

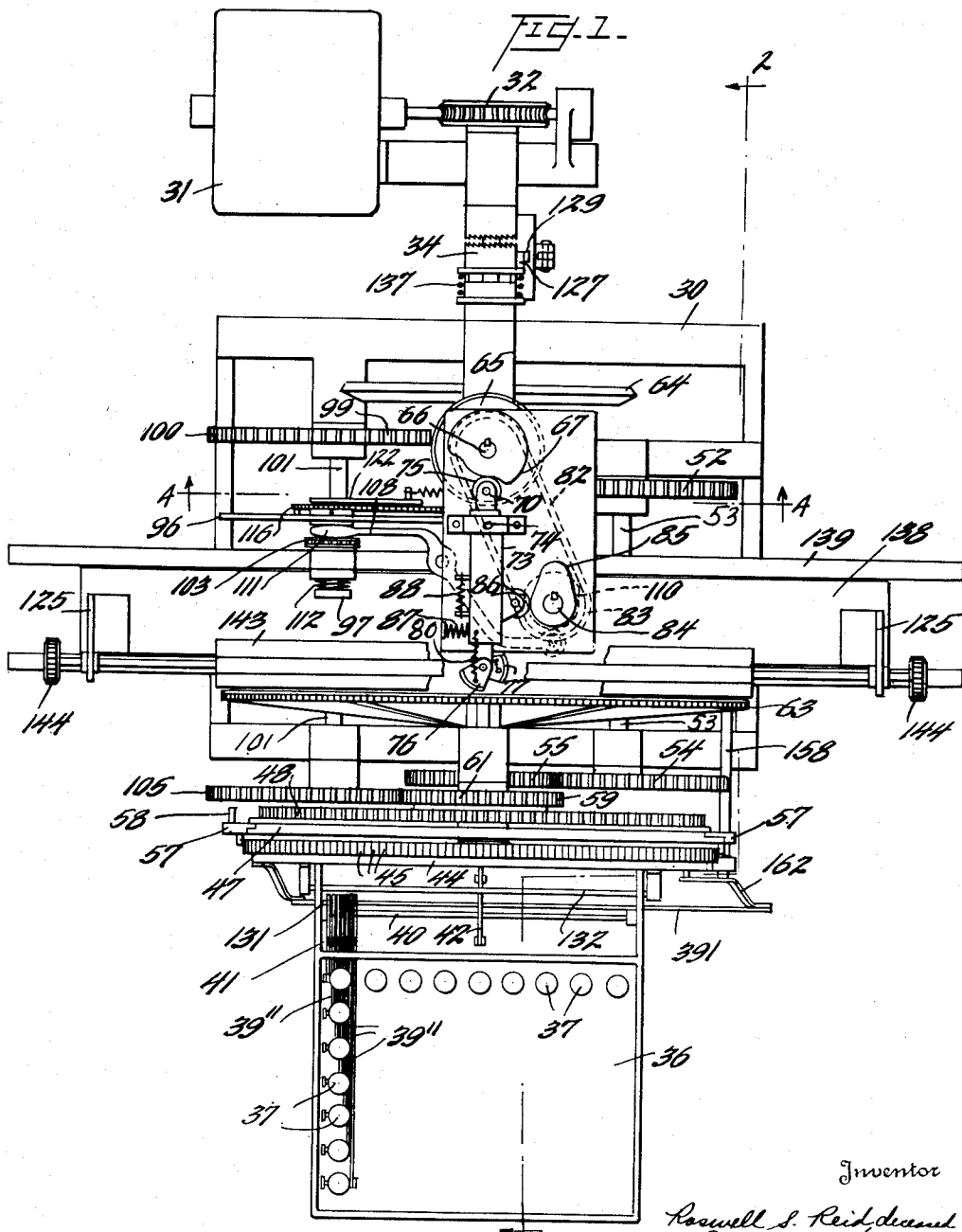
Aug. 31, 1943.

R. S. REID

2,328,097

DISPLAY PRINTING MACHINE

Original Filed April 29, 1938 5 Sheets-Sheet 1



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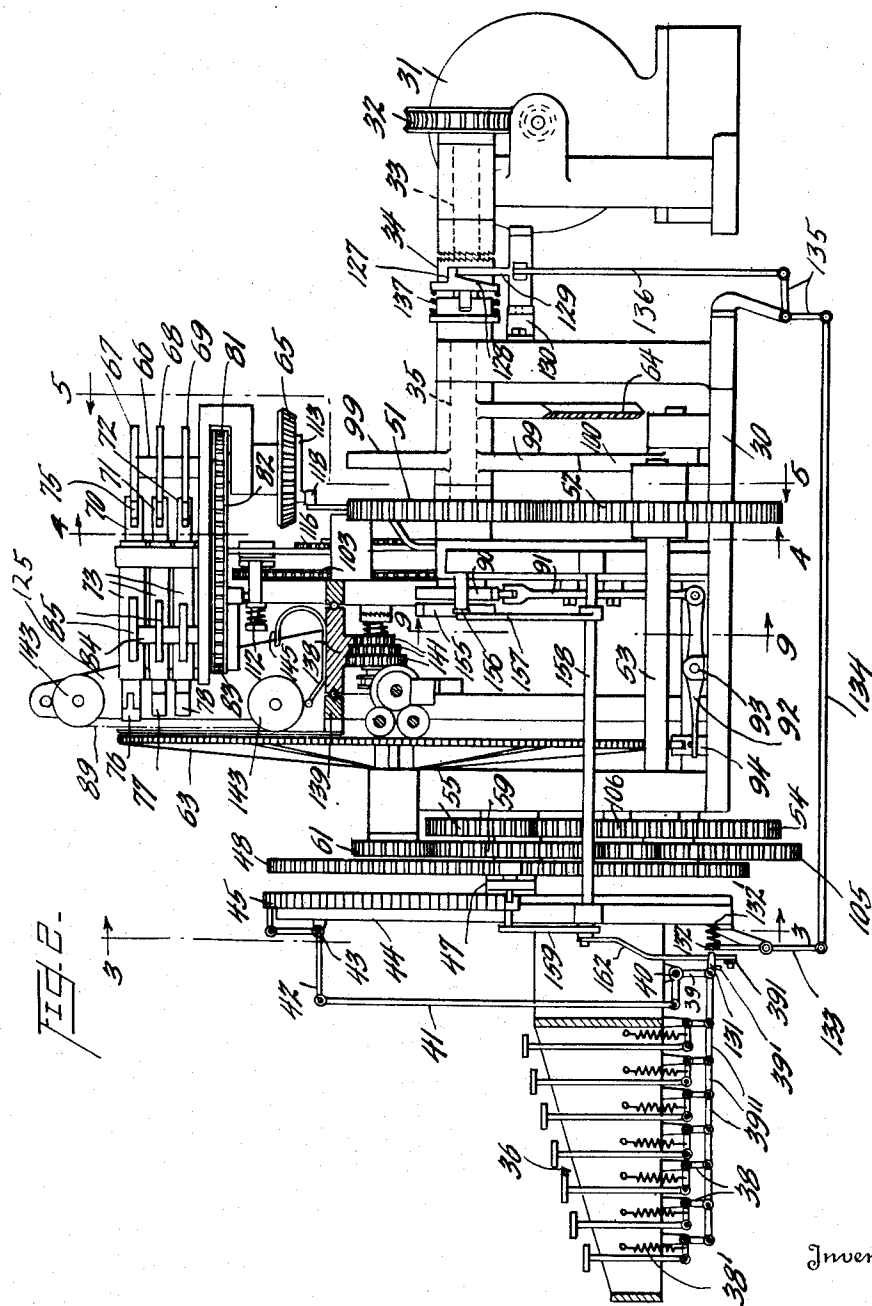
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DISPLAY PRINTING MACHINE

Original Filed April 29, 1938 5 Sheets-Sheet 2



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DISPLAY PRINTING MACHINE

Original Filed April 29, 1938

5 Sheets-Sheet 3

FIG. 3.

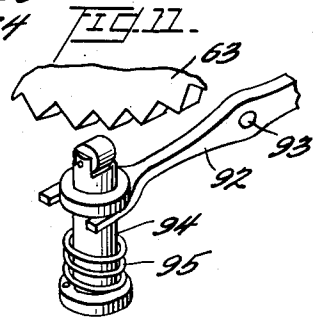
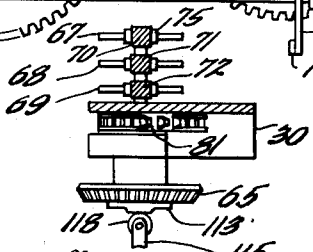
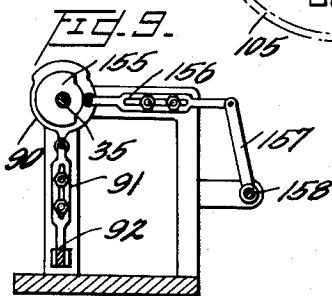
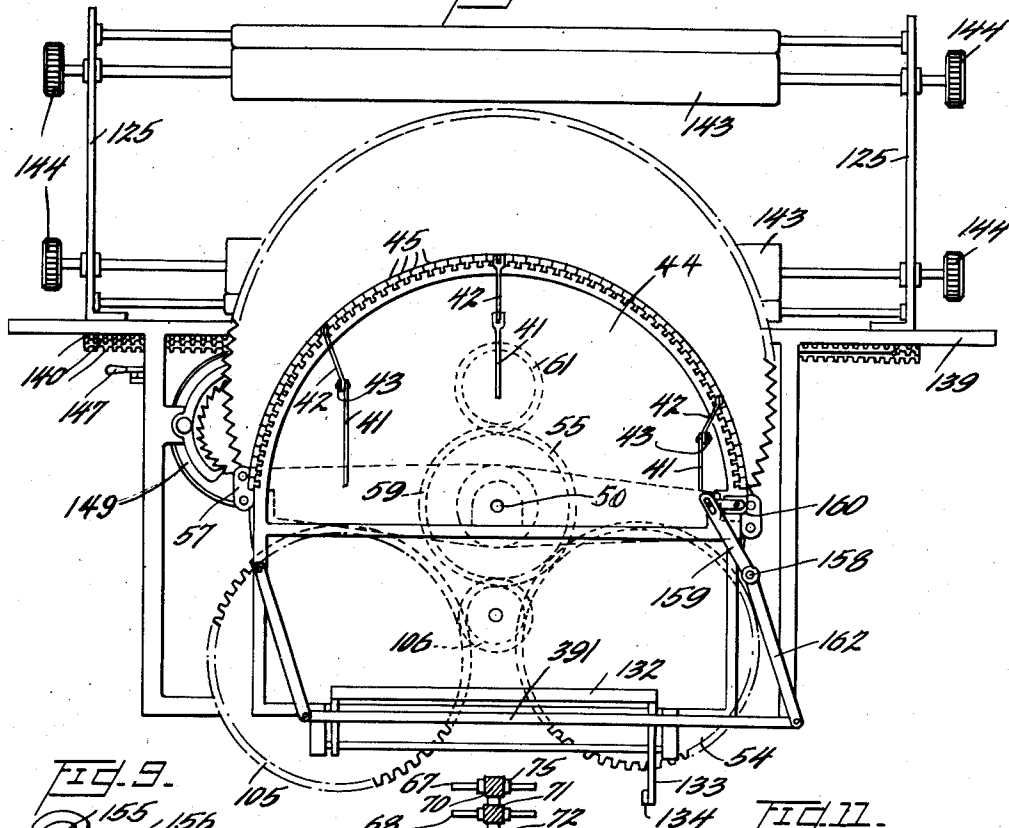
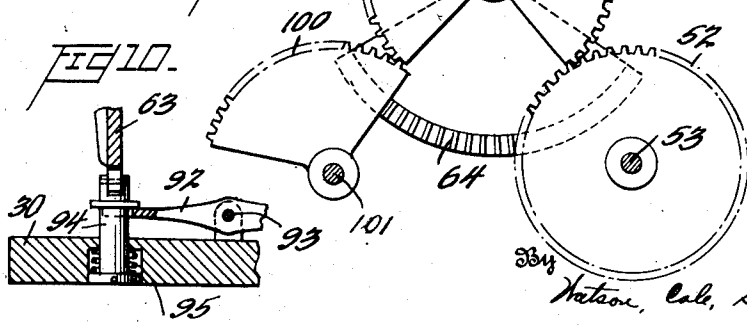


FIG. 4.



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DISPLAY PRINTING MACHINE

Original Filed April 29, 1938 5 Sheets-Sheet 4

FIG. 5.

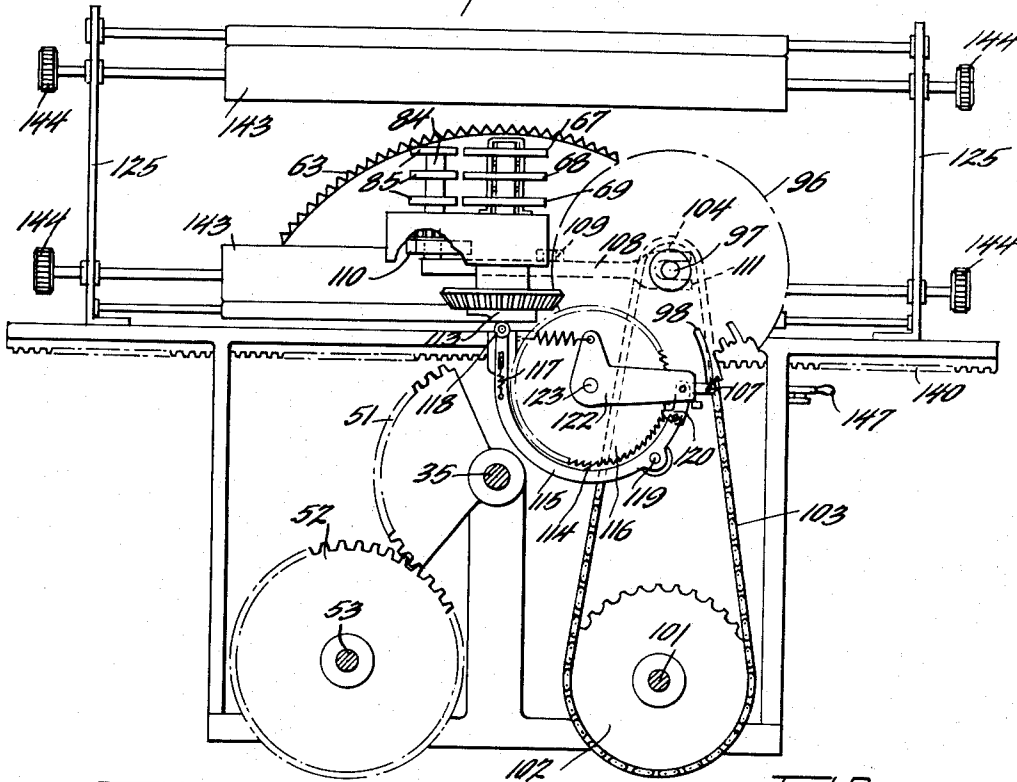


FIG. 6.

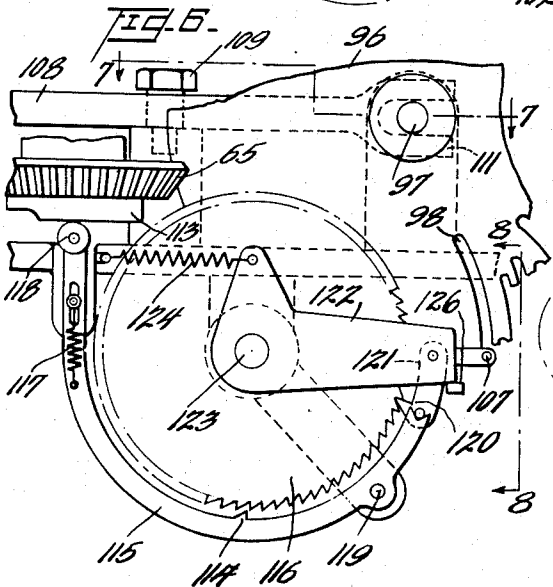


FIG. 7.

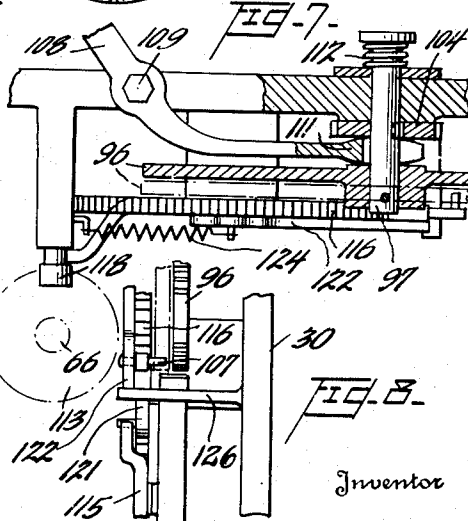


FIG. 8.

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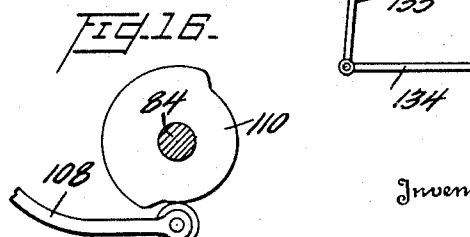
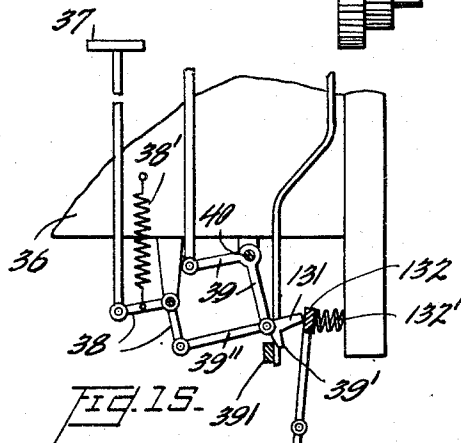
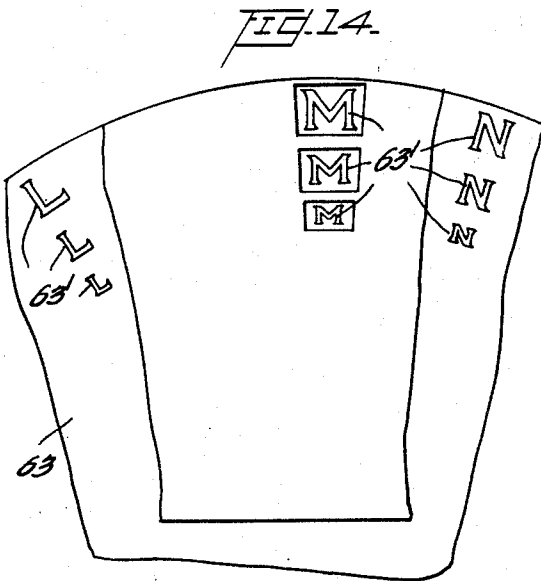
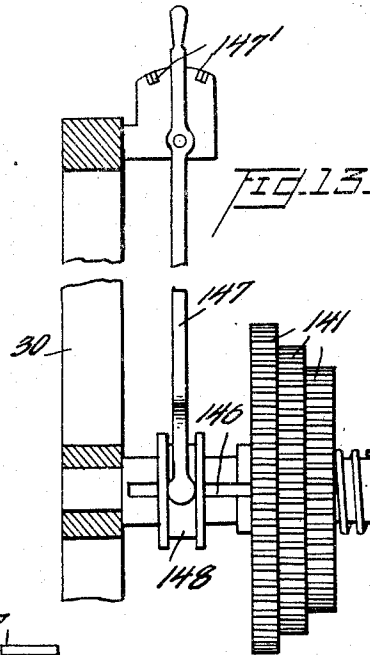
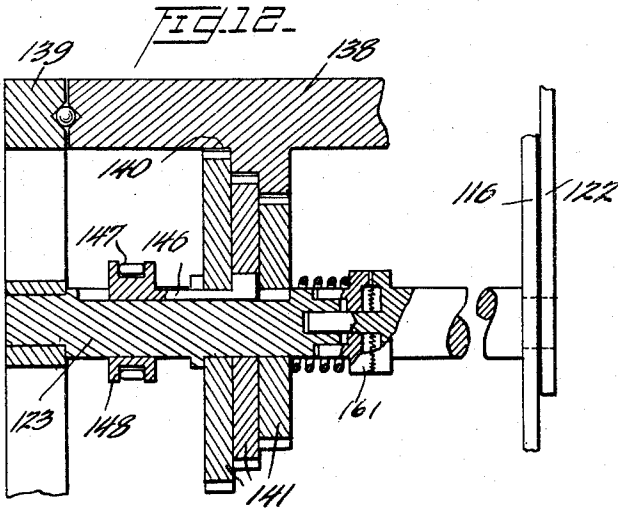
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DISPLAY PRINTING MACHINE

Original Filed April 29, 1938

5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,328,097

DISPLAY PRINTING MACHINE

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Original application April 29, 1938, Serial No. 205,088. Divided and this application December 30, 1941, Serial No. 425,005

9 Claims. (Cl. 197—84)

The present invention relates to printing machines and more particularly to a printing machine which is designed and constructed in such manner as to have the capacity to print, upon a web of paper, words and lines comprising assembled letters of relatively large size, varying for instance from 18 point letters to 60 point letters. Primarily the machine is intended to comprise one of several units by means of which newspapers, magazines, books, periodicals, advertising folders and the like, may be printed without the necessity of casting or setting type.

The present application is a division of the copending application Serial No. 205,088, filed April 29, 1938, which has now matured as U. S. Patent No. 2,290,383, granted July 21, 1942.

As is well-known, the individual letters of a font of printer's type vary in width and in the completed printed line the letters are equidistantly spaced from each other. On the other hand the usual typewriter embodies type faces of uniform width so that the appearance of a completed typewritten line is substantially different from the appearance of a completed printed line. It has heretofore been proposed, however, that by the addition of a variable spacing mechanism to a typewriter, and providing the typewriter with type the faces of which differ in width as do the printer's type, the product of the typewriter may be caused to resemble very closely the product of a printing operation. It has, however, not been found heretofore to be possible to modify the usual typewriter by the addition of variable spacing mechanism to produce the effect of printed lines where very large type faces are to be employed.

The principal purpose of the present invention is to provide a novel variable spacing device in a printing machine, generally analogous to the variable spacing typewriter, by means of which printed lines and words the individual letters of which are of large size, may be rapidly and conveniently produced, the individual letters of the words being spaced apart as though actually printed with printer's type so that the completed product is indistinguishable from the product of the printing press. The novel machine includes a paper carriage in which the paper to be printed is guided for movement in a predetermined plane, a movable type carrying member which is so designed and so mounted that any desired letter may be brought into printing position with respect to the paper, and upon one side of the paper, and a printing head upon the opposite side of the paper which serves, when actuated, to

press the paper against the previously inked letter and to be thereafter retracted to enable the paper to draw away from the type.

The actual printing operation is performed in a novel manner, the printing head being of such character as to be movable in a plane parallel to the plane of the paper during printing operation, the actual paper engaging surface of the printing head rolling over one surface of the paper to insure perfect contact of the area of the surface to be printed with all areas of the ink carrying type and as a result of this more perfected printing of large characters than has heretofore been possible is realized.

The apparatus is motor driven and key controlled, the depression of a key effecting the connection of the printing mechanism to a constantly running motor whereby the printing mechanism is moved through one complete cycle of operations, the connection to the constantly running motor being automatically broken at the completion of such cycle of operations. The variable spacing mechanism embodied in the machine which exemplifies the present invention includes many novel features of construction which will be hereinafter described in detail. These novel arrangements include means for synchronizing the variable spacing elements with the printing, type selecting, and restoring mechanisms, certain brakes or holding devices and other novel elements which include the serrated or notched rotary wheel which serves to gauge the movement of the control elements of the variable spacing mechanism.

A preferred embodiment of the invention is illustrated in the accompanying drawings, but it will be appreciated by those skilled in the art that numerous variations in the details of the elements and subcombinations of elements may be effected in adapting the invention for special purposes and that that form thereof which is illustrated, and which is to be hereinafter described, is set forth by way of example only.

In the drawings:

Figure 1 is a plan view of the machine, the housing having been removed;

Figure 2 is a side view of the machine partially in elevation and partially in section;

Figure 3 is a section on line 3—3 of Figure 2;

Figure 4 is a section taken on lines 4—4 of Figures 1 and 2;

Figure 5 is a section taken on line 5—5 of Figure 2;

Figure 6 is a view of part of the mechanism

shown in Figure 5, on a somewhat larger scale, showing a portion of the spacing mechanism;

Figure 7 is a partial section on line 7-7 of Figure 6;

Figure 8 is an elevation of portion of the mechanism shown in Figure 6, as seen from the line 8-8 of that figure;

Figure 9 is a section on line 9-9 of Figure 2;

Figures 10 and 11 are details of portions of the disc locking mechanism;

Figure 12 is a sectional view through portions of the carriage and its slide controlling members;

Figure 13 is a horizontal section showing the carriage pinions and their key connection shift;

Figure 14 is an elevation of a portion of the type disc and the shield therefor;

Figure 15 shows in side elevation an operating key and the key locking mechanism; and

Figure 16 is a detail of the spacing disc shifting cam.

The several portions of the machine of this invention are supported on a frame 30 the details of which are not important and need not be described. A motor 31 is connected through suitable gears such as are shown at 32 to a drive shaft 33 which is rotatably supported by the frame 30. A single revolution clutch 34, of a well-known type, connects the shaft 33 with the shaft 35 so that when the motor 31 is in continuous operation the clutch 34 may be operated to impart one revolution to the shaft 35. This will cause the machine as a whole to complete one cycle, that is, print one character of type and return to a normal position in readiness for another cycle of operation to print another character.

A suitably constructed typewriter keyboard 36 bearing any desired number of keys 37 is mounted at the front of the machine for easy manual operation. Each of the keys 37 is pivotally connected to a bell crank lever 38 which is pivotally mounted on the frame 30 and which is normally held in the position shown by a tension spring 38'. Each of the bell crank levers 38 is pivotally secured to one end of a rod 39', the other end of which is pivotally secured to one arm of an associated bell crank lever 39, levers 39 being pivotally attached to the frame 30 as at 40. The other arm of each lever 39 is pivotally connected to a vertical link 41 which, through another lever or bell crank 42, pivotally secured as at 43 to a stationary disc 44, causes one of a series of blocks 45 to move forwardly away from its normal position, blocks 45 being shown in normal positions in Figure 2. The several levers or bell cranks 42 are so shaped that the pins which connect them to the blocks 45 are all horizontally disposed. It will be seen from the drawings that each of the keys 37 is independently connected with one of the blocks 45 and through the above described lever system a definite block 45 is moved out, or to the left in Figure 2, as a definite key 37 is depressed.

The single revolution clutch 34 is held in the open position shown in Figure 2 by a sear 127, on a cam 128, contacting a bell crank trigger 129 which is pivoted to the frame 30 at 130. Each of the levers 39 carries a boss 131, any one of which when moved by the depression of any key 37 moves a crossbar 132 which, through a lever 133, pivoted to the frame 30, a link 134, a bell crank 135, pivoted to the frame 30, and a vertical link 136 moves the trigger 129 out of engagement with the sear 127. This permits a

compression spring 137 to close the clutch 34 permitting the continuously running motor 31 to drive the main shaft 35. The shaft 35 is thereby turned through 360 degrees being there stopped by the action of the trigger 129 on the cam 128 to again throw the clutch 34 out of engagement. A compression spring 132', mounted between the crossbar 132 and any stationary part of the machine, urges this bar 132 and the lever system connected thereto back to the normal position when displaced therefrom.

In order that a depressed key (see Figure 15) may remain depressed long enough and yet not too long, another boss 39' on the lever 39 and another crossbar 391 are provided for holding the key which is depressed for a definite length of time. This is accomplished by mechanism, which will be described later, for raising the bar 391 to the position shown in solid lines in Figure 15 as soon as the boss 39' has crossed to the rear of said bar 391. The raising of the bar 391 also serves to prevent a second key from being depressed during the following interval.

The stationary disc 44 bears, on the upper 180 degrees of its periphery, a plurality of keyways 46 in which the blocks 45 are slidably mounted, there being one block for each of the keys 37 of the keyboard. These blocks 45 are so arranged that, when they are all in position, they form a continuous half-cylindrical surface which approximates a smooth surface.

On an axis passing through the center of curvature of the substantially continuous surface formed by the blocks 45 there is rotatably mounted a selection pawl arm 47 and a selection cog wheel 48. The selection pawl arm 47 is fixed to a shaft 50, while the selection cog wheel 48 is rotatably mounted on the same shaft. The selection pawl arm 47 is rotated, when the shaft 35 is rotated, at the beginning of a cycle, for the first one-third of the cycle, by means of a gear train consisting of a 120 degree segment gear 51 engaging gear 52 which through a shaft 53 rotates a gear 54 which engages a pinion 55 which is secured to the shaft 50 upon which said arm 47 is mounted. This gear ratio is such that 120 degrees of revolution of the gear 51 turns the pawl arm 47 through 180 degrees.

When any one key is depressed, since one of the blocks 45 is moved, an opening is left in the formerly smooth surface, all as clearly described in the parent application Serial No. 205,088. A pawl 57 is mounted on each end of the pawl arm 47 so that one of the pawls 57 wipes the surface formed by the blocks 45 and will fall through any opening, if such an opening exists by virtue of the withdrawal of a block 45, when the pawl arm 47 is being rotated. This movement of the pawl 57 permits a dog 58, mounted opposite thereto, to engage the selection cog wheel 48. After this engagement the pawl arm 47, through dog 58 drives the cog wheel 48 through the remaining portion of the 180 degree angle which the pawl arm 47 rotates during the first one-third of each cycle. The cog wheel 48, which is rotatably mounted with respect to the shaft 50, has a gear 59 coaxially mounted and secured thereto by means of a bolt 60. A pinion 61 engages the gear 59 and through a shaft 62 borne by the frame 30 a type disc 63 is rotated. The selection cog 48 is geared to the type disc in a 2:1 ratio, so that when the selector arm 47 is turning through an angle ϕ the type disc is turning through the angle 2ϕ to bring the char-

acter of the key which was depressed into the printing position. One or more fonts of characters 63' may be mounted in concentric circles on the type disc face. One font forms one circle and any character thereof may be brought into a given position by the energy supplied through the pawl arm 47 as previously described, the possibility of a complete revolution of the type disc 63 depending only upon which of the blocks 45 is moved. It will be seen that by pressing one of the keys 37 a certain and dependent angle of revolution for the type disc 63 has been selected which brings the wanted character into a desired position—the printing position. This has been accomplished in 120 degrees of rotation of the main shaft 35.

Upon the completion of the previously described first one-third of a cycle the printing mechanism begins to operate, the printing operation being completed within the second one-third of the cycle. A second 120 degree segment bevel gear 64 secured to the shaft 35 supplies the energy for this portion of the cycle. The gear 65 is secured to the lower end of a vertical shaft 66 which is supported by the frame of the machine and carries on its upper portion a plurality of identical cams 67, 68 and 69. The gear ratio between the segment gear 64 and the bevel gear 65 is 3:1, thus causing the cams 67, 68 and 69 to make a complete revolution during the second one-third of a cycle. At the elevations of said three cams 67, 68 and 69, slide bars 70, 71 and 72 are mounted for both a forward and a rearward sliding motion and for rotation about a vertical axis 74 passing therethrough. A hollow guide member such as 73 is provided for each of the slide bars which pass therethrough, these slide bars being longitudinally slidable with respect thereto. Each of the hollow guide members 73 is pivoted on the vertical axis 74 permitting the slide bars 70, 71 and 72 to be moved in their respective horizontal planes. A roller 75 is mounted on the rear end of each of the slide bars 70, 71 and 72, each of the rollers 75 contacting the respective cams 67, 68 and 69. The forward ends of the slide bars 70, 71 and 72 each have a printing head 76, 77 and 78 respectively, pivotally mounted thereon which may be faced with any desirable cushioning material 79. Small tension springs 80 connect the forward portions of each of the printing heads 76, 77 and 78 with the respective slide bars 70, 71 and 72 giving the printing heads an urge to return to the normal position when not being moved and at the same time providing a paracentric action so that any of the printing heads which are not in use during a given cycle may be held out of the way. The shaft 66 has a chain gear 81 secured thereto which by means of a chain 82, a chain gear 83, and a vertical shaft 84 borne by the frame 30 of the machine drives the cams 85 at a one-to-one ratio with the cam 67. The several cams 85 are proportioned to the width of the widest character of the font which is printed by the respective printing heads 76, 77 and 78. The cam 67 first furnishes forward motion to the printing head 76 and holds it forward for a time during which the cam 85, through a roller 86 supported by the guide members 73, imparts a lateral component to the printing heads 76, 77 and 78 and their supporting members, causing the printing head which is in use to roll across the face of a character on the disc 63. This lateral motion is opposed by a compression spring 87, secured to the machine frame, which serves

to preserve contact between the roller 86 and the cam 85. Small tension springs, such as 88, connected between the slide bars 70, 71 and 72 and the guide members 73 preserve contact between the cams 67, 68 and 69 and the rollers 75.

It will thus be seen that during this second one-third of a cycle the printing head 76, or whichever one of the others is in use, will be forced against paper 89 with a forward motion derived from the cam 67 and then a rolling motion derived from the cam 85, pressing the paper 89 against the character on the printing disc 63 which was placed in the printing position in the first one-third of the cycle.

It is now necessary to space the copy by the width of the character just printed, possibly to index the copy for the next line of print, and to return all moving parts to such positions as are necessary to be in readiness for another cycle. This spacing and repositioning is accomplished during the last one-third of the cycle.

A cam 90, see Figures 2 and 9, secured to the main shaft 35 near its forward end, revolving 360 degrees per cycle of the machine, is so shaped as to push a slide bar 91 downwardly at the beginning of the printing operation, i. e., the second third of the cycle, and to release it at the completion of this operation. A lever 92, pivoted to the frame 30 as at 93, see Figure 10, is pivotally connected at one end to the lower end of the slide bar 91 and has its other end bifurcated and in contact with the underside of a flange on a vertically movable rod 94, so shaped as to clamp the printing disc 63 when moved upwardly. A compression spring 95 mounted between the frame 30 and the lower end of the rod 94 urges this rod 94 out of contact with the printing disc 63 and keeps the slide bar 91 in contact with the cam 90. This clamping action on the printing disc 63 obviates any danger of the character being inadvertently moved during the printing operation. A second hump on the cam 90 also causes the disc to be locked during the stop between cycles.

Immediately in front of the disc clamping cam 90 a cam 155 is secured to the shaft 35. The purpose of this is to raise the pawl 57 back to the surface of the blocks 45 at the beginning of the printing third of the cycle of the machine and to disengage it from the selection cog wheel 48 so that it will arrive at the other side of the machine correctly positioned for operation in the next cycle. This is accomplished by means of a slide bar 156 which rides on the surface of the cam 155 and which through an arm 157, a shaft 158, rotatably mounted in the frame 30, and a second arm 159 slides a plunger 160 from a retracted position where it picks up the pawl 57 at the end of the first third of a cycle to the position shown in Figure 3. The cam 155 is so shaped that the plunger 160 is retracted just after the beginning of a cycle when the pawl 57 has moved beyond the surface of this plunger 160, thus remaining in readiness to receive the next used pawl 57 during the selecting or first one-third of the cycle.

The shaft 158 has another lever 162 secured thereto which is connected with the crossbar 391 in such a manner that, when the cam 155 retracts the plunger 160 as described above, the bar 391 is raised so as to hold the boss 39' which has been moved by a depressed key. It is so held until the end of the first one-third of the cycle.

A third 120 degree segment gear 99 is secured to the main shaft 35 which during a variable portion of the final third of the cycle, i. e., the

repositioning operation, engages another 120 degree segment gear 100 which is secured on the rearward end of a repositioning shaft 101 rotatably mounted in the frame 30 of the machine. The forward end of the shaft 101 carries a gear 105 which through a pinion 106, see Figure 3, turns the gear 59 which, as previously described, is mounted on the shaft 50 and is in positive connection through bolt 60 and the type disc rotating pinion 61, with both the cog wheel 48 and the character disc 63.

Since the gear 59 is secured to the cog wheel 48 the operation of the segment gear 99 on the segment gear 100 turns the cog wheel 48 in the opposite direction from its previous movement during the character selection operation, which movement was through the angle ϕ . It will be seen that when the cog wheel 48 was first turned through the angle ϕ that the segment gear 100 was at that time turned a proportionate amount from its initial position. The gear ratio is such that during the first one-third of the cycle the segment gear 100 is never turned through a greater angle than the 120 degree segment gear 99 is able to return it during the last one-third of the cycle.

In order to vary the spacing of the copy in accordance with the various widths of the characters used on the printing disc 63, a spacing disc 96 is rotatably mounted on a shaft 97 which is longitudinally slidably mounted in the frame 30. The spacing disc 96 has a notch or slot cut in its periphery for each character of one font of type, such as is shown at 98 in Figure 10, the relative positions of the notches on the spacing disc 96 being the same as that of the characters on the printing disc 63 and their depths being proportional to the widths of the various characters. A chain gear 102 is secured to the repositioning shaft 101 and by means of a chain 103 is connected with a chain gear 104 which is secured to the spacing disc 96.

During the first third of the cycle the chain gear 102 and hence the spacing disc 96 are freely driven by the shaft 101 which is turned by the cog wheel 48 through the gear 59 and the pinion 106. The gear ratio from the type disc 63 to the spacing disc 96 is one-to-one and hence the proper notch 98, having a depth proportional to the width of the character placed in the printing position, is in the same position with respect to the frame 30 of the machine regardless of which of the keys 37 is depressed. At the opening of the notch which is in this position there is a pin 107 the function of which will be apparent from the following description.

A lever 108, pivotally mounted at 109, has one end bearing against a cam 110 which is secured to the shaft 84 and the other end 111 bifurcated and engaging the longitudinally slidable shaft 97. When the lever 108 is moved in opposition to a compression spring 112, the spacing disc 96 is shifted from the position shown by solid lines in Figures 7 and 8 to that shown by broken lines, causing the notch 98 to come into the path of the pin 107.

Immediately following the positioning of the spacing disc 96, a cam 113, mounted beneath the gear 65 on the shaft 66 operates to permit a tooth 114 formed on a spacing release lever 115 to engage a tooth on the periphery of a spacing ratchet wheel 116 thereby locking the ratchet wheel 116 against rotation. A small tension spring 117, connected between the lever 115 and the frame of the machine, keeps a roller 118 on

the end of the lever spacing-release 115 in contact with the cam 113. The lever 115 is pivoted, as at 119, to the frame 30 of the machine. When the cam 113 permits the lever 115 to move, as just described, a dog 120 is disengaged from the ratchet wheel 116. The dog 120 is on one arm of a lever 121 the other arm of which carries the pin 107. The lever 121 is pivoted to a lever 122 which is pivotally mounted on the shaft 123 to which the ratchet wheel 116 is secured. A small tension spring 124 connected between the frame 30 of the machine and one arm of the lever 122, causes the levers 122 and 121, upon the release of the dog 120, to move in the direction for the pin 107 to travel into the notch 98. Each notch 98 is so curved that, when the spacing disc is so oriented that the notch being used is in the proper location, the center of its curvature is at the axis 123. When the pin 107 reaches the end of the notch 98 the lever 121 is thereby moved to reengage the dog 120 in the ratchet wheel 116, the dog 120 having skipped a number of teeth corresponding to the width of the character being printed. At this time the spacing disc 96 is released by the action of the cam 110 on the lever 108 which permits the compression spring 112 to move the spacing disc 96 back to the position shown by solid lines in Figure 8 again out of the plane of the pin 107. The spacing release lever 115 is then returned by means of the cam 113 to the position shown in Figure 6, the tooth 114 releasing the ratchet wheel 116 which revolves in a clockwise direction due to tension on a copy carriage 125. This turning of the ratchet wheel 116 is terminated when the lever 122 secured thereto carrying the dog 120 hits a stop 126 on the frame 30. Thus the carriage is permitted to travel a distance corresponding to the width of the character just printed.

Before the completion of the printing third of the cycle the printing head 76 is withdrawn from contact with the back of the copy 89 slightly before the end of the revolution of the cam 67. This is to permit the cam 113 to release the ratchet wheel 116 only after the printing has been completed, but before the gear 65 ceases its operation with the end of the second third of the cycle.

The copy carriage comprises a pair of vertical brackets 125 mounted on a plate 138 which is laterally slidably mounted on rollers held in a way 139 formed in the frame 30. The underside of the plate 138 carries a plurality of racks 140 across its length. For each of the racks 140 there is a pinion 141 rotatably mounted on the ratchet wheel shaft 123, each of the pinions 141 having a keyway 141'. Two pairs of copy holding and indexing rollers 143 are rotatably mounted between the brackets 125, and are so located that the printing heads 76, 77 and 78 will operate between them. Knurled handles 144, mounted on the extremities of two of the indexing roller shafts, provide means for moving the copy paper 89 up or down between the printing heads 76, 77 and 78 and the disc 63. Guides 145 are provided to care for the ends of the copy 89 which protrude from the rollers 143. The plate 138 is connected to the ratchet wheel 116, through the racks 140, the pinions 141, and a key 142 secured on a longitudinally slidable rod 146 which is mounted in the shaft 123.

The keyways 141' in the pinions 141, shown in Figure 12, are so placed that they are in alignment when the copy carriage is at the extreme

right position for the beginning of a line of printing. At this position the key 142 may be shifted to engagement with any one of the pinions 141 by means of a lever 147 which is pivoted to the frame 30 and has a bifurcated end which engages a grooved collar 148 which is mounted on the shaft 123 and is secured to the slidable key rod 146. This permits the key 142 to rotate with the shaft 123 and yet be shifted at any point where the keyways 141' are in line. The outer end of the lever 147 is provided with a handle and the frame 30 is notched as at 147' so that the key 142 will engage only one of the pinions 141 at a time.

A slip ratchet 161 of a well-known type is mounted in the shaft 123 so that the copy carriage may be pushed to the right at any time and yet may be driven to the left by the shaft 123 with each cycle of the machine.

A carriage spring of the conventional type used on typewriters which urges the copy carriage to the left and the ratchet wheel 116, as shown in Figure 6, to rotate clockwise is shown at 149 in Figure 3. Since the motion of the copy carriage per cycle must be dependent upon the size of the font of type in use, for correct spacing, and since the relative motions of the plate 138 and the ratchet wheel 116 must be so proportioned, the gear ratios between the pinions 141 and the racks 140 are such as to accommodate the proportional spacing between the several fonts. The change in this ratio is accomplished by shifting the longitudinal position of the key 142, to cause the proper one of the pinions 141 to drive the ratchet wheel 116 through the common shaft 123.

Although for purposes of disclosure the three phases of the cycle of operation of the present machine have been described as having a duration of one-third of the cycle, and the segment gears 51, 64 and 99 have been described as being approximately 120° in angular extent to accomplish such a division of the cycle, it is obvious that the angular extent of these gears may be varied, if desired, to effect a different distribution of the three phases, provided, however, that the third or restoring phase does not overlap and interfere with the first or selecting phase.

Other changes and modifications may be made in the illustrated and described embodiment without departing from the scope of the invention as defined in the following claims:

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a printing machine of the class described, a plurality of type, a paper supporting carriage adapted to present the paper to a printing position wherein it is impressed by the type, a rotary drive element; type character selecting means, printing means, and restoring means for the selecting means, all driven by said driving element through a cycle of operation for each character to be printed; and variable spacing means for controlling the carriage movement appropriate to the width of the type character selected; said variable spacing means comprising a rotary member provided with a plurality of slots about its periphery, each slot being of a depth proportional to the width of a given type character, means operatively connecting said driving element and said rotary member for moving the latter synchronously and proportionately to the movement of said selecting means, a ratchet wheel operatively connected to the carriage to move synchronously therewith, means for urging said

ratchet wheel continually in one direction, a holding pawl for said ratchet wheel, a selecting pawl element movable circumferentially of said ratchet wheel and also swingable substantially radially thereof to engage a tooth of said wheel in idle position and to disengage said wheel during spacing operation, means operated by said driving element at one point in the cycle of operation to move said holding pawl into engagement with the wheel and to simultaneously release said selecting pawl element from engagement with said wheel, a pin on said selecting pawl element adapted to enter a slot in said rotary member and trip the selecting pawl to engage the ratchet wheel when the pin strikes the bottom of a slot, means for then tripping the holding pawl, and fixed stop means for limiting said last named movement of the selecting pawl and thus said ratchet wheel, whereby said ratchet wheel moves the selected distance to move the carriage to effect the proper spacing.

2. The device as set forth in claim 1 which further includes means operated by said driving means for displacing the slotted rotary member from the plane of said pin whereby the pin and selecting pawl element may freely move along with the ratchet wheel to its final position.

3. A typewriter comprising the combination with a carriage, means tending to advance the carriage, keys, and type of various widths, of mechanism for releasing the carriage after printing of a letter and thereafter stopping the same after it has travelled a distance corresponding to the width of the letter printed, said mechanism including a carriage operated escapement ratchet wheel, a pawl normally engaging the ratchet wheel, means for releasing said pawl, means for moving the pawl, when released, about the periphery of the ratchet, a variable stop means separate from said pawl releasing means for both limiting the movement of the pawl when released and causing the pawl to re-engage the ratchet, said variable stop means comprising a rotary disc member provided with a plurality of slots about its periphery, each slot being of a depth proportionate to the width of a given type character, said pawl provided with a projection adapted to enter a selected one of said slots and move to the bottom thereof, and key actuated means for automatically rotating said disc an amount necessary to bring the opening of a slot of a depth corresponding to the width of a character represented by said key, in front of the pawl projection.

4. In a printing machine of the class described, a plurality of type, a paper supporting carriage adapted to present the paper to a printing position wherein it is impressed by the type, a driving element; type character selecting means and printing means, both driven by said driving element through a cycle of operation for each character to be printed; and variable spacing means for controlling the carriage movement appropriate to the width of the type character selected; said variable spacing means including a rotary member provided with a plurality of slots about its periphery, each slot being of a depth proportional to the width of a given type character, means operatively connecting said driving element and said rotary member for moving the latter synchronously and proportionately to the movement of said selecting means, a ratchet wheel operatively connected to the carriage to move synchronously therewith, means for urging said ratchet wheel continually in one direction, a holding pawl for said ratchet wheel, a select-

ing pawl element movable circumferentially of said ratchet wheel and also swingable substantially radially thereof to engage a tooth of said wheel in idle position and to disengage said wheel during spacing operation, means operated by said driving element at one point in the cycle of operation to move said holding pawl into engagement with the wheel and to simultaneously release said selecting pawl element from engagement with said wheel, a projection on said selecting pawl element adapted to enter a slot in said rotary member and trip the selecting pawl to re-engage the ratchet wheel at a predetermined interval beyond its previous point of engagement when the projection strikes the bottom of a slot, said last-named means adapted to then trip the holding pawl, and means limiting the return of the selecting pawl to a final initial point.

5. In a variable spacing device for a movable-carriage, key-actuated printing machine of the class described, in combination, a rotary circular member operatively connected with the carriage of the machine for angular movement proportional to the movement of said carriage, a gripping device movable angularly concentrically with said member and adapted to engage the latter at selectable points about its periphery to gauge the amount of angular movement thereof which corresponds to a character selected by a key for printing, a stop device for limiting the movement of said gripper device, said stop device comprising a rotary disc, said disc being provided with a plurality of slots in its periphery adapted to selectively receive a portion of said gripping device and limit its movement about the said member, said slots being of various depths proportional to the widths of the characters to be printed, and means for rotating said disc an amount sufficient to present the opening of a slot to the gripping member corresponding to the character represented by the actuated key.

6. In a variable spacing device for a movable-carriage, key-actuated, printing machine of the class described, in combination, a rotary circular member operatively connected with the carriage of the machine for angular movement proportional to the movement of said carriage, a gripping device movable angularly concentrically with said member and adapted to engage the latter at selectable points about its periphery to gauge the amount of angular movement thereof which corresponds to a character selected by a key for printing, a stop device for limiting the movement of said gripper device, said stop device comprising a disc rotatable about a center spaced from the center of rotation of said member and said gripping device, said disc being provided with a plurality of slots in its periphery adapted to selectively receive a portion of said gripping device and limit its movement about the said member, said slots being of various depths proportional to the widths of the characters to be printed, and means for rotating said disc an amount sufficient to present the opening of a slot to the gripping member corresponding to the character represented by the actuated key, each of said slots being of an arcuate configuration centered about the center of rotation of said gripping device when presented in operative position with respect to the latter.

7. In a variable spacing device for a movable-carriage, key-actuated, printing machine of the class described, in combination, a rotary circular member operatively connected with the carriage

of the machine for angular movement proportional to the movement of said carriage, a gripping device movable angularly concentrically with said member and adapted to engage the latter at selectable points about its periphery to gauge the amount of angular movement thereof which corresponds to a character selected by a key for printing, a stop device for limiting the movement of said gripper device, said stop device comprising a rotary disc, said disc being provided with a plurality of slots in its periphery adapted to selectively receive a portion of said gripping device and limit its movement about the said member, said slots being of various depths proportional to the widths of the characters to be printed, and means for rotating said disc an amount sufficient to present the opening of a slot to the gripping member corresponding to the character represented by the actuated key, and means for moving said disc axially to free the gripping device from the engaged slot after the gauged movement thereof.

8. In a variable spacing device for a movable-carriage, key-actuated, printing machine of the class described, which printing machine includes a rotary, key selected, type carrying element, in combination, a rotary circular member operatively connected with the carriage of the machine for angular movement proportional to the movement of said carriage, a gripping device movable angularly concentrically with said member and adapted to engage the latter at selectable points about its periphery to gauge the amount of angular movement thereof which corresponds to a character selected by a key for printing, a stop device for limiting the movement of said gripping device, said stop device comprising a disc, said disc being provided with a plurality of slots in its periphery adapted to selectively receive a portion of said gripping device and limit its movement about the said member, said slots being of various depths proportional to the widths of the characters to be printed, a train of transmission gearing operatively disposed between said disc and said rotary type carrying element for moving said disc to present the opening of a slot to the gripping member corresponding to the character represented by the actuated key.

9. In a printing machine of the class described, a movable paper-supporting carriage, a plurality of keys, a character selecting mechanism for moving the type character into printing position, a printing mechanism for obtaining an impression from said type character at said position, and mechanism for restoring the character selecting mechanism to initial position for subsequent operation, and power means for actuating said character actuating mechanism, said printing mechanism, and said restoring mechanism in the named sequence during one cycle of operation initiated by the depression of a key, means for urging said carriage in one of its directions of movement, a variable escapement device for limiting each movement of the carriage after an impression to a distance appropriate to the width of the character printed, said escapement device comprising a ratchet wheel operatively connected with said carriage for proportionate movement therewith, a holding pawl for said ratchet wheel, a selecting pawl element movable circumferentially of said ratchet wheel and also swingable substantially radially thereof to engage a tooth of said wheel in idle position and to disengage said wheel during spacing operation, means operated by said printing mechanism at

the beginning of its phase of operation to move said holding pawl into engagement with the wheel and to simultaneously release said selecting pawl element from engagement with said wheel, a rotary member provided with a plurality of slots about its periphery, each slot being of a depth proportional to the width of a given type character, means operatively connecting said character selecting mechanism and said rotary member for moving the latter synchronously and proportionately to the movement of said selecting means during the selecting phase of the cycle, a projection on said selecting pawl element adapted to enter a slot in said rotary member and trip the selecting pawl to engage the ratchet wheel when the projection strikes the bottom of a slot, means actuated by said printing means at the beginning of its phase of operation for presenting

5 said rotary member to the path of operation of the projection, means operated by said printing mechanism toward the end of its phase of operation, and after said printing impression has been effected, for tripping the holding pawl, and fixed stop means for limiting said last named movement of the selecting pawl and thus of said ratchet wheel whereby said ratchet wheel moves the selected distance to move the carriage to effect the proper spacing, means actuated by said printing mechanism for moving said rotary member from the path of said projection, and means connecting said rotary member to said restoring means for return of said member to its initial position.

EFFIE ROBERTS REID,

Executor of the Estate of Roswell S. Reid, Deceased.