(No Model.) 2 Sheets—Sheet 1.

J. F. McLAUGHLIN.

TYPE WRITING MACHINE.

No. 421,836. Patented Feb. 18, 1890.

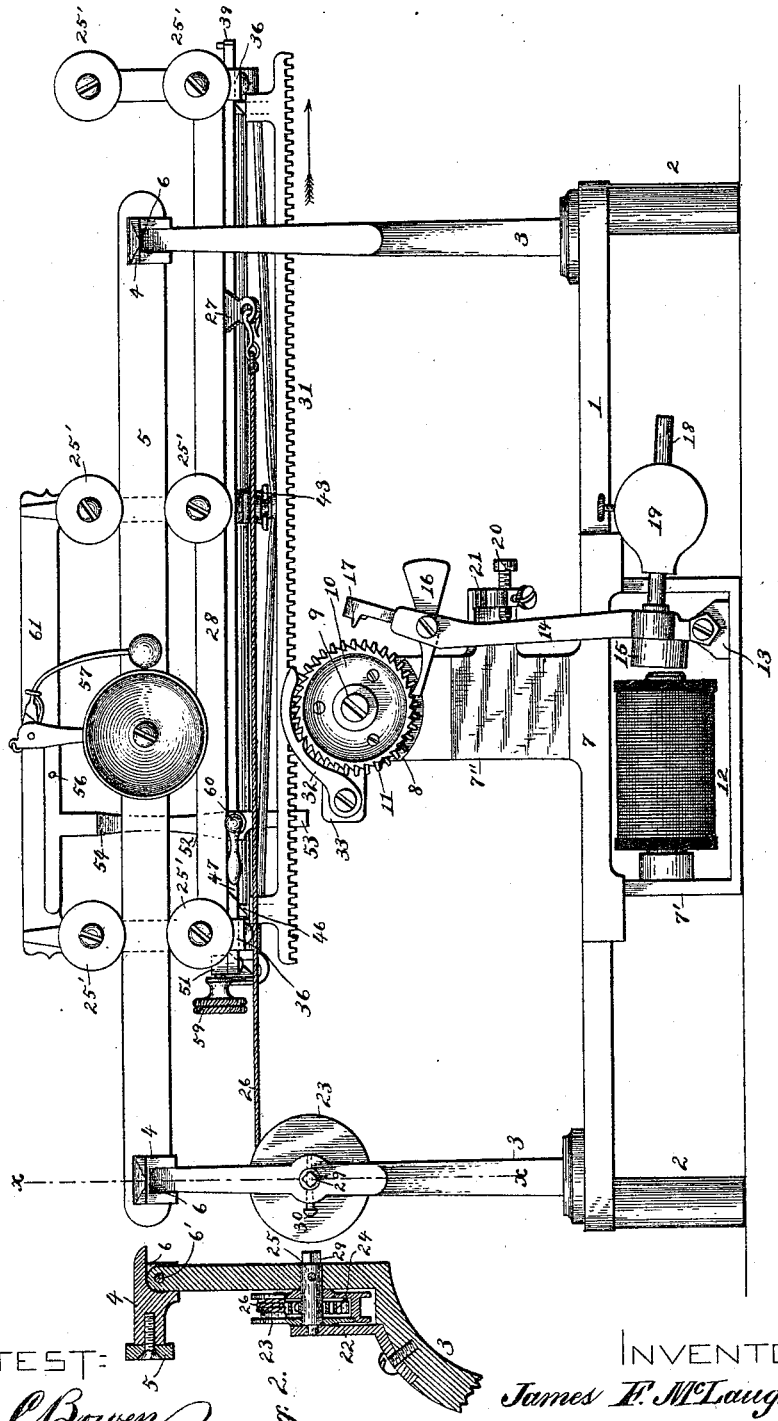

Fig. 1.

Fig. 2.

ATTEST:

Roy C. Bowen.

Fannie Wise

INVENTOR:

James F. McLaughlin.

By Joseph Lyons,

his Attorney.

(No Model.) 2 Sheets—Sheet 2.

J. F. McLAUGHLIN.

TYPE WRITING MACHINE.

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Fig. 4.

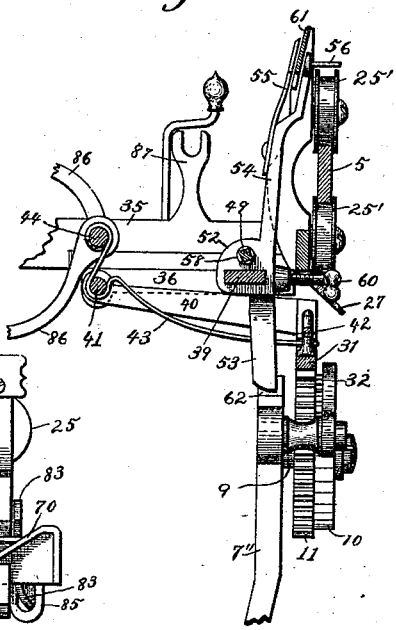


Fig. 7.

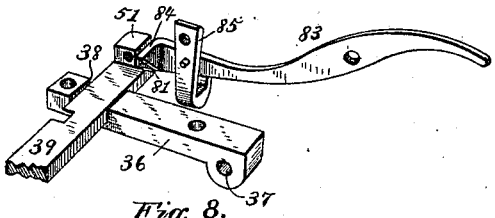


Fig. 8.

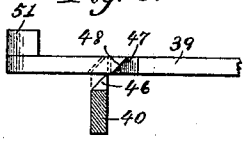


Fig. 6.

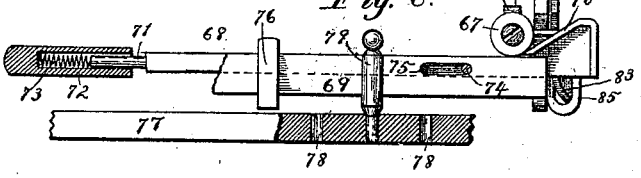


Fig. 3.

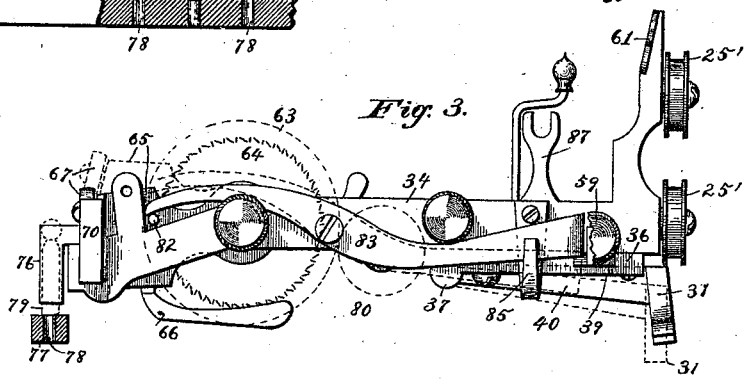
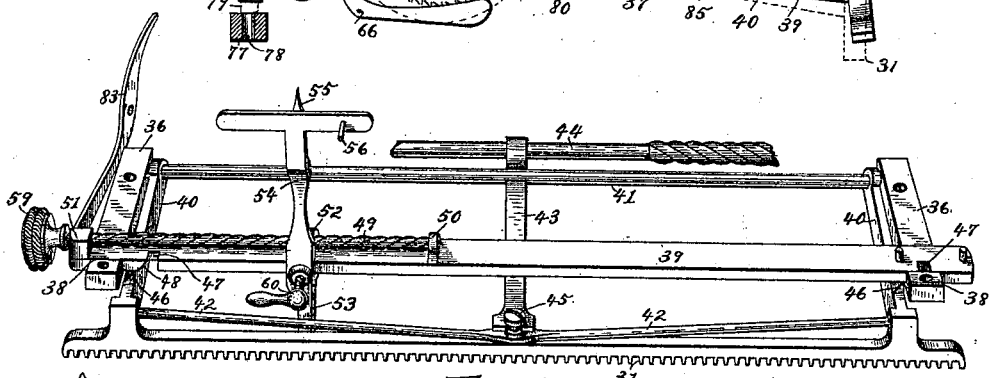


Fig. 5.



ATTEST:

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INVENTOR:

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his Attorney.

UNITED STATES PATENT OFFICE.

JAMES F. McLAUGHLIN, OF PHILADELPHIA, PENNSYLVANIA.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 421,836, dated February 18, 1890.

Application filed September 19, 1888. Serial No. 285,819. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. McLAUGHLIN, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a full, clear, and exact description, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in electrical type-writers, in which a traveling carriage supporting the impression-cylinder is fed forward the space of one letter after each imprint of a type upon the paper, or upon the depression of a specially-provided letter-spacing key; and its special object is to provide novel means for causing the carriage to be automatically returned to its starting-point when the end of a line of printing or writing has been reached.

In an application filed by me June 3, 1888, Serial No. 276,151, and in another application filed September 4, 1888, Serial No. 285,086, I have shown and described automatic reverse movements for the carriage of an electrical type-writer, and the invention herein shown and described is an improvement upon the same, the specific points of novelty of which will clearly appear from the following detailed description, with reference to the accompanying drawings, which form a part thereof, and in which—

Figure 1 is an elevation of the rear of the machine, showing the spacing and reverse mechanisms supported in their relative positions. Fig. 2 is a detail sectional view on the line *x x*, Fig. 1. Fig. 3 is an elevation of the right-hand end of the carriage. Fig. 4 is a transverse sectional view through the rear part of the carriage, showing the letter-spacing wheels in elevation. Fig. 5 is a perspective view looking at the rear part of the rack-bar frame with its supporting-brackets, showing also the actuating-spring, the sliding bar, and the lever for actuating the same; all arranged in their relative positions. Fig. 6 is a front elevation of the right-hand end of the frame of the carriage, showing the inclined plane on the front sliding bar and the anti-friction roller of the line-spacing pawl-lever which rides thereon. Fig. 7 is a perspective view of one end of the rear sliding bar and its supporting-bracket, with the actuating-lever and guide-bracket. Fig. 8 is a detail view of one end of the rear sliding bar, showing the cam-notch in the same and the cam-stud upon the rack-bar frame.

Like numerals of reference indicate corresponding parts in all the figures of the drawings.

Referring now more particularly to Fig. 1, the base plate or platform 1 is there shown upon legs 2 2, and two standards 3 3, mounted upon the rear end of the platform, have hinged to their upper ends brackets 4 4, to the free ends of which the guide-bar 5 is secured by screws, as indicated, or in any other convenient manner. The brackets 4 4 are each formed with an angular recess 6, into which the upper ends of the standards 3 3 are received, and are connected with the same by pivotal pins 6′. The arrangement is such, as will be seen by reference to Fig. 2, that one end of the recess 6 serves as a limit of movement of the brackets 4 4 in one direction, and that the other end of the recess, which is at right angles to the first, serves as a stop to the movement of the bracket 4 in the other direction.

Upon the guide-bar 5 the carriage is supported by means of anti-friction rollers 25′ 25′, of which three pairs are shown, so spaced and distributed that two pairs at a time will bear upon and embrace the guide-bar, whereby the carriage may be raised for inspection of the work done, as is the common practice in machines of this character, when it will turn with the guide-bar and the brackets 4 4 about the pivotal pins 6′ 6′. Another anti-friction roller, mounted upon the front bar of the carriage-frame and about the middle of the same, rides upon the front bar of the supporting-frame; but this feature is not shown in the drawings, but will be readily understood by those skilled in the art, since this is a common feature in machines of this character. It will now be understood that, if not otherwise obstructed, the carriage may move along and upon guide-bar 5 from one end to the other of the same.

To the platform 1 is secured the framework 7, one part of which 7′ extends below the platform, and is shaped like a rectangu-

lar box, and the other part 7^2, extending above the platform, is recessed at 8, and has there mounted upon a stud 9 a ratchet-wheel 10 and a gear-wheel 11. These two wheels are secured together by screws, as indicated in Fig. 1, but are both loose upon the stud 9, for a purpose which will presently appear.

In the box-shaped portion 7′ of frame 7 is mounted an electro-magnet 12, and to a bracket 13 is pivoted the letter-spacing pawl-lever 14, carrying an armature 15 in operative relation to the electro-magnet and the gravity-pawl 16, which is in engagement with the ratchet 10. To the upper free end of the pawl-lever is secured a stop-tooth 17, which is in position to engage one of the teeth of gear-wheel 11, when the pawl-lever is actuated by the electro-magnet, and since the number of teeth in the gear-wheel is equal to the number of teeth in the ratchet-wheel it is clear that when the pawl-lever is actuated by the electro-magnet and the ratchet is turned by the gravity-pawl 16, the stop-tooth 17 will limit the rotation of the ratchet to one tooth.

From the lower rear portion of the pawl-lever 14 extends a small rod 18, upon which a weight 19 is adjustable, and which serves to withdraw the armature pawl-lever to its normal position when the electro-magnet is de-energized. The screw 20, passing through and adjustable in bracket 21, extending from frame 7, serves as a back stop of the armature pawl-lever 14.

In the normal operation of my machine the armature pawl-lever 14 is actuated after each imprint upon the paper, and this is done either electro-magnetically, as indicated, or mechanically, in a manner clearly set forth in my aforesaid application Serial No. 276,151; but for the purposes of my present invention it is of no consequence by what agency the pawl-lever is actuated, so long as it is understood that it will be actuated after each printing operation. To one of the standards 3, which for this purpose is provided with a bracket 22, as shown in Fig. 2, is journaled a spring-barrel 23, and one end of the spiral spring 24 in said barrel is secured to the shaft 25, which passes through its center, and the other end of the same is secured to the body of the barrel, as is common in structures of this kind. This spring-barrel is grooved upon its outer periphery, as shown in Fig. 2, and a cord 26, extending from a lug 27, secured to the rear bar 28 of the carriage, is secured at its other end to the circumference of the barrel within the groove. When the barrel is grasped by one hand and held stationary, and the shaft 25 is turned by the application of a key to its projecting square end 29 by the other hand, the spring in the barrel may be put under tension, and the shaft is then fixed in position by a pin 30, which is inserted through a transverse hole in the bearing portion of standard 3, and a similar hole in the shaft, as shown in Figs. 1 and 2.

The rack-bar 31, mounted upon the carriage in a manner which will hereinafter be described, normally engages the teeth of gear-wheel 11, and when the latter is rotated step by step by the action of pawl-lever 14, or in any other desired manner, the carriage is fed forward in the direction marked by an arrow in Fig. 1, and the spring-barrel is thereby rotated, and the spring will be further wound up as the carriage advances toward the end of a line of printing. Thus, as the carriage is fed forward, power is stored in the spring of barrel 23, which, when permitted, is sufficient to return the carriage to its starting-point. A gravity check-pawl 32, pivoted to a bracket 33, which extends laterally from the upper end of frame 7, is used to prevent a partial return movement of the carriage during the outward stroke of the pawl-lever.

From the foregoing description it will be seen that so long as the rack-bar 31 is in engagement with the teeth of the gear-wheel 11 the carriage cannot be returned to its starting-point by the reaction of the spring in barrel 23, for the reason that the gravity check-pawl 32 prevents effectively an inverse rotation of the gear-wheel. In order, therefore, to enable the spring-barrel to reverse the carriage, the rack-bar must be moved out of engagement with the gear-wheel at the proper moment, and this is effected by the following switch apparatus: Secured to the under side of the side bars 34 35 of the carriage and near the rear ends thereof are two brackets 36 36, having at their inner ends journal-bearings 37, and at their outer ends, in the upper surface thereof, rectangular notches 38. (Most clearly shown in Fig. 7.) When these brackets are in place, secured to the under sides of the side bars, the notches 38 form rectangular slots, through which a sliding bar 39, which hereinafter will be called the "rear sliding bar," is movable. A rectangular frame, composed of the rack-bar 31, side bars 40 40, and rod 41, is pivoted between brackets 36 36 in the journal-bearings 37 thereof by projecting portions of rod 41, so that the rack-bar constitutes an integral element of the pivoted rack-bar frame 31 40 40 41, and an angular stay-rod 42, secured to the middle of the rack-bar and to the side bars 40 40, respectively, gives rigidity to this structure. A flat spring 43, wound upon a screw-rod 44 (the purpose of which will hereinafter be indicated) and under the frame-rod 41, extends with its free end over the upper edge of the rack-bar, and a notch at the end of said spring embraces the screw 45, which secures the stay-rod 42 to the middle of the rack-bar. The tendency of the spring 43 is to raise the rack-bar, and if not obstructed it would do so by pressing upwardly upon the under side of the head of screw 45. Each side bar 40 of the rack-bar frame has formed upon it, upon its upper surface or secured thereto, an upwardly-projecting tooth 46, which is beveled so as to form an inclined plane, having its

lowest point in the plane of the upper surface of the side bar 40 and its highest point in a knife-edge. In effect the projecting teeth 46 46 are triangular prisms, and the rear sliding bar 39 normally rests upon the upper knife-edges of these prisms, or, rather, these prisms bear upon the lower surface of bar 39 by the action of the spring 43. In this condition of the rack-bar frame, in which the rack-bar has the position indicated in dotted lines in Fig. 3, the teeth of the gear-wheel 11 are engaged by the rack-bar. In the sliding bar 39, near each end thereof, is produced a slot 47, one end of which is vertical, while the other is inclined, as indicated at 48 in Figs. 5 and 8, and the inclination 48 corresponds to the inclinations of one of the sides of the prismatic projections 46. The two slots 47 47 are at such distance apart that they will at the same time engage the prisms 46 when the sliding bar 39 is moved to one side, and when this takes place it is clear that the spring 43 will turn the rack-bar frame so as to lift the rear end of the same and force the prisms 46 46 into the slots 47 47, whereby the rack-bar is raised into the position indicated in solid lines in Fig. 3, out of engagement with the gear-wheel 11, and in this position of the rack-bar the spring-barrel may be turned by the spring housed therein to reverse the movement of the carriage, as will now be clearly understood.

In order to again engage the rack-bar with the gear-wheel, the rear sliding bar must be moved in a direction opposite to that in which it was moved to disengage the rack-bar. If this is done, by means hereinafter described, the inclined sides 48 of notches 47 act as cams upon the inclined sides of the prismatic projections or studs 46, and the rack-bar frame is forced to move downwardly about its pivots until the knife-edges again bear upon the smooth under surface of sliding bar 39. This brings the rack-bar frame with the rack-bar again into the position indicated in dotted lines in Fig. 3, thus again engaging the teeth of the gear-wheel. The sliding movement of the rear sliding bar 39 thus controls the engagement and disengagement of the rack with the gear-wheel—or, in other words, it creates the condition under which the carriage may be fed forward step by step to produce the spaces between the successive letters, and also the condition under which the carriage may be reversed by the action of the spring-barrel. The sliding movement of bar 39 in the direction to disengage the rack-bar is caused by the letter-spacing movement of the carriage when the predetermined end of a line of writing is reached, and the movement of bar 39 in the direction to engage the rack-bar is caused by the line-spacing mechanism when the carriage arrives at the end of its reverse movement—*i. e.*, at the beginning of a new line of writing or printing. These movements are gaged and produced in substantially the same manner and by substantially the same mechanism as are fully shown and described in my aforesaid applications, and since the mechanism used for that purpose is only an incidental part of my present invention an approximate description of the same will be sufficient.

A screw-rod 49, having a screw-thread or, rather, eye-pitch is journaled in bearings 50 51, fixed upon sliding bar 39. One of these bearings 50 is near the middle of bar 39, and the other 51 is at the right-hand end of the same, this being the left-hand end of said bar, as represented in Figs. 1 and 5, in which the machine is represented as seen from the back.

A casting 52 is shaped with a central boss, (most clearly shown in Fig. 4,) and with a downwardly-extending tail-piece 53. An arm 54, extending upwardly from the central boss, is provided with a pointer 55, and with a pin 56, projecting from a horizontal extension of arm 54. This pin is destined to actuate the alarm-bell 57 ordinarily used in machines of this character for indicating the approach of a line of writing. A rectangular slot formed in the central boss of the casting receives the sliding bar 39, and the screw-threaded hole 58 receives the screw-rod 49, so that when the latter is turned by means of the milled head 59 the casting will be moved along and upon the sliding bar to the desired position, in which it may be fixed by the set-screw 60. (Shown in Figs. 1 and 5.)

As will be seen by reference to Figs. 4 and 5, the upper extension of casting 52, to which pin 56 is secured, forms one prong of the fork, of which the pointer 55 is the other prong, and by reference to Fig. 4 it will be seen that these prongs embrace a scale-bar 61, so that the pointer will indicate the position to which the casting has been adjusted.

When by the ordinary operation of the machine the carriage is moved forward step by step in the manner hereinbefore described, the tail-piece 53 of casting 52 will approach the middle of the supporting-frame 1 3 3 until it comes in contact with a stop 62, extending upwardly from the upper extension of frame 7, as indicated in Fig. 4. The sliding bar 39, to which casting 52 is fixed, is thus prevented from following the continued movement of the carriage, and as the latter is propelled onward bar 39 will be shifted longitudinally with relation to the carriage, or, rather, the carriage will be shifted with relation to bar 39 until the prismatic projections 46 46 upon the side bars 40 40 of the rack-bar frame will rise into the slots 47 47, as hereinbefore described, whereby the rack-bar assumes the position indicated in solid lines in Fig. 3, and is out of engagement with the gear-wheel 11, thus allowing the spring-barrel to reverse the movement of the carriage until it arrives at its starting-point at the beginning

of a new line of printing. When the carriage arrives in this position, it is necessary that the rack-bar be again thrown into gear with the gear-wheel, and this is accomplished, as stated above, by the line-feed mechanism, which will be here described with sufficient accuracy to understand its co-operation with the reverse-movement mechanism which forms the subject of my present invention.

To one end of the impression-cylinder 63 is secured a gear-wheel 64, both of which are shown in dotted lines in Fig. 3. A lever 65, pivoted upon the shaft of the cylinder is provided with a gravity-pawl 66, the lower end of which only is visible in Fig. 3, the upper end, which engages the teeth of the gear-wheel 64, being hidden from view. The free weighted end of lever 65 is provided with an anti-friction roller 67, which bears upon the upper edge of a sliding bar 68, placed behind the front bar 69 of the carriage. The greater part of this sliding bar 68, which will hereinafter be called the "front sliding bar," as distinguished from the rear sliding bar 39, is indicated in dotted lines in Fig. 6, and, as will be seen by reference to the drawings, one end of it is expanded to form an inclined plane 70, which is in effect a continuation of the upper straight edge of the main body of the bar. The other end of bar 68 is shaped cylindrically, as indicated at 71, and this cylindrical portion is guided in a sleeve 72, and is acted upon by a helical spring 73, which, when expanded, maintains the bar 68 in the position indicated in the drawings—*i. e.*, with the inclined plane 70 just beyond the anti-friction roller 67. The bar 68 is also guided and is limited in its movements by a screw-pin 74, projecting from its side into a slot 75 in the front bar 69 of the carriage. From about the middle of bar 68 projects a bracket 76 over the front bar 69 and down within a short distance from the upper edge of the front bar 77 of the supporting-frame of the machine. In this front bar 77 a series of holes 78 78 are provided, and a pin 79 may be inserted in and withdrawn from either of these holes. If the pin 79 is inserted, as shown, and if the carriage is reversed in the manner hereinbefore described, the bracket 76 will strike the pin, whereby bar 68 will be stopped, while the carriage continues its reverse movement. The carriage is thus shifted with relation to bar 68, thereby compressing the helical spring 73, and causing the roller 67 to ride up the inclined plane 70, whereby the pawl-lever 65 is raised to the position indicated in dotted lines in Fig. 3. A partial rotation is thus given to the impression-cylinder, and the paper is fed forward for a new line between the impression-cylinder and the feed-roller 80. The upward movement of the line-feeding pawl-lever 65 is utilized for returning the rear sliding bar 39 and thereby the rack-bar to their original normal position, whereby the reverse movement of the carriage is stopped. This is effected in the following manner: At that end of rear sliding bar 39 at which the bearing 51 for screw-rod 49 is formed there is also formed a chamfer 81, and from the side of pawl-lever 65 a pin 82 projects laterally. Between chamfer 81 and pin 82 extends a two-armed lever 83, pivoted at about its middle to the side bar 34 of the carriage. The heavier arm of lever 83 is bent inwardly at its end, as shown at 84 in Fig. 7, and the lower edge of this inwardly-projecting portion is beveled, as indicated. Normally the heavy arm of lever 83 rests by its own weight at the bottom of a U-shaped bracket 85, secured to the side bar 34, and in this condition of the machine the beveled end 84 of lever 83 is just out of contact with the lower edge of chamfer 81, or barely touches the same, while the other arm of lever 83, which extends over pin 82, is raised out of contact with the latter. The position of lever 83 in this condition of the machine is indicated in dotted lines in Fig. 3. If, now, the carriage is fed forward by the letter-spacing mechanism during the ordinary operation of the machine, and arriving near the end of a line of printing, which is gaged by the position of casting 52, the rear sliding bar 39 is moved toward the right to raise the rack-bar out of engagement with the teeth of the gear-wheel 11, which at once reverses the carriage, as hereinbefore fully described. The movement of rear sliding bar 39 with relation to the carriage causes the beveled end of lever 83 to ride up the incline of the chamfer 81, and the other end of the lever is depressed to the position indicated in full lines in Fig. 3, bearing upon pin 82. When the carriage arrives near the end of its reverse movement, which is gaged by the position of pin 79 in one of the holes 78 78, the front sliding bar 68 is shifted to the left with relation to the carriage, and the anti-friction roller 67 at the end of pawl-lever 65, riding up the inclined plane 70, raises said lever to the position indicated in dotted lines in Fig. 3, whereby the line-feed is effected, as hereinbefore described. At the same time the pin 82 raises the forward end of lever 83, which is now in its path, and thereby depresses the rear end of said lever, the beveled end of which, acting upon the chamfer 81 like a cam, forces the rear sliding bar 39 back to its normal position, whereby the rack-bar is forced down in engagement with the teeth of gear-wheel 11. Thus it will be seen that by the positively-actuated rear sliding bar the rack-bar is raised and lowered into and out of engagement with the gear-wheel 11 in its two positions for the letter-spacing and for the reverse movement, and that the rack-bar thereby has a swinging motion about the pivots of the rack-bar frame. If, now, a new line of writing is produced and the carriage is again fed forward, the anti-friction roller 67 slowly de-

scends the inclined plane 70, and the front sliding bar 68 is returned to its original position by the reaction of helical spring 73.

The screw-rod 44, above referred to as having one end of spring 43 bent over it, extends longitudinally through the frame of the carriage, and has right and left hand screw-threads on its opposite ends for the purpose of carrying and adjusting the paper-guides 86 86, which, together with the uprights 87 for holding the paper-roll, will not be described herein, since they form no part of the present invention.

Having now fully described my invention, I claim and desire to secure by Letters Patent—

1. In a type-writer, the combination of a carriage, a pivoted rack-bar frame mounted upon the same, and a spring tending to raise the rack-bar frame, with cam projections upon the latter, and a sliding bar having cam-notches corresponding to the cam projections, whereby the movement of the sliding bar in one direction will depress the rack-bar, and the movement of the same in the other direction will allow the rack-bar to return to its raised position, substantially as described.

2. The combination, in a type-writer, of a reciprocating carriage, a feed-arm actuated from the printing mechanism, gearing, substantially as described, operatively connecting said feed-arm and carriage, and a switch apparatus, substantially as described, constructed and operating to disengage said gearing on the completion by the carriage of its forward stroke, and to re-engage the same on the completion by said carriage of its return-stroke.

3. The combination, in a type-writer, of a reciprocating carriage, an intermittently and forwardly revolving gear actuated from the printing mechanism, a laterally-movable rack on said carriage, and rack-switching apparatus constructed and operating to disengage said rack from said gear on the completion by the carriage of its forward stroke, and to re-engage the same on the completion by said carriage of its return-stroke.

4. In a type-writer, the combination of a carriage and a pivoted rack-bar frame mounted upon the same, with a gear-wheel normally engaging the rack-bar for feeding the carriage to produce the letter-spaces, and a sliding bar actuated by the movement of the carriage for permitting the rack-bar to be disengaged from the said gear-wheel, substantially as described.

5. In a type-writer having automatic letter-spacing mechanism, the combination of a carriage, a spring-barrel for storing power by the letter-spacing movement of the carriage, a spring-actuated pivoted rack-bar frame upon the carriage, and a gear-wheel normally engaging the rack-bar for feeding the carriage and for locking the same against the recoil of the spring-barrel, with a sliding bar actuated to move in one direction for depressing the rack-bar into engagement with the gear-wheel and in the other direction for allowing the rack-bar to rise out of engagement, substantially as described.

6. In a type-writer, the combination of a carriage and a pivoted rack-bar frame mounted upon the same, a spring-barrel for storing power, actuated by the carriage and connected with the same by a flexible cord, with a gear-wheel normally engaging the rack-bar to feed the carriage, and a sliding bar provided with cam-notches acting upon the rack-bar frame to engage the rack-bar with the gear-wheel, and to permit the same to be disengaged therefrom, substantially as described.

7. In a type-writer having automatic letter-and-line-spacing mechanisms, the combination of a spring-barrel for storing power, a pivoted rack-bar frame upon the carriage, and a gear-wheel normally in engagement with the rack-bar for propelling the carriage and for locking the same against recoil by the action of the spring-barrel, with a rear sliding rod for disengaging the rack-bar from the gear-wheel to allow the spring-barrel to reverse the carriage, a front sliding rod for operating the line-feeding mechanism, and connections between the latter and the rear sliding rod for re-engaging the rack-bar and gear-wheel, substantially as described.

8. In a type-writer having automatic letter-and-line-spacing mechanisms, the combination of a carriage and a pivoted rack-bar mounted upon the same, a gear-wheel normally engaging the rack-bar for feeding the carriage, and a sliding bar, constructed substantially as described, for engaging the rack-bar and gear-wheel when moved in one direction and for permitting the same to be disengaged when moved in the other direction, with a casting adjustable upon the sliding bar moving against a fixed stop upon the frame of the machine for actuating the sliding bar in one direction, and a lever connecting the line-spacing mechanism with the sliding rod for moving the same in the other direction, substantially as described.

9. In a type-writer, the combination of a carriage and a pivoted rack-bar frame mounted upon the same, with a gear-wheel normally engaging the rack-bar for feeding the carriage to produce the letter-spaces, and a notched sliding bar, arranged substantially as described, for permitting the rack-bar to be automatically disengaged from the gear-wheel when the end of a line of writing is reached and for engaging the same automatically when the carriage has been returned to the beginning of a new line, substantially as described.

10. In a type-writer having automatic letter-and-line-spacing mechanisms, the combination, with such mechanisms and a spring-barrel for storing power by the letter-spacing movement and for reversing the movement of the carriage automatically when the end of a

line of writing is reached, of a pivoted rack-bar frame upon the carriage, a letter-spacing gear-wheel normally engaged by the rack-bar for feeding the carriage, and a sliding bar actuated by the movement of the carriage for permitting, when actuated in one direction, the rack-bar to rise out of engagement with the gear-wheel, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES F. McLAUGHLIN.

Witnesses:
FRANK M. MILLER,
JULIUS HIRSHFELD.