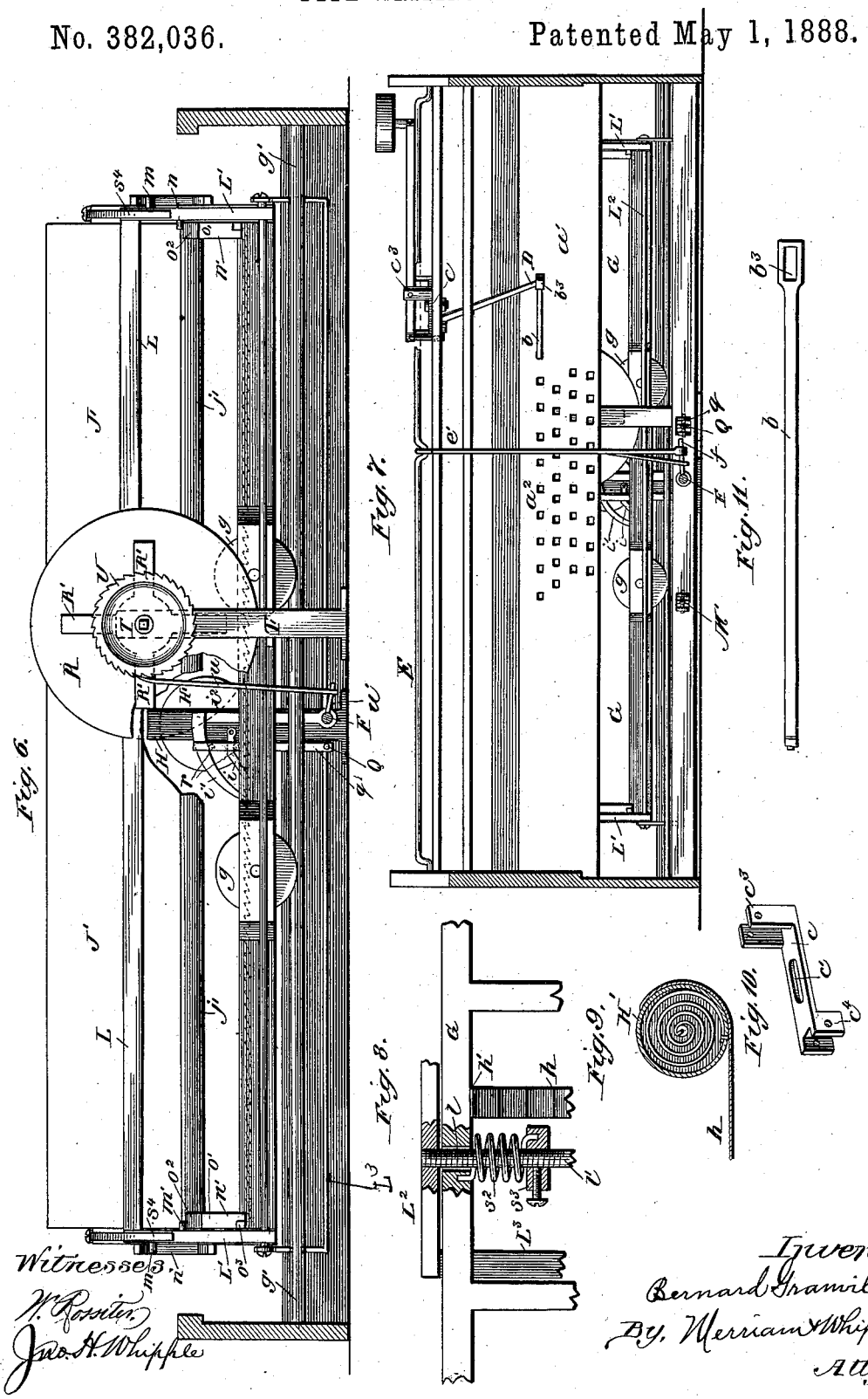

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UNITED STATES PATENT OFFICE.

BERNARD GRANVILLE, OF CHICAGO, ILLINOIS.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 382,036, dated May 1, 1888.

Application filed February 5, 1887. Serial No. 226,617. (No model.)

To all whom it may concern:

Be it known that I, BERNARD GRANVILLE, of Chicago, in the State of Illinois, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

The accompanying drawings illustrate the invention.

Figure 1 is a plan view of my machine. Fig. 2 is a vertical central section taken on line *x x* of Fig. 1, looking toward the right. Fig. 3 is a vertical section of the outer frame, taken on line *y y* of Fig. 1, looking toward the right, a portion of the operating parts being omitted. Figs. 4 and 5 are enlarged details. Fig. 6 is an enlarged cross-section taken on line *z z* of Fig. 1, as will be seen by looking in the direction of the arrow, showing a front elevation of the platen and its carriage. Fig. 7 is a cross section on line *z' z'* of Fig. 1, as will be seen by looking in the direction of the arrow. Figs. 8, 9, 10, 11, and 12 are enlarged details.

A designates the box or stationary frame of the machine. To this frame two plates or rests, *a a'*, are attached. These plates are provided with square or angular holes a^2, and in these holes the type-bars *b* are supported. The holes in the plates are arranged in such position with reference to each other that the type-bars therein are all convergent and when separately thrust forward will all strike the same point on the platen.

A series of bars or supports, B, are arranged in the rear of the plate *a'* for supporting the operating mechanism, which consists of a series of keys or levers, C, to be struck or pressed with the fingers in the usual manner in operating the machine. The keys are each supported upon one of the supports B through a plate or bar, *c*, which is preferably made with an elongated opening, *c'*, in the center, by means whereof it may be adjustably connected to the support by a bolt, c^2, provided with a head and nut adapted to compress the parts together when the bolt is placed in the opening *c'* and passed through an opening or slot, b^2, in the support and the nut tightened underneath. The plates are thus made adjustable in the line of the keys by means of their oblong openings *c'* and adjustable laterally by means of the slots b^2 in the supports. The construction giving such adjustability is, however, not an essential but merely a preferable form.

The plates are provided at their rear ends with upwardly-projecting lugs c^3, to which the keys are pivoted, and which operate as the fulcra of the keys, and at their front ends with downwardly-projecting lugs c^4, to which bell-crank levers D are pivoted, so as to be suspended with their lower ends passing loosely through openings b^3 in the enlarged ends of the type-bars. The bell-crank levers are connected by links *d* to the ends of key-levers, so that each key-lever communicates through a bell-crank lever with a type-bar in such manner that a touch or pressure on the key will cause the type-bar to be projected against the platen, as illustrated by dotted lines in Fig. 2. When the key is released, a spring, c^5, acting in the opposite direction, causes the return of the key-lever, bell-crank levers, and type-bar to their normal position.

The key-levers rest on rods E, which are extended across under the keys, and have cranks at the ends, which are pivoted, as at *e*, to the frame A. To these rods are attached pendants *e'*, having their lower ends bifurcated. Near the bottom of the frame is a rock-shaft, F, which is provided with laterally-projecting arms *f*, corresponding with the pendants, upon which the bifurcated ends of the pendants ride, so that when any key C is depressed it will depress one of the vibrating rods, and through the pendant of said rod bearing upon one of the arms *f* cause a slight rocking of the rock-shaft F.

The carriage G of the machine is supported on wheels *g*, which run upon ways *g'* as the carriage moves back and forth in operation.

At the center of the machine is a fixed post or standard, H, to which a barrel, H', containing a spring, is attached, and upon which a ribbon, *h*, is wound. One end of the ribbon is attached to one end of the frame G at *h'*. The tension of the spring turns the barrel in the direction required to wind the ribbon around the barrel and draw that end of the frame G to which the ribbon is attached close up to the post H, and to counteract this force of the spring upon the frame a ratchet-bar, I, is attached to the frame, and a pawl, *i*, pivoted loosely to the post H, is arranged to hold

the frame against the power of the spring. Another pawl, i', pivoted to an arm, i^2, which is a fixture upon the rock-shaft F, is also arranged to engage the ratchet. At the rear end of the rock-shaft is a spring, s, which has one end fixed to the post H, in which the rock-shaft is journaled, and the other to a collar, s', fixed to the end of the rock-shaft by a set-screw, so that the force of the spring is brought to bear on the rock-shaft in such manner as to return it to its normal position after said shaft has been rocked by a depression of any of the keys which have been released after being depressed.

The rocking of the shaft by the depression of any of the keys swings the arm i^2 back, so that the pawl i' is drawn back and engages in the next notch, and the return motion of said arm with the shaft pushes the carriage along through the distance of the space between the letters or characters successively designed to be printed by the repeated throws of the type-bars.

The front of the carriage is provided with upright posts J, and to these the platen J′ is attached. The face of the platen is in line with the meeting point of the convergent lines of the type-bars when produced.

The platen consists of a metal plate, and its lower edge is curved back, forming about a half-circle, as seen at j. In the rear of the platen is the paper-holder K, which consists of a plate attached at its ends to the posts J and having its center rested upon or attached to the top of the post H. Its lower end is curved to correspond with the curved part of the lower edge of the platen-plate for a short distance, as seen at j', and the space between the paper-holder and platen-plate at this point is just sufficient to allow two or three sheets of paper to pass between them, and when a sheet of paper is passed through this space the curved part of the holder will cause it to be deflected upward over the face of the platen in front of the type-bars. Just below the striking-point of the type-bars a clamp, L, is arranged to press the paper back against the face of the platen. This clamp is connected to and supported by two upright pieces, L′, pivoted at their lower ends to a vibrating frame, L^2, which is pivoted to the carriage-frame at l, said vibrating frame being at this point affixed to a rod, l', which passes loosely through the central post, H, and is journaled in the end bars of the carriage-frame.

The rod l' is provided at each end with a spring, s^2, which has one end attached to the carriage-frame and the other to a collar, s^3, attached to said rod by a set-screw, the connection and arrangement being such that the tension of the spring is brought to keep the vibrating frame in a horizontal position. The top of upright pieces L′ is held by a light spring, s^4, attached to the top of each of the end posts, J, and curved down on the outside of the said pieces and pressing against them. Said upright pieces are also provided with two pins or lugs, m m', projecting from their opposite sides, the one, m, on the outside operating in connection with a plate, n, attached to the posts J on the outside, to guide the clamp L in its upward movement, and the other, m', operating in connection with a vibrating cam, n', on the opposite sides of said posts to guide said clamp in its downward movement.

The plates n are provided along their edges with portions at o extending beyond the face or plane of the platen and a portion between the projecting portions which lies in the plane of the platen, the projecting portions joining the other portion at an incline thereto. The pins m ride on the edges of said plates n when the upright pieces L′ are moving upward and allow the clamp L, attached to said pieces L′ and pressed toward the platen by springs s^4, to come against the paper placed between the clamp and platen when the pins m are passing along over that portion of the edges of said platen which lies in the plane of the platen; but when said pins are passing over the inclined or projecting portions thereof the clamp is thereby carried or held off the paper.

The vibrating cams n' have a straight portion, o', and a bevel portion, o^2, at the upper end, both of which portions project beyond the face or plane of the platen, and the pins m' on each side of the machine ride on these cams when the upright pieces L′ are moving downward, said pins coming first in contact with the beveled or inclined parts o^2. Said pins m', being carried outward by the cams n', force the said upright pieces outward against the springs s^4, so as to move the clamp L back from the paper and the pins m back out of contact with the plate n and hold them so while said pins m' are passing along over the surfaces o^2 o' and until they reach slots or recesses o^3, cut in the bottoms of said cams n'. These slots or recesses extend through the cams n' to the face of the platen and are inclined upward. They are placed at the limit of the downward movement of the pins m', and when said pins pass into said slots the pins m are allowed to come against the edges of the plates n as the springs s^4 bear the uprights L′ inward. The cams n' are pivoted at o^4 to the posts, so that as the pins m' pass into the slots o^3 and upward they can pass between said cams n' and the platen by moving the said cams outward out of their way during the upward movement. The upward movement carries the pins m' just above the top of the cams n', and the lower ends of said cams are provided with a part, o^5, which is extended horizontally from the pivot at o^4, and of sufficient weight to cause said cams to fall back against the platen as soon as the pins m' are raised above their reach, thus bringing the bevel portion o^2 under said pins, so as to receive and throw them outward from the platen, as before described, on the next downward movement.

The rear bar, L^3, of the vibrating frame pro-

jects below the other portions of said frame, and a lever, M, provided with a fulcrum at M′ and having a key, M², is arranged so that by pressing down on said key the opposite end of the lever will elevate the rear of the vibrating frame to the position shown in Fig. 4 and move the end pieces, L′, and clamp L downward, causing the clamp to be raised from the paper and, through the instrumentality of the cams *n′* and the features thereof just described, carried over it for the distance of the space between the lines of writing, and to be then, by the action of spring *s*⁴, brought into contact with it again; and when the key M² is released the spring *s*², which tends to maintain the vibrating frame in a horizontal position, comes into operation and raises the front of the vibrating frame, thus causing the clamp to be raised and the paper to be thereby carried up the distance of the space between lines.

The clamp L is provided with a roughened or rubber facing on its inner surface, which comes against the paper, in order to better adapt it to seize hold of the paper and carry it up without slipping on it, thus insuring uniformity in the spaces between the lines of writing. For the purpose of varying the space between the lines of writing the plates *n* are pivoted or detachably connected to the posts J at *j*² and on different portions of their edges have the space between the cams *o* varied to correspond with the varying distance between the lines of writing, so that by turning the different edges of said plates to the front the space between the lines will be varied to correspond with the space between the projecting cams of the plate by the action of the pins *m* thereon.

The spacing between words is effected through the rock-shaft F by means of a bar, P, which is provided at each end with arms *p*, by which it is pivotally connected with the stationary frame of the machine at *p′* upon each side. This bar P is provided with a pendant, *p*², whose lower end is bifurcated and rides on an arm of the rock-shaft F at *p*³, the same as *f*, in like manner as do the pendants *e′*, so that by depressing the bar P the shaft is rocked and the carriage is moved forward by each return-impulse of the shaft one notch on the ratchet I without operating the type-bars.

The rod *l′* of the carriage is provided with an adjustable stop, *l*², arranged to be tightened on the rod by a set-screw, and in starting to write the carriage is moved to the right until the stop *l*² is brought against the central post, H, the ribbon being wound upon the barrel H′. This leaves a margin at the left of the page, and the width of the margin may be varied by changing the position of the stop on the rod. As the writing proceeds, the carriage, by the operation of the keys C and the bar P upon the rock-shaft F and of the pawls upon the ratchet, as before described, is moved to the left and the ribbon unwound from the barrel until the opposite end of the carriage is brought against the center post. When the carriage is in the last-named position, by raising the pawls *i i′* the spring in the barrel will wind up the ribbon and cause the carriage to move back to the beginning, so as to bring the left-hand side of the page to the striking-point of the type-bars. For the purpose of raising the pawls to effect the result last mentioned a lever, Q, is employed having a fulcrum at *q*, and provided with a key or button, Q′, to be depressed. The depression of this key causes the opposite end of the lever to be elevated, so as to elevate a bar or arm, *q′*, of said lever, which extends upward and is provided with two lugs, *r*, arranged to engage the under side of the pawls and raise them together free from the ratchet, so that the barrel-spring will operate to wind up the ribbon and move the carriage back, as described.

The ink-ribbon R is a circular piece or disk of ribbon supported between two clamps, R′, and having its edge projecting beyond the clamps. The clamps are connected to a shaft, T, journaled in a post, T′, or stationary portion of the machine, and provided with a ratchet-wheel, U, with which a spring-pawl, *u*, supported on an arm, *u′*, of the rock-shaft F, is made to engage, so that the rocking of said shaft by the operation of the keys, as before described, will cause the pawl *u* to be lowered and become engaged with the next lower notch of the ratchet-wheel, so that the return movements of the rock-shaft will operate through said pawl to turn the ink-ribbon and present a fresh portion of its surface to each succeeding type when the machine is in operation, the disk turning round and round during the operation. The striking-point of the type-bars is near the left edge of the ink-ribbon just above the clamp L. The platen is perpendicular to the base of the machine, or nearly so, and faces the operator, so that as the operation of writing is going on the writing moves from behind the ink-ribbon into view as fast as it is done. The operator is thus enabled to see the work as he does it.

This plan of machine also enables the work of type-writing to be done with less motion than heretofore. The type-bars arranged as here shown may be made to do excellent work when having less than one-inch movement from their position of rest to the platen. The touch is thus materially lightened.

Another advantage of this plan is that every motion of the machine can be effected through a manipulation of the key-board.

I am aware that horizontal keys and type-bars are shown in the United States patent granted to Drummond on the 18th day of December, 1877, in which the types are on flexible ends of the bars, but without a paper-carriage opposite to it, and the visibility of the print is not secured; but I do not broadly claim these horizontal type-bars and key-levers, but only these in combination with other parts whereby the result explained is secured.

I am also aware of the existence prior to my invention of an inking-disk interposed between a type and platen, as shown in United States patent of Spiro, No. 355,418; also, that a carriage has been retracted by a spring and moved forward step by step by the keys and intermediate mechanism and returned automatically on reaching the limit of its movement. These things I do not broadly claim, but only the improvements thereon described, whereby I am enabled to have plain view of the character immediately upon the formation thereof, and also entire control of the carriage by manipulation of the keys alone.

Having thus described my invention, what I desire to secure by Letters Patent is—

1. In a type-writer, and in combination, pivoted key-levers substantially horizontal in the machine, sliding and converging type-bars, also substantially horizontal, having type on their end faces, and intermediate connections between the key-levers and the type-bars, a laterally-moving carriage, and a platen in rear of, opposite to, and facing the ends of the type-bars, and an inking mechanism, all substantially as and for the purpose described.

2. In a type-writer, and in combination, pivoted key-levers substantially horizontal in the machine, sliding and converging type-bars, also substantially horizontal, having type on their end faces, and intermediate connections between the key-levers and the type-bars, a laterally-moving paper-carriage, and a platen in rear of, opposite to, and facing the ends of the type-bars, and a vertically-arranged and rotating ink-disk, all substantially as and for the purpose described.

3. The combination of the plates a a', provided with holes a^2, in convergent alignment, type-bars b, of uniform size corresponding to that of the holes a^2, bell-crank levers D, key-levers C, vibrating rods E, pendants e', and rock shaft F, provided with lateral arms, and mechanism for operating the carriage, substantially as specified.

4. The combination of the key-levers C, the vibrating bars E, the pendants e', the rock-shaft F, located near the base of the machine and provided with lateral arms f, spring s, and arm i^2, the pawl i', and the ratchet I, substantially as specified.

5. In a type-writing machine, the combination, with horizontal type-bars, and with a platen and a carriage provided with a ratchet-bar, I, and connected with a stationary part of the machine through a retractile spring, of the pawls i i' and the lever Q, having an upright bar, q', provided with lugs r, engaging said pawls, said lever extending back to the key-board, where it is connected with a key, Q', as and for the purpose specified.

6. In a type-writing machine, the combination, with a group of convergent type-bars placed horizontally in the machine, of a platen and a rotary ink-disk supported vertically between the type and platen, with one edge covering the printing point, and mechanism, substantially as shown, connecting the disk with the operating keys, as and for the purpose specified.

7. The combination, with a vibrating frame and the upright pieces L', provided with a clamp, L, of cam-plates o, arranged to engage pins m on one side of the uprights and guide the motion of said uprights in one direction, and vibrating cams n', arranged to engage with pins m' on the opposite side of the uprights and guide their motion in the other direction, substantially as specified.

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