

Jan. 24, 1961

W. A. ANDERSON

2,969,176

SIGNAL PRINTING MECHANISM

Filed Dec. 14, 1956

2 Sheets-Sheet 1

Fig. 2

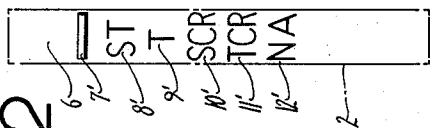


Fig. 1

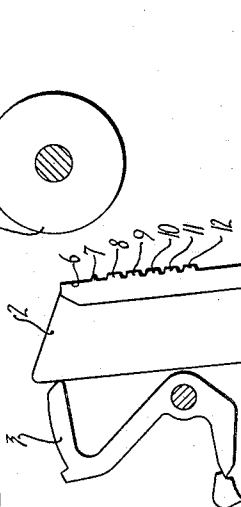
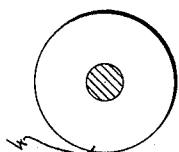
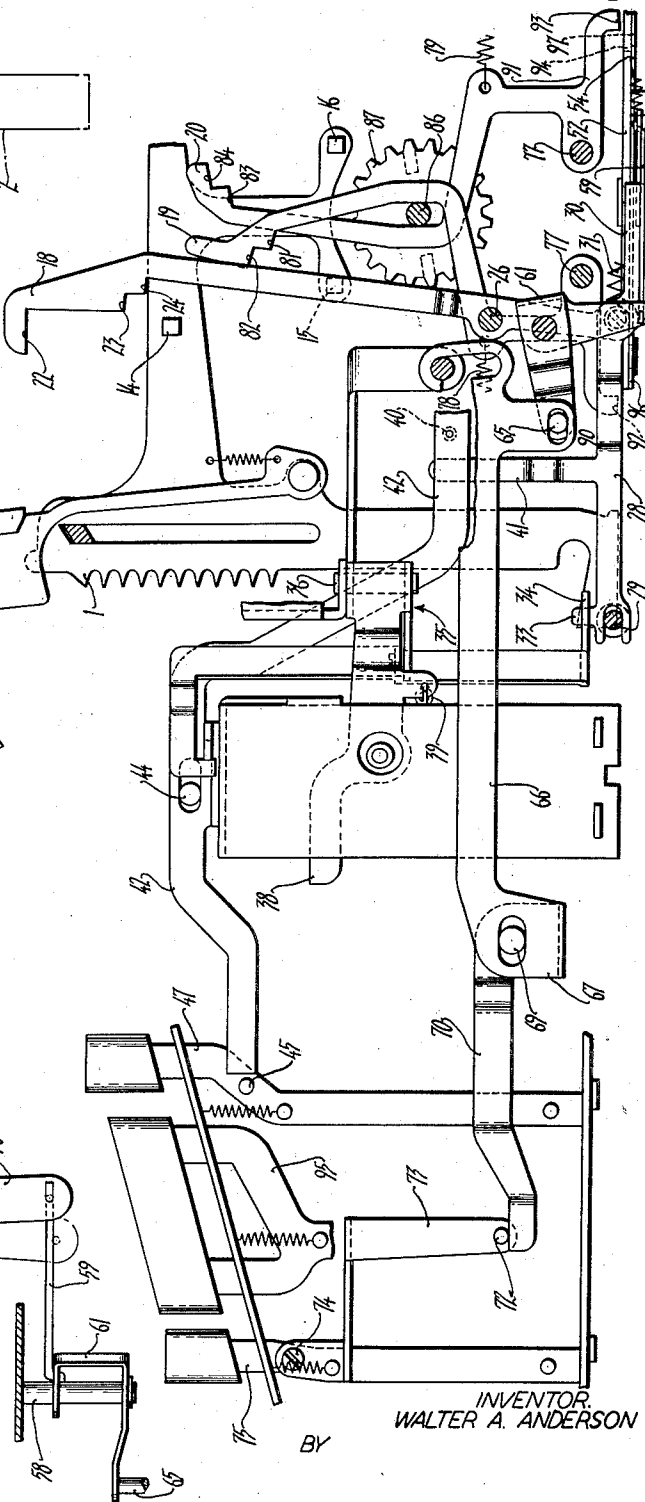
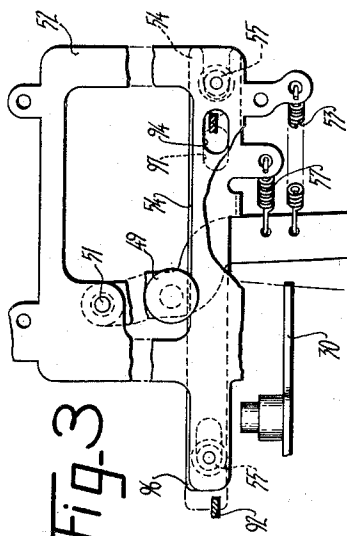


Fig. 3



INVENTOR
WALTER A. ANDERSON

BY

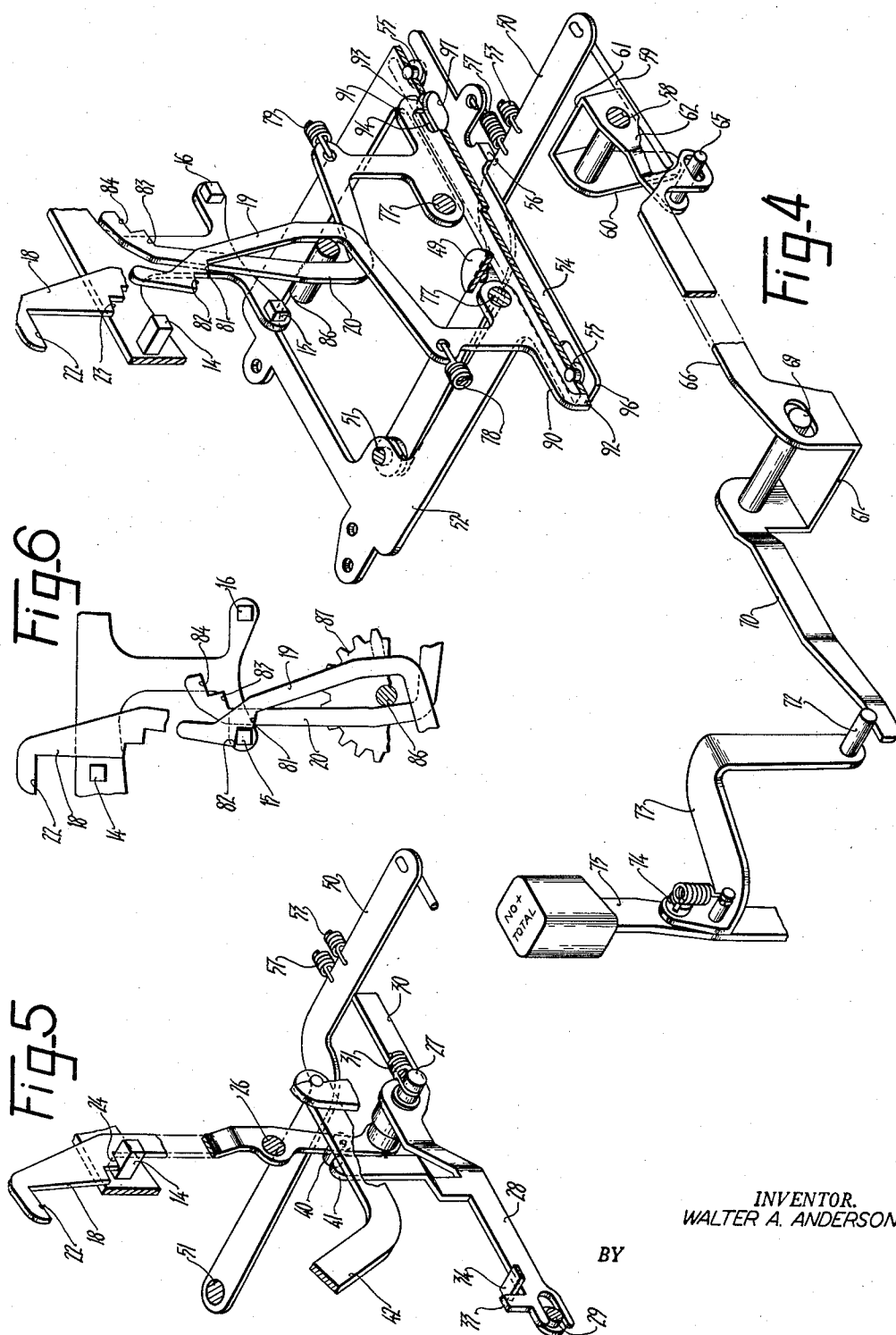
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INVENTOR.
WALTER A. ANDERSON

BY

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SIGNAL PRINTING MECHANISM

Walter A. Anderson, Trumbull, Conn., assignor to Underwood Corporation, New York, N.Y., a corporation of Delaware

Filed Dec. 14, 1956, Ser. No. 628,268

11 Claims. (Cl. 235—60.18)

This application relates to signal printing mechanism for an adding-subtracting machine, and more particularly to a joint control by various machine elements over the movements of a signal type bar.

The signal printing mechanism described in this application is particularly designed for incorporation in the adding machine described in my co-pending application, Serial No. 556,217, filed on December 29, 1955, and titled "Actuating Mechanism for Ten Key Adding Machines" to which reference may be made for a further disclosure of associated mechanisms not described in this application.

In adding machines such as that described in said co-pending application, it is customary to provide a mechanism for printing on the record sheet various signals which respectively denote the various types of operations as they are performed by the machine. One of these signals should be printed adjacent each numerical item, other than those added, which is recorded by the machine so that upon subsequent inspection of the record sheet the operational nature of each of said items may be determined.

One object of the instant invention is to provide a novel signal printing mechanism which is conditioned for operation under the joint control of the function keys and the operation positions of the pin carriage and/or register.

Another object of the invention is to provide a signal printing mechanism which is settable to determine the printing of one of at least 7 different signals when the machine is cycled by the depression of one of three functional control keys.

A further object of this invention is to provide a novel signal printing control mechanism which is simple and reliably accurate.

Other objects will become apparent as the disclosure progresses.

In the drawings:

Figure 1 is a right side elevation of the signal printing mechanism and its control elements showing the normal positions of these parts in relation to the principal parts of the machine,

Figure 2 is a view showing the various signals which may be printed on the record sheet by the instant printing mechanism,

Figure 3 is a plan view showing a portion of the total and subtotal control means for the signal printing mechanism,

Figure 4 is a perspective view showing the total and subtotal control device for the signal printing mechanism,

Figure 5 is an active perspective view of the signal type bar control and shows the signal type bar in the add position.

Figure 6 is a right side elevation of a portion of the register control device for the signal type bar control device in an active position.

In general the signal printing mechanism comprises a cyclically operated vertically movable member to which

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is pivoted a signal type bar. During each machine cycle said member is positioned so as to selectively locate the desired signal type adjacent the printing line of the record tape. A plurality of notched control levers are selectively positioned to limit the extent of vertical movement of said member. One of said levers is operated under the combined control of the pin box and the function keys while at least one other of said levers is operated under the combined control of the register shaft and the function keys.

More specifically and referring to Figure 1, the signal printing mechanism comprises a vertically movable member 1 which pivotally supports the signal type bar 2. This type bar 2 may be impelled rearwardly by a hammer 3 to print a signal on a record tape supported by a platen 4. The construction and operation of member 1, type bar 2, hammer 3 and the actuating member for these elements are the same as those for the corresponding numeral printing type bars described in the above noted co-pending case and need not be further explained here.

The type bar 2 has on its rearward face a plurality of projecting spaced signal type 7, 8, 9, 10, 11, 12 which are vertically arranged in manner corresponding to that of Fig. 2. The printed signals 7', 8', 9', 10', 11' and 12' of Fig. 2 denote respectively a subtraction, a subtotal, a total, a credit subtotal, a credit total and a non-add operation of the machine. It will be noted that the upper portion 6 of the rearward face of the type bar 2 has no type element. This portion 6 of the type bar 2 will be operatively positioned in alignment with the printing line of said platen 4 when the machine is cycled for an adding operation. Hence when any amount item printed on the record tape is not accompanied by a printed signal, it is an indication that said item has been additively entered in the machine. It may be noted that if an addition signal is desired, a plus sign printing type may be located in the space 6.

A rearward extension of said member 1 carries three stop lugs 14, 15, 16 which respectively cooperate with stop shoulders on three control levers 18, 19 and 20. During each operation of the machine, one of said stop lugs 14, 15 or 16 will engage a stop shoulder on the associated one of said control levers 18, 19 or 20 to limit the extent of vertical movement of member 1 carrying type bar 2, thereby positioning the signal type corresponding to the nature of the machine operation being performed at the printing line of platen 4.

The control lever 18 has three spaced shoulders 22, 23 and 24 cooperable with stop 14 and which correspond respectively to the non-add, subtract and add signal positions of the type bar 2. Said control lever 18 is pivotally mounted on a fixed stud 26 and has its lower arm pivotally connected by stud 27, Figure 5, to a link 28 slidably supported at its forward end on a fixed stud 29. A spring 31 connected to stud 27 biases link 28 rearwardly and lever 18 counterclockwise toward the positions shown in Figure 5. An upstanding lug 33 at the forward end of link 28 lies in front of a movable control arm 34 which forms a part of a cradle 35 pivoted on a vertical shaft 36. The forwardly extending arm 33 of said cradle 35 is normally held toward the right side of the machine by a pin carriage, not shown and is biased toward the left by a spring 39. Said pin carriage is fully described in said co-pending application. When no item has been indexed in the pin carriage, the arm 33 of cradle 35 will be held in its normal righthand position wherein control arm 34 of said cradle engages the rear edge of said lug 33 to hold slide 28 in its forward position as shown in Figure 1. As soon as the first digit of an amount item is set up on the keyboard, the pin carriage releases the arm 38 which will be moved to and held in its leftward position by spring 39. This movement of

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arm 38 will rock cradle 35 to move arm 34 to the rear, whereby slide 28 is freed for rearward movement under the action of its spring 31, Figure 5. The extent of rearward movement of slide 28, and hence the rocking of lever 18, will be limited by contact of said lever 18 with stud 14, as indicated in Figure 5. With the slide 28 in this position, the upward movement of member 1 will be arrested when lug 14 engages shoulder 24 on lever 18 and this will position the blank space 6 of type bar 2 at the printing position.

When a subtraction operation is to be performed, slide 28 is restored halfway toward its initial forward position of Figure 1 by the engagement of a stud 40 with an upstanding ear 41 of slide 28. Stud 40 is secured in a subtraction setting slide 42 fully disclosed in said co-pending application. For the present disclosure, it is sufficient to note that slide 42 is normally held in the Figure 1 position but is released by escapement of the pin box to slide on a stud 44 forwardly under the action of a spring not shown, to contact a stud 45 secured to the subtraction key 47. Such contact with stud 45 will prevent an effective movement of slide 42 but when key 47 is depressed to initiate a subtractive machine cycle, slide 42 will move to its forward limit wherein stud 40 will contact ear 41 to move slide 28 and lever 18 to their middle position. In this middle position of lever 18, stud 14 will be arrested by shoulder 23 of lever 18, thereby locating the subtraction type 7 at the printing position.

Referring now to Figures 3 and 4, a lever 50 is pivotally mounted on a stud 51 in bracket 52 secured to the machine frame. Lever 50 carries a stud 49 which has a head engaged above an edge of bracket 52 to support the right end of lever 50 which end is rearwardly biased by a spring 53. A stop slide 54 is slidably mounted on a pair of studs 55 in said bracket 52, and has a downwardly extending lug 56. A spring 57 connected between said slide 54 and lever 50 normally holds slide 54 with said lug 56 in engagement with the rearward edge of lever 50. The right end of lever 50 is connected to a depending arm 60 of a bail 61 by a link 59. Bail 61 is pivoted on a fixed stud 58 and has a forwardly extending arm 62 which has secured thereto a stud 65 which is engaged in the slotted end of an arm 66 of a cradle 67 pivoted on a shaft 69. The forward end of the other arm 70 of said cradle 67 underlies a pin 72 mounted in arm 73 adjustably secured by a screw 74 to the non-add and total key 75. Depression of said key 75 will, through the linkage just described, rock lever 50 clockwise against the action of spring 53 and will yieldably move slide 54 to its forward position through spring 57.

Key 75 is a cycle initiating key which causes printing of an item set-up on the keyboard but prevents entry of such item into the register mechanism. The lowest type 12 on type bar 2 identifies such non-add items and type bar 2 must be elevated to its highest position to bring type 12 to the printing line on platen 4. This requires that the lever 18 be in its normal clockwise position of Figure 1 during the machine cycle. It will be noted in Figure 5 that when lever 18 and slide 28 are released by arm 34, the rear end 30 of slide 28 moves rearwardly to engage the forward edge of lever 50. Depression of the key 75 to initiate a non-add operation will, as has been described, rock lever 50 to the dot and dash position indicated in Figure 3 to reset slide 28 and lever 18 to their Figure 1 position with shoulder 22 of lever 18 in position to be engaged by stud 14 of member 1 whereby the type bar 2 will be in the "NA" printing position.

During total-taking operations, the pin carriage above referred to is in its home position and keeps arm 38 of cradle 35 in its righthand position to thereby hold slide 28 and lever 18 in their Figure 1 positions. In that no item has been indexed on the keyboard, depression of

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the key 95 will cause a sub-total to be printed, while depression of the key 75 will cause a total to be printed. The total or sub-total may be a positive or negative amount, therefore four different signals are needed. Control levers 19 and 20 and the slide 54 are provided to control the printing of the various total and subtotal signals. The control levers 19 and 20 are pivotally mounted on pins 77 in the machine frame and are located above said slide 54. Levers 19 and 20 are urged counterclockwise and clockwise respectively, by springs 78 and 79, Figures 1 and 4. Lever 19 has two stop shoulders 81, 82 which may be selectively positioned to be engaged by said stop lug 15, as shown in Figure 6, while the two stop shoulders 83, 84 of lever 20 may be selectively positioned to be engaged by the stop lug 16. The levers 19 and 20 straddle the laterally movable shaft 86 that supports the register wheels 87. Levers 19 and 20 are normally urged into contact with said shaft 86 by said springs 78, 79 respectively whereby one or the other of said levers will be freed to yieldably follow the forward or rearward movement of said shaft 86 and move to a position above its related stud 15 or 16.

Formed at the lower ends of levers 19, 20 are feeler stop arms 90, 91 respectively. The foot 93 of arm 91 overlies a slot 94 in said bracket 52. When slide 54 is in its normal rearward position the said foot 93 overlies a slot 97 in said slide 54 while the foot 92 of arm 90 is above but forwardly positioned with respect to the end 96 of said slide 54. Thus, when the shaft 86 is displaced to engage the register pinions 87, Figure 1, with the actuator racks, the slide 54 will not prevent full downward movement of the released one of said feet 92 or 93 and the released lever 19 or 20 will be rocked a sufficient amount to position the shoulder 81 above stop lug 15 or the shoulder 83 above stop lug 16 depending on whether said displacement of the register is in a forward or rearward direction. When slide 54 is moved to its forward position by operation of key 75, a portion thereof will underlie each foot 92, 93, Figure 3, so that when said shaft 86 is displaced as above noted, the rocking of the levers 19, 20 is respectively limited by the engagement of the foot 92 or 93 with said slide 54 whereby shoulder 82 will be positioned above stop lug 15, Figure 6, or shoulder 84 will be positioned above lug 16 depending again on the direction of said register movement.

The operations of the various linkages above described are as follows. If an item is to be additively entered in the machine, the item is first set up on the keyboard and the add and subtotal key 95 is depressed to initiate a cycle of the machine. As soon as the first digit of said amount item has been set up on the keyboard, the resultant movement of the pin carriage, as described in said case, releases arm 38 of bail 35 whereby spring 39 will rotate bail 35 and move control arm 34 away from lug 33, Figure 5, to thereby free slide 28 for rearward movement under the action of its spring 31. The extent of rearward movement of slide 28 is limited by the rearward travel of arm 34. This rearward movement of slide 28 will, through pin connection 27, swing control lever 18 counterclockwise, Figure 1, to a position where stop shoulder 24 is positioned in the path of movement of lug 14. During the succeeding machine cycle the signal type bar 2 will be elevated to a position determined by the engagement of lug 14 with shoulder 24. In this position the said blank portion 6 of the type bar 2 will be operatively located in front of platen 4 so that no signal will be printed adjacent the printed item. In the second half of the machine cycle member 1 and the pin carriage will be returned to their normal positions to engage arm 30 of cradle 35 and through arm 34 restore slide 28 and lever 18 to their Figure 1 positions.

If an item is to be subtractively entered in the machine, the setting up on the keyboard of the first digit thereof will again free slide 28 for rearward movement. Here lever 18 swings counterclockwise to the same extent as

in the adding operation explained above. However, when the subtraction key 47 is depressed to initiate the machine cycle, the link 42 is freed for movement to its forward position under the action of its associated spring means at the start of the cycle. Hence, when link 42 moves to its forward position it will, through its stud 40 and the ear 41, move the slide 28 forwardly against the action of the spring 31 to thereby partially restore slide 28 and to pivot lever 18 clockwise a slight amount so that the shoulder 23 now lies above stop lug 14. Here, after engagement of lug 14 with shoulder 23, the type bar 2 is positioned with the type 7 located in front of the platen whereupon the subtraction signal will be printed adjacent the amount item.

If an item is to be non-additively printed by the machine, the setting up of the item on the keyboard will again allow slide 28 to move rearwardly and lever 18 to swing counterclockwise as described above. However, when the non-add and total key 75 is depressed to initiate a non-add cycle, the linkage 73, 67, 61 and 59, Figure 4, will swing lever 50 clockwise to engage the extension 30 of slide 28 and move said slide 28 forwardly thereby restoring lever 18 to its normal clockwise position, Figure 1, wherein shoulder 22 lies in the path of movement of lug 14. During the machine cycle the signal type bar 2 will move upwardly until stop lug 14 engages said shoulder 22 and said type bar 2 will be positioned to print the non-add signal "NA" on the record tape. During the add, subtract and non-add operations of the machine, the register wheels 87 are not engaged with either set of actuator racks during the upward movement of type bar 2, hence shaft 86, Figure 1, will remain in its central position wherein both levers 19 or 20 are retained in their respective inoperative positions.

When either a subtotal or a total operation of the machine is to be made, there is no item set up on the keyboard and either key 95 or key 75 will be depressed. Depending on whether a positive or a negative total has been accumulated, the register wheels 87 will be moved into engagement with the forward or rearward set of actuator racks respectively as explained in said above co-pending application. Slide 28 being held in its normal forward position by said arm 34 will retain lever 18 in its normal clockwise position, Figure 1. This will allow lever 19 or 20 to control the extent of upward movement of the type bar 2.

If it is desired to take a total from the machine register which, it will be assumed, has accumulated a positive amount, the key 75 is depressed. This, through members 73, 67, 61, 59, 50, 56, Figure 4, will move slide 54 forwardly so that the forward end 96 thereof underlies the foot 92 of lever 19. Early in the machine cycle the wheel supporting shaft 86 will be automatically moved forwardly to engage the register pinions 87 with the forward set of actuator racks. Lever 19 under the action of its spring 78 will yieldingly follow the forward movement of said shaft 86 until the foot 92 of said lever contacts the upper surface of end 96 of slide 54. The extent of this rocking movement of lever 19 is sufficient to position shoulder 82 in the path of movement of stop lug 15. Subsequent elevation of member 1 until arrested by the engagement of lug 15 with shoulder 82, as shown in Figure 6, will position the type bar 2 so that total signal 9, "T," is in position to be printed on the record tape.

If a negative or credit amount has been accumulated on the register wheels, the register wheels 87 will be automatically moved into engagement with the rear set of actuator racks at the start of a total-taking operation. Here, the lever 20, under the action of its spring 79, will yieldingly follow the rearward movement of shaft 86 until the foot 93 of said lever contacts the upper surface of the slide 54. The extent of rocking of lever 20 will be sufficient to position stop shoulder 84 in the path of movement of stop lug 16 whereby the type bar 2 may

be positioned to print the credit total signal 11 "TCR" on the record tape.

In subtotalling operations, depression of key 95 will cause slide 54 to remain in its normal rearward position so that when levers 19 and 20 are rocked by the displacement of the register shaft 86, the upper surface of slide 54 will not be positioned to arrest downward movement of either of said feet 92 or 93.

If a positive amount has been accumulated in the register, the lever 19 will follow the forward movement of shaft 86 as described above, and the foot 92 of lever 19 will move downwardly past the forward end 96 of slide 54 which is in the position shown by the solid line portion of Figure 3. This greater displacement imparted to lever 19 will be sufficient to position the stop shoulder 81 in the path of movement of lug 15 and upon subsequent engagement of said shoulder 81 and lug 15 during the machine cycle the type bar 2 will be positioned to print the debit subtotal signal 8 "ST," on the record tape. If a negative amount has been accumulated by the register, the shaft 86 is automatically moved into engagement with the rear set of actuator racks, and the extent of movement of the type bar 2 will be controlled by lever 20. Here the foot 93 of lever 20 will move through the aligned slots 94, 97 so that shoulder 83 will lie in the path of movement of lug 16 whereby the type bar 2 may be positioned to print the credit subtotal signal "SCR."

It will be noted that when one of the control levers 19, 20 is operatively positioned by the said shaft 86 to arrest member 1 during a machine cycle, shaft 86 maintains the other of said levers in an inoperative position. Also, when the register shaft 86 is in its central position as in add, subtract and non-add operations of the machine, shaft 86 retains both levers 19, 20 in their inoperative positions.

The above description of a preferred embodiment of my invention is to be taken as illustrative only and not as limiting the claims to such disclosure for substantial alterations in form and operation are possible without departure from the novel features of the invention as set out in the following claims.

What is claimed is:

1. In an adding machine having a movable register, a pin carriage movable in response to the actuation of an amount key of the machine, a plurality of function control keys and a differentially movable signal type bar; the improvement comprising a first and second stop means each selectively positionable to control the extent of movement of said signal type bar, a first control means actuated by the movement of said register for normally operably positioning said first stop means, a second control means actuated by said function control keys for operably positioning said second stop means and control selecting means actuated by the said movement of the pin carriage for effectively disabling said first stop means and enabling said second stop means.

2. In an adding machine having a movable register, a pin carriage, function control keys and a signal printing type bar; the improvement comprising a first and second stop means each positionable to control the extent of movement of said type bar, a first means, actuated in response to the movement of said register, for moving said first stop means to one of a plurality of operable positions, a second means for moving said second stop means to one of a plurality of operable positions, means controlled by the positional condition of said pin carriage for selectively conditioning either of said stop means for operation and means actuated by the function control keys for controlling the extent of movement of the said conditioned stop means.

3. In an adding machine having a register movable into and out of engagement with a set of actuator racks, function control keys and a differentially movable signal type bar, the improvement comprising stop means selectively positionable to control the extent of movement of

said type bar, means actuated in response to the engaging movement of the said register for moving said stop means, a positionable slide, said slide when in one position being effective to arrest said stop means after a partial movement of said stop means and in another position being ineffective to arrest said stop means, and means actuated by a function control key for controlling the extent of movement of said slide.

4. In a machine of the class described having a register movable into and out of engagement with a set of actuator racks, a plurality of function control keys, a differentially movable signal type bar and stop means selectively positionable to variably limit the extent of movement of said type bar, the improvement comprising means actuated in response to the engaging movement of said register for shifting said stop means to a plurality of operative positions, a slide positionable to determine the operative position of said stop means and means actuated by one of said function control keys for determining the position of said slide to thereby govern the shifted position of said stop means.

5. In an adding machine of the class described having a plurality of function control keys, amount indexing keys, a pin carriage movable in response to the depression of any of said amount keys, a differentially movable signal type bar and a plurality of stop means operatively positionable to variably limit the extent of movement of said type bar, the improvement comprising a first means normally controlled by said function control keys for determining the respective operative positions of a first group of said stop means, a second means controlled by said functional control keys and the positional condition of said pin carriage for operatively positioning a second group of said stop means, and means, actuated when the pin carriage is moved to its normal position, for disabling said first means and enabling said second means for subsequent operation.

6. In a machine of the class described having a movable register, a plurality of function control keys, an indexible pin carriage, and a differentially movable signal type bar; a shiftable control lever for variably limiting the extent of movement of said type bar, means controlled by the movement of said pin carriage for releasing said lever for movement away from its normal position and means controlled by said function control keys for determining the extent of movement of said control lever.

7. The device as defined by claim 6 including a second shiftable control lever for variably limiting the extent of movement of said type bar, means controlled by the movement of said register for shifting said second control lever into one of a plurality of operative positions and means controlled by said function control keys for determining the shifted position of said second control lever.

8. In a machine of the class described having a plurality of function control keys, a register selectively movable into engagement with either of two sets of actuator racks, a differentially movable signal printing type bar, at least two control levers each having a plurality of stop shoulders formed thereon and selectively positionable to variably limit the extent of movement of said type bar, means for moving one or the other of said levers into an operative position in response to and under the control of the movement of the said register and means actuated by one of said function control keys for altering the operative position of the moved one of said levers.

9. In an adding machine of the class described having a register selectively movable into and out of engagement with either one of two sets of actuator racks, a signal printing type bar movable to different positions for presentation of different signal types opposite a printing line, two stop members associated with said type bar, each movable from an inoperative position to a plurality of select positions to limit the movement of said type bar variably to distinct signal printing positions, means responsive respectively to the engaging movements of said register with one or the other of said sets of racks to move respectively one or the other of said stop members from its inoperative position for exercising movement-limiting control over said type bar and manipulative means operatively correlated with said stop members to render each subject to movement by said responsive means to different of its select positions.

10. In an adding machine of the class described having a register engageable with actuator rack means in opposite motion-receiving relations for running respectively negative and positive totals out of such register, a signal printing type bar movable to different positions for presentation of different signal types opposite a printing line, two stop members associated with said type bar, each movable from an inoperative position to a plurality of select positions to limit movement of said type bar variably to distinct signal printing positions, means responsive respectively to the establishment of said register in said opposite motion-receiving relations, to move respectively one or the other of said stop members from its inoperative position for exercising movement-limiting control over said type bar and key-controlled means operatively associated with said stop members to render each subject to movement by said responsive means to different of its select positions.

11. In an adding machine of the class described having function selecting means, a register engageable with actuator rack means in opposite motion-receiving relations for running respectively negative and positive totals out of such register, a signal printing type bar movable to different positions for presentation of different signal types opposite a printing line, two stop members associated with said type bar, each stop member having at least two stop shoulders thereon and being movable from an inoperative position to a plurality of select positions wherein different of said shoulders are selected to limit movement of said type bar to distinct signal printing positions, resilient means responsive respectively to the establishment of said register in said opposite motion-receiving relations, to bias respectively one or the other of said stop members from its inoperative position toward select positions and means subject to differential control by said function selecting means to control said stop members for movement by said resilient means to different of its select positions.

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