Nov. 22, 1955 J. D. DURKEE 2,724,479

TYPEWRITER CARRIAGE FEED AND RETURN

Filed Sept. 30, 1952 4 Sheets-Sheet 1

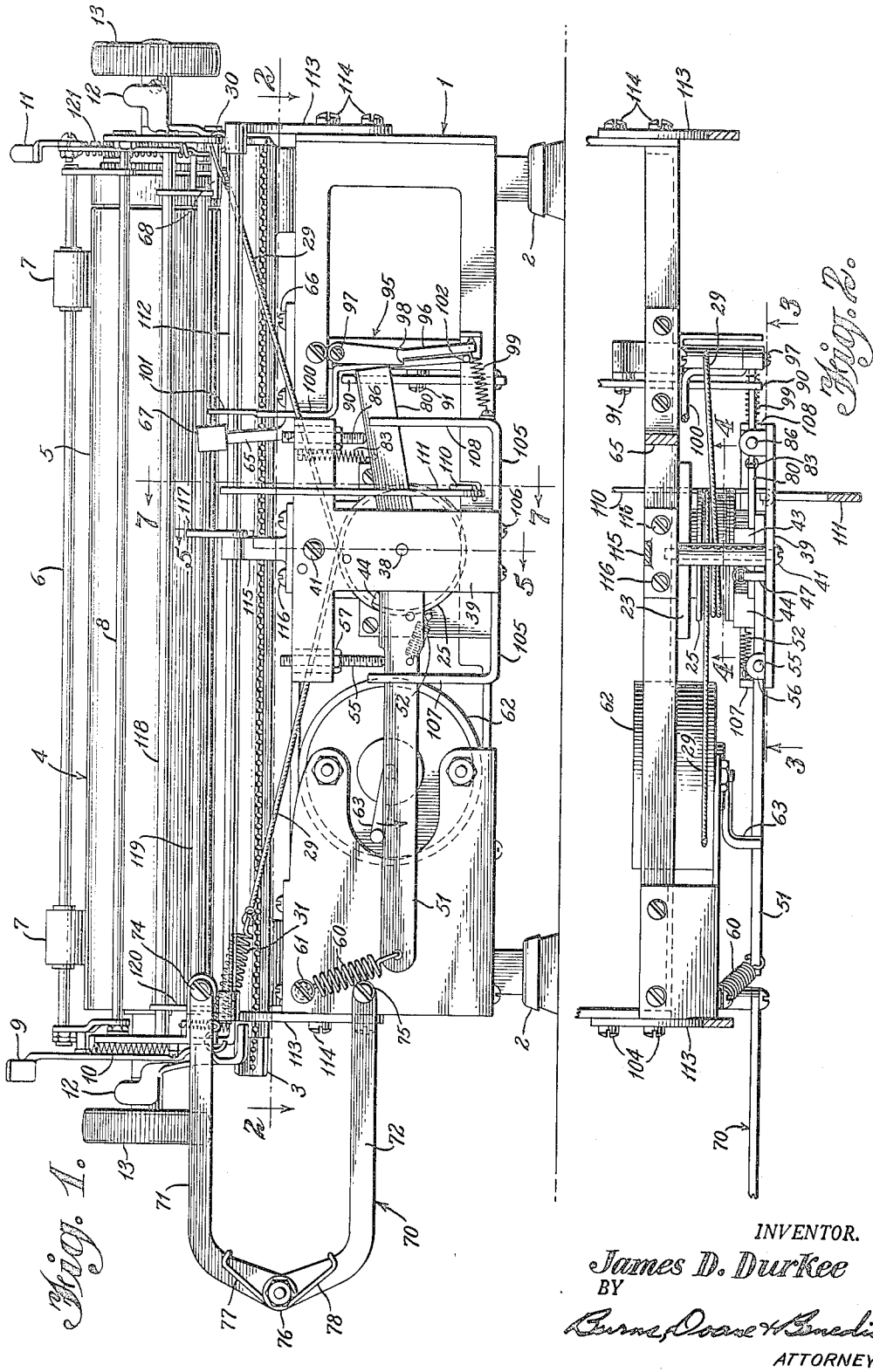


Fig. 1.

Fig. 2.

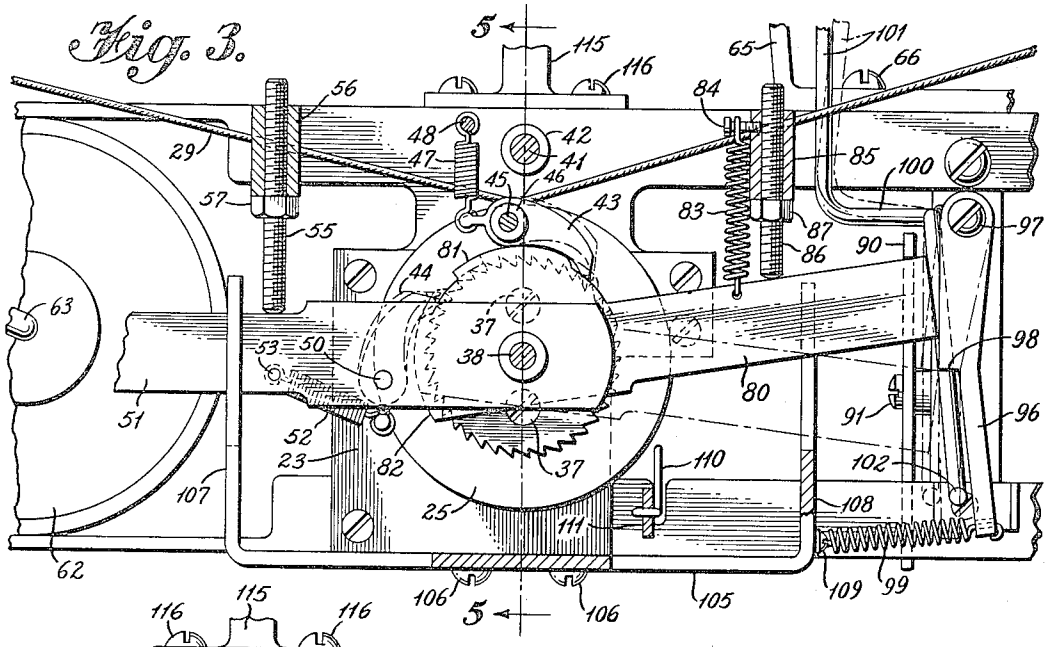
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ATTORNEYS

Nov. 22, 1955 J. D. DURKEE 2,724,479

TYPEWRITER CARRIAGE FEED AND RETURN

Filed Sept. 30, 1952 4 Sheets-Sheet 2

Fig. 3.



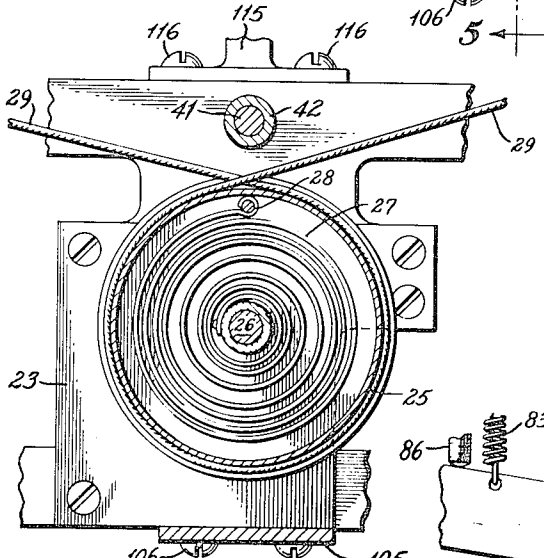
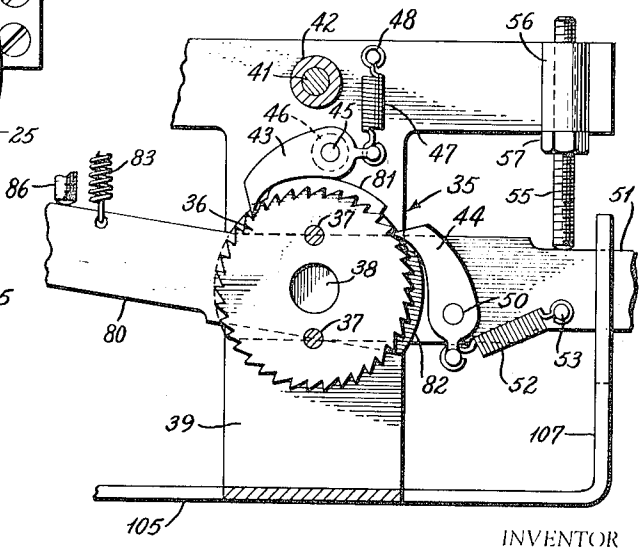


Fig. 4.

Fig. 6.



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Nov. 22, 1955 J. D. DURKEE 2,724,479

TYPEWRITER CARRIAGE FEED AND RETURN

Filed Sept. 30, 1952 4 Sheets-Sheet 3

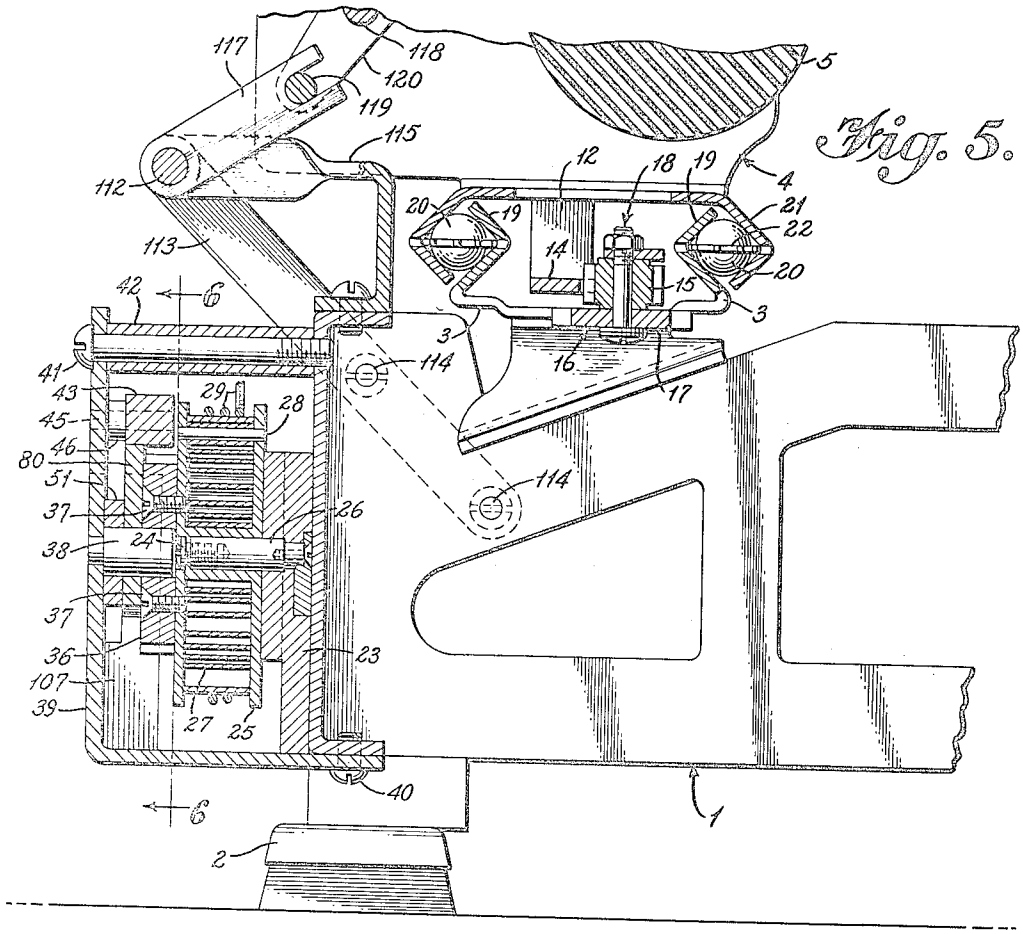


Fig. 5.

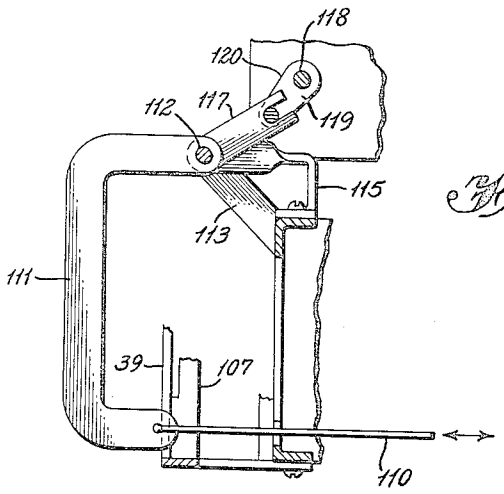


Fig. 7.

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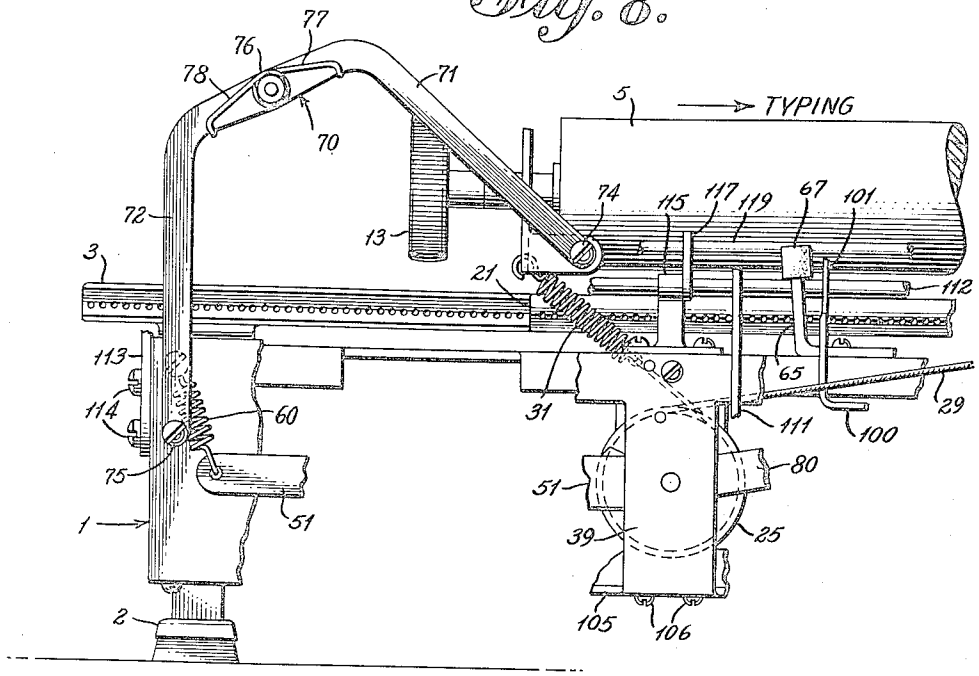
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Nov. 22, 1955 J. D. DURKEE 2,724,479

TYPEWRITER CARRIAGE FEED AND RETURN

Filed Sept. 30, 1952 4 Sheets-Sheet 4

Fig. 8.



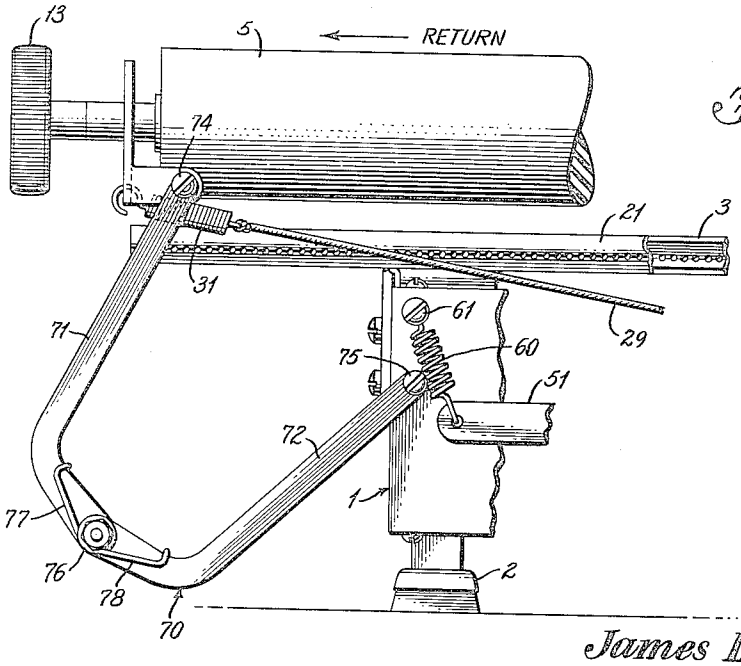


Fig. 9.

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2,724,479

TYPEWRITER CARRIAGE FEED AND RETURN

James D. Durkee, Arlington, Va., assignor, by direct and mesne assignments, to Dualex Corporation, a corporation of Delaware

Application September 30, 1952, Serial No. 312,308

11 Claims. (Cl. 197—68)

This invention relates generally to an improved typewriter construction and more particularly to a typewriter carriage actuating mechanism to produce appropriate movement in the letter spacing direction and return of the carriage.

In the present commercially available typewriters a rotatably mounted drum is usually provided around which a driving tape is wound with one end of such tape connected to the carriage. Inside this drum a spring is assembled tending to rotate such drum, thereby winding up the driving tape and drawing the carriage in the letter spacing direction as each letter is struck. Although this expedient for imparting motion to the carriage is practically standard in the typewriter field, it possesses a serious disadvantage in that the spring which rotates the tape drum stores a large driving force when the carriage is at the beginning of a typed line so that when the carriage has reached the end of this line the spring will still possess the necessary energy to draw the carriage forward quickly and positively under control of the escapement mechanism actuated upon each operation of a typewriting key. Thus, it will be recognized that by reason of this high energy in the tape winding spring at the beginning of the line an excessive strain is placed on the escapement mechanism by reason of this heavy draw exerted by the carriage driving tape at this particular position of the carriage. It is of course obvious that it is not expedient to use a weaker spring in this tape drum since this would merely result in inefficient or sluggish operation of the carriage as it reaches the end of the typed line.

It is also well known in the typewriter art that various attempts have been made to provide an efficient carriage returning means on both the manually and electrically operated typewriters. On the manual typewriter these attempts have been so unsuccessful that present day machines persist in leaving the returning operation to the typist operating the machine. The difficulty in prior attempts to use a spring carriage return on a manual machine has resulted from the inability to provide a stop which could overcome the inertia built up by the carriage in its free return movement. This inertia is developed by the powerful carriage return spring used to return the carriage for a new line of typing. A strong return spring is necessary in prior structures to insure that the carriage will make a complete positive return to begin a new line even in the event that carriage return is desired after only a small portion of a line has been completed. Even the strongest stops soon become battered and misaligned in attempting to overcome this carriage inertia. Elaborate braking devices have been adopted to overcome this disadvantage. These devices are ineffective in that they interfere with complete returning of the carriage should it be desired to return the carriage after only a portion of a line has been typed.

On the power operated typewriters the present day models couple the output from a powerful electric motor to the carriage returning device by means of elaborate gear arrangements or friction drives. Although this method does accomplish carriage return it is too expensive for incorporation on the average mass produced typewriter. It too possesses the characteristic of battering the machine

stop to a point where the left-hand margin of the typed page becomes uneven.

In the carriage return structures presently known, a key is provided on the conventional keyboard of the typewriting machine which is actuated to initiate return of the carriage. This key must be held in actuating position for a sufficient length of time to allow the carriage to complete its return to begin a new line of typing. Thus, if the key is only pressed for an instant, the carriage may not complete its return but instead be stopped at some intermediate point between the beginning and end of the typed line. It will easily be recognized that with modern speed typing it is undesirable to break the typist's rhythm of typing by requiring that the carriage return key be held depressed for a sufficient length of time to insure complete return of the carriage. Thus, it is desirable that a quick striking or instantaneous actuation of the carriage releasing device be effective to insure complete return of the carriage.

The above discussed disadvantages of existing typewriters are effectively overcome by the integrated carriage feed and return structure incorporated in the typewriter of this invention.

A principal object of this invention is to provide a carriage actuating mechanism which may be incorporated in present typewriter constructions with a minimum of change in the typewriter by utilizing the various elements present on the conventional typewriter.

Another object of this invention is to produce a typewriter wherein smooth and even carriage movement in the letter spacing direction and in returning to begin a new line of typing will be accomplished.

A further object of this invention is to provide a typewriter carriage feeding structure wherein a substantially uniform force will be applied to move the carriage in the letter spacing direction under control of the typewriter escapement mechanism.

Still another object of this invention is to provide a typewriter carriage return structure embodying a compensating mechanism together with a coiled return spring to effect uniform carriage return movement without undue slamming at the end of the return movement but at the same time insuring complete and positive return of the typewriter carriage.

A further object of this invention is to produce a typewriter carriage mechanism embodying a return actuator wherein instantaneous and momentary operation of the carriage return mechanism will result in complete return of the carriage preparatory to typing the next line.

These and other objects and advantages of the invention will appear from the following specification and drawings.

A specific embodiment of the invention is shown in the accompanying drawings in which:

Figure 1 is a rear elevational view of a typewriting machine embodying this invention.

Figure 2 is a horizontal sectional view of the carriage actuation mechanism taken on line 2—2 of Figure 1.

Figure 3 is a vertical sectional view taken on line 3—3 of Figure 2.

Figure 4 is a vertical sectional view taken on line 4—4 of Figure 2.

Figure 5 is a vertical sectional view taken on line 5—5 of Figure 1.

Figure 6 is a detailed sectional view of the ratchet mechanism and cam release therefor taken on line 6—6 of Figure 5.

Figure 7 is a detailed sectional view taken on line 7—7 of Figure 1 showing the line feed actuating linkage.

Figure 8 is a partial rear elevational view illustrating the typewriter carriage return compensator with the carriage positioned at the end of a typed line.

Figure 9 is a partial rear elevational view similar

to Figure 8 but with the typewriter carriage shown near its completely returned position.

Referring to the drawings, and more particularly to Figure 1 thereof, the rear side of a typewriter base 1 is illustrated, with the conventional rubber cushioned supporting legs 2. Mounted on the typewriter base 1 on supporting rails 3 is a laterally movable carriage 4. This carriage is provided with a conventional rubber covered rotatable platen 5, as is well known in the art.

The paper bail 6 provided with the usual paper engaging rubber rollers 7 is illustrated as pivotally mounted on the carriage by rod 8. A lever 9 is pivotally connected to the left-hand of the carriage 4 as shown in Figure 1 and is connected by appropriate linkages (not shown) to release the paper held around platen 5 and also lift the paper bail 6 against the tension of spring 10. At the right-hand end of the carriage, as shown in Figure 1, a line feed lever 11 is shown connected for manual operation of the line feed mechanism as may be desired. The details of this line feed mechanism are not illustrated since they form no part of the instant invention.

At either end of the carriage 4, release levers 12 are illustrated adjacent to the usual platen knobs 13. These levers 12 are pivotally connected to the opposite ends of the carriage 4 and function to move a rack 14 into and out of engagement with the gear 15 of an escapement mechanism 16. As shown in Figure 5, the rack 14, gear 15 and escapement mechanism 16 are positioned beneath the ball bearing support structure for the carriage 4. As is well known in the art, an escapement mechanism is utilized in typewriter construction to permit regulated carriage movement in the letter spacing direction as each key on the typewriter keyboard is struck. Thus, although the details of the escapement mechanism 16 are not illustrated on the drawing, it will be recognized that the escapement gear 17 rotatably supported on the nut and bolt 18, will intermittently permit lateral movement of the typewriter carriage 4 as a typewriter key is struck to permit escapement gear 17 to move through an arc equal to the spacing between two teeth of the gear 17, as is well known in the typewriter art. Likewise, it will be readily understood that depressing of either one of the levers 12 connected to rack 14 will move this rack out of engagement with the teeth of gear 15 and thereby permit movement of the carriage in the absence of the normal intermittent releasing action of the escapement mechanism 16.

Again referring to Figure 5, it will be seen that the supporting rails 3 secured to the base 1 are formed to provide right angle trackways 19 for the ball bearings 20. The carriage 4 is provided with a channel 21, the sides of which are likewise formed to provide right angle trackways opposite to the right angle trackways 19. The ball bearings 20 are inserted between these opposed trackways and suitably held in proper location in the trackways by apertured cage gears 22. The teeth of cage gears 22 engage spaced perforations along the length of the opposed trackways so that lateral movement of the carriage 4 will impart rotation to the cage gears 22 and retain the ball bearings 20 properly located between the opposed trackways.

In the improved carriage actuating mechanism of this invention, a drum 25 is rotatably mounted on a stationary axle 26 at the rear of the typewriter. This axle is suitably attached to a supporting plate 23 which in turn is connected to the back of the typewriter base 1. A screw 24 threaded into the outer end of axle 26 retains the drum 25 on the axle. Drum 25 contains a carriage returning spring 27, one end of which is secured to the stationary axle 26 and the other end of which is fastened to pin 28 which rotates with the drum 25.

The outer cylindrical surface of the drum 25 has the carriage driving cord 29 wrapped therearound. One end of this driving cord 29 is secured to one end of the carriage 4 by a clip 30, as shown by the right-hand end of the carriage in Figure 1. The other end of the driving cord 29 is resiliently connected to the opposite end of the carriage by coupling spring 31.

It will thus be seen that rotation of the drum 25 in a clockwise direction as viewed in Figure 1, will transmit by reason of the drive cord 29 a force through spring 31 to urge the carriage 4 in the letter spacing direction. At the same time, clockwise rotation of drum 25 will build up or increase the tension of the return spring 27 as more clearly shown in Figure 4.

On the other hand, counter-clockwise rotation of the drum 25 as viewed in Figure 1, will transmit a pulling force on driving cord 29 through clip 30 to urge the carriage 4 to return preparatory to the typing of a new line.

To impart clockwise rotation to the drum 25 a ratchet mechanism 35 is employed. In this mechanism, as illustrated particularly in Figures 3 and 6, a ratchet wheel 36 is secured to the outer surface of the drum 25 coaxially therewith as by screws 37. To facilitate disassembly of the unit a separate axle 38 is rigidly secured to a housing 39 to serve as a rotational support for the ratchet wheel and other elements to be described. This housing 39 is secured to the underside of the base 1 as by a screw 40 and is secured to the back of the typewriter base by a bolt and spacer sleeve 41 and 42, respectively. A holding pawl 43 and a driving pawl 44 are mounted to engage the ratchet wheel 36 of the ratchet mechanism 35.

The holding pawl 43 is pivotally mounted on pin 45 secured to the housing 39. A spacing washer 46 is positioned on the pin 45 between the housing 39 and pawl 43 to properly locate this pawl with respect to the teeth of the ratchet wheel 36. Also, a helical spring 47 is connected between one end of the pawl 43 and a pin 48 on the housing 39 to constantly urge the holding pawl 43 into engagement with the teeth of ratchet wheel 36.

The driving pawl 44 is pivotally mounted by pin 50 on the ratchet crank 51. As in the case of holding pawl 43, a helical spring 52 is connected between the outer end of the driving pawl 44 and pin 53 on the ratchet crank 51 so as to continuously urge the inner end of pawl 44 into engagement with the teeth of ratchet wheel 36.

The ratchet crank 51 carrying the driving pawl 44 is mounted to pivot on axle 38. Thus, upon downward movement of the ratchet crank 51, viewed in Figure 3 for example, the driving pawl 44 will ride over a tooth of the ratchet wheel 36 while the holding pawl 43 prevents counter-clockwise rotation of the ratchet wheel and drum 25 connected thereto. Likewise, upward movement of the ratchet crank 51 will impart clockwise rotation to the ratchet wheel 36 by engagement of driving pawl 44 therewith and holding pawl 43 will ride over a tooth of the ratchet wheel 36.

An adjustable threaded bolt 55 is screwed into a boss 56 on the housing 39 to limit the upward movement of the ratchet crank 51. A locking nut 57 is screwed onto bolt 55 to lock the position of this bolt at the desired limit for the ratchet crank 51.

Referring again to Figure 1, it will be noted that the outer end of the ratchet crank 51 is provided with a helical spring 60 connected between the end of the ratchet crank and an attaching screw 61 threaded into typewriter base 1. This spring 60 serves to retain the ratchet crank 51 in its upper position against the limiting bolt 55 and further cooperates with the spring 31 between driving cord 29 and the carriage 4 in a manner to provide substantially uniform force for movement of the carriage in the letter spacing direction, as is explained below.

In the particular embodiment of the invention illus-

trated in the accompanying drawings, a rotary type solenoid 62 having a driving arm 63 is shown bolted to the rear of the typewriter base 1 with the driving arm 63 engaging the ratchet crank 51. In this particular embodiment this solenoid 62 is energized for an instant as each and every function in producing the typed material is performed. The energization of this solenoid may suitably be performed by a switch arrangement (not shown) so that a surge of current operates the solenoid, thereby reciprocating the ratchet crank 51 when a key is struck or some other operation performed on the typewriter. It will readily be apparent that the ratchet crank 51 may suitably be operated by any other equivalent mechanism, such as a power transmitting lever connected to a common bar beneath the keys of the typewriter keyboard, or any other suitable power operating mechanism which will impart a reciprocating movement to the ratchet crank 51 upon the performance of a stroke or other operation on the typewriter.

The operation of the above described structure is as follows:

An impulse of current flowing through the rotary solenoid 62 causes the driving arm 63 to move through an arc of a circle in the direction as indicated by the arrow on Figure 1. This movement, driving ratchet crank 51 downwardly, increases the tension on return spring 60. At the same time, the driving pawl 44 mounted on ratchet crank 51 moves across one tooth of the ratchet wheel 36 while the holding pawl 43 engages the ratchet wheel and prevents its counter-clockwise rotation. When the current impulse through solenoid 62 expires the arm 63 will return to the position shown in Figure 1 and the return spring 60 will draw the ratchet crank 51 upwardly to engage the stop bolt 55, and at the same time the driving pawl 44 engaged with ratchet wheel 36 imparts clockwise rotation to the ratchet wheel 36 and the drum 25 connected thereto.

The holding pawl 43 during this movement of the ratchet wheel 36 will ride over a tooth of the ratchet wheel and engage the next tooth on the wheel in readiness for the next reciprocation of the ratchet crank 51. The rotation of drum 25, as pointed out above, has two effects. First, the tension on the return spring 27 within the drum 25 is increased and, secondly, a force is applied to the driving cord 29 to tension the spring 31 which connects the driving cord to the left-hand of the carriage as shown in Figure 1. It will be appreciated that the tension or pulling by driving cord 29 and spring 31 imposed between the carriage and cord will not cause movement of the carriage in the letter spacing direction unless the escapement mechanism 16 has been actuated to allow the carriage to move laterally through a distance to properly space for a letter which has been printed. Since the movement of the drum 25 is clockwise, it will be obvious that the other portion of driving cord 29 connected to the carriage 4 by a clip 30 will become slack. Thus, during movement of the carriage in the letter spacing direction, this portion of the driving cord is not utilized.

In any typing operation there are a number of actions performed by the machine which do not entail movement of the typewriter carriage laterally. For example, simple rotation of the platen to produce line feed without return of the carriage or shifting of the type bars from lower case to upper case letters does not entail any lateral movement of the typewriter carriage. Thus, it might be that where several of such operations are performed in succession with the solenoid 62 receiving a series of impulses causing reciprocation of the ratchet crank 51, the drum 25 drawing on cord 29 and spring 31 would successively increase the pull on the carriage 4 even though the escapement mechanism 16 had not been actuated to permit lateral carriage movement in the letter spacing direction. This fact makes it extremely important that a resilient connection, such as spring 31, be provided between the cord 29 and the carriage 4.

Further, the springs 31 and 60 are carefully proportioned with respect to each other so that only a fixed maximum amount of energy may be stored in the spring 31 to urge the carriage in the letter spacing direction. In this respect it will be noted that the spring 60 actually performs the work of rotating the drum 25 in a clockwise direction by means of the ratchet mechanism 35. In other words, the driving arm 63 of the solenoid 62 functions only to force the ratchet crank 51 downwardly and increase the tension on spring 60 or increase the stored energy in spring 60. Now, when several successive steps have been stored in the spring 31, the energy in spring 60 will be insufficient to impart further rotation to the drum 25 through the driving pawl 44. This situation will result from the fact that the carriage 4 has remained stationary while the tension on spring 31 has been increased step by step up to a point where it exerts sufficient resistance to clockwise rotation of the drum 25 to offset the effort of spring 60 to cause such rotation of said drum.

With this particular construction, even though a number of successive operations are performed which do not actuate the escapement mechanism 16 to allow lateral movement of the carriage in the letter spacing direction, the movement of only a certain number of reciprocations of the ratchet crank 51 may be imparted to tension spring 31 before the spring 31 will overcome the driving tension in spring 60. When spring 31 is thus tensioned spring 60 cannot return the ratchet crank 51 to engage stop 55. Therefore the ratchet wheel 36 is not advanced clockwise sufficiently to permit holding pawl 43 to ride over and engage the next tooth on the ratchet wheel. Under these circumstances additional impulses to solenoid 62 cannot impart further tension to spring 31 through the ratchet mechanism. However, when a typing operation is then preformed which operates the escapement mechanism 16 to permit letter spacing movement of the carriage the tension on spring 31 will be reduced and solenoid 62 and the ratchet mechanism 35 may return to their normal functioning.

Thus, it will be seen that with the improved construction of this invention the typewriter carriage is continuously urged in the letter spacing direction by a force which is substantially uniform, regardless of the location of the carriage when a key is struck on the keyboard. The minimum amount of urging power exists when a single actuation of solenoid 62 rotates drum 25 through one step to move the carriage for the spacing of a single letter. The maximum urging power for the carriage movement occurs when the solenoid 62 has been successively operated in the absence of carriage movement to so tension spring 31 as to overcome the driving or returning tension in spring 60. As noted above, further actuation of the solenoid 62 under these latter conditions, in the absence of actuation of the escapement mechanism 16, will not operate to further tension the spring 31.

By providing this substantially uniform driving power for the typewriter carriage, this invention overcomes the disadvantage inherent in the present typewriter constructions wherein the driving spring strains the escapement mechanism at the beginning of the line due to its large stored power and effects a somewhat sluggish operation of carriage movement toward the end of the line when the driving spring has its minimum stored power.

It has been found that preferably the springs 31 and 60 are proportioned so that five steps or actuations by solenoid 62 may be applied to tension spring 31 before this latter spring will offset or overcome the returning tension in spring 60. In other words, after five reciprocations of the ratchet crank 51 without any lateral movement of the carriage, further actuations of the solenoid 62

will not impart additional rotation to drum 25 due to the power relationship between springs 31 and 60.

So far the operation of the carriage movement in the letter spacing direction has been considered. It has been pointed out that as the drum 25 is rotated in a clockwise direction, as viewed from the rear of the machine, the carriage return spring 27 is progressively tensioned within the drum. Accordingly, when it is desired to return the carriage to begin a new line of typing, it is merely necessary to disengage both the holding pawl 43 and driving pawl 44 from the ratchet wheel 36. With both these pawls disengaged from the teeth of the ratchet wheel, the tension in the carriage returning spring 27 will act through pin 28 on the drum 25 to rotate this drum in a counter-clockwise direction. This counter-clockwise rotation places a draw on cord 29 through its connecting clip 30 to pull the carriage in a direction opposite to its movement in the letter spacing direction. It will be apparent that this clockwise rotation of drum 25 will result in the other portion of driving cord 29 along with spring 31 being slack and therefore merely idling during the returning movement of the carriage.

To limit the return movement of the carriage an angle margin stop 65 is secured to the top of the typewriter base 1 by suitable screws 66. This stop is provided at the upper end thereof with a rubber cushion 67 and the right end of the carriage, as viewed in Figure 1, has secured thereto a stop engaging abutment 68. This simplified showing of a suitable stopping means to limit the return of the typewriter carriage is illustrated merely by way of example. It is, of course, understood that any suitable adjustable margin stop may be provided on the typewriter to facilitate varying the stopping point for the carriage as may be desired.

Previous attempts to use a coil spring in typewriter carriage returns have run into a major problem. This problem arises from the fact that a heavy carriage return spring is required to insure the complete return of the carriage preparatory to typing the next line. If such a strong spring is not used and the typist desires to return the carriage after completing only a portion of a line, the weak spring is ineffective to start the carriage in its return for only this small portion of the line. With the strong spring the return of the carriage is complete but it results in a heavy blow being applied to the margin stop which eventually results in such stop being battered out of proper alignment.

To overcome the various disadvantages inherent in spring driven carriage returns, a compensator 70 is incorporated in the structure of this invention to offer resistance to carriage movement when the return spring 27 possesses high energy and to encourage carriage return when the return spring has expended most of its energy during the return movement. This carriage return compensator 70 consists of two pivotally connected arms 71 and 72. A nut and bolt connector 73 serves as a pivotal connection between the ends of these two arms. The upper arm 71 is pivotally connected to the left end of the carriage, as viewed from the rear of the typewriter, by screw 74. The lower arm 72 is pivotally connected to the rear of the typewriter base 1 by screw 75. A helical torsion spring 76 is mounted on the connector 73 with the hooked arms 77 and 78 thereof engaging the compensator arms 71 and 72, respectively, to continuously urge these latter arms away from each other.

The operation of this carriage return compensator will be clear from a study of the structure illustrated in Figures 1, 8 and 9. In Figure 8 the typewriter carriage and compensator are shown near the completion of the line of typing. Accordingly, the carriage is in position to be returned for a new line of typing. At this point the action of the spring 76 on arms 71 and 72 has an effect to resist the return of the carriage. In other words, the tendency of these arms 71 and 72 to spread apart urges the carriage in the letter spacing direction rather than in the carriage return direction. At this point in the carriage travel, the carriage return spring 27 is tensioned to have its maximum returning power for the typewriter carriage. Accordingly, the compensator 70 when the carriage is in this position will tend to offset a portion of the driving power of the carriage return spring 27.

In Figure 1, the typewriter carriage is substantially centered over the typewriter base 1. Thus, the carriage is in its half-way returned position. In this position the carriage return spring 27 stores a medium amount of energy to urge complete return of the carriage. Also in this position the compensator 70 is at a position wherein its effect on carriage return is substantially neutral. The reaction of arms 71 and 72 will not effect a driving of the carriage either in the letter spacing direction or in the return direction. The spreading reaction of these two arms through connecting screws 74, 75 will have nothing more than a lifting effect on the typewriter carriage 4 with respect to the typewriter base 1.

Figure 9 shows the typewriter carriage in its substantially completely returned position. At this point of the typewriter carriage travel, the return spring 27 retains its minimum driving power and, accordingly, the compensator is necessary to encourage complete carriage return and thus assist the return spring 27. Therefore, it will be noted that as spring 76 urges arms 71 and 72 apart the carriage 4 will be urged to its complete returned position through the connecting screws 74 and 75 of the compensator.

Summing up the action of compensator 70 on the carriage return operation as described above, the compensator functions to oppose the return spring 27 during the initial return movement when this return spring has the maximum stored energy. When the carriage is half way returned the compensator 70 neither adds to nor opposes the power in the return spring 27 and as the carriage nears the complete return position the compensator again comes into play to assist the return spring in completing the carriage return. It will thus be apparent that this compensating mechanism in the carriage return structure insures more even carriage return movement. Further, a weaker return spring may be used to free the return operation from the undesirable slamming of the margin stop occasioned by the use of the heavy return springs of the prior structures. This weaker return spring will still insure complete and positive carriage return to the margin stop by reason of the assistance offered it by the spring 76 in the compensator 70. It has been found that even when only one or two spaces have been made in the letter spacing direction of the carriage, the cooperating return spring 27 and compensator spring 76 will insure return of the carriage to the margin stop. It has also been found that with this improved carriage return structure a complete return of the carriage from the end of a full line of type will not result in slamming or battering the margin stop as is characteristic of prior spring returning devices. The compensator 70 effectively smooths out or evens the driving power impressed on the carriage in returning it to begin a new line.

As noted above, to release the drum 25 for the carriage return operation, it is necessary that both the driving pawl 44 and holding pawl 43 be disengaged from the ratchet wheel 36. This operation is performed by a novel cam release construction as particularly shown in Figures 3 and 6. A cam operating lever 80 is mounted on axle 38 for pivotal movement thereon. The hub of this lever 80 carries two cams 81 and 82. The cam 81 engages the underside of holding pawl 43 while cam 82 engages the underside of driving pawl 44.

In the position of lever 80 shown in Figure 6, the cams 81 and 82 are in inoperative position with respect to the pawls 43, 44 respectively. Upon movement of the lever 80 downwardly these cams are rotated to disengage the pawls 43 and 44 from the ratchet wheel 36 against the tension of the pawl springs 47 and 52. With the pawls

disengaged from the ratchet wheel **36**, the drum **25** will be free to rotate in a counter-clockwise direction under the urging of the return spring **27**.

To retain the lever **80** in its uppermost position with cams **81** and **82** in inoperative position, a spring **83** is connected between the lever and a pin **84** mounted in a boss **85** on the housing **39**. This boss **85** is threaded similar to boss **56** to receive a limit screw **86** to limit the upward movement of the release lever **80**. To lock the screw **86** in the desired position a nut **87** is threaded thereon.

An actuating lever **90** for lever **80** is pivotally mounted on the typewriter base **1** by a suitable screw **91**. This lever may be operated by a suitable carriage return key on the typewriter keyboard or by a suitable electric solenoid in the case of an electric typewriter. In either case it will be apparent that movement of lever **80** downwardly by the actuating lever **90** will cause the cams **81** and **82** to move in a direction to disengage the holding and driving pawls **43** and **44**.

In operation of the carriage release lever **80** it is highly desirable that a quick striking of the carriage return key or short electrical impulse to the driving means, in the case of an electric typewriter, be effective to insure complete return of the typewriter carriage preparatory to typing a new line. To this end the typewriter construction of this invention embodies an improved latch mechanism **95** which will hold the lever **80** down until the complete carriage return has been accomplished. This latch mechanism comprises a latch **96** pivotally mounted on the rear of the typewriter base **1** by a screw **97**. Latch **96** is provided with a shoulder **98** which engages the outer end of lever **80** when this lever has been moved downwardly to release the pawls **43**, **44**. A spring **99** is connected to the end of latch **96** to continuously urge the latch into engagement with the end of lever **80**. Whenever the lever **80** is moved down so that shoulder **98** engages the end thereof, the spring **99** will cause the latch **96** to retain lever **80** in position with the pawls **43** and **44** disengaged. Thus, the drum **25** will rotate freely under power from return spring **27** to return the carriage to begin another line of typing.

In order to reset the pawls **43** and **44** to proceed with the next typed line it is necessary that the lever **80** be released from its downwardly held position. To accomplish this release a trip member **100** is pivotally mounted on the screw **97** with the upper end **101** mounted adjacent the rubber cushion **67** and the lower end thereof **102** extending outwardly in front of the latch **96**. The upper end **101** of the trip member is so positioned with respect to the margin stop **65** that the abutment **68** on the carriage will engage the upper end of the trip member. Thus, as the carriage moves to complete returned position the trip **100** will pivot in a counter-clockwise direction as viewed in Figure 1 on screw **97** with the lower end **102** of the trip member driving the latch **96** out of engagement with lever **80**. Accordingly, spring **83** returns the lever to its uppermost position causing the holding and driving pawls **43** and **44** to reengage with the ratchet wheel **36** for further operation of the typewriter. Likewise, as the carriage moves away from the margin stop **65** spring **99** will draw the latch **96** and trip **100** to their reset position in readiness for the next return operation of the typewriter carriage.

A U-shaped member **105** is secured to the underside of housing **39** by screws **106**. The legs of this U-shaped member **107**, **108** are suitably forked to serve as guides for the ratchet crank **51** and carriage return lever **80**, respectively. One end of the latch spring **99** is secured by screw **109** to the bottom of leg **108**.

Figure 7 illustrates the linkage arrangement provided for driving the line feed mechanism mounted on the right end of the carriage **4**. The actual mechanism used in providing regulated line feed movement of the platen **5** is not illustrated. However, the driving force to actuate the mechanism is applied through the driving rod **110**. Movement of rod **110** is transmitted through crank **111** to shaft **112**. This shaft is pivotally mounted at the ends thereof on members **113** secured to the ends of the typewriter base **1** by screws **114**. A center pivotal support **115** for the shaft **112** is likewise secured to the typewriter base **1** by suitable screws **116**. An actuating fork **117** is connected to shaft **112** to move therewith. A shaft **118** parallel to shaft **112** is pivotally mounted on the ends of the carriage **4**. This shaft **118** has secured parallel thereto rod **119** by connecting members **120**. Movement of shaft **118** is transmitted to a suitable line feed mechanism through an operating lever **121** rigidly secured to the right end of shaft **118**.

It will thus be seen that movement of driving rod **110** will transmit through crank **111**, shaft **112**, actuating fork **117**, rod **119**, members **120**, shaft **118** and eventually to lever **121**, a movement effective to operate the line feed mechanism. It will be understood that the operation of driving rod **110** may be performed by a suitable key provided on the typewriter keyboard or in the case of an electric typewriter by driving power derived from a solenoid or some such other suitable driving means. It will further be seen that with this line feed actuating linkage the line feed operation may be performed regardless of the position of the carriage with respect to the typewriter base by reason of the sliding connection between the forked actuator rod **117** and the rod **119**. Thus, wherever the carriage is positioned, reciprocation of the forked actuator **117** will transmit movement to the rod **119** and shaft **118** and thereby effect operation of the line feed mechanism.

Having specifically described a specific embodiment of my invention, it is to be understood that the structure shown in this application is for purposes of illustration only and that variations may be made in it without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. In a typewriter having a reciprocating carriage and an escapement mechanism to permit successive carriage movements in the letter spacing direction, the combination of a rotatably mounted drum, a carriage driving cord wound around said drum and having one end thereof resiliently connected to one end of said carriage, a ratchet wheel and crank mechanism associated with said drum, a driving spring connected to said ratchet crank so as to cause rotation of said ratchet wheel and said drum for tensioning said driving cord, and means for stressing said driving spring.

2. The combination recited in claim 1 wherein the resilient connection between said carriage and said driving cord is a spring.

3. A typewriter having a laterally movable carriage, an escapement mechanism to permit appropriate carriage movement upon each actuation of a type key, a rotatably mounted drum, a driving cord connected between the ends of said carriage and wound around said drum intermediate said ends whereby rotation of said drum will urge carriage movement, a resilient coupling spring interposed between said carriage and one end of said driving cord, a ratchet mechanism associated with said drum to produce rotation of said drum, a driving spring connected to said ratchet mechanism tending to rotate said drum in opposition to said coupling spring, said coupling spring being of sufficient strength to overcome the driving power imparted to said ratchet mechanism by said driving spring after a predetermined number of actuations of said ratchet mechanism.

4. In a typewriter having a reciprocating carriage and an escapement mechanism to permit successive carriage movements in the letter spacing direction, the combination of a rotatably mounted drum, a carriage return spring operatively connected to said drum, a carriage driving cord wound around said drum and having one end thereof resiliently connected to one end of said carriage, a

ratchet wheel and crank mechanism associated with said drum, a driving spring connected to said ratchet crank to cause rotation of said ratchet wheel and said drum for tensioning said driving cord and said return spring, means for stressing said driving spring, and cam means for disengaging said ratchet mechanism from driving engagement with said drum whereby said carriage return spring acting through said drum and driving cord will return said carriage.

5. A typewriter having a laterally movable carriage, an escapement mechanism to permit regulated carriage movement under control of the type keys, a rotatably mounted drum, a driving cord connected between the ends of said carriage and wound around said drum intermediate said ends whereby rotation of said drum will urge carriage movement, a coupling spring interposed between said carriage and one end of said driving cord, a carriage return spring mounted in said drum to urge rotation of said drum for carriage return, a ratchet mechanism associated with said drum to produce rotation of said drum, a driving spring connected to said ratchet mechanism tending to rotate said drum in opposition to said coupling spring, said coupling spring being of sufficient strength to overcome the driving power imparted to said ratchet mechanism by said driving spring after a predetermined number of actuations of said ratchet mechanism and means to disengage said ratchet mechanism from driving engagement with said drum to permit carriage return.

6. A typewriter having a laterally movable carriage, an escapement mechanism to permit regulated carriage movement under control of the type keys, a rotatably mounted drum, a driving cord connected between the ends of said carriage and wound around said drum intermediate said ends whereby rotation of said drum will urge carriage movement, a coupling spring interposed between said carriage and one end of said driving cord, a carriage return spring mounted in said drum to urge rotation of said drum for carriage return, a ratchet mechanism associated with said drum to produce rotation of said drum, a driving spring connected to said ratchet mechanism tending to rotate said drum in opposition to said coupling spring, said coupling spring being of sufficient strength to overcome the driving power imparted to said ratchet mechanism by said driving spring after a predetermined number of actuations of said ratchet mechanism, means to disengage said ratchet mechanism from driving engagement with said drum to permit carriage return, and latch means for retaining said means in ratchet disengaging position until complete return of said carriage.

7. A typewriter having a laterally movable carriage, an escapement mechanism to permit regulated carriage movement under control of the type keys, a rotatably mounted drum, a driving cord connected between the ends of said carriage and wound around said drum intermediate said ends whereby rotation of said drum will urge carriage movement, a coupling spring interposed between said carriage and one end of said driving cord, a carriage return spring mounted in said drum to urge rotation of said drum for carriage return, a ratchet mechanism drivingly associated with said drum to produce rotation of said drum, a driving spring connected to said ratchet mechanism tending to rotate said drum in opposition to said coupling spring, said coupling spring being of sufficient strength to overcome the driving power imparted to said ratchet mechanism by said driving spring after a predetermined number of actuations of said ratchet mechanism, a cam member movable to disengage said ratchet mechanism from its driving association with said drum, a margin stop for said carriage, a latch pivotally mounted between said cam member and said margin stop with one end thereof engaging said cam member to retain it in ratchet disengaging position and the other end thereof being interposed between said margin stop and said carriage whereby complete return of said carriage will pivot said latch and release said cam member from ratchet disengaging position.

8. A typewriter having a base and a carriage movable laterally thereof, a rotatably mounted drum, a carriage driving cord wound around said drum and having one end thereof connected to one end of said carriage, a carriage return spring mounted in said drum to urge rotation of said drum for carriage return, and a carriage return compensator operatively connected between said carriage and typewriter base so as to resist the returning power of said return spring during the initial stages of the carriage return action and to assist said return spring as said carriage nears the full returned position.

9. A typewriter having a base and a carriage movable laterally thereof, a rotatably mounted drum, a carriage driving cord wound around said drum and having one end thereof connected to one end of said carriage, a carriage return spring mounted in said drum to urge rotation of said drum for carriage return, a carriage return compensator comprising a pair of arms pivotally connected with the outer ends thereof pivoted to said carriage and typewriter base respectively, and a helical torsion spring associated with said arms so as to urge said arms apart whereby the driving power of said return spring is resisted at the initial point of carriage return movement and is assisted as the carriage nears the full carriage returned position.

10. In a typewriter having a base, a reciprocating carriage on said base and an escapement mechanism to permit successive carriage movements in the letter spacing direction, the combination of a rotatably mounted drum, a carriage return spring operatively connected to said drum, a carriage driving cord wound around said drum and having one end thereof resiliently connected to one end of said carriage, a ratchet wheel and crank mechanism associated with said drum, a driving spring connected to said ratchet crank to cause rotation of said ratchet wheel and said drum for tensioning said driving cord and said return spring, means for stressing said driving spring, a carriage return compensator having pivoted spring biased arms connected respectively to said carriage and typewriter base, and cam means for disengaging said ratchet mechanism from driving engagement with said drum whereby said carriage return spring acting through said drum and driving cord will return said carriage.

11. A typewriter having a base and a carriage movable laterally thereof, an escapement mechanism to permit regulated carriage movement under control of the type keys, a rotatably mounted drum, a driving cord connected between the ends of said carriage and wound around said drum intermediate said ends whereby rotation of said drum will urge carriage movement, a coupling spring interposed between said carriage and one end of said driving cord, a carriage return spring mounted in said drum to urge rotation of said drum for carriage return, a ratchet mechanism associated with said drum to produce rotation of said drum, a driving spring connected to said ratchet mechanism tending to rotate said drum in opposition to said coupling spring, said coupling spring being of sufficient strength to overcome the driving power imparted to said ratchet mechanism by said driving spring after a predetermined number of actuations of said ratchet mechanism, a pair of pivotally connected arms with the outer ends thereof hingedly joined to said carriage and typewriter base respectively, a helical torsion spring urging said arms apart, and means to disengage said ratchet mechanism from driving engagement with said drum to permit carriage return.

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