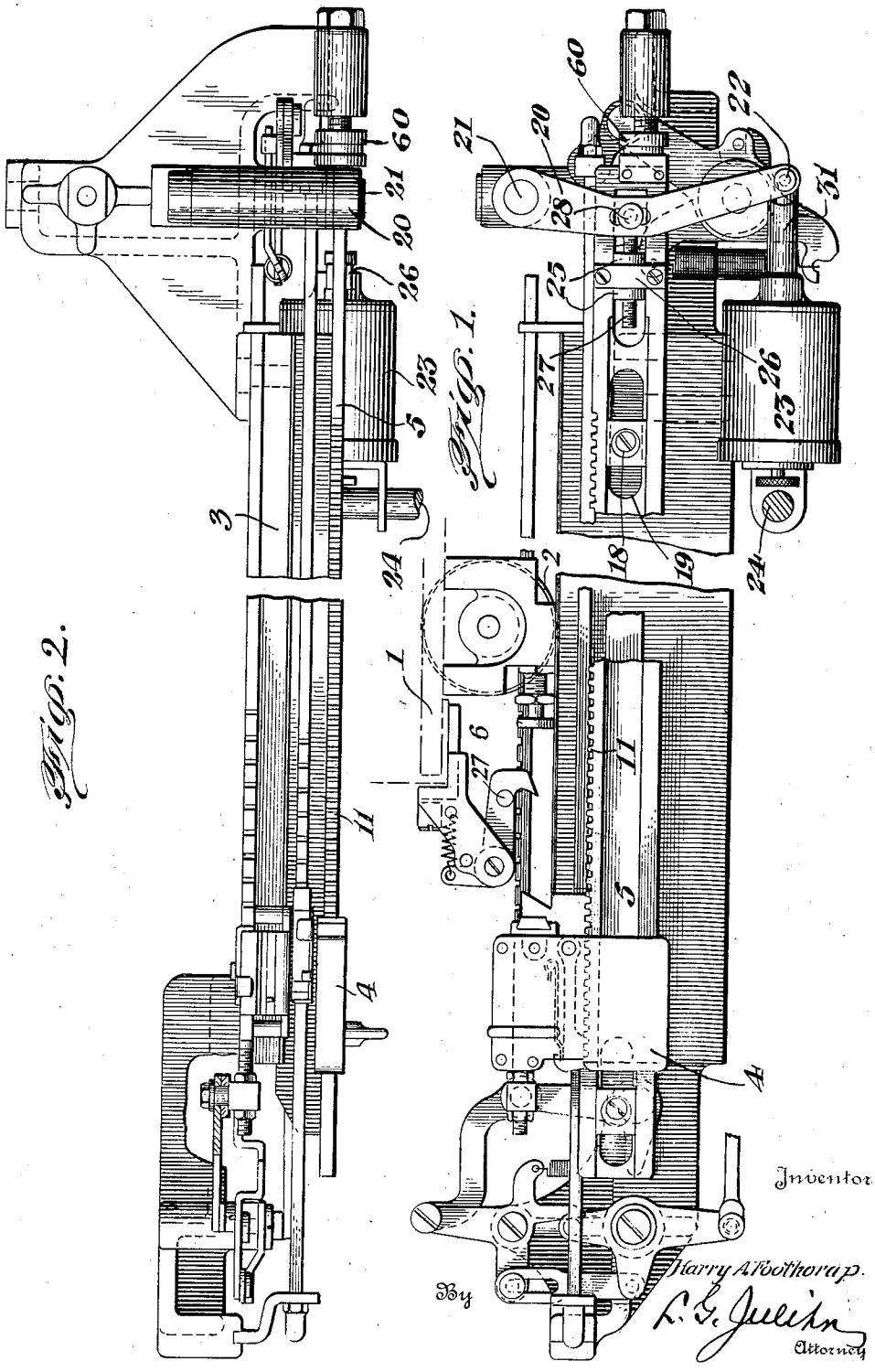
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SHOCK ABSORBING MECHANISM FOR TYPEWRITERS

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SHOCK ABSORBING MECHANISM FOR TYPEWRITERS

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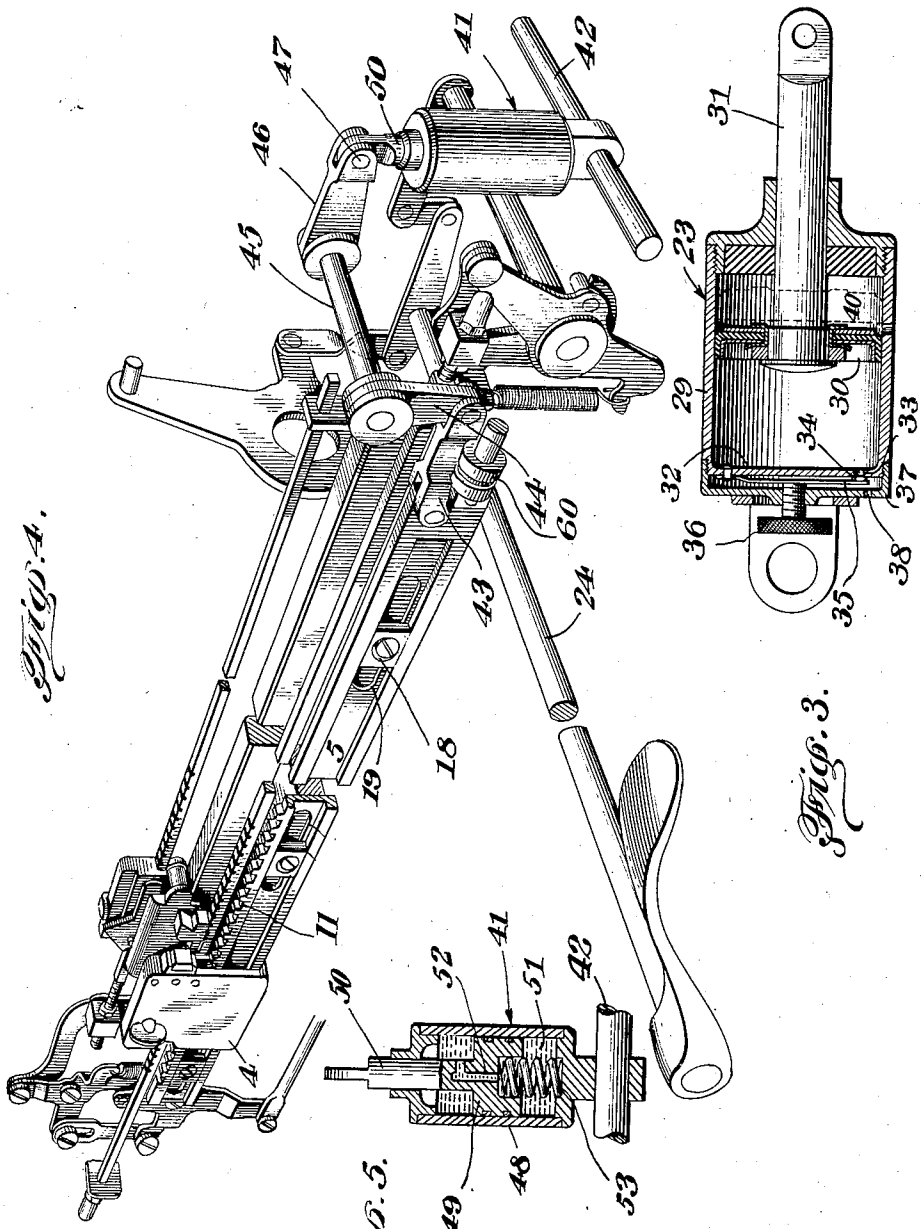


Fig. 4.

Fig. 3.

Fig. 5.

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SHOCK ABSORBING MECHANISM FOR TYPEWRITERS

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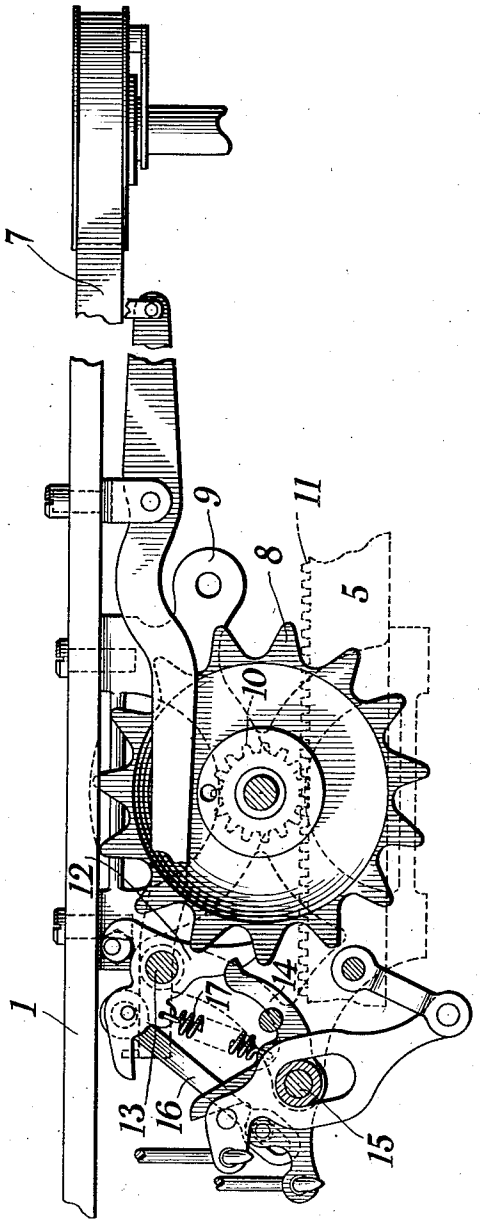


Fig. 6.

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1,992,940

SHOCK ABSORBING MECHANISM FOR TYPEWRITERS

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Application October 23, 1931, Serial No. 570,568

11 Claims. (Cl. 197—183)

My invention relates to improvements in typewriting machines and particularly to shock absorbing mechanism therefor.

As is well known, typewriting machines employ relatively movable printing and paper supporting elements, the relative movement of which is utilized to effect letter spacing in a continuous line of writing. It will be further understood that the printing organization may be made to move with respect to the paper supporting means to effect such letter spacing, as is shown for example, in my Patent No. 1,203,519, which issued October 31, 1916, or, the paper supporting structure of the machine may be caused to move relatively to the printing organization, as is shown for example, in the patents to Oscar J. Sundstrand, Nos. 1,856,056 and 1,901,135, issued April 26, 1932 and March 14, 1933, respectively; Patent No. 1,152,517, issued September 7, 1915, upon an invention of W. J. Kilpatrick, and Patent No. 1,854,216, issued April 19, 1932, upon an invention of R. L. Muller.

It is likewise well known that the movable element of such machines operates in advancing and retracting excursions between left and right hand margin stops. The advancing movement is normally effected in letter space increments under control of escapement mechanism, the retracting operation, on the other hand, being commonly accomplished in a single continuous traverse from the end of a line, or from the right hand margin stop, to the left hand margin stop. The speed attained during the retracting movement, coupled with the weight of the moving element, gives rise to momentum, the effect of which must be overcome in arresting that element prior to commencing a new line at the predetermined left hand marginal position.

It is, accordingly, an object of the present invention to provide new and improved shock absorbing means effective to arrest the retracting movement of the movable structure of machines of the class described.

It is another object of the invention to provide shock absorbing means for a machine of the class described, which shall be effective seriatim: to arrest the laterally movable element of the machine after the latter has been retracted to a position beyond the predetermined marginal position; to utilize energy derived from the momentum of said element and stored during said arresting movement, to advance said element toward the predetermined marginal position; and to yieldingly stop the movable element at the predetermined marginal position.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a view in front elevation of a portion of a machine equipped with a preferred form of my invention.

Fig. 2 is a fragmentary top plan view.

Fig. 3 is a view in longitudinal section, of a cushioning device forming part of the preferred form of the invention.

Fig. 4 is a perspective view of a modified form of the invention.

Fig. 5 is a longitudinal sectional view through another cushioning device used in connection with the modified form of the invention shown in Fig. 4.

Fig. 6 is a view of one form of escapement mechanism.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings, and will describe, preferred and alternative embodiments, but it is to be understood that I do not thereby intend to limit the invention to the specific forms disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

For the purposes of this disclosure, the invention is shown as applied to the laterally movable printing mechanism supporting carriage of the well known Elliott-Fisher machine, but it will be understood that the invention is equally applicable to that form of machine in which the paper supporting platen is movable relatively to the printing mechanism.

Referring particularly to Figures 1 and 6, the base of a printing carriage of the type fully disclosed in my aforesaid Patent No. 1,203,519, is indicated at 1.

The carriage is supported for advancing and retracting movement to define writing lines, by means of rollers 2 journaled on the carriage and arranged to ride on suitable tracks defined by transverse frame members, one of which is indicated at 3, in Figure 1.

The advancing and retracting excursions of the carriage may be limited by any desired or preferred form of margin stops. One such stop, effective to limit retracting or left hand movement, is generally indicated at 4, in Figures 1 and 4, and is fully disclosed in my copending application, Serial No. 532,810 filed April 25, 1931,

now U. S. Letters Patent No. 1,930,433, issued October 10, 1933.

It will suffice to say, in this instance, that the stop 4 may be adjustably positioned along a carriage feed rack 5 in the path of an abutment 6 carried by the carriage, to variously control the left hand writing margin.

The carriage 1 is normally urged to move in an advancing direction, or to the right, as viewed in Figure 1, under the influence of a spring motor 7 (Fig. 6). Action of the spring 7 is controlled by an escapement mechanism shown in Figure 6. While various forms of escapement may be used, that chosen for illustration is identical with the showing in my aforesaid Patent No. 1,203,519, and comprises an escapement wheel 8 journaled in similar brackets 9 fixed to the carriage 1. A carriage feed pinion 10, non-rotatably secured to the escapement wheel 8, meshes with rack teeth 11 of the rack 5. A holding dog 12 pivoted at 13, normally functions to restrain the escapement wheel from rotation in a clockwise direction (as is viewed in Figure 6) under the influence of spring 7, which, as has been indicated, tends to move the carriage, and thus the escapement wheel and its associated driving pinion to the right.

A spacing dog 14, pivotally supported at 15 and operatively connected to the holding dog by means of a link 16, is arranged to be actuated by a bail (not shown), common to each one of the keys of the printing carriage. A contractile spring 17 normally maintains the holding and spacing dogs in operative position, as shown in Figure 6, and fully described in my beforementioned Patent No. 1,203,519. Operation of any one of the keys of the machine functions to rock the spacing dog in a clockwise direction, thus communicating clockwise movement to the holding dog 12 through the medium of link 16, the holding dog thereby being displaced to permit that tooth with which it was in contact to escape. The escapement dog 14 meantime engages the next succeeding tooth so as to restrain the escapement wheel while the holding dog 12 is out of engagement therewith. As is also fully explained in the patent referred to, release of the operated key serves to restore the holding dog to the position shown in Fig. 6, in which it will engage and block the next succeeding tooth and thus prevent further advancing movement of the carriage under the influence of spring 7.

Now coming to the mechanism constituting the present invention: the rack 5 is adapted for movement longitudinally of its principal axis. To this end, the rack is slidably supported on spaced bearing blocks 18 secured to the frame by headed pins, and arranged to project into suitable elongated apertures 19 formed in the rack.

In the preferred embodiment of the invention as illustrated in Fig. 1, a lever 20, pivoted to the frame at 21, projects downwardly beyond the rack and is operatively connected at 22 to a shock absorbing device generally indicated at 23, which in turn, is pivoted at 24 to a part rigid with frame 3.

The lever 20 is adjustably connected to the rack 5 intermediate its pivotal support 21 and the connection 22 with the shock absorbing device 23. Referring particularly to Fig. 1, a sleeve 25 is rotatably connected to rack 5 and restrained against longitudinal movement with respect thereto by a bearing block 26. A rod 27 arranged for screw threaded engagement with block 25, is pivotally and slidably connected to the lever 20 at 28.

As fully shown in Fig. 3, the shock absorbing device of the preferred embodiment of the invention includes a cylinder 29 and a piston and piston rod 30 and 31, respectively. The head 32 of cylinder 29 is provided with a port 33 arranged to be closed by a disk valve 34 mounted adjacent the free end of a spring 35 fixed at its opposite end to the external surface of the head. The position of valve 34 with respect to port 33 is adapted to be controlled so as to regulate escape of pressure fluid from the head end of the cylinder 29, by means of a headed screw 36 carried by a cap 37 adapted, in this instance, to threadably engage the external peripheral surface of the cylinder. The inner end of the screw 36 bears against the resilient support 35 on which the disk valve 34 is mounted, to adjust the valve relatively to its port 33.

An open port 38 in the cap 37 connects the compartment formed between the cap and the cylinder head 32 with the atmosphere to permit the escape of pressure fluid entering the compartment from the cylinder 29 through valve 33. The piston 30 is adapted to differentially resist movement in opposite directions, and to this end, a port 40 in the wall of the cylinder distant from the cylinder head 32 communicates with its interior at a point spaced from its longitudinal center.

Referring particularly to Figures 4 and 5, in which an alternative form of the invention is disclosed, a shock absorbing device 41, is pivotally supported at one end on a shaft 42, carried by the frame of which the member 3 is a part. An operative connection between the shock absorbing device 41 and the rack 5 is provided, in this instance, by means including a link 43 connecting the rack and a crank 44 fixed to a shaft 45. A second crank 46, likewise fixed to shaft 45, communicates movement of the latter part to the shock absorbing device 41 through a pivotal connection 47.

As is fully shown in Figure 5, the shock absorbing device 41 includes a cylinder 48 fitted with piston and piston rod 49 and 50, respectively. The cylinder 48 is substantially filled with a suitable liquid 51, and a relatively small port 52, formed in the body of the piston 49, permits a restricted flow of the fluid within the cylinder between opposite sides of the piston. Piston 49 is arranged to differentially resist reciprocating movement. To this end, a coil spring 53 acts between the lower head of the cylinder, as viewed in Figures 4 and 5, and the adjacent end of piston 49. The spring is restrained against displacement by seating its respective ends in shallow bores formed in the inner surface of the lower cylinder head and the under surface of the piston.

Prefacing a description of the operation of the invention, it is pointed out that the spring motor 7 exercises a continuous effort to move the carriage to the right, or in advancing direction, with respect to the carriage feed rack, and that this tendency is restrained by the escapement mechanism, except when a key of the machine is depressed. Thus the spring motor, through the medium of the carriage and its escapement mechanism, effectually urges the rack bar 5 to the right, it being understood that a suitable stop, as 60 (Fig. 1) is employed to limit such movement of the rack, in both forms of the invention. In this normal position of the rack 5, the piston 30 (Fig.

3) lies in the dotted line position shown in Fig. 3, to which it has been drawn by its connection with the rack 5, under the influence of the usual spring drum 7.

In such position, there is a compression of fluid between the piston and the adjacent cylinder head sufficient to form a cushion, hereinafter referred to.

The piston, in its normal position, uncovers the port 40, for communication with the chamber formed between the piston and the cylinder head 32.

As the carriage, when moved in a retracting direction in preparation for the beginning of a new line of writing, approaches the left hand margin, its abutment 6 contacts the margin stop 4, whereupon continued travel of the carriage draws the feed rack 5 along so that the carriage and feed rack move as a unit to the left of the predetermined marginal position against the combined efforts of the spring motor 7 and the resistance which is set up in the shock absorbing device. As a result of drawing the rack leftwardly from its normal position, at the start of such leftward movement of the rack, the piston 30 is likewise forced to the left, its travel at first being practically unopposed. But as the piston first closes and then passes the port 40, the fluid to the left of the piston begins to be compressed, and as the piston continues its leftward movement, the degree of compression increases, thereby opposing a gradually increasing resistance to continued leftward travel of the carriage, the farther it recedes from its predetermined left hand marginal position.

In the preferred embodiment of the invention, the resistance to movement of the shock absorbing mechanism from its normal position, as shown in Fig. 3, is occasioned by the compression of the gaseous fluid in the head, or left end, of the cylinder. It will be noted in this connection, that the extent of such resistance may be controlled by regulating the position of valve 32 with respect to port 33 through the medium of screw 36. Thus the device is adapted for use upon carriages of varying weight and speed. In the alternative form of the invention shown in Figures 4 and 5, the piston 49 is forced downwardly against the combined action of spring 52 and the resistance to flow of the fluid 51 through the relatively small port 52.

The momentum of the carriage having been overcome, and both carriage and feed rack arrested at a point to the left of the normal left hand marginal position, it is now desirable to quickly advance the carriage in a reverse direction to the predetermined marginal position, and restore the rack 5 to its normal position. The energy stored in the compressed gaseous fluid to the left of the piston (Fig. 3) in the shock absorbing device as an incident to arresting the retracting movement of the carriage, is effective to advance the carriage and rack, by reason of the fact that the opposite end of the cylinder is vented to the atmosphere through port 40 and such compression supplements the action of spring 7 in accomplishing this purpose.

A similar action, as far as the piston is concerned, takes place as the piston starts toward the right, that occurred when the piston started to the left. Thus, at the beginning of its travel to the right, the piston moves quite rapidly under the influence of the compression to the left of the piston, and of the spring drum 7, the chamber to the right of the piston being vented by the open port 40.

It will be obvious that even in travelling the relatively short distance from the point of extreme leftward travel forwardly to the marginal position, the carriage will attain momentum, the effect of which must be overcome in bringing it to rest if damage to the mechanism is to be avoided. The shock absorbing device effects this second cushioning function. As the piston 29 moves to the right over the port 40, it compresses the gaseous fluid trapped in the relatively small portion of the cylinder defined between that port and the right hand cylinder head, and thus yieldingly arrests the carriage and rack in predetermined marginal position.

Adjustment of the threaded rod 27 (Fig. 1) by rotation of the collar 25, enables the regulation of the size of the cushioning chamber at the right of the piston by shifting the piston in the cylinder and thus varying the degree of compression obtainable to cushion the carriage on its rebound from its extreme left hand limit of travel.

The carriage 1 and rack 5 are not positively limited in their travel in retracting direction past the left hand margin stop position, the arrest of the carriage and rack being effected by the gradually increasing resistance afforded by the compressed fluid in the left hand chamber of the cylinder (Fig. 3).

Hence the actual point at which the carriage and rack cease their excess retracting travel may vary somewhat, but it is necessary to positively arrest the carriage on its advance to its left hand marginal position, in order that each line of writing may start from the same point.

The adjustable abutment 60 in the path of the right hand end of the rack 5 constitutes such stop.

It is obvious that the sooner the carriage is conditioned for beginning a line of writing, the less time is lost by the operator in his work. Therefore, it is desirable that the carriage advance from its excess retracted position to the beginning of a line with all speed.

Therefore, I have so arranged the unitary shock absorbing mechanism that the piston, on its travel to the left, will gradually compress the fluid in the cylinder through a comparatively long stroke, such compression commencing early in the leftward travel of the piston, so as to bring the carriage to a comparatively slow stop to avoid shocks and jars. The carriage is connected to the feed rack 5 by the escapement mechanism, during the time of retraction of the rack by the carriage. The particular arrangement present in the invention also enables the carriage, under the influence of the fluid compressed in the left hand end of the cylinder, plus the influence of the usual spring drum 7, to advance rapidly and without encountering substantial resistance, from its extreme left hand travel to a point nearly coincident with the predetermined left hand marginal position, the piston traveling freely to the right, at this time, and it is this difference in the character of compression when the piston is traveling to the left, and when traveling to the right, that is referred to in the claims, and constitutes an important feature of the invention.

Just as the carriage is about to arrive at its predetermined left hand marginal position, the shock absorber is adapted to become effective to quickly compress the fluid in the right hand end of the cylinder to cushion the carriage and its

rack, as the right hand end of the rack strikes the abutment 60.

It will be noted that the shock absorber is relied upon to arrest leftward travel of the carriage, but that in the travel to the right, the abutment 60 actually arrests the carriage, the shock absorber merely cushioning the carriage against shock and jar.

These results are obtained by the use of a unitary structure, the cylinder 29 being vented at 40 near its right hand end, at a point just to the left of the normal position of the piston 30, which piston, therefore, divides the cylinder into comparatively large and small chambers, respectively.

The piston 30 on its advance towards the left, first closes the vent port 40, and then proceeds to gradually compress the fluid in the larger chamber, until such compression overcomes the momentum of the carriage in its excess travel past the left hand marginal stop position. The vent port 40 prevents the formation of a vacuum behind the piston during its travel to the left.

Immediately the carriage is brought to rest at the end of its extreme travel to the left, the spring drum and the compressed fluid in the left hand chamber of the piston become effective to advance the carriage to the right to its left hand marginal position which it has over-run.

And since the vent port is unobstructed, the travel of the piston and the carriage to the right is practically unimpeded so that the carriage is quickly brought to its predetermined starting position.

Just as the carriage is about to reach its starting position, however, the piston 30 closes the vent port 40, adjacent the right hand cylinder head, whereupon continued travel of the piston towards the right quickly compresses the air in the small chamber to form a buffer or cushion for the carriage and rack as the latter strikes its abutment 60. The vent port is uncovered as the piston proceeds to the right to prevent the formation of a vacuum and to vent the larger chamber.

The spring drum 7 insures the arrival of the carriage in its starting position, as well as the contact of the right hand end of the rack 5 with its abutment 60.

What I claim is:

1. In a machine of the class described, the combination with a carriage, an endwise movable rack, escapement mechanism normally effective to prevent movement of the carriage relative to the rack in an advancing direction and a motor normally urging the carriage in an advancing direction, of margin stop mechanism, including a stop on said rack arranged to abut the carriage when the latter is moved to a retracted position and a single fluid compression means for opposing movement of said rack in different degree in opposite directions.

2. In a machine of the class described, the combination with a carriage, and a motor normally urging the carriage in an advancing direction, of margin stop mechanism, including a carriage feed rack endwise movable to provide for overthrow retraction of the carriage beyond marginal position, and advance thereto, and a fluid controlled shock absorbing mechanism for opposing movement of said rack in a retracting direction, driving said rack from a retracted to a relatively advanced marginal position, and cushioning the arrest of said carriage in said marginal position.

3. In a machine of the class described, the combination with a carriage, of a carriage feed rack endwise movable in opposite directions, and a single means for opposing resistance in different degree to movement of the rack in opposite directions, respectively.

4. In a machine of the class described, the combination with a carriage, of a carriage feed rack endwise movable in opposite directions, and a single fluid compressing means for opposing resistance in different degree to movement of said rack in opposite directions, respectively.

5. In a machine of the class described, the combination with a carriage, of a carriage feed rack endwise movable, and fluid compressing means for opposing resistance to movement of said rack in opposite directions, respectively, including a piston, and a cylinder having a port therein, the piston normally so positioned in the cylinder as to provide relatively large and small compression chambers upon opposite sides of the piston to enable the development of a gradual opposition to the travel of the piston in one direction from its normal position, and a less gradual opposition to its travel in the opposite direction from its normal position.

6. In a machine of the class described, the combination with a carriage, of a carriage feed rack movable in opposite directions, and fluid compressing means for opposing resistance to movement of said rack in opposite directions, respectively, and including a piston, a cylinder having a port therein, the piston normally so positioned in the cylinder as to provide relatively large and small compression chambers upon opposite sides of said piston, to enable the development of a gradual opposition to the travel of the piston in one direction from its normal position, and a less gradual opposition to its travel in the opposite direction from its normal position; and an operating connection between the rack and said piston adjustable to change the starting position of the latter and thereby vary the relative sizes of said chambers.

7. In a writing machine, the combination with a travelling carriage; and a motor to normally advance the carriage; of margin determining mechanism for the carriage, providing for overthrow retraction of the carriage beyond its marginal position, and for advance of the carriage from its overthrown position to its marginal position; and a unitary shock absorbing mechanism effective to oppose a gradual resistance to the travel of the carriage beyond its marginal position, and to oppose an abrupt resistance to the advance of the carriage as it approaches its marginal position from its overthrown position.

8. In a writing machine, the combination with a travelling carriage; and a motor to normally advance the carriage; of margin determining mechanism for the carriage; providing for overthrow retraction of the carriage beyond its marginal position, and for advance of the carriage from its overthrown position to its marginal position; and a unitary shock absorbing mechanism effective to oppose a gradual resistance to the travel of the carriage beyond its marginal position, and to advance the carriage towards its marginal position, and to oppose an abrupt resistance to the advance of the carriage as it approaches its marginal position from its overthrown position.

9. In a writing machine, the combination with a travelling carriage, a motor to advance the carriage in letter spacing direction; of a com-

bined left hand marginal stop and shock absorbing mechanism, adapted to permit the carriage to overthrow past its predetermined marginal position, including a cylinder having a vent located adjacent one end, and a piston normally positioned in advance of the vent, and dividing the cylinder into comparatively large and small chambers, the piston adapted to compress fluid in the larger chamber during overthrow travel of the carriage on its retraction, and to compress fluid in the smaller chamber as the carriage advances from its overthrown position to its predetermined marginal position.

10. In a writing machine, the combination with a travelling carriage; and means to advance the carriage in one direction; of a longitudinally shiftable member connected with the carriage; an abutment to positively arrest the shiftable member in one direction of its travel; and a unitary shock absorbing means to oppose a gradually increasing resistance to the travel of the shiftable member away from its abutment, which finally arrests the shiftable member, and to oppose a more quickly developed resistance to the shiftable member as it approaches its abutment to cushion the contact of the shiftable member with its abutment.

11. In a machine of the class described, the combination with a travelling carriage; an endwise movable member connectable with the carriage; and an abutment to positively limit the travel of the member in one direction; of fluid compressing means to oppose resistance to the endwise travel of the member, in opposite directions, including a cylinder having a port therein located nearer one head of the cylinder than the other; a piston in the cylinder normally positioned between the port and the nearer cylinder head, to divide the cylinder into larger and smaller chambers, to enable the development of a gradual resistance to the travel of the piston in one direction from its normal position, and a less gradual resistance to the travel of the piston in the opposite direction from its normal position; and means to maintain the piston in its normal position when the parts are at rest.

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