

O. C. KAVLE.
 TABULATING MECHANISM FOR TYPE WRITING MACHINES.

APPLICATION FILED JUNE 4, 1909.

Patented Jan. 14, 1913.

3 SHEETS—SHEET 1.

1,050,548.

Fig. 1.

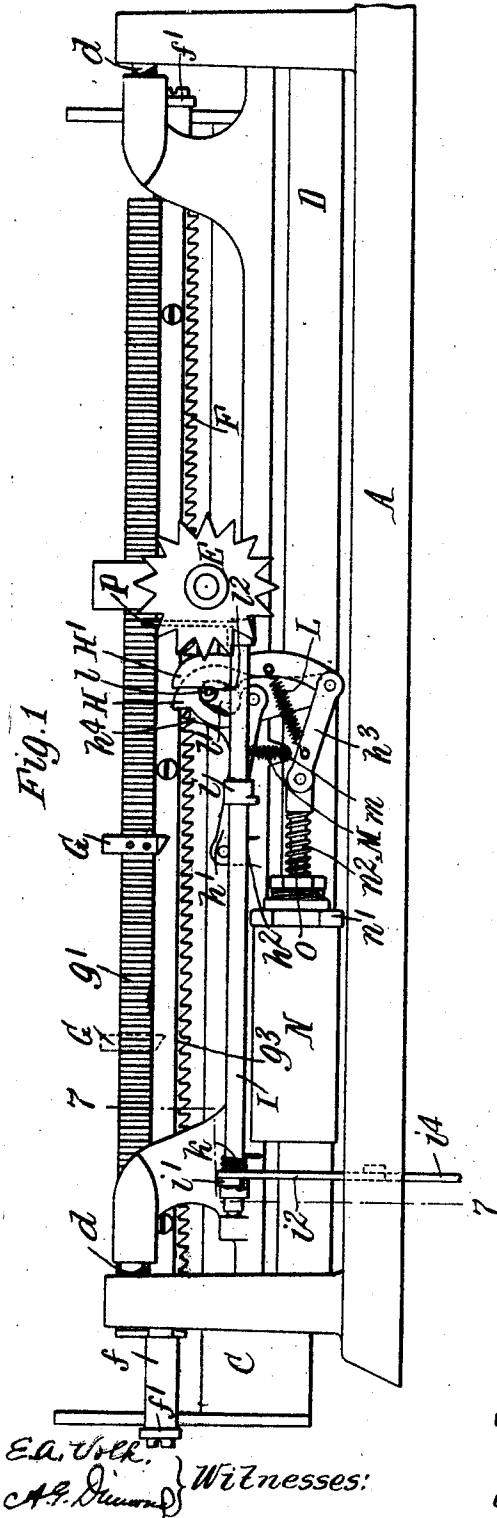
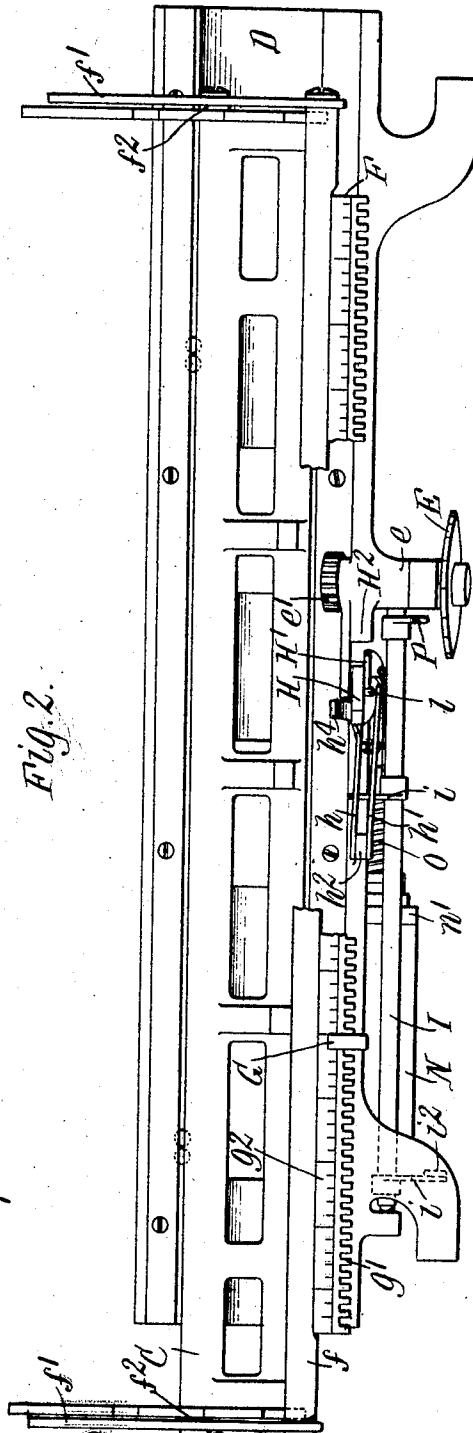


Fig. 2.



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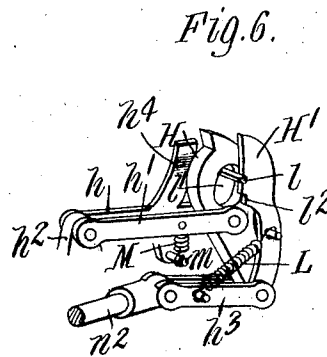
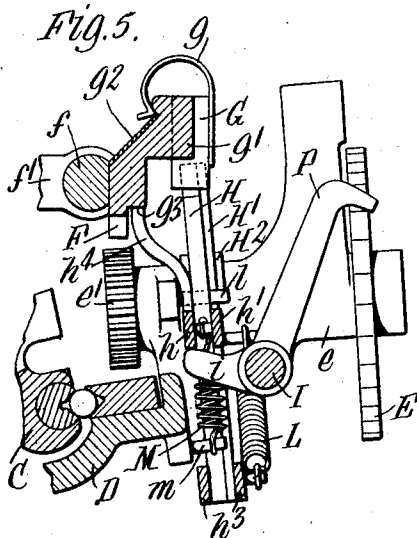
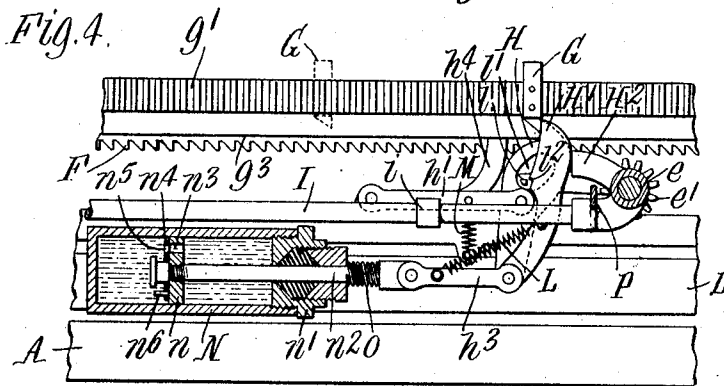
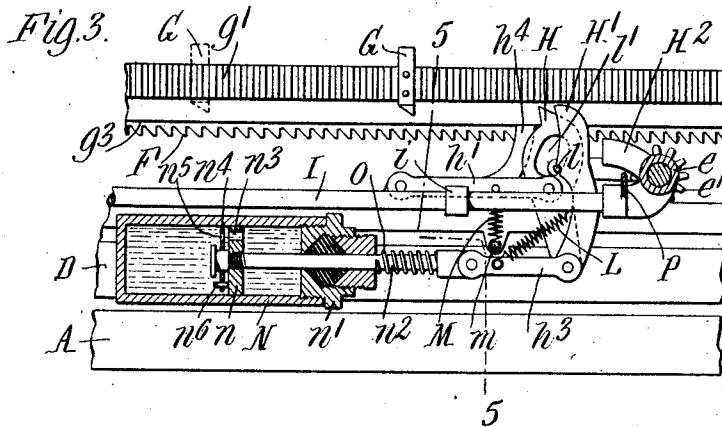
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3 SHEETS—SHEET 2.



Witnesses:
E. A. Volk.
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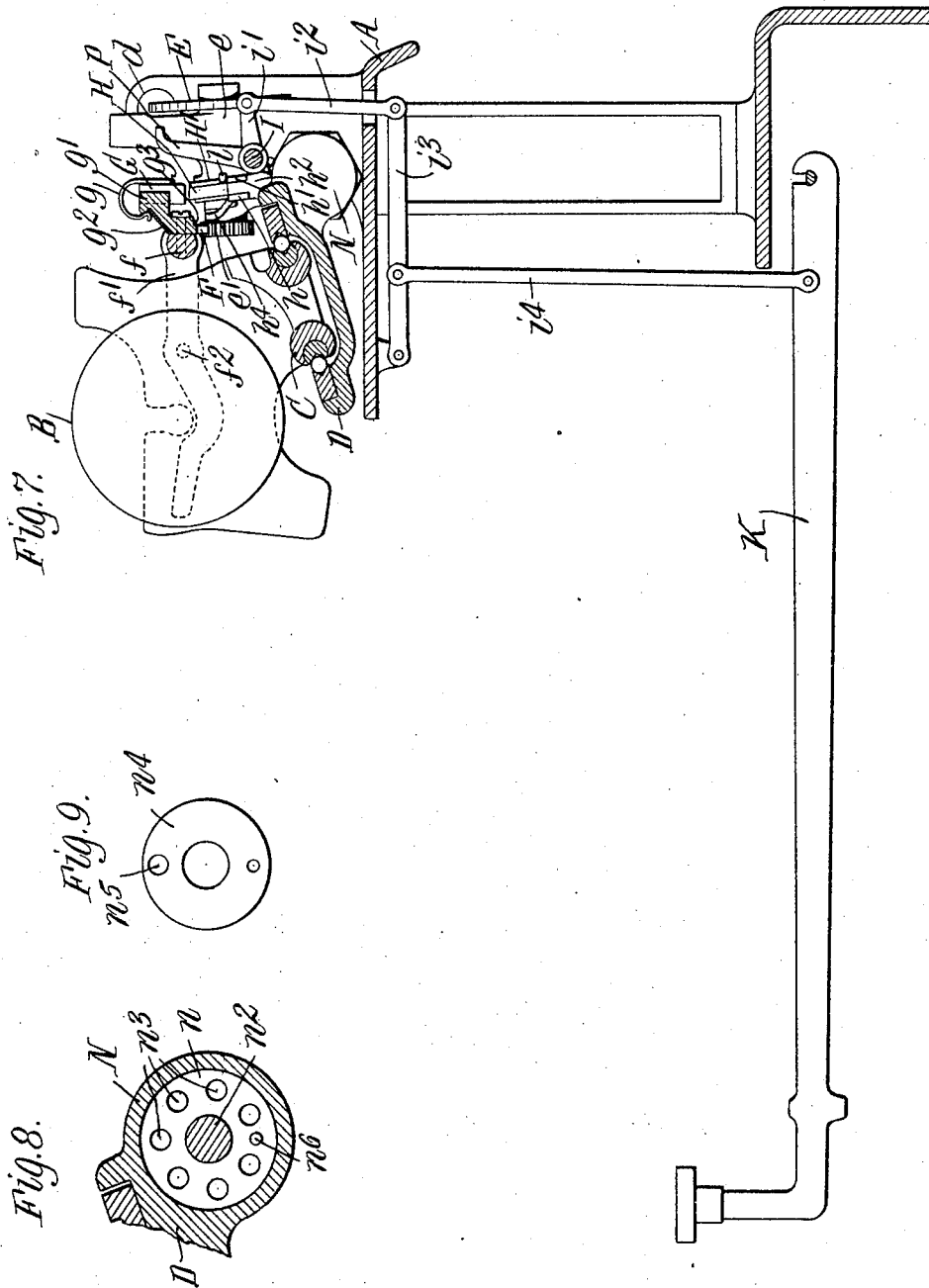
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3 SHEETS-SHEET 3.



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UNITED STATES PATENT OFFICE.

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TABULATING MECHANISM FOR TYPE-WRITING MACHINES.

1,050,548.

Specification of Letters Patent.

Patented Jan. 14, 1913.

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To all whom it may concern:

Be it known that I, OSCAR C. KAVLE, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented a new and useful Improvement in Tabulating Mechanisms for Type-Writing Machines; of which the following is a specification.

This invention relates to tabulating mechanisms for typewriting machines for enabling the carriage to be quickly moved to different desired positions to produce tabulated or column work.

One of the principal objects of the invention is to produce an efficient, desirable and practical tabulating mechanism, which is positive and certain in action.

Other objects of the invention are to make a mechanism that is practically noiseless in action; that permits the carriage to move rapidly, stops it with the minimum shock and positively prevents it from rebounding; that is capable of use on typewriting machines of ordinary construction without interfering with their ordinary use; that can be operated by simply depressing a tabulating key and without requiring the key to be held down; also to provide a device of novel construction for absorbing the shock incident to stopping the carriage; and also to improve tabulating mechanisms in the respects hereinafter described and set forth in the claims.

In the accompanying drawings, consisting of three sheets: Figure 1 is a fragmentary rear elevation of a typewriting machine provided with tabulating mechanism embodying the invention. Fig. 2 is a plan view thereof. Figs. 3 and 4 are similar fragmentary rear elevations thereof, partly in section, showing two different positions of the parts. Fig. 5 is a longitudinal sectional elevation thereof, on an enlarged scale, in line 5-5, Fig. 3. Fig. 6 is a fragmentary perspective view thereof. Fig. 7 is a longitudinal sectional elevation thereof in line 7-7, Fig. 1. Fig. 8 is a cross section, on an enlarged scale, of the shock absorber. Fig. 9 is an elevation of the valve of the shock absorber.

Like reference characters refer to like parts in the several figures.

The invention is shown in the drawings applied to a front strike machine in which the platen is shiftable vertically for print-

ing upper and lower case characters, but the improvements are also applicable to other kinds of typewriting machines.

A represents a portion of the main frame of the machine, B the platen, C the platen carriage, and D a shift frame on which the carriage is supported and is moved laterally by the usual spring motor or other means (not shown), and which is pivoted at *d d* at the upper rear portion of the main frame to swing vertically for shifting the platen.

E represents the escapement wheel of the mechanism which governs the letter space movements of the carriage. This escapement wheel is secured to the rear end of a shaft which is journaled in a bearing *e* on the shift frame and is provided at its front end with a pinion *e'* that meshes with a rack bar F on the carriage. The rack bar F is secured to or formed with a rod *f* which is secured at its ends to the rear ends of carriage release levers *f'* fulcrumed at *f²* on the ends of the carriage. Springs (not shown) act to hold the rack bar in operative engagement with the escapement pinion *e²* except when the rack bar is purposely raised by actuating either of the levers *f'*, or a tabulating key to release the carriage from the escapement. The parts as thus far described may be of known or any suitable construction.

The irregular movements of the carriage necessary for producing tabulated work are effected by releasing the carriage from the escapement and arresting the motion of the carriage by the driving spring drum or motor at the desired points by a stop device which is caused to intercept cooperating adjustable stops provided on the carriage. For clearness of description, the stops on the carriage will be hereinafter referred to as "carriage stops" and the cooperating stop device as the "stop."

G represents the carriage stops, of which any desired number, one or more, may be adjustably mounted on the carriage in any suitable way. Each stop shown has a spring clip *g* which embraces the upper edge of the rack bar and detachably retains the stop thereon with a tooth on the stop in engagement with a serrated rear face *g'* on an upwardly and rearwardly extending portion of the rack bar to prevent the stop from shifting on the rack bar. The front end of the spring clip *g* forms an index which cooper-

ates with a scale on an inclined front face g^2 of the rack bar to enable the proper adjustments of the stop. This construction enables the stops to be readily placed in position and adjusted on the rack bar and detached therefrom when not required for use. The rack bar is provided in rear of its lower toothed edge with a downwardly-facing ledge or shoulder g^3 for the engagement of a device, hereinafter described, for lifting the rack bar.

H and H' represent main and auxiliary intercepting stops which normally stand side by side below the path of movement of the stops G, as shown in Fig. 1, and are adapted to be raised to a position to intercept the carriage stops to arrest the carriage. The main stop H is pivoted between its ends to the free ends of links h h' which are pivoted at their outer ends to a lug h^2 on the shift frame D, and both stops H and H' are pivoted at their lower ends to the free ends of links h^3 which are pivoted at their other ends to the piston rod or movable part of a dash pot or shock-absorber, hereinafter described. These links constitute a movable or floating support for the intercepting stops which enables the several movements of the stops hereinafter described. The link h preferably has a rigid lifting finger h^4 which projects therefrom beneath the ledge g^3 of the rack bar for lifting the rack bar out of engagement with the escapement pinion e' when using the tabulating mechanism.

H² represents a lug on the shift frame which serves to limit the movement of the stops H and H' by the carriage and form a back stop or abutment therefor.

The actuating mechanism for the stops H H' is preferably constructed as follows: I represents a rock shaft suitably journaled on the shift frame in rear of the stops H H' and provided with a rigid arm i which projects forwardly under the upper stop-supporting links h h' . When the shaft I is rocked, this arm i raises the links and places the upper ends of the stops H H' in position to intercept the carriage stops G, and the lifting finger h^4 on the link h engages the ledge g^3 of the rack bar and lifts the rack bar out of engagement with the pinion e' to free the carriage from the escapement. The parts will then be in the position shown in Figs. 3 and 5. The rock shaft I is provided near its outer end with an arm i' , Figs. 1, 2 and 7, connected by a link i^2 to a lever i^3 which is pivoted on the top plate of the main frame and is connected by a rod i^4 to a tabulator key lever K which is fulcrumed on the main frame and extends forwardly to the key-board. A suitable spring k , Fig. 1, is provided for returning the rock shaft to the normal position, after actuation. The link i^2 is so arranged that in the normal

position of the shift frame, shown in Fig. 7, it inclines rearwardly from a line passing through the pivotal axis of the shift frame D and the pivotal connection of the link with the lever i^3 , whereas when the shift frame is raised to shift the platen the link swings across such line to a corresponding forwardly inclined position, so that the depression of the tabulator key will produce equal movements and the same action of the intercepting stops H H' in both positions of the shift frame. Any other suitable mechanism for raising the stops H H' into intercepting position could be employed.

L, Figs. 1 and 3-6, represents a spring which connects the auxiliary stop H' to one of the links h^3 and holds the upper end of said stop against a stationary pin l projecting from a suitable part of the shift frame through an opening l' in the main stop, so that when the stops H H' are raised by depressing the tabulator key, a shoulder l^2 on the auxiliary stop will snap over the pin l and hold the stops up in the intercepting position until released by the engagement of the carriage stop with the auxiliary stop H', without requiring the tabulator key to be held down until the carriage is stopped.

M represents a spring connecting the upper stop-supporting links h h' with a stud m projecting from the shift frame for lowering the stops H H' out of engagement with the carriage stop after arresting the carriage.

N represents the cylinder of the dash-pot or shock absorber, and n the piston thereof. The cylinder is preferably made integral with the shift frame and has a screw head provided with a stuffing box n' through which extends the piston rod n^2 to which the lower-supporting links h^3 for the stops H H' are pivoted. The piston closely fits the cylinder and has a number of holes n^3 through it, and is provided at one side with a valve or disk n^4 which has a limited movement toward and from the latter. The valve is of smaller diameter than the piston and has a single hole n^5 which is kept in register with one of the holes in the piston by a pin n^6 projecting from the piston through a hole in the valve. The cylinder is filled with oil. When the carriage stop strikes the main stop H it will swing the latter about its pivotal connection with the upper-supporting links h h' to the position shown in Fig. 4, and move the piston n inwardly. The oil will pass freely through the several holes n^3 of the piston and offer only slight resistance to the first portion of the movement of the piston, but the valve will then be seated against the piston by the pressure of the oil thereon and close all of the holes except that registering with the hole n^5 in the valve, thereby materially in-

creasing the resistance and checking the motion of the piston and the main stop H. A spring O surrounding the piston rod returns the piston and the main stop H to their normal positions when the stop is lowered out of engagement with the carriage stop G by the spring M. In the return movement of the piston the valve n^4 uncovers the holes in the piston and permits a rapid motion thereof. The dash-pot could be constructed in other ways and effect the described action of the piston, starting rapidly, then retarding in its movement in one direction and returning rapidly.

The operation of the tabulating mechanism is as follows: The carriage stop or stops G is or are adjusted to stop the carriage at the desired point or points. The tabulating key K is then depressed, which raises the stops H and H' in position to intercept the carriage stop, and releases the carriage from the escapement in the manner stated, and the auxiliary stop H catches on the pin l and holds the stops up, permitting the tabulating key to be released. The parts are then in the position shown in Figs. 3 and 5. The carriage is then moved by its driving spring or motor to the left (to the right in the rear views of Figs. 1-4) until the carriage stop G strikes the main stop H. The momentum of the carriage swings the stop to the position shown in Fig. 4 and forces the piston inwardly in the dash-pot, the described action of the dash-pot causing the carriage to be brought to a stop gradually, or without shock. Just before the main stop H is moved into contact with the back stop H² the carriage stop G strikes the auxiliary stop H', which disengages it from the pin l and permits the stops to be returned to their initial position by the return springs M and O. The described action of the dash-pot permits the stops to be rapidly restored to their normal position. The momentum of the carriage has been overcome and the carriage brought almost to a standstill before the auxiliary stop H' is thus released. The opening in the main stop H through which the latch pin l for the auxiliary stop passes, is large enough to allow the several movements of the main stop, *i. e.*, upwardly, then laterally, next downwardly and finally back to the initial position, without interference with the pin. The shock absorber described will completely overcome the momentum of a carriage of ordinary weight, even when it is permitted to run the full length of its travel, before the carriage forces the main stop H against the fixed abutment H², as shown in Fig. 4, but the continued pull of the carriage driving spring on the carriage after the momentum of the latter is overcome almost instantly moves the stop against the abutment. The abutment serves only to prevent over movement

of the stops H and H' under the action of the carriage driving spring after the momentum of the carriage is overcome by the dash-pot. The carriage is stopped dead, or without the least tendency to rebound, by the described mechanism, and the usual noise and vibration of the machine incident to arresting the carriage is almost entirely eliminated.

P represents a hook-shaped arm on the inner end of the rock shaft I. When the shaft is rocked and releases the rack bar F from the escapement pinion, the end of this arm is swung rearwardly between the teeth of the escapement wheel E, and moves the wheel backwardly about one-quarter of a tooth space and holds it there until the rack bar is again engaged with the pinion. This insures the proper meshing of the rack bar and pinion even if the rack bar returns before the main stop is forced clear back against the back stop H², and prevents the carriage escapement from acting one letter space at the time the rack bar reengages the pinion.

The parts are so proportioned and arranged that the rack bar F reengages the escapement pinion e' before the main stop clears the carriage stop, thus restoring the carriage to the control of the escapement before releasing it from the tabulating mechanism. In case a second carriage stop G is used within two or three letter spaces of the first one, it would be located directly over the main stop H, when the carriage is arrested by the first stop G, and when the tabulating key is again depressed the main stop H will strike this second carriage stop G and raise the rack bar higher than usual, but when the carriage moves, the second carriage stop G will slide down the inclined end of the main stop H and engage the auxiliary stop H', which will arrest the carriage in the proper position. Thus two carriage stops G can be placed on the rack bar with but a single letter space between them, if so desired.

The action of the dash-pot described is different from the pneumatic devices heretofore employed, for the latter provide elastic cushions which increase the tendency of the carriage to rebound, whereas the former, while preventing shock, does not make an elastic cushion and the carriage has no tendency to rebound. The described mechanism is also entirely different in action from a friction governor, for it permits the carriage to travel at full speed as soon as released until the stops contact, and is free from the wear incident to frictional devices.

The dash pot or shock absorber herein described and containing non-elastic liquid is radically different from an air filled cylinder, and different means are required to

apply the two devices. An air filled cylinder answers to absorb the shock but it has the fatal objection of increasing the rebound of the carriage, while the liquid dash-pot or device described absorbs the shock efficiently and entirely overcomes the tendency of the carriage to rebound.

A shock absorber operating as described would also be desirable for use in connection with the margin stops that limit the extreme movements of the carriage, as the carriage is frequently set back for a new line with greater force than required, and occasionally a careless operator releases the carriage and permits it to run against the right-hand marginal stop with considerable force when changing the position of the carriage. It is, therefore, not intended to restrict the claims to the use of the shock absorber in tabulating mechanisms. Furthermore, a shock absorber operating as described could be differently constructed and arranged and used with a tabulating mechanism of different construction.

The shock absorbing means are also adapted to such machines as book typewriters which have a stationary platen and a carriage acting to move the printing mechanism over the paper, and to adding and calculating machines that move either the paper or printing mechanism by jumping over a considerable distance.

I claim as my invention:

1. In a typewriting machine, the combination with a laterally movable carriage, and a support for the carriage, of a stop on one of said parts, a movable intercepting stop on the other part, an abutment for the intercepting stop, and a dash-pot which governs the movement of the intercepting stop from the intercepting position toward said abutment, substantially as set forth.

2. In a typewriting machine, the combination with a laterally movable carriage, and a support for the carriage, of a stop on one of said parts, a movable intercepting stop on the other part, and a dash-pot which governs the movement of said intercepting stop and has a valve which allows the movable part of the dash-pot to move in one direction with greater freedom than in the other, substantially as set forth.

3. In a tabulating mechanism for typewriting machines, the combination with a motor-driven carriage having a stop moving therewith, of a liquid dash-pot comprising relatively movable members, and an intercepting stop which is moved by the contact of the carriage stop therewith and acts on the dash-pot to gradually stop the carriage, substantially as set forth.

4. In a typewriting machine, the combination with a laterally movable carriage, and an escapement controlling the carriage, of cooperating stops one of which moves

with the carriage, means for placing one of said stops in position to intercept the other and for releasing the carriage from the escapement, one of said stops being moved by contact with the other, and a liquid dash-pot for resisting said movement of said stop, substantially as set forth.

5. In a typewriting machine, the combination with a laterally movable carriage, and an escapement controlling the carriage, of cooperating stops one of which moves with the carriage, means for placing one of said stops in position to intercept the other and for releasing the carriage from the escapement, one of said stops being pivoted and adapted to be swung on its pivot by contact with the other stop, and a dash-pot for resisting the pivotal movement of said pivoted stop, substantially as set forth.

6. In a typewriting machine, the combination with a laterally movable carriage having a stop moving therewith, and a shift frame for the carriage, of a dash-pot supported by the shift frame and moving therewith, and means by which the carriage stop acts on the dash-pot to stop the carriage with a retarding motion, substantially as set forth.

7. In a typewriting machine, the combination with a laterally movable carriage having a stop moving therewith, and a shift frame for the carriage, of an intercepting stop on the shift frame which intercepts the carriage stop and is moved by contact therewith, and a dash-pot on the shift frame and moving therewith which resists said movement of said intercepting stop, substantially as set forth.

8. In a typewriting machine, the combination with a laterally movable carriage having a stop moving therewith, and an escapement controlling the carriage, of an intercepting stop normally out of line with the carriage stop, means for placing said intercepting stop in position to intercept the carriage stop and for releasing the carriage from the escapement, means for automatically holding said intercepting stop in intercepting position, said intercepting stop being movable by contact with the carriage stop, and a dash-pot for resisting the movement of said intercepting stop, substantially as set forth.

9. In a typewriting machine, the combination with a laterally movable carriage having a stop moving therewith, and an escapement controlling the carriage, of an intercepting stop normally out of line with the carriage stop, means for placing said intercepting stop in position to intercept the carriage stop and for releasing the carriage from the escapement, means for locking the escapement until the carriage is reengaged with the escapement, said intercepting stop being movable by contact with the carriage

stop, and a dash-pot for resisting the movement of said intercepting stop, substantially as set forth.

10. In a typewriting machine, the combination with a laterally movable carriage having a stop moving therewith, a rack bar on the carriage, an escapement mechanism having a pinion meshing with the rack bar, an intercepting stop movable transversely of the rack bar, and means for first moving the intercepting stop into line with the carriage stop and then moving both stops together with the rack bar to disengage the rack bar from the pinion, substantially as set forth.

11. In a typewriting machine, the combination with a laterally movable carriage having a movably mounted rack bar moving therewith, of a carriage stop adjustably mounted on the rack bar, an intercepting stop normally out of line with the carriage stop, a pinion normally meshing with the rack bar, an escapement wheel connected to the pinion, and means for first moving the intercepting stop into line with the carriage stop, then moving both stops and the rack bar to disconnect the rack bar from the pinion, and at the same time locking the escapement wheel against rotary movement, substantially as set forth.

12. In a typewriting machine, the combination with a laterally movable carriage having a stop moving therewith, of main and auxiliary intercepting stops arranged in parallel planes and normally out of line with the carriage stop, and means for simultaneously moving both of said intercepting stops into line with the carriage stop, substantially as set forth.

13. In a typewriting machine, the combination with a laterally movable carriage having a stop moving therewith, of main and auxiliary intercepting stops arranged in parallel planes one in advance of the other and both normally out of line with the carriage stop, and means for projecting both of said stops simultaneously into line with the carriage stop, substantially as set forth.

14. In a typewriting machine, the combination with a laterally movable carriage having a stop moving therewith, of main and auxiliary intercepting stops arranged one in advance of the other and both normally out of line with the carriage stop, means for moving said stops into line with the carriage stop, and means cooperating with said auxiliary stop for holding said intercepting stops in intercepting position until the carriage stop strikes said auxiliary stop, substantially as set forth.

15. In a typewriting machine, the combination with a laterally movable carriage having a stop moving therewith, of main and

auxiliary intercepting stops arranged one in advance of the other and both normally out of line with the carriage stop, means for moving said stops into line with the carriage stop, means cooperating with said auxiliary stop for holding said intercepting stops in intercepting position until the carriage stop strikes said auxiliary stop, and a dash-pot for resisting movement of said main intercepting stop by the carriage stop, substantially as set forth.

16. In a typewriting machine, the combination with a laterally movable carriage having a stop moving therewith, of a movable intercepting stop, pivoted links supporting said intercepting stop and connected to the stop at different points, and means for moving said intercepting stop into position to intercept the carriage stop, substantially as set forth.

17. In a typewriting machine, the combination with a laterally movable carriage having a stop moving therewith, of a movable intercepting stop, pivoted links supporting said intercepting stop and connected to the stop at different points, means for moving said intercepting stop into position to intercept the carriage stop, and a shock absorber connected to one of said supporting links for resisting movement of said intercepting stop on the other link, substantially as set forth.

18. In a typewriting machine, the combination with a laterally movable carriage having a stop moving therewith, and a carriage-supporting frame, of a floating intercepting stop normally out of line with the carriage stop, a fixed abutment on the carriage supporting frame for the floating stop, and means for moving the floating stop into line with the carriage stop, substantially as set forth.

19. In a typewriting machine, the combination with a laterally movable carriage having a stop moving with the carriage, of a movably mounted intercepting stop normally out of line with the carriage stop, means for moving the intercepting stop bodily into line with the carriage stop, said intercepting stop being also movable laterally with the carriage stop, means for limiting the lateral movement of the intercepting stop with the carriage stop, and means for moving the intercepting stop out of engagement with the carriage stop and returning it laterally to the initial position, substantially as set forth.

Witness my hand, this 27th day of May, 1909.

OSCAR C. KAVLE.

Witnesses:

GERTRUDE ENTZ,
FRANK E. REID.