

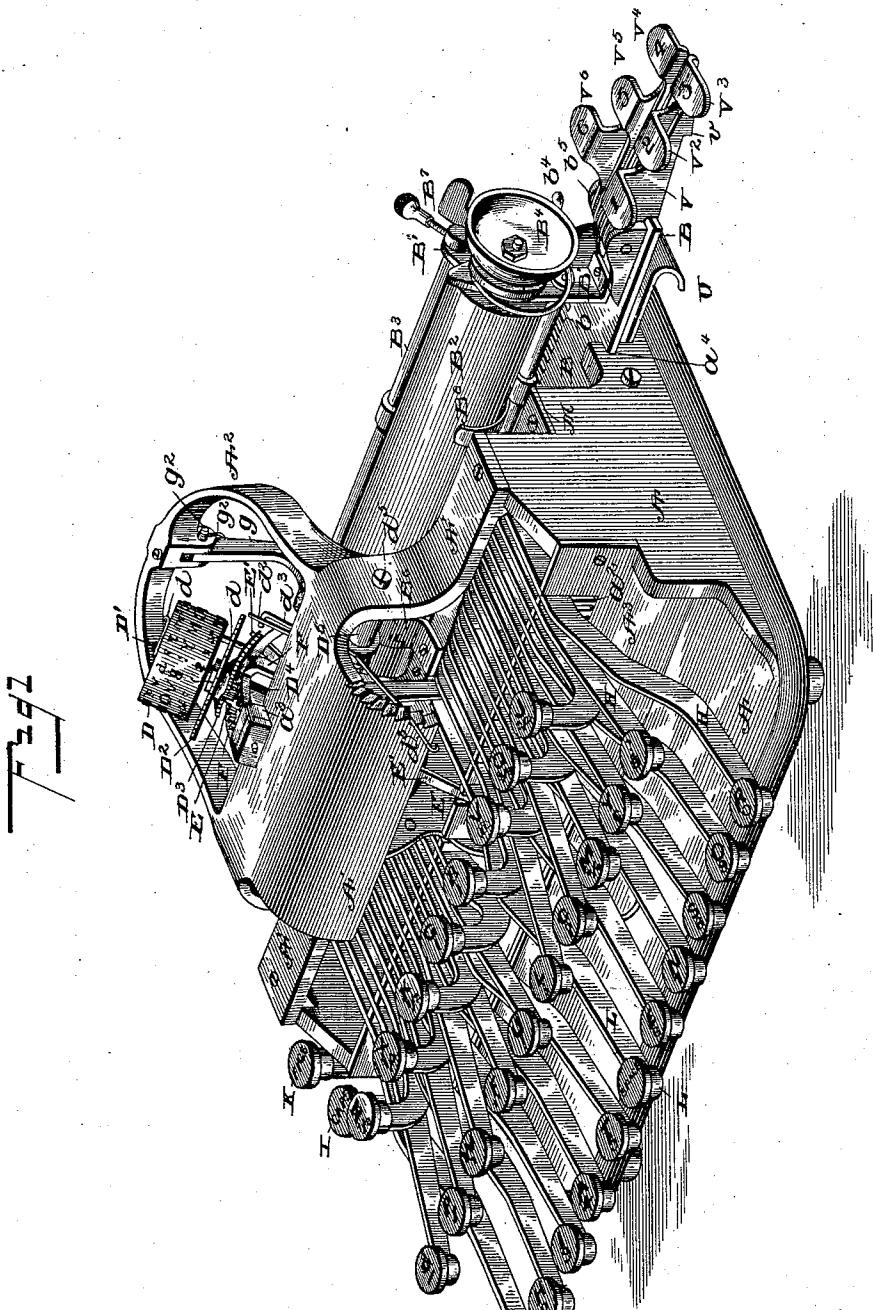
(No Model.)

12 Sheets—Sheet 1.

G. C. BLICKENSDERFER.  
TYPE WRITING MACHINE.

No. 472,692.

Patented Apr. 12, 1892.



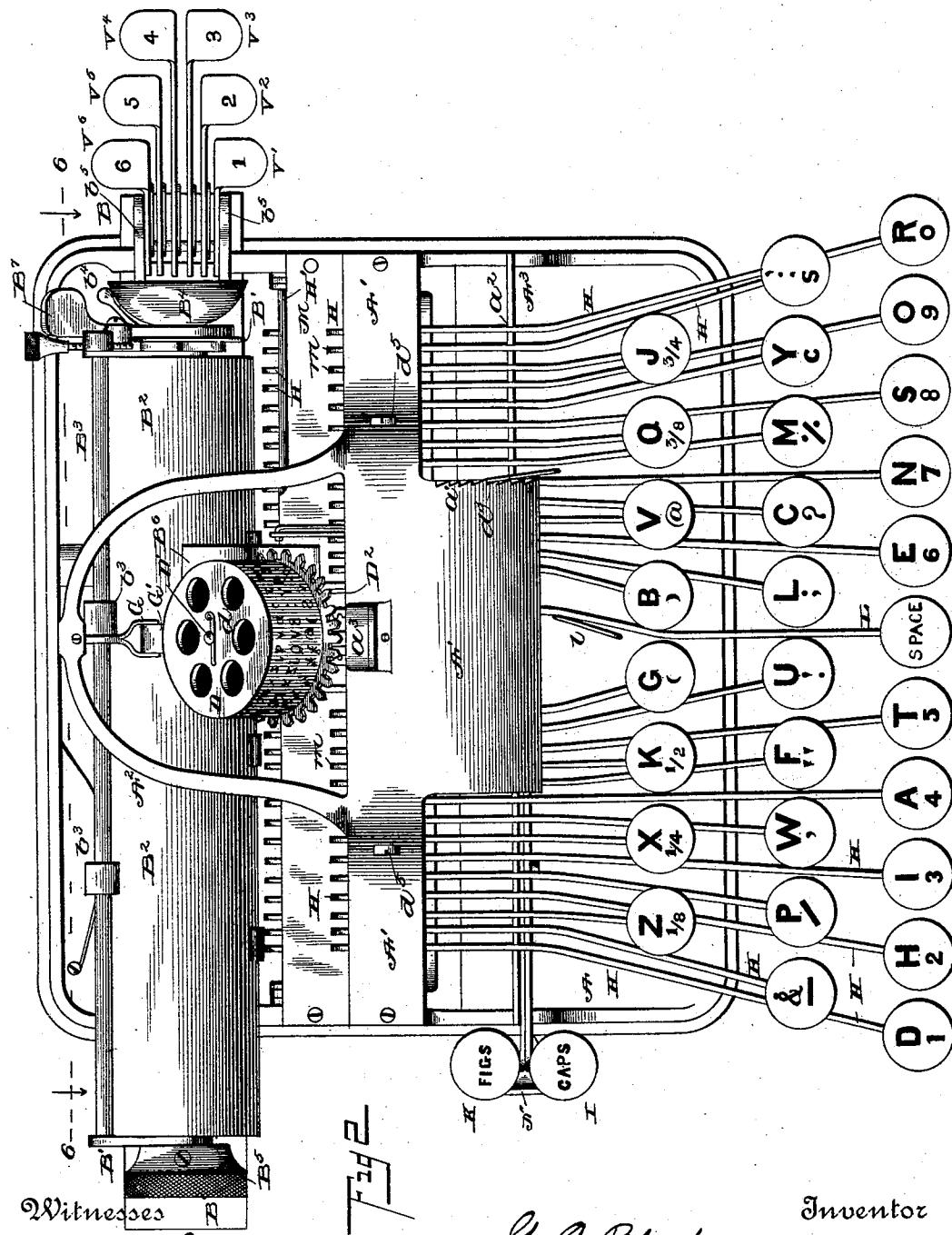
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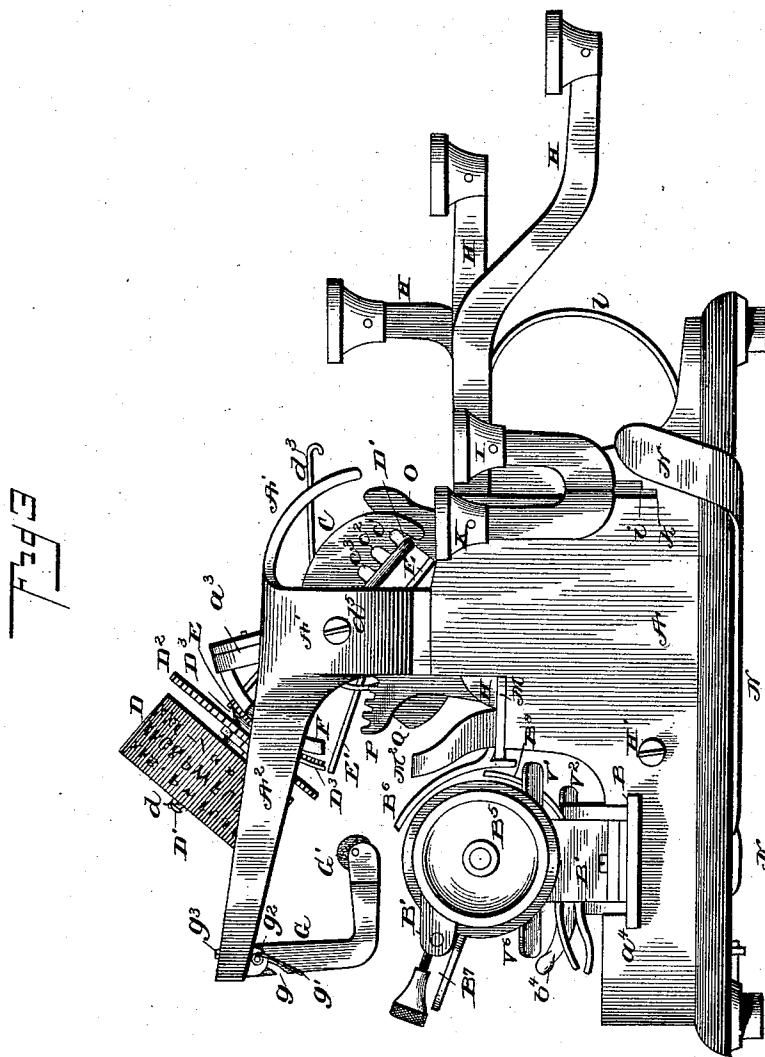
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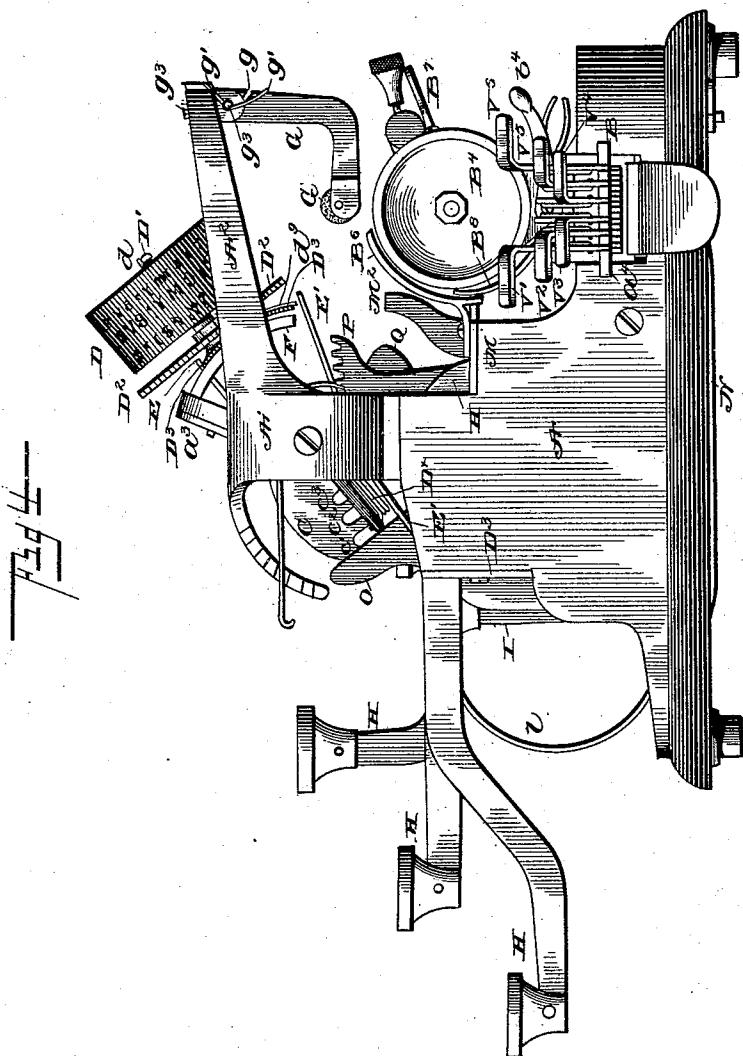
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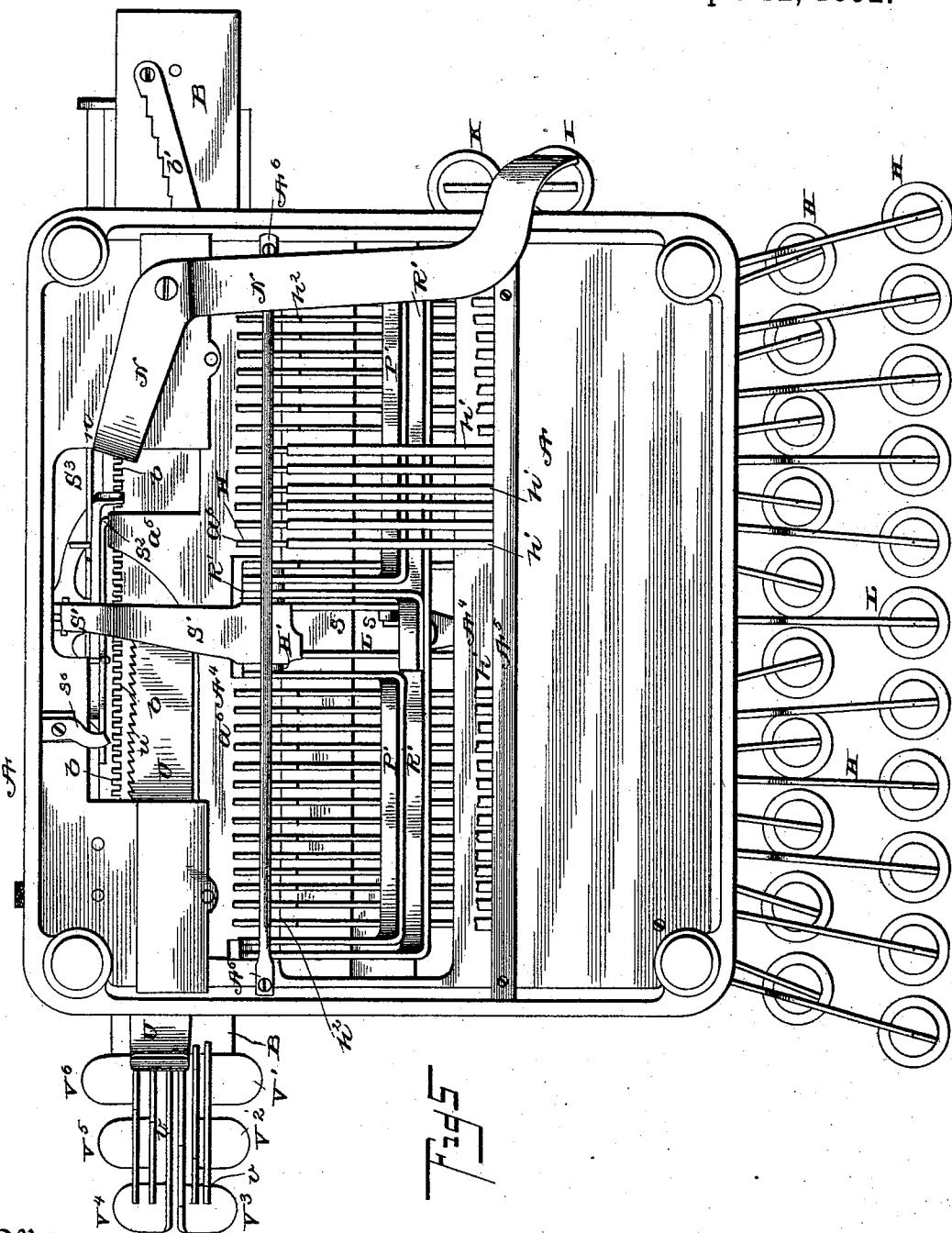
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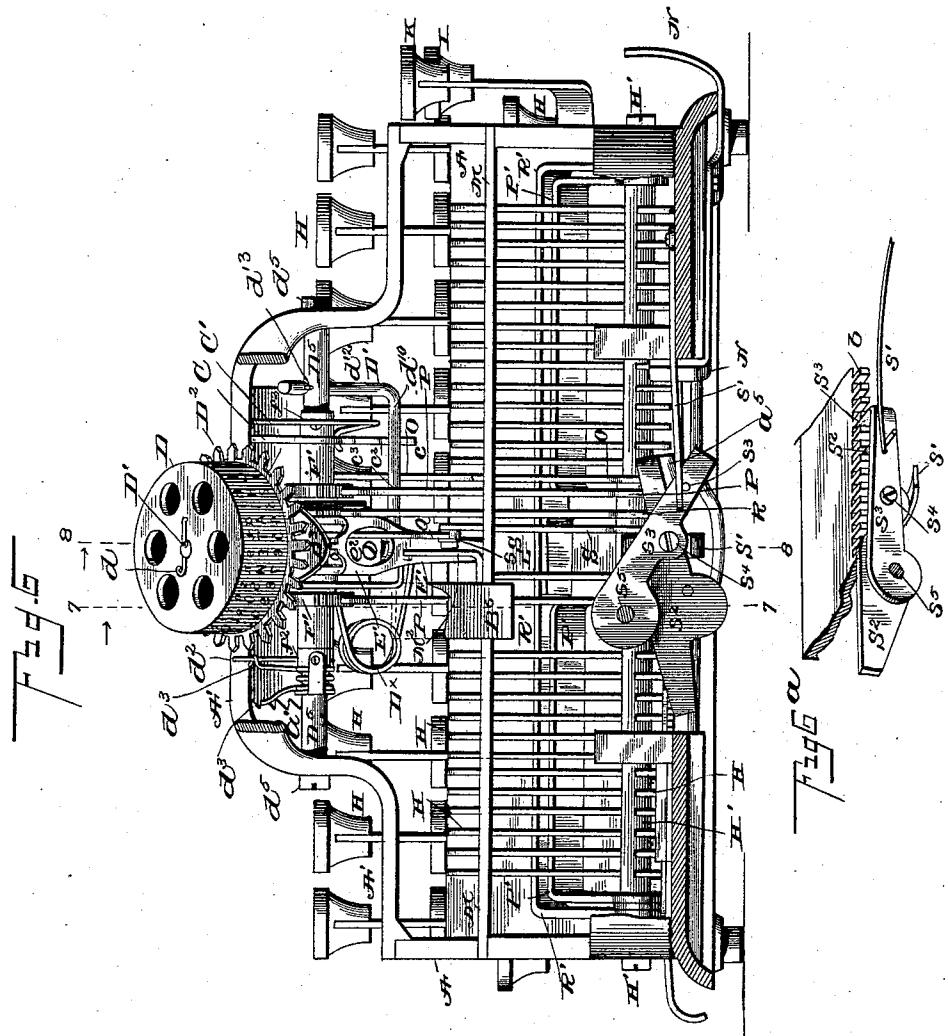
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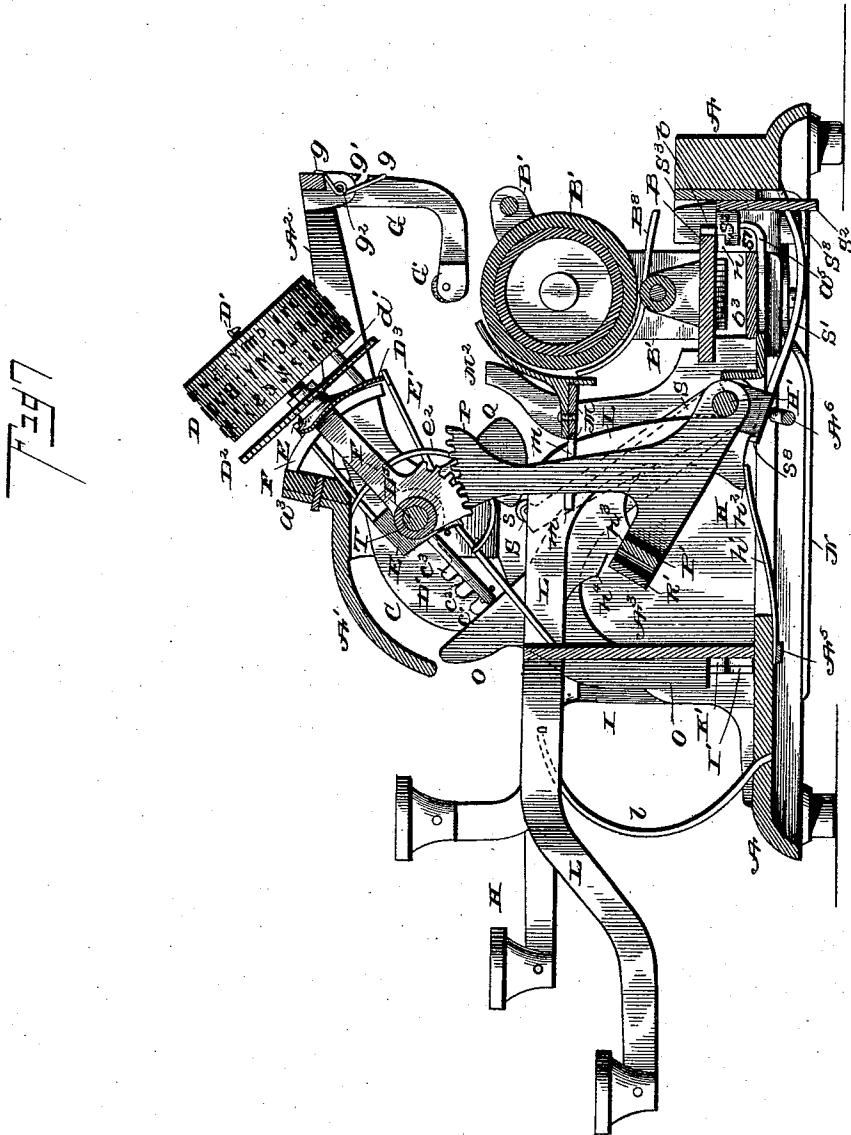
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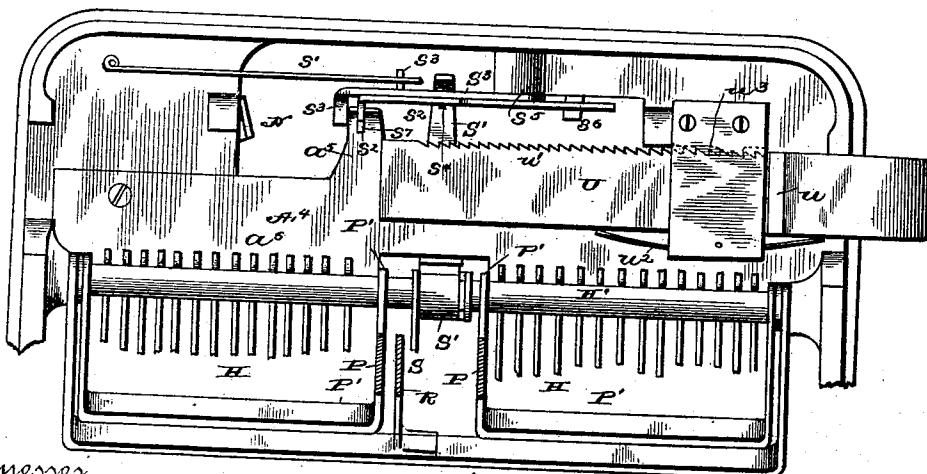
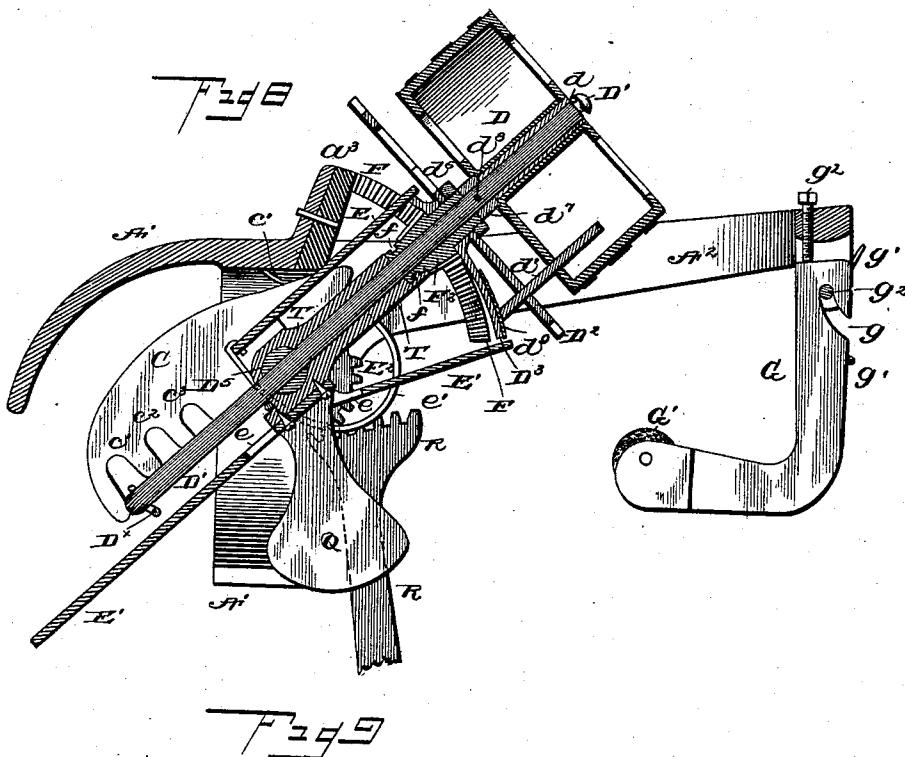
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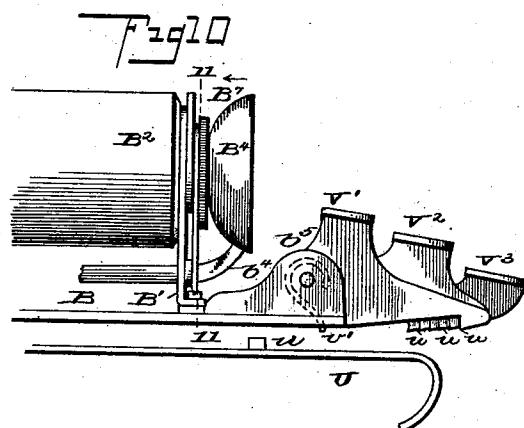


Fig 11

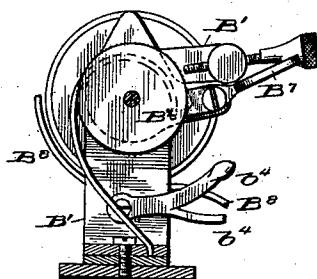
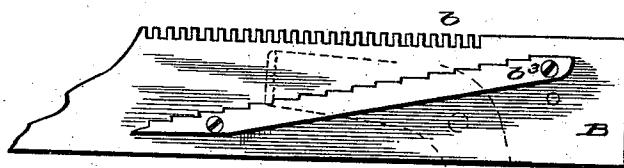


Fig 12



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Fig 13

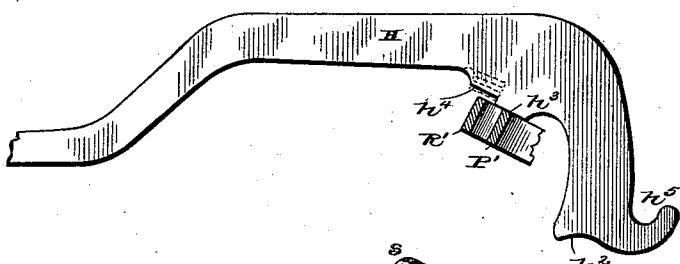


Fig 14

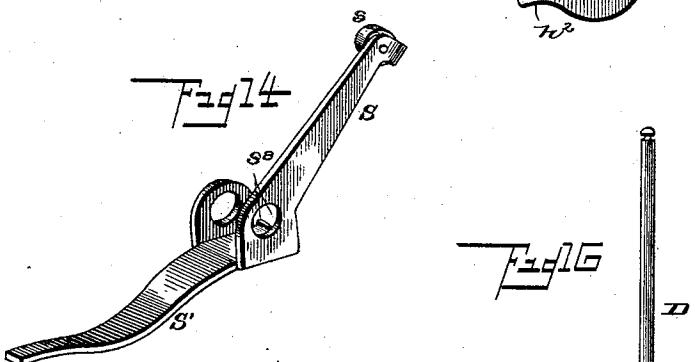


Fig 15

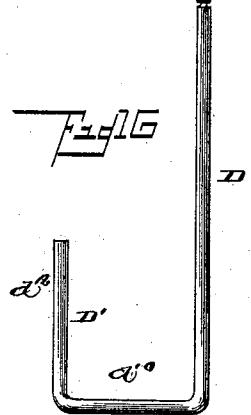
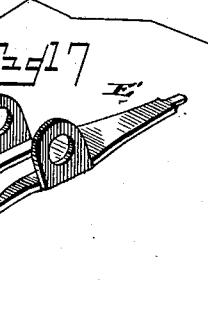
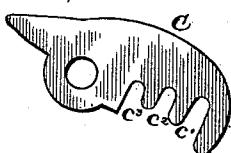


Fig 15



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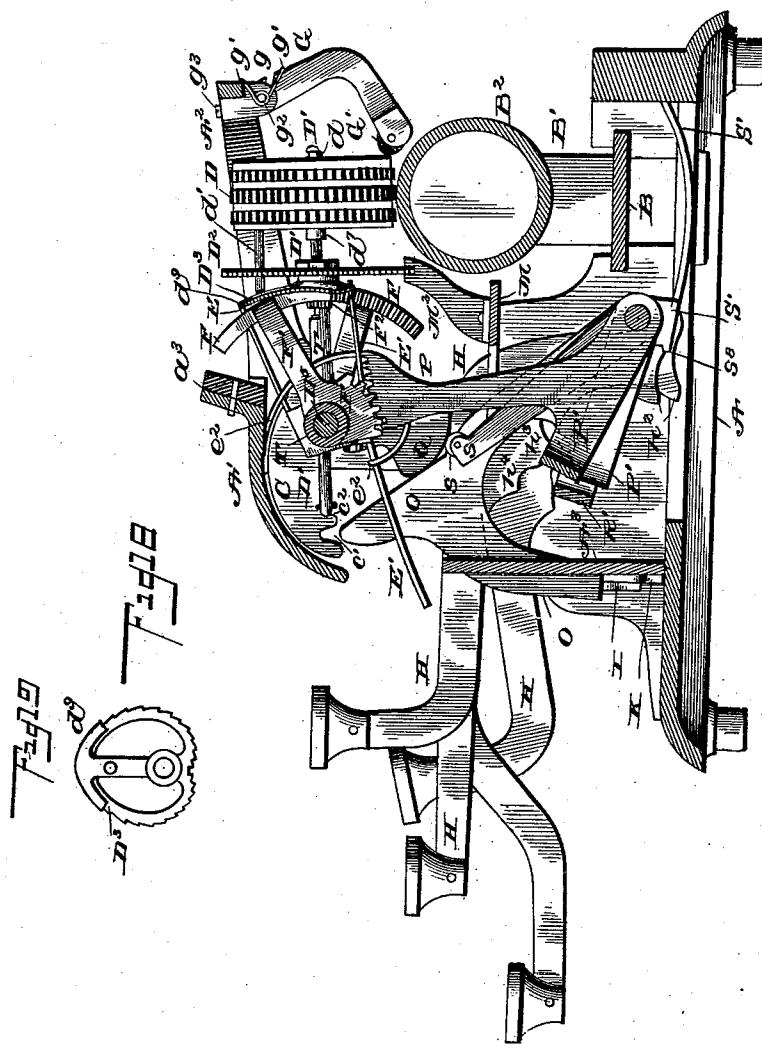
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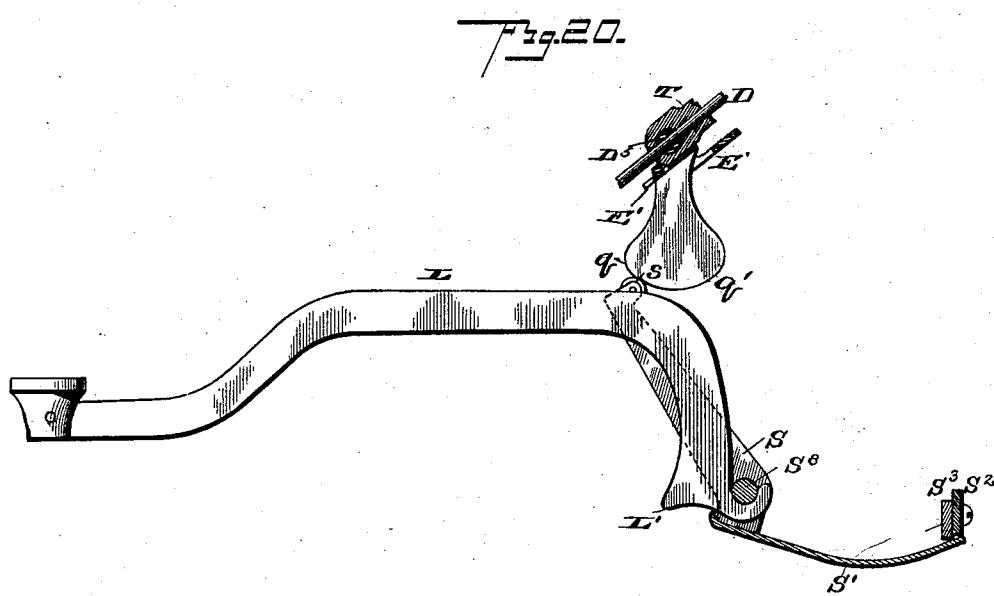
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# UNITED STATES PATENT OFFICE.

GEORGE C. BLICKENSDERFER, OF STAMFORD, CONNECTICUT, ASSIGNOR TO THE BLICKENSDERFER MANUFACTURING COMPANY, OF NEW YORK, N. Y.

## TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 472,692, dated April 12, 1892.

Application filed July 11, 1891. Serial No. 399,117. (No model.)

To all whom it may concern:

Be it known that I, GEORGE C. BLICKENSDERFER, a citizen of the United States, residing at Stamford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Type-Writing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to type-writing machines; and it consists in certain improvements in the construction thereof, as will be hereinafter fully set forth, and pointed out in the claims.

The particular class of machines to which my invention relates is that having a type-wheel, and the particular type of that class is that construction of type-wheel machines shown in several pending applications for patents by me—such, for instance, as Serial Nos. 390,488 and 390,489, filed April 25, 1891, and Serial Nos. 316,588 and 316,591, filed July 25, 1889.

The leading features shown in the accompanying drawings are closely allied to those shown in the applications Serial Nos. 390,488 and 390,489, and the present machine may be treated as a modification of the machines represented in those cases.

The accompanying drawings illustrate the present construction, as follows: Figure 1 is a perspective view of the machine complete. Fig. 2 is a top or plan view of the machine. Fig. 3 is an elevation, looking at the left side of the machine. Fig. 4 is an elevation, looking at the right side of the machine. Fig. 5 is a plan view of the bottom of the machine 40 with some of the springs  $h'$  broken away. Fig. 6 is a longitudinal vertical section on the line 6 6 in Fig. 2, looking in the direction of the arrow thereon, with parts beyond in elevation and the paper-carriage omitted; Fig. 45 6<sup>a</sup>, a perspective view showing in detail the position of the feeding-pawl and checking-pawl when in operative contact with the rack of the carriage. Fig. 7 is a transverse vertical section taken on the line 7 7 in Fig. 6, looking 50 in the direction of the arrow. Fig. 8 is a transverse vertical section, partly in elevation, on

the line 8 in Fig. 6 of a portion of the machine, the scale being enlarged. Fig. 9 is a plan or top view of the lower rear portion of the machine with upper parts removed. Fig. 10 is a front elevation of the right-hand end of the paper-carriage. Fig. 11 is a transverse vertical section of the paper-carriage on the line 11 11 in Fig. 10, looking in the direction of the arrow. Fig. 12 is bottom view of a portion of the base-plate of the paper-carriage. Fig. 13 is a side view of a portion of one of the key-levers and shows its relation to the frames P' and R'. Fig. 14 is a perspective of the feed-lever S S' detached from the machine. Fig. 15 is a side view of the locking-bar C detached from the machine. Fig. 16 is a top view of the type-wheel shaft D' detached from the machine. Fig. 17 shows the pawls E and E' in perspective detached from the machine. Fig. 18 is a like view to Fig. 7, showing a changed position of parts and with the spacer-key L removed. Fig. 19 is a top view of the ratchet D<sup>3</sup> removed from the machine, showing the guard-plate d'. Fig. 20 is a detail showing the connection between the space-lever and the lever which actuates the pawls; also, the cam for operating said pawls.

Like letters and numerals of reference indicate like parts in all the figures.

The construction and operation are as follows:

A A' A<sup>2</sup> mark the frame-work of the machine.

A<sup>3</sup> is a comb or front frame-plate, having slots a<sup>2</sup> to receive the type-keys. M is a comb or back frame-plate, also having slots m to guide the key-levers.

A<sup>4</sup> is a comb or bottom frame-plate, having slots a<sup>6</sup> to hold the lower ends of the key-levers. A<sup>5</sup> is a frame strip or bar, under which are clamped the fixed ends of the key-lever springs h'. A<sup>6</sup> is a frame-bar which lies along under the ends of the key-levers and keeps them in place. (For the parts A<sup>4</sup>, A<sup>5</sup>, and A<sup>6</sup> see Fig. 5.) The plate A<sup>4</sup> has a back extension a<sup>5</sup>, like a bracket, to serve as a rest for the feeding-pawls S<sup>2</sup>. (See Figs. 5 and 9.)

H H, &c., are the type-key levers. These levers are all substantially alike in form, differing in length, so as to form banks of keys,

and differing in direction to give them proper spread at their key ends.

L is the spacer-lever, which is substantially like the longest key-levers. In Fig. 13 the 5 inner part of one of these key-levers is shown. It has at its extreme inner end a hooked toe  $h^5$ . Back of this is a heel  $h^2$ , and above this are two bearing-surfaces  $h^3$  and  $h^4$ . Of these bearing-surfaces the ones marked  $h^3$  are alike 10 in position, while those marked  $h^4$  vary in position, so that in a line of keys they will be graded consecutively. This is indicated by dotted lines in Fig. 13. The type-keys are arranged in two like groups, one on each side 15 of the middle line of the machine, and the spacer-key is located between the two groups. These keys pass through the slots  $a^2$ ,  $m$ , and  $a^6$  and hook under and are thereby pivoted on a common rod  $H'$ , which runs lengthwise 20 of the machine at its lower rearward part. The spacer-key L is arranged in the same manner as the key-levers. On the shaft  $H'$  are also pivoted three swinging frames  $P'$   $P'$  and  $R'$ , the former of which contact with the 25 bearing-faces  $h^3$  of the two groups of keys, respectively, and the latter contacts with the bearing-faces  $h^4$  of all the keys of both groups; but the spacer-key L is so formed as to escape these frames entirely. (See Fig. 7.) The 30 frames  $P'$  each carry a rocking arm P, and these arms have gear-teeth at their upper ends, meshing with like teeth on the arms F', which are journaled on the shaft  $D^5$ . Hence when the frames  $P'$  are rocked the arms F' are also 35 rocked. The frame  $R'$  carries arm R, which has gear-teeth at its upper end, meshing with like teeth on the pawl-arm E  $E^2$ , journaled on the shaft  $D^5$ . Hence when the frame  $R'$  is moved the pawl-arm E  $E^2$  is moved. (See Figs. 40 8 and 17.) The gear-teeth on the pawl E  $E^2$  and the part R, which engages said pawl, are arranged in an arc having the same radius as the arcs of teeth on the segment-carrying arms F'. Hence when the pawl is moved by the 45 part R it will move in exact consonance with the arm F'.

On the shaft  $D^5$  is a T-formed sleeve T, and in this sleeve is held the type-wheel spindle D'. This spindle has an extension or bail  $d^{10}$ , 50 which is vibrated therewith and when vibrated engages with a locking-bar C for a purpose hereinafter described. In the present instance this extension  $d^{10}$  is formed by bending the spindle D' at right angles to the vertical part. 55 It can be then bent again at right angle  $d^{12}$  to the horizontal part to form a rectangular loop (see Fig. 16) and passed through the shaft  $D^5$ , which will serve as a guide and also hold the spindle against rotation. (See Fig. 6.) The 60 down movement of the part  $d^{12}$  is limited by a stop  $d^{13}$ . The type-wheel D is held on a spindle D' between a collar  $d^7$ , fastened by a pin  $d^8$ , and a catch d, which engages a groove at the upper end of the spindle. Between the 65 collar  $d^7$  and the upper end of the sleeve T on the spindle D' is journaled loosely the pinion F<sup>2</sup>, and it is held against longitudinal move-

ment by a groove f therein engaging with a lip t on the sleeve. (See Fig. 8.) On the upper part of the hub of the pinion F<sup>2</sup> is fastened 70 by a screw-collar  $d^6$  a ratchet-wheel D<sup>2</sup> and eccentric or heart-shaped ratchet D<sup>3</sup>, so that they will move with the pinion. A crank post or pin d' is attached to the ratchet D<sup>3</sup>, passes through the ratchet D<sup>2</sup>, and engages the wheel 75 S. As the shaft or spindle D' has no rotary movement, the wheel D is propelled rotatively by the pin d'. By means to be explained farther on the spindle D' is moved longitudinally, and it carries the wheel D with it, so as to 80 bring the different fields of type on the wheel into position, and in thus moving the wheel slides on the pin d', which is of proper length to permit of that movement. In Fig. 18 the wheel is shown thus moved outwardly. The wheel D 85 can be quickly removed from the spindle by removing the catch d from the groove in the end of the spindle. Axial motion is imparted to the pinion F<sup>2</sup> by segmental racks F, carried on the arms F', which, as before explained, 90 rocked by the arms P and frames P' through the action of the key-levers H. Only one of the frames P' and arms P will be moved at a time, and which one it may be will depend whether the key-lever depressed is in one 95 group or the other—that is, on one side or the other of the middle line. When in normal position, the two segmental gears F F have their upper ends abutting against the buffer a<sup>3</sup> on the frame-piece A'. As soon as one or 100 the other is moved in the manner above described it falls away from the buffer and of course rotates the pinion. This action of the pinion rolls it down the stationary segment F, and the reactive effect keeps the stationary 105 segment F against the buffer; but the shaft D<sup>5</sup> is rocked and the spindle D' is tilted forward, carrying the wheel D and ratchets D<sup>2</sup> and D<sup>3</sup> with it. All these parts D D<sup>2</sup> D<sup>3</sup> partake 110 of the rotary action of the pinion, as well as the tilting movement of the spindle. So, it will be seen, the type-wheel has imparted to it by the depression of any of the key-levers H a simultaneous axial and vibratory movement; but the axial movement must be stopped 115 as soon as the desired letter is brought into proper position for impression, and the vibratory movement must be continued until the type is impressed. The means for effecting this result are the frame R', the arm R, 120 the pawl-lever E<sup>2</sup> E, and the key-lever H. It will be remembered that the key-levers H have bearing-faces  $h^4$ , which act upon the frame R', and that these faces in each group of keys are graded as to their distance from 125 the frames. The effect of this is that each individual key-lever of each group will contact with the frame R' after moving through more or less space than any of the others of its group. The characters on the type-key levers 130 and the corresponding type on the type-wheel are so arranged relatively that when any key-lever is depressed its corresponding type will be positioned for action, and the bearing-face

*h<sup>4</sup>* of that key-lever is so distanced from the frame R' that as soon as its correlated type is positioned the key-lever will bear upon the frame R' and move it down. The arm R 5 of said frame then will move the pawl-lever E<sup>2</sup> E into contact with the ratchet D<sup>3</sup> to stop the rotary movement of the ratchet, the pinion F<sup>2</sup>, and the type-wheel. The continued downward movement of the key-lever, however, continues the tilting movement of the shaft M<sup>5</sup> and the parts carried thereby until the type-wheel is brought against the platen B' on the carriage B, and thus impresses the type upon the paper on the platen. The 10 ratchet D<sup>3</sup> is provided with as many notches as there are key-levers H, which number is also the same as the number of type in each field of type on the wheel D, and the ratchet D<sup>2</sup> has a like number of teeth. The ratchet 15 D<sup>2</sup> is a concentric disk, and hence its teeth are equidistant apart; but the ratchet D<sup>3</sup> is slightly heart-shaped and eccentrically mounted on the pinion F<sup>2</sup>, and its teeth increase in length in proportion to their distance from 20 the axis of the ratchet.

We have seen that the pawl E<sup>2</sup> E remains stationary until a type is positioned and that the ratchet D<sup>3</sup> moves down as it moves axially, and the downward movement is produced by 25 the rotary movement of the pinion which carries the ratchet, and consequently the two movements are proportional one with the other, so that it follows that the teeth of the eccentric-ratchet will, although moving in different paths, all pass the point of the pawl E<sup>2</sup> E at like distance from it, so that the said pawl will have to move no farther to engage one tooth of the ratchet D<sup>3</sup> than another. The 30 pawl E<sup>2</sup> E is held so as to just barely escape 35 the passing teeth, so that its movement necessary to engage a tooth is as slight as possible, and it will therefore engage the proper tooth practically instantaneously on the positioning of the type.

When the type to be positioned has to be moved through considerable distance, the parts acquire considerable momentum, and when the pawl E<sup>2</sup> E engages a tooth there may be a rebound. To obviate this, I provide a 40 pawl E', which engages the ratchet from the opposite direction diametrically and coincidentally, or practically so, with the pawl E<sup>2</sup> E. These pawls E<sup>2</sup> E and E' grasp the ratchet D<sup>3</sup> somewhat like a pair of pinchers and hold it 45 against reaction. The form of the pawl E' is shown in Fig. 17 clearly. It is pivoted loosely on the shaft D<sup>5</sup>, and its lower end rests in a notch in the comb A<sup>3</sup>, (see Fig. 1,) and it is held there flexibly by a spring e<sup>2</sup>. (See Figs. 50 7 and 18.) Its upper end stands in as close proximity to the ratchet D<sup>3</sup> as possible, and it engages the ratchet by the ratchet being pushed against it by the pressure of the opposite pawl E<sup>2</sup> E, and as soon as it is engaged 55 with the ratchet it moves down with it, overcoming the spring e<sup>2</sup>. (See Fig. 18.) The pawl E' is not required to act except when the ax-

ially-moving parts have to move a considerable distance, and thereby acquire considerable momentum, and I have found by practice that it is better that it be not used when the axial movement is slight, and therefore I have applied to the apex of the lobe of the ratchet a shield d<sup>2</sup>. (See Figs. 19, 8, and 4 for best illustration.) This shield is on top of 70 the ratchet and stands or ledges out over the teeth and holds the pawl E' off from the teeth, while it permits the pawl E<sup>2</sup> E, which is made shorter at its engaging end, to engage those teeth covered by it, as seen in Fig. 18. 75

To insure absolute accuracy in the positioning of a type by reason of any lost motion, the ratchet D<sup>2</sup> is provided. This ratchet is a concentrically-arranged disk having radial teeth, which are engaged by the fixed horn-like pawl M<sup>2</sup> as the type-wheel is brought down to the platen (see Fig. 18) and steadies the wheel against trembling and against any lost motion that may exist in the parts. In order to position a field of type, the wheel D 90 has to be moved longitudinally of the shaft, and then it must be held against further longitudinal movement while being operated. The means for effecting this result are as follows: The spindle D' is movable longitudinally and it carries the wheel with it. The spindle is kept down to normal position by the spring D<sup>5</sup>, (shown best in Fig. 6,) and it is moved up by a lever O, which is pivoted on the rod H'. This lever is under the control of two levers I' and K', which lie parallel with the front plate A<sup>3</sup> and extend out at the side of the machine through a slot which has a stepped bottom i k for regulating the degree of depression of said levers, and then 95 turn up and are provided with finger-buttons I and K. There are shown in the present instance three fields of type on the type-wheel. One is in action when the spindle is at normal position—that is, down. The next field—the 100 middle one—is brought into action by the use of the key I and lever I', and the lower field is brought into action by using the key K and lever K'. There will be as many such keys and levers as there are fields of type 105 more than one. These levers raise the pivoted lever O, and it pushes the spindle D' up one, two, or more points, according to which key and lever is operated, and this moves the wheel one, two, or more points, so as to bring 110 the proper field of type into action. The means for holding the wheel at any of these points of action and for preventing any longitudinal movement of the wheel when in action is the locking-bar C, which has notches 115 c' c<sup>2</sup> c<sup>3</sup>, which engage the bail of the spindle when it is tilted, whether it be at normal or at one of its elevated positions. This locking-bar C is seen clearly in Figs. 3, 4, 6, 7, 8, and 18 in its proper place, and in Fig. 15 detached from the machine. It is journaled 120 loosely on the shaft D<sup>5</sup> and is flexibly held against pivotal movement by the spring C' (see Fig. 6) and is limited in its movement 125 130

by the frame-piece A' crossing as a stop. Whenever the type-wheel is tilted, the bail of its spindle enters one of the notches  $c' c^2 c^3$ , according to its position, and is held 5 against any possible longitudinal movement. When the parts are in their normal positions, the bail is free from the locking-bar and the spindle can be moved longitudinally. The changed position of parts (shown in Fig. 18) 10 shows the middle field of the type-wheel in action and the spindle engaged by the middle notch  $c^2$  on the locking-bar and the locking-bar tilted up, with the bail of the spindle and the lever I depressed. 15 The type are inked after being positioned and while moving forward to an impression. This is effected by an inking-roller G', hung on a yielding arm G in the path of the type-wheel, which is pushed aside by the type-wheel, and the ink-roller thereby applied to the positioned type. The arm G is hung on the frame-piece A<sup>2</sup> on a pintle  $g^2$  and is made quickly reactive by a spring g, and its forward movement is limited by a set-screw  $g^3$ . 20 25 The arm G is quickly detachable from its hanger, as it has an open-hooked slot  $g'$ , which hooks over the pintle  $g^2$ , and can be disengaged quickly by drawing the arm back and then downward bodily. 30 The means for feeding the paper carriage are as follows, (see Figs. 5, 6, 6<sup>a</sup>, 7, and 9;) On the rear edge of the base-piece B of the carriage is a ratchet b, having rectangular indentations, and on the rear part of the frame A, back of the carriage, are two pawls 35 S<sup>2</sup> S<sup>3</sup>, one of which S<sup>3</sup> is pivoted at  $s^5$  to the frame-work, and the other S<sup>2</sup> is pivoted to the pawl S<sup>3</sup> at  $s^4$  and is reacted by a spring s'. The pawl S<sup>2</sup> has a free action on its pivot and 40 is counterweighted, so that its head will keep erect. Its tail end is supported on a rest  $s^6$  on the rear part of the frame-work, and its head when in normal position rests on the bracket a<sup>5</sup>. 45 In Fig. 6 the pawls are shown in normal position, or when out of action, and in Fig. 6<sup>a</sup> when in action upon the carriage. Normally these pawls are not in engagement with the carriage; but as soon as moved the pawl S<sup>2</sup> 50 enters its point between the teeth b on the base-piece B of the carriage and is prevented from passing above by an extension s<sup>7</sup>, which strikes upon the plate B back of the ratchet. (See Fig. 7.) As the movement of the pawls 55 continues upward the head of the pawl S<sup>2</sup> moves forward and carries the carriage with it, and when the pawls have completed their upward movement the head of the pawl S<sup>3</sup> has also entered a notch of the ratchet. The position is 60 then as shown in Fig. 6<sup>a</sup>, with both pawls in engagement. The carriage is then immovable. The forward movement of the carriage is effected wholly by the forward movement of the pawl S<sup>2</sup> as it moves up, which forward 65 movement is effected by its pivot  $s^4$  moving in the arc of a circle having the pivot  $s^5$  as a center. The degree of forward movement

is just equal to the spacing of the ratchet-teeth b, so that the carriage is moved one notch at a time. The pawl S<sup>3</sup> acts only to lock the carriage against undue movement. The means for moving these pawls is the arm S', forming a part of the lever S S', which lies directly below the pivot-point  $s^4$ . The lever S S' is shown detached from the machine in Fig. 14. It is journaled loosely on the shaft H' and is movable by the action of any of the key-levers H or the spacer-lever L. The spacer-lever L is journaled to the shaft H' between the ears of lever S S' and is provided with a heel L', which engages a lip or projection s<sup>10</sup> on the pawl-operating lever S S' when the spacer-lever is depressed to move said lever, the pawls connected therewith, and the paper-carriage independently of the key-levers. As has been seen above, a movement of any of the key-levers H will rock the shaft D<sup>5</sup>, which is journaled on points d<sup>5</sup>, fixed in the frame-piece A'. On this shaft D<sup>5</sup> is secured a cam Q, preferably eccentrically faced and which rocks with the shaft. This cam has two faces q and q'. The face q is of gradually-increasing radius, the shaft D<sup>5</sup> being the center of the different radii. The face q' is on an arc of a circle, the shaft D<sup>5</sup> being the center. Whenever the shaft is rocked to impress the type-wheel upon the paper, the cam Q acts upon a roller s on the upper end of the pawl of the lever S S' to depress that end and raise end S' to operate the pawls S<sup>2</sup> and S<sup>3</sup> to respectively propel and stop the carriage. This movement of the pawls is accomplished by the face q of the cam Q acting upon the roller s until the face q' is reached. This face, being on an arc having the shaft D<sup>5</sup> as a center, will slip over the roller s without depressing the arm any further and at the same time by means of said lever hold the pawls in place until the motion of the shaft is reversed.

It will be noted that the spacer-lever moves fewer parts than the type-key levers, and hence will naturally move easier; but it is desirable that this key have the same resistance to the hand of the operator as the other keys. This may be accomplished by making its spring h' stiffer than the others, or a supplementary spring l may be used.

As above stated, the pawls S<sup>2</sup> S<sup>3</sup> when in normal position are wholly disengaged from the carriage and it is free to be moved manually in either direction. Hence when wide or extended spacing is wanted or when the carriage is to be gigged back to start a new line it will be moved manually. A pointer or guide B<sup>6</sup>, which lies over the platen, serves to indicate to the operator the point where the type will be impressed upon the paper, so as to aid him in placing the carriage in the position desired. This pointer B<sup>6</sup> is a curved bar, which is fixed to the comb-plate M, as clearly seen in Figs. 1, 2, 4, and 6. At the right hand or rear end of the carriage is a warning-bell B<sup>4</sup> and a hammer b<sup>4</sup> for striking the bell, which

is pivoted to the end frame-piece B' and is moved to strike the bell by the lower end of the pawl S<sup>2</sup> striking against the hammer b<sup>4</sup> as the carriage passes said pawl.

5 In order to relieve the operator of care in placing the carriage always in the same position at the beginning of a line, so as to make the lines register or align vertically, I have provided a variable stop mechanism, which 10 can be used or not, as desired, and when used may be set so as to align the lines more or less distant from the left-hand edge of the paper, and thus give a margin of more or less width, and it can be quickly changed, so as to change 15 the width of margin at will and quickly when desired. This stop mechanism consists of a serrated catch-bar b<sup>5</sup> placed diagonally across the lower side of the carriage-base B near the front or left-hand end of the same, (see Figs. 20 5 and 12,) and a variable-stop lever N, which is pivoted on the under side of the frame A and extends out at the left side of the machine. (See Figs. 2, 3, 5, 6, 7, and 12.) By 25 swinging the outer end of this lever close up to the side of the frame the point n at the inner end will entirely escape the catch-bar and the carriage can be moved freely; but by swinging the outer end of the lever N away from the machine the point n will be carried 30 in front of the catch-bar b and will engage with it and stop the carriage. The degree of extension of the lever N will regulate the point of stopping, because the farther out the lever is swung the nearer the point n will be 35 carried to the inner end of the catch-bar b', and hence the carriage will be stopped earlier in its rearward movement or gigging, and hence the wider the margin will be. It is often desirable to stop the traverse of the carriage 40 at certain positions in the line or at one or more points in the line during the motion toward a uniform terminal point, particularly in such work as making out bills of account when a column of figures is to be printed at the right-hand side of the sheet with a space between it 45 and the items printed at the left-hand side of the sheet, or in tabulating and other like work. Unless some special stopping device is provided the operator is compelled to exercise 50 great care to print the amounts, so that the units, tens, hundreds, &c., will be aligned vertically, so as to be summed up easily. The mechanism provided for this purpose is seen 55 in Figs. 1, 2, 3, 4, 5, and 10, and consists of an adjustable stop on the frame of the machine and a variable-catch mechanism on the paper-carriage. The adjustable stop consists of a bar U, on which is a lug u to engage the catch mechanism. This bar slides in ways below 60 the carriage and extends out at the side of the frame and is bent at the end, so as to be easily grasped by the hand. It has notches u' on one side, which engage with like teeth u<sup>2</sup> on the fixed part of the machine, and is 65 held flexibly in contact therewith by a spring u<sup>2</sup> on the opposite side. The bar U can be moved longitudinally easily by the hand and

can be set so as to fix the lug u at various points. The catch mechanism on the carriage consists of a series of keyed catch-bars V' V<sup>2</sup>, 70 &c., pivoted in a bracket b<sup>5</sup> at the right-hand end of the carriage. These catch-bars are held up by springs v' (see dotted line in Fig. 10) and are depressed by pressing with the finger on the key of the lever. Each catch-bar 75 is provided with a catch-notch v on its under side, and the position of the catch-notch on each bar is different from that on the others, and they are so arranged as to be graded from the end of the carriage. Thus the notch on 80 the bar V' is farthest from the carriage, and on V<sup>2</sup> next farthest, and on V<sup>3</sup> next, and so on, bringing the notch on V<sup>2</sup> the nearest. The keys of these bars are numbered 1 2 3, &c., to 6. Let it be supposed that the operator is making out a bill of account. He will set the bar U so as to bring the lug u to the point he desires. This determines the position on the paper of the unit-line of the column of figures to be printed. He will then print in the 85 item on the left of the sheet and then move the carriage so as to print in the account on the right of the sheet. In so moving the carriage he will take hold of it with the right hand at the right-hand end, and if the 90 amount to be entered contains three digits he will depress the key having the number "3" thereon, and the catch on that bar will engage the lug u and stop the carriage in position to properly position the left-hand digit 95 of the amount. He will then release the catch and operate the keyboard and print in the amount. If the next amount to be entered contains four figures, he will depress catch-bar 4, and the carriage will be stopped 100 one notch earlier than before, and hence the figures of that amount will have their units under the units of the amount above and their tens under the tens, and so on. So it will be seen that all amounts printed in will have 105 their units, tens, &c., aligned vertically on the paper. The carriage will always be stopped in exact position for the printing of the left-hand digit in proper place. The 110 disposition of the parts of the carriage-stopping mechanism, as shown, is an important and valuable feature of the invention, for by placing the stop on the frame of the machine and the variable key-actuated catch on the carriage the operator is able to vary the catch, 115 as desired, and move the carriage forward simultaneously by a single movement of one hand, while when the stop is on the carriage and the variable catch on the frame, as shown in Figs. 10 and 11 of my pending application, 120 Serial No. 398,672, the use of one hand to move the carriage and the other to manipulate the catch is necessary. In machines having a spring-actuated carriage that is fed forward by an escapement or releasing device 125 the latter construction is desirable; but where the carriage is free to be moved manually independent of its feed mechanism, as here shown, it is undesirable and inadequate.

The means for rotating the platen step by step to space the lines is the pawl-and-ratchet device B<sup>7</sup>, which may be of any desired construction. The construction here shown is 5 not new in its details and requires no special description. The means for rotating the platen continuously to draw in a new sheet of paper is the hand-wheel B<sup>5</sup>. The means for holding the paper closely to the roller or platen 10 are the curved guide-fingers B<sup>8</sup> and the roller B<sup>9</sup>, and as these parts may be of any desired construction and, as shown, possess no new features further description is unnecessary.

By the term "variable stop or catch mechanism" as used in this specification I wish to be understood as meaning a mechanism which will stop the carriage at varying points, and by the term "adjustable stop" I wish to be understood as meaning a stop that 20 can be shifted to varying points. The adjustable stop determines the location of the column of figures on the paper, and the variable-catch mechanism determines the point where the first numeral of any amount to be 25 printed shall be located within said column.

I do not herein claim an attachment for type-writing machines consisting of a series of stops arranged side by side and at a letter-space distance apart for the purpose of determining the stopping-point of the carriage and enabling such point to be varied at each successive line, as said subject-matter is embraced in an application, Serial No. 410,893, filed November 4, 1891; nor do I claim here 35 in the combination of a carriage, a stop mechanism for arresting the carriage at different points as it moves to the left, and a key mechanism for manipulating said stop mechanism, nor the combination of a paper-carriage 40 and a columnating attachment consisting of a variable-stop mechanism controlled by keys which stop said carriage while moving toward the left at varying predetermined type-space distances from the predetermined uniform 45 unit point, according to the key that is manipulated, nor the combination of a carriage, a stop mechanism for arresting the carriage at varying desired distances from a uniform terminal point while moving toward that 50 point, and a key mechanism for positioning said stop during the traverse of the carriage, as these subject-matters are also embraced in said application, Serial No. 410,893.

By the term "key mechanism" as herein used I wish to be understood as embracing all mechanism wherein the stop is variably positioned by the pressure of the hand or finger upon a yielding part or parts in contradistinction to a mechanism which may be variably set or adjusted, such as a pin in a hole or a collar on a rod, &c.

What I claim as new is—

1. In a type-writing machine, the combination of a type-wheel, a sleeve, a non-rotative 65 longitudinally-movable spindle, part of which passes through said sleeve to support the type-wheel and the other part bent upon it-

self to form a bail, and means which engage said bail to hold said spindle against rotation.

2. In a type-writing machine, the combination, with the type-wheel, of a sleeve, a non-rotative longitudinally-movable spindle, part of which passes through said sleeve to support the type-wheel and the other part bent 75 upon itself, means which engage said bent part to move said spindle longitudinally, and means which engage with said bent part to lock the spindle against further longitudinal movement when moved to the desired position.

3. In a type-writing machine, the combination of a type-wheel, a shaft having a sleeve, and a spindle bent upon itself to form a bail, one part passing through said sleeve to support the type-wheel and the other through 85 the shaft to hold said spindle against rotation.

4. In a type-writing machine, the combination of a type-wheel, a shaft having a sleeve, a spindle bent upon itself to form a bail, one 90 part passing through said sleeve to support the type-wheel and the other through the shaft to hold said spindle against rotation, and means for moving said spindle longitudinally.

5. In a type-writing machine, the combination, with the type-wheel, of a non-rotative longitudinally-movable spindle carrying the type-wheel and having a lateral extension at its lower end, a lever acting upon said extension for moving said spindle longitudinally, special key-levers for moving said lever, and means for engaging said extension and holding said spindle against undue longitudinal movement.

6. In a type-writing machine, the combination, with the type-wheel, of a non-rotative longitudinally-movable spindle carrying the type-wheel and having a lateral extension at its lower end, a lever acting upon said extension for moving said spindle longitudinally, special key-levers for moving said lever, and a locking-bar for engaging said extension and holding said spindle against undue longitudinal movement.

7. In a type-writing machine, the combination, with the rock-shaft which carries the type-wheel spindle or shaft and is rocked when the type-wheel is vibrated laterally, of an eccentrically-faced cam carried by said rock-shaft, a lever moved by said cam; and a feeding mechanism for the paper-carriage, which is actuated to move said carriage by said lever.

8. In a type-writing machine, the combination, with the rock-shaft which carries the type-wheel spindle or shaft and is rocked when the type-wheel is vibrated laterally, of an eccentrically-faced cam carried by said rock-shaft, a lever moved by said cam, a feeding mechanism for the paper-carriage, which is actuated by said lever, and a spacer-key lever for moving said lever independently of said cam.

9. In a type-writing machine, the combination of a rock-shaft, key-levers for rockers on said shaft, a type-wheel on said rock-shaft, a paper-carriage having feeding and checking pawls, a lever for operating said pawls, and a cam operating upon said lever to feed and check said carriage when the shaft is rocked.

10. In a type-writing machine in which the carriage is fed and checked during the down movement of the key-lever, the combination of a lever for operating the pawls and a shaft under control of the key-levers and having a cam with faces  $q$  and  $q'$  for operating said lever, for the purpose set forth.

11. The combination of a paper-carriage, feeding and checking pawls for said carriage, a pawl-controlling lever, a rock-shaft having a cam in contact with said pawl-controlling lever, and key-levers connected by intermediate mechanism with said rock-shaft, the cam of which operates upon the pawl-controlling lever to move and hold the pawls in engagement with the carriage when a key-lever is depressed.

12. In a type-writing machine, the combination, with the type-wheel, of a pinion for moving said wheel axially, two segment-gears for moving said pinion, vibrating arms carrying said segmental gears and having gear-teeth, thereon, two vibrating frames carrying arms having gear-teeth thereon, which mesh with the gear-teeth on said segment-carrying arms, and two groups of type-key levers for moving said vibrating frames.

13. In a type-writing machine, the combination, with the type-wheel, of a rock-shaft carrying the spindle of said wheel, a pinion concentric with said wheel for moving the same axially, a stopping-ratchet carried by said pinion, a pawl for engaging said ratchet, that is pivoted on said rock-shaft and having gear-teeth arranged concentric with said rock-shaft, two segment-gears for moving said pinion, carried on arms pivoted on said rock-shaft concentric with said pawl and having gear-teeth arranged in an arc of the same radius as the gear-teeth on the said pawl, two vibrating frames carrying arms having gear-teeth thereon which mesh with the gear-teeth on said segment-carrying arms, two groups of type-key levers for vibrating said frames, a third vibrating frame pivoted concentric with the other frames and embracing both of said frames and in position to be actuated by any of the type-keys of both said groups, and an arm carried by said third frame, having gear-teeth which mesh with the gear-teeth on said pawl.

14. In a type-writing machine, the combination, with the type-wheel, the pinion for moving the type-wheel axially, the pawl and ratchet for stopping the type-wheel, the two vibrating frames for moving the mechanism which moves the pinion, and the single frame for moving the said pawl, of key-levers for actuating said frames, which are pivoted on a common pintle or shaft, are arranged above

said frames in two distinct groups and act thereon when depressed, and have uniformly-placed bearing-faces for contacting with the two pinion-actuating frames and other bearing-faces for moving the pawl-actuating frame, which are gradatively arranged in each group of key-levers.

15. In a type-writing machine, the combination, with a series of type-key levers that are pivoted on a common shaft and divided into two groups, of two type-actuating frames pivoted concentrically with said key-levers and arranged each below one of said groups of key-levers, a third frame pivoted concentrically with said type-key levers, arranged below both of said groups of keys and embracing the two other frames, mechanism operated from said third frame for stopping the type-actuating mechanism operated by the two first-named frames, and two bearing-faces on each of the type-key levers for contacting with the two frames below it, said bearing-faces on each key-lever being so graded relative to each other that the outer frame will be moved later than the inner, more or less, according to the distance between the planes of said faces.

16. In a type-writing machine, the combination of a series of type-key levers pivoted on a common pintle-shaft, two frames for actuating the type-wheel from said keys, pivoted on the same pintle-shaft, a frame for operating means for stopping the type-wheel pivoted on said shaft, a lever for actuating the feed mechanism of the paper-carriage, moved from the action of the type-wheel pivoted on said shaft, a spacer-key lever for actuating said feed mechanism independently of the type-wheel mechanism pivoted on said shaft, and a lever for longitudinally moving the type-wheel spindle also pivoted on said shaft.

17. In a type-writing machine, the combination of a series of type-key levers pivoted on a common pintle-shaft, two frames for actuating the type-wheel from said keys, pivoted on the same pintle-shaft, a frame for operating means for stopping the type-wheel pivoted on said shaft, a lever for actuating the feed mechanism of the paper-carriage, moved from the action of the type-wheel pivoted on said shaft, and a spacer-key lever for actuating said feed mechanism independently of the type-wheel mechanism pivoted on said shaft.

18. In a type-writing machine, the combination of a series of type-key levers pivoted on a common pintle-shaft, two frames for actuating the type-wheel from said keys, pivoted on the same pintle-shaft, a frame for operating means for stopping the type-wheel pivoted on said shaft, and a lever for actuating the feed mechanism of the paper-carriage, moved from the action of the type-wheel pivoted on said shaft.

19. In a type-writing machine, the combination of a series of type-key levers pivoted on a common pintle-shaft, two frames for

actuating the type-wheel from said keys, pivoted on the same pintle-shaft, and a frame for operating means for stopping the type-wheel pivoted on said shaft.

5 20. In a type-writing machine, the combination, with the type-wheel D, ratchet  $D^2$  for stopping said wheel, and pawls E  $E^2$  and E' for acting on said ratchet, of a shield at the apex of the lobe of said ratchet for preventing the engagement of said pawl E' with the extreme teeth on said ratchet.

15 21. In a type-writing machine, the combination, with the vibrating type-wheel D, of the swinging arm G, carrying the ink-roller G and engaging with its pintle  $g^2$  detachably by means of the open-ended slot  $g'$ .

20 22. In a type-writing machine, the combination, with the paper-carriage, of a ratchet on the side of the carriage, having rectangular teeth b, and a pushing-pawl and a checking-pawl, which engage said teeth by moving between them by a vertical movement.

25 23. In a type-writing machine, the combination, with the paper-carriage, of a ratchet on said carriage, having rectangular teeth, a checking-pawl pivoted to the frame-work, a pushing-pawl pivoted to the checking-pawl, and a lever controlled by the key-levers for operating said pawls.

30 24. In a type-writing machine, the combination, with the paper-carriage, of a type-wheel that vibrates to impress a type, a lever for operating the feed mechanism of the carriage, that is rocked as the type-wheel is vibrated, a checking-pawl that is pivoted to the frame-work and is moved by said lever, a pushing-pawl that is pivoted to the checking-pawl and carried by it, and a ratchet on said carriage, having rectangular teeth and engaged first by the pushing-pawl and then by the checking-pawl.

35 25. In a type-writing machine, the combination of a paper-carriage normally free to be moved manually, a stop mechanism for arresting the carriage at different points as it moves to the left, and key mechanism for manipulating said stop mechanism to stop the traverse of the carriage at any desired position in the line.

40 26. In a type-writing machine, the combination of a paper-carriage normally free to be moved manually, a stop mechanism, and a key mechanism for positioning said stop mechanism at any desired point in the line during the motion toward a uniform terminal point.

45 27. In a type-writing machine, the combination, with the paper-carriage thereof, of a stop device capable of being adjusted at varying points and when so adjusted remains fixed and determines the position of the unit or right-hand figure of amounts to be printed in vertical order, and a series of catches for engaging said stop, representing units, tens, hundreds, thousands, &c., and which will when operated severally stop the carriage while moving toward the left at the point where the numeral represented by said catch should be printed relative to the unit-point.

50 28. In a type-writing machine, the combination, with the paper-carriage thereof, of a variable-stop mechanism for stopping said carriage at varying predetermined points within its forward traverse and means for bringing said stop into action and out of action and fixing the variable point at which said carriage shall be stopped, which means are under the control of the hand of the operator while it is moving the carriage.

55 29. In a type-writing machine, the combination, with the paper-carriage thereof, of a variable-stop mechanism for stopping said carriage at varying predetermined points within its traverse and a series of keys and mechanism controlled by said keys for bringing said stop mechanism into action and fixing the variable point at which said carriage shall be stopped, which keys are under the control of the hand of the operator while it is moving the carriage.

60 30. In a type-writing machine, the combination, with the carriage thereof, of a variable stop or catch mechanism carried by said carriage and under the control of the operator's hand, used for moving the carriage, and a stop on the frame of the machine for engaging with said variable stop or catch mechanism.

65 31. In a type-writing machine, the combination, with the carriage thereof, of a variable stop or catch mechanism carried by said carriage and under the control of the operator's hand, used for moving the carriage, and an adjustable stop on the frame of the machine for engaging with said variable stop or catch mechanism.

70 32. In a type-writing machine, the combination, with the paper-carriage thereof, of a stop on the frame of the machine, a variable-catch mechanism on the carriage, and a series of keys controlling said variable-catch mechanism.

75 33. In a type-writing machine, the combination, with the paper-carriage thereof, of an adjustable stop on the frame of the machine, a variable-catch mechanism on the carriage, and a series of keys controlling said variable-catch mechanism.

80 34. In a type-writing machine, the combination, with the paper-carriage thereof, of a detachable and adjustable stop on the frame of the machine, a variable-catch mechanism on the carriage, and a series of keys controlling said variable-catch mechanism.

85 35. In a type-writing machine, the combination, with the paper-carriage thereof, of a stop on the frame of the machine, a variable-catch mechanism on the carriage, and means for manually actuating said variable catch while moving the carriage.

90 36. In a type-writing machine, the combination, with the paper-carriage thereof, of an attachment for regulating the point of commencement of the lines, consisting of a graded

series of catches on the carriage and a variable stop on the frame-work.

37. In a type-writing machine, the combination, with the paper-carriage thereof, of an attachment for regulating the point of commencement of the lines, consisting of a graded series of fixed catches on the carriage and a variable stop carried by the frame-work that can be moved into line with any of the said

10 series of fixed stops.

38. In a type-writing machine, the combination, with the paper-carriage thereof, of an attachment for regulating the point of commencement of a line, consisting of a series of 15 catches and a variable stop, one part of said attachment being on the carriage and the other on the frame of the machine.

39. In a type-writing machine, the combination, with the carriage thereof, of a variable-20 stop mechanism for variously vertically aligning the beginning of the several lines of printing, having one part thereof on the frame of the machine and the other part on the carriage, and a second variable-stop mechanism 25 for variously vertically aligning matter to be printed between the beginning and the ends of the lines, having one part thereof on the frame of the machine and the other part on the carriage, and key mechanism for manipulating 30 said stop mechanism to stop the traverse of the carriage at any desired position in the line.

40. In a type-writing machine, the combination, with the carriage thereof, of a series of 35 fixed graduated catches on the carriage, and a lever on the frame, carrying a stop and movable, so as to bring said stop into line with either of said catches.

41. In a type-writing machine, the combination, with the carriage thereof, of a series of 40

fixed catches arranged diagonally on the carriage and a swinging lever carrying a stop and movable, so as to bring said stop into line with either of said catches.

42. In a type-writing-machine attachment, 45 the combination of a removable or detachable bar having a lug and a series of keyed bars having catch-notches which engage said lug on the removable bar.

43. In a type-writing-machine attachment, 50 the combination of an adjustable bar having a lug and a series of keyed bars having catch-notches which engage said lug on the removable bar.

44. In a type-writing-machine attachment, 55 the combination of an adjustable bar having notches on one side, a frame for the adjustable bar, having similar notches to those on the bar, and means for holding the notched side of the bar in contact with the notches of the frame.

45. In a type-writing-machine attachment, the combination of an adjustable bar having notches on one side, a frame for the adjustable bar, having notches similar to those on 65 said bar, and a flexible retaining device for holding the notched bar in contact with the notches of the frame.

46. In a type-writing-machine attachment, the combination of a notched adjustable bar 70 having a lug, a notched frame, means for holding said notched bar against the notched frame, and a series of keyed levers having catch-notches which engage said lug.

In testimony whereof I affix my signature in 75 presence of two witnesses.

GEORGE C. BLICKENSDERFER.

Witnesses:

M. F. HALLECK,  
E. L. WHITE.