

Feb. 18, 1964

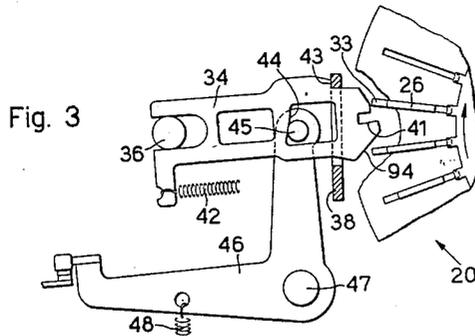
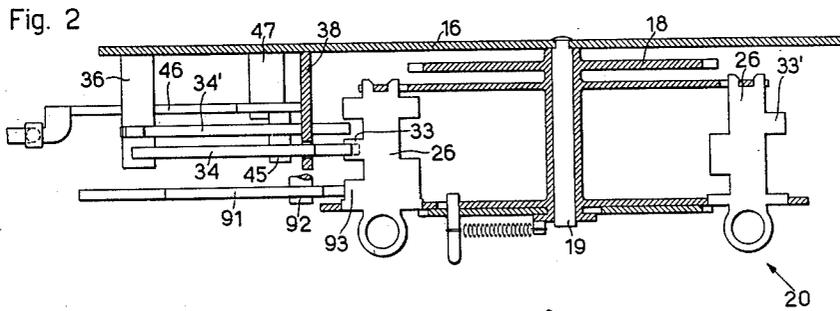
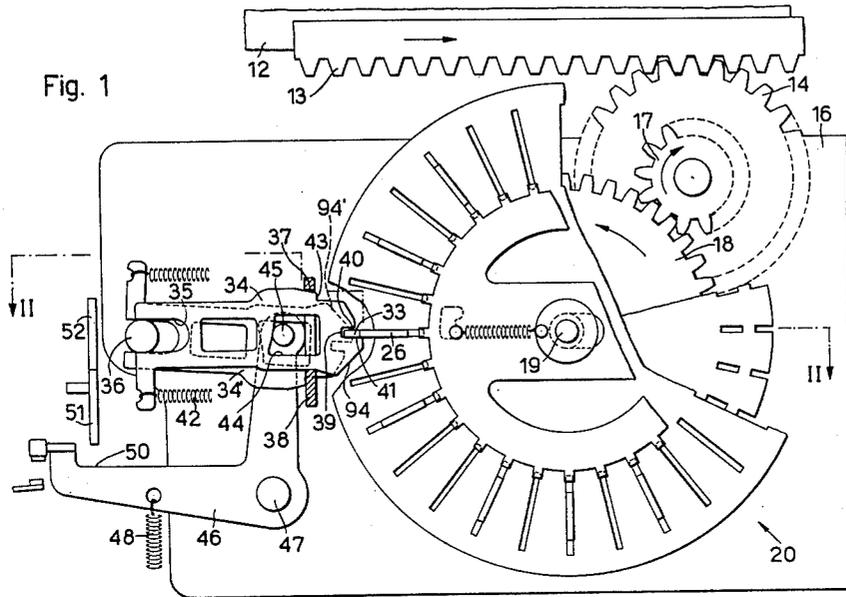
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3,121,487

PAPER CARRIAGE CONTROL MECHANISM FOR ACCOUNTING MACHINES

Filed April 4, 1961

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

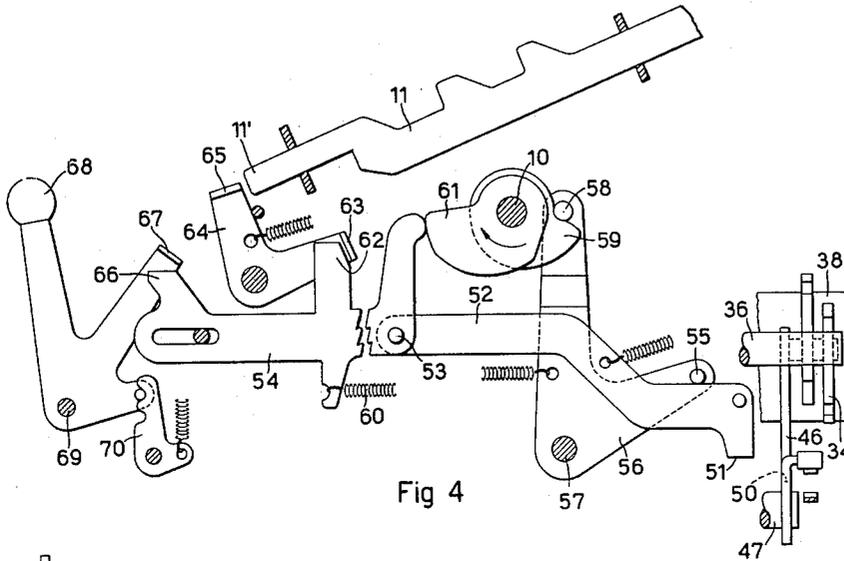


Fig 4

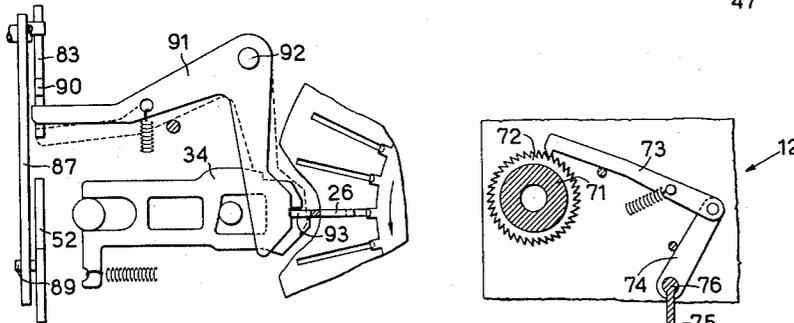


Fig. 6

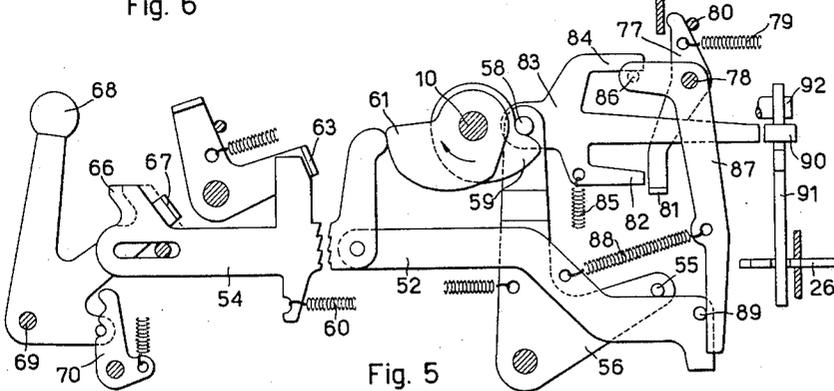


Fig. 5

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3 Sheets-Sheet 3

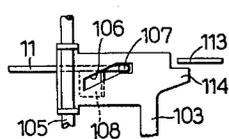


Fig. 8

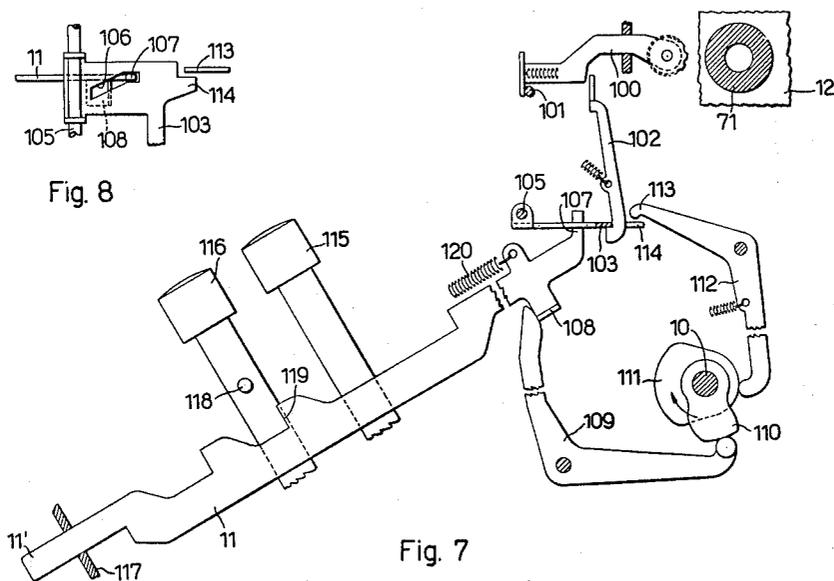


Fig. 7

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**PAPER CARRIAGE CONTROL MECHANISM FOR ACCOUNTING MACHINES**

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4 Claims. (Cl. 197—176)

This invention relates to accounting machines having a traveling paper carriage, a cyclical operating mechanism, a printing mechanism, and a member operable by said operating mechanism for controlling said printing mechanism. More particularly, the invention relates to a carriage control mechanism comprising a set of column stops movable with said carriage, a counterstop normally cooperating with one of said stops to locate the carriage in a corresponding columnar position, and means operable by said operating mechanism for moving said counterstop to an ineffective position to release the carriage for a tabulating stroke.

In the accounting machines according to the prior art, the counterstop is invariably disengaged from the column stop at the end of each machine cycle, irrespective of the character of said cycle, under the direct control of either the depressed motor key or a tappet of the column stop itself. Therefore, said machines require special control devices to prevent said counterstop from being disengaged whenever no tabulating stroke is desired, as for example after a correction cycle or after each non-printing repeat cycle in the course of a multiplication or division operation. To meet these several requirements said control devices are intricate and render the machine expensive to manufacture.

It is the primary object of the invention to provide a carriage control mechanism which is easy to operate and inexpensive to manufacture.

Another object of the invention is to provide a carriage control mechanism adapted to be automatically actuated in response to the sole printing cycles of the machine.

A further object of the invention is to provide a carriage control mechanism adapted to selectively control either a tabulating mechanism or a line spacing mechanism in response to printing cycles, whereby upon an impression the paper will always be selectively moved either horizontally or vertically.

According to the invention, in an accounting machine of the class described having a member operable by the operating mechanism for controlling the printing mechanism, a set of column stops movable with the carriage, a counterstop normally cooperating with one of said stops to locate said carriage in a corresponding columnar position, and means operable by said operating mechanism for moving said counterstop to an ineffective position, I now provide means controlled by said member for causing said moving means to be operated by said operating mechanism.

Other objects, features and advantages of the invention will become apparent from the following detailed description of a preferred embodiment thereof, made with reference to the accompanying drawings, wherein:

FIG. 1 is a partial rear sectional view of a paper carriage control mechanism according to the invention, as embodied in an accounting machine;

FIG. 2 is a sectional view taken on the line II—II of FIG. 1;

FIG. 3 is a rear view of a detail of FIG. 1 in different position;

FIG. 4 is a partial right-hand longitudinal view of the mechanism of FIG. 1;

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FIG. 5 is another partial right-hand longitudinal view of the mechanism of FIG. 1;

FIG. 6 is a rear view of a detail of FIG. 5;

FIG. 7 is a partial right-hand longitudinal view of the printing mechanism of the machine embodying the control mechanism of FIG. 1;

FIG. 8 is a plan view of a detail of FIG. 7.

The invention is embodied in an accounting machine having a transversely traveling paper carriage, a cyclical operating mechanism, and a printing mechanism.

Referring to FIG. 7, the printing mechanism is substantially of the type described in the Italian patent No. 491,469 issued March 5, 1954. Said printing mechanism is formed of a set of printing members, such as type wheel slides 100, cumulatively controlled by a universal bar 101 actuated by a cyclical operating mechanism comprising a conventional main shaft 10. Each printing member is further individually controlled by an upper end of a latch 102 normally engaging a transverse bail 103 rockably and slidably mounted on a stationary shaft 105. The bail 103 is provided with a cam slot 106 (FIG. 8) engaged by a projection 107 of a printing control member such as a slide 11 urged forward by a spring 120 (FIG. 7) and contacting by means of a lug 108 an upper arm of a lever 109 cooperating with a cam 110 secured to the main shaft 10. Another cam 111 secured to the main shaft 10 is followed by a lever 112. An upper end 113 of the lever 112 is adapted to engage a projection 114 of the bail 103, which projection, however, is normally out of the path of the end 113 (FIG. 8).

The machine cycles may be of two different types, namely, printing cycles such as adding, subtracting and total taking cycles, and non-printing cycles such as correction cycles, keyboard clearing cycles and repeat cycles in multiplication and division operations. FIG. 7 shows an adding key 115 adapted to condition the machine for a printing cycle, and a correction key 116 adapted to condition the machine for a non-printing cycle, said keys being further adapted in a manner known per se, to start the main shaft 10 for one cycle.

If a printing key, such as the adding key 115 is depressed, at the beginning of the ensuing machine cycle the cam 110 releases the lever 109 and the slide 11 is moved forward by its spring 120 until arrested by a portion 117 of the machine frame. The projection 107 moves the bail 103 leftward (upward in FIG. 8) thus shifting the projection 114 into the path of the end 113 of the lever 112. At about mid-cycle the universal bar 101 (FIG. 7) has been removed from the path of the slides 100 in a manner known per se and the cam 111 will rock the lever 112 counterclockwise whereby the bail 103 will be rocked clockwise. The latches 102 are thus lowered to individually release the slides 100 and enable same to print an amount on the platen 71.

On the contrary, if a non-printing key, such as the correction key 116 is depressed a pin 118 of the key stem will be located into the path of a shoulder 119 of the slide 11. When at the beginning of the ensuing machine cycle the cam 110 releases the lever 109, the slide 11 will be immediately arrested by the pin 118, whereby the projection 114 will not enter the path of the end 113 of the lever 112 and the printing mechanism will not be operated. It will thus be clear that in printing cycles the slide 11 is controlled by the main shaft for conditioning the printing mechanism for operation.

The accounting machine is provided with a paper carriage 12 (FIG. 1) traveling transversely with respect to a stationary frame 16 by the action of spring or motor powered means known per se and not shown in the drawings. The carriage 12 is controlled by a tabulating mechanism comprising a set of column stops 26 movable with

the carriage. More particularly, the stops 26 are radially mounted on a drum 20 pivoted on a stationary pin 19 and connected through a train of gears 18, 17 and 14 to a rack 13 secured to the carriage 12. Each column stop 26 is provided with a projection 33 which upon rotation of the drum 20 is movable along a predetermined path and is adapted to be engaged by a counterstop 34 to locate the carriage in a corresponding columnar position.

The counterstop 34 is slidably mounted by means of a slot 35 on a stationary pin 36 and in a slot 37 of a stationary plate 38. The counterstop 34 is provided with a notch 39 flanked by a pair of abutments 40 and 41 normally embracing the projection 33 of one of the stops 26, the abutment 41 being longer than the abutment 40. The counterstop 34 is provided with a shoulder 43 adapted to engage the upper edge of the slot 37, and with an aperture 44 cooperating with means operable by the main shaft 10 for moving the counterstop 34 to an ineffective position against the urge of a spring 42. More particularly, said moving means comprise a lever 46 pivoted at 47 and provided with a pin 45 engaging the aperture 44 of the counterstop 34. The lever 46 is urged counterclockwise by a spring 48. Since the action of the spring 42 prevails over the spring 48 the lever 46 normally contacts the plate 38 (FIG. 1).

The arm 50 of the lever 46 is adapted to cooperate with a projection 51 of a lever 52 (FIG. 4), said projection being normally displaced forwards and upwards with respect to the arm 50. The lever 52 is linked at 53 to a sensing element such as a slide 54 urged rearwards by a spring 60 to contact a cam 61 of the main shaft 10 to be operable thereby. The lever 52 is spring urged to normally contact a pin 55 of a lever 56 fulcrumed at 57 on the machine frame and provided with a second pin 58 cooperating with another cam 59 of the main shaft 10.

The slide 54 is provided with a projection 62 adapted to sense a bent lug 63 of a pivoted lever 64 having a second bent lug 65 on the path of the forward end 11' of the slide 11. A further projection 66 of the slide 54 is adapted to sense a bent lug 67 of a manual means such as a manual lever 68 pivoted at 69 and movable to either one of two positions defined by a positioning latch 70.

Mounted on the carriage 12 is the conventional platen 71 (FIGS. 5 and 7) and a line spacing mechanism therefor, said mechanism comprising a ratchet wheel 72 (FIG. 5) secured to the platen 71 and a pawl 73 linked to an upper arm of a lever 74 pivotally mounted at 76 on the carriage 12, the lower arm of said lever being formed of a bail 75 extending along the carriage. Pivoted on a stationary shaft 78 of the machine frame is a lever 77 adapted to cooperate with the bail 75 in any transverse position of the carriage 12. The lever 77 is normally urged by a spring 79 to contact a stationary pin 80 and is provided with a bent lug 81 engageable by a first arm 82 of a three-armed lever 83 fulcrumed on the pin 58 of the lever 56.

A second arm 84 of the lever 83 is urged by a spring 85 to contact a pin 86 of a control lever 87 pivoted on the shaft 78. The lower arm of the lever 87 contacts a pin 89 of the lever 52 by the urge of a spring 88 whose action prevails over the spring 85. The lever 87 thus normally keeps the arm 82 higher than the lug 81. A third arm 90 of the lever 83 cooperates with a lever 91 (FIG. 6) pivoted at 92 and lying in the path of a tappet 93 (FIG. 2) provided on predetermined column stops 26.

The operation of the carriage control mechanism is as follows:

If a non-printing key, such as the key 116 (FIG. 7) has been depressed, during the machine cycle the slide 11 is prevented by the pin 118 from moving forwards. Thus the end 11' does not rock the lever 64, whose lug 63 prevents the slide 54 from moving rearward. The lever 52 together with the levers 87 and 83 will remain in the

position of FIG. 5, irrespective of the position of the manual lever 68.

Near the end of the machine cycle the cam 59 of the main shaft 10 rocks the lever 56 clockwise. On one hand the pin 55 of this lever rocks the lever 52 clockwise but the projection 51 (FIG. 4) does not engage the lever 46, whereby the counterstop 34 will not be disengaged. On the other hand the lever 56 moves the three-armed lever 83 rearward (rightward in FIG. 5), but the arm 82 does not engage the lever 77, whereby the line spacing mechanism will not be affected.

Assuming now that a printing key 115 is depressed, at the beginning of the ensuing machine cycle the slide 11 moves forward to condition the printing mechanism 100 (FIG. 7) for operation, as described above. The forward end 11' of the slide 11 now engages the lug 65 (FIG. 4) and rocks the lever 64 counterclockwise, moving thus its lug 63 out of the path of projection 62 of the slide 54.

If the lever 68 is in its normal position of FIG. 4, its lug 67 is out of the path of the projection 66. During the machine cycle the cam 61 releases the slide 54 which is shifted rearward by the spring 60 through its maximum extent to assume a first position. The lever 52 is moved along with the slide 54 and puts its projection 51 above the arm 50 of the lever 46. Simultaneously, the pin 89 of the lever 52 rocks the lever 87 counterclockwise. If the stop 26 actually embraced by the counterstop 34 is not provided with a projection 93, such as the right hand stop 26 shown in FIG. 2, the lever 91 is in the position shown by broken lines in FIG. 6, wherein its upper arm is out of the path of the arm 90 of the lever 83. Therefore, this lever may now follow the pin 86 (FIG. 5) of the lever 87 to rock clockwise and move its arm 82 to a position lower than the lug 81.

Near the end of the machine cycle, when the lever 56 is rocked clockwise the arm 82 does not engage the lug 81 and the lever 77 does not operate the line spacing mechanism. On the contrary, the projection 51 of the lever 52, which is rocked clockwise by the pin 55, engages the arm 50 (FIG. 1) of the lever 46 which is thus rocked counterclockwise. The pin 45 moves now the counterstop 34 leftward (FIG. 1) to an ineffective position, thus disengaging the stop 26 and releasing the carriage for a tabulating stroke.

Upon completion of the machine cycle the cam 61 restores the slide 54 and the cam 59 enables the lever 56 to return to rest, together with the levers 52 and 83. The spring 42 (FIG. 1) now urges the counterstop 34 rightward, but the shoulder 43 is arrested by the upper edge of the slot 37, thus locking the counterstop in an intermediate position wherein the shorter abutment 40 will be out and the longer abutment 41 will be in the path of the projection 33 of the stops 26 (FIG. 3).

When in the course of the carriage travel the next stop 26 having a projection 33 engages the abutment 41, the counterstop 34 is slightly rocked about the pin 36 and its shoulder 43 is disengaged from the slot 37. The counterstop 34 is now instantly moved rightward by the spring 42 and restored to its effective position of FIG. 1 in which it embraces the projection 33 and prevents rebound of the carriage. The left hand edge of the aperture 44 of the counterstop 34 now restores the lever 46.

It will thus be clear that the lever 52 is controlled by the member 11 for causing the moving means 46 to be operated by the main shaft 10.

If, however, the manual lever 68 is rocked clockwise to be set in its rocked position as in FIG. 5, the lug 67 is moved into the path of the projection 66 of the slide 54. During the machine cycle the slide 11 rocks the lever 64 with its lug 63 out of the path of the projection 62. The slide 54, however, cannot be shifted rearward through its maximum extent because upon being moved through an intermediate extent it is arrested by the lug 67 in an intermediate position. In this case the projection 51 (FIG. 4)

is not put above the arm 50 of the lever 46 and the pin 39 rocks the lever 37 only partially, whereby the arm 82 of the lever 33 is put in front of the lug 81.

When near the end of the machine cycle the lever 52 is rocked clockwise by the pin 55 the projection 51 does not engage the lever 46, thereby not affecting the tabulating mechanism. On the contrary, the arm 82 now engages the lug 81 and rocks the lever 77 counterclockwise. The bail 75 is thus rocked clockwise and the pawl 73 engages the ratchet wheel 72 to space the platen 71 one line.

It will thus be clear that the manual means 68 when set in the position of FIG. 5 prevents the element 54 from sensing the member 11, said element when so prevented causing operation of the line spacing mechanism.

If the manual lever 68 is in its normal position of FIG. 4 and the stop 26 actually embraced by the counterstop 34 is provided with a tappet 93, this tappet keeps the lever 91 in the position shown by full lines in FIG. 6. During the machine cycle the slide 54 is shifted rearward to its first position thus causing operation of the tabulating mechanism as described above. When the lever 83 is released by the pin 86 to rock clockwise, the arm 90 is arrested by the lever 91 in such a position as to put the arm 82 in front of the lug 81, in the same manner as if the slide 54 would have been shifted to its above described intermediate position. When the lever 56 is rocked clockwise the arm 82 will engage the lug 81 and operate the line spacing mechanism.

It will thus be clear that the tappet 93 causes operation of the line spacing mechanism even if the manual lever 68 is in its position selecting operation of the tabulating mechanism.

It is intended that many changes, modifications and embodiments may be made to the control mechanism of the invention without departing from the scope thereof. For example, in order to arrest a return stroke of the carriage (made leftward as seen in FIG. 1) an additional counterstop 34' may be provided which is identical to the counterstop 34, but turned over with respect thereto. The counterstop 34' may cooperate with a projection 33' (FIG. 2) of the stops 26. Obviously, during a tabulating or a return stroke of the carriage the projections 33', 33 of the stop 26 will engage an inclined edge 94' or 94, respectively, thereby forcing leftward the counterstop 34' or 34, respectively, which shall not arrest the carriage.

What I claim is:

1. In an accounting machine having a traveling paper carriage, a cyclical operating mechanism, a printing mechanism, and a member operable by said operating mechanism for selectively controlling said printing mechanism, a carriage control mechanism comprising a set of column stops movable with said carriage along a predetermined path, a counterstop having a pair of abutments and being spring urged to a normally effective position wherein said abutments extend into said path to embrace one of said stops and locate said carriage in a corresponding columnar position, one of said abutments being longer than the other, means operable by said operating mechanism for temporarily moving said counterstop to an ineffective position against said spring urge to cause said pair of abutments to clear said path, means controlled by said member for causing said moving means to be so operated, and means effective upon termination of said temporary movement for latching said counterstop in a substantially intermediate position wherein said longer abutment only extends into said path, each one of said stops when contacting said longer abutment being adapted to disengage said counterstop from said latching means.

2. In an accounting machine having a traveling paper

carriage, and a cyclical operating mechanism, a set of column stops movable with said carriage along a predetermined path, a counterstop having a pair of abutments and being spring urged to a normally effective position wherein said abutments extend into said path and embrace one of said stops to locate said carriage in a corresponding columnar position, one of said abutments being longer than the other, means operable by said mechanism for temporarily moving said counterstop to an ineffective position against said spring urge to cause said abutments to clear said path, and means effective upon termination of said temporary movement for latching said counterstop in a substantially intermediate position wherein said longer abutment only enters said path, each one of said stops when contacting said longer abutment being adapted to disengage said counterstop from said latching means.

3. In an accounting machine having a frame, a paper carriage traveling on said frame, and a cyclical operating mechanism, a set of column stops movable with said carriage along a predetermined path, a counterstop having a notch flanked by a pair of abutments, spring means urging said counterstop to a normally effective position wherein said abutments extend into said path and embrace one of said stops to locate said carriage in a corresponding columnar position, one of said abutments being longer than the other, means for mounting said counterstop on said frame for movement along a first direction and for limited movement along a second direction, means operable by said mechanism for temporarily moving said counterstop from said effective position along said first direction to an ineffective position against said spring urge to cause said abutments to clear said path, said spring means additionally urging said counterstop from said ineffective position along said second direction, and means to intercept said counterstop on its movement along said first direction upon its movement along said second direction to enable said longer abutment only to be restored into said path, each one of said stops when contacting said longer abutment being adapted to disengage said counterstop from said intercepting means.

4. In an accounting machine having a frame, a paper carriage traveling on said frame, and a cyclical operating mechanism, a set of column stops movable with said carriage along a predetermined path, a counterstop having a notch flanked by a pair of abutments, spring means urging said counterstop to a normally effective position wherein said abutments extend into said path and embrace one of said stops to locate said carriage in a corresponding columnar position, one of said abutments being longer than the other, means for shiftably and rockably mounting said counterstop on said frame, means operable by said mechanism for temporarily shifting said counterstop from said effective position to an ineffective position against said spring urge to cause said abutments to clear said path, said spring means being adapted to rock said counterstop from said ineffective position, a shoulder on said counterstop, and means on said frame for intercepting said shoulder when so rocked in a third position wherein said longer abutment only extends into said path, each one of said stops when contacting said longer abutment being adapted to disengage said counterstop from said intercepting means.

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