Aug. 20, 1940. R. S. REID 2,211,911

TYPEWRITER

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FIG. 1

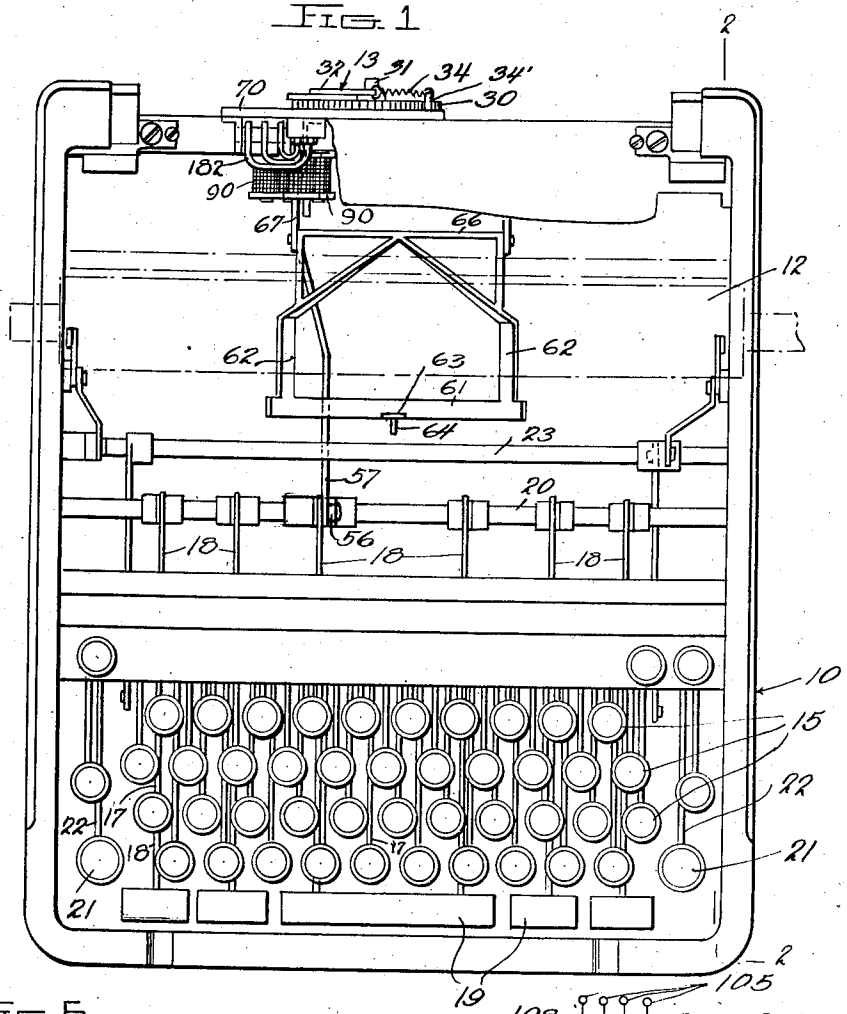
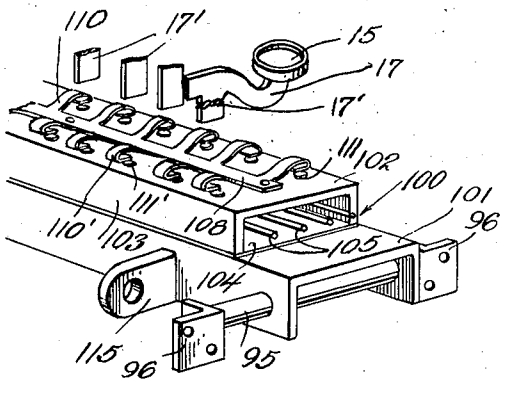


FIG. 6



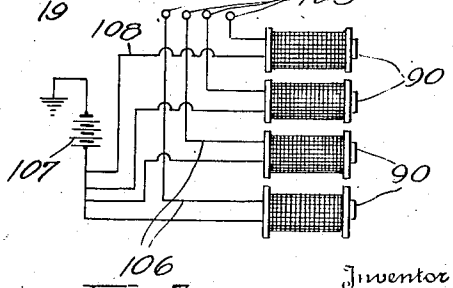


FIG. 7

Inventor

R. S. Reid,

By Watson, Coit, Grosvenor & Grindle,

Attorneys

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TYPEWRITER

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FIG. 2

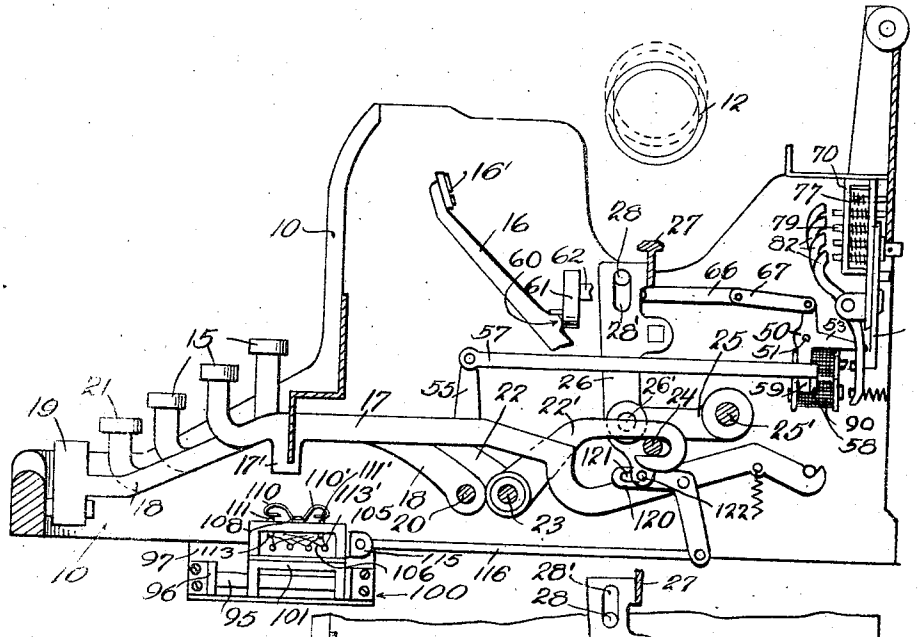


FIG. 3

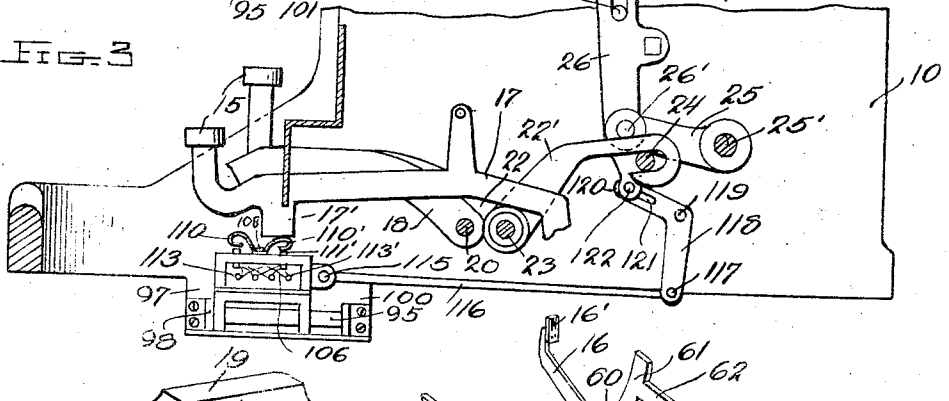


FIG. 8

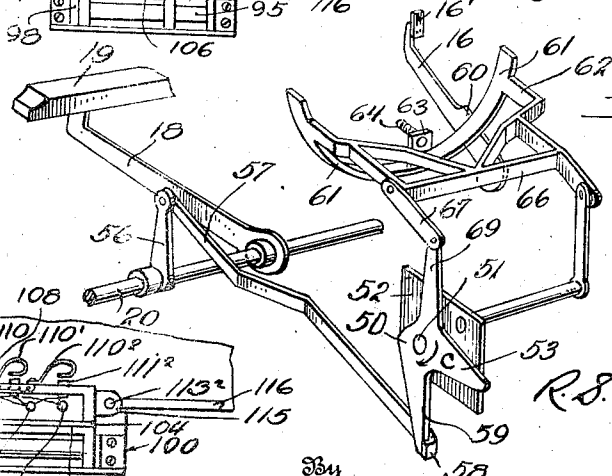
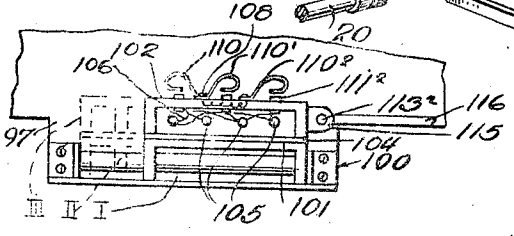


FIG. 4



Inventor
R. S. Reid,
By Watson, Coit, Moore & Grindle
Attorney

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FIG. 5

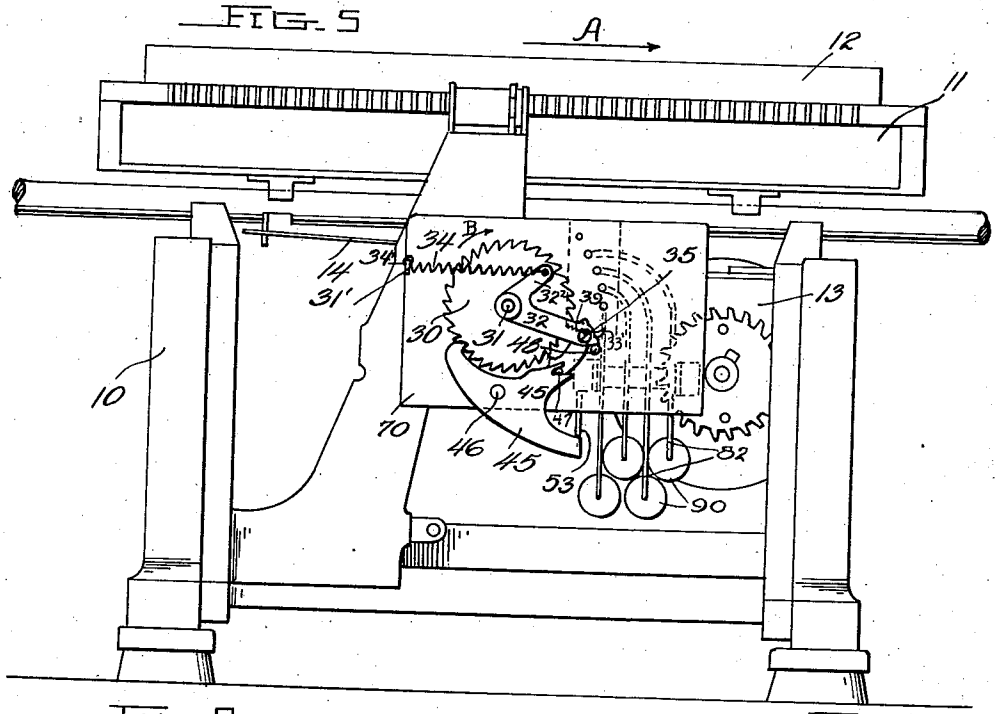


FIG. 9

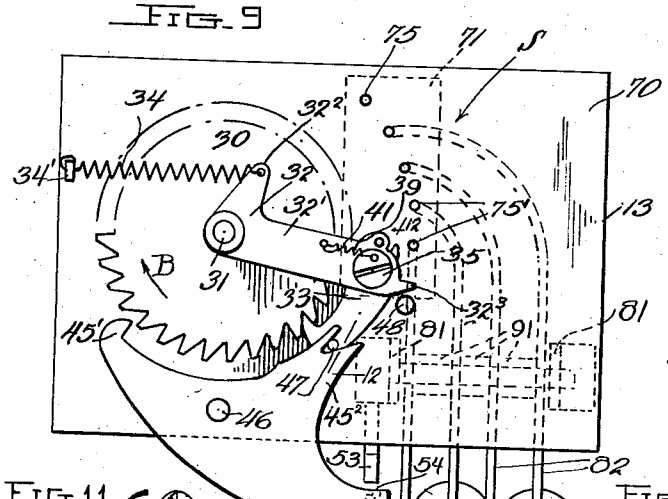


FIG. 10

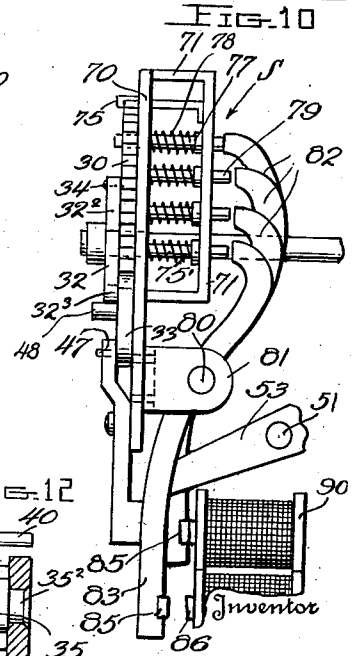


FIG. 11

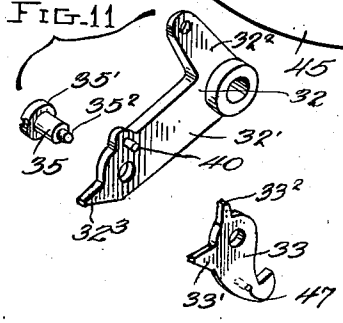
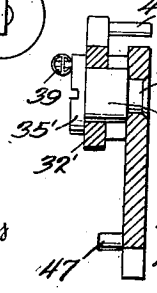


FIG. 12



By

R. S. Reid,
Watson, Coit,
Morse & Grindle
Attorney

Patented Aug. 20, 1940 2,211,911

UNITED STATES PATENT OFFICE

2,211,911

TYPEWRITER

Roswell S. Reid, Morgantown, W. Va., assignor to West Virginia Newspaper Publishing Company, Morgantown, W. Va., a corporation of West Virginia

Application October 11, 1937, Serial No. 168,494

6 Claims. (Cl. 197—84)

This invention relates to typewriters and more particularly to typewriters of the variable spacing type; this general class of machine being exemplified by the invention disclosed in my copending application Serial No. 157,964, filed August 7, 1937.

The general purpose of the present invention is to provide a novel and improved typewriter of the character described; and more particular objects include the provision of novel variable escapement mechanisms and also of novel electrically operated means for actuating the escapement to cause the appropriate movement of the carriage to take place upon the depression of a character key or a spacing bar.

Another object is to provide, in connection with such a typewriter, novel means for varying the operation of the electrically operated escapement controlling device in accordance with the actuation of the carriage shifting mechanism to effect different spacings suitable to the widths of the capital letters, or punctuation marks brought into use ordinarily by the depression of a shift key. The invention is equally adaptable to single and double shifting arrangements as will be more particularly shown hereinafter.

Although not specifically limited thereto, except as set forth in the appended claims, the present invention in its preferred embodiments is well adapted for application to a typewriter of the kind described in the copending application to which reference has been made.

As distinguished from machines of the ordinary type now in widespread use, wherein each printed letter occupies the same amount of space measured longitudinally of the printed line regardless of the widths of the letters, these typewriters embody means for causing the carriages thereof to move forwardly after each actuation of a type bar, a distance proportional to the width of the character just printed; so that the final appearance of the completed typewritten line is similar to that of a printed line, at least so far as the spacing of the letters therein is concerned. These improved typwriting machines are particularly useful in the preparation of typewritten sheets for subsequent employment in processes of printing which involves the transfer by a photographic step of the typewritten matter from the paper sheet to an element to be used in the actual printing operation, such as for example in any one of various offset or planographic printing methods. These variable spacing machines in which the present invention is preferably embodied comprise in addition to the usual type bars and longitudinally movable paper holding carriage, mechanism which is responsive to the actuation of the type bars for effecting advancement of the carriage variable distances, the distance advanced by the carriage after the actuation of any type bar being proportional to the width of the letter imprinted on the paper sheet. It will be understood, of course, that the type elements are not affixed to the type carrying bars in the conventional manner now employed in typewriter manuafcture, i. e., so that the various type elements are centered upon the type carrying bars; but on the other hand, are so arranged that the left hand edge of each letter would strike the paper at the same identical point if the carriage were not moved between impressions.

While the individual units which go to make up a font of printer's type may be made in a large number of different widths, they may be conveniently classified according to width into five groups, ranging from a relatively small group, containing a few of the widest capital letters, to a group of the narrowest small letters. All of the letters of the font may be allocated to one or the other of these five groups. The present invention therefore involves a variable spacing mechanism by which the travel of the carriage is automatically regulated so that it will advance, after actuation of the type bar, a distance corresponding to the width of type in the group in which the letter just printed is classified, the advance of the carriage after the printing of one of the largest capital letters being, in this embodiment, five times as great as the advance after the printing of one of the smallest letters, the desired spacing of the letters in the printed line being thereby attained. Proper justification of the printed line is provided for by the sub-division of the usual spacing bar into five units and the connection of these separate units with the variable spacing mechanism in order to bring about variable spacing between the words or letters; this provision further increasing the ability of the operator to provide typewritten matter which is indistinguishable from printed matter.

The preferred embodiment of the invention contemplates the provision of certain modifications in the usual escapement mechanism, such as will permit the conventional ratchet wheel or equivalent member to rotate through predetermined angles under the influence of the main spring or tensioning device for effecting the travel of the carriage. These modifications include the provision of a pawl or detent device of novel construction, and also means for initiating and gov-

erning its action upon the depression of the keys. Separate electromagnetically controlled means are preferably provided to determine the respective limits of movement of the escapement wheel, and these means are individually and selectively capable of being placed in communication with a source of current by means of switches which are positioned so as to be closed by the actuation of the keys. A separate switch is preferably provided in conjunction with each key bar and with each of the several space bars, and is connected with the particular electromagnetic limiting means which corresponds to the spacing required for the character printed or the blank space desired.

The switches are arranged in a plurality of banks or tiers beneath the key bars and suitably mounted upon a movable member which can be adjusted by means of the carriage shifting mechanism to bring the appropriate bank of switches beneath the keys for determining the proper spacing for either capital or small letters or the customary figures and symbols involved in the usual typewriter keyboard. This feature is equally applicable to single shift or double shift machines.

In the accompanying drawings a preferred embodiment of the invention is illustrated, but it will be appreciated by one skilled in the art that without departure from the invention the design and arrangement of its various elements may be very considerably modified, particularly in adapting the invention to typewriters of various makes and designs. It will be understood also that in the accompanying drawings, many conventional portions of a typewriter have been omitted in order that the novel features of invention may be more clearly illustrated.

In the drawings:

Figure 1 is a plan view of a portion of a typewriter showing the frame and keyboard and illustrating certain elements of the variable spacing mechanism;

Figure 2 is a vertical longitudinal sectional view taken on line 2—2 of Figure 1;

Figure 3 is a view similar to Figure 2 but more fragmentary and showing a shifted position of the switch bank and carriage shifting mechanism;

Figure 4 is a similar view illustrating the adaptation of the invention to a machine having a double shift keyboard;

Figure 5 is a rear elevation of the typewriter illustrated in Figure 1 showing the major elements of the carriage controlling mechanism;

Figure 6 is a fragmentary perspective view of portions of the switch supporting mechanism and adjacent parts of the key bars;

Figure 7 is a wiring diagram showing the circuits connecting the switch banks with the escapement controlling electromagnets;

Figure 8 is a fragmentary perspective view of the operative connections between the escapement and both the key bars and spacing bars;

Figure 9 is a fragmentary view in rear elevation and on an enlarged scale, of one form of escapement mechanism, showing the operating mechanisms in different positions from those which they occupy in Figure 5;

Figure 10 is a view in side elevation of the escapement mechanism shown in Figure 9;

Figure 11 shows in disassembled relationship the several elements of the pawl which comprises part of the escapement mechanism shown in Figure 9; and

Figure 12 is a sectional view taken substantially on line 12—12 of Figure 9.

In the drawings, the frame of the typewriter is indicated generally by the reference character 10, and this frame may be of any suitable or conventional type. The carriage of the machine is indicated rather diagrammatically at 11 in Figure 5 of the drawings, the platen being designated by the numeral 12 in this figure and also in Figures 1 and 2. It will, of course, be understood that the carriage is mounted for movement in a direction parallel to the longitudinal axis of the platen 12 and that, after the actuation of a type bar, the carriage will be advanced in the direction of the arrow A in Figure 5 by any ordinary or usual tensioning device such as diagrammatically indicated at 13, this device being connected to the carriage by means of a strap or tape 14.

The keys are indicated at 15 and they are operatively connected to the type bars, one of which is indicated at 16 in Figure 2, by means of the key bars 17 and other conventional mechanism not shown. The type bars 16 carry at their outer ends the type 16′ which, as already mentioned, are preferably of a design suitable for the simulation of the typography ordinarily effected by printing devices of different kinds. It is essential, however, that each key bar be provided with a downwardly extending portion 17′ which is adapted to actuate the electromagnetic controlling means for the variable escapement, the details of which will be later described. Space bars are indicated at 18, each of these space bars having a spacer key 19 mounted upon its outer end and having its inner end secured to the transverse shaft 20. The central spacer key 19 is longer than the other four and is mounted upon the two central space bars 18 which move simultaneously when the central key 19 is depressed.

One of the two shift keys is indicated at 21 and a shift key bar at 22, this key bar being mounted upon the transverse shaft 23 and having an extension 22′ which is horizontally slotted to receive a pin 24 fixed upon a rocker member 25 rotatably supported on the shaft 25′. To the rocker member 25 is pivotally connected, as at 26′, the lower end of a vertically movable slide 26, upon the upper end of which is mounted the carriage supporting rail 27; the slide 26 being guided in its vertical movements by means of a fixed pin 28 which passes through the slot 28′ in the slide member. It will be understood that, upon depression of the shift key 21, the rail 27 will be elevated by means of the intermediate mechanism just described, to raise the carriage and the platen supported thereon from the position in which it is shown in full lines in Figure 2 to its dotted line position. It is by means of this shift mechanism that the platen is adjusted for the printing of capitals, small letters, and figures in the customary manner. The shift mechanism thus described is of conventional type.

At the rear of the machine is an escapement mechanism of the pawl and ratchet type, one embodiment, illustrated best in Figures 5, 9 and 10 of the drawings, being substantially the same as that disclosed in the above mentioned copending case.

This escapement mechanism comprises the escapement ratchet wheel 30, fixed on the shaft 31, which shaft is operatively connected by the usual arrangement of gearing to the typewriter carriage 11 so that the ratchet 12 is constantly urged to rotate in the direction of the arrow B by the carriage advancing means. Associated with the escapement ratchet 30 is mechanism for releasing the ratchet to permit it to rotate

and hence provide for the advancement of the carriage in the direction of the arrow A (Figure 5), and for stopping such rotation after a predetermined angular travel, and thus halting the movement of the carriage. This mechanism will now be described.

Mounted for free rotation on the end of the shaft 31 is a member 32 having two angularly disposed arms 32' and 32^2, the first of which carries at its outer end a pawl 33 arranged in the plane of the ratchet wheel, and the second arm 32^2 having attached to its outer end one end of the spring 34, the opposite end of which is attached to a stationary portion of the machine such as the plate 70 by any suitable means as at 34', the spring being normally in tension and tending to rotate the member 32 in a counterclockwise direction about the axis of shaft 31, or opposite to the direction in which the ratchet wheel 30 rotates when released. Rotatably mounted in a cylindrical aperture formed in the end of arm 32' is a stud 35 having an enlarged head 35' and a reduced axial portion 35^2 upon which the pawl 33 is non-rotatably fixed. The pawl itself is normally maintained in the position (with respect to the pawl carrying arm 32') in which it is shown in Figure 9. A projection 33^2 is provided upon the arm 32' which is adapted, when the pawl is released from the ratchet wheel, to abut the pin 40 secured to the pawl carrying arm 32'. One end of the spring 39 is attached to arm 32' by means of pin 41 and the other end connected to the head 35' of stud 35 at a point spaced from the axis thereof, which stud, as has previously been explained, is rotatably mounted in arm 32'. The pawl 33 is provided with a projection 33' which is adapted to strike a selected one of the stop devices which will be later described.

An escapement lever or pawl is indicated at 45, this lever being mounted for rocking movement upon a pin 46 rigid with the frame. One end of lever 45 carries a tooth 45' adapted to engage one or other of the teeth of the ratchet wheel 30 and to lock the ratchet wheel against rotation. The escapement lever likewise carries an arm 45^2 the outer end of which is notched to receive a pin 47 carried by the pawl 33, member 45^2 comprising means for disengaging pawl 33 from ratchet 30 when lever 45 is rocked in a clockwise direction. Clockwise movement of pawl carrying arm 32' is limited by the contact of projection 32^3 thereon with the stop pin 48.

The escapement lever 45 is actuated in a clockwise direction of rotation about pivot 46 by mechanism which includes the multi-armed bell crank lever 50 which is pivoted as at 51 to a fixed plate 52 suitably carried by the frame of the typewriter. The arm 53 of the bell crank 50 projects above the adjustable contact pin 54 on the end of the pawl lever 45 and is adapted to abut therewith and move it downwardly upon the actuation of a key or a space bar. One form of mechanism which serves to operatively connect the key bars and space bars with this escapement actuating bell crank 53 is illustrated fragmentarily in Figure 8 of the drawings. The precise details of this particular arrangement form no particular part of the present invention and any equivalent operative connection obviously might be employed.

In this construction, however, there is secured to the transverse rocking shaft 20 which carries the space bars 18, the crank arm 56 to the outer end of which is pivotally secured one end of the link 57. The movements of this link may be guided by any suitable mechanism not shown, and the rear end thereof is formed with a hooked portion 58 which engages the outer end of the arm 59 of the bell crank 50, to form a lost motion connection therewith. It will thus be seen that when any one of the spacer keys 19 is depressed, the crank 50 will be rotated in the direction of the arrow C in Figure 8 and thus actuate the escapement mechanism; the distance the carriage is allowed to move upon such actuation being governed by the variable spacing mechanism which will presently be described.

Upon the actuation of a character key 15, the type bar 16 will be moved toward the platen 12 and during such movement the cam 60 formed on the type bar 16 will engage a portion of the arcuate member 61 of the sliding frame 62 adapted to move longitudinally of the typewriter frame. This sliding frame 62 may be guided in its sliding movement by any suitable means which may involve the upwardly projecting bracket 63 and pin 64. The sliding member 62 is provided with a rearwardly projecting portion 66 which is connected by means of link 67 with the arm 69 of the bell crank 50. Thus, when any of the character keys is depressed, the corresponding type bar 16 will move the frame 62 rearwardly and rotate the bell crank 50 in the direction of the arrow C and initiate the operation of the escapement mechanism, the amount of movement being regulated by the variable spacing mechanism. When the lever arm 53 causes the lever 45 to rotate about its pivot 46, the detent 45' of this lever will immediately engage one of the teeth of the escapement ratchet wheel 30, to lock the same against rotation, the arm 45^2 being at the same time swung away from the escapement ratchet and carrying the pawl pin 47 with it to effect disengagement of the pawl from the ratchet.

A graduated stop mechanism is indicated generally by the reference character S and is best illustrated in Figures 9 and 10 of the drawings. This mechanism is preferably applied to the same plate 70 as is employed to support the ratchet escapement device. A casing or bracket 71 may be applied to the rear face of this plate 70, as viewed in Figure 9, and a plurality of stop pins 75, 75' are supported by the plate and casing in parallelism and equidistantly spaced apart on the arc of a circle, the center of which is coincident with the axis of the shaft 31. The uppermost one of the stop pins 75 may be rigidly supported by the plate and casing so as to project from the face of the plate 70 in the path of movement of the projection 33' on pawl 33. The remaining pins 75' are slidably mounted in openings through the plate 70 and the rear supporting casing or frame 71, are provided with shoulders or frames 77 and are urged rearwardly by the expansive influence of the coil springs 78 which surround the pins and are seated between the sleeves or shoulders 77 and the rear wall of the plate 70.

The rear ends 79 of the pins are adapted to normally project beyond the rear wall of the frame 71 and the front ends of the movable pins are adapted to be disposed substantially flush with the outer surface of the plate 70. With all of the lower movable pins 75' in this normal retracted position the rotation of the arm 32' in its counterclockwise direction after the pawl is released from the ratchet wheel, will continue under the influence of the spring 34 until the projecting ear 33' of pawl 33 engages the uppermost stationary pin 75, the spring 39 maintaining

the tooth at the lower end of the pawl 33 out of contact with the teeth of ratchet 30 during such movement. As soon, however, as the stop engaging ear 33' strikes the stop pin 75, which lies in its path, it will cause the pawl 33 to rock in a clockwise direction around the axis of the stud 35 and against the tension of spring 39 until its toothed end enters the space between two of the ratchet teeth. This will effect the maximum movement of travel of the carriage permitted by the escapement. For the attainment of smaller increments of travel appropriate to the width of narrower letters or space, selected ones of the lower movable stop pins 75' are projected from the face of the plate 70 into the path of the ear 33' of pawl 33, and the actuation of the pawl will take place sooner according to the position of the selected pin along the arc.

The function of the spring 39, therefore, is to hold the pawl 33 out of engagement with the ratchet wheel 30 until the extension 33' on the pawl 33 strikes the stop pin. The extension 33^2 on pawl 33 moves against pin 40 on the arm 33 under the action of the spring 39, thus limiting the extent of movement of the pawl 33 so that the engaging end will just clear the teeth of the ratchet wheel during the upward swing of the arm 32. The pin 48 acts as a stop pin for limiting the return or downward swinging movement of the projection 32^3, on pawl carrying arm 32' of member 32.

It is clear that by the projection of selected ones of the pins the angular travel of the pawl-carrying arm upon its release from the ratchet wheel, may be regulated. Inasmuch as the ratchet wheel and pawl move together upon the return stroke of the pawl, until the arm 32' carrying the pawl strikes the stop pin 48, it is clear that the length of the arc of upward travel of the pawl determines the extent of angular rotation of the ratchet wheel when the pawl returns to the initial position, thus determining the extent of advancing movement of the carriage. Hence by proper selection of one of the five pins 75, 75' to be effective in stopping the pawl, the carriage may be allowed to advance after a printing operation, either one, two, three, four or five spaces.

For selectively projecting the movable pins 75', the following mechanism is provided. There is fulcrumed upon the shaft 80 carried by the brackets 81 secured to the rear face of the plate 70, a plurality of levers 82, the upper ends of which are disposed adjacent the rearwardly projecting ends 79 of the four movable stop pins 75'. The lower ends 83 of these levers 82 are provided with armature portions 85 which are adapted to be attracted by the cores 86 of the electromagnets 90 when said magnets are energized. In order to permit a relatively close spacing of the levers 82, as by means of the sleeves 91, the electromagnets 90 are staggered, and the lower ends of the levers 82 are of alternating lengths as clearly shown in Figures 5 and 9 of the drawings.

The electrical connections between these stop actuating magnets 90 and the keys of the typewriter will now be described, together with the details of the novel switch arrangement adapted to be actuated by the keys. Horizontal shafts 95 are secured, as by means of the brackets 96, to a portion 97 of the frame 10 of the typewriter. Slidably mounted upon the shafts 95 is the shiftable switch assembly designated generally by the reference numeral 100. This assembly will be seen to comprise an elongated transversely disposed, inverted, U-shaped member or block 101 which is provided with openings adapted to receive the shafts 95 adjacent each end thereof. The block 101 is therefore slidably carried by the shafts 95 so that the switch assembly 100 may be shifted for the purpose to be later described. A casing 102 which is adapted to house certain of the main conductors included in the electrical circuit is carried by the member 101 and may comprise an inverted U-shaped member 103 formed of fiber or other suitable insulated material and an interposed sheet of insulating material 104 forming the bottom of the casing 102. Within the casing 102 there are suitably disposed the four conductors 105 which are respectively placed in communication with the magnets 90 as by means of the wires 106 shown in the diagram comprising Figure 7 of the drawings. The other terminals of the magnets 90 are each connected with a source of current such as indicated at 107 by means of the wires 108, the opposite battery terminal being connected with a return conduit or suitable ground such as the frame of the typewriter.

Suitably secured to the top of the casing 102 of the switch assembly 100, is the contact strip 108 which is made of spring metal and either grounded to a portion of the frame of the typewriter, or connected by a return conductor to the remote terminal of the source of current 107. The contact strip 108 is provided with a plurality of curved flexible members 110 and 110' projecting from opposite sides thereof and each disposed approximately beneath and in the same vertical plane with a key bar projection 17'. The contacts 110 are also disposed above and suitably spaced from the fixed contact points 111 which extend through the casing 102 and are connected to suitable ones of the main conductors 105 depending upon which of the stop pins 75 is to be projected to effect the travel of the carriage corresponding to the width of the letter printed by the selected key. Of course, the few capital letters which require the maximum width of spacing need not be provided with the fixed contacts since none of the movable stop pins are utilized in this case, dependence being placed on the final fixed pin to stop the pawl.

As indicated in Figure 2 of the drawings, one series of resilient contacts 110 is disposed beneath the row of actuating projections 17' carried by the keys and the corresponding fixed contacts 111 for each of these contacts 110 are connected to the appropriate conductor 105 by means of the wires 113; all of these individual connections being based upon the "lower-case" or unshifted keyboard arrangement. In order to provide the appropriate spacing for the keyboard arrangement corresponding to the capitals, "shifted" characters or punctuation marks, provision is made for sliding the switch assembly 100 upon the guiding and supporting rods 95 until the row of flexible contacts designated 110' are disposed beneath the line of projections 17' as clearly shown in Figure 3 of the drawings. Then the contacts 110' will be individually depressed according to the key which is selected and will close the circuit through the fixed contacts 111' which are connected to appropriate ones of the conductors 105 by means of the wires 113'; these connections all being arranged in accordance with the proper widths of the capital letters and punctuation marks which are brought into use by depressing the shift key 21.

In order to synchronize the movements of the switch bank or assembly 100 with the shifting of the carriage 11 which is effected by the shift key 21, the following connections are provided. An ear or lug 115 is formed on the member 101 and pivoted to this ear is one end of the link 116, the other end of which is pivotally connected as at 117 with one end of the depending arm of the bell crank 118. This bell crank 118 is fulcrumed to a suitable fixed portion of the frame of the typewriter as at 119 and the upper arm 120 thereof is provided with a slot 121 within which a pin 122 carried by the vertically movable carriage shifting member 26' is adapted to move. Obviously, when the member 26 is lifted by means of the depression of the shift key 21 in order to raise the carriage rail 27, as shown in Figure 3, the bell crank 118, 120 is rocked in a clockwise direction from its position shown in Figure 2 to the shifted position illustrated in Figure 3. Thus there is provided means for actuating the proper limiting stop pin 75' which determines the amount of release of the escapement mechanism, in accordance with the widths of both the lower-case characters and the capitals.

The space bars 18 are also provided with depending projections such as indicated in connection with the key bars at 17' and four of these space bars may be adapted to actuate appropriate contacts 110, 111 in order to regulate the width of the blank spaces in the same way as the width of the type is regulated. Obviously the space bars will actuate contacts connected to the same magnet in either the shifted or unshifted position; and the space bar intended for the actuation of the carriage for the maximum travel will not be provided with electrical connections to a magnet.

In Figure 4 of the drawings there is illustrated an arrangement for adapting the invention to a double shift typewriter. In such machines the carriage will be lifted to one of two different heights and the element 26 will be capable of being disposed in three different positions instead of two as shown in Figures 2 and 3 of the drawings. The same type of connection can be disposed between the switch block 100 and the member 26 except that the switch block or assembly will in this case be capable of adjustment to and from three different positions. Also, an additional row of pairs of contacts indicated at 110^2 and 111^2 will be provided and the contacts 111^2 will be connected with the appropriate main conductors 105 by means of the wires 113^2. The lower-case position of the switch assembly 100 is shown in Figure 4 in full lines and is indicated by the reference character I. The two shifted positions of the assembly wherein the contacts 110' and 110^2 are respectively brought beneath the key projections 17' are indicated by the fragmentary broken lines designated II, III. Thus it will be seen that the electrical actuation of the variable spacing mechanism may be readily adapted to a double shift typewriter.

As a specific example of the operation of the invention, it may be explained that whenever the key representing the small letter "i" is depressed, the projection 17' carried by the key bar will cause its flexible contact 110 to contact with the fixed contact 111 which is connected by means of the wires 113 with that one of the main conductors 105 which is connected to the magnet 90 controlling the projection of the lowermost pin 75' which permits the least amount of travel of the pawl controlling the release of the escapement ratchet 30. However, if the switch assembly 100 is shifted by the mechanism already described, upon the depression of the shift key 21, and the key designated by the capital "W" is depressed, no actuation of a movable pin 75' is effected and the pawl will travel through its arc of movement until stopped by the last fixed pin 75 and thus effect the maximum travel of the carriage.

It is obvious that all of the pins including the pin 75 could be made movable and projected from the plate 70 by means of magnets, but this would entail the provision of an additional magnet and additional connections to the keys. It is also obvious that more or less than the five different widths of spacing could be employed by using an appropriately greater number of stop pins, magnets and conductors.

The mechanism is entirely automatic in character and the typewriter may be operated rapidly to produce typewritten matter indistinguishable from printed matter insofar as spacing of the letters is concerned. This typewritten matter is entirely suitable for use in the method of printing commonly known as offset printing and involving a photographic step. It also presents a superior appearance when used for this or any other purpose.

It will be further understood that various other changes in the design and arrangement of the embodiments illustrated and described herein, as for example, in adapting the invention to typewriters of various makes, may be made without departing from the scope of the invention as defined in the subjoined claims.

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

1. A typewriter of the class described including the usual keys, key bars, and shift mechanism, a carriage, means for advancing the carriage, and means for controlling the forward movement of the carriage, said means including a graduated stop mechanism, electromagnetic means for actuating said stop mechanism, a source of current for energizing said electromagnetic means, an electric circuit making and breaking means adapted to be operated by movement of said keys to energize said electro-magnetic means in order to actuate said stop mechanism, and means adapted to be actuated by operation of the shift mechanism to upper case position to adjust the circuit making and breaking means so as to prepare the same for effecting a different actuation of the stop mechanism by the movement of said keys, when said shift mechanism is operated than when the typewriter is set for lower case operation.

2. A typewriter of the class described including the usual keys, key bars, and shift mechanism, a carriage, means for advancing the carriage, and means for controlling the forward movement of the carriage, said controlling means including an escapement device and a plurality of stop elements for limiting the escapement movement of said escapement device, and thus to control the forward movement of the carriage at different predetermined distances, electromagnetic means associated with each of said stop devices to actuate them, a source of current, electric circuits connecting said electromagnetic means and said source of current, a plurality of switches operable by each of said keys and controlling said circuits, and means actuated by the

shift mechanism for determining which switch will be actuated by said key, whereby the stop element appropriate to the lower case and capital characters represented by the selected keys may be selectively actuated.

3. A typewriter of the class described including the usual keys, key bars, and shift mechanism, a carriage, means for advancing the carriage, and means for controlling the forward movement of the carriage, electrically operated means for regulating the distance of movement of the carriage appropriate to the width of the character printed, a pair of switches movably disposed adjacent each of the keys, and each adapted to close an electric circuit through the electrically operated means to determine the movement of the carriage corresponding to the width of the lower case and capital characters capable of being printed by manipulation of said respective keys, and means actuated by the shift mechanism to bring one or the other of said switches of each of said pairs into operative relation with said keys.

4. A typewriter of the class described including a keyboard comprising the usual keys and key bars, a carriage, shift mechanism, means for advancing the carriage, and electrically actuated means for controlling the amount of forward movement of the carriage in accordance with the widths of the characters printed, a plurality of electric circuits placing said means in connection with a source of current, a movable switch block disposed beneath said keys and provided with a plurality of banks of switches for controlling said respective circuits, each of the switches of one bank being disposed below and adapted to be actuated by one of the keys of the typewriter during one position of the shift mechanism, and means for moving said block so that another bank of switches is brought into operative relation to said keys upon actuation of the shift mechanism from said position.

5. In combination with a typewriter of the class described, a keyboard comprising a plurality of keys and key bars, a carriage, shift mechanism, means for advancing the carriage, an electrically actuated means for controlling the amount of forward movement of the carriage in accordance with the widths of the characters printed, a plurality of electric circuits placing said means in connection with a source of current, a projection on each of said keys, said projections being disposed in a straight line, an electric switch block horizontally slidably disposed beneath said keyboard, a plurality of rows of switches carried by said block for controlling said electric circuits, the switches of each row being disposed directly beneath the respective projections on said key bars during one or another of the slidably adjusted positions of said block, and means for sliding said block.

6. A typewriter of the class described including the usual keys, key bars, and shift mechanism, a carriage, means for advancing the carriage, means for controlling the forward movement of the carriage, a plurality of stop devices, each operable to limit the forward movement of the carriage to a different predetermined distance, electromagnetic means associated with each of said stop devices to actuate them, a source of current, electric circuits connecting said electromagnetic means and said source of current, a shiftable switch block disposed beneath the keys, a plurality of rows of switches carried by said block, the switches of one row adapted to be respectively actuated by the keys when the typewriter carriage shift mechanism is not actuated, the switches of another row adapted to be actuated by the keys when the shift mechanism is actuated, a plurality of conductors carried by said switch block and respectively connected with said electromagnetic means, and means connecting one contact of each of said switches with that one of said conductors which is connected to the electromagnetic means which limits the carriage travel to the distance corresponding to the letter printed by the key associated with said switch.

ROSWELL S. REID.