

(No Model.)

3 Sheets—Sheet 1.

C. SPIRO.
TYPE WRITING MACHINE.

No. 447,438.

Patented Mar. 3, 1891.

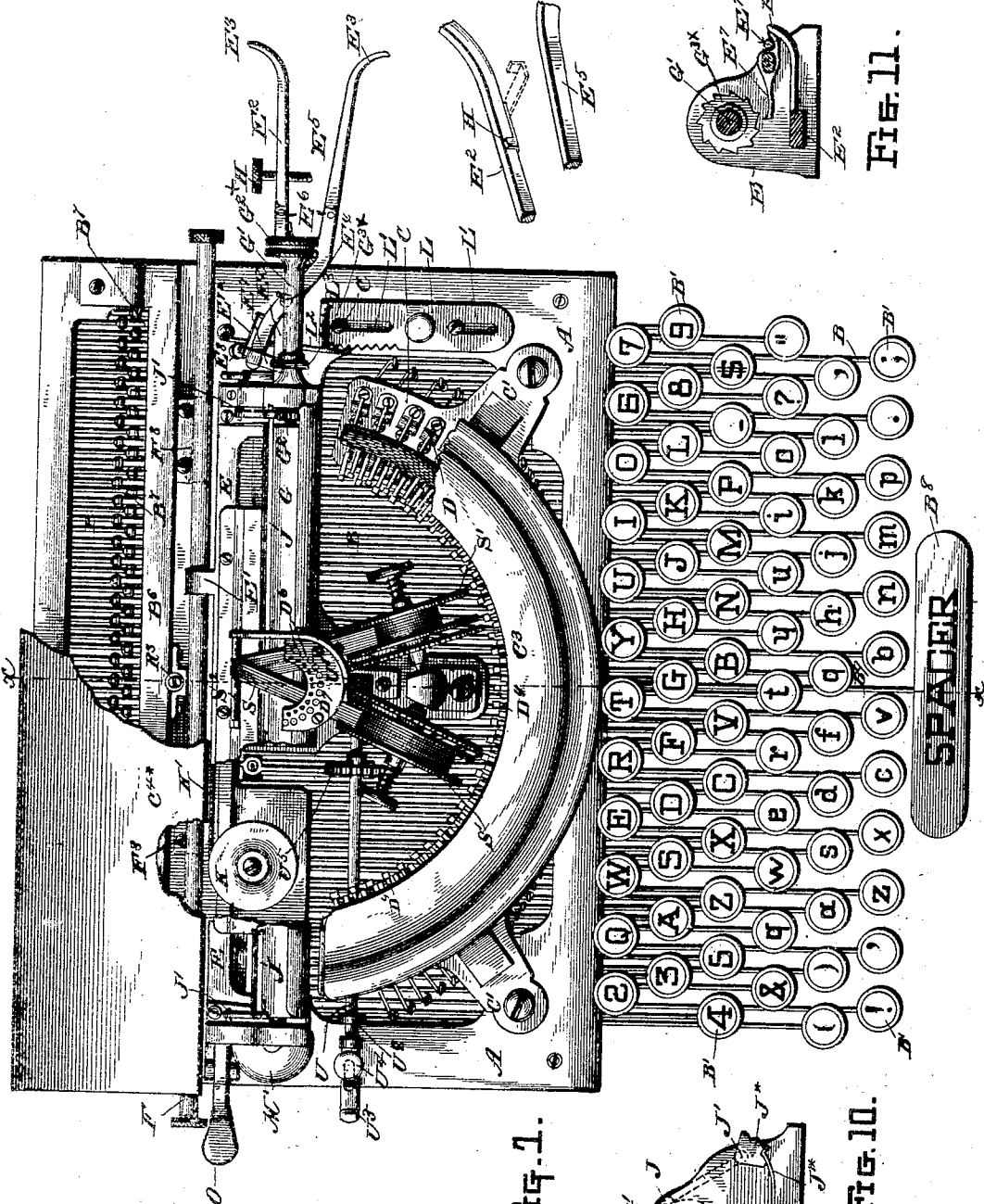


FIG. 1.

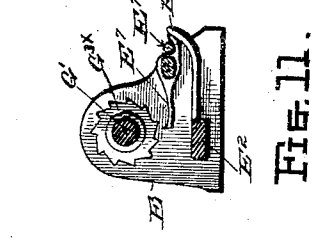


FIG. 11.

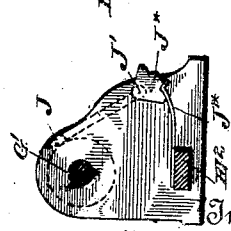


FIG. 10.

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(No Model.)

3 Sheets—Sheet 3.

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TYPE WRITING MACHINE.

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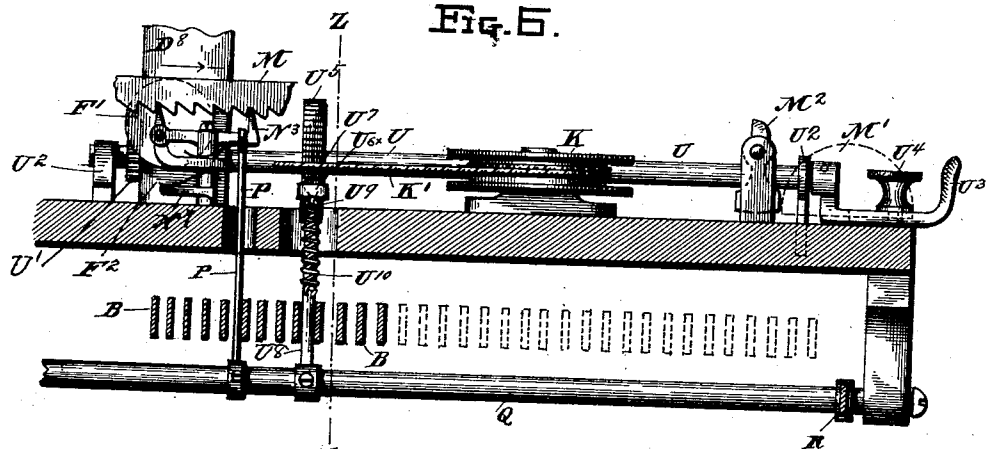


Fig. 6.

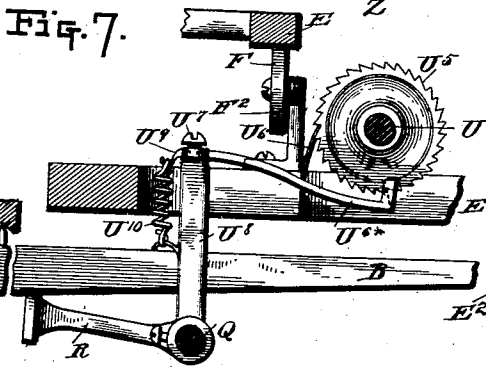


Fig. 7.

Fig. 8.

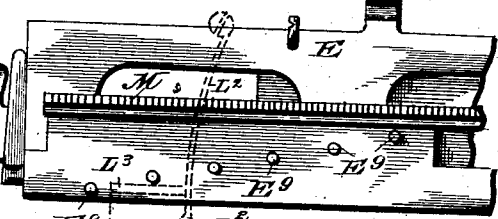


Fig. 9.

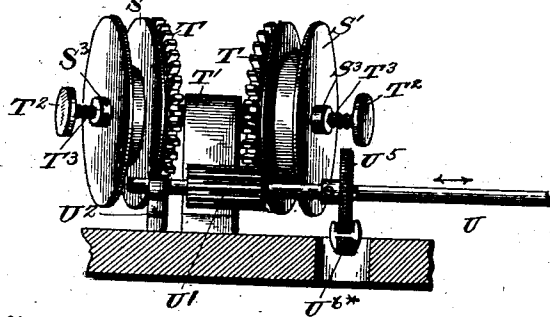
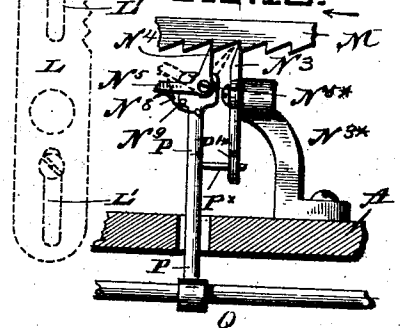


Fig. 12.



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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. 447,438, dated March 3, 1891.

Application filed September 14, 1887. Serial No. 249,684. (No model.)

To all whom it may concern:

Be it known that I, CHARLES SPIRO, a citizen of the United States, residing at New York, in the county of New York, State of New York, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has relation to type-writing machines of that class in which are employed type-bars and key-levers connected therewith, each bar and lever being adapted to print a single character; and among the objects of the invention are to produce a practicable, serviceable, rapid type-writing machine consisting of as few parts as possible, and so constructed as to expose the printed work to the view of the operator; to construct and arrange the type-bars so that it will be impossible in the most rapid operation of the key-levers practically attainable to cause any two bars employed to come into contact with each other during the operation of approaching and leaving the printing-point; to so connect the type-bars and key-levers and other movable parts of the machine as to reduce to a minimum the friction of the parts upon each other, and the required depression of a key in order, to give the necessary movement to a type-bar to cause an impression to be made from the type thereon.

Other objects and advantages of the invention will appear in the following description, and the novel features thereof will be particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a plan (with portions of the front and rear shields and carriage removed) of a type-writing machine constructed in accordance with my invention. Fig. 2 is a central vertical section on the line xx of Fig. 1. Fig. 2^a is a detail in perspective of portions of the carriage-supporting rod and of the slotted lug of the carriage-frame. Figs. 3, 4, and 5 are details of the pawl mechanism employed in connection with the feeding of the carriage. Fig. 6 is a transverse section on the line YY of Fig. 2, looking toward the front of the machine. Fig. 7 is a central vertical longitudinal section on the line ZZ , Fig. 6, illustrating the devices employed for giving a step-by-

step motion to the inking-ribbons. Fig. 8 is a bottom plan of a portion of the carriage and means for adjusting it as to the length of line to be printed. Fig. 9 is a front elevation of the ribbon-spools and a portion of the mechanism for changing the direction of their rotation. Fig. 10 is an end view of the carriage, showing the paper-holding bail, its sector, and detent-spring. Fig. 11 is a similar view of the carriage, showing the line-spacing pawl and its co-operating cam. Fig. 12 is a modified construction and arrangement of the pawls for feeding the carriage.

Similar letters of reference indicate like parts in all the figures of the drawings.

A represents the base of the machine, which in this instance is supported by legs A' . At the rear edge of the base is a depending flange A^2 , having formed therein two parallel grooves A^3 , extending from side to side of the base and preferably V-shaped in cross-section.

B represents a key-lever, having a key B' at one end, and having at the opposite or rear end a pin, bar, or plate B^2 , projecting slightly above the upper edge of the key-lever and terminating in a V-edge, which is arranged in one of the grooves A^3 of the base, where by a knife-edge bearing is provided for each of the key-levers. Now by providing two grooves A^3 a closer lateral arrangement of a series of key-levers is possible where, as in this instance, the bearing pin or plate B^2 is secured to the side or sides of the bar and projects therefrom, as shown in end view, immediately at the right of the knife-edge bearings of the key-levers, in Fig. 2. It is evident that the knife-edge bearing may be an integral projection from the upper edge of the type-bar itself, as shown by dotted lines B^3 , Fig. 2. Instead of employing a flatspring for sustaining the key-lever in its upper position, said spring having frictional contact with the under surface of the key-lever, as in the usual construction, I employ a coiled spring B^4 , connected with the key-lever at its upper edge, as at B^5 , and having its opposite or upper end connected with a rigid bar B^6 , extending crosswise over and above the base, in this instance, by means of pins B^7 , projecting from the bar B^6 , so that it will be seen that the least possible friction exists between

the bar, the lever, and the spring, whereby the amount of pressure required to depress a key-lever is reduced to a minimum when the knife-edge bearing and spring are so employed. At the front of the base and extending from side to side thereof is a series of depending pins or rods A¹, which serve their common and well-known function as guides for the key-levers. A rubber bumper A^{4x} extends under and across the base to cushion the levers.

In the machine as illustrated the key-board comprises capitals and lower-case letters arranged in separate groups—that is, the capitals occupying the upper portion of the key-board and the lower-case letters the lower portion, the punctuation-marks being with the lower-case letters and the numbers with the capitals. A single key and lever B⁸ B⁹ serve as the spacer-lever of the machine in a manner similar to the remainder of the key-levers of the system.

C represents a table supported on the base by brackets or uprights C¹. The table C is formed on a circle the center of which is the printing-point of the machine and has mounted thereon the type-bar bracket C².

C³ is the front shield, and C^{3*} the rear shield, each of which consists of sheet or other metal, and is placed in the position shown for the purpose of protecting the mechanism arranged therein or thereunder. Each of the brackets C² is secured to the table by means of a screw C⁴, (see Fig. 2,) and is slotted to form ears C⁵, between which the type-bars D take bearing by means of trunnions D¹ passing through the ears of the bracket. Each of the type-bars is somewhat like a "bell-crank" lever, as it is provided between its ends and near its trunnions with a projection D^{1x}, perforated for the reception of a connecting-rod D², which extends from the projection of the type-bar to the key-lever, to which it is connected, as at D³, between the key and the point of pivotal connection of the key-lever with the base of the machine. In other words, instead of extending the type-bar beyond its pivots or trunnions and attaching the connecting-rod at the end of the bar, I connect the rod to the bar between its ends and arrange its trunnions at the extremity of the bar, and in this manner secure a practically-straight draft from the key-lever to the type-bar and produce a downward motion of the free end of the latter, whereby it is adapted to print upon the top of the platen and return to its position of rest, and thus leave exposed to the view of the operator the work accomplished by the machine, thus also obviating the necessity of raising the carriage of the machine to inspect the work and securing the advantageous embodiment of a lever of the second class in a type-writing machine. In this construction I also embody another of the many features, all of which tend to reduce the friction of the parts and the amount of pressure and the extent of a de-

pression of a key required in order to produce an impression, in that the type-bar descends toward the printing-point instead of having to be lifted to it, as in some previous arrangements. In returning to the position of rest the type-bars strike against a cushioning-ring C^{3x}, which is covered with cloth or leather and supported in any suitable manner upon the table C.

Each of the type-bars, near its type D¹, is provided with a depending lug D⁵, which is adapted to pass, at the time an impressor is made, between two of a series of pins D⁶, projecting upwardly from a plate D⁷, arranged near the printing-point of the machine, and supported by brackets D⁸, mounted on the base A. These elements are comprised in means for locking the type-bars to secure a perfect alignment of the printed work and to permit of the use of very thin resilient metal in making the type-bars, and of imperfect—that is, not necessarily accurate—bearings for the type-bar trunnions in its bracket; but no claim is herein made for these features, as they constitute the subject-matter of my patent, No. 400,265, dated March 26, 1889.

E represents the carriage, which at its rear edge is provided with two lugs E¹, which are bored and slotted to embrace the round head of a bracket or standard F, secured to the base A by means of the lugs F⁸ and extending across the same, there being one of these lugs near each end of the machine, as seen in Fig. 1. By slotting and boring the lugs, the diameter of the bore being greater than that of the slot, it will be seen that the carriage is adapted to reciprocate across the base on the round portion of the bracket or standard, but cannot be lifted when the lugs are upon the web of the bracket, the lug acting as a hinge by reason of the walls of the slots coming into contact with the solid portion of the neck of the bracket or standard. In other words, the carriage is not hinged to the bracket or standard. The locking-plate D⁷ over the platen also prevents any upward swing or hinge movement of the carriage. Directly underneath the front edge of the carriage (and preferably in line from front to rear with the printing-point of the machine) is a roller F¹, supported by a bracket F², secured upon the base A. This gives a support always opposite the printing-point. The bracket or standard F and roller F¹ provide three points of support for the carriage, and also permit of its travel across the base.

G represents the platen of the machine, which is supported in brackets at the ends of the carriage, from which platen extends a shaft G¹, by which the platen may be rotated for line-spacing, it being held against displacement, as usual, by a ratchet G² and a spring-detent (not shown) operating therewith.

E² represents a handle extending from one end of the carriage, which handle is curved,

as at E³, to facilitate drawing the carriage from left to right across the machine, as in beginning a new line of work. To the handle E² is pivoted, as at E⁴, a companion handle E⁵, the end of which is also curved, but in an opposite direction to the end E³ of the opposite handle. Each of the handles E² E³ are jointed, as at E⁶, so that they may be folded in one direction parallel with the side of the machine, in order to occupy less space in packing for shipment. The shaft G' of the platen is provided with a thumb-nut G^{2x} for the purpose of rotating the shaft in either direction, and also with a ratchet G^{3x}. This ratchet is operated by a pawl E⁷, mounted on the end of the handle E⁵, and thrown into contact with the ratchet by a spring E^{7x}. The pawl E⁷ projects beyond the handle and comes into contact with a cam-shaped elevation E⁸ on the carriage. Now the object and purpose of providing two handles to the carriage, one of them carrying a pawl, is that in the act of drawing the carriage from left to right across the machine to begin a new line the pivoted handle may, in the act of grasping the two, be brought toward the rigid handle, and thus the pawl be carried off from the cam E⁸ toward and up into contact with the ratchet on the platen-shaft, and thus rotate the platen the distance from one line to another.

Whenever it is desired to rotate the platen a greater or less distance, an adjusting device—such as the thumb screw or latch H—is mounted on one of the handles in a manner to be brought into the path of the other handle, and thus limit the distance which the pivoted handle is moved when grasping the two to draw the carriage along. In case the latch is used it is swung out, as shown in dotted lines in the illustration at the side of Fig. 1.

I, Fig. 2, represents a pressure-roller employed in connection with the platen to retain the paper in feeding-contact therewith, a spring I' being arranged at each end of the carriage and provided with suitable bearings, serving to maintain the roller I in a proper relative position with the platen.

J is a rod or bail under which the leading end of the sheet is passed, so as to retain the paper smoothly on the platen, which bail is pivoted, as at J', Fig. 10, in the end brackets of the carriage and terminates in a notched sector J^x, held in open and closed position by a spring-detent J^{xx}.

The carriage is fed from right to left by means of a spring-barrel K and a cord K' extending therefrom to the carriage, the barrel being fixed to the base of the machine below the carriage. The under side of the carriage is provided with a series of pins E⁹, arranged on a line diagonal to that of the edge of the carriage, and on the base of the machine is a plate L, having slots L', through which screws pass to secure the plate movably on the base. The edge of the plate is serrated to receive a spring-detent L², which

serves to retain the plate in an adjusted position. Now it will be seen that by moving the plate L toward and under the carriage the upwardly-bent end L³ thereof may be brought into the path of any one of the pins E⁹, and thus prevent a further movement of the carriage to the right to determine the marginal line at which the printing shall begin.

On the under side of the carriage is fixed a rack-bar M, with which a pawl mechanism arranged beneath the carriage co-operates to feed the same by releasing the carriage, so that it may be drawn from right to left by the cord K' and spring-barrel K. A bell M' is fixed to the base at its left side, and a trip-hammer M² is pivoted near the bell upon the base, so as to be actuated in the well-known manner by a lug (not shown) depending from the carriage for the purpose of indicating the end of a line in the printed work.

The carriage feed or releasing pawls which I have devised are arranged immediately beneath the rack M. A sleeve N, Fig. 3, having a cross bar or arm N' at its top, is mounted on the base by means of a screw N², passing through the sleeve and into the base, so that the sleeve is capable of an oscillatory movement around the screw. At one end of the arm N' is a pallet, projection, or fixed pawl N³, and at the other end of the cross-bar N' is a pivoted pawl N⁴, which is extended beyond its pivot angularly to form an arm N⁵. Between this arm and cross-bar is a flat spring N⁶, which has a tendency to press the arm N⁵ downwardly, and which will yield sufficiently to permit of the pawl N⁴ being thrown entirely out of connection with the rack M by means of a releasing-lever O, (see Fig. 1,) having an upright pin which lifts arm N⁵, whereby the carriage may be moved independently of the pawls in either direction across the machine when said lever O is depressed at its outer end and brought into contact with the arm N⁵ of the pivoted pawl. Below the pivoted pawl and projecting from the sleeve N is a bracket N⁷, upon which is a spring N⁸, which spring has a tendency to lift the arm N⁵, and serves to cushion the pivoted pawl when it comes into contact with the rack, and also allows the point of the said pivoted pawl to move with the rack the distance of one tooth whenever the fixed pawl N³ is moved out of contact with the rack. A pin N⁹ projects upwardly from the bracket N⁷ into the path of the arm N⁵ of the pivoted pawl and serves to determine the extent of the movement of said arm, the pawl, rack, and carriage. The pivot of the main pawl is perpendicular to the face of the teeth of the rack. (By "face of the teeth of the rack" I mean the part between the sides thereof.) A rock-arm P extends from a rock-shaft Q upwardly through the base and is bifurcated at its upper end to embrace the rigid cross bar or arm N'. The rock-shaft Q is supported in hangers Q' depending from the base and has rigidly mounted thereon a bail R, which extends

underneath the entire series of key-levers. This bail is connected by a rod R' to a coiled spring R², and the said spring is connected with a screw R³, mounted upon the cross-bar B⁶. The object of the screw is to regulate the tension of the spring and therefore the pressure required to depress any key-lever of the system. It is noted that each of the springs B⁴ serve to hold in place the knife-edge bearings. By connecting the bail as above described with the adjusting device R³ simplicity of construction for adjusting the tension of all the key-levers is secured.

Now it will be noticed that as the spacer-lever or any lever is depressed it depresses the bail P, which causes the rock-shaft Q to oscillate and motion is imparted to the rod P, so that the pawl N³ is caused after an impression is made to move out of contact with the rack-bar M, and the movable pawl N⁴ is brought into contact with said rack-bar and is cushioned and allowed to move the distance of one tooth by the spring N⁵. An opposite movement of the rod P brings the pawl N³ into contact with the next tooth of the rack-bar M, the carriage having moved by reason of the pivotal action of the pawl N⁴ that distance, and throws the pawl N³ out of contact with the rack-bar, when its spring N⁵ causes said pawl to move the distance of one tooth, so as to take contact therewith at the next release of the fixed pawl N³. In this manner a step-by-step movement of the carriage is secured, and is accomplished without the use of pawls which vibrate in the same plane in one direction and without any joint vibration, or without any vibration in which both pawls move simultaneously in one direction. My fixed and movable pawls oscillate around a common center, each moving always in a direction opposite to that of the other.

S represents the inking-ribbon, which is fed from spools S' and carried over the platen and around a bar S², projecting at one side and parallel with the platen. This bar may be formed on or secured to the bracket D⁸, which supports the locking-plate. The ribbon passes and repasses over the platen at such an angle to expose that portion nearest to the platen for contact of the type therewith. Each of the ribbon-spools is provided with a miter or other gear T, Fig. 9, and is mounted on a bracket T', arranged on the base A and between the spools. A screw T² is threaded in the end of the shaft, on which each spool revolves, and a coiled spring T³ is arranged on the screw to bear against the hub S³ of the spool S', so that a desired tension may be maintained in the inking-ribbon. A long pinion U' is arranged upon a shaft U, mounted in suitable bearings U², projecting upwardly from the base and terminating in a slotted plate U³, through which a thumb-screw U⁴ passes into the base, so that by loosening the said thumb-screw the shaft and the long pinion may be reciprocated in the

bearings, so as to cause the pinion to mesh with one or the other of the gears T of the ribbon-spools. A ratchet U⁵ is mounted on the shaft U, and a spring-detent U⁶, Fig. 7, projecting from the base against the ratchet, retains the ratchet steady after each movement thereof. This ratchet is operated by a pawl U^{6x}, pivotally mounted, as at U⁷, on the end of a rock-arm U⁸, projecting upwardly from the rock-shaft Q. The pawl U^{6x} is bifurcated at one end to embrace the ratchet, and is extended beyond its pivot U⁷ in the form of a hook U⁹, with which is connected a coiled spring U¹⁰, one end of which is secured to the arm U⁸. By this construction the pawl has a vertical movement and a lateral movement at its operative or front end, so that it oscillates to rotate the ratchet and moves laterally with the shaft U and the ratchet when the same is reciprocated to bring the long pinion into mesh with either of the gears of the ribbon-spools.

Now it will be seen that at the depression of any of the key-levers, the bail, rock-shaft, and rock-arm U⁸ are oscillated and movement is conveyed to the pawl, ratchet, and one of the ribbon-spools, so that the ribbon is moved step by step and is wound upon one of the spools and unwound from the other. Now by shifting the long pinion the ribbon may be wound upon the companion spool.

In the modified construction and arrangement of the carriage-releasing pawls (see Fig. 12) the movable pawl N⁴ is pivoted to the rock-arm P, as at N^{5x}, and cushioned by a spring N⁵, secured to the rock-arm and projecting beneath the arm N⁵. The banking-pin N³ is also mounted on the rock-shaft beneath the arm of the pawl. The fixed pawl N³ is in this modification pivoted to a bracket N^{3x}, mounted on the base of the machine, and is connected with the rock-arm P by means of a pin or rod P^x, working in a longitudinal slot P^x in the pawl N³ at a point below its pivot. The operation is the same as in the other construction, in that when the pawl N³ is in mesh with the rack the pawl N⁴ is out of mesh and is forced by the spring N⁵ into line with a succeeding tooth of the rack-bar and meshes therewith on a movement of the rock-arm toward the bar, which movement withdraws the pawl N³ from the bar.

Having described my invention and its operation, what I claim is—

1. The combination, with the paper-carriage and platen of a type-writing machine, of a rack-bar secured to the carriage and two ratchets mounted one on each side of a vertical pivot for successive oscillation into and out of contact with the bar and one of them pivoted to move, at a right angle to the direction of its oscillation, substantially as specified.
2. The combination, with the rack-bar of a carriage of a type-writing machine, of two pawls carried by a support, oscillating on a fixed vertical pivot and each mounted for oscillation simultaneously in opposite directions

and one pivoted for movement substantially lengthwise of the rack-bar, substantially as specified.

3. The combination, with the rack-bar of a type-writing machine, of two pawls mounted for successive oscillation into and out of contact with said bar and one of them pivoted for movement at substantially a right angle to the direction of its oscillation, and a rod pivotally connected with the non-pivoted pawl for producing the oscillation thereof, and connected by a bail with the key-levers of the machine, whereby the depression of a key-lever operates the pawls, substantially as specified.

4. The combination, with the rack-bar of a carriage of a type-writing machine, of two pawls on opposite sides of a vertical rack and extending substantially parallel with said rack and mounted for oscillation simultaneously in opposite directions, one of said pawls being mounted for movement at an angle to the direction of its oscillatory movement, and a stop to limit said angular movement, substantially as specified.

5. The combination, with the rack-bar of a carriage of a type-writing machine, of two pawls mounted for oscillation simultaneously in opposite directions, one of said pawls being mounted for a movement at an angle to the direction of its oscillatory movement, and a spring for cushioning the pawl in said angular movement, substantially as specified.

6. The combination, with the rack-bar of a carriage of a type-writing machine, of two pawls mounted for oscillation simultaneously in opposite directions, one of said pawls being mounted for movement independently of its oscillation, and a lever adapted to engage directly said pawl for producing at will said independent movement, substantially as specified.

7. In a type-writing machine, the combination, with its series of key-levers and reciprocating carriage, of a bail arranged to be operated by the levers and rigidly secured to a rock-shaft, and an arm rigidly connected with the rock-shaft, and two pawls, one of which is connected with the arm and both pivotally supported for simultaneous horizontal movement into and out of contact with a rack-bar secured lengthwise to the carriage of the machine, and a pivotal connection for the pawls one with the other, whereby one is rigid and the other movable lengthwise of the

rack-bar and carriage, substantially as specified.

8. The combination, with the carriage of a type-writing machine having a diagonally-disposed series of pins depending therefrom, of a sliding plate mounted on a fixed part of the machine adjacent to the carriage and for movement into contact with any one of the pins depending therefrom, substantially as specified.

9. In a type-writing machine, the combination, with the rack-bar, of a vertical sleeve upon a fixed vertical pivot perpendicular to the face of the teeth of the rack and having lateral arms, one of which terminates in a pawl and the other having pivotally connected therewith another pawl, substantially as described.

10. In a type-writing machine, the combination of the rack-bar and a sleeve mounted to oscillate upon a fixed vertical pivot perpendicular to the face of the teeth of the rack and terminating at its upper end in lateral arms, one of which is formed with a pawl, and a pawl pivotally connected with the other arm and having an extension and a spring bearing on said extension, substantially as shown and described.

11. The combination, with a type-writing machine inking-ribbon and its spools and spool-operating gears, of a shaft having thereon a pinion and a ratchet and capable of longitudinal movement to bring the pinion into mesh with either spool-gear, of a pawl pivoted to follow the ratchet in the longitudinal movements thereof and to ride the teeth of the ratchet, substantially as specified.

12. The combination of the ink-ribbon spools of a type-writing machine and the mechanism for operating the same, said mechanism comprising a ratchet mounted for rotation and for longitudinal movement with the shaft upon which it is mounted, a pawl pivoted to ride the teeth of and follow the ratchet, and a rock-shaft and arm connected with the pawl and with the series of key-levers of the machine, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses

CHARLES SPIRO.

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