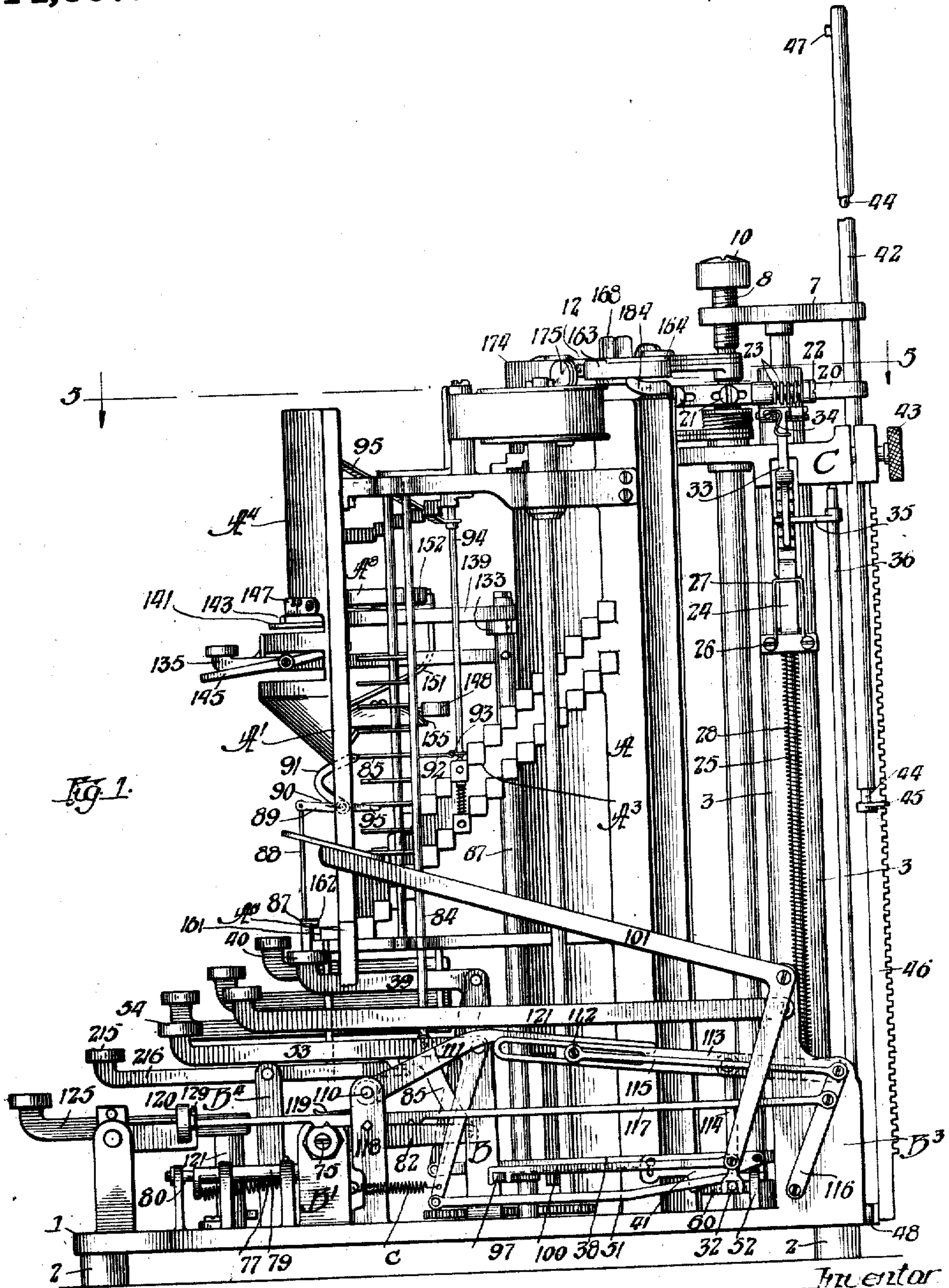


C. S. NICKERSON.
 TYPE WRITING MACHINE.
 APPLICATION FILED MAY 7, 1906.

Patented Mar. 9, 1909.

7 SHEETS—SHEET 1.

914,667.



Witnesses:
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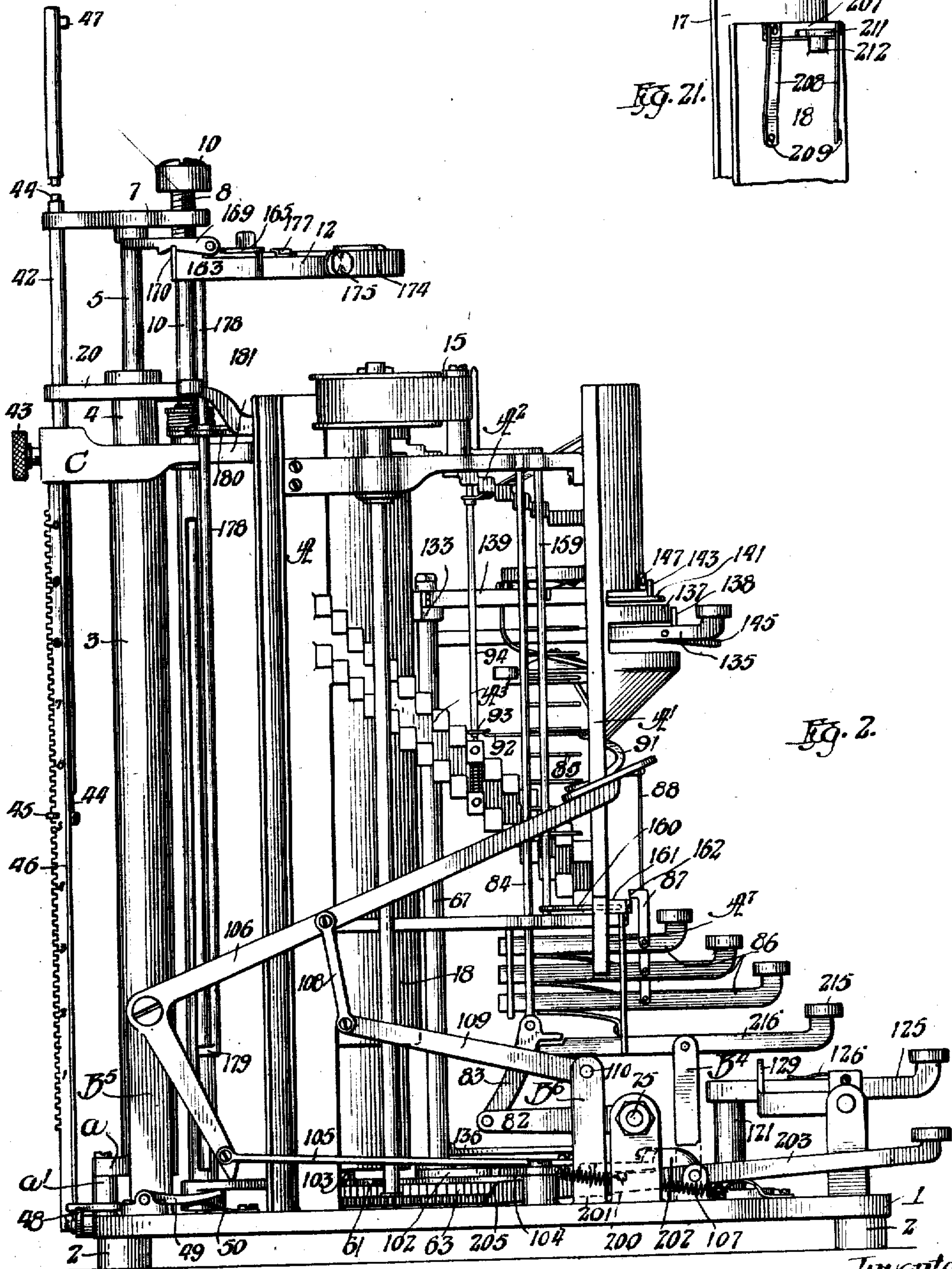
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7 SHEETS—SHEET 2.



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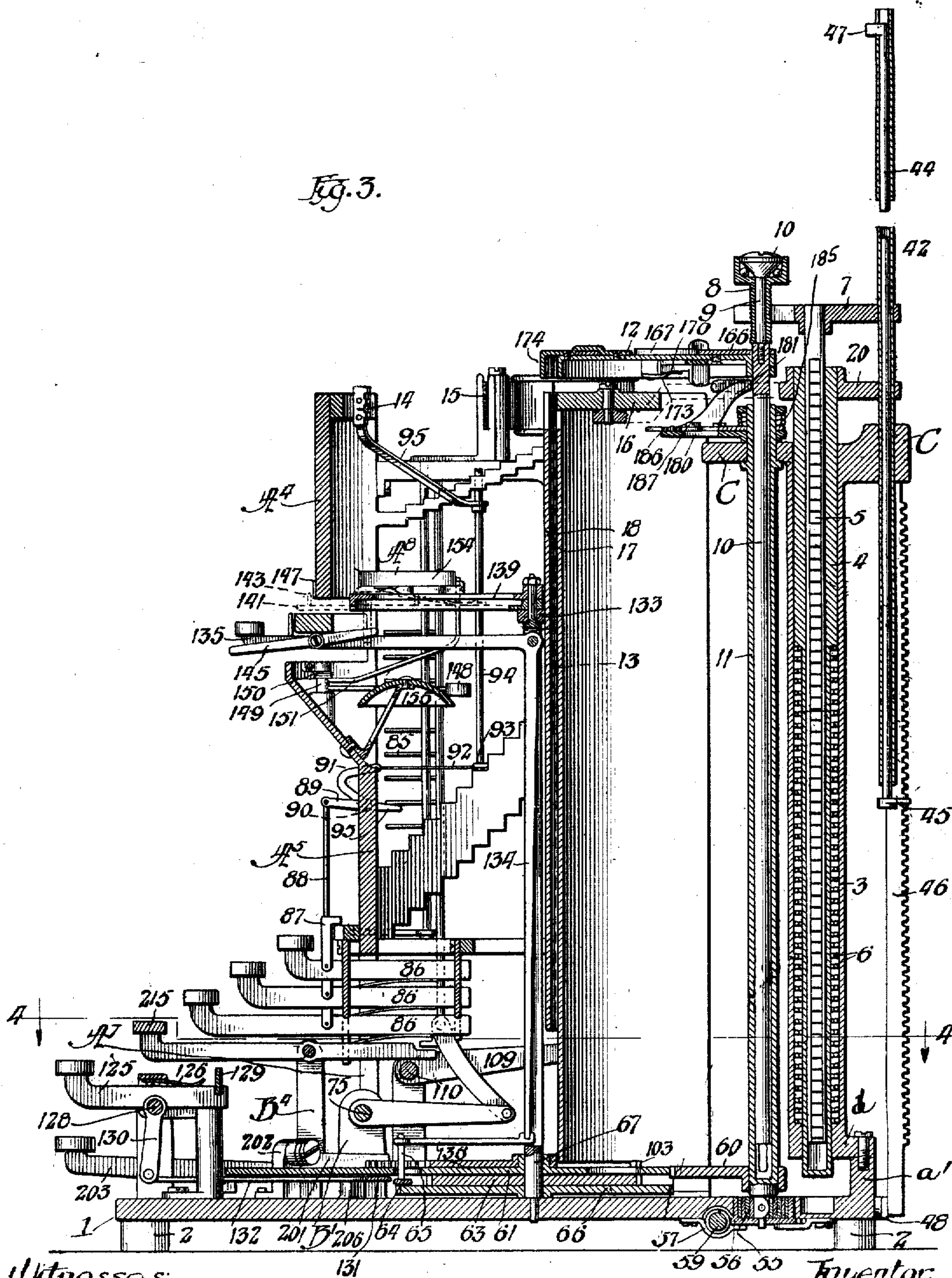
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7 SHEETS—SHEET 3.

Fig. 3.



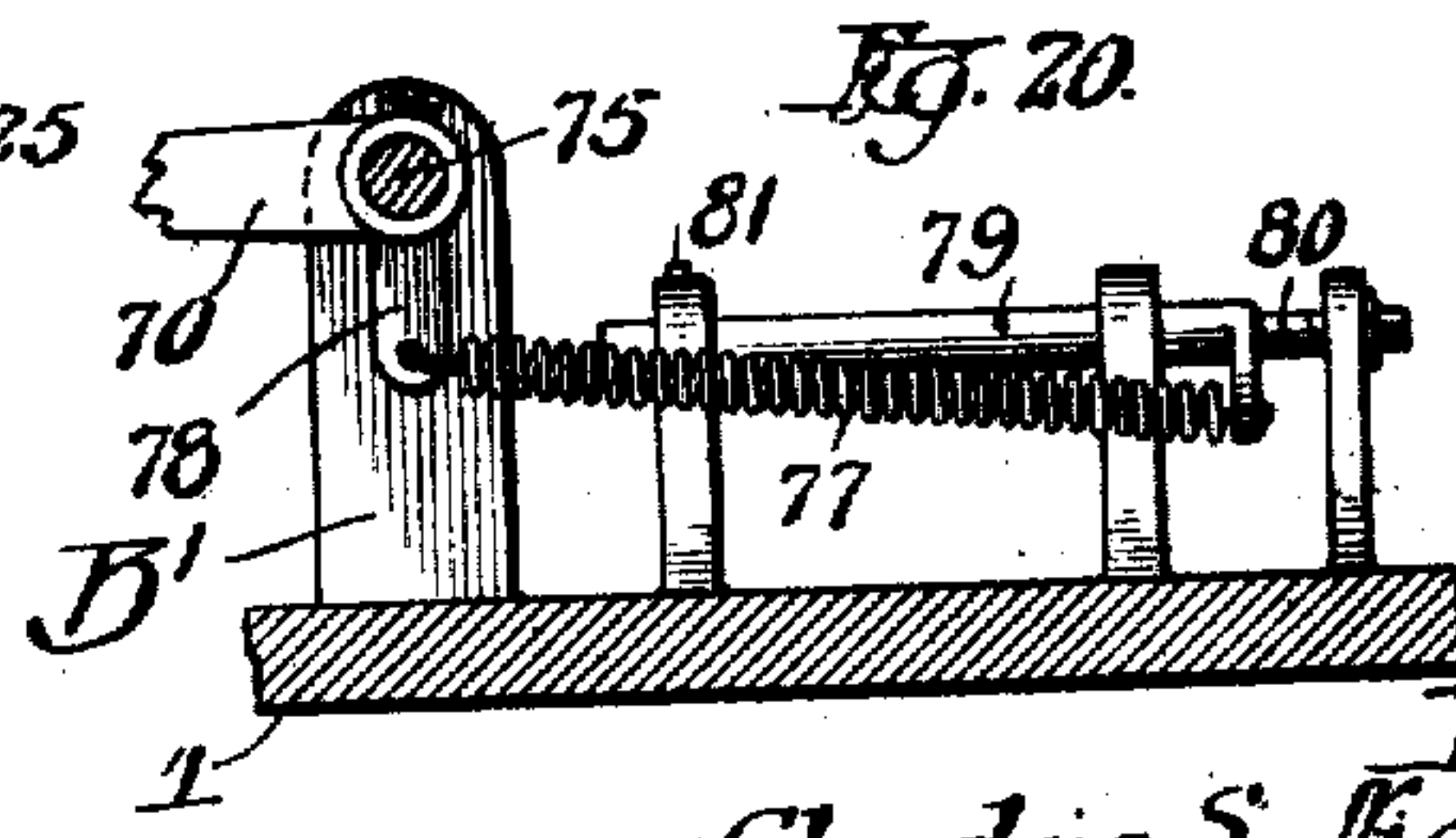
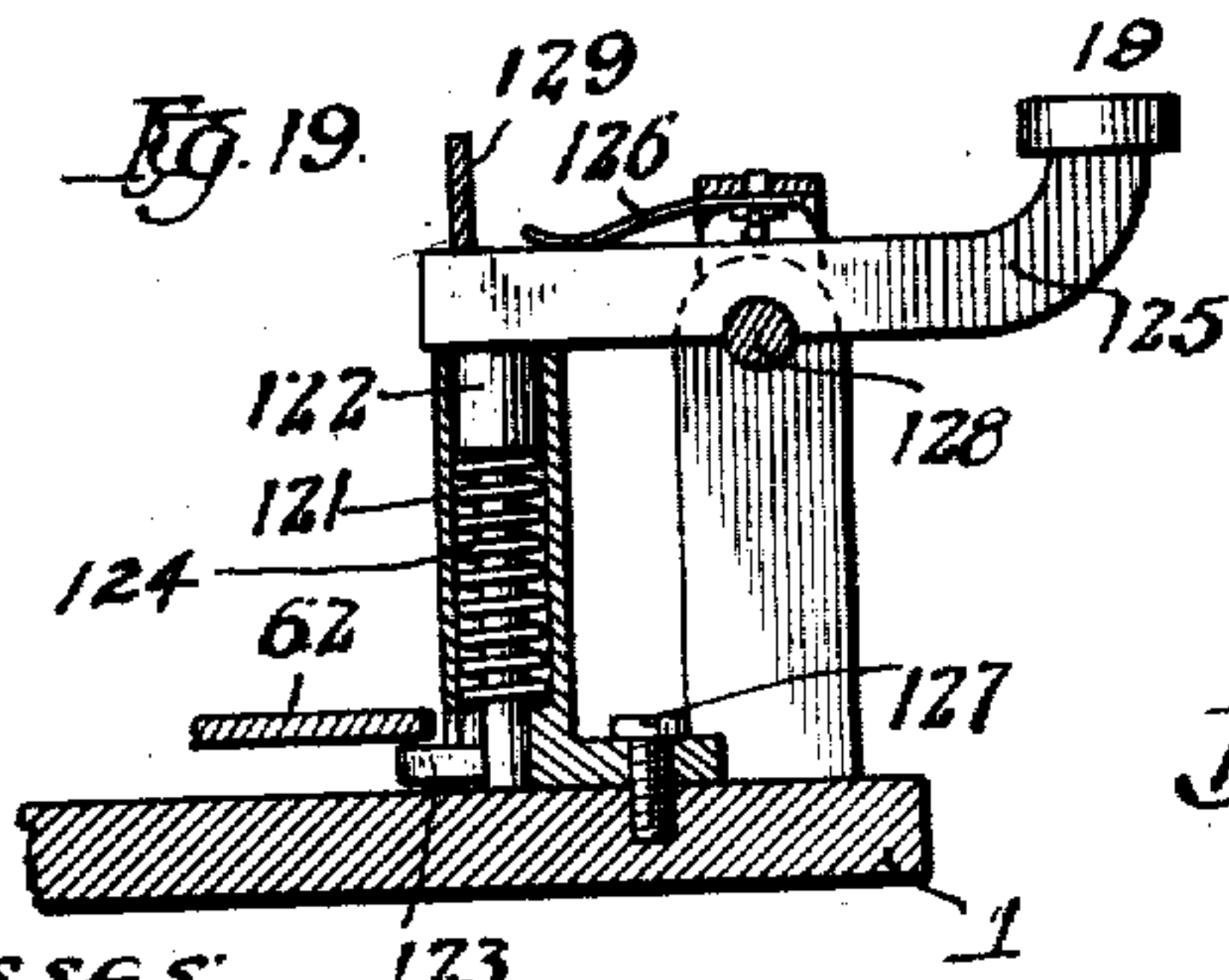
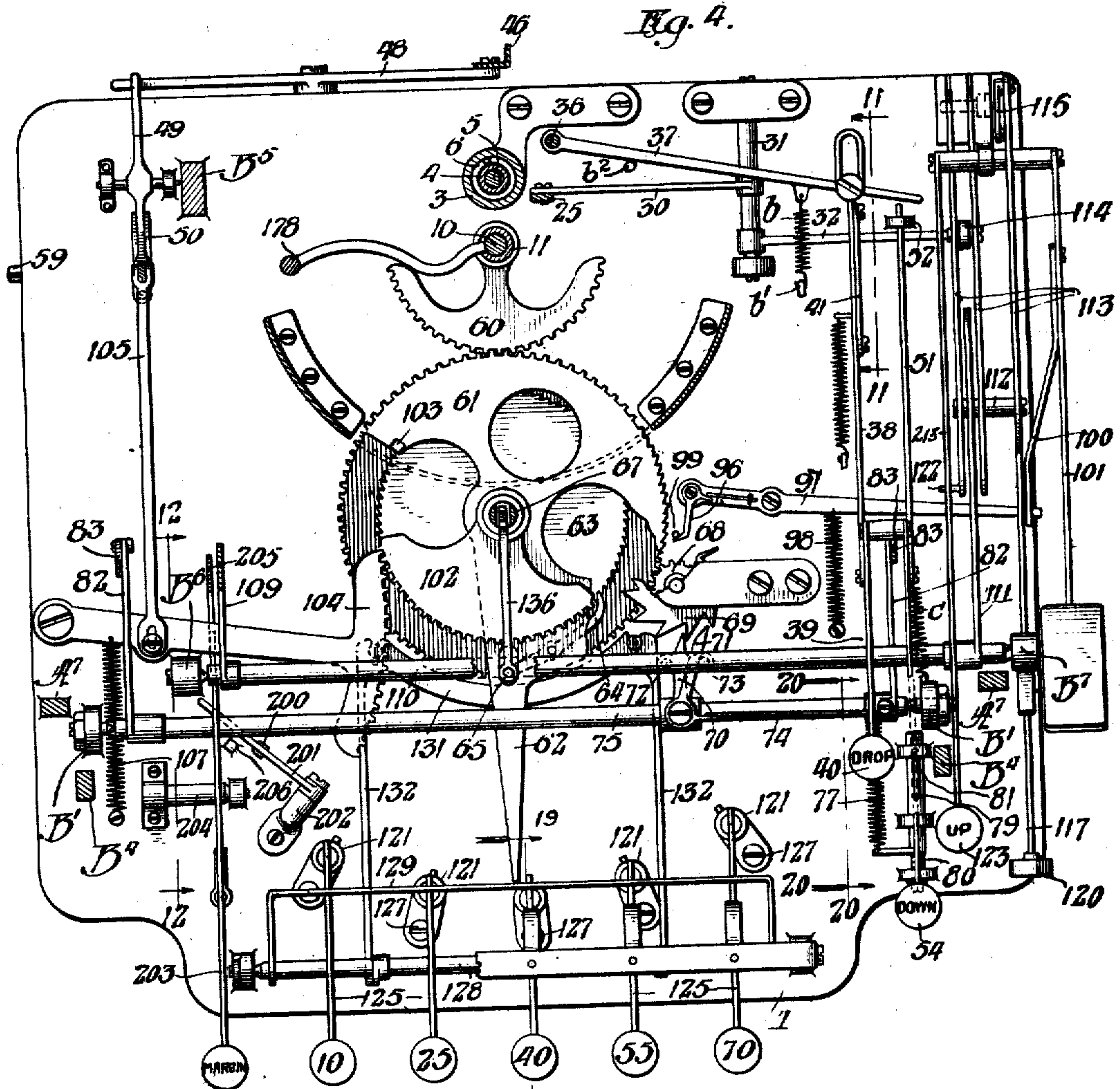
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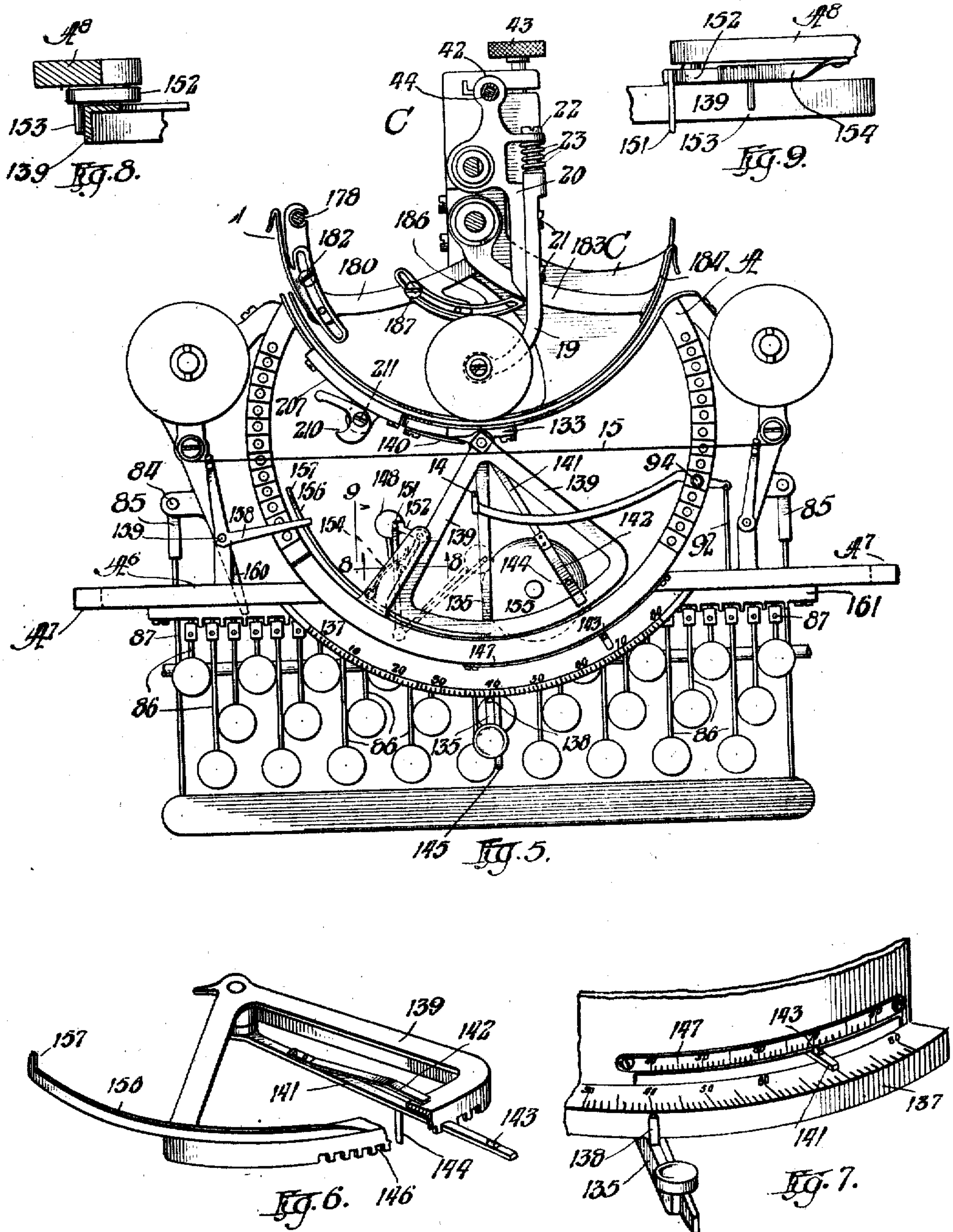
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7 SHEETS—SHEET 5.

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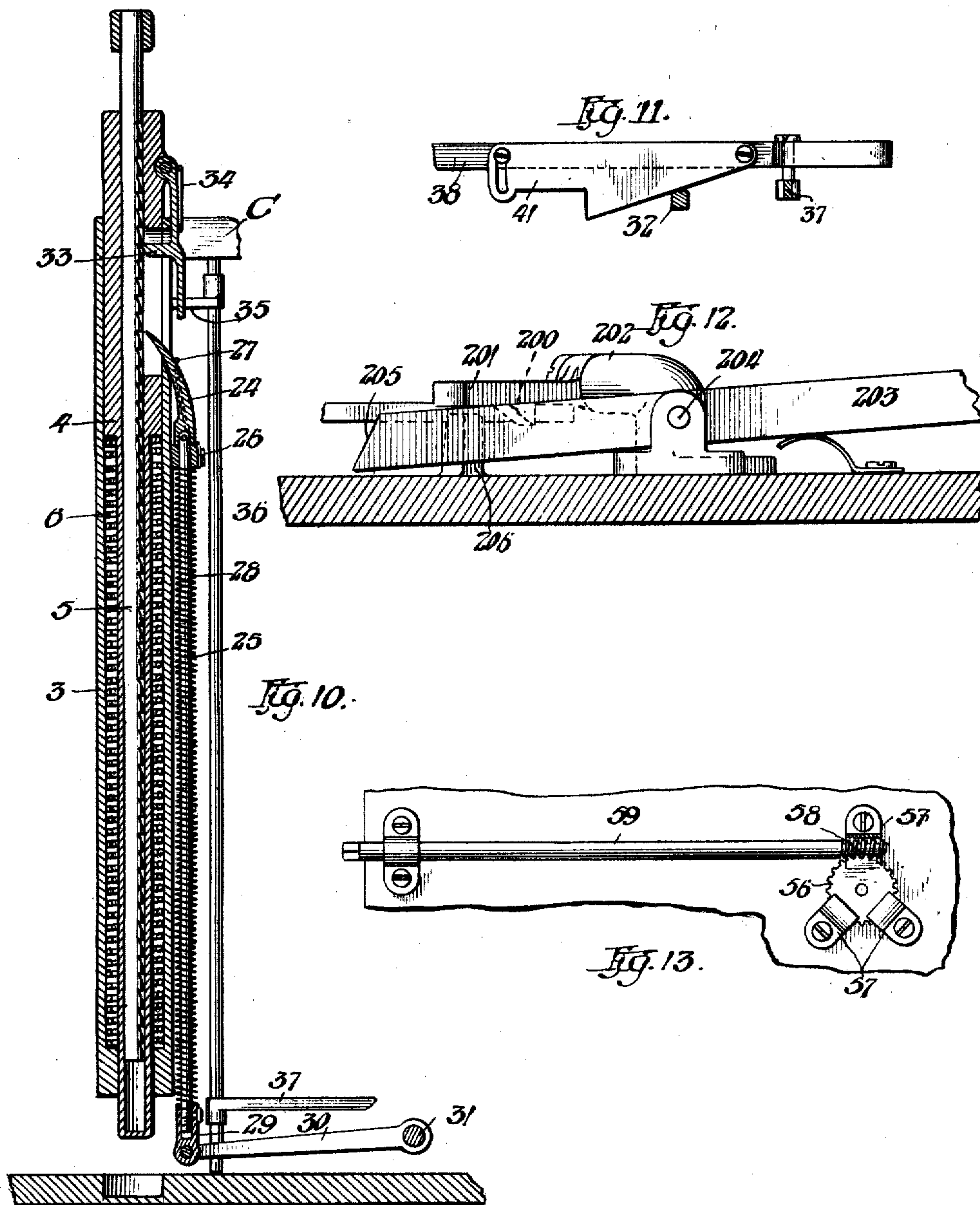
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Patented Mar. 9, 1909.
7 SHEETS—SHEET 6.

914,667.



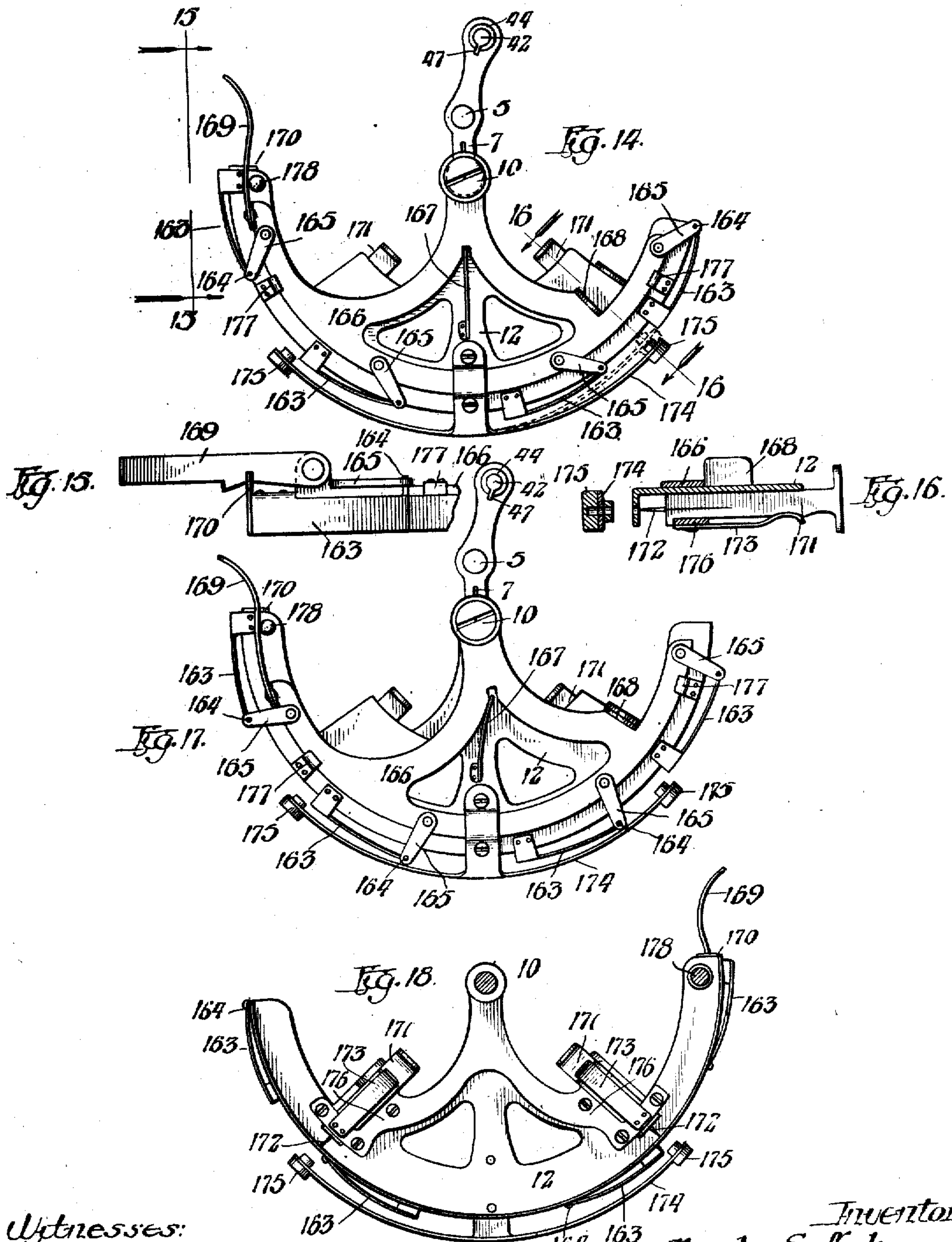
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7 SHEETS—SHEET 7.

914,667.



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UNITED STATES PATENT OFFICE.

CHARLES S. NICKERSON, OF EVANSVILLE, INDIANA, ASSIGNOR TO NICKERSON TYPEWRITER COMPANY, OF RACINE, WISCONSIN, A CORPORATION OF WISCONSIN.

TYPE-WRITING MACHINE.

No. 914,667.

Specification of Letters Patent.

Patented March 9, 1909.

Application filed May 7, 1906. Serial No. 315,638.

To all whom it may concern:

Be it known that I, CHARLES S. NICKERSON, a citizen of the United States, of Evansville, in the county of Vanderburg and State of Indiana, have invented certain new and useful Improvements in Type-Writing Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to those parts of a typewriting machine involved in supporting the sheet of paper to be written upon and for giving line space and letter space movement to the sheet.

The parts of the mechanism of a typewriting machine hereinafter described and shown in the accompanying drawings constitute part of a complete machine of the kind set forth in my prior application for United States Letters Patent, Serial Number 234,705, filed in the U. S. Patent Office on or about November 29th, 1904 and which, in its entirety, will embrace type-bar actuating mechanism, such as is shown in a prior application for United States Letters Patent, Serial No. 273,067, filed in the U. S. Patent Office August 7th, 1905; a platen-shift mechanism, such as shown in a prior application for United States Letters Patent, Serial No. 286,379, filed November 8th, 1905, and a ribbon movement, such as shown in a prior application for United States Letters Patent, Serial No. 286,378, filed November 8th, 1905.

The paper supporting and actuating devices illustrated in the drawings, embrace, as the principal features thereof, a paper holder of segmental form, or of sector-shape, having rotative or oscillatory movement about a vertical axis, to provide for the letter-space movement of the sheet of paper which is attached and moves with said paper holder, and also having vertical bodily movement to give line-space movement to said sheet of paper. In connection with such paper holder are employed stationary curved guides arranged concentrically with the paper holder and acting to hold the paper in the form of a cylindrical segment corresponding in curvature with the curved edge of the paper holder, to which the sheet is attached at its upper edge; devices for clamping or otherwise attaching the sheet

of paper to the curved edge of the said paper holder, mechanism for giving swinging movement to the paper holder about its vertical axis, an escape mechanism for giving step-by-step movement to the paper holder for letter spacing, mechanism for retracting the said paper holder or returning it to its starting point, means for releasing the paper holder from its letter-spacing mechanism and stopping its swinging movement at predetermined points; mechanism for elevating the paper holder step-by-step to effect line-spacing, devices for releasing the paper holder from the line-spacing devices and returning it to its starting point, means for giving to the paper holder vertical movement to bring it in any desired position, and means for varying the line-spacing movements to give spaces of different widths between the lines of writing.

As shown in the accompanying drawings:—Figure 1 is a side elevation of the right hand side of the machine illustrating only the parts there located. Fig. 2 is a side elevation of the left hand side of the machine, showing only the parts at such left hand side. Fig. 3 is a central vertical section showing the main operative parts of the machine. Fig. 4 is a horizontal section taken on a horizontal plane a short distance above the base plate on line 4—4 of Fig. 3. Fig. 5 is a plan section of the top part of the machine taken on line 5—5 of Fig. 1. Fig. 6 is a detail perspective view of the rocking frame for operating the key locking mechanism and bell-trip. Fig. 7 is a perspective view of the right hand end of the scale bar of the machine, showing the adjustable lever for the bell-trip and the outer end of the lever for moving the paper holder. Fig. 8 is a detail section, taken on line 8—8 of Fig. 5. Fig. 9 is a detail section, taken on line 9—9 of Fig. 5. Fig. 10 is a detail vertical section of the rear stationary column of the machine, taken on a plane parallel with the front of the machine and showing in detail the mechanism for elevating step-by-step the paper holder for line-spacing. Fig. 11 is a detail view, taken on line 11—11 of Fig. 4, of the locking mechanism forming a part of the device for releasing and dropping the paper holder. Fig. 12 is a detail sectional elevation of the devices for writing on the left hand margin of the paper, taken on line 12—12 of Fig. 4.

Fig. 13 is a front view partly in section of the key-locking mechanism. Fig. 14 is a plan view of the paper holder. Fig. 15 is a detail view of the locking and releasing device at the left hand side of the paper holder forming a part of the mechanism for operating the paper clamp. Fig. 16 is a sectional view, taken on line 16—16 of Fig. 14 showing one of the slides constituting a part of the paper holding mechanism. Fig. 17 is a plan view of the paper holder showing the paper clamps in their open or released positions. Fig. 18 is a view of the paper holder as seen from beneath. Fig. 19 is a detail section of one of the column stop devices, taken on line 19—19 of Fig. 4. Fig. 20 is a detail section, taken on line 20—20 of Fig. 4. Fig. 21 is a detail view of the erasing clamp for the paper.

As shown in the said drawings, 1 is the horizontal base-plate of the machine which is provided with supporting lugs or feet 2, 2. Attached to and rising from the rear part of the base-plate is a hollow column or stationary standard 3, the lower end of which terminates somewhat above the base-plate and which is rigidly attached to the base-plate by means of a rearwardly extending lug *a* on said standard (Fig. 3) secured to a lug *a*¹ which rises from the base-plate. Within the standard 3 is a vertically movable hollow shaft 4. The bore of the hollow standard 3 is smaller at the bottom than at the top of the standard and the hollow shaft 4 is made exteriorly of corresponding diameters, being smaller at its lower than at its upper part. Between the downwardly facing shoulder on the said hollow shaft 4 and the lower part of the hollow standard 3, is located a spiral spring 6, which tends to keep the shaft 4 normally in its elevated position. Shift-mechanism, for giving endwise movement to the shaft 4 and parts attached thereto, will usually be employed for shifting the platen vertically for printing from one of the three types on the type-bars of the machine, but parts constituting such shift-mechanism are omitted from the accompanying drawings, the same constituting the subject-matter of my separate application for United States Letters Patent Serial Number 286,379, hereinbefore referred to.

Within the hollow shaft 4 is located a vertically sliding rod 5, provided on one of its sides with ratchet-teeth having downwardly facing shoulders. Attached to the upper end of said rod 5 is a horizontally arranged plate 7 having an arm which projects forwardly from the rod and which carries an upright bearing-screw 8 having an enlarged head, by which it may be turned in the plate 7, with which said bearing-screw has screw-threaded engagement. The part of said plate 7 engaged by said screw 8 is

shown as slotted or forked in such manner that the parts thereof at opposite sides of the slit exercise a clamping action on the said screw, tending to hold it firmly at any point to which it may be adjusted. The screw 8 is made tubular to receive an upright bearing-spindle 9, which revolves freely therein and is provided at its upper end with a head that is received within a recess formed in the head of the screw 8. The head of the spindle 9 is provided with a downwardly facing conical bearing surface and the head of the screw 8 with a corresponding interior upwardly facing bearing surface and between said surfaces are preferably located antifriction balls or rollers, as shown. The bearing-spindle 8 is rigidly attached at its lower end to and supports a vertical, endwise movable rod 10 which extends downwardly through and has endwise sliding engagement with, an upright hollow shaft 11, located in front of and adjacent to the hollow shaft 3. The rod 10 has splined connection with the hollow shaft 11 (Fig. 4) so that said rod and shaft have endwise sliding or telescopic engagement with each other, but turn or rotate together.

12 is the paper-holder of the machine which consists of a segmental plate or sector-shaped piece of metal arranged horizontally and rigidly secured to the upper end of the rod 10 with its curved peripheral surface arranged concentrically with respect to said rod and facing toward the front of the machine. The paper to be written upon is attached at its upper margin to the curved forward edge of said paper holder, being bent into the form of segment of a cylinder and the lower part of the sheet hangs or depends from said forward edge of the paper holder to which it is attached. The position of the paper is indicated in Fig. 3 by the dotted line 13. Devices are provided for securing the upper edge of the sheet or sheets of paper to the curved forward edge of the paper-holder as will be hereinafter described.

Lateral oscillatory or swinging movement of the paper-holder about a vertical axis is afforded by the rotation of the hollow shaft 11 in the machine frame, while vertical movement of said paper-holder is afforded by the sliding of the rod 10 in the hollow shaft 11. The rod 5 is connected with the rod 10 and the paper-holder by the devices described, so that it moves vertically therewith, and said rod 5, being the medium through which vertical lifting movement is imparted to the paper-holder for line-spacing is herein called the lifting-rod.

16 indicates the platen of the machine. Said platen has the form of a wheel or flat disk and is mounted in a horizontal position, with its central axis vertical, at a point centrally in front of the hollow standard

3 and rod 10 and beneath the forward marginal part of the sector-shaped paper-holder. Said platen is carried upon an arm 19 (Fig. 5) which extends generally in a direction from front to the rear of the machine and is adjustably secured by screws 21, 21 to a horizontal plate 20, which latter plate is rigidly secured to the upper end of the hollow shaft 4. The screws 21, 21 pass through elongated holes in the arm 19 thereby allowing said arm to be adjusted longitudinally on the plate 20 and an adjusting screw 22 engages said arm 19 and a part of the plate 20 at the rear of said arm. Said screw is surrounded by a spiral spring 23 which is interposed between the rear end of the arm 19 and the part of the plate 20 engaged by the adjusting screw, and tends to force or press said arm 19 and the platen thereon forwardly. Said adjusting-screw and spring afford means for accurately adjusting the platen in position with respect to the paper-holder and the type-bars of the machine.

In Figs. 3 and 5, 14 indicates one of the type-heads of the machine and 15 an inked ribbon which extends between the type-heads and the platen. The machine will be equipped with the usual or any desired number of type-bars, only one of which is shown in the drawings. The type-bars are arranged in two groups, one on each side of the machine and strike to a common center upon the platen 16. Said type-bars are arranged in the manner fully set forth and illustrated in my prior application for United States Letters Patent Serial No. 273,067 hereinbefore referred to.

The face of the platen 16 is wide enough vertically to cover only one of the three characters or types upon the type-head, as seen in Fig. 3, and said platen is shifted vertically to bring it opposite either of said types upon the type-head by the use of any suitable shift-mechanism, such, for instance, as that shown in my prior application for United States Letters Patent Serial No. 286,379, hereinbefore referred to. The face of the platen may be made of rubber or some other elastic material, or the whole platen may be made of such material.

In the operation of printing, the sector-shaped paper-holder is swung horizontally from left to right about its vertical axis of rotation to carry the paper horizontally past the printing point for letter-spacing and said paper-holder is elevated or raised vertically step-by-step, a line-space distance at a time, for line-spacing. In order that the lower part of the sheet of paper which hangs or depends from the curved forward margin of the paper holder may be held or retained in its curved form during its movement past the platen and at the same time held or retained substantially in contact

with or in position to bear lightly upon the forward face of the platen, two stationary paper-guides 17 and 18 are employed which have the form of upright cylindrical segments, and are arranged parallel with each other and concentric with the rod 10 or pivotal axis of the paper holder. Said paper-guides are arranged at such distance apart as to leave between them a narrow guide space or passage wide enough to receive a sheet, or such number of sheets, of paper as may at one time be attached to the paper-holder. The said segmental paper-guides 17 and 18 are shown as having their upper edges about at the level of the top surface of the platen 15, and as being notched or cut away opposite or in front of the platen; the inner or rear guide 17 being thus provided with an opening through which the forward part of the platen projects while the outer or forward guide is provided with an opening through which the types act upon the paper.

In the particular construction illustrated the inner guide plate 17 is secured near its top to a forwardly projecting, horizontal plate or arm C formed on or rigidly secured to the upper end of the stationary hollow-standard 3. The lower end of said inner guide-plate is rigidly secured to the base-plate 1, so that said guide-plate forms a part of the frame of the machine. The outer or forward guide-plate 18 is secured at its side margins to the upright lateral frame members A of the machine which constitute parts of the stationary frame in which the type-bar mechanism is mounted. Other parts of said frame consist of forward uprights $A^1 A^1$, lateral, curved, oblique connecting members $A^2 A^3$, a curved plate A^4 extending between the upper parts of the forward uprights $A^1 A^1$, an upright frame member A^5 located midway between said forward frame uprights, a horizontal, transverse frame-member A^6 extending between the uprights $A^1 A^1$ and projecting at their ends beyond the same at both sides of the frame, and standards $A^7 A^7$ which support the ends of said transverse member A^6 from the base-plate. The lower edge of the forward guide-plate 18 preferably terminates a considerable distance above the base-plate in order to give room for parts there located and for convenience in cleaning the machine.

In inserting the paper into the machine, it is thrust between the guide-plates 17 and 18 at the right hand side of the machine and carried along between the guide-plates toward the left until brought in position beneath the paper holder, the sheet being bent by the guides into curved form so that its upper edge may be easily clamped to the correspondingly curved front edge of the paper-holder 12. To elevate the paper holder for line-spacing a step-by-step move-

ment is given to the lifting-rod 5, which rod, being connected at its upper end with the rod 10 through the screw 8 and bearing spindle 9 transmits a corresponding movement to said rod 10 and the paper-holder attached thereto. For effecting such step-by-step elevating motion, a vertically reciprocating pawl 24 operates in connection with the ratchet-teeth on the side of the said rod 5 in the manner illustrated in Figs. 4 and 10. Said pawl 24 is pivotally connected with the upper end of an upright rod 25 mounted to slide vertically at its upper end in a bearing block 26 attached to the standard 3.

The actuating spring 27 for said pawl is shown as having the form of a wire spring of U-form attached at its ends to and rising from the bearing block 26. A coiled spring 28, surrounding the rod 25 and interposed between the lower surface of the bearing block 26 and a block 29 on the lower part of the rod 25, tends to keep the pawl 25 normally depressed and free from contact with the ratchet-teeth on the rod 5, the parts being so constructed that when the pawl is depressed it bears against the lower edge of the slot in the hollow standard through which it projects for engagement with the ratchet-teeth, said lower edge of the slot being arranged in proper position to hold the free end of the pawl away from said ratchet-teeth when the pawl is in such depressed position. When the rod 25 is elevated, however, the spring 27 brings the point of the pawl into position for engagement with the said ratchet-teeth, so that each time the pawl is moved upward it will engage one of said ratchet-teeth and carry the rod 5 upwardly with it. It follows that by giving an up-and-down vibratory movement to said pawl, the lifting-rod 5 will be elevated or lifted regularly step-by-step and the paper-holder will have a corresponding movement. The rod 10, with the paper-holder thereon, will be free to revolve for letter-space movement; the weight of said rod 10 and the paper-holder being carried by the bearing spindle and antifriction rollers which engage the adjusting screw 8. By turning the said screw 8 in the plate 7 the paper may be accurately adjusted vertically with respect to the platen or striking point of the type, enabling the printing to be done exactly upon a ruled line or upon any desired part of the paper.

The pawl-supporting rod 25 is attached at its lower end to the block 29 which is pivoted to the end of a crank-arm 30, rigidly attached to a rock-shaft 31 which is arranged horizontally above the base-plate of the machine and extends in a direction from front to rear of said base-plate (Fig. 4). Said rock-shaft is provided with a second rigidly attached crank-arm 32 which extends therefrom in a direction opposite the

arm 30 and toward the right-hand side margin of the base-plate.

At a point above the pawl 24 is located a second pawl 33, which is pivoted at its upper end to the hollow shaft 4 and is provided with a tooth which extends inwardly through the slot in said hollow shaft 4 and engages the ratchet-teeth on the said rod 5. A spring 34 presses inwardly on the pawl 33 and holds it normally in engagement with said ratchet-teeth. Said pawl 33 serves as a holding pawl to maintain the rod 5 from descending after being elevated by the action of the pawl 24.

In the particular construction illustrated from its engagement with the ratchet-teeth, as is necessary when it is desired to permit the paper-holder to descend, a horizontal trip-arm 35 is attached to a vertical rock-shaft 36, with its free end behind the downwardly extending arm of said pawl 33. The rock-shaft 36 is mounted to turn at its upper end in the plate C and at its lower end in the base-plate. Near its lower end said rock-shaft 36 is provided with a rigidly attached horizontal crank-arm 37 (Figs. 4 and 10), that extends outwardly over the base-plate to a point near the right hand margin of the same. The arm 37 is given a horizontally swinging movement through the medium of a horizontal operating rod 38 (Figs. 1 and 4) which extends from front to rear of the machine above the base-plate and at its forward end is connected with the depending arm of a key-lever 39 of a bell crank shape. The key-lever 39 is pivoted at its rear end to a standard B on the base-plate. For holding said key-lever 39 in its elevated position and the horizontally swinging arm 37 at the forward limit of its movement, a coiled spring 6 is shown as connected with the lever 37 and with a plug 6¹ on the base-plate in front of the said lever (Fig. 4). The forward swing of the arm 37 may be limited by a stud 6² on the base-plate. The rear end of said actuating bar 38 is shown as extending transversely over the arm 37, and as engaging said arm 37 through the medium of an upright headed stud on the arm engaging a longitudinal slot or loop at the rear end of the said bar 38 (Fig. 11). The key-lever 39 is provided at the forward end with a key 40, the depression of which will act through the bar 38 and arm 37 to rotate the rock-shaft 36 and thereby withdraw the pawl 33 from engagement with the ratchet-teeth on the rod 5, thereby allowing the whole paper-carrying mechanism to drop by its own weight.

To prevent any jar or strain upon the mechanism when the paper-holder and connected parts are so dropped, the hollow shaft 4 is closed at its lower end and the lower end of the rod 5 is adapted to fit accurately the bore thereof, so that an air-

cushion will be formed within the lower part of the shaft as the rod 5 descends therein.

In order to avoid the necessity of holding down the key-lever 40 until the rod 5 and paper holder have made their full descent, I have provided means for locking the trip-arm 35 in its retracted position so as to hold the pawl 33 free from the ratchet teeth on said rod. For this purpose a latch-plate 41, seen more clearly in Fig. 11, is arranged at one side of and pivoted to the operating rod 38 at a point above the crank-arm 32; said latch-plate being pivoted at one end to the arm and being free to rise and fall at its opposite end by gravity. Said latch-plate 41 is provided with a downwardly extending tooth adapted to engage the crank-arm 32, and having a vertical face or shoulder which faces forwardly or toward the front of the machine. These parts are so arranged that when the key 40 is depressed and the bar 38 thereby moved rearwardly to carry the free end of the arm 37 rearwardly, the tooth of the latch 41 will drop over and engage the arm 32 so that the bar 38 will be held or locked by said latch from returning, and the pawl 33 will thereby be held temporarily out of engagement with the ratchet-teeth on the said rod 5. When, however, the crank-arm 32 is next depressed, by the devices hereinafter described, for line-spacing, said arm will be swung downwardly clear of the tooth on the latch 41 and the bar 38 will then move forward, permitting the pawl 33 to again come into its normal or operative position.

In order to steady the upper end of rod 5 in the vertical movement of the paper-holder, especially when the paper holder and connected parts are in the elevated position thereof, a guide rod 42 is rigidly secured to a rearwardly projecting part of the plate C on the top of the hollow standard 2 and is engaged by a rearwardly extending part of the arm 7 on said rod 5. Said guide-rod extends upwardly from the plate C and also downwardly therefrom. The rear part of the plate C is provided with a slit or notch extending transversely thereof, through the opening which receives the guide-rod 42, and with a clamping-screw 43 that extends through the arm formed on said plate C by said slit or notch, and serves to draw said arm toward the body of the plate to hold the rod 42 from endwise movement in the said plate. The rearwardly extending parts of the arm 7 and plate 20, both of which are provided with guide apertures for said rod 42, slide freely upon the latter in the line-space movement of the rod 5 and the platen-shift movement of the hollow shaft 4. Said rod 42 is adjustable vertically in the plate C and is adapted to be secured in any desired ver-

tical position by the clamping screw 43. In the position of parts shown in the drawings, the rod 42 is in an intermediate position, but when the machine is adjusted for operating upon sheets of paper of considerable length, said rod 42 will be slid upwardly through the plate C so that it will extend far enough above said plate to constitute a guide for the plate 7 during the entire vertical movement of the paper-holder.

In order to provide means for giving the operator warning when the bottom of the sheet of paper is reached, as the paper is fed upwardly in its line space movement, devices are provided as follows: The guide rod 42 is made in the form of a tube and within the same is a rod 44 adapted to slide freely in endwise direction therein. The rod 44 is provided at its lower end, which projects below the rod 42, with a laterally extending locking arm 45 pivoted to turn on the said rod and adapted to engage the teeth of an upright rack bar 46, which is arranged adjacent to and parallel with the rod 42 and has a limited endwise movement; the teeth of said rack-bar being spaced to correspond with the teeth on the rod 5. The upper end of said rack bar 46 slides freely in a slot in the plate C and at its lower end said rack-bar is pivotally connected with a lever 48 (Figs. 2 and 4) which extends along the rear edge of the base-plate and is pivoted between its ends to the latter by a horizontal pivot permitting the lever to swing in a vertical plane. The outer end of the said lever 48, which is located adjacent to the left hand side of the base-plate, extends beneath and is adapted to operate a locking dog 49, hereinafter described.

At the top of the rod 44, the same is provided with a forwardly extending tooth 47, which projects through a slot in the rod 42 and is long enough to extend outside of the outer surface of said rod 42. The rod 42 will be clamped to the plate C at such elevation that the plate 7 when moved upwardly with the rod 5 and the paper holder, will engage the tooth 47 when the paper is in position for writing thereon the last or bottom line. The plate 7 thereafter, by its action on the tooth 47, lifts the rod 42 and thereby elevates the rack-bar 46 so as to swing the lever 48 on its pivot in a manner to depress the outer or left hand end thereof, and thereby operate the locking-dog 49. Said locking-dog operates to lock from movement the devices provided for returning the paper-holder to its starting point in beginning a new line of writing, as will be hereinafter described.

Provision is made for lowering the lifting-rod 5 and the paper-holder one tooth or line-space at a time. Devices for this purpose embrace an endwise movable actuating

bar 51, arranged horizontally above the base-plate of the machine and adjacent to the right hand edge of said base-plate, and extending from front to rear of the machine.

5 Said rod 51 is adapted to slide at its rear end horizontally in a lug 52 (Figs. 1 and 4) which rises from the base-plate, and its forward end is connected with the depending arm of a bell-crank key-lever 53 which is

10 pivoted to the standard B and has a key 54, located at the front and right hand side of the machine. For holding the rod 51 normally at the forward limit of its movement and the key-lever 53 elevated, a coiled spring

15 c connected with the depending arm of the key-lever and with the standard B¹ may be used. The bar 51 is deflected upwardly at its rear end and its inclined rear portion extends over and engages the outer end of the

20 crank-arm 32 on the rock-shaft 31, through which the elevating pawl 24 is operated. The stud 52 is located just to the rear of the arm 32 and said arm 32 is located in position for the action thereon of the inclined lower

25 edge of the bar 51 when the latter is pushed rearwardly by the action of the key-lever 53. The rearward movement of the said bar 51 depresses the arm 32 just far enough to bring the point of the pawl 24 inside of the

30 point of the ratchet-teeth upon the rod 5, but not far enough to bring the pawl into engagement with said ratchet-teeth. The rear end of the bar 51 is, moreover, located in line with and in position to act upon the

35 right hand end of the horizontally swinging arm 37 of the upright rock-shaft 36, through which the holding pawl 33 is operated. These parts are so arranged that when the bar 51 is moved rearwardly it swings

40 the free end of the arm 37 toward the rear, thereby withdrawing the holding pawl 33 from engagement with the rod 5 and allowing the latter to fall until the tooth thereon next above the pawl 24 comes into contact

45 with said latter pawl and arrests the further descent of the rod. By repeating the movements of parts through successive operations of the key 54, the rod 5 with the paper-holder may be lowered step-by-step. To prevent the bar 38 and key 40 from being moved

50 in this operation of the arm 37, with which said bar 38 is connected, the rear end of said bar 36 is connected with the arm 37 by a headed-stud on the arm engaging a slot in

55 the rear end of the bar 38, as hereinbefore described, the loose connection thus afforded enabling the arm 37 to be pushed rearwardly by depression of the key 40, while at the same time said arm 37 may move freely

60 backward when shifted by the action of the key 54, by reason of the sliding connection between said bar 38 and said arm 37.

To give the horizontal swinging movement of the paper-holder upon its axis, required in letter-spacing, an actuating spring

is applied to swing or move said paper-holder toward the left and an escapement mechanism operated by the several key-levers of the machine is provided for controlling the movement of the said paper- 70 holder to give letter-space movements as the several keys are struck. As shown in the accompanying drawings, said actuating spring has the form of a volute-spring 55 (Fig. 3) mounted in a barrel 56 (Figs. 3 and 75 13) which is arranged below and concentrically with the hollow shaft 11, and is adapted to revolve in a circular opening in the base-plate 1. The said hollow shaft 11 extends downwardly into said barrel and its 80 lower end has bearing in the flat bottom wall of the barrel. The inner end of said volute-spring is attached to the shaft 11 and its outer end to the barrel. The barrel 56, as shown in the drawing, Fig. 13, is held in 85 place on the base-plate by clips 57 attached to the under surface of the base-plate and overlapping the marginal part of the barrel. Said barrel has around its lower edge, gear-teeth which engage a worm-screw 58 on a 90 horizontal shaft 59 having bearings in the base-plate and which extends to the left hand side of the latter. Said shaft 59 is squared at its outer end for the application of a key, by which the shaft and spring- 95 barrel may be turned and the tension of the spring 55 thereby regulated with exactness. The rod 10 being free to slide endwise in the hollow shaft 11, but being held from rotation therein by a splined connection, it fol- 100 lows that the spring 55 by its action on the hollow shaft 11 tends to constantly turn or swing the paper holder in a direction toward the left, whatever may be the vertical position of said paper holder. 105

To the lower end of the hollow shaft 11 (Figs. 3 and 4) is rigidly attached a toothed gear-segment 60 which extends forwardly from said shaft, as clearly seen in Fig. 4. Mounted horizontally on the base-plate in 110 front of the gear-segment 60 and in intermeshing engagement therewith is a larger gear segment 61 provided with a forwardly projecting rigid arm 62. The said gear-segment 61 is rigidly attached to an upright 115 shaft 67, the lower end of which engages and turns in a bearing aperture in the base-plate 1 and the upper end of which has pivotal engagement with and turns in a bearing block 133 attached to the central 120 part of the front guide-plate 18, as clearly seen in Fig. 3. Beneath the gear-segment 61 and mounted to revolve loosely upon the shaft 67 is a ratchet-wheel 63. The peripheral teeth on said ratchet wheel are engaged 125 by a pawl 64 which is mounted on the lower surface of the gear segment 61. The shoulders of said ratchet-teeth face toward the left, at the front of the ratchet-wheel, so that the pawl 64 holds said ratchet-wheel 130

from turning at its forward part toward the left. The pawl 64 is provided with a pin 65 which rises through a hole in the gear segment 61. Said pin 65 is mounted on an arm of the pawl that extends from the pivot thereof toward the left, so that outward movement of the pin in a direction away from the shaft 67 tends to throw the point of the pawl, which is at the left of said pivot, into engagement with the ratchet-wheel. A gear-wheel 66 which is larger in diameter than the ratchet wheel is rigidly attached to the latter below the same and adjacent to the base-plate. Said gear-wheel 66 has intermeshing engagement with a pinion 68 mounted to turn on a vertical axis, and to the upper end of which is secured an escape-wheel 69. Said escape wheel is located above the level of the gear-segment 61.

75 is a horizontally arranged rock-shaft which extends across the front of the machine above the base-plate adjacent to and in front of the escape-wheel 69. Rigidly attached to said rock-shaft at a point opposite the escape-wheel is an escapement-dog 70 the rear end of which is in position for engagement with said escape-wheel 69, and pivotally connected with said dog, by a pivot, at right angles to the shaft 75, is a vibrating-dog 71 the free end of which is also located in position for engagement with said ratchet-wheel. The movement of the vibrating-dog 71 is limited by separated studs 72 and 73 on the said dog 70. Said dog 71 is thrown toward the right and held against the stud 73 by a spring 74, shown in the drawing as having the form of a light leaf-spring extending longitudinally of and attached at its outer end to the shaft 75. The said shaft 75 is shown as mounted at its ends in bearings formed by conical-ended screws inserted horizontally through lugs B¹ B¹ which rise from the base-plate 1. The vibrating-dog 71 stands normally in engagement with the teeth of the escape-wheel 69 and at such time rests against the stop-stud 72. By rocking the shaft 75, the dog 71 is released from and the dog 70 engaged with one of the teeth of the escape-wheel. The dog 71 is pressed, by the action of the paper-holder actuating spring 55, against the stop stud 73, and upon rocking the shaft 75 back to its normal position one tooth of the wheel 69 is allowed to escape or pass the escapement dogs.

A spring 77 (Fig. 20), shown as having the form of a coiled-spring, is applied to hold the shaft 75 in its normal position, or with the escapement dogs depressed and the swinging dog 71 in engagement with the teeth of the escapement wheel. Said spring is shown as being attached at its rear end to a downwardly projecting rigid arm 78 on the shaft 75. For convenience in adjusting

the tension of said spring 77, it is attached at its forward end to an arm which projects laterally from a horizontal, endwise sliding shaft 79 that extends from front to rear of the machine, and is mounted in two guide lugs that rise from the base plate of the machine. An adjusting screw 80 having rotative engagement with a lug on the forward edge of the base-plate engages the forward end of the shaft 79 in such manner as to draw the same forward, the shaft being held from turning in its bearings by means of a pin 81 inserted in the rear bearing-lug of the shaft and engaging a longitudinal groove in said shaft 79. The screw 80 is shown as provided with a square head so that it may be turned by a key.

To the rock-shaft 75 are rigidly attached two rearwardly projecting crank-arms 82, 82 (Figs. 1 and 3) through the medium of which the said rock-shaft and the escapement dogs are actuated. To the rear end of each of the arms 82 is pivoted a connecting bar 83 which rises from the said arms and at its upper end is pivoted to a vertical sliding rod 84; there being one of these rods on each side of the machine and said rods being mounted to slide vertically in the parts of the machine frame by which the type-bar mechanism is supported. Each of said rods 84 is provided with a number of horizontal pins 85, 85 extending forwardly therefrom, the number of said pins corresponding with the number of type-bars in the machine.

86, 86 indicate the key-levers of the machine from which the type-bars are operated. The connections between said key-levers and the type-bars as well as the features of construction in the said type-bars and the mounting thereof are like the corresponding parts set forth in my prior application for United States Letters Patent Serial No. 273,067, hereinbefore referred to. These parts are illustrated in the accompanying drawings only so far as necessary to an understanding of the present invention and so far as illustrated in said drawings embrace features as follows.

To the key-levers are pivoted upright links 87, to the upper ends of which are secured upright connecting rods 88. Said rods 88 are connected at their upper ends with forwardly projecting arms 89 on horizontal rock-shafts 90 which are mounted in the frame uprights A¹ and A⁵ of the machine. Attached to the rock-shafts 90 are second crank-arms 91 which rise from the rock-shafts and are preferably of curved form. The crank-arms 91 are, by horizontal, rearwardly extending connections 92 (Figs. 1, 2 and 3) connected with the horizontal, rigid arms 93 on upright rock-shafts 94 to which the type-bars are attached. The horizontal rock-shafts 90 are provided each with a third, rigid, rearwardly projecting

arm 95, that extends horizontally therefrom and engages at its rear part with one of the pins 85 upon one of the vertically sliding rods 84. In the machine illustrated, the several rock-shafts 90, 90 belonging to the group of type-bars at each side of the machine are located one above another and each of the two vertical rods 84 is equipped with a number of pins 85, 85 corresponding in number and vertical distance apart with the several rock-shafts 90. The pins 85 are made long enough to be bent slightly up or down in order to secure accurate adjustment of the letter-spacing for each key upon the machine. When any key-lever is depressed, one of the rods 84 will be lifted, thereby actuating the rock-shaft 75 to operate the escapement dogs and permit the movement of the paper-holder a letter-space distance. 215 indicates the space-bar of the machine, which extends transversely in front of the key-levers 86. Said space-bar is attached to the front ends of two space-bar levers 216 which are pivoted to standards B⁴ B⁴ on the base-plate. The rear ends of the levers 216 extend beneath forwardly projecting lugs on the upper ends of the connecting bars 83 (Figs. 1 and 2), so that when the space-bar is depressed, the said connecting bars and the rear ends of the arms 82, 82 on the rock-shaft 75 will be elevated, with the effect of turning said rock-shaft and actuating the spacing dogs carried thereby to give spacing movement to the paper-holder.

Mechanism for back letter-spacing, or for shifting the paper holder backwardly step-by-step, a letter-space distance at a time, is provided as follows: The gear-segment 61 has on its right hand edge (Fig. 4) a plurality of ratchet-teeth which have their shoulders or holding edges directed rearwardly. 96 is a spring-pressed pawl, pivotally connected with the end of a lever 97, which is pivotally mounted between its ends on the base-plate of the machine so as to swing in a horizontal plane. Said lever 97 is thrown by a spring 98 in a direction to carry the free end or point of the pawl into engagement with the ratchet-teeth on the gear-segment 61, but when the end of the lever 97 bearing the pawl is thrown rearwardly the free end of said pawl rests against a stationary pin 99 in the base-plate and the pawl is thereby held out of engagement with said ratchet-teeth. When, however, the right hand end of said lever 97 is thrown toward the rear of the machine the pawl will come into engagement with the ratchet-teeth and move or turn the segment in a direction to swing the latter backward, so as to turn or carry the paper holder backward against the action of its actuating spring. For operating the lever 97, its outer or right hand end is engaged with the forward

ward end of a horizontal connecting bar 100, the rear end of which is pivoted to the depending arm of a key-lever 101, which, as clearly shown in Fig. 1, is pivoted to a standard B³ on the base-plate, and which has a forwardly extending arm provided with a key. The spring 98 acts to draw the right hand end of said lever forwardly and to hold the key-lever 101 normally in its elevated position. When the key-lever 101 is thrown downwardly or actuated by the finger of the operator, the said right hand end of the lever 97 is thrown rearwardly against the action of the spring 98 and the pawl 96 will then come into engagement with the ratchet-teeth on the gear-segment 61, so that by swinging or moving of the key-lever 101 downwardly the desired distance, the gear segment 61 may be rotated backwardly one or more letter-spaces as may be desired in order to bring the paper-holder or paper to the point required for the insertion of a letter when an erasure has been made, or for other like purpose.

To provide means for returning the paper-holder to its starting point or for swinging it from left to right to carry the paper into position for beginning a new line of writing, devices are provided as follows: 102 is a gear-segment which is loosely mounted upon the shaft 67 above the gear-segment 61. Engaged with the teeth of said segment 102 is another gear segment 104 which is pivoted to the base-plate of the machine and at a point adjacent to the left hand edge of the same, as seen in Fig. 4. The gear segment 104 is operated by means of a connecting rod 105 (Figs. 2 and 4) that is arranged horizontally and extends rearwardly from the segment 104 above the base-plate. The rear end of said rod 105 is connected with the lower end of the depending arm of an angular key-lever 106 located at the left hand side of the machine. Said key-lever 106 is pivoted to an upwardly extending standard B⁵ on the base-plate, located at a point near the rear edge of the latter. The forwardly projecting arm of the lever 106 is provided with a key or finger-piece which, when depressed, throws backwardly the lower end of the depending arm of said lever and thereby gives, through the connecting rod 105, a corresponding rearward movement to the gear-segment 104.

The gear-segment 102 is held normally in its position to the right, and the segment 104 in its forward position by a coiled spring 107. Said segment 102 is adapted to be turned from its normal position toward the left by the backward movement of the segment 104, when the latter is swung inwardly by downward pressure on the key-lever 106, and said gear-segment 104 is adapted, when so turned to the left, to strike a stud 103 which rises from the gear-segment 61, there-

by turning the latter gear-segment in a direction to swing the gear-segment 60 on the hollow shaft 11 toward the right, and swinging or turning the paper holder in the same direction and back to its starting point for beginning a new line of writing. In its turning movement, the said gear-segment 60 passes beneath the stationary hollow shaft 3, which latter is attached to the base-plate through the medium of the rearwardly projecting lug a on said shaft and the lug a^1 on the base-plate, as hereinbefore described. After the paper holder has been rotated back to its starting point for beginning a new line of writing, the key-lever 106 is released and a spring 107, returns said gear-segments 104 and 102 to their normal positions so that these parts will not interfere with the swinging movement of the gear-segment 61 in the subsequent operation of the letter-spacing mechanism, as the paper-holder swings or moves toward the left by the action of the spring 55, under the control of said spacing mechanism.

In the machine illustrated, provision is made for automatically lifting the paper holder, to effect line-spacing, at the time said paper-holder is swung back, by the operation of the lever 106, to its starting point for the beginning of a new line. For this purpose, a construction is provided as follows: As seen in Fig. 2, 108 is a link which connects the paper-holder returning key-lever 106 with a crank-arm 109 which is attached to and extends rearwardly from a rock-shaft 110 that extends horizontally across the front of the machine above the base-plate and is mounted at its ends in standards B^s B^r on the base-plate, as clearly seen in Figs. 1, 2, 3 and 4. At its right hand end, said rock-shaft 110 is provided with a rigidly attached crank-arm 111, (Fig. 1) which extends rearwardly therefrom and is adapted to act or press downwardly upon a horizontally arranged pin 112 that extends across the path of movement of said arm 111, as clearly seen in Figs. 1 and 4. The pin 112 is mounted adjustably in the forward end of a lever 113 that extends from front to rear of the machine and is pivoted at its rear end to the standard B^s on the rear part of the base-plate. This lever is shown as made double or provided with two pairs of arms both of which are slotted for the passage of the pin 112, which pin is adapted for adjustment in the slots of said arm 113 longitudinally thereof. The lever 113 has pivotally connected with it a depending link 114, the lower end of which is notched or otherwise constructed to embrace the right hand end of the vertically swinging crank-arm 32 hereinbefore described, this being the arm of the rock-shaft 31 through the medium of which is actuated the vertically movable pawl 24 by which the rod 5 is lifted

to give line-space movement. By the depression of the key-lever 106 not only will the paper be returned to position for the beginning of a new line, but at the same time through the rock-shaft 110 the arm 111 thereon, the lever 113 and its depending link 114, the arm 32 of the rock-shaft 30 will be depressed and the pawl 24 moved upwardly so as to lift the paper-holder a distance of one line-space, as hereinbefore described. The double-levers 113 are shown as pivotally connected at their rear ends by a horizontal pivot to the standard B^s and the depending link 114 is shown as extending at its upper end between the said lever 113 and is connected therewith by a horizontal pivot extending from said levers and through a hub at the upper end of the arm. This construction permits the lower end of said link 114 to swing freely and at the same time act with downward pressure on the arm 32.

The pin 112 which, as before stated, is adjustable endwise upon or with relation to the double lever 113 is made so adjustable for the purpose of regulating the space between the lines and provision is made for shifting or adjusting said pin lengthwise of the lever 113 as follows.

115 (Fig. 1) is a connecting rod which is attached to the pin 112 and extends rearwardly therefrom to the upper end of a swinging lever 116, pivoted at its lower end to the standard B^s in such manner that its upper end may swing forwardly and rearwardly in a vertical plane. 117 is a horizontally arranged, endwise adjustable rod which is pivoted at its rear end to the lever 116 and extends forwardly along the base-plate above the same and slides at its forward end in the standard B^r on the base-plate. Said rod 117 passes through a slot in said standard B^r and is provided in its lower edge with a number of notches adapted to engage a horizontal pin 118, which extends transversely through the slot in the said standard B . A spring 119 is attached to the standard and bears downwardly upon the rod 117 so as to hold either one of the notches thereof in engagement with the pin 118. These notches upon the rod 117 are so arranged or spaced that a uniform downward stroke of the crank-arm 111 will raise the rod 5 a distance equal to one, two or three of the teeth thereon, according to which one of the three notches in the under side of said rod 117 is engaged with the pin 118. The key 120 is secured to the forward end of the sliding rod 117 for convenience in changing the space or distance between the lines.

In order to provide for elevating the paper independently of the lever 106 by which line spacing is automatically accomplished, a separate or independent device is

provided for this purpose embracing the key-lever 213 which is pivoted at its rear end to the standard B³ on the base-plate and which extends forwardly from its pivot over a pin 122 (Fig. 4) which is rigidly attached to the forward end of the innermost of the two levers 113 and projects laterally therefrom into the path of the said lever 213. When said lever 121 is depressed by downward pressure of the finger on its key 123 it acts upon the lever 113 to depress the same and thereby depresses the arm 32 so as to actuate the line space lifting pawl 24 independently of the operation of other parts; it being manifest that by repeated movements of the lever 213, the paper holder may be lifted to any extent desired and brought into position for printing at any line on the sheet.

I have further provided in connection with the features of construction above described, means for warning the operator when the bottom of the sheet of paper is reached or when there is no room for printing additional lines. As hereinbefore described, the guide rod 42 is clamped in position at a height corresponding with the length of the sheet to be written upon. For the convenience of the operator a numbered scale is provided either upon the rod 42 or upon the vertical rack-bar 46, as shown in Fig. 2. As hereinbefore described, when the bottom of the paper is reached the plate 7 will lift the sliding rod 44 by contact with its tooth 47 and will thereby lift the rack 46 by the action of the latch 45. At this time the rack 46 will operate to lift the inner end of the lever 48 and the outer end of said lever will be depressed. Said outer end of the lever 48 engages the rearwardly extending arm of the locking-dog 49, the forward end of which is located in such position that when elevated it will come in position behind the lower end of the lever 106 and thereby prevent the movement or actuation of said lever.

A spring 50 acts upon the forward end of the locking-dog 49 and tends to lift the same into its locking position, but the lever 48 stands normally in such position that its outer or left hand end bears upwardly against the rear end of said locking-dog and holds its forward end depressed against the action of said spring 50. When, however, the inner end of said lever 48 is lifted through the upward movement of the rack-bar 46, its outer end is correspondingly depressed. The dog 49, being then no longer held with its forward end depressed, is thrown by the spring 50 into position for engagement with the lever 106. Upon reaching the last line of the sheet, therefore, the operator will be free to complete the printing of such last line, but cannot actuate the key-lever 106 either to return the paper

holder or to effect the line-space movement thereof and is thereby warned that the insertion of a fresh sheet of paper into the machine is necessary.

The machine illustrated includes mechanism for stopping the letter space movement of the paper-holder at any desired point for tabulating or like work. These features are shown in Figs. 1, 2, 4 and 19. Upon the base-plate 1 and forward of the path traversed by the forward end of the arm 62 on the gear-segment 61, are located a number of short upright standards 121 which are fastened to the said base-plate by screws 127 inserted through inwardly or outwardly extending base-flanges on said column so as to afford slight lateral adjustment of the column. In each column 121 is a vertically sliding piston 122 (Fig. 19) provided with a stop-arm 123 which projects through a slot in the lower part of the column in such position that it may be brought into the path of said arm 62 and will stand in the path of said arm 62 when the piston 122 is in its elevated position. A coiled spring 24, located in column beneath said piston, presses upwardly on the piston and tends to hold it in the path of the arm 62. The said spring 124 is interposed between an internal shoulder of the column 121 and a head or enlargement on the upper end of the piston. 125, 125 indicate pivotally supported key-levers which extend forwardly from the columns 121 with their rear ends over the pistons 122. Springs 126, strong enough to overcome the springs 124, act downwardly upon the inner ends of the key-levers 125. Said springs 126 hold the pistons 122 normally depressed, with the stops 123 thereof below the plane of oscillation of the arm 62. The several key-levers 125 are shown in the drawing as pivotally supported on a horizontal rock-shaft 128, which extends transversely across the front of the machine above the base-plate. Said rock-shaft is mounted at its ends in bearing lugs which rise from the said base-plate. Rigidly attached to said rock-shaft 128 and extending rearwardly therefrom is a bail 129 the central part of which is parallel with the rock-shaft and extends over and in contact with the inner ends of the several key-levers 125. Said shaft 128 is provided near its ends with two depending rigid crank-arms 130 which are pivoted at their lower ends to forwardly projecting arms 132 on a horizontally arranged, sliding plate 131 which is located above the arm 62 and adjacent to the margin of the gear-segment 61. The rear edge of said plate 131 is curved concentrically with the said gear-segment and is adapted for engagement with the pin 65 upon the pawl 64. Said plate 131 when pushed rearwardly by the turn-

ing of the rock-shaft 128 engages and forces inwardly the said pin 65 so as to release the pawl 64 from the ratchet wheel 63.

The several levers 125 are provided at their forward ends with keys which bear figures corresponding with the letter-space position of the arm 61, when the latter is in engagement with the stop-arms 123 on the several columns. In the operation of these parts, when one of the keys is depressed, its key-lever 125 lifts the bail 129 and by rocking the shaft 128 (on which the key-levers freely turn) throws the sliding plate 131 rearwardly against the pin 65 thus releasing the pawl 64 from the ratchet-wheel 63 and allowing the gear-segments 61 and 60 to freely revolve through the action of the main actuating spring 55. At the same time the piston 122 is allowed to rise, under the action of the spring 124, until the stop-arm 123 comes into the path of the arm 62, and thereby stops said arm and the paper holder at a point upon the scale corresponding with the figure upon the key-lever 125 which is depressed.

Devices are provided for releasing the paper-holder from the letter-spacing mechanism and revolving said holder horizontally to bring the paper in a desired position with respect to the striking point of the type, as follows: 135 is a laterally swinging key-lever, provided with a button or key at its forward end, and located at the front of the machine near its top. The vertical shaft 67 to which the gear-segment 61 is attached, extends upwardly to and has bearing engagement with the block 133, as before stated, and said shaft 67 is provided in the principal part of its length with a longitudinal slot in the upper part of which the rear end of the key-lever 135 is pivoted by a transverse pivot-pin. The key-lever 135 has a downwardly extending, rigid, vertical arm 134, which extends downwardly in the slot in the shaft 67. At its lower end the vertical arm 134 engages the rear end of a horizontally arranged, endwise movable, connecting bar 136, which extends in a direction from front to rear of the machine above the gear-segment 61 and the forward end of which is engaged with the pin 65 upon the pawl 64, as clearly seen in Figs. 3 and 4. By depressing the forward end of the key-lever 135, the bar 136 is carried to the rear, thereby shifting rearwardly the pin 65 and drawing the pawl 64 out of engagement with the teeth of the ratchet-wheel 63. The gear-segment 61 is thus released from engagement with the ratchet-wheel 63 and said gear-segment 61 with the gear 60 and the paper-holder is free to be turned by swinging the key-lever 135 laterally, it being thereby possible to release the paper-holder from its actuating device and to revolve the same horizontally to bring any desired part

of the paper opposite the printing point. It will of course be understood that when the paper-holder is thus released from the letter-spacing mechanism it still remains under the influence of the actuating spring 55, which tends to throw or turn said paper holder toward the left, but the paper-holder may be stopped at any desired point by releasing the downward pressure on the key-lever 135 and thereby permitting the pawl 64 to again engage the ratchet wheel 63.

The key-lever 135 is shown as extended at its forward end through a horizontal slot formed in the curved front plate A⁴ of the frame of the machine. In order to enable the operator to determine accurately the position to which the paper-holder is swung or moved by the actuation of the key-lever 135, an arc-shaped scale bar 137 is attached to the part A⁴ of the frame, and extends horizontally above the slot in the plate A⁴ and over the key-lever 135. Said scale-bar is provided with a scale which is marked to correspond with the letter-spaces and numbered in the usual manner. The lever 135 is also desirably provided with a pointer 138 (Fig. 7) which rises from said lever with its upper end in position opposite the scale, which is preferably marked on the upper surface of the scale-bar 137.

Devices are provided for warning the operator when the end of a line of writing is reached, as follows: 139 indicates, as shown in Figs. 1, 2, 3, 5 and 6, a horizontally arranged sector-shaped frame located at the rear of the curved frame-plate A⁴ and which is pivoted upon the upper end of the shaft 67 above the bearing-block 133, so as to swing freely on said shaft. 140, (Fig. 5) is a spring, attached to the block 133 and pressing on a lug which projects to the left from the frame 139, in such manner that said spring tends to turn or swing said frame 139 toward the left side of the machine. A lever 141 is also pivoted to the upper end of the shaft 67 and extends forwardly therefrom, the inner end of said lever engaging the shaft at a point beneath the bearing block 133 and the frame 139. The forward end of said lever 141 extends through a horizontal slot in the curved front plate A⁴ of the machine, said slot being located above the scale-bar 137, so that the forward end of said arm 141 projects above the top surface of said scale-bar, as seen in Fig. 7.

The curved forward part of the sector-shaped frame 139 is provided with a depending flange, on the lower edge of which is formed a series of teeth or notches 146, as clearly seen in Fig. 6. A spring 142 presses the forward end of the lever 141 upwardly into engagement with the notched edge of said arm 139, said spring having the form of a leaf-spring extending longitudinally

of said arm and the free end of which extends over and bears upon the top surface of the curved forward part of said frame 139, so that it tends to lift the forward end of said arm toward the lower notched edge thereof. Said arm 141 has an indicator 143 (Figs. 6 and 7) adapted to move along a scale-strip 147 attached to the front face of the frame-plate A⁴ above the slot in which the arm 141 moves, as clearly seen in Fig. 7. By pushing the arm 141 downward until it is released from engagement with the teeth 146, said arm may be swung laterally until brought opposite a desired point on said scale 147, and when allowed to rise will again engage the teeth 146 and will be thereby locked from lateral movement. The arm 141 is provided, inside of the frame plate A⁴, with a downwardly projecting stud 144 which extends into the path of the rear end of a lever 145, pivoted to the lever 135. Said lever 145 extends longitudinally of the lever 135 at one side thereof and is pivoted between its ends to said lever 135 so that its forward end projects to a point beneath the key on said lever 135 and its rear end is adapted for engagement with the stud 144 when its said forward end is depressed. 148 indicates a bell-hammer, which is attached to the rear end of an arm upon a vertical rock-shaft 149 pivoted to the frame below the path of the lever 135. Said rock-shaft is actuated or turned in one direction by a coiled spring 150 surrounding the same. Said shaft 149 is provided with a rigid arm 151 which extends rearwardly therefrom and is bent upward at its rear end. 152 is an angular detent lever pivoted on a rearwardly extending arm A⁸ on the plate A⁴ so as to swing on a vertical axis. Said detent lever 152 is held in position to engage said arm 151 by the left hand edge of the swinging frame 139, which presses against a depending pin 153 on the forward projecting arm of said detent-lever 152, a spring 154 being secured to the arm A⁸ and pressing on the forwardly projecting arm of the lever 152 in such manner as to press or carry the pin 153 toward said frame 139. When the lever 135, moving step-by-step toward the right as the machine operates, strikes the pin 144, it swings the frame 139 away from the pin 153. The spring 154 then throws the detent lever 152 out of engagement with the arm 151, and the hammer 148, impelled by the spring 150, strikes the bell 155.

Should the operator not heed the warning of the bell it is desirable to lock the keys of the machine and devices are provided for this purpose as follows: The swinging frame 139 is provided with a curved arm 156 (Figs. 5 and 6) which projects toward the left inside of the frame-plate A⁴ and the end of which is provided with an upwardly

extending projection 157 which is clearly seen in Fig. 6. 158 is a horizontally swinging, bell-crank lever attached to the upper end of a vertically arranged rock-shaft 159 (Figs. 2 and 5) located at the left hand side of the machine frame. The rock-shaft 159 is provided near its lower end with a forwardly projecting rigid arm 160 adapted to engage a horizontal, endwise sliding, lock-bar 161, which extends across the front of the machine in front of the lower part of the frame B. Said lock-bar 161 is located behind the upright links or bars 87 through which the type-bars are operated, as clearly seen in Figs. 1 and 5. Each of the bars 87 is provided with a rearwardly extending tooth 162 at its upper end, which tooth, when the key-lever 86 is lifted, stands above the forward notched edge of the lock-bar 161. In the normal position of the lock-bar 161 the several teeth 162 are adapted to pass freely through the notches in the said lock-bar and when the latter is moved endwise by the action of the arm 160 on the rock-shaft 159, which rock-shaft is operated through contact of the pin 157 with its arm 158, the teeth 162 engage the teeth of the lock-bar 161 so that all the key-levers are locked from movement. When the keys are thus locked they may be released by lifting the lever 145 which will release the tooth 144 and allow the frame 139 to swing back toward the left to its normal position.

The line-locking mechanism illustrated is like that shown in my prior application for United States Letters Patent No. 286,378 for ribbon-movement. Said line-locking mechanism, as shown in said application is operated by a stop or projection on the inked ribbon when one of the ribbon-spools becomes empty. In the machine constructed as herein described, if, after operating the lever 145, the keys still remain locked, then the operator will know that they are locked by the ribbon-mechanism, as set forth in said application last referred to.

For removably securing the paper to the forward curved edge of the paper-holder 12, devices are provided, as shown in Figs. 1, 2, 3, 14, 15, 16, 17 and 18. As more clearly shown in Figs. 14 to 18, 163, 163 indicate a number of leaf-springs which are secured, each at one end, to the marginal part of the paper-holder and are located opposite the curved face thereof; the attached ends of the springs having upwardly and horizontally extending attaching arms, that are secured to the top surface of the paper-holder. The free ends of said springs are shown as extending toward the right. Each spring 163 has at its free end a pin 164 which projects upward therefrom and engages the free end of a horizontally arranged link 165, pivotally connected with a swinging frame or plate 166, which is generally of segmental

or sector-shape, corresponding with the shape of the body of the holder, and which is pivoted on the upper end of the rod 10, so as to swing concentrically with the said holder. The swinging plate 166 is held at its forward edge in contact with the top of the surface of the paper-holder, by means of two clips 177, 177 attached to the body of the holder and overlapping the swinging plate. A spring 167 attached to the holder and acting on the swinging plate tends to press the same toward the left. The said plate is provided with a thumb-piece 168 by which its forward edge may be turned or shifted toward the right.

The arms or links 165 being pivoted to the swinging plate at their inner ends and connected with the free ends of the springs 163 at their outer ends, it follows that, when the swinging frame is drawn toward the right, said links will push the free ends of said springs outwardly, thereby permitting the paper to be inserted between their said free ends and the forward curved face of the paper-holder. A latch 169 is pivoted loosely on the left hand end of the shifting frame 166 in such manner as to swing freely in a vertical plane, said latch extending toward the left from its pivot which is located above the top of said frame. Said latch 169 has a downwardly projecting tooth adapted to engage an upwardly projecting detent-arm 170 on the left end of the paper-holder, which detent-arm 170 is provided with a vertical notch forming a guide for the swinging end of said latch. The tooth of the latch 169, when engaged with the detent-arm 170, holds the swinging frame 166 in its shifted position to the right and thereby maintains the several paper clamps in open position, but by lifting said latch the said frame will be released and thrown toward the left by the springs 167, thus bringing the free ends of the springs, which in effect constitute clamp-jaws, into pressing contact with the paper and securing the same to the paper-holder.

In order to enable several sheets of paper to be attached at one time to the paper-holder in such manner that they may be separately removed therefrom, auxiliary attaching devices are provided, as follows: Mounted on the under surface of the paper-holder are two radially arranged, endwise sliding bars 171. Each bar at its outer end has a needle 172 (Fig. 16) which passes through a hole in the depending flange which forms the curved front face of the paper-holder. Each slide 171 is adapted to be held in its advanced or retracted position by a spring detent engaging two notches therein, said spring detent having the form of a leaf-spring 173 which is riveted to a plate 176 secured by screws or otherwise to the under surface of the paper-holder, said plate being bent or shaped to form with the

body of the paper holder, guides or ways in which the said slides are held. 174, 174 indicate two spring arms which are located at the outer face or edge of the paper-holder and extend horizontally along the same, said arms being shown in the drawing as made of a single piece or strip of sheet metal having a central arm which extends horizontally from the top edge of the strip and is secured by screws to the top surface of the paper-holder at the center thereof. Said arms 174, 174 are provided at their free ends with hollow buttons 175, 175 which are arranged opposite the holes for the needles 172, 172. In the use of this device the paper is first clamped to the paper-holder by the spring clamps 163, 163, as hereinbefore described, then the operator pushes slides 171, 171 forward, while holding buttons 175, 175 inward or in contact with the paper during the time the slides are being so pressed forward. The needles will then pass through and fasten the several sheets of paper. The spring-clamps 163, 163 are then released, when the paper will be supported by the needles 172, 172 alone. If several sheets of paper are thus held by the needles each sheet may be removed by simply tearing out the holes made by the needles, leaving the next sheet in position to be written upon.

Devices for holding in place the side margins of the sheets at points below the paper holder and for securing accurate location of the sheets on the paper holder to give a uniform left hand margin on the several sheets, are provided as follows: Rigidly attached to the said paper-holder 12 at the left-hand end thereof is a vertical rod 178 which extends downwardly from the paper-holder and is attached at its lower end to an arm 179, which is attached to the lower part of the sliding rod 10 that supports the paper-holder. Said arm 179 extends through a longitudinal slot (Fig. 4) in the hollow shaft 11. To the said hollow shaft 11 near its top is rigidly secured (Figs. 3 and 5) a horizontal, radial arm 180 provided with a slot or opening through which the rod 178 passes. A margin-guide 181, in the form of a strip with a hooked end, is adjustably clamped to the arm 180 by a clamping-screw 182 which passes through a slotted part of the horizontal portion of the paper-guide that rests upon the top of the outer end of the arm 180. Said guide 180 is bent or deflected upwardly from its point of attachment, so that its hooked end is located above the level of the top edge of the inner curved, stationary guide-plate 17, as seen in Fig. 2, and will pass freely over said guide-plate in the swinging movement of the paper-holder and margin-guide.

The hooked end of the guide 180 is adapted to engage the left hand side margin of the paper and by adjusting said guide on the

arm 180 the left hand margin left upon the paper may be made wider or narrower as desired by the operator. Another horizontal arm 183 is mounted on the upper end of the shaft 11 and projects toward the right therefrom, said arm carrying at its free end a margin-guide 184, arranged in position to engage the right hand margin of the paper. Said guide 184 has a hooked end to engage the right hand edge of the sheet, and its said hooked end is elevated above the top margin of the guide-plate 17, so as to pass over the same. The arm 183 has rotative adjustment on the shaft 11 in a horizontal plane so that it may be adjusted toward or from the arm 180 so as to permit the distance between the guides 181 and 184 to be adjusted according to the width of the sheets of paper used in the machine. For adjustably fixing the distance apart of the said arms 180 and 183 when the guides are in position to engage the paper, a curved, slotted arm 186 is attached to the arm 180 by a clamp-screw 187. The right hand end of the said arm 180 is adapted for contact with and forms a stop to limit the inward movement of the arm 183. During the insertion of the paper into the machine the arm 183 is turned back out of the way. After the paper has been inserted between the guide-plates 17 and 18 and secured to the paper-holder with its left hand edge in contact with the guide 181, the arm 183 with the paper-guide 184 is swung inward until the said arm comes against the end of the stop-arm 186. The arm 183 is held from movement by a frictional connection between the same and the shaft 11, shown as consisting of a spiral spring 185 surrounding the upper part of the shaft 11 between a collar on the upper end of the shaft and the part of said arm 184 that surrounds the shaft, and acting to press the same against the inner end of the arm 180. The two guides 181 and 184, arranged as described, serve to guide and hold in position the side edges of long sheets of paper as the sheets are lifted and swung laterally with the paper-holder.

It is sometimes desirable that one or more of the lines of writing should project beyond the left hand margin of the written page. By the depression of the lever 106, the paper-holder is ordinarily thrown back always to a certain predetermined point for beginning a new line. To provide, however, for a still further retraction of the paper holder, so that the operator may begin the line further toward the left hand margin of the paper, devices are provided, in connection with the lever 106, as follows: As seen in Figs. 2, 3, 4 and 12, 201 is a lever arranged horizontally above the base of the machine near the left hand side thereof and mounted to swing at one end

upon a bracket 202 attached rigidly to said base-plate and overhanging the path of the outer or forward end of the arm 62 on the gear-segment 61. The said lever 201 is arranged to turn on a horizontal axis, extending obliquely of the base-plate and in such manner that the said lever 201 extends transversely across the path of the said arm 62 and is at right angles to and above said arm 62 when the latter is at the normal or usual left hand limit of its movement. The lever 201 has a tooth 200 projecting downward therefrom in position for contact therewith of the arm 62 when the same reaches its usual or normal limit of movement toward the left. Said tooth constitutes a left-hand margin stop.

203 is a key-lever extending from front to rear of the machine and mounted on a horizontal rock-shaft 204 which is supported in a bearing lug on the base-plate (Fig. 4). Said lever 203 is so located that its part or arm at the rear of its pivotal axis extends beneath the rear or free end of the lever 201 (Fig. 12). Said lever 203 carries a key at its forward end by which the said forward end thereof may be depressed. The rear end of said lever is beveled as indicated at 205 in Fig. 12. In the retracted position of the paper-holder the gear-segment 104, which is operated by the lever 106 to effect the retraction of said paper holder will be at the rearward limit of its movement, and its forward edge will then be just above the beveled surface 205 on the rear end of the key-lever 203. Upon depressing the forward end of said key-lever 203 the latter will thus lift the lever 201 until the tooth 200 is drawn above or out of the path of the arm 62. Further depression of said key-lever brings the inclined face 205 thereon into contact with the gear-segment 104, thereby giving a further rearwardly swinging movement to the said gear-segment so as to swing or rotate the gear-segment 61 with its arm 62 still farther toward the left. Such movement of the arm 62 is finally limited by contact with the stationary stop-lug 206 on the base-plate. To permit such swinging movement the connecting bar 105 is connected with the gear-segment 104 by means of a stud and slot connection affording lost motion between said parts. Manifestly, when it is desired to write upon the left hand margin of the paper, the paper-holder will be swung, in its normal movement to the right, by the action of the key-lever 106 and thereafter the margin-key on the lever 203 will be depressed to bring or carry the paper-holder as far toward the right as necessary, in which position it will be temporarily held by the pawl 64 working in the ratchet-wheel 63. The printing of the line will then be proceeded with in the usual manner. It is not, however, necessary that

the key-lever 203 should itself be constructed to act upon and swing the gear segment 104, as said lever may be employed to operate the lever 201 for lifting the tooth or margin stop 200 out of the path of the arm 62, in which case the said arm and the paper-holder will, (while the key-lever 203 is held down) be further retracted by operating the back-spacing key-lever 101. The construction shown, by which the key-lever 203 both lifts the margin-stop 200 and also operates the gear-segment 104 is employed merely for convenience, or to enable the paper-holder to be retracted beyond its usual range of movement by operating the said key-lever 203 only.

To enable one or more words of the writing to be conveniently erased without removing the paper from the machine, the upper part of the left hand side of the inner stationary paper-guide 17 is extended upwardly so as to come above the level of the line of writing, while the corresponding left hand portion of the upper edge of the outer curved paper-guide 18 is cut away, to form an opening through which is exposed the part of the sheet at the left of the platen or printing point. The part of the inner paper-guide above the exposed portion of the sheet extends, forms a rigid and smooth support for the paper against which the same rests in doing the erasing. To enable the sheet to be firmly held against the inner guide-plate 17 for erasing, a horizontally arranged, curved clamp-bar 207 (Fig. 21) is movably supported on the front paper-guide 18 with its upper edge below the level of the line of writing or printing point. The said clamp-bar is preferably located in a notch formed in the upper margin of said guide-plate 18, as clearly shown in Fig. 21, so that the clamp-bar may bear upon the paper and clamp the same against the outer surface of the inner guide-plate 17. Supporting means for said clamp-bar consist of two upright left-springs 208, 208, attached at their upper ends to the clamp-bar, and at their lower ends to the outer guide-plate 18 by screws 209, 209. For actuating the clamp-bar so as to force it tightly into clamping engagement with the sheet, a cam 210 is provided, which turns upon an upright pivot-stud 211 mounted in a bracket 212 attached to the outer paper-guide 18 below the clamp-bar 207. Said cam 210 is provided with a handle by which it may be turned, and its curved or cam surface is arranged to operate upon the outer face of the clamp-bar 207 to force the said clamp-bar inwardly when the cam-plate is turned in one direction and to release said clamp-bar by permitting it to move outwardly away from the inner guide-plate 17 under the action of the spring-arms 208, 208, when it is desired to release the paper. Said clamp-

bar normally stands in its outward position, so as not to interfere with the passage of the paper between the said inner and outer guide-plates 17 and 18.

I claim as my invention:—

1. In a typewriting machine, the combination of a sector-shaped paper holder having swinging letter space movement on a vertical axis and vertical line-space movement, a vertical lifting rod, a hollow upright shaft in which said lifting rod slides, said shaft being provided with a rigidly attached horizontal platen supporting plate, and a platen connected with said plate by means affording adjustment of the platen relatively to the paper holder.

2. In a typewriting machine, the combination with a platen, of a sector-shaped paper holder having swinging letter space movement on a vertical axis and vertical line-space movement, a lifting rod provided with ratchet teeth, a vertically movable key-actuated lifting pawl, a holding pawl, a vertical rock-shaft provided with a trip arm adapted to operate said holding pawl and also with a horizontally swinging crank arm, and a key-lever acting on said crank arm for turning said rock shaft and releasing the holding pawl from the lifting rod to permit the descent of the paper-holder.

3. In a typewriting machine, the combination with a platen, of a sector-shaped paper holder having swinging letter-space movement on a vertical axis, and vertical line-space movement, a lifting rod provided with ratchet-teeth, a vertically movable, key actuated lifting pawl, a holding pawl, a vertical rock shaft provided with a trip arm adapted to operate the holding pawl, and with a horizontally swinging crank-arm, a key-lever, and an endwise movable operating bar which is given endwise movement by the key-lever and which is connected with the said crank-arm of said vertical rock-shaft.

4. In a typewriting machine, the combination with a platen, of a sector-shaped paper holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a lifting rod provided with ratchet teeth, a vertically movable lifting pawl, a rock-shaft through which said lifting pawl is actuated, said rock-shaft being arranged horizontally and provided with a vertically swinging crank-arm, key-actuated means acting on said crank-arm for operating the lifting pawl, a holding pawl, a horizontally swinging crank-arm connected with and operating said holding pawl, an endwise movable, key-actuated, horizontal operating bar extending transversely of the vertically swinging crank-arm and connected with the said horizontally swinging crank-arm, and a movable latch-plate on said operating bar adapted to engage said vertically swinging crank-arm to retain the

holding pawl in its released position until a subsequent operation of the lifting pawl.

5. In a typewriting machine, the combination with a platen, of a sector-shaped paper holder, having swinging letter-space movement on a vertical axis and vertical line-space movement, a vertically arranged lifting rod having a horizontal rigid arm, a vertically movable and rotative rod to the upper end of which the said paper-holder is attached and which has rotative connection with said arm, a vertical guide-rod rigidly secured to the frame of the machine, and an arm rigidly attached to the upper end of the lifting-rod and having sliding engagement with the said guide-rod.

6. In a typewriting machine, the combination with a platen, of a sector-shaped paper holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a spring applied to turn the paper holder in one direction, and escapement mechanism controlling the swinging movement of the paper holder for letter spacing, a key-lever connected with the paper holder for returning it to its starting point, and a line-lock mechanism embracing a locking dog adapted to engage and hold from movement said key lever and a vertically movable rod provided with a stop-lug for contact with a part which rises with the paper holder and which is connected with and operates said locking dog.

7. In a typewriting machine, the combination with a platen, of a sector-shaped paper holder having swinging letter-space movement on a vertical axis and vertical line-space-movement, a spring applied to turn said paper holder in one direction, an escapement mechanism controlling the swinging movement of the paper holder for letter spacing, a key-lever connected with the said paper holder for returning the same to its starting point, and a line-lock mechanism embracing a movable dog adapted to engage and hold from movement the said key-lever, a vertically movable rod provided with a stop-lug for contact with a part which rises with the paper-holder, and a vertical bar which is connected with and operates the said dog, and which has adjustable connection with said rod.

8. In a typewriting machine, the combination with a platen, of a sector-shaped paper holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a vertical lifting rod with which the paper holder has pivotal connection, a vertically arranged, tubular guide rod adjustably attached to the machine frame, an arm on the lifting rod which slides on the guide rod, a vertically movable line-lock rod sliding in said tubular guide rod, said line-lock rod having a stop-lug at its upper end, a key-lever connected with the

paper holder for returning it to its starting point, and a locking-dog operated by said line-lock rod for holding said lever from movement.

9. In a typewriting machine, the combination with a platen, of a sector-shaped paper holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a vertical lifting rod with which the paper is pivotally connected, a vertically arranged, tubular guide-rod adjustably attached to the machine-frame, an arm on the said lifting rod sliding on said guide-rod, a vertically movable line-lock rod sliding in said tubular guide rod, said line-lock rod being provided with a stop-lug at its upper end, a vertical, notched bar, a latch for adjustably connecting the lower end of said line-lock rod with said notched bar, a key-lever connected with the paper holder for returning the latter to its starting point, a locking dog for holding said key-lever from movement, and a connection between said vertical bar and said dog whereby the latter is actuated from the line-lock rod.

10. In a typewriting machine, the combination with a platen, of a sector-shaped paper holder having swinging letter-space movement on a vertical axis and vertical line-space movement, key-actuated means for lifting the paper holder step-by-step for line spacing, and key-actuated means permitting the descent of the paper holder step-by-step.

11. In a typewriting machine, the combination with a platen, of a sector-shaped paper holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a lifting rod connected with the paper holder and provided with ratchet teeth, a vertically reciprocating lifting pawl acting on said rod, key-actuated means for operating said pawl, a key-actuated holding pawl also engaging the teeth of said lifting rod, and key-actuating means operating to give partial movement to said lifting pawl and to also operate the holding pawl for permitting the step-by-step descent of the lifting rod.

12. In a typewriting machine, the combination with a platen, of a sector-shaped paper holder having swinging letter-space movement on a vertical axis, and vertical line-space movement, a lifting rod provided with ratchet-teeth, a vertically movable lifting pawl, a holding pawl, a horizontal rock-shaft which is connected with and operates the lifting pawl and has a vertically swinging crank-arm, a key-lever acting to exert downward pressure on the said vertically swinging arm of said rock-shaft, a vertical rock-shaft provided with a trip-arm and with a horizontally swinging crank-arm, a key-lever acting on the said horizontally

swinging crank-arm, a horizontal, endwise movable operating bar having an inclined surface which acts upon the arm of the horizontal rock shaft to depress the same which also acts by its endwise movement on the said horizontally swinging arm, and a key-lever connected with and operating said operating bar.

13. In a typewriting machine, the combination with a platen, of a sector-shaped paper holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a lifting rod provided with ratchet teeth, a vertically movable lifting pawl, a holding pawl, a horizontal rock-shaft having operative connection with the lifting pawl and provided with a vertically swinging crank-arm, a key-lever acting to exert downward pressure on the said vertically swinging crank-arm, a vertical rock-shaft provided with a trip arm which operates said holding pawl and with a horizontally swinging crank-arm, an endwise movable, key-actuated operating bar having an inclined surface which acts downwardly upon the vertically swinging arm of the horizontal rock-shaft, and which, in its endwise movement, acts also on the horizontally swinging crank-arm of the vertical rock-shaft, a second, key-actuated, endwise movable, operating bar connected with the said horizontal swinging arm on the vertical rock-shaft by means permitting lost motion between said parts, and a vertically movable latch-plate on said second operating bar, adapted to engage the said vertically swinging arm on the horizontal shaft, to retain the holding-pawl free from engagement with the lifting-rod until a subsequent operation of the lifting-pawl.

14. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis, a spring applied to turn said paper-holder in one direction, an upright, rotative shaft, an oscillating member attached to said shaft and having operative connection with said paper-holder so as to partake of the turning movement of the same, a ratchet-wheel mounted on said shaft, an escapement mechanism controlling the turning of said ratchet-wheel under the action of said spring, a pawl carried by said oscillating member and engaging said ratchet-wheel, a horizontally swinging key-lever connected with said shaft by a horizontal pivot and provided with a vertical arm that is connected with said pawl, said key-lever when depressed acting to release the pawl from the ratchet-wheel to allow the paper-holder to be freely moved.

15. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space

movement on a vertical axis, a spring applied to turn said paper-holder in one direction, an upright, rotative shaft, an oscillating member attached to said shaft and having operative connection with said paper-holder so as to partake of the turning movement of the same, a ratchet-wheel mounted to turn on said shaft, an escapement mechanism controlling the turning of said ratchet-wheel under the action of said spring, a pawl on said oscillating member engaging said ratchet-wheel, a horizontally swinging key-lever connected with said shaft by a horizontal pivot and provided with a vertical arm that is connected with said pawl, said key-lever when depressed acting to release the pawl from the ratchet-wheel to allow the paper-holder to be freely moved, a curved scale-bar on the frame of the machine adjacent to the path of said key-lever and an indicator on the key-lever which moves along said scale-bar.

16. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a spring applied to turn said paper-holder in one direction, a gear-segment connected and turning with said paper-holder, a second gear-segment intermeshing with the first gear-segment, a ratchet-wheel mounted concentrically with said second gear-segment, an escapement device controlling the turning of the said ratchet-wheel, a horizontally swinging key-lever connected and turning with the said second gear-segment, a pawl on said second gear-segment engaging the teeth of said ratchet-wheel, and connections between said key-lever and said pawl for releasing the pawl from the ratchet-teeth to permit the second segment and the paper-holder to be freely moved.

17. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a spring applied to turn the paper-holder in one direction, a gear-segment connected and turning with the paper-holder, a second gear-segment intermeshing with the first gear-segment, an upright shaft to which said second gear-segment is attached, a ratchet-wheel mounted on said shaft, an escapement mechanism for controlling the rotative movement of said ratchet-wheel, a pawl on the second segment engaging said ratchet-wheel, and a key-lever connected by a transverse pivot with said shaft, at a point above the second gear-segment and provided with a depending rigid arm, said arm being connected with and operating said pawl.

18. In a typewriting machine, the combination with a platen, of a sector-shaped

- paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a spring applied to turn the paper-holder in one direction, a gear-segment connected and turning with the paper-holder, a second gear segment intermeshing with the first gear-segment, an upright shaft to which said second gear-segment is attached, a ratchet-wheel turning on said shaft, a gear-wheel rigidly attached to said ratchet-wheel, an escapement mechanism embracing an escape-wheel in geared connection with said gear-wheel, a pawl mounted on the second gear-segment and engaging said ratchet-wheel, a key-lever connected with said shaft for turning the same and operative connections between said key-lever and pawl for releasing the latter from the ratchet-wheel.
19. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging movement on a vertical axis, and vertical line-space movement, a spring applied to turn said paper-holder in one direction, an oscillating member which is connected and turns with said paper-holder, a vertical shaft to which said oscillating member is attached, said shaft being longitudinally slotted, a ratchet-wheel mounted on said shaft, a pawl pivoted to the said oscillating member and engaging said ratchet-wheel, a gear-wheel attached to said ratchet-wheel, an escapement device embracing an escape-wheel having geared connection with said gear-wheel, a horizontally swinging key-lever pivoted to the said shaft and having a depending arm located in the said longitudinal slot in said shaft, and a connection between the lower end of said arm and the said pawl.
20. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging movement on a vertical axis and vertical line-space movement, a spring applied to turn said paper-holder in one direction, a gear segment which is connected and turns with said paper-holder, a second gear-segment intermeshing therewith, a ratchet-wheel mounted concentrically with the second gear-segment, a pawl mounted on the second gear-segment and engaging said ratchet-wheel, a gear-wheel connected and turning with said ratchet-wheel, an escapement device embracing an escape-wheel having geared connections with said gear-wheel, and means for turning the paper-holder backwardly step-by-step against the action of said spring comprising ratchet-teeth on the second gear-segment and a vibrating key-actuated pawl, normally out of engagement with said ratchet-teeth.
21. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a spring applied to turn said paper-holder in one direction, an escapement device controlling the movement of the paper-holder for letter-spacing, and means for returning the paper-holder to its starting point against the action of said spring, comprising an oscillating member which is connected with and partakes of the turning movement of the paper-holder, and a key-actuated oscillating segment mounted concentrically with and having limited oscillatory movement relatively to said oscillating member.
22. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging movement on a vertical axis and vertical line-space movement, a spring applied to turn said paper-holder in one direction, a gear-segment which is connected and turns with the paper-holder, a second gear-segment intermeshing with the first named gear-segment, an escapement device controlling the movement of the said second gear-segment, a third gear-segment mounted concentrically with the second gear-segment, and having limited oscillatory movement relatively thereto, a fourth gear-segment intermeshing with said third gear-segment, key-actuated means for giving movement to said fourth gear-segment, and a spring applied to hold the third gear-segment normally in position to permit free movement of the second gear-segment.
23. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, an oscillating member connected and turning with said paper-holder, a spring applied to turn the paper-holder and said oscillating member in one direction, an escapement device controlling the turning movement of the paper-holder for letter-spacing, a gear-segment mounted concentrically with the oscillating member and having limited oscillatory movement with respect thereto, a second gear-segment intermeshing with the first gear-segment, a key-lever connected with and adapted to give oscillatory movement to said second gear-segment, a lifting-rod provided with ratchet-teeth and adapted to give vertical line-space movement to the paper-holder, a vertically movable lifting-pawl, a horizontal rock-shaft having operative connection with said lifting-pawl and provided with a horizontally extending crank-arm, a lever arranged to act downwardly on the said crank-arm, and operative connections between said key-lever and the last named lever whereby the lifting-pawl is actuated

when the said second gear-segment is actuated to turn the paper-holder back to its starting point.

24. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, an oscillating member connected and turning with said paper-holder, a spring applied to turn the paper-holder in one direction, an escapement device controlling the movement of the paper-holder for letter-spacing, a gear-segment mounted concentrically with said oscillating member and having limited oscillatory movement with respect thereto, a second gear-segment intermeshing with the first gear-segment, a key-lever connected with and adapted to give oscillatory movement to the second gear-segment, a lifting-rod provided with ratchet-teeth and adapted to give vertical line-space movement to the paper-holder, a vertically movable lifting-pawl, a horizontal rock-shaft having operating connection with said lifting-pawl and provided with a horizontally extending crank-arm, a lever arranged to act downwardly on the said crank-arm, operative connections between said key-lever and the last named lever whereby the lifting-pawl is lifted when the said second gear-segment is actuated to turn the paper-holder back to its starting point, and means interposed in the connections between said key-lever and the lifting-pawl for varying the vertical movement of said lifting-pawl.

25. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis, and vertical line-space movement, an oscillating member connected and turning with said paper-holder, a spring applied to turn the paper-holder in one direction, an escapement device controlling the movement of the paper-holder for letter-spacing, a gear-segment mounted concentrically with the said oscillating member and having limited oscillatory movement with respect thereto, a second gear-segment intermeshing with the first gear-segment, a key-lever connected with and adapted to give oscillatory movement to the second gear-segment, a lifting-rod provided with ratchet-teeth and adapted to give vertical line-space movement to the paper-holder, a vertically movable lifting-pawl, a horizontal rock-shaft having operative connection with said lifting-pawl and provided with a horizontally extending crank-arm, a horizontal rock-shaft extending transversely of the machine, a connection between said last named rock-shaft and said key-lever, by which the rock-shaft is operated from said key-lever, a horizontally extending crank-arm on the said last named rock-shaft and a

horizontal lever, operated by said last named crank-arm and acting downwardly on the horizontally extending crank-arm of the first named rock-shaft to give movement to the lifting-pawl.

26. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis, and vertical line-space movement, a lifting-rod provided with ratchet-teeth, a vertically movable lifting-pawl, a horizontal rock-shaft having operative connection with the said lifting-pawl and provided with a horizontally extending crank-arm, a lever arranged to act downwardly on the said crank-arm of the rock-shaft, a pin adjustable lengthwise of the said lever, and a key-actuated lever acting on said pin.

27. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a lifting-rod provided with ratchet teeth, a vertically movable lifting-pawl, a horizontal rock-shaft having operative connection with said lifting-pawl and provided with a crank-arm which extends horizontally from said rock-shaft, a lever arranged to act downwardly on the said crank-arm of the rock-shaft, a pin adjustable lengthwise of the said lever, a key-actuated lever acting on said pin, and means for shifting said adjustable pin embracing an endwise movable rod provided with means for locking it in its adjusted position, a swinging arm with which said rod is connected, and a link connecting said swinging arm with said pin.

28. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis, and vertical line-space movement, a spring applied to turn the paper-holder in one direction, an escapement mechanism for controlling the movement of the paper-holder for letter-spacing, a key-lever connected with the paper-holder for returning the same to its starting point, a vertically movable lifting-rod provided with ratchet-teeth, a vertically movable lifting-pawl, a horizontal rock-shaft having operative connection with said lifting-pawl and provided with a horizontally extending crank-arm, a lever arranged to act downwardly on said crank-arm, a connection between the said platen returning key-lever and said last named lever whereby the latter lever is depressed and the lifting-pawl operated when the paper-holder is returned to its starting point and a separate key-lever acting on the last named lever for operating the lifting-pawl to lift the paper-holder step-by-step.

29. In a typewriting machine, the combination with a platen, of a sector-shaped

nation with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a lifting-rod provided with ratchet-teeth, a vertically movable lifting pawl, a horizontal rock-shaft having operative connection with said lifting-pawl and provided with a horizontally extending crank-arm, a lever arranged to act downwardly on said crank-arm and provided with a pin which is adjustable lengthwise thereof and also with a laterally extending pin, a key-actuated lever acting on said adjustable pin, and a separate key-lever acting on said fixed pin.

30. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a spring applied to turn the paper-holder in one direction, an escapement mechanism for controlling the turning movement of the paper-holder, a key-lever connected with the paper-holder for returning the same to its starting point, a lifting-rod provided with ratchet-teeth, a vertically movable lifting-pawl, a lever having operative connection with said lifting-pawl and provided with a pin which is adjustable lengthwise thereof, a lever having operative connection with the paper-holder returning key-lever, and acting on said pin to operate the lifting-pawl, a second pin extending laterally from said lever which bears the adjustable pin and a separate key-lever acting on said last named pin for independently operating the lifting-pawl to lift the paper-holder step-by-step.

31. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a spring acting to turn the paper-holder in one direction, an escapement mechanism controlling the movement of the paper-holder for letter-spacing, a horizontally swinging arm having operative connection with, and which partakes of the swinging movement of, said paper-holder, and a column-stop device comprising a plurality of vertically sliding pistons, provided with stop-lugs located near the path of the moving end of said swinging arm and adapted to be shifted into said path, springs applied to said pistons to hold the same normally out of said path, key-levers connected with and operating said pistons, and means operated by the several key-levers adapted to disengage the said paper-holder from the said escapement mechanism.

32. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a horizontally swing-

ing arm which has operative connection with and partakes of the turning movement of the paper-holder, a ratchet-wheel mounted concentrically with said arm, a pawl on said arm engaging said ratchet-wheel, an escapement mechanism controlling the turning of said ratchet-wheel under the action of said spring, a column-stop device comprising a plurality of vertically sliding spring-pressed pistons having stop-lugs which normally stand adjacent to the path of said swinging arm and which are adapted to be moved into the said path, a plurality of key-levers acting on said pistons, a horizontally movable pawl-actuating plate having a curved bearing surface adapted for contact with said pawl at all points in the swinging movement of said arm, and a bar which is operated by all of said key-levers and is connected with said pawl-actuating plate, so that the latter is shifted and the pawl released from the ratchet-wheel when either of said key-levers is operated.

33. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a horizontally swinging arm which has operative connection with and partakes of the turning movement of the paper-holder, a ratchet-wheel mounted concentrically with said arm, a pawl on the said arm engaging said ratchet-wheel, an escapement mechanism controlling the turning of said ratchet-wheel under the action of said spring, a column-stop device comprising a plurality of vertically sliding spring-pressed pistons having stop-lugs which normally stand adjacent to the path of said swinging arm and which are adapted to be moved into the said path, a plurality of key-levers acting on said pistons, a curved pawl-actuating plate having a curved bearing surface adapted for contact with said pawl at all points in the swinging movement of said arm, a rock-shaft extending transversely of the key-levers, and a bar which is rigidly attached to said rock-shaft and is adapted to be operated by all of said key-levers, said rock-shaft being provided with two crank-arms and the pawl actuating plate being provided with forwardly extending arms connected with said crank-arms.

34. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis, and vertical line-space movement, and means for warning the operator when the end of the line of writing is reached comprising a lever having horizontal swinging movement corresponding with that of the paper-holder, an alarm bell, a spring-actuated hammer therefor, a spring-pressed detent which holds the hammer away from the bell, a

horizontally swinging member mounted concentrically with said swinging lever, a spring which holds that member normally in position to engage said detent, and a stop-pin adjustably connected with said member and extending into the path of movement of said swinging arm.

35. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis, and vertical line-space movement, and means for warning the operator when the end of the line of writing is reached comprising a lever having horizontal swinging movement corresponding with that of the paper-holder, an alarm bell, a spring actuated hammer therefor, a spring pressed detent which holds the hammer away from the bell, a horizontally swinging sector-shaped frame mounted concentrically with said swinging-arm, a spring which holds the sector-shaped frame normally in engagement with said detent, an arm pivoted concentrically with the said sector-shaped frame and provided with a stop-pin which extends into the path of movement of the said swinging arm, and means for adjustably holding the arm in position on the sector-shaped frame embracing notches on the curved member of the frame, and a spring for holding said arm in engagement with one of said notches.

36. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, type-bars, key-levers for actuating the same, and a line-lock mechanism comprising a horizontally arranged, endwise movable notched bar adapted to lock all of the key-levers from movement, a horizontally swinging lever which has operative connection with and partakes of the swinging movement of the paper-holder, a horizontally swinging member pivoted concentrically with the said swinging lever and provided with a stop-pin which projects into the path of said lever and is adjustable laterally on said member, a second stop-pin on said member, and means actuated by said second stop-pin and acting on the said locking bar to shift the latter to its locking position when the sector-shaped frame is moved by contact of said swinging lever with said adjustable pin.

37. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis, and vertical line-space movement, type-bars, key-levers for actuating the same, and a line-lock mechanism comprising a horizontally arranged endwise movable notched bar adapted to lock all of the key-levers from movement, a horizontally swinging lever which has oper-

ative connection with and partakes of the swinging movement of the paper-holder, a horizontally swinging member pivoted concentrically with the said swinging lever, and provided with a stop-pin which projects in the path of said lever and is adjustable on said member, a second stop-pin on said member, a vertical rock-shaft provided with an arm which extends into the path of the said second pin on the said member and with a second arm which engages said locking bar.

38. In a typewriting machine, the combination with a sector-shaped paper holder, of means for securing sheets of paper to said holder comprising a plurality of paper clamps, a sector-shaped plate pivoted concentrically on the paper-holder, and links connecting said plate with the several paper clamps.

39. The combination with a sector-shaped paper-holder, of a plurality of spring-actuated paper clamps, a sector-shaped plate pivoted concentrically on the paper-holder, links connecting said plate with the said paper clamps, and a spring applied between the holder and said plate and normally holding said plate in position to keep the paper clamps closed.

40. The combination with a sector-shaped paper-holder, of a plurality of spring-actuated paper clamps, a sector-shaped plate pivoted concentrically on the paper-holder, links connecting said plate with the said paper clamps, a spring applied between the holder and said plate and normally holding said plate in position to keep the paper clamps closed, and a latch for holding the said plate in position to retain the clamps open.

41. The combination with a sector-shaped paper-holder, of paper clamps consisting of leaf springs attached each at one end to the paper-holder, a sector-shaped plate pivoted concentrically on said holder, and links pivoted to said plate and to the free ends of said springs.

42. The combination with a sector-shaped paper-holder, and paper clamping means thereon, of auxiliary paper holding means, comprising radially arranged slides on the paper-holder provided with needles adapted to pass through the curved face of the paper-holder, and spring-arms attached to the paper-holder and provided with hollow buttons arranged opposite said needles.

43. The combination with a sector-shaped paper-holder and paper clamping means thereon, of auxiliary paper-holding means, comprising radially arranged slides on the paper-holder provided with needles adapted to pass through the curved face of the paper-holder, spring arms attached to the paper-holder and provided with hollow buttons arranged opposite said needles, and spring de-

tents acting on said slides to hold the same in their retracted positions.

44. In a typewriting machine, the combination with a paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, of a guide for the left hand edge of the margin of the paper which is located below the paper-holder and has horizontal swinging movement therewith, but which does not partake of the line space movement of said paper holder.

45. In a typewriting machine, the combination with a paper holder having swinging letter-space movement on a vertical axis and vertical line-space movement, of a guide for the left-hand side of the margin of the paper which is located below the paper-holder and has swinging movement therewith but which does not partake of the line space movement of said paper-holder, said guide having horizontally adjustable connection with the paper-holder.

46. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, of two guides, one for the right hand margin and the other for the left hand margin of the sheet, said guides having horizontal swinging movement with the paper-holder.

47. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, of two guides, one for the right hand margin and the other for the left hand margin of the sheet, said guides having horizontal swinging movement with the paper-holder, and being adjustable relatively to each other to provide for sheets of paper of different widths.

48. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, two parallel, stationary, curved guide plates arranged concentrically with the axis of the paper-holder, and two side margin guides which have horizontal swinging movement with the paper-holder and move in horizontal paths above the top edge of the inner stationary guide-plates.

49. In a typewriting machine, the combination with a platen, of a paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, an upright rod to which said paper-holder is attached, an upright hollow shaft in which said rod has vertical sliding movement, a horizontal arm rigidly attached to the upper end of said hollow shaft, and a

paper-guide for the left hand margin of the paper adjustably attached to said arm.

50. In a typewriting machine, the combination with a platen, of a paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, an upright rod to which said paper-holder is attached, an upright hollow shaft in which said rod has vertical sliding movement, a horizontal arm rigidly attached to the upper end of said hollow shaft, a paper-guide for the left hand margin of the paper adjustably attached to said arm, and a second arm pivotally connected with the upper end of said hollow shaft and carrying a paper-guide for the right hand margin of the paper.

51. In a typewriting machine, the combination with a platen, of a paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, an upright rod to which said paper-holder is attached, an upright hollow shaft in which said rod has vertical sliding movement, a horizontal arm rigidly attached to the upper end of said hollow shaft, a paper-guide for the left hand margin of the paper adjustably attached to said arm, and a second arm pivotally attached to the upper end of said hollow shaft and carrying a paper-guide for the right hand margin of the paper, said second arm having frictional engagement with the hollow shaft whereby it is adjustably held in position with respect to the first arm.

52. In a typewriting machine, the combination with a platen, of a paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, an upright rod to which said paper-holder is attached, an upright hollow shaft in which said rod has vertical sliding movement, a horizontal arm rigidly attached to the upper end of said hollow shaft, a paper-guide for the left hand margin of the paper adjustably attached to said arm, a second arm pivotally connected with the upper end of said hollow shaft and carrying a paper-guide for the right hand margin of the paper, said second arm having frictional engagement with the hollow shaft whereby it is adjustably held in position with respect to the first arm, and an adjustable stop on one of said arms adapted for contact with the other arm to limit the approach of the paper-guides toward each other.

53. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a vertical rod to which said paper-holder is attached, an upright hollow shaft in which said rod vertically slides, said shaft being provided with a

longitudinal slot, an arm attached to the lower end of said rod and extending outwardly through said slot, an upright rod attached to the bottom of the paper-holder and attached at its lower end to said arm, and a horizontal arm rigidly attached to the upper end of said hollow shaft and bearing a paper-guide for the side margin of the paper, said arm having sliding engagement with the said upright rod.

54. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, a horizontally oscillating member connected with and partaking of the swinging movement of the paper-holder and provided with a radially extending arm, a vertically swinging arm provided with a tooth located in the path of said swinging arm and constituting a margin stop, and a key-lever acting on said arm to shift said tooth out of the path of said arm.

55. In a typewriting machine, the combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis, and vertical line-space movement, a horizontally swinging member connected with and partaking of the swinging movement of the paper-holder and provided with a radially extending arm, a horizontally swinging gear-segment pivoted concentrically with the said oscillatory member and having limited oscillatory movement with respect to the same, a second horizontally oscillating gear-segment intermeshing with the first named gear-segment, a key-lever connected with and operating said second gear-segment, a vertically swinging lever provided with a tooth located in the path of said swinging

arm and constituting a margin stop, and a key-lever provided with a beveled or cam surface adapted to act upon the said second gear-segment and to also act upon the said vertically swinging lever to shift the tooth thereon out of the path of said horizontally swinging arm.

56. The combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, two stationary parallel guide plates arranged concentrically with the vertical axis of the paper-holder, the upper margin of the inner guide plate being extended above the upper margin of the outer plate to expose the paper for erasing, and a clamp-bar yieldingly mounted on the outer guide-plate and adapted to press the paper against the inner plate, and means for operating said clamp-bar.

57. The combination with a platen, of a sector-shaped paper-holder having swinging letter-space movement on a vertical axis and vertical line-space movement, two stationary parallel guide plates arranged concentrically with the vertical axis of the paper-holder, the upper margin of the inner guide-plate being extended above the upper margin of the outer guide-plate to expose the paper for erasing, a clamp-bar, spring-arms supporting the clamp-bar, and a cam acting on said clamp-bar to force the same toward the inner guide-plate.

In testimony, that I claim the foregoing as my invention I affix my signature in presence of two witnesses, this 30th day of April A. D. 1906.

CHARLES S. NICKERSON.

Witnesses:

C. CLARENCE POOLE,
GEORGE R. WILKINS.