Aug. 16, 1938. F. W. SCHREMP 2,127,431

TYPEWRITING AND LIKE MACHINE

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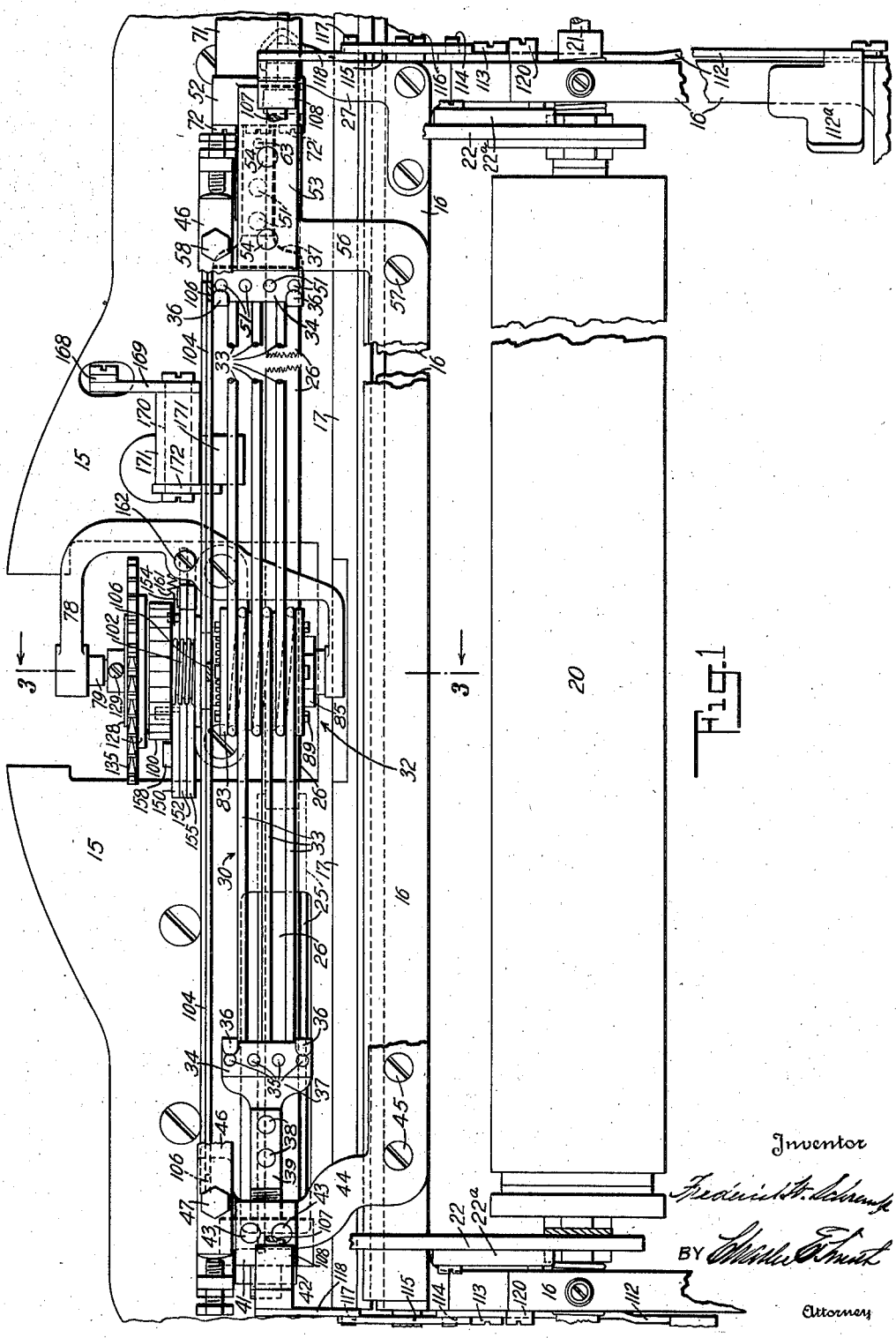


Fig. 1

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TYPEWRITING AND LIKE MACHINE

Filed May 6, 1937 6 Sheets-Sheet 2

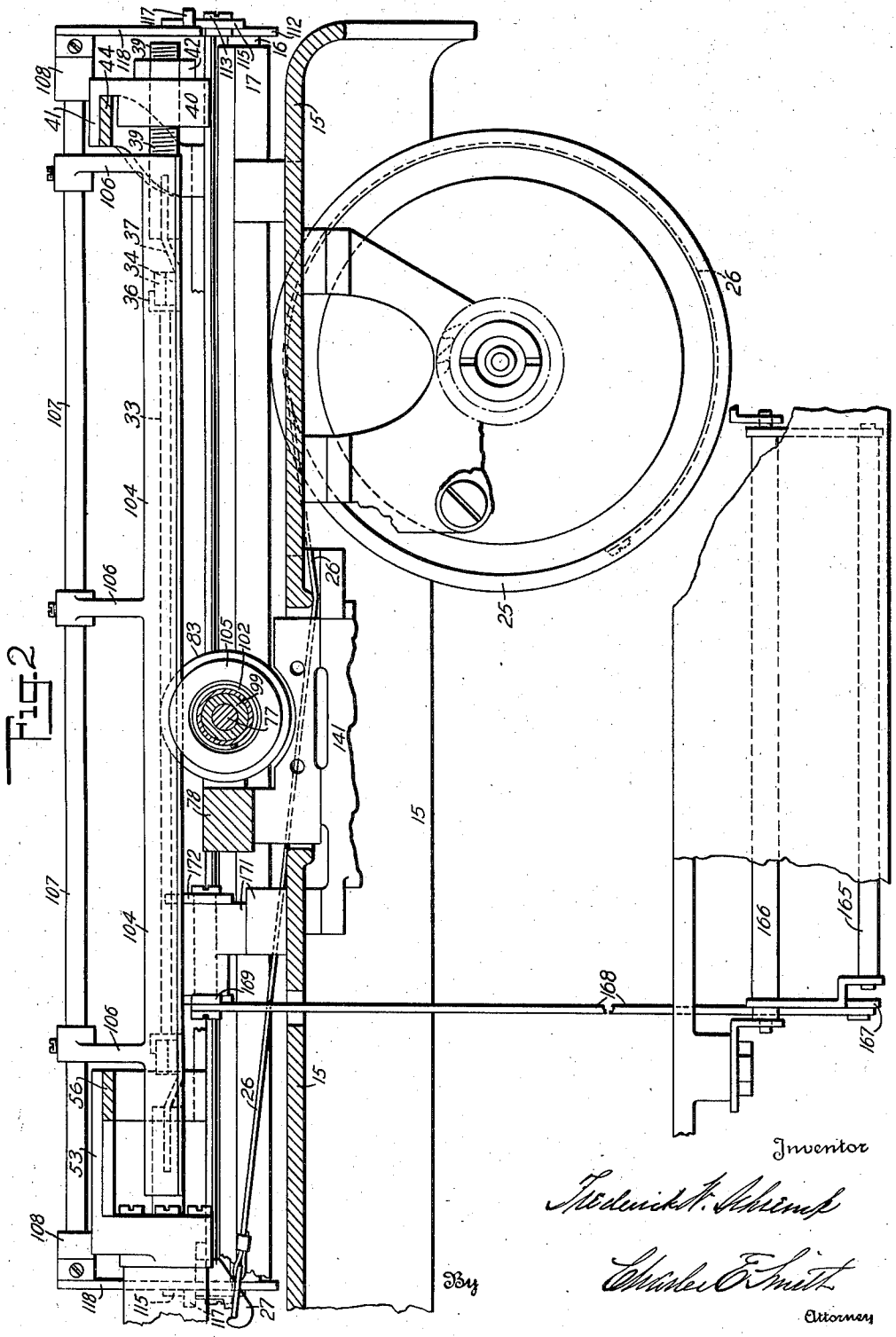


Fig. 2

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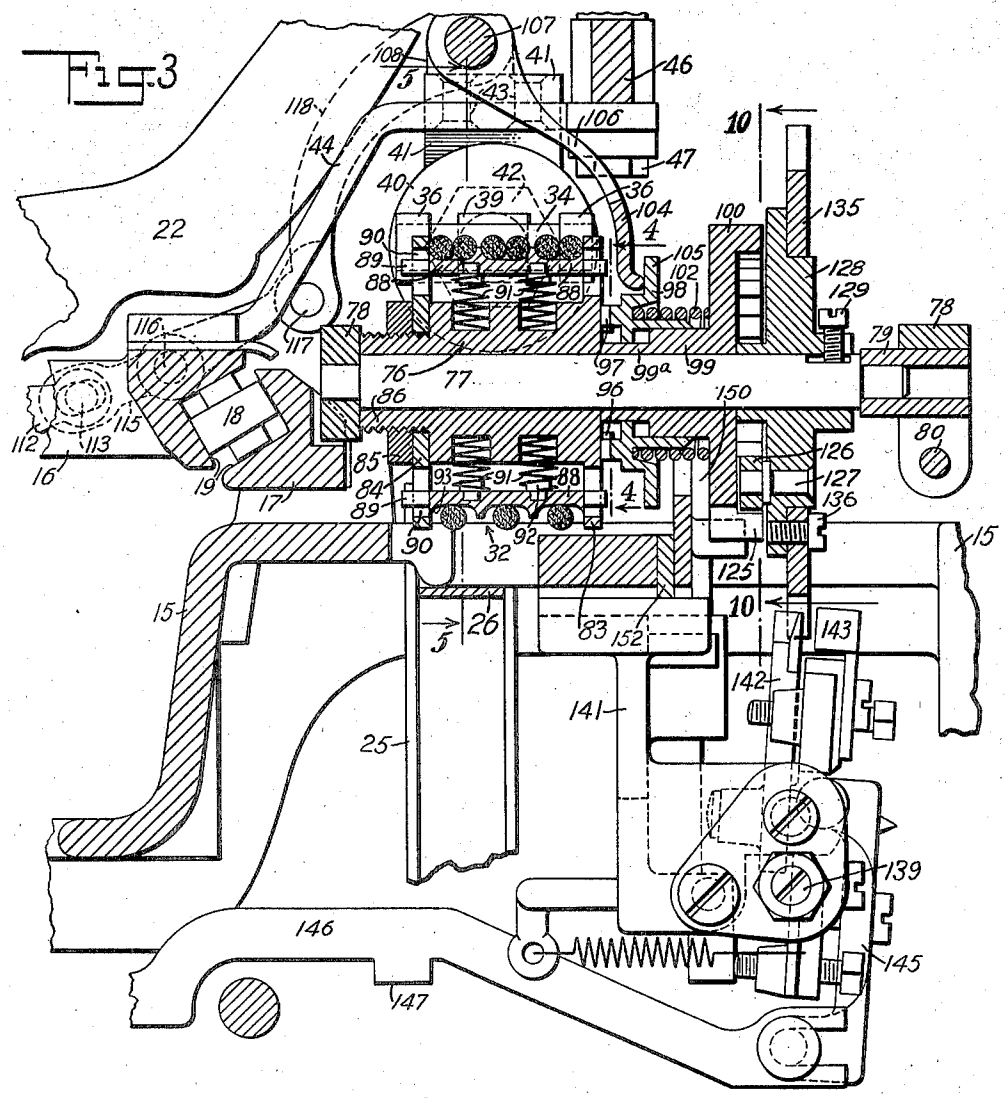
Attorney

Aug. 16, 1938. F. W. SCHREMP 2,127,431

TYPEWRITING AND LIKE MACHINE

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Fig. 3



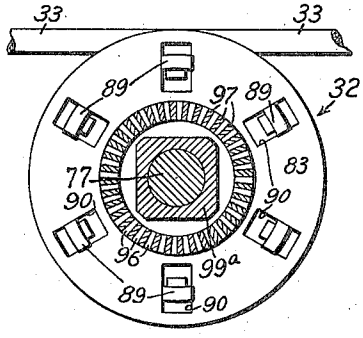


Fig. 4

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TYPEWRITING AND LIKE MACHINE

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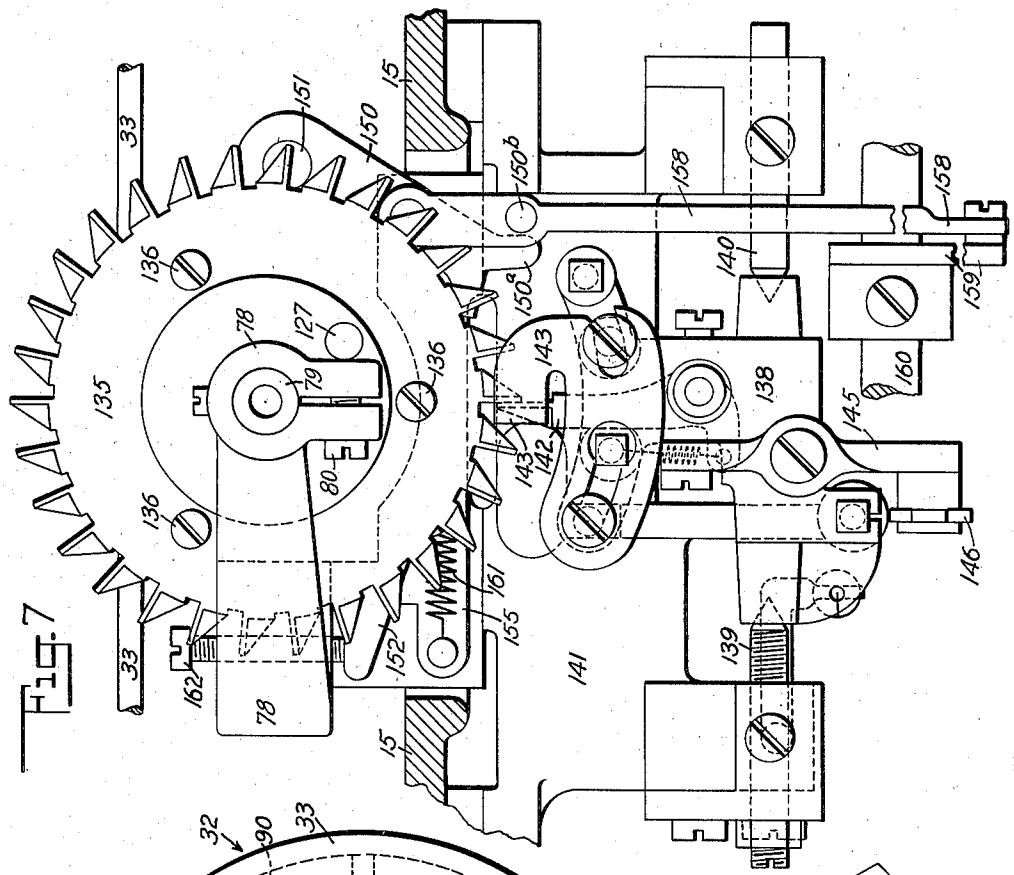


Fig. 7

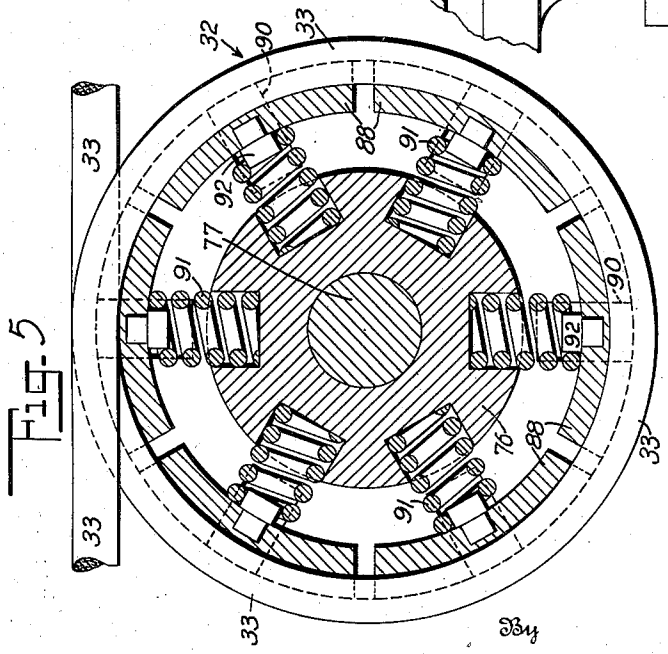


Fig. 5

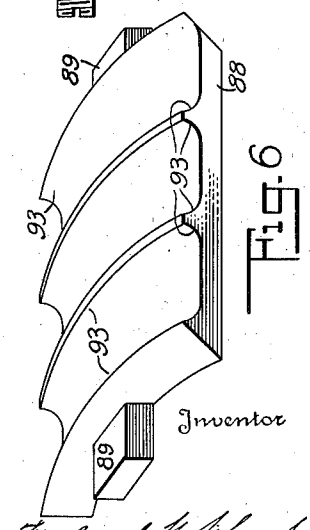


Fig. 6

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TYPEWRITING AND LIKE MACHINE

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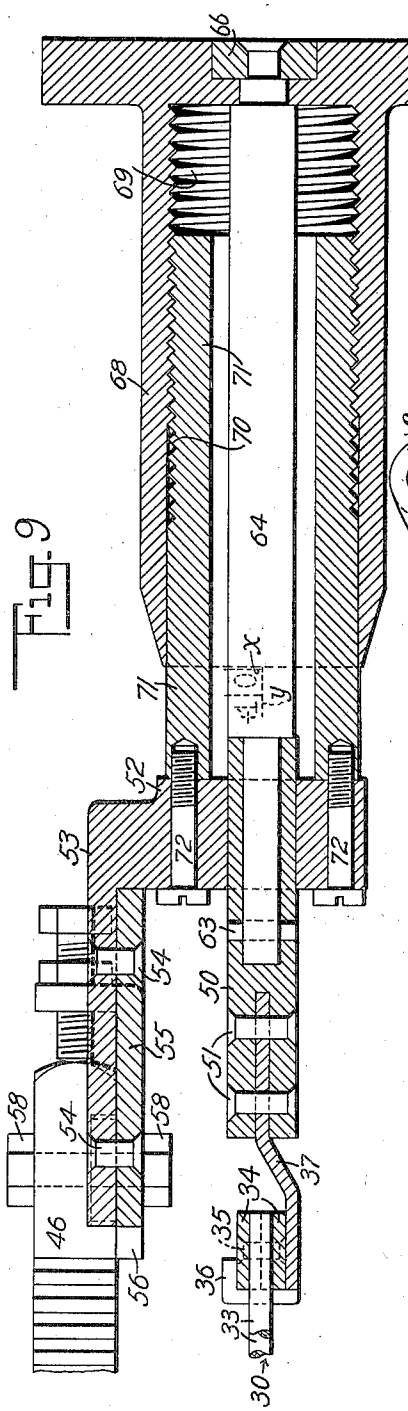


Fig. 9

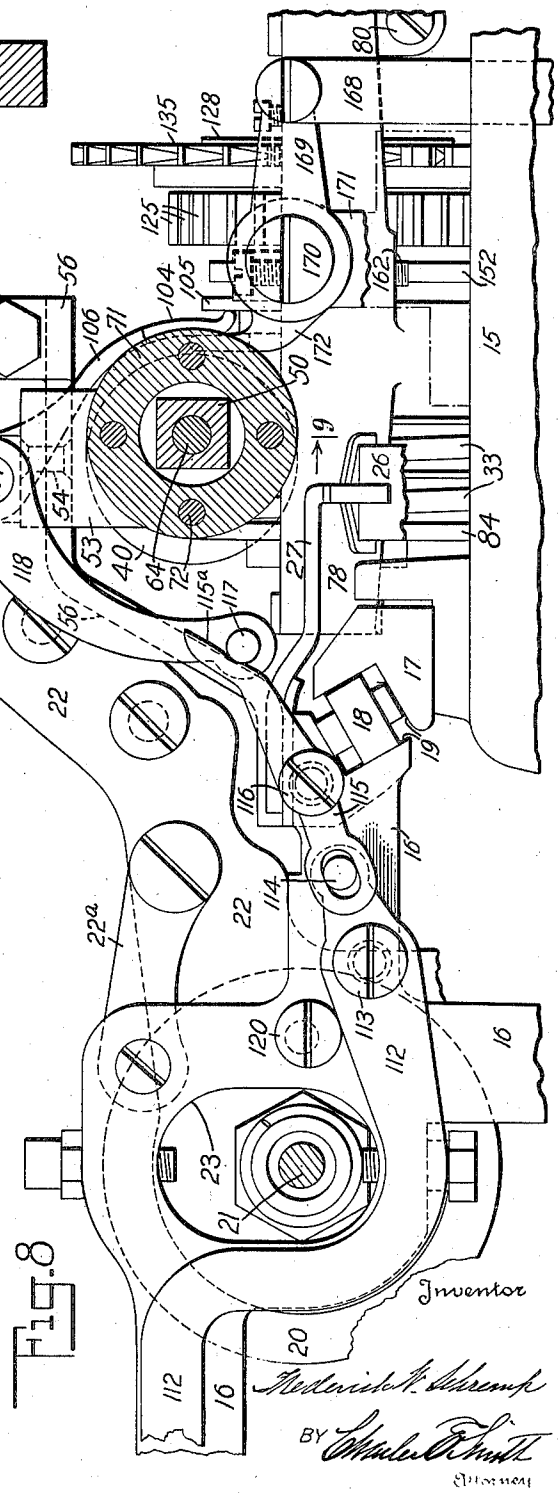


Fig. 8

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TYPEWRITING AND LIKE MACHINE

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Fig. 10

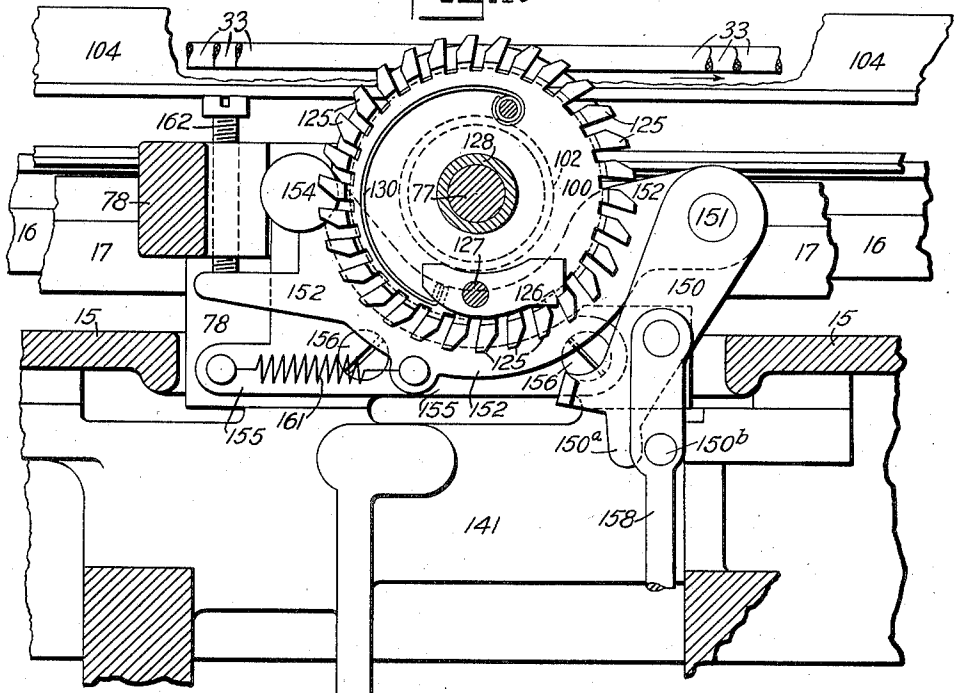


Fig. 12

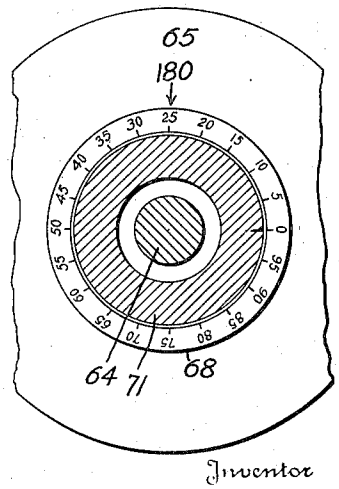
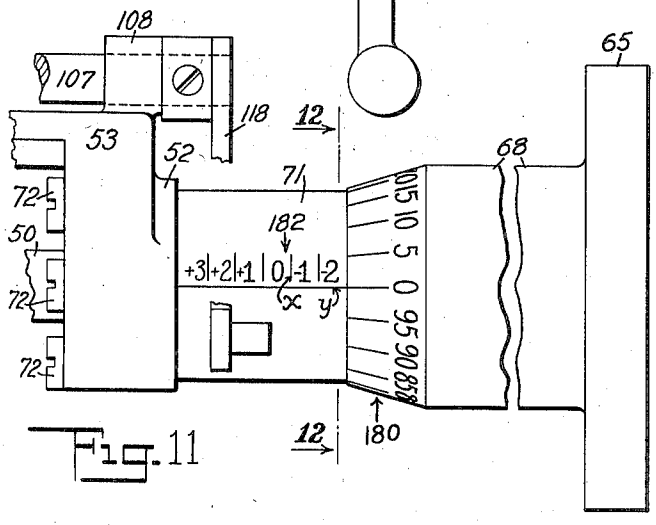


Fig. 11



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Patented Aug. 16, 1938 2,127,431

UNITED STATES PATENT OFFICE

2,127,431

TYPEWRITING AND LIKE MACHINE

Frederick W. Schremp, Elmira, N. Y., assignor to Remington Rand Inc., Buffalo, N. Y., a corporation of Delaware

Application May 6, 1937, Serial No. 141,038

17 Claims. (Cl. 197—84)

My invention relates to typewriting and like machines, and more particularly to variable carriage feed mechanism and also to back spacing mechanism by which the carriage may be back spaced to accord with the variable forward feed of the carriage.

The main object of my invention, generally stated, is to provide simple, improved and highly effective variable feed mechanism that may be set to predetermine the extent of letter spacing required.

A further object of my invention is to provide variable feed mechanism of the character specified which is incorporated in the driving connections between the carriage and the escapement wheel thereof, so that a variation in the letter feed movement of the carriage may be readily effected notwithstanding that a uniform letter feed movement of the escapement wheel may take place at all times.

A still further object of my invention is to combine a back spacing mechanism with such variable letter feed mechanism so that the back spacing movement of the carriage will at all times accord with the variable forward letter feed movement of the carriage.

Another object of my invention is to incorporate the features specified above in a standard typewriting machine without materially modifying the existing structural features thereof.

To the above and other ends which will hereinafter appear, my invention consists in the features of construction, arrangement of parts and combinations of devices hereinafter set forth and particularly pointed out in the appended claims.

In the accompanying drawings—

Fig. 1 is a fragmentary top plan view of the rear portion of a No. 16 Remington typewriting machine equipped with the devices of my invention, the view showing certain parts in section and certain other parts omitted for the purpose of clearer illustration.

Fig. 2 is a rear elevational view of a portion of the machine shown in Fig. 1, the view also showing parts in section and parts omitted.

Fig. 3 is an enlarged, detail sectional view of a portion of the construction, the section being taken on line 3—3 of Fig. 1 and viewed in the direction of the arrows at said line.

Fig. 4 is an enlarged, detail sectional view of a portion of the construction shown in Fig. 3, the section being taken on line 4—4 of Fig. 3 and viewed in the direction of the arrows at said line.

Fig. 5 is an enlarged, detail sectional view of a portion of the construction, the section being taken on line 5—5 of Fig. 3 and viewed in the direction of the arrows at said line.

Fig. 6 is an enlarged perspective view of a detail of the construction.

Fig. 7 is an enlarged fragmentary rear elevational view of the escapement mechanism, the view showing certain parts in section and certain other parts omitted.

Fig. 8 is an enlarged, fragmentary, side elevational view of the carriage and associated parts with certain parts thereof shown in section and certain parts omitted.

Fig. 9 is an enlarged sectional view of the adjusting means taken on line 9—9 of Fig. 8 and viewed in the direction of the arrows at said line, the view showing an adjusted position thereof which is in accord with the position of the parts shown in Fig. 5 for example.

Fig. 10 is an enlarged, fragmentary sectional view of the back spacing mechanism, the view being taken on line 10—10 of Fig. 3 and viewed in the direction of the arrows at said line.

Fig. 11 is an enlarged fragmentary front elevational view of the adjusting means, the view showing a different adjusted position thereof than in Fig. 9.

Fig. 12 is an enlarged, fragmentary sectional view of the adjusting means, the view being taken on line 12—12 of Fig. 11 and viewed in the direction of the arrows at said line.

I have shown my invention in the present instance embodied in a No. 16 Remington typewriting machine in which the devices of my invention may be readily incorporated without materially modifying the existing structural features of such machine. It should be understood, however, that the invention may be embodied in various types of typewriting and like machines, wherever found available.

It is one of the purposes of my invention to provide simple and effective means embodied in the driving connections between the carriage and escapement wheel therefor by which a variable letter feed of the carriage may be effected, dependent on a presetting of adjustable means

by which the variation in the feed may be controlled.

It also is one of the purposes of the present invention to combine back spacing mechanism with said driving connections so that the back spacing will always accord with the forward letter spacing irrespective of the variation in the latter.

The machine in the present instance includes the usual frame having a top plate **15**. A rectangular carriage frame or truck **16** is mounted in the usual manner in front and rear guide rails on the top plate **15** for movement from side to side of the machine. The front rail is not shown in the present drawings, but is similar to the rear stationary rail **17** shown in Fig. 3, which rail is grooved to receive crossed anti-friction rollers **18** which are also received in grooved ways **19** in the rear cross bar of the carriage frame **16**.

As shown in Fig. 8 a platen **20** is mounted by the usual shaft **21** upon a case shifting platen frame including arms **22** having bearings receiving the ends of the platen shaft **21** and which are connected to the truck **16** by the usual parallel links **22a**, whereby the platen **20** may be moved vertically relative to the carriage frame **16** for case shifting. The carriage frame **16** is provided with elongated openings **23** to allow such vertical movement of the platen shaft **21**.

The usual spring drum **25** (see Fig. 2) is mounted on the frame of the machine and a pull band **26** extending from the spring drum is connected at **27** to the carriage frame **16**. The spring drum **25** thus tends to move the carriage from right to left or in a letter space direction in the usual manner.

The portion of the complete machine which is chiefly affected by the incorporation of my invention therein is the carriage feed or escapement mechanism, or the means by which the carriage is controlled in its movement under the power of the spring drum **25** for letter space movement and for spacing between words. Accordingly in the present embodiment of my invention it is intended that the parts of the machine thus far described as well as certain other parts thereof which are not shown in the drawings may be of the usual construction employed, in the present example, in the No. 16 Remington machine.

In accordance with the present invention, I do not employ the usual carriage feed rack and pinion which ordinarily operatively connect the carriage with the escapement wheel for controlling letter space movements thereof. In the place of the usual carriage feed rack, I have provided a flexible cable, designated as a whole by the reference numeral **30**, which is connected at its ends to the carriage and is wound around and thus operatively connected to a rotatable drum, designated as a whole by the reference numeral **32**. This drum is operatively connected with the escapement wheel and accordingly replaces the usual feed pinion. The flexible cable **30** in the present instance comprises three parallel stranded wire members or strands **33** which are joined at their extreme ends by transverse clamping members **34**. Rivets **35** are employed to securely clamp the members **34** to the ends of the stranded wire strands **33**, and these clamping members **34** are received within and between hooked portions **36** of respective connecting members **37**, as shown for example in Fig. 9.

The method of connecting the left-hand end of the cable **30** to the carriage frame **16** is shown particularly in Figs. 1, 2 and 3, wherein it may be seen that the left-hand cable connecting member **37** is fixedly secured at **38** to a squared portion of an anchor rod **39** having a round threaded portion passing through a tapped opening in an enlarged hub portion **40** of a depending bracket **41**. The rod **39** is retained in the bracket **41** by a nut **42** threaded thereon and bearing against the outer surface of the hub portion **40**. The upper end of the depending bracket **41** is attached, as by rivets **43**, to a rearwardly extending bracket **44** which is fixedly secured at **45** (see Fig. 1) to the carriage frame **16**, the bracket **44** being ordinarily employed in the machine to support the left-hand end of a usual tabulator column stop bar **46** which is attached thereto at **47**.

From certain aspects of my invention any suitable means may be employed for adjustably connecting one end of the cable **30** to the carriage; the right-hand end in the present instance. The reason for thus adjusting the cable will be hereinafter described.

The means employed in the present instance adjustably connecting the right-hand end of the cable **30** to the carriage frame is shown particularly in Figs. 1, 8 and 9, wherein it may be seen that the end of the right-hand cable connection **37** is received in a slot in a pull rod **50** that is square in cross section and is securely attached to said pull rod by rivets **51**. The pull rod **50** is received for longitudinal movement only in a square opening in an enlarged hub portion **52** of a depending bracket **53** attached at **54** to a lateral extension **55** of a rearwardly extending bracket **56**. The bracket **56** is secured to the carriage frame **16** at **57** (see Fig. 1) and is also employed to support the right-hand end of the tabulator column stop bar **46** which is attached thereto at **58**.

The pull rod **50** is connected at **63** to a reduced diameter portion of a cylindrical rod **64** which is received in a center bore in the rod **50**. The right-hand end of the rod **64** is connected to a finger wheel **65** in a manner that causes said rod and finger wheel to travel together longitudinally of said rod but enables the finger wheel to be turned independently of the rod. In the present instance this connection is effected as follows. The finger wheel **65** is provided with a central, concentric depression in the outer face thereof in which a flange member **66** is received for free rotation therein. The flange member **66** is riveted and thus fixedly connected to a reduced diameter end of the rod **64**, as shown in Fig. 9. This construction enables the finger wheel **65** to be turned around the rod **64** but compels the wheel and rod to travel together longitudinally of the latter. The finger wheel **65** is provided with an inwardly extending cylindrical portion **68** having internal threads **69** coacting with external threads **70** of a fixed cylindrical member **71** surrounding the rod **64** and attached by screws **72** to the hub portion **52** of the bracket **53**.

As shown in Figs. 1, 3, 4 and 5, the drum **32** which coacts with the cable **30** comprises a hub **76** rotatively mounted on an escapement wheel shaft **77**. The shaft **77** may be of the same general construction as that ordinarily employed in the No. 16 Remington machine and is mounted in the usual manner for rotation in a U-shaped bracket **78** which is fixedly secured in the usual manner to the top plate **15** of the machine. The rear reduced diameter end of the shaft **77** is

received by a bearing sleeve 79 which is clamped by a screw 80 in an opening in the bracket 78, thus permitting removal of the shaft 77 from the bracket 78 by first withdrawing the sleeve 79.

The construction of the drum 32 is best shown in Figs. 3, 5 and 6 wherein it may be seen that the hub 76 carries a rear integral annular flange 83, and a disc 84 corresponding to the flange 83 is clamped upon the forward end of the hub 76 by a nut 85 threaded on a reduced diameter portion 86 of the hub 76. The disc 84 may further be keyed or otherwise securely locked against turning on the hub 76. The outer surface of the drum 32 about which the cable 30 is wound is formed by a plurality of separate segments or sections 88, one of which is shown in detail in Fig. 6. There are six of such sections 88 in the present form of the construction. Each of the sections 88 is mounted for radial movement relative to the axis of the hub 76 by laterally extending ear portions 89 (see Fig. 6) which are received in radial slots 90 in the flange 83 and disc 84, as may be seen in Fig. 4. Each of the sections 88 is spring pressed outwardly from the hub 76 by two coiled expansion springs 91, (see Figs. 3 and 5) the inner ends of the springs 91 being seated in recesses in the hub 76 and the outer ends surround respective pins 92 extending inwardly from the central portions of each of the sections 88. The sections 88 are all provided with three grooves 93 (see Fig. 6) on their outer surfaces, each groove being sufficiently wide to accommodate two widths of the individual cable members 33. These grooves 93 serve to separate and maintain the individual cable members 33 of the cable 30 in proper spaced relation as they are wound around the drum.

The manner of expanding and contracting the drum 32 and the purposes to be attained thereby will be hereinafter more fully described, but before doing so the manner of releasably connecting said drum to the back spacing and escapement wheels will first be described in order that a clearer comprehension of the construction as a whole may be arrived at.

An escapement wheel and a back spacing wheel, which in general construction and operation may be the same as those ordinarily employed in said Remington machine, are herein normally operatively connected with the drum 32. Inasmuch as the usual feed rack and feed pinion are not employed in the present construction, the usual method of releasing the carriage from the control of the escapement wheel by disengaging the feed rack from the feed pinion cannot be utilized in the present mechanism. Accordingly, a special carriage releasing mechanism is provided in the present instance in the form of a clutch between the drum 32 and the escapement and back spacing wheels.

Thus, the rear end of the hub 76 is provided with crown clutch teeth 96 (see Fig. 3) which normally mesh with similar clutch teeth 97 on a clutch member 98. This clutch member 98 is mounted for longitudinal movement on a forwardly extending hub portion 99 of a ratchet or back spacing wheel 100, and is spring pressed to bring its clutch teeth 97 into engagement with the clutch teeth 96 of the hub 76 by a coiled expansion spring 102 surrounding the ratchet wheel hub 99. The clutch member 98 is prevented from turning on the ratchet wheel hub 99 by a squared portion 99a (see Fig. 4) at the forward end of the hub 99 which enters a corresponding opening in the clutch member 98.

In order to afford manual release of the clutch member 98 from the hub 76, a vane or bar 104 is provided on the carriage which coacts with an annular flange 105 on the clutch member 98. The bar 104 extends longitudinally of the carriage and is of sufficient length to coact with the flange 105 regardless of the position of the carriage in its line of travel. Said bar 104 is fixedly secured by upwardly and forwardly extending arms 106 to a rock shaft 107 which is pivotally mounted in bearings 108 on the brackets 41 and 53, as may be seen in Fig. 2.

A carriage release lever 112 terminating in a release key 112a (see Figs. 1 and 8) is pivotally mounted at 113 at each end of the carriage frame 16 in the usual manner, and in the present instance, the rear ends of these release levers 112 carry pins 114 entering slots in the forward ends of respective rocker arms 115 which are likewise pivotally mounted at 116 on the carriage frame 16. The rear end of each of the rocker arms 115 is provided with a camming surface 115a coacting with an associated pin 117 at the lower end of respective arms 118 depending from and fixedly secured to opposite ends of the rock shaft 107. Thus, a downward pressure on either of the release keys 112a is effective to move the bar 104 rearwardly and release the carriage from the escapement mechanism by disengaging the clutch member 98 from the teeth 96 of the drum 32 and against the force of the restoring spring 102. An adjustable eccentric stop screw 120 (Fig. 8) is mounted at each end of the carriage frame 16 and coacts with the companion releasing lever 112 to arrest the return movements thereof and determine the normal positions of said levers and the bar 104 controlled thereby.

As will be seen from a consideration of Fig. 10 a back spacing ratchet wheel 100 of the usual construction is provided with teeth 125 that constitute internal as well as external teeth, the former coacting with a pawl 126 pivotally carried at 127 by an escapement wheel hub 128 which is secured to the shaft 77 by screws 129. The pawl 126 is pressed by a spring 130 into engagement with the inside of the teeth 125, and the teeth 125 and pawl 126 are arranged to cause the back spacing wheel 100 and the escapement wheel to turn together when the escapement wheel is advanced for letter spacing movement of the carriage, but to allow the back spacing wheel to rotate relative to the escapement wheel in the opposite direction when the carriage is being returned to begin a new line of writing. The construction also is such that when the back spacing wheel is turned backward it will transmit a back spacing movement to the carriage as will hereinafter more clearly appear.

An escapement wheel 135 is secured by screws 136 to the hub 128. This escapement wheel is of the usual construction employed in the Remington No. 16 machine except that its diameter has been increased to accommodate an increased number of teeth. In the present instance, the normal effective diameter of the drum 32 is two times the diameter of the feed pinion which it replaces, and accordingly in order to provide the normal extent of given letter spacing, the number of teeth in the present escapement wheel is two times the number of teeth usually provided when the conventional feed pinion for such spacing is used.

The usual form of feed dogs and rocker escapement devices shown in Figs. 3 and 7 control the letter spacing movement of the escapement wheel

135. Thus, the hub member 138 of the usual dog rocker is pivotally mounted on adjustable coned pivots 139 and 140 carried by a yoke-like bracket 141 secured in the usual manner to the top plate 15 of the machine. The stepping dog 142 and holding dog 143 are mounted on the rocker hub member 138 and are of the usual construction to afford a fixed movement of the escapement wheel 135 equal to one tooth-space movement thereof at each forward and back movement of the dog rocker about its pivots 139 and 140. The dog rocker is provided with a depending operating arm 145 which is operated rearwardly through a link 146 connected with the usual universal bar (not shown) which is actuated by the type bars. The link 146 is provided with a laterally extending lug 147 whereby it may be operated in a like manner by the usual space bar mechanism (not shown). Thus, the escapement mechanism is operated to afford a uniform movement of the escapement wheel 135 upon the operation of either a printing key or the space bar, and it is intended that such operation may be effected in the usual manner.

The usual form of back spacing devices is shown in the present instance to coact with the outer sides of the teeth 125 of the back spacing wheel 100. Referring to Fig. 10 it will be seen that a back spacing pawl 150 is pivotally mounted at 151 on a pawl carrier 152 which in turn is pivotally mounted at 154 on a bracket 155 secured at 156 to the escapement wheel supporting bracket 78. A key controlled link 158 connects the back spacing pawl 150 with an arm 159 carried by a rock shaft 160 (see Fig. 7), and the rock shaft 160 is operated in the usual manner by the back spacing key lever, not shown. An operation of the back spacing key lever first moves the pawl 150 upwardly around its pivot 151 into engagement with the teeth 125 of the back spacing wheel and thereafter moves the pawl, pawl carrier and wheel 100 in unison in a direction to move the carriage backward against the force of the spring drum 25. This movement is limited by a stop 150a on the pawl 150 engaging an off-set stop pin 150b on the link 158. A contractile spring 161 returns the back spacing mechanism to its normal position where it is arrested by an arm on the pawl carrier 152 engaging an adjustable stop screw 162. The teeth 125 on the back spacing wheel 100 accord in number with the teeth on the escapement wheel 135, and an operation of the back spacing mechanism causes one tooth 125 to ride over the pawl 126 so that the wheel 100 is moved one tooth-space in a reverse direction relative to the escapement wheel 135.

The tabulator mechanism which ordinarily operates to release the carriage by lifting the usual feed rack is herein slightly modified to release the carriage by operating the clutch member 98 through the releasing bar 104. In Fig. 2 it may be seen that the usual tabulator universal bar 165 which depends from a pivoted rock shaft 166 is operated rearwardly by an operation of any one of several tabulator keys (not shown). A forwardly extending arm 167 on the universal bar 166 is connected by a vertical link 168 to an arm 169 on a rock shaft 170 mounted in a bearing member 171 secured to the top plate 15. The rock shaft 170 carries a releasing arm 172 coacting with the bar 104 (see Fig. 8) whereby an operation of a tabulator key releases the carriage by moving the bar 104 rearwardly to disengage the teeth of the clutch member 98 from the teeth of the drum 32 thus freeing the carriage from control of the escapement mechanism.

It will now be clear that in the present construction the escapement wheel 135 which is driven through the drum 32 functions generally in the usual manner under control of the feed dogs to afford uniform extents of letter-feed motion of said drum. Also that uniform extents of intermittent backward motion of the drum 32 are effected through the operation of the back spacing mechanism. Notwithstanding the uniform movements of the drum 32 under the conditions pointed out above variable movements of the carriage may be effected due to the variation in the diameter of the drum as will hereinafter more clearly appear.

It will also be clear that provision has been made for releasing the drum 32 from the control of the escapement mechanism either by the usual carriage release keys or by the usual tabulator keys in the keyboard.

However, in the present construction the extent of intermittent forward or backward movement of the carriage which results respectively from this uniform extent of forward or backward movement of the drum 32 is determined by the effective diameter of the drum. In other words, the ratio between the fixed movement of the drum 32 and the movement of the carriage is determined by the diameter or the circumference of the drum around which the flexible cable 30 is wound, and in the present construction this diameter of the drum may be readily contracted or expanded by tightening or loosening the cable.

In order to contract the diameter or circumference of the drum 32 to decrease the extent of each of such intermittent carriage movements, for example, the finger wheel 65 as viewed from the right is turned in a counter-clockwise direction to pull on the right-hand end of the cable 30, and as the left-hand end thereof is fixed, this results in tightening the cable on the drum or in decreasing the length of the portion of the cable which surrounds the drum 32. This results in effecting an inward radial movement of each of the sections 88 against the force of its associated springs 91 thereby contracting the diameter of the drum. In order to expand the diameter or circumference of the drum to increase the extent of each intermittent carriage movement, the finger wheel 65 is turned in the opposite or clockwise direction which loosens the cable at the right-hand end thereof and allows that portion of the cable which surrounds the drum to increase in length thus affording an outward radial movement of each of the sections 88 under the force of its associated springs 91.

In the present construction, the brackets 41 and 53 are rigidly interconnected between opposite ends of the cable 30 by the tabulator column stop bar 46 and the carriage frame 16. This prevents any inward movement of the cable end supports when tightening the cable, thus insuring that each increment of adjustment of the finger wheel 65 will be accurately reflected in a change in diameter of the drum 32.

The adjustment of the finger wheel 65 thus determines the extent of spacing between printed characters and between words and at the same time determines that the extent of each back spacing movement shall be the same as the extent of forward spacing movement irrespective of the extent of letter spacing determined by the expansion or contraction of the drum. In order

to aid in the proper setting of the finger wheel 65, indexing means 180 are provided on a beveled end of the cylindrical portion 68 of said finger wheel, which indexing means coact with indexing means 182 on the fixed cylindrical member 71, as may be seen in Figs. 11 and 12. These indexing means 180 and 182 are arranged in much the same manner as the indexing means on an ordinary micrometer and are arranged to indicate the extent of longitudinal movement of the right-hand end of the cable 30 either to the right or left of a normal position wherein a normal standard letter space movement of the carriage is afforded.

In the present instance the setting of the finger wheel 65 for normal spacing or one in which the ordinary standard letter spacing for, say, pica type is afforded, is shown in Fig. 9, where in its inner edge of the cylinder 68 registers with the transverse line x on the fixed member 71 (see Fig. 11) which is at the right of the indicia "0" of the indexing means 182, and the indicia "0" of the indexing means 180 registers with the longitudinal line y on the fixed member 71. This setting is arranged to provide the expansible and contractible drum 32 with an effective circumference of three inches, and with 30 teeth on the escapement wheel 135 as shown, the carriage movement afforded is .1 inch which is the normal extent of letter spacing for "pica" type.

The nut 42 for the connection at the left-hand end of the cable 30 may be adjusted on the rod 39 in assembly to either tighten or loosen the left-hand end of the cable 30 and thus provide this normal letter spacing in accordance with the normal setting of the finger wheel 65.

It should be understood that if the finger wheel 65 is turned one complete revolution in either direction from the so-called normal position, the effective circumference of the drum 32 will be either increased or decreased .1 of an inch and the change in intermittent carriage movement will be one-thirtieth of this change in circumference. The finger wheel 65 is shown in Fig. 11 in a position of adjustment which contracts the circumference of the drum 32 to the extent of .2 of an inch. The change in circumference of the drum 32 produced by less than a full revolution of the finger wheel 65, or the extents of change intermediate the indices on the indexing means 182, will be indicated in terms of thousandths of an inch by the indicia on the indexing means 180 which registers with the longitudinal line y on the fixed member 71. Thus, the change from normal in the circumference of the drum 32 is indicated in every instance in decimal parts of an inch by the number to the left of the first exposed transverse mark x on the indicating means 182 at the left of the end of sleeve 68, which number is to be followed by the number on the indexing means 180 which registers with the longitudinal line y on the member 71.

It will be understood therefore, that at each setting of the finger wheel 65, the extent of letter spacing, and incidentally the extent of back spacing, will be equal to the algebraic sum of .1 inch and one thirtieth of the reading on the indexing means 180 and 182.

When the present device is to be used for justifying typewritten lines, the setting of the finger wheel 65 by the operator may be greatly facilitated by the use of a chart or the like showing the setting of the finger wheel required for effecting various extents of expansion or contraction of lines as shown for example as follows:

No. of spaces unjustified copy	Amount of justification	Setting of wheel 65	Length of space, inches	Circumference of hub 32, inches
Five inch line (pica type)				
45	+5	+.333	.111	3.333
46	+4	+.261	.109	3.261
47	+3	+.191	.106	3.191
48	+2	+.125	.104	3.125
49	+1	+.061	.102	3.061
50	0	.000	.100	3.000
51	−1	−.059	.098	2.941
52	−2	−.115	.096	2.885
53	−3	−.170	.094	2.830
54	−4	−.222	.093	2.778
55	−5	−.273	.091	2.727
Six inch line (pica type)				
55	+5	+.273	.109	3.273
56	+4	+.214	.107	3.214
57	+3	+.158	.105	3.158
58	+2	+.104	.103	3.104
59	+1	+.051	.102	3.051
60	0	.000	.100	3.000
61	−1	−.049	.098	2.951
62	−2	−.097	.097	2.903
63	−3	−.143	.095	2.857
64	−4	−.188	.094	2.813
65	−5	−.231	.092	2.769
Seven inch line (pica type)				
65	+5	+.231	.108	3.231
66	+4	+.182	.106	3.182
67	+3	+.134	.104	3.134
68	+2	+.088	.103	3.088
69	+1	+.043	.101	3.043
70	0	.000	.100	3.000
71	−1	−.042	.099	2.958
72	−2	−.083	.097	2.917
73	−3	−.123	.096	2.877
74	−4	−.162	.095	2.838
75	−5	−.200	.093	2.800

A highly efficient and reliable means has thus been provided in the driving connections between the carriage and escapement and back spacing wheels whereby variable extents of forward letter space movements of the carriage may be afforded during the unvariable extent of letter space movements of the escapement wheel, and whereby the extent of back spacing movement of the carriage will at all times accord with the variable forward letter space movement.

It will be clear that the adjustable flexible driving member in the form of a cable which surrounds an expansible and contractible drum in the present construction constitutes a direct driving connection for the escapement wheel which enables the radio between the movements of the carriage and the escapement and back spacing wheels to be readily changed, and which nevertheless remains unaffected by and are not dependent on the travel of the carriage.

The variable spacing means may be used for justifying lines in the manner described or it may be used for various other purposes. For example, the present variable spacing means provides for conveniently adjusting the letter spacing to accord with a machine provided for writing, say for example, "roman", "pica", or "elite" without changing or modifying the escapement mechanism in any manner. The present variable spacing means may also be used to readily permit the writing of open spaced headings or for emphasizing words by increasing the spacing between the letters of such words.

Although the carriage in the present instance is controlled by an escapement mechanism where-

in the movement of the escapement wheel is uniform at all times, it will be clear that the present construction will operate with equal facility if differential movements of the escapement wheel were afforded to provide different extents of spacing for narrow, medium and wide characters and provision is made for back spacing in like manner.

It is also to be understood that although the mechanism of this invention is shown embodied in a machine having a platen-carrying carriage, the invention is not restricted to machines of this type but also may be employed, for example, in flat platen machines wherein the "carriage" carries the printing instrumentalities, and the term "carriage" is employed in a generic sense to apply to either form of carriage referred to above.

It is further to be understood that various changes may be made in the construction, and certain features thereof may be employed without others without departing from my invention as it is defined in the accompanying claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a typewriting or like machine, the combination of a carriage, escapement mechanism therefor including an escapement wheel, intermediate driving connections between the carriage and said escapement wheel and through which the escapement wheel is turned, said connections including an expansible and contractible driving drum, and a driving member that surrounds said drum, the expansion and contraction of the drum affording a change in the ratio of the movements of the carriage relatively to the escapement wheel.

2. In a typewriting or like machine, the combination of a carriage, and means for controlling the letter space movements thereof and for varying the extents of such movements comprising a rotative member capable of being expanded and contracted to vary the diameter thereof, and means coacting with said member to cause the change in the diameter thereof to be reflected in and determine the extent of letter space movement afforded the carriage.

3. In a typewriting or like machine, the combination of a carriage, and means for controlling the letter space movements thereof and for varying the extents of such movements comprising a rotative member capable of being expanded and contracted to vary the diameter thereof, means coacting with said member to cause the change in the diameter thereof to be reflected in and determine the extent of letter space movement afforded the carriage, and settable means for predetermining the amount of expansion and contraction of said member and thereby regulate the variable letter space movements of the carriage.

4. In a typewriting or like machine, the combination of a carriage, and means for controlling the letter space movements thereof and for varying the extents of such movements comprising a rotative member capable of being expanded and contracted to vary the diameter thereof, means coacting with said member to cause the change in the diameter thereof to be reflected in and determine the extent of letter space movement afforded the carriage, settable means for predetermining the amount of expansion and contraction of said member and thereby regulate the variable letter space movements of the carriage, and indexing means to aid in the proper setting of said settable means.

5. In a typewriting or like machine, the combination of a carriage, an escapement mechanism therefor including an escapement wheel, a rotative drum expansible and contractible to vary the diameter thereof, means for operatively connecting said drum with the escapement wheel, a cable surrounding said drum and operatively connected to the carriage, and adjustable means for controlling the expansion and contraction of said drum.

6. In a typewriting or like machine, the combination of a carriage, an escapement mechanism therefor including an escapement wheel, a rotative drum expansible and contractible to vary the diameter thereof, means for operatively connecting said drum with the escapement wheel, a cable surrounding said drum and connected at one end to the carriage, and adjustable means by which the other end of said cable is connected to the carriage and by which the expansion and contraction of the drum is controlled and the variation in the letter spacing of the carriage is brought about.

7. In a typewriting or like machine, the combination of a carriage, an escapement mechanism therefor including an escapement wheel, a rotative drum expansible and contactible to vary the diameter thereof, means for operatively connecting said drum with the escapement wheel, a cable surrounding said drum and connected at one end to the carriage, adjustable means by which the other end of said cable is connected to the carriage and by which the expansion and contraction of the drum is controlled and the variation in the letter spacing of the carriage is brought about, and indexing means for said adjustable means to aid in the setting thereof and thereby predetermine the extent of letter spacing.

8. In a typewriting or like machine, the combination of a carriage, and means for controlling the letter space movements thereof and for varying the extents of such movements comprising a rotative member including a series of segmental sections forming the periphery thereof, spring means tending to force said sections outwardly, a cable surrounding said sections and operatively connected to the carriage, and adjustable means for tightening or loosening said cable on said sections to contract or afford an expansion thereof and thus vary the diameter of said rotative member and the extent of letter feed movements of the carriage.

9. In a typewriting or like machine, the combination of a carriage, escapement mechanism therefor including an escapement wheel, intermediate driving connections between the carriage and said escapement wheel and through which the escapement wheel is turned, said connections including a rotative member operatively connected to the escapement wheel and having a series of segmental sections forming the periphery of the rotative member and mounted for radial movement towards and from the axis thereof, spring means which tend to move said sections outwardly, a cable which surrounds said sections and which is operatively connected to the carriage, and adjustable means connecting said cable with the carriage and with the aid of which the cable may be tightened to effect a contraction of said sections or may be loosened to afford an expansion of said sections, thereby changing the diameter of said rotative member and the extent of letter feed movements of the carriage.

10. In a typewriting or like machine, the combination of a carriage, escapement mechanism therefor including an escapement wheel, a back

spacing wheel operatively connected to turn therewith in one direction and to turn independently of the escapement wheel in the opposite direction, a back spacing pawl coacting with said back spacing wheel, and intermediate driving connections between said back spacing wheel and the carriage comprising means by which the ratio between the movements of the escapement and back spacing wheels and the carriage may be changed to afford different extents of letter space movements of the carriage, said driving connections comprising an expansible and contractible driving drum operatively connected to said back spacing wheel, a cable surrounding said drum and operatively connected to said carriage, and adjustable means for controlling a contraction and expansion of said drum.

11. In a typewriting or like machine, the combination of a carriage, escapement mechanism therefor including an escapement wheel, a back spacing wheel operatively connected to turn therewith in one direction and to turn independently of the escapement wheel in the opposite direction, a back spacing pawl cooperative with said back spacing wheel, and intermediate driving connections between said back spacing wheel and the carriage comprising means by which the ratio between the movements of the escapement and back spacing wheels and the carriage may be changed to afford different extents of letter space movements of the carriage, said driving connections comprising a rotative member operatively connected to said back spacing wheel and having a series of sections movable towards and from the axis of said rotative member, spring means which tend to move said sections away from the axis of the rotative member, a cable surrounding said sections and operatively connected to the carriage, and adjusting means for tightening or loosening the cable on said sections to vary the diameter of the rotative member and thereby change the extent of letter feed movements of the carriage afforded by the escapement and back spacing wheels.

12. In a typewriting or like machine, the combination of a carriage, escapement mechanism therefor including an escapement wheel, a back spacing wheel operatively connected to turn therewith in one direction and to turn independently of the escapement wheel in the opposite direction, a back spacing pawl coacting with said back spacing wheel, and intermediate driving connections between said back spacing wheel and the carriage comprising means by which the ratio between the movements of the escapement and back spacing wheels and the carriage may be changed to afford different extents of letter space movements of the carriage, said driving connections comprising a rotative member connected to said back spacing wheel and having a series of sections movable towards and from the axis of said rotative member, spring means which tend to move said sections away from the axis of the rotative member, a cable surrounding said sections and operatively connected to the carriage, adjusting means for tightening or loosening the cable on said sections to vary the diameter of the rotative member and thereby change the extent of letter feed movements of the carriage afforded by the escapement and back spacing wheels, and indexing means associated with said adjusting means to predetermine the extent of differential feed afforded by the adjustment of said adjustable means.

13. In a typewriting or like machine, the combination of a carriage, an escapement wheel, a back spacing wheel, pawl and ratchet mechanism for causing the back spacing and escapement wheels to turn together in one direction and for affording a backward movement of the back spacing wheel independently of said escapement wheel, back spacing means coacting with said back spacing wheel, an expansible and contractible drum connected to said back spacing wheel, a cable surrounding said drum and connected to said carriage, and adjustable means for tightening and loosening said cable on said drum.

14. In a typewriting or like machine, the combination of a carriage, escapement mechanism therefor including an escapement wheel, a rotative drum expansible and contractible to vary the diameter thereof, a cable surrounding said drum and operatively connected to the carriage, adjustable means for controlling the expansion and contraction of said drum, and releasable connecting means between said drum and said escapement wheel for freeing the carriage from control of its escapement mechanism.

15. In a typewriting or like machine, the combination of a carriage, escapement mechanism therefor including an escapement wheel, a rotative drum expansible and contractible to vary the diameter thereof, a cable surrounding said drum and operatively connected to the carriage, adjustable means for controlling the expansion and contraction of said drum, connecting means between said drum and said escapement wheel, and means on said carriage coacting with said connecting means at any point in the travel of the carriage for disconnecting said drum from said escapement wheel and thereby freeing the carriage from control of its escapement mechanism.

16. In a typewriting or like machine, the combination of a carriage, an expansible and contractible drum operatively connected to the carriage, an escapement wheel operatively connected to said drum, means coacting with said escapement wheel for affording uniform extents of intermittent forward movements of said drum, and means for varying the circumference of said drum for affording variable extents of forward movements of the carriage during the uniform forward movements of said drum.

17. In a typewriting or like machine, the combination of a carriage, an expansible and contractible drum operatively connected to the carriage, a back spacing wheel operatively connected to said drum, means coacting with said back spacing wheel for effecting uniform extents of intermittent back spacing movements of said drum, and means for varying the circumference of said drum for effecting variable extents of back spacing movements of the carriage during the uniform back spacing movements of said drum.

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