Sept. 18, 1945. J. F. SMATHERS 2,385,036

TYPEWRITING MACHINE

Filed Oct. 10, 1942 4 Sheets-Sheet 1

FIG. 1A.

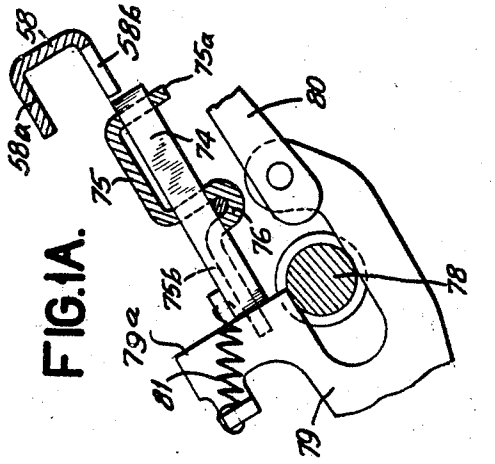

FIG. 1.

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Filed Oct. 10, 1942 4 Sheets-Sheet 2

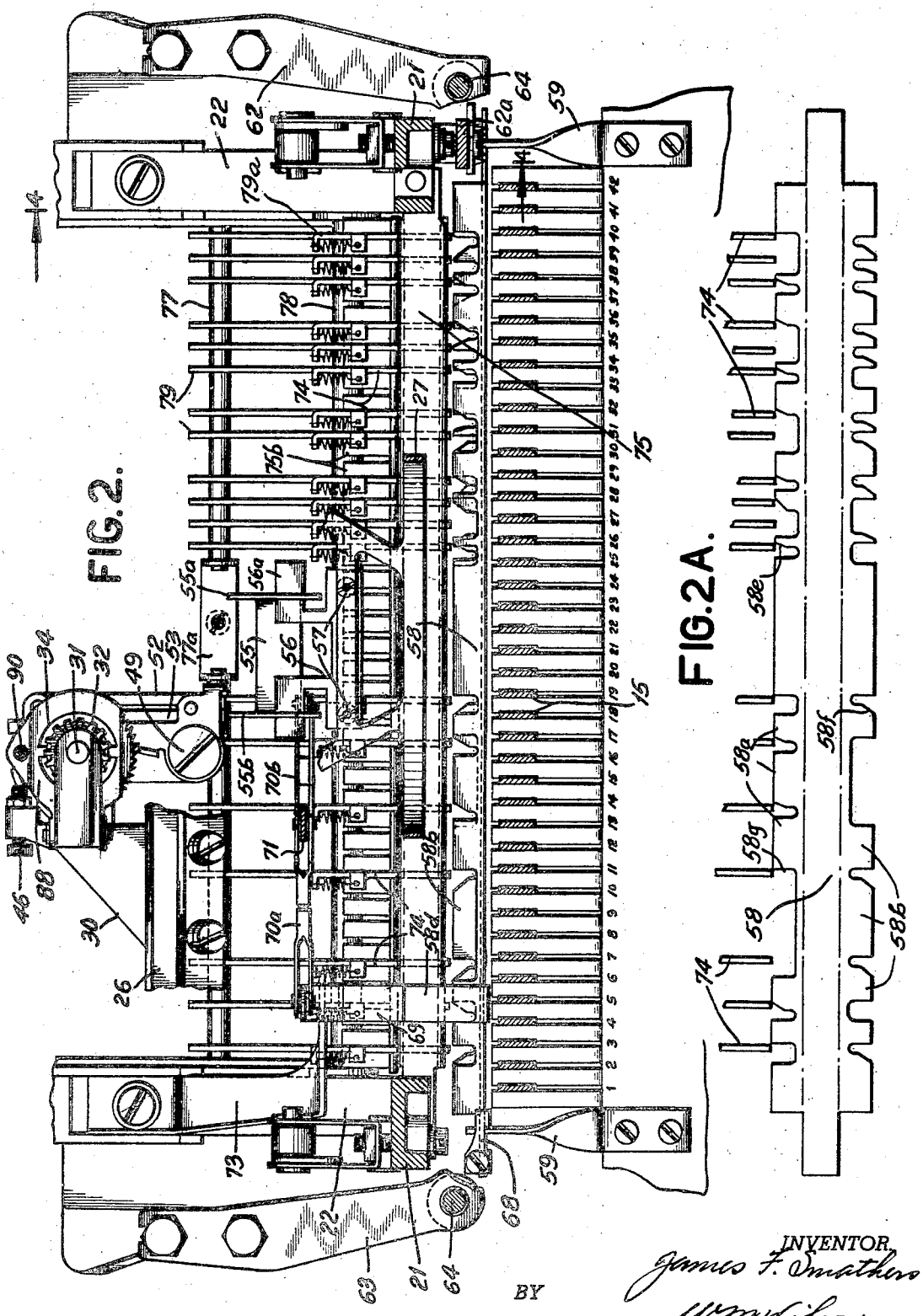

FIG. 2.

FIG. 2A.

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TYPEWRITING MACHINE

Filed Oct. 10, 1942 4 Sheets-Sheet 3

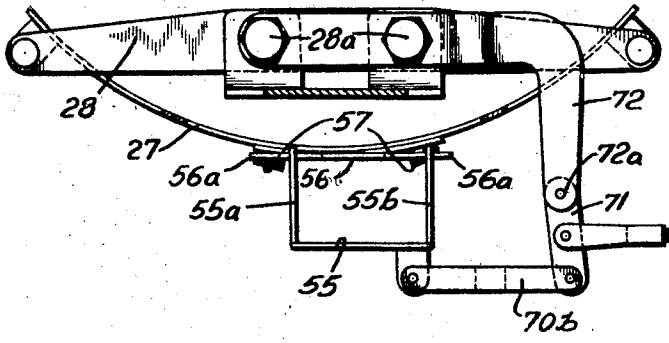


FIG. 3.

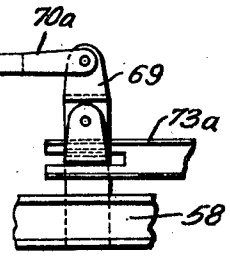


FIG. 5.

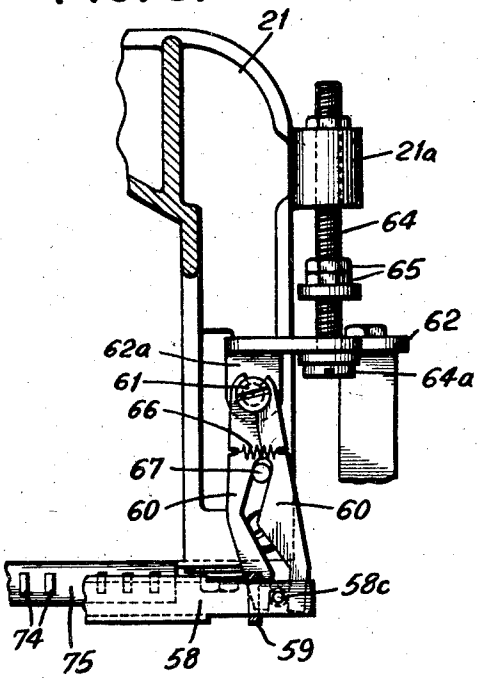
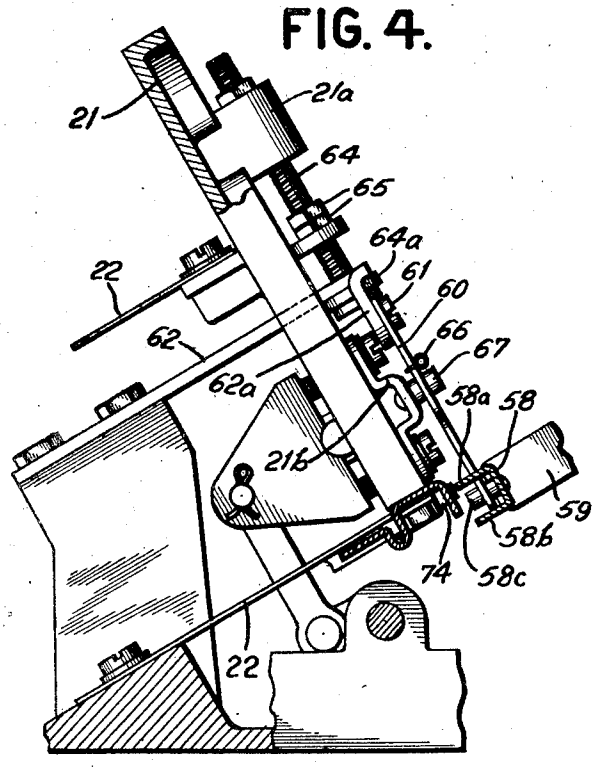


FIG. 4.



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TYPEWRITING MACHINE

Filed Oct. 10, 1942 4 Sheets-Sheet 4

FIG. 6.

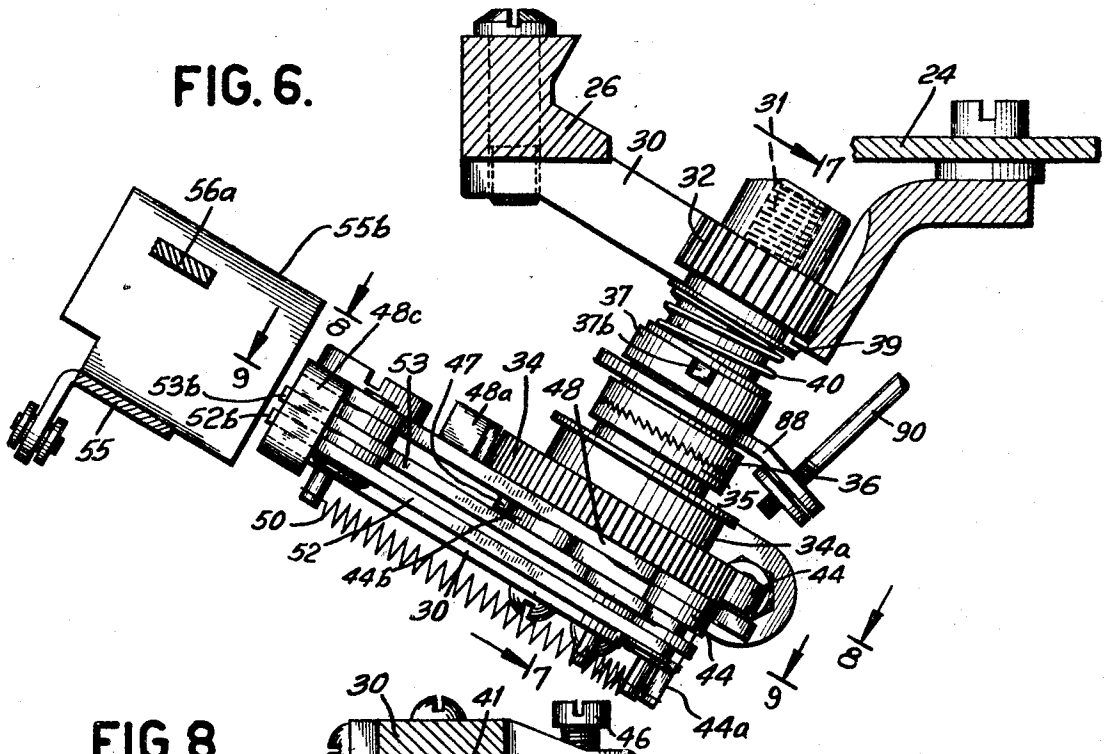


FIG. 8.

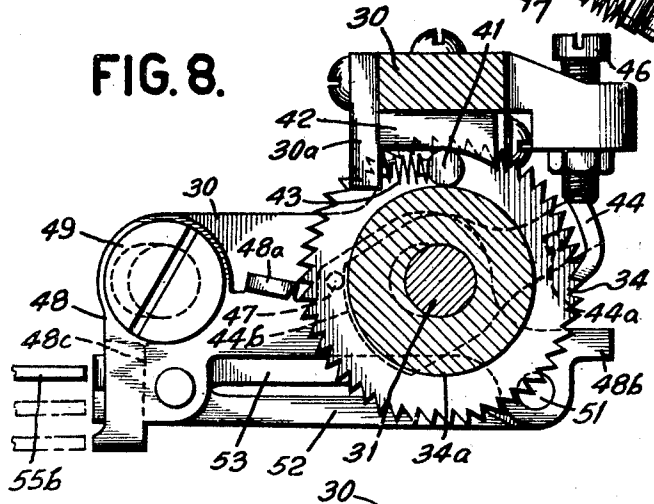


FIG. 9.

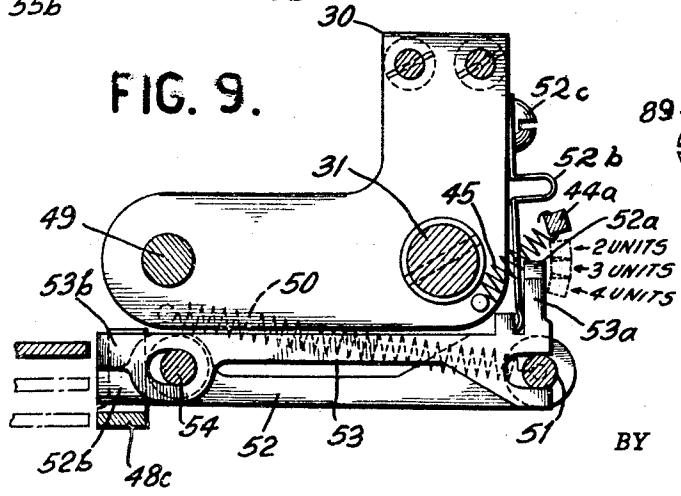
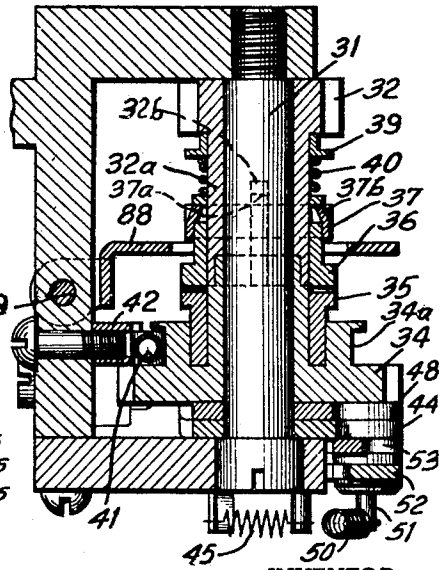


FIG. 7.



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Patented Sept. 18, 1945 2,385,036

UNITED STATES PATENT OFFICE

2,385,036

TYPEWRITING MACHINE

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Application October 10, 1942, Serial No. 461,551

20 Claims. (Cl. 197—84)

This invention relates to typewriting machines.

An object of the present invention is to provide an improved variable carriage feed mechanism.

An object is to provide a variable carriage feed mechanism which has relatively fewer parts than is usually the case.

Typewriting machines have been equipped with variable carriage feed mechanisms which vary the spacing of the work sheet receiving the impressions in proportion to the widths of the characters printed. Such mechanisms have been constructed in many different forms, but they all have one characteristic feature of the provision of some form of selector mechanism which usually is controlled in some fashion by the character keys to determine the extent of spacing of the carriage and hence of the work sheet upon which the characters are impressed. As a rule these selector mechanisms are so arranged that each key directly moves or controls a part which in some manner or other selectively controls the escapement mechanism itself. In the past it has usually been considered necessary to provide each key with a separate character feed element or member, notwithstanding the fact that a large number of the characters have the same spacing, or can be allotted the same spacing, without too great a compromise in the design of the type face used on the type bars. It has been found that this results in unnecessary duplication of parts which the present invention aims to correct.

In the present case the type font is arranged with the letters divided into groups with all of the characters in one group having the same spacing. It has been found by careful study that nearly all of the characters can have the same spacing with the exception of certain letters which will be enumerated hereinafter in the detailed description of the invention.

By this means it is possible to greatly reduce the number of parts in the machine. Thus, in the present case the machine illustratively includes 42 type bars of which only 10 in the lower case and only 13 in the upper case need have a selective action on the escapement mechanism. This reduces by more than half the number of parts required to provide a full range of selection of spacings as only 19 selector elements which are individual to type bars may be required instead of 42. This, of course, takes into consideration not only the letters of the alphabet and the numerals but the other characters which are commonly provided, such as punctuation marks.

Another object is to provide a more compact escapement which has fewer parts, taking into consideration the number of selections which may be effected, than former escapements.

Another object is to provide an escapement mechanism which is a self-contained unit and may be directly mounted on one of the carriage supporting rails.

An object is to provide an improved escapement of the ratchet wheel type which is simpler in construction and has fewer working parts than variable escapements proposed heretofore.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a vertical section through the machine.

Fig. 1A is a view showing the selector mechanism in upper case position.

Fig. 2 is a view looking in the direction of the arrows 2—2 in Fig. 1 with the carriage removed.

Figs. 2A is a view of the selector slide.

Fig. 3 is a rear view of the universal bar.

Fig. 4 is a side view of the shift mechanism.

Fig. 5 is a front view of certain parts associated with the shift mechanism.

Fig. 6 is a large scale side view of the escapement mechanism.

Fig. 7 is a section on the line 7—7 in Fig. 6.

Fig. 8 is a section on the line 8—8 in Fig. 6.

Fig. 9 is a section on the line 9—9 in Fig. 6.

The present invention is disclosed in the drawings as applied to the well known "Electromatic" typewriter, also known as the "International," purely as a convenience in description. It will be understood that the invention may be applied to other power operated typewriters or to manually operated typewriters without altering the principles or basic features of the invention. Since the "Electromatic" typewriter is now well known, only a very brief description will be given herein.

The machine is controlled by character keys 10 (Fig. 1) with each of which is associated a cam unit 11 pivoted on one of two parallel fulcrum rods 12 suitably supported in the framework of the machine. When any key 10 is depressed the associated cam unit 11 is rendered operable by the power roller 13 which rotates continually in the direction of the arrow while the machine is in use.

Each cam unit 11 is connected by a link 14 to a sub-lever 15 pivoted on a fulcrum rod 16. The sub-levers 15 are connected by links 16 and toggles 17 to the type bars 18 which are mounted in a well known way in the segment 19 by means of a pivot wire 20. The segment 19 is supported in a type basket frame which is generally designated 21. This type basket frame is mounted on leaf springs 22 (Figs. 2 and 4) whereby the basket is capable of a shifting movement to change the case of characters typed. Normally the type basket frame is held in an elevated position but is drawn downwardly in a well known way to effect printing of the upper case characters by means of a cam unit, not shown, similar to the cam units 11 and controlled by a shift key also not shown.

The machine is provided with the usual platen 23 (Fig. 1) mounted in the carriage 24 which moves on the rear rail 25 and front rail 26. Just before the type bars 18 strike the work sheet on the platen 23 they engage a universal bar 27 which is mounted in the well known way by means of leaf springs 28 (Fig. 3) which compels the universal bar 27 to move in substantially a straight line at right angles to the rear face of the segment 19. This universal bar actuates the escapement mechanism selectively in a manner made clear hereinafter.

The escapement mechanism is most clearly shown in Figs. 6 to 9 and is wholly carried by a frame 30 secured to the underside of the front rail 26. This frame supports a long stud 31 rotatably mounting the escapement pinion 32 which meshes with an escapement rack 33 (Fig. 1) secured to the underside of the carriage 24. The frame 30 is so shaped that the longitudinal axis of stud 31 is substantially parallel with rear face of the segment 19 and in a vertical plane.

Rotatably mounted on the stud 31 (Figs. 6, 7 and 8) is an escapement ratchet 34 to which is secured a toothed clutch member 35 meshing with a similar clutch member 36 slidably mounted along a tubular extension 32*a* (see Fig. 7) of the pinion 32. Clutch member 36 is keyed to sleeve 32*a* by means of a key 37*a* formed as an inwardly projecting lug of a retaining ring 37 which key projects into a slot 32*b* milled in the tubular extension 32*a* of pinion 32. The collar 37 is also formed with two prongs 37*b* which are pressed toward stud 31 into two openings formed in the tubular member 36. Interposed between the clutch member 36 and a washer 39 loose on the tubular portion 32*a* is a spring 40 which normally holds the clutch member 36 in engagement with the clutch member 35.

The ratchet 34 is provided with a groove 34*a* (Figs. 6 and 8) in which is located a cylindrical piece 41. Secured to the frame 30 is a block 42 having a curved face confronting the groove 34*a* to provide a tapering space in which the member 41 is confined. This member is provided with a pilot for a spring 43 which is seated on a similar projection on a block 30*a* attached to the frame 30. The spring 43 presses the member 41 to the right in Fig. 8 to jam the member 41 between the curved face of the block 42 and the bottom of the groove 34*a* thereby preventing clockwise rotation of the ratchet 34. The member 41, however, does not prevent counterclockwise rotation of the ratchet 34 since this would have the effect of frictionally moving or rolling the member 41 to the left into the wider part of the space between the block 42 and the bottom of groove 34*a*. It is by this means that reverse rotation of the right wheel 34 is prevented.

It will be understood that by virtue of the usual carriage spring motor, (not shown) acting on pinion 32 through rack 33, there is a constant tendency to rotate the ratchet 34 in a counterclockwise direction (Fig. 8). Normally the ratchet 34 is restrained against rotation by means of a pawl 44 having a pivotal sliding movement on the stud 31 for limited movement to the right from the position of Fig. 8 to release ratchet 34. A spring 45, most clearly shown in Figs. 7 and 9, normally urges the pawl 44 in a clockwise direction on stud 31 and also holds it in its position of Fig. 8 in which it engages the teeth of ratchet 43. In this position the rotational effort applied to the ratchet 34 by the carriage spring motor forces the pawl 44 up against a screw stud 46 (Fig. 8).

The pawl 44 has an arcuate portion 44*b* which is concentric with the stud 31 with the parts in the normal position (Fig. 8). Engaging this arcuate portion 44*b* is a pin 47 (Fig. 6) on a slide 48 movable horizontally in Fig. 8 on a stud 49 carried by the frame 30 and on stud 31, the slide 48 being slotted for this purpose. The slide 48 is provided with a tooth 48*a* adjacent the pin 47 which tooth is normally clear of the teeth of the ratchet 34.

A spring 50, anchored to a reduced portion of a stud 51 on the slide 48 and to a pin carried by the frame 30, normally holds the slide 48 in its left hand position of Fig. 8. If the slide 48 is moved to the right with reference to Fig. 8, the tooth 48*a* will enter a tooth space in the ratchet 34 and the pin 47 will push the pawl 44 to the right clear of the ratchet 34. When this takes place, the spring 45 will be free to rock the pawl 44 clockwise until it is stopped. Considering only the parts as shown in Fig. 8 and assuming the slide 48 is moved to the right, the pawl 44 will be rocked a maximum distance in a clockwise direction until stopped by a projection 48*b* forming part of the slide 48. If now the slide 48 is released, the spring 50 will draw it to the left back to the position of Fig. 8 allowing the pawl 44 to reengage the teeth of the ratchet. Since the pawl 44 has now been moved away from the stud 48 there is nothing to restrain the ratchet 34 with the result that the disengagement of the lug 48*a* from the ratchet will permit it to rotate in a counterclockwise direction an extent equivalent to the amount the pawl 44 was rotated about stud 31. This will amount to four tooth spaces of the ratchet 34 and will cause the carriage to be spaced the maximum distance possible.

Means is provided for selectively controlling the movement of the pawl 44 to permit the carriage to move 2, 3, or 4 letter spaces as desired. This means includes a two unit slide 52 and a three unit slide 53 which are slotted on their right hand ends (Fig. 9) to embrace the stud 51 carried by slide 48 and at their left hand ends are formed with closed slots embracing a stud 54 also carried by slide 48.

The two unit slide 52 has an upstanding post 52*a* (Fig. 9) which, by engagement with the portion 44*a* of pawl 44 when the slide 52 is moved to the right in Fig. 9 will limit rotation of the pawl 44 on stud 31 to only two tooth spaces of ratchet 34. The slide 53 has a similar but shorter post 53*a* which allows the pawl 44 to move three tooth spaces. In Fig. 9 the different extents of movement after release of the pawl 48*a* is denoted by arrows designated with the number of units of feed defined by the posts 52*a*, 53*a* and pro-

jection 48b. Normally the slides 52 and 53 are held in the position of Fig. 9 by leaf springs 52b secured by screws 52c to the frame 30, the leaf springs extending into slots in the slides and urging the slides to the left.

The three slides 48, 52, and 53 are operated selectively in the following manner: When the slide 48 is operated alone four spaces result, when the slides 48 and 52 are both operated together two spaces result, but when slide 53 operates three spaces take place. For this purpose the slides 52, 53 are formed with offset portions 52b, 53b and the slide 48 is provided with a U-shaped bend 48c.

For the purpose of operating the slides 48, 52, 53 there is provided a member 55 (Figs. 1, 2, 3, 6, 8 and 9) in the form of a U-shaped frame slidably mounted on a plate 56 which is secured by screws 57 (Figs. 1, 2 and 3) to the universal bar 27. As best shown in Fig. 2 this plate 56 is provided with horizontally aligned projections 56a slidably fitting in rectangular slots in the vertical parallel side arms 55a, 55b of the frame 55.

With reference to Fig. 2, it will be seen that if the universal bar 27 is moved upwardly toward the rear of the machine, the projections 56a, 56b will carry the frame 55 upwardly also. The side arm 55b is always located in fore and aft alignment (Fig. 2) with one of the lugs 52b, 53b or with the vertical part of the U-shaped bend 48c in the slide 48, but the frame 55 may be slid horizontally or to the right and left in Fig. 2 to position the side arm 55b in front of a different one of the lugs 52b, 53b or part 48c.

The selective positioning of the side arm 55b is effected by mechanism operated by the sub-levers 15 in a manner that will be made clear hereinafter. Conveniently, the frame 55 and the arm 55b which cooperates with lugs 52b, 53b may be termed an interposer since it is selectively interposed between universal bar 27 and the selectively operable parts of the escapement mechanism which determine the extent of spacing by controlling the throw of the pawl 44.

The interposer 55 is selectively operated prior to the impact of a type bar by means of a selector slide 58 best shown in Figs. 2 and 2A formed of a strip which is channel shaped in transverse section (Figs. 1 and 4). Slide 58 is movably mounted on stationary brackets 59 (Figs. 1, 2, 4 and 5) which have rectangular closed slots guiding the ends of the slide, the parallel sides 58a, 58b of the slide 58 being cut away for this purpose near the ends as best shown in Fig. 5.

At the right hand end of the bar 58 (Figs. 4 and 5) there is provided a pin 58c which is engaged by the ends of stop levers 60, the other ends of which are shaped to partly embrace the side of the shouldered shank of a stud 61 carried by a bent over lug 62a of a bracket 62. This bracket 62 and a similar one 63 on the left (Fig. 2) are mounted on the framework of the machine and have holes receiving adjustable stop screws 64 (Figs. 4 and 5) threaded into bases 21a forming part of the type basket frame 21. The heads of the stop screws 64 together with adjustable lock nuts 65 limit the case shifting movements of the type basket 21 and, with brackets 62, 63 are a usual feature of the "Electromatic" typewriter.

The stop arms 60 are held in contact with the sides of the pin 59a and the stud 61 by means of a spring 66 (Figs. 4 and 5). The type basket frame 21 has a bracket 21b provided with a pin 67 and the arms 60 are so shaped as to form a Z-shaped slot or opening (Fig. 4) receiving pin 67. The type basket is shown in elevated or lower case position in the drawings except Fig. 1A. When the type basket is shifted downwardly to lower case position by the means usually provided for this purpose controlled by the shift key, the pin 67 moves downwardly and rocks both arms 60 in a counterclockwise direction, thereby drawing the slide 58 to the right with reference to Figs. 2 and 5. The movement of the slide 58 to the right and left is limited by an adjustable stop 68 (Fig. 2) clamped on and partly surrounding the slide 58 and having a vertical slot through which the left hand bracket 59 projects, the vertical sides of the slot in the stop 68 limiting the relative movement between the slide and left hand bracket 59. This movement of the slide 58 upon a case shifting movement of the type basket controls the change in spacing necessary in printing the capital letters as many of the capital letters are wider than the lower case letters. Thus, most of the lower case characters which require two spaces will require four spaces when printed as capitals.

The slide 58 is formed with clearance slots and cams along the two parallel sides 58a, 58b which, in cooperation with certain parts, effect a selective shifting movement of the slide 58 which, of course, selectively controls the movement of the interposer 55. For this purpose there is secured to the left hand end (Fig. 2) of the slide 58 an arm 58d to which is fastened a bracket 69 (see Fig. 3 also) connected by an adjustable link 70a to an arm 71 pivoted at 72a to a bracket 72. The bracket 72 is attached to the framework of the machine by the same studs 28a as the leaf springs 28 for the universal bar 27 as best shown in Fig. 3. The arm 71 is connected by a link 70b to the interposer 55. Arm 58d is partly supported by a bracket 73 secured to the same part of the frame as springs 22 and having a horizontal slot guiding arm 58d.

Cooperating with the slide 58 are 19 selector interposers 74 (Figs. 1 and 2) which are slidable at right angles to the slide 58 in a comb bar 75 which is rigidly mounted in the type basket 21 and extends parallel with the slide 58. As most clearly shown in Fig. 1A, the front flange 75a of bar 75 is formed with rectangular slots or openings to accommodate the forward ends of the bars 74 which are substantially straight and rectangular in section. The rear edge of the bar 75 is slotted to form guide prongs 75b and also shaped to provide a support for a restraining rod 76 upon which the bar 74 rests near their midpoints. This makes it possible to remove certain of the bars if necessary without removing the others by sliding the rod 76 longitudinally by means of a similar rod in a well known way.

Slidably mounted on cross rods 77 and 78 are selector slides 79 which are connected by links 80 to certain of the sub-levers 15. The selector slides 79 each have an upstanding portion 79a having a straight edge abutting the rear end of a bar 74 and is connected to such bar 74 by means of a spring 81 which is anchored to ears formed in the bar 74 and in the slide 79. The straight edge just mentioned is parallel with the line of shift of the type basket 21 to permit the comb bar 75 and the selector bar 74 carried thereby to move with the type basket relative to the slide 79 without effecting a shifting movement of the selector bar 74 longitudinally. This movement of the bar 75 and the type basket is at right angles to the sliding movement of the slide 79 which remains relatively fixed in the machine.

The teeth 75b of comb bar 75 extend far enough to the rear of the machine to act as guides for the selector slides 79 as well as for the interposer bars 74 and also hold said slides in alignment with their associated bars 74. The slides 79 also may be kept in proper spaced relation and guided by any suitable means as by grooves in the rods 77, 78 or spacing collars on said rods. Rod 78 extends all the way across the machine but there are two rods 77 supported at their inner ends by a bracket 77a (Fig. 2) secured to the underside of a part of the main framework.

Standard typewriters usually are provided with 42 type bars each having two characters whereby such machines are capable of printing 84 separate characters including the upper case letters. It has been found by practical experience that the larger share of the characters in each letter case are so nearly alike in width that they may all be given the same amount of spacing without much of a sacrifice in the legibility and artistic appearance of the characters. Accordingly, the selector slide 58 has been designed with this in mind so that normally the bulk of the lower case characters receive a uniform feed of three basic units and the upper case four units. For this purpose the slide 58 is made capable of movement to three different positions and normally, with the type basket in lower case position, that is, elevated as in Fig. 1, the lug 55b, as shown in Figs. 2, 8 and 9 is located so as to actuate the slides 48 and 53. When the type basket is shifted to the upper case position, as explained above, the slide 58 is shifted to the right in Fig. 2 to its third position in which case the lug 55b will be positioned to actuate only the slide 48.

The arm 60, springs 66 and stud 67 constitute a means to hold the slide 58 in either the first or third, position according to the position of the pin 67 and at the same time permit the slide 58 to be shifted to right or left selectively in a manner to be described hereinafter. For example, in Fig. 5 the slide 58 is shown occupying its first or extreme left hand position from which it may be selectively moved to either of two positions on the right. In so moving, the right hand arm 60 will be actuated by the pin 58c and rocked in a counterclockwise direction against the tension of the spring 66 which will operate to restore the slide 58 to the position of Fig. 5 when released. The extent of restoring movement will be limited by the pin 67 which restricts clockwise movement of the right hand arm 60 and by the left hand arm 60 which is held against the pin 67 by the spring 66. On the other hand, when the type basket is shifted downwardly and the pins 67, through the arms 60, effect the case shifting movement of slide 58 to the right to its third position, said slide may be moved selectively to the right to the first position or to the intermediate position from which the slide will be restored by spring 67 and the left hand arm 60.

The slide 58 may be shifted to the right selectively in Fig. 2 to its third position to select slide 48 alone or to an intermediate position to select both slides 52 and 48. Thus the escapement will normally be operated each time by the type bar through the universal bar to cause the carriage to travel three units of spacing. This is automatically changed to four units of spacing upon the case shifting movement of the type basket from which either the three or two-unit spacing members 52 and 53 may be selectively operated to reduce the spacing to two or three units as required. Table 1, given below, shows the apportionment of the spacings among the lower case letters and other lower case selected characters typed. In the first column is given the number of the type bar, counting from left to right in the type basket, to correspond with the small numbers designating the sub-levers 15 associated therewith appearing below said sub-levers in Fig. 2.

Table 1.—Lower case

Type Bar No.	Character	Spacing
1	q	3
2	a	3
3	1	3
4	z	3
5	w	4
6	s	3
7	2	3
8	x	3
9	e	3
10	d	3
11	3	3
12	c	3
13	r	3
14	f	2
15	4	3
16	v	3
17	t	2
18	g	3
19	5	3
20	b	3
21	y	3
22	h	3
23	6	3
24	n	3
25	u	3
26	j	2
27	7	3
28	m	4
29	i	2
30	k	3
31	8	3
32	, comma	2
33	o	3
34	l	2
35	9	3
36	. period	2
37	p	3
38	' apostrophe	2
39	0 zero	3
40	- hyphen	3
41	plus sign	3
42	%	3

It will be noted with reference to the above table that only the 5th, 14th, 17th, 26th, 28th, 29th, 32nd, 34th, 36th, and 38th type bars require the alterations in spacing which may be obtained by selectively moving the bar 58 to the right in Fig. 2. For this purpose the upper flange 58a of the slide 58 is provided with cam surfaces 58e (Figs. 2 and 2A) with which coact the interposer bars 74 which are operated by the sub-levers corresponding to the above type bars. In Fig. 2A the ends of the bars 74 which coact with the cams are shown in proper position to operate the slide 58 and the bars 74 are numbered to correspond with the type bars as listed in the above table. It will thus be seen that if the 5th type bar, which prints the letter w, is operated, the bar 74 corresponding to this type bar will be drawn toward the front of the machine by the sub-lever 15 for such bar to cam the slide 58 to its extreme right hand or third position, thereby shifting the lug 55b (Fig. 2) into registry with the vertical part of the U-shaped bend 48c whereby only slide 48 will be operated to produce the maximum spacing of four units. The interposer bar 74 for the 14th type bar printing the small letter f, on the other hand, cooperates with a cam 58e designed to move the slide 58 to the right to its intermediate position to select both the slide 48 and the slide 52 which, of course, will cause the carriage to be spaced only two units.

The lower flange 58b of the slide 58 is similarly provided with cams 58e as shown in Figs.

2 and 2A which, for the most part, are located to be operated by the bars 74 associated with type bars other than the ones which operate the slide 58 in the lower case position. Table 2 below shows the spacings allotted to the upper case characters from which it will be noted that all, with the exception of the ones printed by the 3rd, 7th, 11th, 19th, 26th, 27th, 29th, 31st, 32nd, 35th, 36th, 38th, 39th, and 40th type bars receive a uniform spacing of four units.

Table 2.—Upper case

Type bar No.	Character	Spacing
1	Q	4
2	A	4
3	*	3
4	Z	4
5	W	4
6	S	4
7	Paragraph symbol	3
8	X	4
9	E	4
10	D	4
11	/	3
12	C	4
13	R	4
14	F	4
15	$	4
16	V	4
17	T	4
18	G	4
19	Dagger symbol	3
20	B	4
21	Y	4
22	H	4
23	?	4
24	N	4
25	U	4
26	J	2
27	!	2
28	M	4
29	I	2
30	K	4
31	Cents symbol	3
32	:	2
33	O	4
34	L	4
35	(	2
36	;	2
37	P	4
38	'	2
39	)	2
40	_ underline	3
41	Sterling sign	4
42	@	4

In Table 2 it will be noted that all of the changes in spacings amount to reductions in consequence of the fact that most of the changes are required for the combination type bars which bear two different symbols which have no relation to each other, such as combinations of numerals with punctuation marks, and special symbols with punctuation marks, which in the upper case selection require less spacing. It will also be noted that the keys which in the lower case position selected two units of spacing for the type bar now select three or four units. The cams 58*f* are shaped to selectively move the slide 58 to the left away from the third position to which it is moved immediately upon a case shifting operation. The flange 58*a* is cut away as shown at 58*g* to provide clearance spaces which prevent blocking those of the bars 74 which must be provided for a selective control of spacing for one case, but which are not required for that purpose when printing in the other case. For example, both the upper and lower case letter w have the same spacing which in the lower case, is selected by movement of the bar 74 to the third position under the influence of the interposer bar 74 corresponding to that character. In the upper case this selection is obtained automatically by the initial shifting of the slide 58 to the third position by the case shift movement of the type basket, thereby rendering unnecessary a cam 58*f* for the bar 74 associated with the type bar No. 5. For this reason a clearance space 58*g* is provided on flange 58*a* to prevent that bar 74 from being blocked by the flange 58*b* when printing the upper case W. Similarly, clearance spaces are provided for all the bars 74 which are operative in one but not the other of the case shifting positions of the bar 74.

Since in only four cases is the same interposer bar 74 operative for both the upper and lower case characters, it is necessary to provide only 19 of the bars 74 thereby effecting a very considerable saving in parts, it being unnecessary to provide bars 74 for 23 of the 42 keys. In consequence of the fact that the slide 58 is automatically shifted to increase the spacing upon a case shifting operation it is necessary in a few cases to provide cams 58*f* to maintain the same spacing for the upper case characters as for the lower case characters. For example, it will be noted that type bar No. 3, which prints both the numeral 1 in the lower case and the asterisk in the upper case, requires the same spacing in both cases making it necessary to provide a cam 58*f* on the slide 58 to shift the slide 58 back to the normal lower case position in order to obtain a three unit spacing for the printing of the asterisk. This is also true of the 29th type bar because the upper and lower case I's require the same spacing.

It is necessary to provide for operation of the escapement mechanism when the usual space bar is operated. As the machine is ordinarily constructed, it is provided with an arm 82 (Fig. 1) secured to a short shaft 83 which is rocked counterclockwise through the medium of a cam unit (not shown) controlled by space bar SB. Also the universal bar 27 is usually connected by a link 84 to a rock lever 85 pivoted on a stud 86 carried by a bracket 87 secured to the rear rail 25. When the space bar SB is depressed and the cam unit associated therewith is rendered operative to rock the arm 82 counterclockwise (Fig. 1) this arm engages the arm of lever 85 to which the link 84 is connected and rocks said lever clockwise. Arm 85 thus actuates the universal bar 27 in the same direction as it is moved by a type bar, thereby operating the escapement mechanism. If the type basket is in lower case position, this, of course, will result in the carriage being advanced three units of spacing, while in the upper case, the carriage will be advanced four units.

It is also necessary to provide for releasing the escapement mechanism when it is desired to move the carriage by hand or tabulate the carriage by means of the usual tabulating mechanism. For this purpose the clutch comprising the members 35 and 36 is provided with a releasing plate 88 (Figs. 1, 2, 6 and 7) which is pivoted at 89 (Figs. 1 and 7) to the escapement frame 30. This plate, as shown in Figs. 2 and 6, has diametrically opposite lugs projecting into the annular space between the larger part of the clutch member 36 and the ring 37 whereby rocking of the plate 88 counterclockwise in Fig. 7 effects disengagement of the clutch member 36 from the cooperating member 35. In order to effect this movement the plate 88 is connected by a link 90 (Figs. 1, 2, and 6) to one arm of a lever 91 pivoted at 92 on a bracket 92*a* carried by the rear rail 25. The upper arm of this lever 91 cooperates with the usual escapement release bail 93 (Fig. 1) which is pivotally mounted in the carriage and which is actuated in a clockwise direction (Fig. 1) by the usual carriage release levers 94 located at each end of the carriage. This movement, of course, rocks the lever 91 counterclockwise (Fig. 1) to

draw the link 90 upwardly and to the left in Fig. 1 to disengage the clutch members 35 and 36. The upper arm of lever 91 is bifurcated to partly surround the usual tabular lever (not shown) by means of which the lever 91 may be rocked counterclockwise by a rearward or left hand movement of one end of the tabular lever (Fig. 1) in a well known way if it is desired to equip a machine embodying the present invention with conventional tabulating mechanism.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In a typewriting machine, in combination with the carriage, a selectively operable variable feed mechanism for said carriage, including a plurality of selectively operable members, each defining a different spacing when operated, and a common member for operating the spacing mechanism as a whole; an actuating member positioned to operate said common operating member, and variably selectively movable to a position to actuate said operating member alone or to positions to select in addition one of said selectively operable members, said actuating member being movable transversely of its selecting movement to operate the common operating member and the selected one of the first named members; a series of character keys, selector elements controlled by said character keys, a selector bar having a connection to the selectively movable actuating member and operable variable extents by said selector elements, character printing means controlled by said keys, and means operative during each printing operation to operate the selectively movable actuating member to actuate the common operating member and the selected one of the first named members.

2. In a typewriting machine, in combination with the carriage, selectively operable variable escapement mechanism, a member movable to a plurality of positions in one direction to selectively control the escapement mechanism and movable transversely of its selecting movement to operate the escapement mechanism, a longitudinally movable selector bar having connections to move said member to any one of said plurality of positions, said selector bar having two series of cam surfaces, a series of selector elements normally cooperating with one series of cams on said selector bar, character keys, case shiftable printing mechanism controlled by said keys, means to effect a relative shifting between the selector elements and the selector bar upon a case shifting operation to bring the selector elements into cooperation with the other series of cam surfaces on the selector bar, and means controlled by the keys for operating the selector elements, said selector elements when operated engaging said cam surfaces to effect a longitudinal shifting movement of the selector bar thereby moving said member to determine the extent of feed of the carriage according to the character printed.

3. A typewriter including a carriage, printing mechanism, a series of character keys, a series of power actuating devices for the printing mechanism controlled by said keys, variable feed mechanism for the carriage including a plurality of selectively actuable elements determining different extents of feed of the carriage, a member movable a plurality of extents to select said elements and also movable to operate the selected elements, means to automatically effect the last named movement each time a character key is operated, and selecting mechanism operated by said power devices for moving said member a plurality of extents, said selecting mechanism including selector elements each associated with a key and a member movable variable extents by said selector elements and connected to the first named member, said selector elements having connections to certain of the power devices so as to be operated whenever certain keys are operated.

4. In a typewriting machine, a carriage, selectively operable variable feed mechanism for the carriage including separately operable elements each determining a different extent of feed, a member movable to select said elements and also movable to operate the selected element, case shiftable character printing mechanism, a series of character keys, means to actuate said member to operate the selected element with each operation of the printing mechanism, and means controlled by the keys for selectively moving said member upon the operation of certain keys, and means operable upon a case shifting operation of the printing mechanism to change the selecting movement of the first member.

5. In a machine of the class described, a carriage, selectively operable variable feed mechanism for the carriage, a member movable to a plurality of different positions to determine the extent of feed imparted to the carriage by said feed mechanism, a series of type bars, a type basket supporting said type bars and having a case shifting movement, a series of character keys for controlling the operation of the type bars, a selector member movable away from a normal lower case position a plurality of extents and having a connection to the first named member to selectively position said member and also shiftable to a normal upper case position from which said member is movable toward the normal lower case position a plurality of different extents to selectively position the first member, and means controlled by the case shifting movement of the type basket for shifting the second member to the normal upper case position.

6. A typewriter comprising a carriage, variable selectively operable feed mechanism for the carriage, a member for operating and variably controlling the feed mechanism movable a plurality of different extents to selectively control the feed mechanism and also movable to operate the feed mechanism after a selection has been made, case shiftable printing mechanism including a part movable from a lower case position to an upper case position, a selector member connected to the first member and movable by said part away from a lower case selecting position a plurality of different extents to selectively position the first member and also movable to an upper case position away from which said selector member also is movable a plurality of different extents, a series of keys for controlling the printing mechanism, means controlled by the keys for shifting said selector member away from the lower case selecting position including elements individual to the character keys for variably moving the selector member, and means controlled by said movable part for shifting the selector member

to the upper case position and also changing the relation of said elements to said selector member upon each case shifting operation of the printing mechanism.

7. Selector mechanism for a variable spacing typewriter comprising a selector bar having two series of cam surfaces and movable longitudinally, a support bar disposed parallel with the selector slide, a series of selector elements slidably mounted on said support bar and cooperating with one of the two series of cams on the selector bar and movable into cooperation with said cams to variably shift said selector bar extents determined by the position and angularity of the cams on said bar, a series of keys, mechanism controlled by said keys for operating the selector elements, and means to shift the selector bar and support bar relative to each other to bring the selector elements into cooperation with the other series of cams.

8. A selector mechanism for a variable spacing typewriter comprising a selector bar movable variable extents away from a lower case selecting position toward an upper case selecting position from which upper case position the bar is reversely movable variable extents toward the lower case selecting position, key controlled operating means cooperating with said bar in one position to move the bar variable extents from its lower case position towards its upper case position and shiftable relative to said bar for moving said bar variable extents away from the upper case selecting position toward the lower case selecting position, and means operable upon a case shifting operation to shift said bar to the upper case selecting position and change the operating relation of the key controlled means to said bar.

9. A selecting mechanism for a variable spacing typewriter comprising a selector bar longitudinally settable to a lower case selecting position and to an upper case selecting position from either of which longitudinally set positions said bar is longitudinally movable variable extents, means to set the bar in either its lower case selecting position or its upper case selecting position upon a case shifting operation, and key controlled means for variably moving said bar longitudinally from either of said positions.

10. Selector mechanism for a variable spacing typewriter including a member movable variable extents away from a lower case shifting position and settable to an upper case shifting position from which said member also is movable variable extents toward the lower case shifting position, a series of character keys, means individual to said character keys and cooperating with said member in its different case shifting positions to shift said member variable extents from either of said positions toward the other position, and means operable upon a case shifting operation for setting said member to one or the other of its case shifting positions.

11. A selector mechanism for variable spacing typewriters comprising a slide movable longitudinally to any of a plurality of space selecting positions, a series of character keys, and operating members individual to and controlled by said keys for moving said slide longitudinally variable extents and operative, when a character key is operated, to shift the slide an extent dependent on the character represented by the operated key.

12. A variable escapement mechanism comprising a ratchet wheel, an escapement dog, a member operable to release the escapement dog and lock the escapement wheel, means operative upon the release of the escapement dog to move it to an advanced position, a plurality of stop members each movable into the path of said escapement dog to limit its movement when released by the first named member to thereby determine the extent of rotation of the ratchet, and a member common to the first member and said stop members for operating both the releasing member and a selected stop member, said common member being selectively movable to select said stop members for operation.

13. A variable escapement mechanism comprising a ratchet wheel, an escapement dog, means operable to release the escapement dog from the escapement wheel and to lock the escapement wheel, means operative upon the release of the escapement dog to move it to an advanced position, a plurality of stop members each movable into the path of the said escapement dog to limit its movement when released to thereby determine the extent of rotation of the ratchet, character keys, and operating means including a common member controlled by said keys movable to first select said stop members and then movable to operate both the selected stop member and the releasing means.

14. A variable escapement mechanism comprising a ratchet wheel tending to rotate in a letter feeding direction, an escapement dog normally engaging said ratchet to prevent rotation in a letter feed direction, spring means to move said dog counter to letter feeding movement of the ratchet when released therefrom; a releasing slide having a tooth movable into engagement with the ratchet to lock it against rotation when the dog is released and also releasing said dog for movement by said spring, said slide having a stop for arresting said released dog in a position to determine a maximum extent of rotation of the ratchet; a plurality of stop slides having stop portions positionable by movement of said slides to arrest the released dog in intermediate positions determining lesser extents of rotation of the ratchet, and a member selectively movable to a plurality of positions, in one of which positions said member operates the first slide alone and in another of which positions the member operates the first slide in conjunction with a selected one of said plurality of said slides.

15. In a typewriting machine, in combination with the carriage, a selectively operable variable feed mechanism for the carriage, operating means for said feed mechanism including a series of selectable stop elements movable to determine the extent of feed of the feed mechanism and including a common operating member for said stop elements and selectively movable to a plurality of positions to select one of said stop elements for operation and thereby determine the extent of feed effected by said feed mechanism; selector mechanism including a series of selector elements for moving said member different extent; a series of character keys, and means controlled by said keys for operating said selector elements.

16. In a typewriting machine, in combination with the carriage; a selectively operable variable feed mechanism for the carriage including a plurality of members for operating the feed mechanism, certain of said members being selectively operable, one at a time, in conjunction with a predetermined one of said members, to operate the feeding mechanism to determine different extents of feed, and operable alone by said

one member to determine an extent of feed different from those determined by said certain ones of said members, a universal bar having an invariable stroke of movement, a member actuated by said universal bar for selecting and operating said first-named members, a series of character keys, selector elements controlled by the character keys, a selector slide having a connection to the universal bar actuated member and provided with cam means actuated by said selector elements for moving the said selector slide and said member variable extents according to the widths of the characters corresponding to the keys, and character printing means controlled by said keys.

17. In a typewriting machine, in combination with the carriage, a selectively operable variable feed mechanism for the carriage, character printing means, a universal bar automatically operated to actuate said feed mechanism each time a character is printed, character keys, selector elements controlled by the character keys, and a selector bar movable variable extents by said selector elements and selectively controlling operation of the feed mechanism by said universal bar.

18. In a typewriting machine, in combination with the carriage, a selectively operable variable speed mechanism for the carriage including a plurality of actuable members for operating the feed mechanism, certain of said members being selectively operable, one at a time, in conjunction with a predetermined one of said members to determine different extents of feed, said predetermined member also being operable alone to determine an extent of feed different from those determined by said predetermined members, a universal bar having an invariable stroke of movement, a member actuated by said universal bar and movable to both select and operate said first named members, a series of character keys, selector elements controlled by the character keys; a selector slide having a connection to the universal bar actuated member to select the first named members for operation and provided with cam means actuable by said selector elements for moving the said selector slide and said universal bar actuated member variable extents according to the widths of characters corresponding to the keys, said selector bar having two series of cam means, one of which normally cooperates with said selector elements, the other cam means including cams facing in the opposite direction to the cams of the first cam means and coacting with said selector elements when said slide is shifted to an upper case position by both a longitudinal and a lateral shifting of the slide, a case shifted part, and means whereby the case shifted part effects the shifting of said slide to said upper case position.

19. In a typwriting machine, a carriage, selectively operable variable feed mechanism for the carriage including a series of selectable operating elements representing different extents of feed of the carriage, a member movable to different positions to select said elements for operation, character printing mechanism, character keys, means controlled by said character keys for variably moving said member, and means to actuate said member to operate the selected elements.

20. A variable escapement mechanism including an escapement ratchet, an escapement dog normally engaged with said ratchet, means movable to a position to release said dog and operative in said position to lock the escapement wheel against rotation, means operative upon release of the escapement dog to move said dog counter to the rotation of the ratchet in its feed movement, a series of stop members separately movable to positions to arrest the escapement dog variable distances from its normal ratchet engaging position; said releasing means, when restored, permitting the dog to reengage the ratchet in positions determined by said stop members and when restored, also releasing the ratchet to permit the latter to rotate an extent determined by the shifted position of the dog and the normal engaging position of the dog; and a member shiftable to a plurality of positions to select one of said stop members for operation and also movable to operate both said releasing means and said selected one of the stop members.

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