Oct. 5, 1943. R. D. DODGE 2,330,960

TYPEWRITING MACHINE

Filed Nov. 12, 1941 2 Sheets-Sheet 1

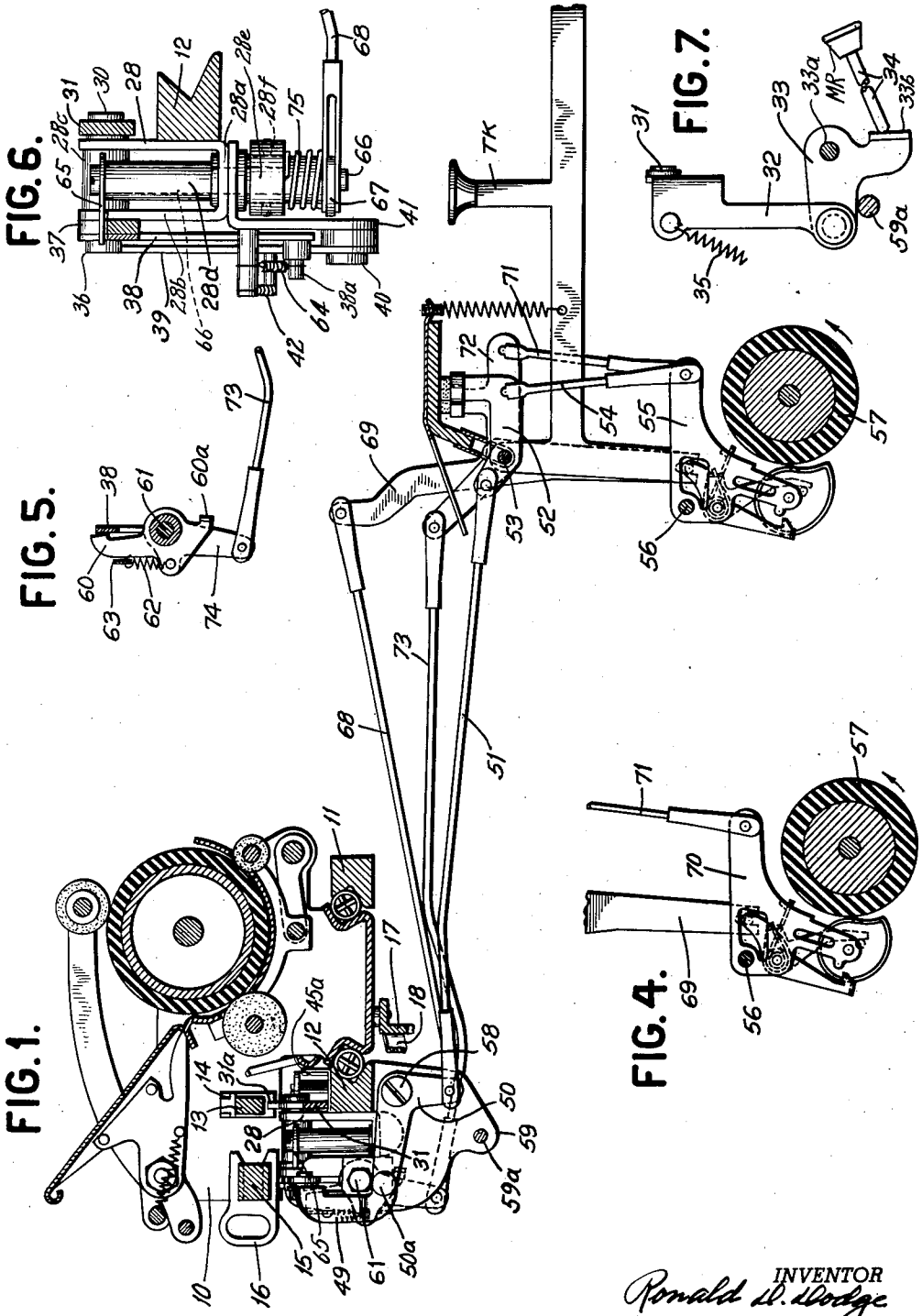


FIG. 1.

FIG. 5.

FIG. 6.

FIG. 7.

FIG. 4.

INVENTOR
Ronald D. Dodge

BY
W. M. Wilson
ATTORNEY

Oct. 5, 1943. R. D. DODGE 2,330,960

TYPEWRITING MACHINE

Filed Nov. 12, 1941 2 Sheets-Sheet 2

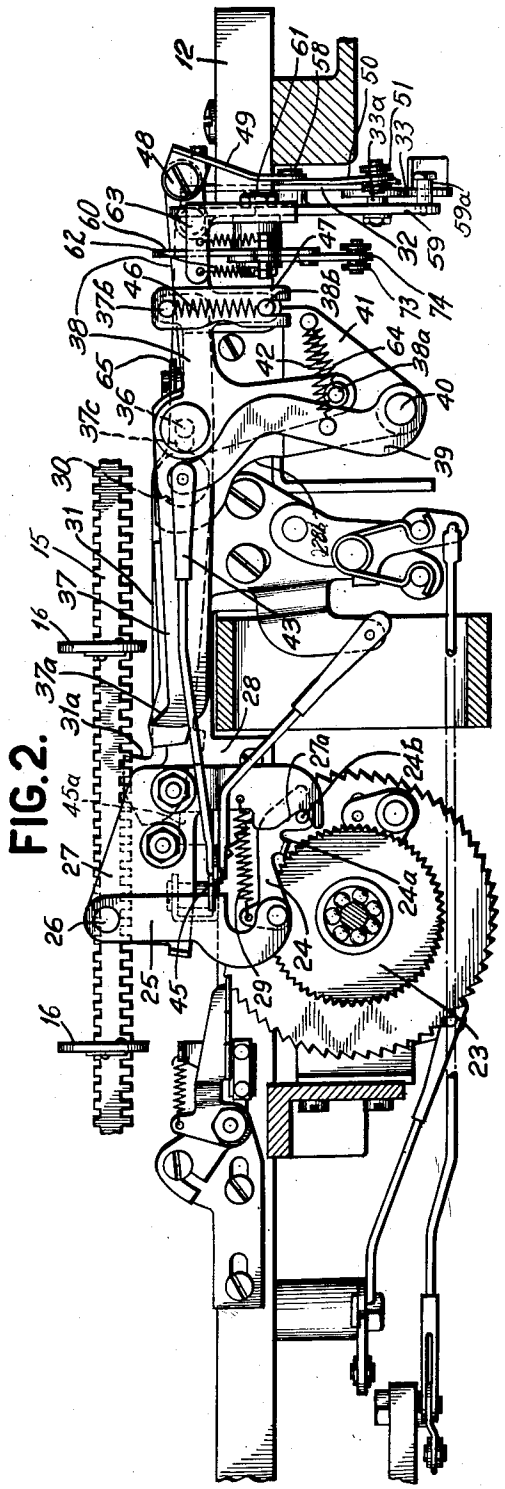


FIG. 2.

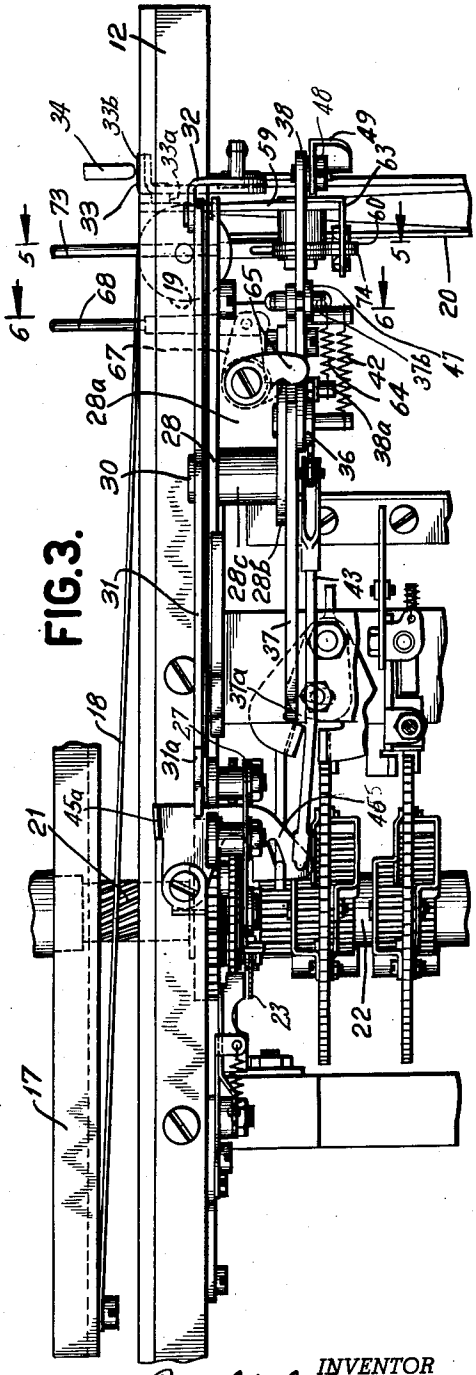


FIG. 3.

INVENTOR
Ronald D. Dodge

BY

ATTORNEY

Patented Oct. 5, 1943

2,330,960

UNITED STATES PATENT OFFICE

2,330,960

TYPEWRITING MACHINE

Ronald D. Dodge, Rochester, N. Y., assignor to International Business Machines Corporation, New York, N. Y., a corporation of New York

Application November 12, 1941, Serial No. 418,711

15 Claims. (Cl. 197—177)

This invention relates to tabulating mechanisms.

The principal object of the present invention is to provide an improved tabulating mechanism suitable for use in typewriters and like machines wherein carriages must be moved directly from one columnar position to another.

An object is to provide a power operated tabulating mechanism in which the engagement and disengagement of the main or counter-stop with the columnar stops is effected and controlled by power, respectively.

An object is to provide a tabulating mechanism which is more dependable in its operation.

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

The present application discloses an improvement in the tabulating mechanism disclosed in Patent No. 1,935,436. In this patent there is disclosed an arrangement whereby a key controlled power mechanism operates a counter-stop to move it into the path of the column stops on the carriage and this counter-stop is latched in operated position. When the column stop strikes this counter-stop, it moves the counter-stop a short distance sufficiently to disengage the counter-stop from the column stop and this action is supposed to take place in such a way that the carriage escapement is re-engaged before the carriage is released.

It is desirable that the carriage be definitely at rest at the time the escapement mechanism is allowed to re-engage to insure that, at the end of the tabulating movement, the carriage will be in the proper column. This is particularly important when columns of figures are being written because a one-space displacement of the carriage may result in writing the figures in the wrong denominational columns. It has been found from experiences with the tabulating mechanism disclosed in the above patent that the carriage is not always at rest when the escapement pawls are re-engaged with the escapement rack and the carriage does not finally stop in the proper column but in the next column. Due to the high speed of operation of the tabulating mechanism by the movement of the carriage in unlatching the counter-stop, or tabular lever, as it has been called, it is very difficult to adjust the counter-stop and to maintain it in adjustment.

In the present application, the uncertainty of of the re-engagement of the escapement pawls with the rack has been obviated by so arranging the tabulating mechanism that the disengagement of the counter-stop or tabular lever from the column stop is caused by a power device which unlatches the counter-stop and is controlled by the movement of the counter-stop by the carriage. It has been found that the provision of this power device to control the disengagement of the counter stop introduces a short time lag into the operation of the tabulating mechanism which is sufficiently long to permit the carriage to come definitely to rest in the proper column before the counter stop is released. Another advantage of the mechanism is that the disengagement of the latching device which holds the counter-stop in the path of the column stops is made more positive and thereby more certain in its operation and less dependent upon fine adjustment of the parts.

In the drawings:

Fig. 1 is a vertical section transversely of the platen carriage of the typewriting machine and including portions of the keyboard and power mechanism.

Fig. 2 is a rear elevation of the tabulating mechanism.

Fig. 3 is a plan view of the tabulating mechanism as it would appear to a person standing at the rear of the machine.

Fig. 4 is a detail view of the power means for disengaging the counter stop.

Fig. 5 is a vertical section on the line 5—5 in Fig. 3.

Fig. 6 is a vertical elevation on the line 6—6 in Fig. 3.

The present invention is shown in the drawings as applied to a power operated typewriter, such as the one disclosed in Patent No. 2,224,766, issued December 10, 1940. In this patent there is disclosed a typewriter employing the well known power operating mechanism of the "Electromatic" typewriter and provided with a variable spacing mechanism which spaces characters in proportion to their widths. Since the power mechanism of the "Electromatic" is now well known, only a very general description will be given of the power mechanism and for the same reason it has not been shown in any great detail in the drawings.

In Fig. 1 the reference numeral 10 generally designates the usual platen carriage which is mounted for letter spacing movement on the front rail 11 and the rear rail 12. Mounted in

this carriage is the usual marginal stop rack 13 on which marginal stops like 14 are adjustably mounted in a well known way. A tabular stop bar 15 of well known form is also mounted in the carriage and is provided with a plurality of column stops 16 which may be set in transverse grooves in the stop bar 15. Secured to the underside of the carriage is a carriage feed rack 17 to which is connected the tape 18. This tape, as partly shown in Fig. 3, extends around a pulley 19 carried by the rail 12 and is fastened to the drum 20 of a spring motor which provides power to feed the carriage in a letter spacing direction as described in the above patent.

Meshing with the escapement rack 17 (Fig. 3) is a pinion 21 having connections, through a releasable clutch, to variable escapement mechanism 22 which conveniently may be of the form disclosed in the above patent. However, any other suitable carriage escapement or feed mechanism may be used as desired. The aforementioned clutch is utilized to release the platen carriage from the feed mechanism during carriage return and tabulating operations and also whenever the carriage is manipulated by hand.

As explained in the above patent, this clutch is operated to disengage the escapement mechanism from the pinion 22 by rotating a ratchet wheel 23 (Fig. 2) a slight amount counterclockwise. For this purpose there is provided a dog 24 which is pivoted to an arm 25. The pivot 26 for arm 25 is carried by a plate 27 secured to an extension of a frame 28. This frame is mounted on the rear side of the rear rail 12 and supports the bulk of the tabulating mechanism. The dog 24 has a bent-over lug 24*a* in the plane of the ratchet wheel 23 but a spring 29, anchored to an arm formed in the dog 24 and to the plate 27, holds the dog 24 and arm 25 in the position of Fig. 2 in which a pin 24*b* in the dog 24 rests in a notch 27*a* in an extension of plate 27. The pin 24*b* thus supports the dog 24. When the arm 25 is rocked in a clockwise direction (Fig. 2), the dog 24 will be drawn to the left whereby the pin 24*b* will be withdrawn from the slot 27*a* and permit the dog 24 to rock clockwise sufficiently to engage the lug 24*a* with the ratchet 23. With further movement of the arm 25, the ratchet 23 will be rotated counterclockwise an extent sufficient to disengage the clutch and permit the pinion 21 to turn freely when the carriage moves.

The frame 28 at the point 28*a* is bent horizontally rearwardly and formed with an upward extension 28*b* (Figs. 2, 3 and 6) which is secured to and spaced from the main part of the frame 28 by means of a collar 28*c*. A pin 30 (Fig. 3) pivotally supports a main stop lever 31 having a lug 31*a* which is normally in a raised position in the path of the marginal stops 14 to limit carriage movement to the extent defined by the marginal stops. At its right hand end (Figs. 2, 3, and 7) the lever 31 is pivotally connected to a vertically extending link 32 which, in turn, is pivoted on the horizontal arm of a bell crank 33, the other arm of which is formed with a lug 33*b* engaged by the rear end of the push rod 34 of the usual margin release key MR. A spring 35, connected to a pin carried by the link 32, normally tends to draw the link downwardly and thereby maintains lug 31*a* in the path of the marginal stops 14. However, when the margin release rod 34 (Fig. 7) is pushed to the left, it rocks the lever 33 in a clockwise direction, thereby elevating the link 32. This results in depressing the left hand end (Figs. 2 and 3) of the lever 31, thereby removing the lug 31*a* from the path of the marginal stop and permitting the carriage to be moved by hand beyond the marginal position.

Pivoted on a stud 36 carried by the extension 28*b* is the tabular lever or counter-stop 37 (Figs. 2, 3, and 6) which extends horizontally parallel with the lever 31 and is provided with a tooth 37*a* normally out of the path of movement of the tabular stops 16. Also pivoted on the stud 36 is an operating lever 38 which has one arm extending almost straight downwardly and provided with a pin 38*a* in the plane of an arm 39 pivoted on a stud 40. The latter is carried by a bracket 41 secured to the underside of the level portion 28*a* of the frame 28. A spring 42, connected to the arm 39 and to a pin carried by the bracket 41, holds the arm 39 in contact with pin 38*a*. The arm 39 is connected by a link 43 to a lever 45 pivoted on the top of the rear rail 12. The lever 45 cooperates with the edge of the arm 25 and is operated by the carriage release levers which are mounted in the carriage. This lever 45 is similar in function to the one designated 91 in the above patent and has a lug 45*a* (Figs. 1, 2 and 3) for the same purpose as the lug 90 in the patent.

Whenever the arm 38 is rocked clockwise (Fig. 2), the pin 38*a*, engaging the arm 39, will cause the latter to rock counterclockwise, thereby pushing the link 43 to the left and operating the arm 45. This arm 45, in turn, operates the arm 25 to disengage the pinion 21 from the escapement mechanism 22, this operation being required during tabulating operations in order to release the carriage for free running movement by the spring motor 20.

The lever 38 is resiliently connected to the lever 37, whereby the foregoing movement of lever 38 also causes the lever 37 to be rocked clockwise (Fig. 2) to elevate the lug 37*a* into the path of a tabular stop 16. For this purpose, the horizontal arm of the lever 38 has a short downward extension provided with a pin 38*b* (Fig. 2) connected by a spring 46 to a pin 37*b* on the lever 37. A guard plate 47 is loosely pivoted on the pin 37*b* and slotted to embrace the pin 38*b* and is placed between the extension of the arm 38 and the spring 46. Opposite the front or upper face (Fig. 3) of the lever 37, there is provided a similar spring which, with spring 46, causes the levers 37 and 38 to normally move in unison. If the tooth 37*a* should strike the lower edge of a column stop 16 when lever 38 is rocked clockwise (Fig. 3) springs 46 stretch and prevent damage to any of the parts.

The lever 38 is pivotally connected at 48 to a link 49 (Figs. 1, 2 and 3), having its lower end pivotally connected at 50*a* to a bell crank 50. The downwardly extending arm of the bell crank 50 is connected by a long link 51 to a rock lever 52 pivoted on the rod 53 which fulcrums the key levers including the tabulating key TK (Fig. 1). The lever 52 is connected by a short link 54 to a conventional cam unit 55 of the single-lobe type pivotally mounted on the rod 56. The cam unit 55 cooperates with the usual power roller 57 which rotates continually in the direction of the arrow (Fig. 1) while the machine is in use. The cam unit 55 is controlled in a well known way by the tabulating key TK which, when depressed by the operator, causes the cam unit 55 to be actuated by the power roller in a well known way, thereby rocking cam unit 55 in a clockwise direction. This results in drawing down the link 54,

rocking the lever 52 clockwise, and drawing the link 51 to the right in Fig. 1, thereby rocking the lever 50 counterclockwise on its pivot 58 in the bracket 59. Link 49 is thus drawn downwardly, depressing the right hand end (Figs. 2 and 3) of the horizontal arm of the lever 38. The arm 39 is operated as described above to free the carriage from the escapement mechanism and, at the same time, the lever 37 is rocked clockwise (Fig. 2) to elevate the lug 37a into the path of the nearest stop 16 immediately to the left (Fig. 2) of the lug 37a.

When operated in this fashion, the lever 38 is latched to hold the lug 37a in the path of the column stop 16. As best shown in Fig. 5, there is provided a latch 60 pivoted on a stud 61 carried by the bracket 59 and urged in a clockwise direction (Fig. 5) by a spring 62 which is anchored to a bracket 63 secured to the bracket 59. Normally the latch 60 bears against the rear face or side of the lever 38 but, when the latter is operated as described above, snaps over the upper edge of the lever 38 and thereby prevents said lever from returning to the position of Fig. 2. When the lever 38 is rocked as described above, a spring 64 (Figs. 2 and 3), connected to the pin 38a and to the same pin on bracket 41 as the spring 42, tends to restore the levers 37 and 38 as a unit to the position of Fig. 2 but the latch 60 prevents this from taking place. Thus, the counter stop 37 is maintained in the operative position in the path of the column stop 16 until the movement of the carriage brings the column stop into engagement with the lug 37a.

The lever 37 is slotted horizontally at the point where the stud 37 passes through as shown by the dotted line 37c (Fig. 2) and normally the lever 37 occupies the left hand position of Fig. 2. The lever 37 is held in this position by means which includes an arm 65 (Figs. 1, 2, 3 and 6) secured to the upper end of a stub shaft 66 which is rotatably mounted in a bushing 28d secured to the level portion 28a of frame 28. Fixed to the lower end of the stub shaft 66 is an arm 67 connected by a link 68 to a trip lever 69 pivoted on the rod 53. This trip lever extends downwardly and at its lower end is shaped like that portion of a key lever which cooperates with the release lever of a cam unit and controls a cam unit 70 (Fig. 4) in exactly the same way as the TK key controls the cam unit 55. This cam unit 70 is similar to the cam unit 55 and is connected by a link 71 to a rock lever 72 somewhat similar to the rock lever 52. The rock lever 72 is connected by a horizontal link 73 to an arm 74 journalled on the stud 61 and engaging a bent-over lug 60a in the latch 60. A torsion spring 75 (Fig. 6) connected to the arm 67 and to a collar 28e secured by set-screws 28f to bushing 28d, tends to urge the shaft 66 and arm 65 in a clockwise direction with reference to Fig. 3, thereby holding lever 37 in its left hand position as shown in Fig. 2.

When the column stop 16 strikes the lug 37a, it moves the lever 37 to the right in Figs. 2 and 3, thereby rocking the arm 65 in a counterclockwise direction (Fig. 3). This causes the arm 67 to be similarly rotated, thereby pushing the link 68 to the right in Fig. 1, thus rocking the trip lever 69 for the cam unit 70 in a clockwise direction. This causes the cam unit 70 to be operatively coupled to the power roller 57 in a well known way. As a consequence, the cam unit 70 is rocked clockwise (Fig. 4), thereby drawing down the link 71 and rocking the lever 72 in a clockwise direction. This draws the link 73 to the right in Figs. 1 and 5 and rocks the arm 74 (Fig. 5) in a counterclockwise direction, also, through the lug 60a, rocking the latch 60 to disengage it from the depressed horizontal arm of lever 38. This permits the levers 37 and 38 to rock counterclockwise (Fig. 2) under the influence of spring 64, thereby removing lug 37a from engagement with the column stop.

The principal advantage of the invention described herein is that the use of a power device, such as a cam unit, to effect the release of the tabular lever or counter-stop interposes a short time delay between the time the carriage-borne column stop strikes the counter-stop and the time of disengagement of the counter-stop. This delay, while short, gives time for the carriage to stop vibrating before the counter-stop is disengaged. In practically all tabulating mechanisms, particularly on long runs of the carriage, the carriage tends to vibrate or bounce back and forth from the counter-stop before finally coming to rest. Sometimes this vibrating or bouncing effect is so great that the carriage rebounds sufficiently to finally come to rest several spaces away from the final position. In the present case, the escapement pawls are definitely held out of engagement with the escapement rack and the counter-stop is definitely held in the path of the tabular lever long enough to give the carriage time to come to rest.

It has been found that by the use of the cam unit or other power device to disengage the counter-stop, instead of depending solely upon the movement of the carriage, the action of the tabulating mechanism is much more positive and reliable than in the case of the tabulating mechanism disclosed in the above mentioned patent which has been a feature of the well known "Electromatic" typewriter for a considerable length of time.

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

What is claimed is:

1. In a machine of the class described, a carriage; a column stop, a counter-stop, one of said stops being moved relative to the other by the carriage, one of said stops being engaged by the other during the movement of the carriage, one of said stops being actuable into the path of the other, one of said stops acting as a control stop and, when engaged by the other, being movable a predetermined extent in the direction of the relative movement between the two stops when the carriage moves; means to hold the actuable stop in the path of the other stop, a power device for moving the actuable stop into the path of the other stop and a second power device controlled by the predetermined movement of the control stop for releasing the holding means.

2. In a machine of the class described, the combination of a carriage, a stop bar moved by the carriage, column stops on said bar, a stop lever pivotally mounted for movement of one of its ends to a position in the path of a column stop and also slidably mounted for movement in the same direction as the column stops, a latch for

holding the lever in said position, a power device for moving the lever to said position, a second power device for releasing the latch, and controlling means operated by the second movement of the lever for rendering the second power device operative to disengage the latch when a column stop strikes said lever.

3. In a machine of the class described, a carriage, a column stop on said carriage; a counter-stop relative to which the column stop moves when the carriage moves, said counter-stop being normally out of the path of the column stop, but movable into the path of the column stop to arrest the carriage; means to move the counter-stop into the path of the column stop, means to hold the counter-stop in its moved position, a power device for releasing the holding means, and means controlled by movement of the carriage to render the power device operative to release the holding means.

4. In a machine of the class described, a longitudinally movable stop bar and column stops disposed along said bar, a counter stop lever swingable transversely of said bar to engage a column stop on said bar and also slidable by a stop on the bar a predetermined extent when the column stop engages said stop lever during movement of said bar, a continuously rotating power roller, a cam unit cooperating with said power roller and having means coupling it to said lever to swing said lever whenever the cam unit is operated by the power roller, a detent for holding the lever in the position to which it is swung by said cam unit, a second cam unit cooperating with the power roller and having connections to said detent to release the latter whenever said second cam unit is operated by the power roller, and control means for said second cam unit operated by the sliding movement of said lever for causing the second cam unit to be operated by the power roller.

5. In a machine of the class described, a carriage; a stop supporting member having column stops disposed thereon in longitudinal alignment for determining columnar positions of the carriage; a counter-stop member movable transversely of the stop supporting member and normally clear of said stops for engaging said stops to define a columnar position of the carriage, said counter-stop member also having a movement to a limited extent longitudinally of the stop supporting element, one of said members being moved by the carriage, two power operating devices, means to hold the counter-stop member in its transversely moved position; means coupling the holding means and said member to the two power devices, respectively; and means operated by the longitudinal movement of said counter-stop member for rendering the power device for the holding means operative to release said holding means.

6. In a machine of the class described, the combination with the main frame, a carriage, rails movably supporting said carriage on the main frame, a stop bar mounted on the carriage and having column stops, a counter-stop lever slidably and pivotally mounted on one of said rails and rotatable from an inactive position to an active position in the path of the column stops, a latch mounted on said rail and operative to hold said lever in the path of said column stops, a power device for rotating said lever, a second lever engaging the first lever and actuated by sliding movement thereof, and a second power device controlled by the second lever for disengaging said latch.

7. In a tabulating mechanism for the carriage of a typewriting machine having a column stop and a counter stop, one of which stops is movable with the carriage, one of which stops is also movable into the path of the other to arrest the carriage in a columnar position; two power devices, one for effecting movement of said one stop into the path of the other, and the other device for effecting disengagement of said one stop from the other upon impact between said stops at the columnar position defined by said stops; means to initiate operation of the first of said power devices, and means rendered operative upon impact of said stops for initiating operation of the second power device.

8. In a machine of the class described, in combination with the carriage, a row of column stops movable with the carriage for defining different columnar positions of the carriage, a counter-stop lever, means to pivotally and slidably mount said counter-stop lever for movement into the path of a column stop and for movement by the column stop parallel with the row of stops, a second lever, resilient means connecting both said levers whereby when the second lever is operated, the first lever will be operated, key controlled means connected to the second lever for operating both said levers, a latching device cooperating with the second lever to hold said levers in the operated position, a third lever having one of its arms in a position to be engaged and moved by the first lever when the latter is slidably moved by the engagement of a column stop therewith, and a power device controlled by the third lever for disengaging said latching device.

9. In a machine of the class described, in combination with a carriage, a pair of stops for defining a columnar position of the carriage and movable in parallel paths, one of said stops being movable by the carriage, one of said stops acting as a controlling stop when moved by the other, one of said stops being normally clear of the other but movable into the path of the other stop to define a columnar position of the carriage by engagement with the other stop during a movement of the carriage to said columnar position; means to move the last named stop into the path of the other, and means including a power device controlled by the movement of the controlling stop in its parallel path for effecting the disengagement of the stops.

10. In a machine of the class described, the combination with the carriage, a pair of coacting stop elements movable in parallel paths, one of said elements being moved in its path by the carriage and the other of said elements being movable to a position to be engaged by the first element and moved parallel therewith when the carriage moves, said other element acting as a control element when moved in its parallel path, means for moving said other element transversely of the parallel paths to place it in a position to be engaged and moved by the first element during a movement of the carriage to the columnar position defined by said elements; two power devices, one for effecting said transverse movement; and means controlled by the control element for rendering operative the second power device, said second power device being operative to effect a disengagement of the control element from the other element.

11. In a machine of the class described, the

combination with the carriage, of a pair of co-acting stop elements, one of said elements being moved by the carriage in its movement to the columnar position defined by said elements, the other of said elements being slidable parallel with the carriage moved element and movable into the path of the carriage moved element, a device for moving said slidable element into the path of the carriage moved element, a device for holding the slidable element in the path of the carriage moved element, power means for releasing the holding device, and means actuated by a sliding movement of the slidable element for causing operation of the power means to release the holding means.

12. In a machine of the class described, the combination of the carriage, a carriage moved element, an element engageable with the carriage moved element and movable thereby, means to disengage the second element from the first element, and power means responsive to movement of the second element by the first element for rendering the disengaging means effective.

13. In a machine of the class described, the combination of a support, a carriage on said support; a carriage moved element and an element stationary relative to said support, said elements being engageable when the carriage moves to define a columnar position of the carriage; means to move one of said elements into a position to be engaged by the other during movement of the carriage, means to retain said one element in said position, a power device for rendering the retaining means ineffective, and control means rendered operative, upon engagement of said elements, to initiate operation of said power device.

14. In a machine of the class described, a carriage; a column stop supporting member moved when the carriage moves and a counterstop, one of said stops being movable into a position to be engaged by the other during the movement of said member to define a columnar position of said carriage, one of said stops also being movable by the other a limited extent after said stops are engaged by movement of said member, a power device for effecting the first named movement of said stops, means to set said power device in operation, means including a second power device for disengaging said stops, and means responsive to said limited movement of said stop for setting in operation the second power device.

15. In a machine of the class described, the combination with the carriage; of a column stop for defining a columnar position of the carriage and a counter stop, one of said stops being moved by the carriage, said column stop and counter stop having a movement relative to each other transversely of the movement of the carriage moved stop to place the column stop and the counter stop in a common path; power means to effect said relative movement, a second power means for causing a relative restoring movement between the column stop and counter stop; and means rendered operative, when the column stop engages the counter stop, to render the second power means operative to cause said restoring movement.

RONALD D. DODGE.