

March 30, 1926.

1,578,294

B. C. STICKNEY

TYPEWRITING MACHINE

Original Filed Sept. 14, 1923 2 Sheets-Sheet 1

Fig. 1.

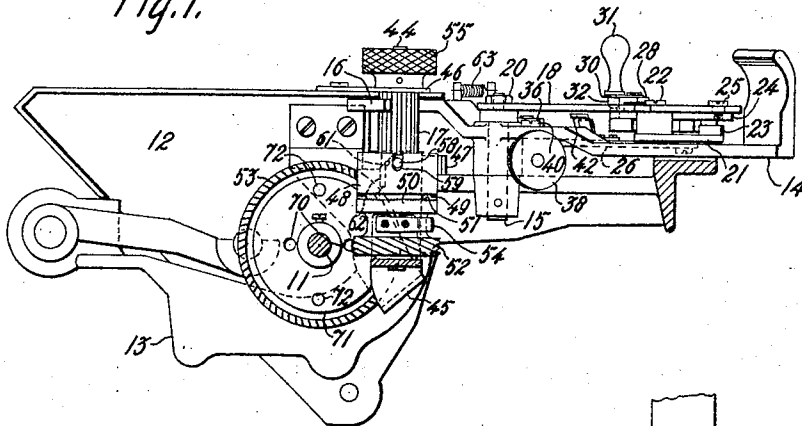


Fig. 2.

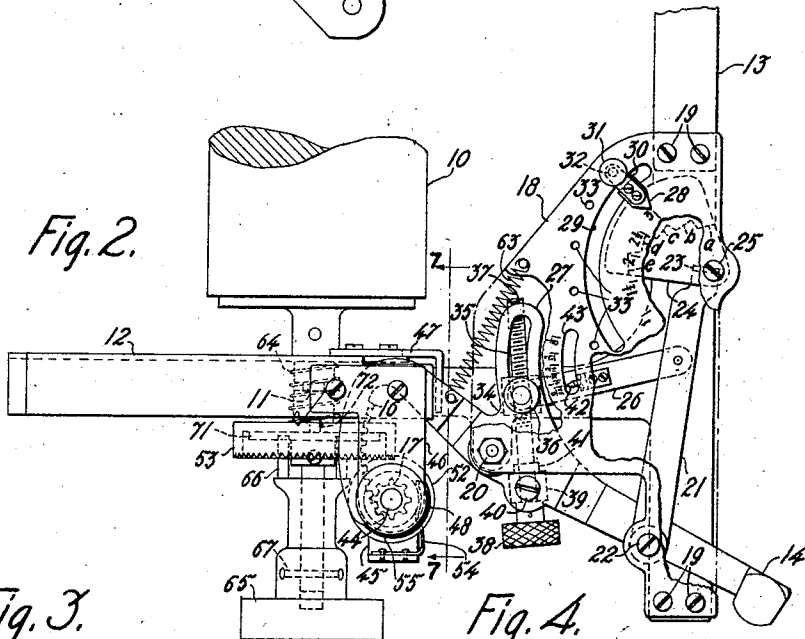


Fig. 3.

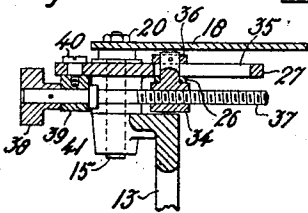
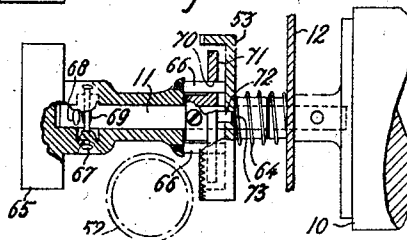


Fig. 4.



Inventor:

Bornham & Stickney

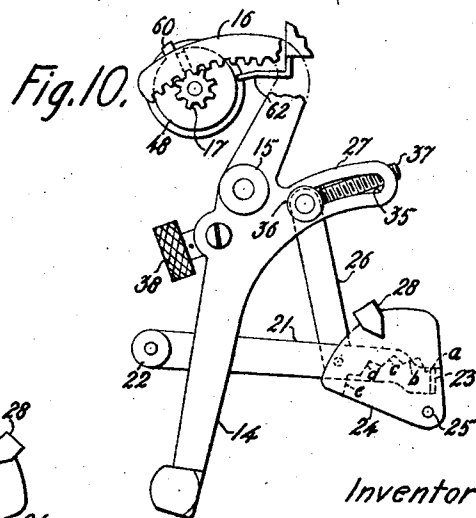
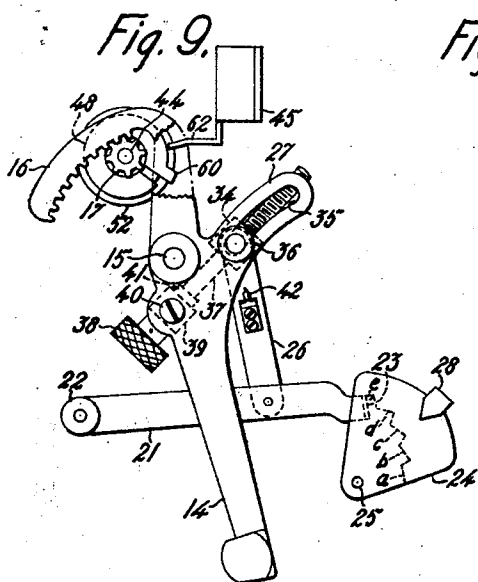
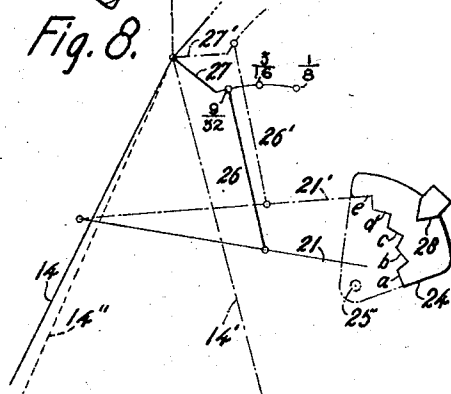
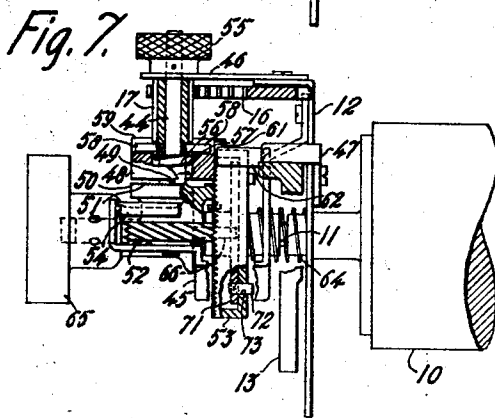
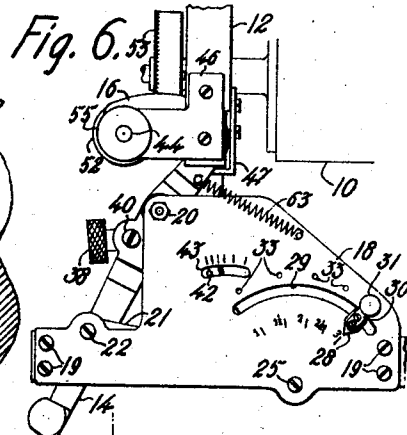
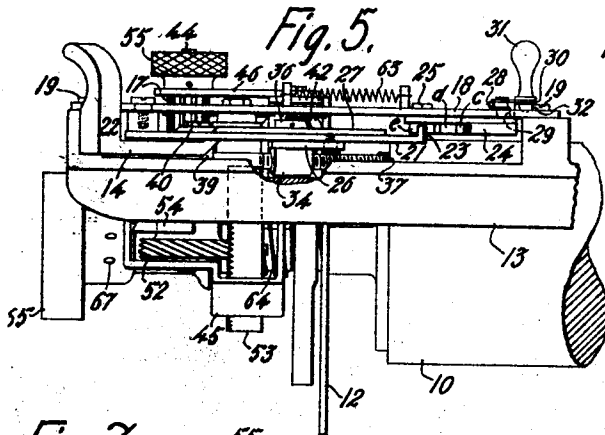
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TYPEWRITING MACHINE

Original Filed Sept. 14, 1923 2 Sheets-Sheet 2



Inventor:

Burnham C. Stickney

UNITED STATES PATENT OFFICE.

BURNHAM C. STICKNEY, OF RUTHERFORD, NEW JERSEY, ASSIGNOR TO UNDERWOOD TYPEWRITER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

TYPEWRITING MACHINE.

Application filed September 14, 1923, Serial No. 662,609. Renewed August 15, 1925.

To all whom it may concern:

Be it known that I, BURNHAM C. STICKNEY, a citizen of the United States, residing in Rutherford, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Typewriting Machines, of which the following is a specification.

This invention relates to line-spacing mechanism for typewriting machines. In my pending application, Serial No. 635,237, filed April 28, 1923, disclosure was made of novel unit-adjusting means for controlling the line-spacing mechanism to effect minute variations in the extent of the line-spacing basis or unit, especially in combination with novel multiple-adjusting means settable to cause the platen to be advanced at the line-spacing operation either 1, $1\frac{1}{2}$, 2, $2\frac{1}{2}$ or 3 times (for example) the unit distance determined by the fine regulation of the unit-adjusting means. The multiple and unit adjusting means were arranged to be set entirely independently of each other, that is, a given setting of the multiple-adjusting means would multiply by the indicated amount any selected unit determined by the unit-adjusting means to cause the platen to be advanced at the line-spacing operation a distance equal to the selected multiple of the selected unit.

The line-space lever was connected to drive the platen through a train of mechanism, consisting of a rack, a pinion, a universal clutch, a worm and a worm-wheel. The clutch enabled the line-space lever to pick up the worm in any position, while the worm, intermeshing with the worm-wheel, retained the platen in any position to which it was advanced. Provision was made of a finger-piece for turning the worm in one direction to advance the platen minute distances independently of the line-spacing mechanism for the purpose of effecting fine adjustments. The worm was held yieldingly in engagement with the worm-wheel by a spring, so that it could be forced aside by the worm-wheel to permit a rapid revolution or sweeping movement to be imparted to the platen.

It is the object of the present invention to provide mechanism more compact than said mechanism, and which has other important advantages that will be pointed out herein. The mechanism of the present invention in-

cludes independently-settable unit and multiple adjusting means for regulating the length of stroke of the line-space lever, and a train of mechanism connecting the line-space lever and the platen for causing the platen to be line-fed in proportion to the length of stroke of the line-space lever.

In accordance with one important feature of the invention, the rack for driving the platen is located directly upon the line-spacing lever and acts as a part thereof, conducing to simplicity and compactness.

In the machine of the application referred to above, provision was made for relative vertical shifting of the line-space lever and rack to permit the rack to shift with the platen-frame in case-shifting. The placing of the rack on the line-space lever itself, in the present instance, is accompanied by the provision of other means in the train for permitting this relative shifting between the parts mounted on the carriage and the parts mounted on the platen-frame. The rack is caused to mesh with a pinion mounted on the platen-frame for rotation about a vertical axis, the teeth of the pinion being long enough to permit relative movement of the rack and pinion in case-shifting without disengaging them.

The pinion is preferably coaxial with a worm, and drives the worm through a universal clutch. The worm, in turn, meshes with a crown wheel mounted on the platen-axle for driving the platen. The provision of a crown wheel at this point in the train enables the worm to be arranged beside the wheel, thus permitting the parts to be arranged compactly. It also contributes materially to other features of the invention.

One of these features consists in arranging the crown wheel so that it, and not the worm, may be moved to disconnect the platen from the worm to permit a sweeping movement of the platen. For this purpose, the crown wheel is slidably mounted upon the platen-axle and is urged toward the worm by a spring. One of the platen-turning knobs may be slidable along the platen-axle to thrust the crown wheel out of engagement with the worm, and a detent locks the crown wheel out of engagement with the worm when desired. Provision is made of driving connections between the platen-knob and the platen, and between the worm-wheel and the platen, which are effective at all

times, to cause the platen, platen-knob, and worm wheel to turn in unison.

A further feature of the invention consists in the provision of means for finely adjusting the platen in either direction independently of the line-space lever. To permit the worm to be turned backward, the worm and pinion are disconnected. As has been stated, the worm is connected to be driven by a pinion through a universal clutch. Cam means is provided for withdrawing the movable member of the clutch from engagement with the fixed member of the clutch, near the end of the return stroke of the line-space lever, as the parts approach their normal positions, and for holding the clutch-members disengaged while the parts are in their normal positions. A finger-piece is connected to the worm for turning it forward or backward to rotate the platen independently of the pinion.

Other features of the invention include simplified and more compactly arranged unit and multiple adjusting means, and the provision of a cover-plate for the adjusting means having plainly visible indexes.

The line-space regulator or multiple-adjusting means comprises a stop-device adjustable to bring any one of several stops or steps into the path of an oscillating arm which is connected to an arm of the line-space lever by using a connecting link provided with a microscopically adjustable block. This arm of the line-space lever to which the oscillating arm is connected may extend substantially at right angles to the actuating arm thereof, whereby space is economized.

The unit-adjusting means comprises a micrometer-screw mounted in a block which is swiveled on the line-space lever. The screw is threaded into an adjustable block, for adjusting the block toward and from the fulcrum of the line-space lever. Said link is pivoted to said adjustable block. The mounting of the micrometer-screw in the swiveled block results in a very much simplified construction of the unit-adjusting means, and permits the axis of the screw to shift or swing to accommodate the curve of the path of the adjustable block.

The cover-plate supports the adjusting means and forms with the line-space lever a unit which may be readily substituted for the line-space lever of the standard construction. The cover-plate has slots which accommodate pointers mounted respectively on the multiple-adjusting stop and on the link which connects the oscillating arm to the line-space lever. Index-marks adjacent the first-mentioned slot indicate the multiplier for which the multiple-adjusting device is set, and recesses in the plate co-operate with a detent on the stop to retain the stop in its adjusted positions. Index-marks

adjacent the second-mentioned slot indicate the unit for which the unit-adjusting device is set.

Other features and advantages will hereinafter appear.

In the accompanying drawings,

Figure 1 is a sectional side elevation of the carriage of an Underwood typewriting machine having the present improvements applied thereto.

Figure 2 is a plan view of the left end of the carriage, partly broken away.

Figure 3 is a front sectional elevation through the unit-adjusting means, showing the construction thereof.

Figure 4 is a detail plan view, partly in section and partly broken away, showing the mounting of the crown wheel and the platen-turning knob for disconnecting it from the worm.

Figure 5 is a front elevation of the left end of the carriage.

Figure 6 is a plan view showing the line-spacing mechanism as it would appear in the assembled machine.

Figure 7 is a vertical sectional view, taken on the line 7-7 of Figure 2, looking in the direction of the arrows.

Figure 8 is a diagrammatic view indicating the positions of the line-space lever and connected mechanism in normal and actuated positions with the unit-adjusting means set for the largest possible unit, and the coarse line-space regulator or multiple-adjusting means set for the largest possible multiple or the widest line-spacing.

Figure 9 is a plan view, partly broken away, of the line-space lever and adjusting mechanism in actuated position, the unit-adjusting means being set for the largest unit, and the multiple-adjusting means being set for the largest multiple.

Figure 10 is a fragmentary plan view of the line-space lever and adjusting mechanism in actuated position, the unit-adjusting means being set for the largest possible unit, and the multiple-adjusting means being set for the smallest multiple.

The usual Underwood cylindrical platen 10 is mounted upon an axle 11, journaled in a platen-frame 12, carried by a traveling carriage 13, and shiftable vertically with respect thereto for upper-case writing. The platen 10 is line-spaced to feed the work by a horizontally-reciprocable line-space lever 14, fulcrumed at 15 on the carriage 13 and bearing at its rear end an arcuate rack 16 in mesh with a pinion 17 mounted on the platen-frame 12 for rotation about a vertical axis. Connections between the pinion 17 and the platen 10 cause the platen to be advanced when the line-space lever 14 is moved toward the right, the advance of the platen being in proportion to the extent of such movement of the line-space lever. The

platen remains idle during the return movement of the line-space lever 14 toward the left. The connections for this purpose will be fully described hereinafter.

5 The extent to which the line-space lever 14 may be moved at a line-spacing operation is controlled by the joint operation of unit-adjusting means and multiple-adjusting means, the unit-adjusting means being effective to determine the unit or basis of line-spacing, and the multiple-adjusting means being settable to cause the extent of line-feeding to be equal to the product of the selected unit by any one of a series of multipliers, in the present case 1, $1\frac{1}{2}$, 2, $2\frac{1}{2}$ or 3. A cover-plate 18 is secured upon the carriage 13 by screws 19 and a nut 20 and supports the line-space adjusting mechanism with the exception of the parts carried by the line-space lever. This mechanism may be substituted in the standard machine, therefore, by changing the line-space lever and adding the cover-plate with its connected parts. The multiple-adjusting means comprises an oscillating arm 21 pivoted on the cover-plate 18 at 22, to reciprocate toward and from the platen 10, and having an upturned end 23 for limiting movement of the oscillating arm by engagement with one of the steps *a, b, c, d, e* of an adjustable stop 24 pivoted at 25 upon the cover-plate 18. The arm 21 crosses the line-space lever 14 and is connected through a link 26 to an arm 27 of the line-space lever 14 that extends, generally, in the direction of the length of the platen 10, and is swung by said arm 27 at the line-spacing operation. The steps *a, b, c, d, e* may be located selectively in position to intercept the upturned end 23 of the oscillating arm 21. The steps *a, b, c, d* and *e* are designed to arrest the line-space lever when the platen has been advanced 1, $1\frac{1}{2}$, 2, $2\frac{1}{2}$ and 3 line-space units, respectively. The adjusting stop 24 has a pointer 28 which passes through a slot 29 in the cover-plate 18 and co-operates with index-marks on the cover-plate to indicate the setting of the stop. A spring-plate 30 on the pointer 28 carries a handle 31 for moving the stop 24, and also carries a projection 32 to fit into openings 33 in the cover-plate to detain the stop yieldingly in its adjusted positions.

55 The link 26 is connected to the line-space lever 14 by means of a block 34 which is pivotally and slidingly received in a slot 35 in the arm 27 of the line-space lever, the block being retained in the slot by a collar 36 at its upper end. The block 34 is adjustable along the slot 35 to vary its distance from the fulcrum 15 of the line-space lever 14 by an adjusting screw 37 which is threaded into the block 34 and which has a knurled head 38 whereby it may be turned. This adjusting screw 37 is mounted in a swiv-

eled bearing block 39 depending from a pivot-screw 40 on the line-space lever 14. The adjusting screw 37 is freely rotatable in the swiveled bearing block 39, but is held against endwise movement relatively thereto by the head 38 and a collar 41 on the adjusting screw which bear against opposite sides of the bearing block 39. It will be seen that adjustment of the block 34 toward the fulcrum 15 of the line-space lever 14 reduces the effective length of arm 27, diminishes the motion transmitted by the line-space lever to the oscillating arm 21, and so increases the movement of the line-space lever required to move the end 23 into engagement with a given step of the stop 24, and therefore increases the line-space unit. An indicator 42 on the link 26 is visible through a slot 43 in the cover-plate 18 and co-operates with index-marks on the cover-plate to show the line-space unit for which the mechanism is adjusted.

The slot 35 in the arm 27 is curved upon an arc having as its center the point of connection of the oscillating arm 21 and the link 26 in the positions occupied by the parts when the advance of the platen is begun. Turning of the screw 37 to change the line-space unit does not, therefore, alter the position at which the advance of the platen is begun. The provision of the swiveled bearing block 39 for supporting the adjusting screw 37 enables the axis of the adjusting screw to shift as the block 34 is adjusted along the arcuate slot 35, and thus simplifies the unit-adjusting means.

The pinion 17 is mounted for rotation about a vertical shaft 44 journaled in brackets 45 and 46 on the platen-frame 12, and its vertically-extending teeth are of sufficient length to permit the pinion to be shifted with the platen-frame, and relatively to the rack 16 for upper-case writing without disengaging the pinion and the rack. A portion of the platen-frame which usually rests on the carriage to support the platen-frame in its normal, lower-case position is cut away to avoid interference with the reciprocation of the rack 16. An angle-plate 47 is secured to the platen-frame in non-interfering relation to the rack 16 and engages the carriage to serve as a stop and support for the platen-frame in its lower-case position.

The pinion 17 drives the platen 10 through a universal clutch comprising a movable clutch-member 48 having teeth 49 and a relatively stationary clutch-member 50 having fine teeth 51 to be engaged by the teeth 49. The relatively stationary clutch-member 50 is fast to the shaft 44. A worm 52 is also fast to the shaft 44 at its lower end and meshes with a crown wheel 53 mounted on the platen-axle 11. A brake 54 retards the movement of the worm 52 to prevent over-feeding of the platen due to the momentum

acquired by the worm and the mechanism connected to the worm.

It is desirable at times to adjust the work-sheet to exact typing positions different from the positions determined by the line-space lever, as, for example, when filling in the blanks of a printed form, and particularly to adjust the work-sheet by turning the platen backward, since this cannot be accomplished by the line-space lever. To this end, the shaft 44, to which the worm 52 is fast, is provided with a knurled finger-piece 55 at its upper end for turning it, and hence the worm, in either direction. The movable member 48 of the universal clutch is slidable along the shaft 44 into and out of engagement with the relatively fixed clutch-member 50, being urged toward the latter by a spring 56, which is received in a cupped opening 57 of the member 48 and bears at its upper end against the lower face of the pinion 17. Horizontally-extending pins 58, threaded into the lower end of the pinion 17, are slidable in a groove 59 in the top of the clutch-member 48 to maintain a driving connection between the pinion and the clutch-member 48, while permitting the clutch-member 48 to slide toward and from the clutch-member 50 and relatively to the pinion. In order to permit the worm 52 to be turned by the knurled finger-piece 55 in a direction to drive the platen 10 backward, provision is made of means to hold the clutch-member 48 normally in a disengaged position, so that the pinion 17 and rack 16 will not be connected to the worm. The clutch-member 48 has a projection 60 which is provided with a lower beveled cam-face 61 to engage a co-operating cam 62 on the bracket 45. On the reverse movement of the line-space lever 14, and just prior to the completion of such movement, the cam-face 61 engages the cam 62 to lift the clutch-member 48 to a disengaged position. A line-space lever return spring 63, connected to the line-space lever 14 and the cover-plate 18, is strong enough to return the line-space lever the full distance and lift the clutch-member 48 against the resistance of the spring 56.

It is desirable when inserting and removing work, and at other times as well, to impart a sweeping movement to the platen 10. In order to permit this to be done, the crown wheel 53 is slidably mounted upon the platen-axle 11, being normally urged into engagement with the worm 52 by a spring 64 interposed between the crown wheel and the platen-frame 12. The left-hand platen-knob 65 is also slidable lengthwise upon the platen-axle 11 and carries pins 66 which may be actuated by longitudinal movement of the knob 65 to move the crown wheel 53 out of engagement with the worm 52. The knob 65 carries a spring-pin 67 which is designed

to snap into either of two notches 68 and 69 in the platen-axle 11, the notch 69 detaining the knob in position to hold the crown wheel 53 and worm 52 disengaged (see Figure 4). The pins 66 for thrusting the crown wheel 53 out of engagement with the worm 52 pass through openings 70 in a disk 71 fast on the platen-axle 11 and maintain a driving connection between the knob 65 and the platen, and the disk 71 has pins 72 slidably received in openings 73 on the crown wheel 53 to maintain a driving connection between the crown wheel and the platen at all times.

In Figure 8 the normal and actuated positions of the line-space lever and the adjusting means are shown diagrammatically, the multiple-adjusting means being set for triple spacing, and the unit-adjusting means being set for $\frac{3}{8}$ of an inch. With the parts thus set, the platen will be advanced $\frac{27}{32}$ of an inch at each line-space operation. The parts are indicated in normal positions by the full lines 14, 27, 26, 21, and in actuated positions by the dot-and-dash lines 14', 27', 26', 21'. The line-space lever moves from the position of full line 14 to the position of dotted line 14' before the clutch-members 48 and 50 become engaged to advance the platen. Figure 9 shows the parts in positions corresponding to the dot-and-dash lines of Figure 8.

In Figure 10 the parts are shown in actuated position with the multiple-adjusting means set for single spacing, and the unit-adjusting means set for $\frac{3}{8}$ of an inch. Comparison of Figures 9 and 10 shows that the line-space lever 14 is permitted to advance three times as far in Figure 9 as in Figure 10, which results in the pinions being turned three times as far, and hence results in three times as great line-space advance.

Variations may be resorted to within the scope of the invention, and portions of the improvements may be used without others.

Having thus described my invention, I claim:

1. In a typewriting machine, in combination, a revoluble platen and line-spacing mechanism therefor, comprising a line-space lever, a horizontal rack on the line-space lever, and a pinion in mesh with the rack, the pinion being mounted for rotation about a vertical axis and having teeth of sufficient length to permit case shifting of the pinion relatively to the rack without disengaging the rack and pinion.

2. In a typewriting machine, a traveling carriage, a platen-frame shiftable therein between upper and lower case-writing positions, a revoluble platen in the platen-frame, a line-space lever on the carriage, an arcuate rack on the line-space lever and reciprocable horizontally thereby, the rack being curved about the fulcrum of the line-space lever as

a center, and a pinion in mesh with the rack, the pinion being mounted on the platen-frame for rotation about a vertical axis and having teeth of sufficient length to permit the pinion to shift with the platen-frame and relatively to the rack without being disengaged from the rack.

3. In a typewriting machine, a platen-frame, a platen-axle journaled therein, a platen on said axle, and line-spacing mechanism for the platen comprising a crown wheel on the platen axle, a worm at the side of the crown wheel and in mesh therewith, a reciprocable line-space lever, and means for effecting a one-way driving connection between the line-space lever and the worm.

4. In a typewriting machine, a platen-frame, a platen-axle journaled therein, a platen on said axle, line-spacing mechanism for the platen comprising a crown wheel on the platen-axle, a worm at the side of the crown wheel and in mesh therewith for rotating the crown wheel to line space the platen and also for locking the crown wheel against accidental rotation, means for driving the worm, and means for moving the crown wheel out of engagement with the worm to permit a sweeping rotation of the platen.

5. In a typewriting machine, a platen-frame, a platen-axle journaled therein, a platen on said axle, line-spacing mechanism for the platen comprising a crown wheel on the platen-axle, a worm at the side of the crown wheel and in mesh therewith for rotating the crown wheel to line-space the platen and also for locking the crown wheel against accidental rotation, means for driving the worm, a platen-knob on the platen-axle for rotating the platen independently of the worm to impart a sweeping movement to the platen, and means operable by the platen-knob to move the crown wheel out of engagement with the worm to permit such sweeping movement of the platen.

6. In a typewriting machine, a revoluble platen, line-spacing mechanism for rotating the platen step by step, comprising a worm-wheel and a worm in mesh therewith, the worm being effective to turn the platen in any rotated position, means for moving the worm-wheel out of engagement with the worm, and means for rotating the platen independently of the worm.

7. In a typewriting machine, a platen, line-spacing mechanism adjustable to advance the platen variable distances and effective to lock the platen against independent rotation, and means for disconnecting the line-spacing mechanism and the platen and for then imparting a sweeping movement to the platen independently of the line-spacing mechanism.

8. In a typewriting machine, a platen, line-spacing mechanism adjustable to advance the platen variable distances, compris-

ing a worm and worm-wheel, the worm being effective to lock the platen against independent rotation, and means for moving the worm-wheel out of engagement with the worm and detaining the worm-wheel in such disengaged position and for thereafter rotating the platen independently of the worm.

9. In a typewriting machine, a platen-frame, a platen-axle journaled therein, a platen on the axle, line-spacing mechanism adjustable to advance the platen variable distances, comprising a worm and a crown wheel on the platen-axle in mesh with the worm, the worm being effective by engagement with the crown wheel to lock the platen against independent rotation, means for moving the crown wheel along the platen-axle to disengage it from the worm and for detaining the crown wheel in disengaged position, and means for imparting a sweeping movement to the platen independently of the line-spacing mechanism while the crown wheel is disengaged from the worm.

10. In a typewriting machine, a platen-frame, a platen-axle journaled therein, a platen on the axle, line-spacing mechanism for the platen, comprising a crown wheel mounted on the axle for sliding movement relatively thereto, a worm beside the crown wheel, a spring normally pressing the crown wheel into mesh with the worm, the worm being effective through the crown wheel to rotate the platen and to lock the platen against independent rotation, means for moving the crown wheel against the resistance of the spring to disengage the crown wheel from the worm, means to maintain a driving engagement between the crown wheel and the platen at all times, and means for rotating the platen independently of the worm when the crown wheel is disengaged from the worm.

11. In a typewriting machine, a platen-frame, a platen-axle journaled therein, a platen on the axle, line-spacing mechanism for the platen, comprising a crown wheel slidable on the platen-axle but having driving connection therewith, and a worm beside the crown wheel and in mesh with it for rotating the platen and for locking the platen against independent rotation, a platen-knob slidable on the platen-axle but having driving connection therewith, means carried by the platen-knob for moving the crown wheel away from the worm, the platen-knob being rotatable to turn the platen independently of the worm, and a detent carried by the platen-knob for detaining it in position to hold the crown wheel disengaged from the worm.

12. In a typewriting machine, a platen-frame, a platen-axle journaled therein, a platen on the axle, line-spacing mechanism for the platen, comprising a line-space lever, a horizontal reciprocable rack carried there-

by, a pinion mounted for rotation about a fixed vertical axis on the platen-frame, a pinion having teeth of sufficient length to permit relative vertical movements of the pinion and rack in case-shifting, a worm driven by the pinion and co-axial therewith, and a crown wheel on the platen-axle driven by the worm, and means for moving the crown wheel along the platen-axle to disengage it from the worm to permit a sweeping movement of the platen independently of the line-spacing mechanism.

13. In a typewriting machine, a platen-frame, a platen-axle journaled therein, a platen on the axle, line-spacing mechanism for the platen, comprising a worm mounted on the platen-frame rotatable about a fixed vertical axis, a crown wheel on the platen-axle, and means for pressing the crown wheel yieldingly into engagement with the worm whereby the worm is connected to rotate the platen and to lock it yieldingly against independent rotation, and means to move the crown wheel out of engagement with the worm and to yieldingly detain it in disengaged position.

14. In a typewriting machine, a platen-frame, a platen-axle journaled therein a platen on the axle, line-spacing mechanism for the platen, comprising a worm rotatable about a fixed vertical axis on the platen-frame, a crown wheel slidable on the platen-axle, means yieldingly holding the crown wheel in engagement with the worm, a platen-knob movable along the platen-axle to thrust the crown wheel out of engagement with the worm and rotatable to then turn the platen independently of the worm, a disk fast on the platen-axle, thrust-pins on the platen-knob for engaging the crown wheel to move it out of engagement with the worm, said thrust-pins passing through openings in the disk to maintain a driving connection between the knob and the platen-axle at all times, and pins on the disk received in openings in the crown wheel to maintain a driving connection between the crown wheel and the platen-axle at all times.

15. In a typewriting machine, a platen-frame, a platen-axle journaled therein, a platen on the axle, line-spacing mechanism for the platen, comprising a worm rotatable about a fixed vertical axis on the platen-frame, a crown wheel slidable on the platen-axle, a spring for pressing the crown wheel into engagement with the worm, and a plate fast on the platen-axle for limiting movement of the crown wheel toward the worm, and a platen-knob for thrusting the crown wheel out of engagement with the worm to permit the platen to be rotated independently thereby, said plate serving also to connect both the crown wheel and the platen-knob to the platen-axle at all times.

16. In a typewriting machine, a revolu-

ble platen, a platen-axle, and line-spacing mechanism for the platen, comprising a line-space lever, means for adjusting the stroke of the lever to vary the extent of the line-space advance, means operatively connecting the lever to rotate the platen, comprising a universal clutch consisting of relatively fixed and movable members, a worm and a worm wheel on the platen-axle in mesh with the worm, means for rotating the worm in either direction independently of the line-space lever to effect fine adjustments of the platen in either direction, and means normally holding the clutch members disengaged to disconnect the worm and line-space lever so as to permit the worm to be rotated in a direction to rotate the platen backward.

17. In a typewriting machine, a revoluble platen, a platen-axle, a line-space lever, connections between the lever and the platen comprising a pinion rotatable about a fixed vertical axis, a clutch member driven by the pinion but slidable relatively thereto, a second clutch member arranged to be driven by the first, a worm fast to the second clutch member, a worm-wheel on the platen-axle, a cam for holding the clutch members disengaged in the normal positions of the parts, and means for turning the worm independently of the line-space lever to adjust the platen forward or backward while the clutch members are held disengaged by the cam, the cam being arranged to permit the clutch members to become engaged early in the forward stroke of the line-space lever to advance the platen.

18. In a typewriting machine, a platen-frame, a platen-axle journaled therein, a platen on the axle, a line-space lever, connections between the line-space lever and the platen, comprising a relatively movable clutch member having a cam thereon, a relatively fixed clutch member having a worm fast thereto and a worm-wheel on the platen-axle in mesh with the worm, the relatively movable clutch member having a definite range of movement determined by the line-space lever and being returned always to the same initial position, a stationary cam on the platen-frame arranged to engage the cam on the relatively movable clutch member near the end of its return stroke and to move the relatively movable clutch member out of engagement with the relatively fixed clutch member, and means for rotating the worm when the clutch members are thus disengaged to adjust the platen either forward or backward.

19. In a typewriting machine, a platen-frame, a platen-axle journaled therein, a platen on the axle, a line-space lever having a horizontal reciprocable rack at its rear, a pair of brackets on the platen-frame, a vertical shaft rotatably mounted in the brackets, a pinion loose on the shaft and in mesh with

the rack, a clutch member loose on the shaft and connected to be driven by the pinion, a second co-operating clutch member fast to the shaft, a worm fast to the shaft, a crown wheel on the platen-axle in mesh with the worm, co-operating cam means on the loose clutch member and the platen-frame to disengage the clutch members near the end of the return stroke of the line-space lever, and a finger-piece for turning the worm in either direction to adjust the platen independently of the line-space lever while the clutch members are disengaged.

20. In a typewriting machine, a platen-frame, a platen-axle journaled therein, a platen on the platen-axle, a line-space lever having a horizontal reciprocable rack at its rear, a vertical shaft rotatably mounted on the platen-frame, a pinion loose on the shaft at its upper end, a relatively movable clutch member loose on the shaft below the pinion and connected to be driven by the pinion, a relatively fixed clutch member fast to the shaft at its lower end, a worm fast to the relatively fixed clutch member, a crown wheel on the platen-axle and in mesh with the worm, a spring urging the relatively movable clutch member toward the relatively fixed clutch member, means effective in the normal position of the parts for holding the relatively movable clutch member away from the relatively fixed clutch member against the force of said spring, and a finger-piece fast to the vertical shaft at its upper end for rotating the shaft to turn the worm in either direction independently of the line-space lever to effect fine adjustments of the work.

21. In a typewriting machine, a platen-frame, a platen-axle journaled therein, a platen on the platen-axle, a line-space lever having a horizontal reciprocable rack at its rear, a vertical shaft rotatably mounted on the platen-frame, a pinion loose on the shaft at its upper end, a relatively movable clutch member loose on the shaft below the pinion and connected to be driven by the pinion, a relatively fixed clutch member fast to the shaft at its lower end, a worm fast to the relatively fixed clutch member, a crown wheel on the platen-axle and in mesh with the worm, a spring urging the relatively movable clutch member toward the relatively fixed clutch member, means effective in the normal position of the parts for holding the relatively movable clutch member away from the relatively fixed clutch member against the force of said spring, a finger-piece fast to the vertical shaft at its upper end for rotating the shaft to turn the worm in either direction independently of the line-space lever to effect fine adjustments of the work, and a return spring for the line-space lever of sufficient strength to effect a full

return stroke thereof to disengage the clutch members against the resistance of the spring tending to effect their engagement.

22. In a typewriting machine, a platen, a train of line-spacing mechanism therefor, including micrometer means for adjusting the unit of line-spacing; and also including means for adjusting the number of units the platen will be advanced at a line-spacing operation, and means connected in said train for finely adjusting the platen in either direction without altering the distance the platen will be advanced at the next succeeding line-spacing operation.

23. In a typewriting machine, a revoluble platen, a line-space lever having an arm arranged to reciprocate toward and from the platen, an oscillating arm connected to said arm of the line-space lever to be swung toward and from the platen by it, a stop on said oscillating arm, and a stop device settable to interpose any one of a series of steps in the way of the stop on the oscillating arm to limit movement of the line-space lever, and connections between the line-space lever and the platen for advancing the platen in proportion to the movement of the line-space lever.

24. In a typewriting machine, a revoluble platen, a line-space lever having an arm arranged to reciprocate toward and from the platen, an oscillating arm extending across the line-space lever and connected to be swung toward and from the platen by it, a stop on the oscillating arm, a stop device settable to determine various limits of movement for the line-space lever by arresting the stop on the oscillating arm, and connections between the line-space lever and the platen for advancing the platen in proportion to the movement of the line-space lever.

25. In a typewriting machine, a revoluble platen, a line-space lever having a slotted arm arranged to reciprocate toward and from the platen, an oscillating arm extending across the line-space lever, a link connecting the slotted arm of the line-space lever to the oscillating arm to swing the latter toward and from the platen, an adjustable stop device to arrest the oscillating arm in various positions to determine different limits of movement thereof and thereby to vary the range of movement of the line-space lever, a block connecting the link to the slotted arm of the line-space lever, said block being pivotally and slidingly received in the slot of said arm, and means for adjusting the block along the slot toward and from the fulcrum of the line-space lever to vary the extent of movement of the line-space lever permitted by a given movement of the oscillating arm and thereby to change the line-space basis or unit, and connections between the line-space lever and the platen

for advancing the platen in proportion to the extent of movement of the line-space lever.

26. In a typewriting machine, a platen, a line-space lever, connections between the line-space lever and the platen for causing the platen to be advanced in proportion to the extent of movement of the line-space lever, unit-adjusting means for determining the basis or unit of line-spacing, multiple-adjusting means for determining the number of units the platen will be advanced at the line-spacing operation, said unit and multiple-adjusting means co-operating to determine the extent of movement of the line-space lever, and the unit-adjusting means comprising a sliding block pivotally and slidably mounted on the line-space lever, a micrometer-screw threaded into the block for adjusting it toward and from the fulcrum of the line-space lever, and a swiveled bearing block on the line-space lever for the micrometer-screw, the arrangement being such that the axis of the micrometer-screw may shift as the adjustment of the sliding block proceeds.

27. In a typewriting machine, a platen, a line-space lever, connections between the line-space lever and the platen for causing the platen to be advanced in proportion to the extent of the movement of the line-space lever, means for limiting the movement of the line-space lever, comprising an arm on the line-space lever, a stop device, an oscillating arm for movement into engagement with the stop device, a link connecting the arm of the line-space lever and the oscillating arm, means for adjusting the point of connection of the line-space lever arm and the link toward and from the fulcrum of the line-space lever to adjust the line-space unit, a pointer on the link, and a cover-plate for the adjusting mechanism, the cover-plate having a slot through which the pointer is visible and index marks for indicating the setting of the unit-adjusting means.

28. In a typewriting machine, a platen, a line-space lever, connections between the line-space lever and the platen to advance the platen in proportion to the extent of the movement of the line-space lever, unit-adjusting means adjustable to vary the line-space unit or basis, multiple-adjusting means for controlling the number of the selected units that the platen will be advanced at a line-space operation, a cover-plate for said adjusting means, pointers on the adjusting means, and indexes on the cover-plate for co-operating with the respective pointers to indicate the settings of the adjusting means.

29. In a typewriting machine, a platen, a line-space lever, connections between the line-space lever and the platen to advance the platen in proportion to the extent of move-

ment of the line-space lever, unit and multiple adjusting means co-operating to determine the extent of movement permitted to the line-space lever, and a cover-plate for the adjusting means, said adjusting means being mounted entirely on the line-space lever and the cover-plate whereby the adjusting means may be placed in the machine without special provision being made to receive them.

30. In a typewriting machine, a platen, a line-space lever, connections between the line-space lever and the platen to advance the platen in proportion to the extent of movement of the line-space lever, adjusting means for determining the number of units that the platen will be advanced at a line-spacing operation, comprising an oscillating stop and an adjustable stop having a series of steps selectively setttable into position to arrest the oscillating stop, a cover-plate for the adjusting means having index marks to indicate the setting thereof and recesses to detain the adjustable stop in adjusted positions, said adjustable stop having a pointer extending through the cover-plate to co-operate with index marks on the cover-plate to indicate the settings of the stop, a spring-plate on the pointer, a handle carried by the spring-plate for adjusting the stop, and a detent on the spring-plate for co-operating with the recesses in the cover-plate to detain the stop in its adjusted positions.

31. In a typewriting machine, a platen, a line-space lever, connections between the line-space lever and the platen for causing the platen to be advanced in proportion to the extent of movement of the line-space lever, said connections comprising a worm to lock the platen in any position to which it is advanced, means for breaking the connection between the line-space lever and the worm in the normal position of the line-space lever and permitting the worm to be picked up by the line-space lever early in the forward movement thereof, means for adjusting the length of stroke of the line-space lever, comprising an oscillating arm, a stop in the path of said arm, a slotted arm on the line-space lever, a link connecting the oscillating arm and the slotted arm, and means for adjusting the connection between the link and the slotted arm along said slot, the slot being arcuate and having as its center the point of connection of the link and oscillating arm in the positions occupied by the parts at the conclusion of the lost motion between the line-space lever and the worm, whereby the position of the oscillating arm at the beginning of the advance of the platen is caused to be the same for all positions of adjustment of the adjusting means.

32. In a typewriting machine, a platen, a

line-space lever, connections between the line-space lever and the platen to advance the platen in proportion to the extent of movement of the line-space lever, means for limiting the movement of the line-space lever, comprising a slotted arm on the line-space lever extending generally in the direction of the length of the platen, a stop, an oscillating arm movable into engagement with the stop, a link connecting the oscillating arm to the slotted arm of the line-space lever, means for adjusting the point of connection of the slotted arm and the link toward and from the fulcrum of the line-space lever to adjust the line-space unit, a pointer on the link, and a cover-plate for the adjusting device, the cover-plate having a slot through which the pointer is visible and index marks for indicating the setting of the unit adjusting means, the arrangement being such that the index marks and pointer may be aligned with the eye of the operator sitting at the machine.

33. The combination of a platen, a line-space lever, a rack driven thereby, a pinion driven by the rack, a worm, a driving clutch between the pinion and the worm, a worm-wheel driving the platen, a train of stop mechanism for said lever, one end of said train connected to said lever to be finely adjusted longitudinally thereof, and the other end of said train including a set of line-space-regulating stops, said clutch being normally released, and said worm in mesh with the worm-wheel, retaining the platen where adjusted by the line-spacing mechanism, and means for effecting separation of the worm and worm-wheel.

34. In a typewriting machine, the combination with a revoluble platen, of a line-spacing lever, a rack thereon, a pinion meshing with said rack, a worm and worm-wheel between said pinion and the platen, a stop mechanism for said lever including a finely variable member for effecting minute variations in the extent of line-spacing motion of the platen, and a multiple stop device settable independently for multiplying the extent of line-spacing movement, said platen being shiftable vertically, and said rack being non-shifting but remaining in mesh with said pinion during the vertical shifting of the platen.

35. The combination of a platen, a line-space lever, a rack driven thereby, a pinion driven by the rack, a worm, a driving clutch between the pinion and the worm, a worm-wheel driving the platen, and a train of stop mechanism for said lever, one end of said train connected to said lever to be finely adjusted longitudinally thereof, and the other end of said train including a set of line-space-regulating stops, said worm-wheel in the form of a crown-wheel mounted coaxially with the platen.

36. The combination of a platen, a line-space lever, a rack driven thereby, a pinion driven by the rack, a worm, a driving clutch between the pinion and the worm, a worm-wheel driving the platen, and a train of stop mechanism for said lever, one end of said train connected to said lever to be finely adjusted longitudinally thereof, and the other end of said train including a set of line-space-regulating stops, said worm-wheel in the form of a crown-wheel mounted coaxially with the platen, and said crown-wheel and worm separable to release the platen.

37. The combination of a platen, a line-space lever, a rack driven thereby, a pinion driven by the rack, a worm, a driving clutch between the pinion and the worm, a worm-wheel driving the platen, a train of stop mechanism for said lever, one end of said train connected to said lever to be finely adjusted longitudinally thereof, and the other end of said train including a set of line-space-regulating stops, said worm-wheel in the form of a crown-wheel mounted coaxially with the platen, said crown-wheel and worm separable to release the platen, and a spring holding the crown-wheel and worm in mesh.

38. The combination of a platen, a line-space lever, a rack driven thereby, a pinion driven by the rack, a worm, a driving clutch between the pinion and the worm, a worm-wheel driving the platen, a train of stop mechanism for said lever, one end of said train connected to said lever to be finely adjusted longitudinally thereof, and the other end of said train including a set of line-space-regulating stops, said worm-wheel in the form of a crown-wheel mounted coaxially with the platen, said crown-wheel and worm separable to release the platen, and a spring holding the crown-wheel and worm in mesh, said platen provided with a rotating knob having means to release the crown-wheel from the worm.

39. The combination of a platen, a line-space lever, a rack driven thereby, a pinion driven by the rack, a worm, a driving clutch between the pinion and the worm, a worm-wheel driving the platen, a train of stop mechanism for said lever, one end of said train connected to said lever to be finely adjusted longitudinally thereof, and the other end of said train including a set of line-space-regulating stops, said worm-wheel in the form of a crown-wheel mounted coaxially with the platen, said crown-wheel and worm separable to release the platen, a spring holding the crown-wheel and worm in mesh, and means for separating the worm and worm-wheel and for locking them out of engagement.

40. The combination of a platen, a line-space lever, a rack driven thereby, a pinion

driven by the rack, a worm, a driving clutch between the pinion and the worm, a worm-wheel driving the platen, a train of stop mechanism for said lever, one end of said
 5 train connected to said lever to be finely adjusted longitudinally thereof, and the other end of said train including a set of line-space-regulating stops, and means effective upon the conclusion of the return stroke of
 10 said lever for disconnecting said pinion from said worm.

41. The combination of a platen, a line-space lever, a rack driven thereby, a pinion driven by the rack, a worm, a driving clutch
 15 between the pinion and the worm, a worm-wheel driving the platen, a train of stop mechanism for said lever, one end of said train connected to said lever to be finely adjusted longitudinally thereof, and the other
 20 end of said train including a set of line-space-regulating stops, means effective upon the conclusion of the return stroke of said lever for disconnecting said pinion from said worm, and a finger-piece connected to the
 25 worm for rotating it in either direction together with the platen, thereby advancing or retracting the platen.

42. In a typewriting machine, the combination with a platen, of a line-spacing train
 30 therefor, including a driver, one member of said train being pivotally mounted to swing at the line-spacing operation, a micrometer screw, means by which it is mounted upon
 35 said swinging member, a block adjustable along said swinging member, said screw threaded into said block, a stop link pivoted to said block to be adjusted thereby, and a series of stops adjustably co-operative with
 40 the other end of said link.

43. In a typewriting machine, the combination with a platen, of a line-spacing train therefor, including a driver, one member of said train being pivotally mounted to swing

at the line-spacing operation, a micrometer
 45 screw, means by which it is mounted upon said swinging member, a block adjustable along said swinging member, said screw threaded into said block, a stop link pivoted
 50 to said block to be adjusted thereby, a swinging stop device pivoted to the other end of said link, and a co-operating stop.

44. The combination with a line-spacing lever and a platen, of a driving train between said lever and platen comprising a
 55 rack, a pinion, a worm, a normally open clutch between the pinion and the worm, and a worm-wheel meshing with said worm and connected to the platen.

45. The combination with a line-spacing
 60 lever and a platen, of a driving train between said lever and platen comprising a rack, a pinion, a worm, a normally open clutch between the pinion and the worm, and a worm-wheel meshing with said worm
 65 and connected to the platen, said worm-wheel in the form of a crown-toothed wheel.

46. The combination with a line-spacing lever and a platen, of a driving train between said lever and platen comprising a
 70 rack, a pinion, a worm, a normally open clutch between the pinion and the worm, a worm-wheel meshing with said worm and connected to the platen, and a brake for the
 75 platen.

47. The combination with a line-spacing lever and a platen, of a driving train between said lever and platen comprising a
 80 rack, a pinion, a worm, a normally open clutch between the pinion and the worm, a worm-wheel meshing with said worm and connected to the platen, and a finger-wheel connected to said worm to effect fine adjust-
 85 ments of the platen.

BURNHAM C. STICKNEY.