

June 10, 1952

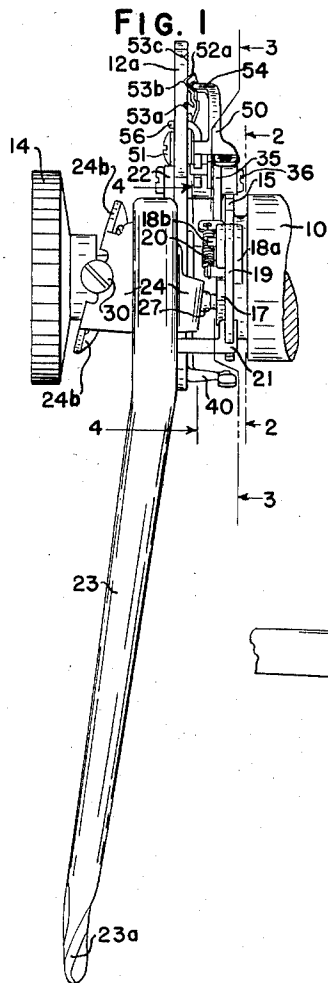
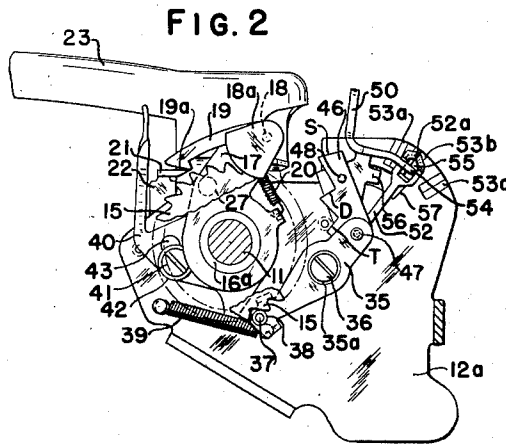
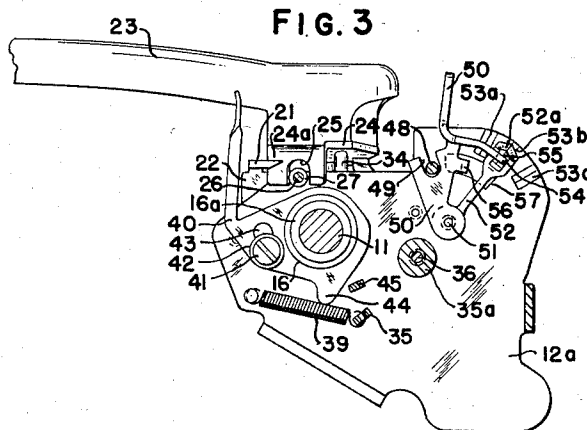
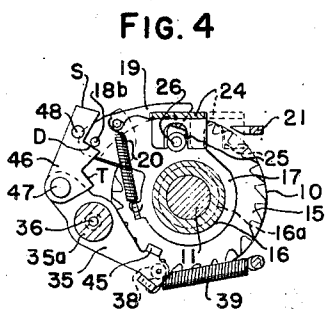
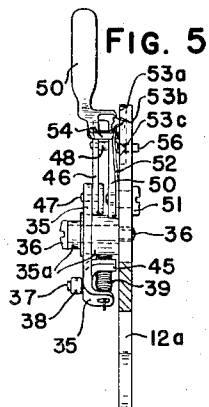
H. A. AVERY ET AL

2,599,535

LINE SPACING MECHANISM FOR TYPING MACHINES

Filed May 4, 1950

2 SHEETS—SHEET 1



HENRY ALLEN AVERY AND
JOSEPH P. BARKDOLL
INVENTORS

Theodore E. Simonton
ATTORNEY

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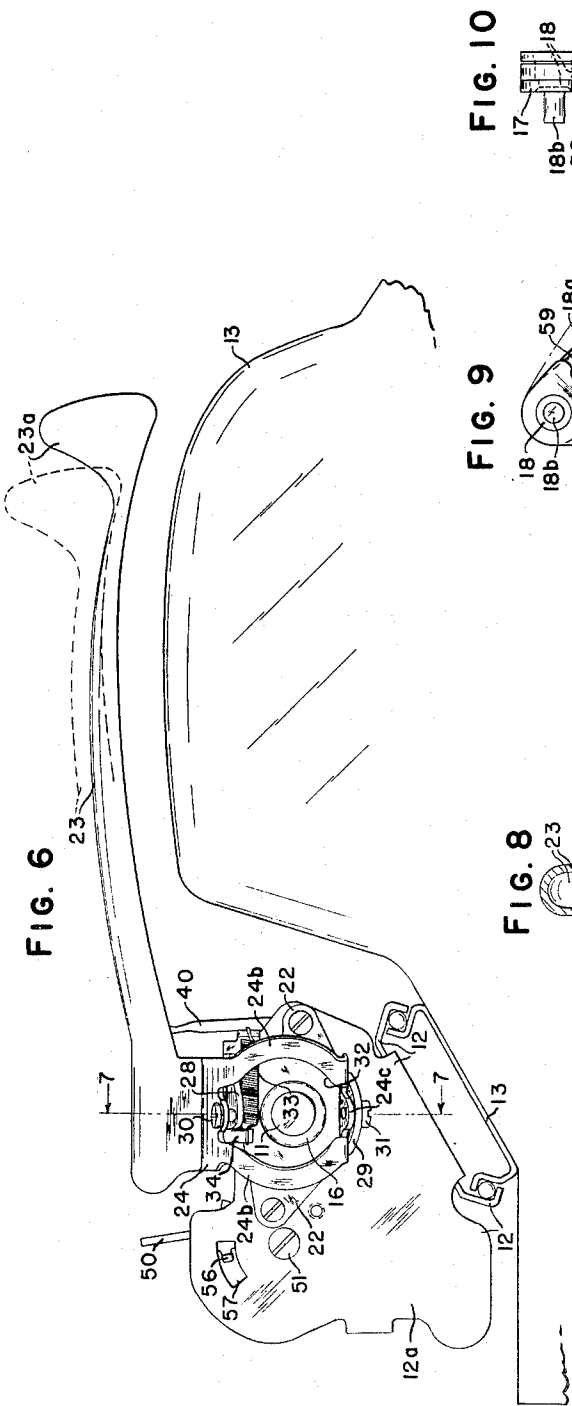
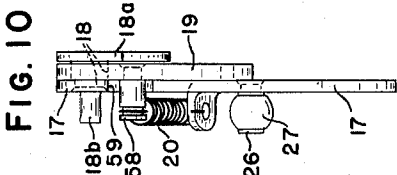
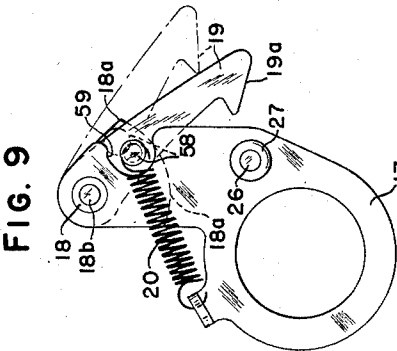
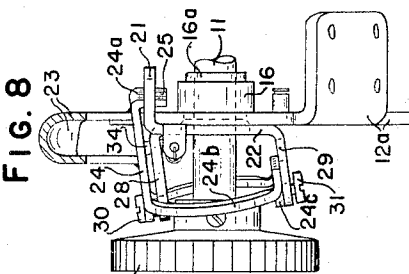
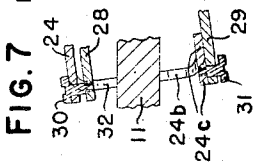
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LINE SPACING MECHANISM FOR TYPING MACHINES

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2 SHEETS--SHEET 2



HENRY ALLEN AVERY AND
JOSEPH P. BARKDOLL
INVENTORS

Theodore E. Simonton
ATTORNEY

UNITED STATES PATENT OFFICE

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LINE SPACING MECHANISM FOR TYPING MACHINES

Henry Allen Avery and Joseph P. Barkdoll,
Groton, N. Y., assignors to L. C. Smith &
Corona Typewriters, Inc., Syracuse, N. Y., a
corporation of New York

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8 Claims. (Cl. 197-114)

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The general purpose of the invention is to provide a line spacing mechanism of simple and sturdy construction by which a roller platen journaled in a platen carriage or other platen support may be rotated through accurate line spacing steps of any one of several selective extents and normally be released and yieldingly detented against accidental rotation.

More specifically the invention provides an improved pawl and ratchet wheel mechanism for rotating the roller platen through paper advancing line spacing steps; and also provides an improved and compact mounting and assemblage of said mechanism with respect to a platen journaling end of a platen carriage, a platen rotating finger wheel and an adjacent end of the roller platen, the construction being such that the finger wheel and an operating handle of the pawl mechanism are freely accessible and that liability of the typist's hand colliding with other parts of the machine in operating said handle to line space the platen and return the carriage is minimized.

Further, the invention provides means which serves as a working stroke limiting stop for the pawl mechanism, normally serves to yieldingly detent the ratchet wheel against accidental rotation, and serves at the end of each working or line spacing stroke of the pawl mechanism to positively lock the ratchet wheel against rotation in either direction until an idle or return stroke of the pawl mechanism is started. Said means stops the pawl mechanism without jamming of the pawl into a tooth space of the ratchet wheel, without liability of damage either to the pawl or the ratchet wheel, and without any accidental binding together of the pawl and ratchet wheel which would prevent a return stroke of the pawl mechanism or cause accidental reverse rotation of the ratchet wheel. In the preferred embodiment of the invention said means includes a variably settable stop device or line space regulator to stop working strokes of the pawl mechanism. Provision also is made for, at will, freeing the ratchet wheel from the detenting action of said means.

Other purposes and advantages of the invention will appear from the following description in detail of its preferred embodiment illustrated by way of example in the accompanying drawings.

In the drawings:

Figure 1 is a plan view of the improved line spacing mechanism with the parts in normal idle position and with said mechanism set for line spacing the platen to the extent of two tooth spaces of the platen rotating ratchet wheel;

Figure 2 is a sectional view on the line 2-2 of Figure 1;

Figure 3 is a sectional view on the line 3-3 of Figure 1;

Figure 4 is a sectional view on the line 4-4 of

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Figure 1 showing the parts as positioned at the end of the working stroke of the line spacing mechanism;

Figure 5 is a detail rear view showing the working stroke limiting and ratchet wheel detenting means;

Figure 6 is a fragmentary left hand end view of the typing machine showing the line spacing mechanism mounted and positioned thereon as in Figure 1, the platen rotating finger wheel or knob being removed;

Figure 7 is a sectional view on the line 7-7 of Figure 6 showing details of the mounting of the line spacing handle or hand lever of the line spacing mechanism; and

Figures 8, 9, and 10 are detail views illustrating certain parts of the line spacing mechanism as hereinafter more fully described.

The invention is shown embodied in a type-writing machine wherein, as is common in the art, the paper is line spaced by rotating a roller platen 10 held on a shaft 11 journaled in the ends, one of which is shown at 12^a, of a platen carriage 12 which is mounted to travel endwise back and forth over the rear portion of a stationary main part 13 of the machine. The usual finger wheels, one of which is shown at 14, are fixed to the ends of the platen shaft, and the usual line spacing ratchet wheel 15 is held to the roller platen at the left hand end of the roller platen to rotate therewith. The improvements now will be described.

Adjacent its left hand end the platen shaft is journaled in a bearing sleeve 16 the outer end of which is fixed in an aperture in the left hand carriage end 12^a. Said sleeve has a reduced cylindrical inner end portion 16^a on which is journaled the lower end of a pawl carrier or pawl supporting and driving arm 17 whose opposite faces abut the main body part of said sleeve 16 and the outer face of the ratchet wheel 15 with the outer face of the ratchet wheel abutting the inner end of the sleeve. The pawl carrier normally extends upward from said sleeve and has a pawl pivot 18 extending laterally and horizontally therethrough near its upper end and fixed thereto.

A line space pawl 19 for driving the ratchet wheel 15 is mounted at its rear end on pivot 18 with the rear portion of the pawl closely laterally confined between the inner face of the pawl carrier and a head 18^a of the pivot 18 to resist lateral movements of the pawl. Pivot 18 has a horizontal outwardly projecting portion 18^b forming as hereinafter described, a pawl carrier stop. A spring 20 is connected at one end to the pawl carrier and at its other end to the pawl between the pivot 18 and the nose of the pawl to urge the pawl to swing downward and engage the toothed periphery of the ratchet wheel. The nose

end of the pawl has a cam edge 19^a which, at the end of each idle stroke of the pawl, rides up on a fixed pawl lifting lug 21 which extends inward over the carriage end 12^a and is an extension of a bracket 22. Bracket 22 is fixedly held to said carriage end 12^a at the outer face of the carriage end by suitable fastening screws as shown in Figure 6. Lug 21 holds the nose of the pawl lifted out of engagement with the teeth of the ratchet wheel in the normal idle condition of the line spacing mechanism.

The pawl carrier is rocked through working and return strokes by a bellcrank hand lever fulcrumed on bracket 22 as hereinafter described. This lever has a forwardly extending handle arm 23, and a pawl carrier driving arm 24 which extends under the rear end of arm 23 transversely of arm 23 and is welded or otherwise rigidly affixed to arm 23. Arm 23 has an upstanding finger piece 23^a at its forward end. Arm 24 extends over the carriage end 12^a and has a pendent inner end portion 24^a provided with a vertical slot 25 which is open at its lower end and has extending thereinto a horizontally disposed driving stud or projection 26 which is fixed to the pawl carrier. Said stud preferably has a pierced anti-friction ball 27 journaled thereon and engaged in the slot 25.

Bracket 22 has two outwardly extending and vertically spaced and superposed ears 28 and 29 respectively, in which are threaded and through which extend shouldered pivot or fulcrum screws 30 and 31 for the hand lever 23—24. Arm 24 overlies ear 28 of bracket 22 and is pivoted adjacent its outer end on screw 30. Pendent from the outer end of arm 24 is an extension 24^b formed at its lower end at a right angle thereto with a pivot ear 24^c which is pivoted on the reduced upper end of screw 31 and is seated on the upper face of ear 29 of bracket 22. A stable double pivot bearing for lever 23—24 is thus provided. Extension 24^b of lever arm 24 has a substantially circular central aperture 32 substantially larger in diameter than the platen shaft 11 and the adjacent hub portion of finger wheel 14 to clear these latter parts in all positions into which the lever can be rocked. Parts 28, 29, 24, 24^b, and 24^c preferably are tilted as shown, and the screws 30 and 31 are arranged in axial alignment with their axes inclined downward and inward toward carriage end 12^a and lying in a vertical plane in which lies the axis of the platen shaft 11, for the purposes hereinafter pointed out.

The handle arm of lever 23—24 is rocked toward the right from the invariable normal idle position thereof shown in Figures 1 and 6 to impart working strokes to the pawl, and it is returned to said position by a return spring 33 which is connected at one end to the bracket 22 and at its other end to the lower end of a pendent stud 34 fixed to arm 24 of said lever, which stud abuts the rear edge of bracket ear 28 to arrest return movement of the lever at said invariable position.

An important feature of the invention resides in means now to be described whereby the platen may be rotated by the pawl mechanism above described through any desired one of several selected numbers of tooth spaces of the ratchet wheel for line spacings of selected extents and also is detented, the means shown being mounted on the carriage end member 12^a at the inner side of said member and being settable or adjustable for rotation of the ratchet wheel by the pawl mechanism through either one, two or

three tooth spaces of the wheel for single, double or triple line spacing drives of the platen.

Located at the inner side of carriage end 12^a is a pivoted platen detenting member 35 having a hub 35^a journaled on a shouldered and horizontally disposed pivot screw 36 which is threaded at its outer end in said carriage end. Hub 35^a projects at both sides of member 35. This member, in the construction shown, is a lever of the first order which has its two arms extending in opposite directions from hub 35^a and which is supported by said hub to swing in a vertical plane close to the outer face of the ratchet wheel with its pivotal axis located adjacent the periphery of said wheel at the rear of the wheel. One arm of lever 35 extends forwardly and carries adjacent its forward end, to swing positively therewith toward and from the toothed periphery of the wheel, an inwardly projecting detent device 37—38 which comprises a horizontally disposed stud 37 fixed to said lever arm and also comprises, preferably, an anti-friction roller 38 journaled on said stud. The device 37—38 is adapted to enter part way into successive tooth spaces of the ratchet wheel and seat on the adjacent edges of the two teeth defining each such space. A spring 39 is connected to the carriage end 12^a and to said lever to normally yieldingly hold the device 37—38 to the toothed periphery of the ratchet wheel with said device pressing on the wheel substantially radially inward in a tooth space of the wheel.

Normally the platen and ratchet wheel may be forcibly rotated as far as desired in either direction by the finger wheel 14 against the yielding detenting action of the parts 35, 37, 38, and 39. It is at times desirable to free the ratchet wheel from the detenting action of these parts, and for this purpose there is provided a detent release hand lever 40 which is journaled on sleeve 16 and held abutted against the inner face of the carriage end 12^a by a screw 41 and a friction washer 42, said screw being threaded into said carriage end with its shank passing through an arcuate slot 43 in the hand lever to limit the extent of rocking movements of the lever. Washer 42 prevents accidental swinging of the hand lever 40. When desired, the hand lever 40 may be rocked from the normal idle position thereof best shown in Figures 2 and 3, to cause a cam portion 44 of the lever to contact a lug 45 on lever 35 and rock said lever 35 against the force of spring 39 to fully disengage the device 37—38 from the ratchet wheel. Such rocking of lever 40 is arrested by engagement of the upper end of slot 43 with screw 41 at a point at which the cam part 44 seats on the upper face of lug 45 to maintain the device 37—38 disengaged from the ratchet wheel until lever 40 is manually restored.

The parts 35 to 38 serve not only to coast with the ratchet wheel to detent it as above described, but serve also as part of means coactive with the pawl mechanism and the ratchet wheel to selectively determine the extent of line spacing imparted by each working stroke of the pawl mechanism and to positively lock the ratchet wheel and platen against rotation in either direction at the end of each working stroke of the pawl mechanism until a return stroke of the pawl mechanism is started. The remaining parts of said means as provided in the construction shown, now will be described.

The second or rearwardly extending arm of lever 35 carries a stop 46 which is located in the path in which the stop 18^b on the pawl carrier

17 moves on the working strokes of the pawl mechanism. A horizontal pivot stud 47 is fixed to said lever arm near the rear end of said arm and pivotally journals the stop 46 near the lower end of said stop. Stop 46 extends upwardly from its pivot and has three upwardly directed and relatively stepped abutment edges S, D and T selectively positionable for abutment of the pawl carrier stop 18^b therewith at the ends of the working strokes of the pawl mechanism sufficient to rotate the ratchet wheel respectively and precisely through one, two or three tooth spaces for single, double or triple line spacing.

To selectively position or set the stop 46 it is, in the construction shown, rocked about its pivot 47 by the following means. A horizontal stud 48 is fixed to stop 46 above pivot 47 and projects outward toward the carriage end 12^a into an upwardly extending slot 49 in a stop setting hand lever 50 which is located at the inner side of carriage end 12^a. Lever 50 is pivotally connected at its lower end below slot 49 with carriage end 12^a by a horizontal pivot 51 which is substantially in axial register with pivot 47 in the normal position of lever 35. Pivot 51 also pivotally supports the lower end of a laterally bent and laterally flexible spring latch arm 52 for lever 50, said arm having its upper end bent at 52^a to snap snugly into any one of three latching notches 53^a, 53^b or 53^c formed in the inner side of carriage end 12^a. A lug 54 on lever 50 engages in an aperture 55 in arm 52 to prevent relative rotation between said lever and arm. A second lug 56 on lever 50 extends outward into an arcuate slot 57 in carriage end 12^a and is engageable with opposite ends of said slot to arrest lever 50 in position for latch arm 52 to engage in notches 53^a and 53^c, respectively, to position abutment edges S and T of stop 46 respectively in the path of pawl carrier stop 18^b. In the drawings, stop 46 is set for double spacing with arm 52 engaged in notch 53^b and the abutment edge D of stop 46 positioned in the path of stop 18^b.

To prevent pawl 19 from being accidentally rocked so far out of working engagement with the ratchet wheel that the pawl spring 20 will no longer bias the pawl back to such engagement, the spring is connected to a horizontal stud 58 fixed on the pawl for positively limited movement in a notch 59 formed in pawl carrier 17 as more clearly shown in Figure 9 wherein the maximum shifted position of the pawl away from the ratchet is shown in dot and dash lines with stud 58 engaged with one edge of notch 59.

When the handle of the lever 23—24 is swung toward the right from its normal idle position to line space the paper, the pawl 19 slides off the lifter lug 21 into driving engagement with the wheel 15, the nose of the pawl entering a wheel tooth space which is located immediately in rear of said lug, whereupon the pawl mechanism immediately begins to rotate the ratchet wheel and platen in line spacing direction. Such swinging of the handle and rotation of the platen will be arrested at the completion of a working stroke of selected length of the pawl mechanism. The length of the working stroke varies with the setting of stop 46 and, in the setting of the stop 46 shown, is arrested when the pawl carrier stop 18^b abuts the edge D of stop 46, as shown in Figure 4, at which time the pawl 19 has rotated the ratchet wheel precisely through two tooth spaces. At this time the manual thrust on handle 23 is transmitted through the pawl carrier and its stop 18^b, the stop 46, lever 35 and the device 37—38

to the toothed edge of the ratchet wheel at a tooth space point of said wheel and in a direction at least substantially radially inward toward the axis of the wheel.

Since the wheel 15 prevents or blocks movement of these parts by the pawl mechanism under manual rightward thrust on handle 23 of the pawl mechanism, the working stroke of the entire pawl mechanism is positively blocked or arrested upon collision of stop 18^b with stop 46. No strain on the pawl is imposed in thus arresting the pawl mechanism or during continued rightward thrust on handle 23 to return the carriage. Nor is the pawl jammed into the teeth of the ratchet wheel at the end of its working stroke by forcing the pawl between the toothed edge of the wheel and a stationary part, as is common in the art. Such jamming of the pawl in prior mechanisms injures both the pawl and the ratchet wheel and also frequently results in such firm jamming of the pawl that the usual return spring of the pawl mechanism will not return said mechanism.

So long as the rightward hand thrust is maintained after collision or abutment of stops 18^b and 46 the ratchet wheel will be held locked by the device 37—38 against rotation in either direction. Furthermore, said hand thrust causes part 37—38 to securely lock the wheel against over-rotation when the handle is violently thrust rightward, the locking force increasing in proportion to the violence of such thrust.

The mountings of the pawl and the pawl carrier above described resist lateral canting of the pawl and carrier and maintain them in their proper working planes. The relatively long hub 35^a protruding at both sides of lever 35 affords a stable bearing for lever 35 to keep it in its proper working plane. The stud 58 coacts with slot 59 to prevent accidental or mischievous disabling of the pawl, such disabling being a frequent source of annoyance in many previously known line spacers.

The pivotal axis of the line space lever 23—24 is so tilted that the handle arm 23 rises throughout each working stroke as indicated, for example, in dotted lines in Figure 6 to afford added clearance above the underlying part of the machine for the typist's hand. The pivoting of the lever 23—24 on the carriage directly above and below the platen axis and with the pivotal axis of the lever passing through the platen axis transmits carriage return thrust on said lever to the carriage at such points as to minimize canting and binding of the carriage in its bearings during carriage return.

The construction and arrangement of the parts shown and above described affords a very compact assemblage of the finger wheel 14, the adjacent end of the platen and the interposed parts of the line spacing mechanism, in which assemblage the finger wheel and the handle arm of the lever 23—24 are, nevertheless, both freely accessible to the typist.

We claim:

1. A line spacing mechanism for typing machines comprising, in combination, a peripherally toothed ratchet wheel mounted for rotation about a fixed axis through line spacing steps, a spring-retained and one-way driving pawl mechanism mounted for driving strokes on said wheel, a lever mounted for rocking thereof about a fixed axis parallel to the wheel axis, a detent roller journaled on said lever for rotation about an axis fixed relatively to the lever and parallel to the axes of the wheel and lever and to seat in a

tooth space of the wheel to exert pressure on the wheel substantially radially inward toward the wheel axis when said lever is rocked in one direction about its axis, spring means connected with the lever to rock it in said one direction, a driving stroke limiting stop for said pawl mechanism pivotally held to said lever for swinging adjustments of the stop about an axis parallel to the axes of the wheel and lever, said stop having a plurality of abutments variably spaced from the pivotal axis of the stop, and adjusting means for selectively swinging said stop about its pivotal axis and maintaining said stop positioned to present any desired one of said abutments for collision therewith of said pawl mechanism on driving strokes of said mechanism and to transmit the collision force to said wheel through said lever and detent roller.

2. A line spacing mechanism, as claimed in claim 1, wherein the limit stop adjusting means comprises a stop setting hand lever mounted for swinging about an axis parallel with the pivotal axis of the stop and interlocked with the stop against relative swinging of the hand lever and stop about their pivotal axes and for movement of said stop relatively to said hand lever when the lever to which said stop is pivoted is rocked, and means for releasably detenting said hand lever to selectively maintain the desired stop abutment positioned for collision therewith of the pawl mechanism.

3. A line spacing mechanism, as claimed in claim 1, having manually shiftable cam means operable on said stop and detent roller carrying lever to rock the latter against the force of the spring connected therewith to disengage said detent roller from the wheel and hold it disengaged.

4. A line spacing mechanism, as claimed in claim 1, wherein the pawl mechanism comprises a pawl carrier mounted at one end to rock about the axis of the ratchet wheel toward said limit stop on the driving strokes of the pawl mechanism and having fixed means thereon for collision selectively with said limit stop abutments, and a driving pawl for the ratchet wheel pivotally held to the pawl carrier for rocking into and out of toothed engagement with the ratchet wheel and spring urged to engage the wheel, and wherein means are provided to automatically disengage the pawl from the wheel as the pawl mechanism completes each return stroke.

5. A line spacing mechanism, as claimed in claim 4, wherein the pawl is pivoted at one end to the pawl carrier and is engageable at its other end with the ratchet wheel and has between its pivot and its other end a lateral projection, a spring is connected to said projection and the pawl carrier to urge said other end of the pawl to engage the wheel, and said pawl carrier has means engageable by said projection to prevent the pawl from swinging about its pivot away from the ratchet wheel far enough to change the direction of urging of the pawl about its pivot by the spring.

6. A typing machine having, in combination, a platen carriage reciprocable horizontally endwise through feed and return movements, a platen roller extending longitudinally of the carriage and having a shaft journaled in the carriage, said carriage having an upstanding end part through which one end of said shaft extends, a platen roller rotating knob spaced from the outer side of said carriage end part and fixed on said shaft, ratchet means at the inner side

of said carriage end part for rotating the platen roller in one direction through line spacing steps, a spring returned bellcrank hand lever manually movable through limited working strokes in carriage return direction to first actuate said ratchet means to rotate the platen roller and thereafter return the carriage by continued application of manual force thereto in said direction, said bellcrank hand lever having a handle arm extending forwardly from the carriage, said machine having a relatively stationary portion thereof underlying said handle arm of said lever, said bellcrank lever having a second arm fixed to the rear end of said handle arm and extending transversely over said carriage end part and connected at its inner end with said ratchet means to actuate said means to rotate the platen roller on the working strokes of the bellcrank hand lever, means carried by said carriage end part and fulcruming said second arm of the bellcrank hand lever at the outer end of said second arm between said platen roller rotating knob and carriage end part for swinging of said bellcrank hand lever through its working and return strokes about an axis which lies in a vertical plane and passes through the platen roller shaft axis and is inclined in said plane relatively to said carriage end part in a direction to cause said handle arm of the bellcrank lever to rise throughout each working stroke thereof, and means for limiting working strokes of said bellcrank hand lever.

7. A typing machine, as claimed in claim 6, wherein said second arm of the bellcrank hand lever has a pendant outer end portion located between said carriage end part and platen roller rotating knob, which pendant outer end portion encircles and is spaced from the platen roller shaft and is fulcrumed by said fulcruming means adjacent its upper and lower ends respectively above and below said shaft.

8. A typing machine, as claimed in claim 7, wherein the ratchet means comprises a ratchet wheel rotative and coaxial with the platen roller, a pawl carrier rockable about the axis of the platen roller through working and return strokes by the inner end of said second arm of the bellcrank hand lever, a pawl carried by said pawl carrier to rotate said wheel on working strokes only of said bellcrank hand lever, and fixed means on the carriage to disengage said pawl from said wheel on return strokes of said lever and hold it disengaged while said lever is in returned position, and wherein there is provided means shiftable mounted on said carriage end part for concomitant abutment with said wheel and said pawl carrier to limit working strokes of said pawl carrier and bellcrank lever and to positively lock the wheel against rotation while said pawl carrier and bellcrank lever are manually held at their working stroke limits of movement about their respective pivotal axes.

HENRY ALLEN AVERY.
JOSEPH P. BARKDOLL.

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