

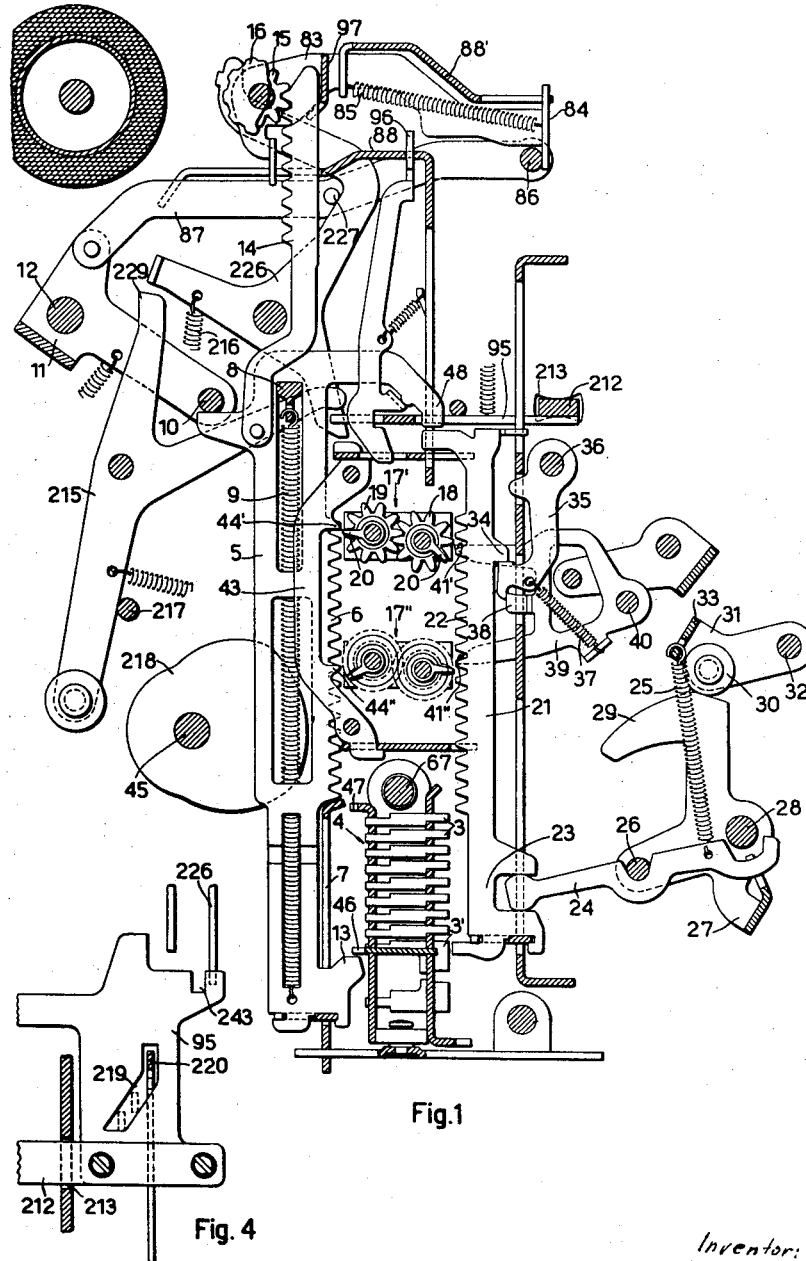
April 10, 1962

N. CAPELLARO
DIFFERENTIAL MECHANISM FOR VALUE ENTRY, TENS
TRANSFER AND TOTAL TAKING

3,029,014

2 Sheets-Sheet 1

Filed July 20, 1953



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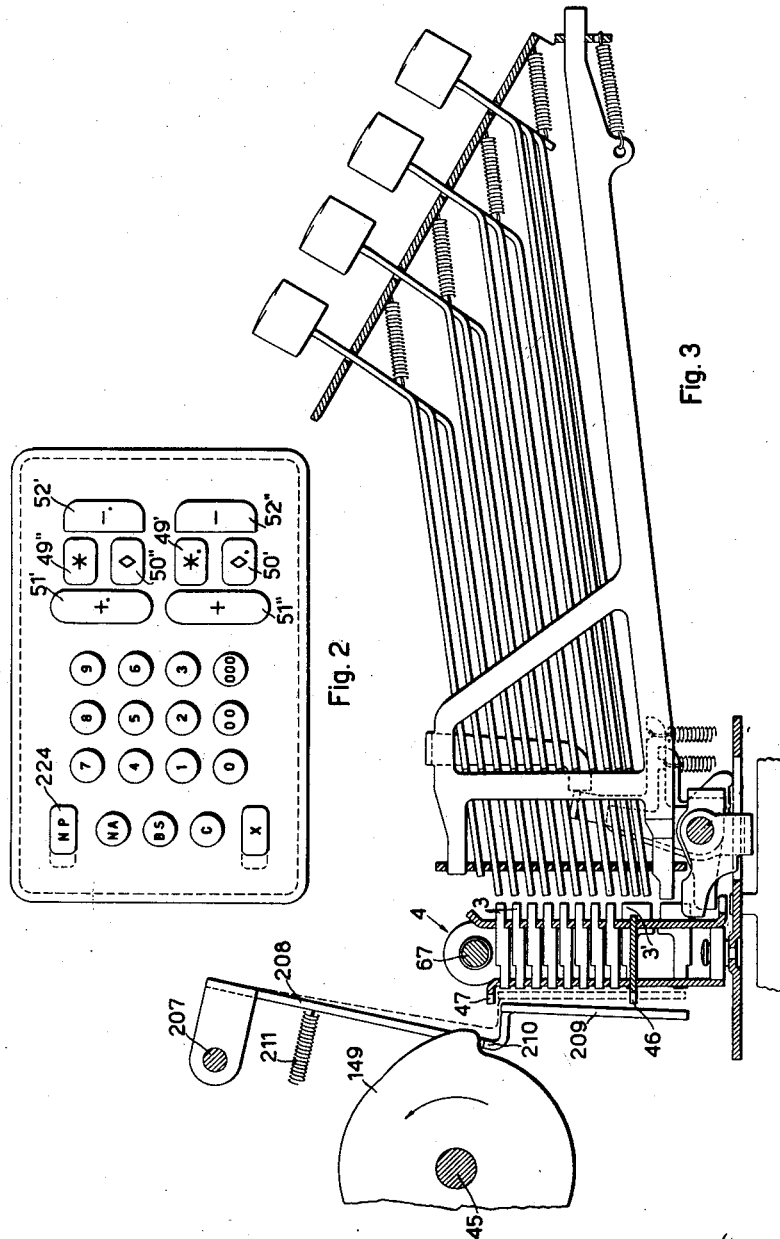


Fig. 3

Fig. 2

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3,029,014

**DIFFERENTIAL MECHANISM FOR VALUE ENTRY,
TENS TRANSFER AND TOTAL TAKING**
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Filed July 20, 1953, Ser. No. 369,059
Claims priority, application Italy Aug. 1, 1952
13 Claims. (Cl. 235—60.31)

This invention relates to computing machines.

Machines of this type generally comprise amount representing means, such as a pin carriage or a keyboard, a set of differential members, such as slides, a register, and a set of actuators, usually racks, associated with said differential members and engageable with said register. Either said differential members or said actuators cooperate with type carriers such as type bars, type wheels or the like, for printing the amount entered into the register or taken as a total by clearing the register.

In the machines hitherto known the general organization of said differential members, register and actuators was such that the rapid movement and abrupt stopping of the parts resulting from the reciprocation of said differential members generally caused relatively heavy loads, whereby, due to inertia and rebounds, the cycling speed of the machines had to be held low.

It is one of the objects of the invention to provide improvements in the general organization of said machines to permit said machines to be operated at a higher cycling speed.

According to the invention, in a computing machine having amount representing means, a set of differential members differentially movable under the control of said amount representing means, means for moving said differential members, a register, and a set of actuators differentially movable into an amount representing position and engageable with said register, means are provided for moving said actuators independently of the movement of said differential members.

Further objects and details will be apparent from the following description when read in connection with the accompanying drawings, wherein:

FIG. 1 is a longitudinal sectional view through a machine embodying the invention;

FIG. 2 is a plan view of a keyboard of said machine;

FIG. 3 is a partial longitudinal sectional view through the machine, and

FIG. 4 is a partial plan view of a detail of the machine.

General Description

The invention is here disclosed as embodied in a computing machine of the well known ten-key keyboard type. Nevertheless, the invention may be applied also to other types of computing machines, such as of the full keyboard type.

As will be seen from FIG. 1, the machine contains the usual pin carriage 4, movable transversely on a fixed shaft 67 and carrying rows of pins 3 and 3' adapted to be shifted to the left of FIG. 1, in a known manner not to be described, by the digit keys of the ten-key keyboard shown in FIGS. 2 and 3.

On the left hand side of the pin carriage 4 is arranged a set of slides 5, each slide 5 being provided with rack teeth 6 for engaging a corresponding pinion of a register to be hereinafter described. The slides 5 are vertically movable in a slotted fixed frame 7 and are guided by a fixed bar 8. Each slide 5 is urged upwardly by a spring 9. A restoring bar 10, carried by a restoring bail 11 secured to a shaft 12, normally holds all the slides 5 in their lowest position.

Each slide is provided with a projection 13 on which the pins of the pins carriage 4 may act as stops.

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More particularly, the pins 3' act as zero stops, the eight rows of pins 3 act as stops for the digits from 1 to 8 and the teeth of a comb 47, protruding from the frame of the pin carriage 4, act as stops for the digit 9. A comb 46 acts as zero stop for the slides 5 of the higher orders, as is known in the art.

Each slide 5 is associated with a type carrier 16 to be described later.

A register 17' is arranged on the right hand side of the slides 5. In the present example this register is of the well known type comprising two sets of pinions, designated as 18 and 19, which are in constant mesh with each other and which are supported by a suitable cradle. Each pinion has ten teeth and moreover a transfer tooth such as the tooth 20.

On the right hand side of the register is arranged a set of actuators 21, one actuator being provided for each order of the register, and, therefore, for each slide 5. Each actuator 21 has rack teeth 22 for actuating the register pinions and is formed at its lower end with a fork 23 engaging an arm 24. Each arm 24 is urged counterclockwise about its pivotal connection with the fork 23 and is normally restrained in the position of FIG. 1 by a restoring bar 26 carried by a bail 27 secured to a shaft 28.

The bail 27 is formed with a cam shaped arm 29, on which rests a roller 30 pivoted on a bail 31. The bail 31 is loosely mounted upon a shaft 32 and is urged counterclockwise by the springs 25 secured to its transverse bar 33.

Normally, the springs 25 urge the arms 24 to rotate counterclockwise about bar 26 whereby the actuators 21 are urged downwardly.

In the position of FIG. 1 the downward movement of each actuator 21 is arrested by a transfer trip lever 35 cooperating with an abutment 34 of the actuator. Each transfer trip lever 35 is loosely mounted upon a shaft 36 and is urged to rotate counterclockwise by a spring 37. In the position of FIG. 1 the transfer trip lever 35 is latched by a bent-over lug 38 of a lever 39 pivoted at 40 and urged clockwise by the spring 37 attached thereto. Each lever 39 is provided with a pawl 41' which is engageable, in a manner known per se, by the transfer tooth 20 of either pinions 18 and 19 of the next lower order of the register 17'.

On the left hand side of the register is provided a set of fixed stop plates 43, each having a stop lug 44' for arresting the transfer tooth 20 of either pinions 18 and 19 of the register in total taking.

Shaft 45, FIG. 1, designates the main operating shaft of the machine. As is well known in the art, this shaft makes a full rotation at each cycle of the machine and by known means, not to be described, imparts first a forward and then a return stroke to both shafts 12 and 23 at each cycle of the machine. More particularly, shaft 12 rocks first counterclockwise and then clockwise and shaft 23 rocks first clockwise and then counterclockwise.

Addition

Assume now that an amount has been set into the pin carriage 4 and that, by hand or by motor drive, an operating cycle is started. Shaft 12 initiates its counterclockwise rotation and the restoring bar 10 is lifted. The slides 5 are drawn upwardly by the springs 9, until arrested by the projected pins of the pin carriage in the manner described hereinabove.

The movement of the slides 5 is transmitted to the type carriers 16 hereinafter described.

At the same time as shaft 12, the shaft 28 initiates its clockwise rotation. During the first few degrees of said rotation the arms 24 are permitted by the bar 26 to rotate counterclockwise around their upper contact point with the corresponding forks, 23, until they contact the shaft 28. During the further rotation of shaft 28, the

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arms 24 are rotated clockwise around the shaft 28 by their spring 25, thereby lifting the actuators 21. Each actuator 21 moves until arrested by an arm 43 projecting from the corresponding slide 5.

It will thus be apparent that at the end of the forward stroke the elements of each pair of elements 5, 21 move both the same distance, said distance being determined by the corresponding digit set into the pin carriage 4.

The amount represented by the type carriers 16 is then printed, as will be hereinafter described, and the register 17' is shifted to the right, whereby the adding pinions 18 are put into engagement with the actuators 21, as is well known per se.

During the return stroke of the shafts 12 and 28 the slides 5 and the actuators 21 are restored to their initial position, whereby the amount represented by the actuators 21 is entered into the register engaging therewith. Thereupon the register is disengaged from the actuators, as is known in the art, and it resumes its central inactive position of FIG. 1. The register engaging and disengaging mechanism may be of a known type and will not be described.

For appreciating the invention and comparing it with conventional structures, it will now be useful to consider the slides 5 as the differential members cited hereinbefore and the actuators 21 as the actuators cited hereinbefore. In most known structures the actuators are usually either rigidly connected to the slides or associated therewith by means of a pin and slot connection permitting a relative movement of one step for purposes of tens transfer, as is well known in the art. Anyway, in hitherto known machines each actuator moves bodily with the corresponding slide, so that the inertia of the system is regulated by the total mass of the two elements, namely, both the slide and the actuator. In contrast thereto, in the structure according to the invention the elements of each pair of elements 5, 21 are normally disconnected from each other and move independently of each other until the actuator contacts the corresponding slide 5 stopped by the pin carriage. It will thus be apparent that the masses concerned are the single mass of slide 5 at one side and the single mass of actuator 21 at the other side, the two masses pertaining to two distinct and independent dynamical systems. Owing to the reduced inertia of each system the machine may, therefore, be operated at a far higher cycling speed than was heretofore possible.

It may further be observed that, due to the actuator 21 stopping against the slide 5 shortly after the stoppage of the slide 5 by the pin of the pin carriage, as hereinbefore described, the actuator 21 acts as a locking member for the slide 5 thus reducing any substantial rebounding thereof.

It may be observed that, owing to the beam-like construction of the arms 24, each spring 25 serves two purposes, namely firstly of urging the actuators 21 downwardly from the position of FIG. 1 for purposes of transfer and secondly, after several degrees of clockwise rotation of shaft 28, of urging the actuators 21 upwardly for purposes of actuation. More particularly, if during the downward stroke of an actuator 21 the transfer tooth 20 of the register wheel engaging therewith abuts against the transfer pawl 41', the latter is rocked counterclockwise, whereby its bent-over lug 38 releases the transfer trip lever 35 cooperating with the abutment 34 of the actuator 21 of the next higher order. The lever 35 is thus rocked counterclockwise by the spring 37, whereby upon completion of the downward stroke of the actuator 21 the abutment 4 is clear of the lever 5 and the actuator is urged by the spring 25 to move one additional step downwards beyond the position shown in FIG. 1. Thus, in accomplishing the first purpose, i.e. that of urging the actuator during the transfer operation, the spring 25 has the same function as the spring normally stretched between each differential member and the correspond-

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ing actuator, connected by a pin and slot as is known in the art. In accomplishing the second purpose, i.e., that of urging the actuator during amount entering operation, the spring 25 has the same function as that of the actuating spring normally urging the actuator for differential movement in conventional machines.

Subtraction

If the operation to be performed is a subtraction, prior to the shifting of the register the register cradle is rotated 180° about a central axis, in a manner well known per se, whereupon the subtracting pinions 19 are put into engagement with the actuators 21. The register reversing mechanism may be of a known type and will not be described.

Taking Totals

For taking a positive total the register to be cleared is shifted to the left into engagement with the slides 5; if, on the contrary, the total is negative, prior to the shifting of the register the register cradle is rotated 180° about a central axis, in a manner well known per se and not to be described, whereupon the pinions 18 are put into engagement with the slides 5.

Furthermore, as is known in the art, prior to total taking the pin carriage 4 is shifted half step transversely to the machine, thereby permitting the projections 13 of slides 5 to pass between the teeth of the comb 46. Such a half-step shifting mechanism for the pin carriage is fully described, for example, in the U.S. Patent 1,707,303 to J. E. W. Greve, page 4, lines 101 to 119, in connection with the comb 94 (FIGS. 6, 18 and 19) and the projections 20 of the type carriers 19 (FIGS. 1 and 6).

During the forward stroke of the total taking cycle each slide 5 moves upwardly until the transfer tooth 20 of the register pinion engaging therewith is arrested by the stop lug 44' of the stop plate 43. Therefore, at the end of the forward stroke the slides 5 assume the position corresponding to the total taken from the register and thereupon the type carriers 16 may print said total. At the end of the forward stroke the register is disengaged from the slides 5, as is known per se. However, if the total to be taken is a sub-total, the register is held engaged also during the return stroke, as is well known in the art.

During the return stroke the restoring bar 10 restores the slides 5 to normal.

In further comparing the invention with the known structures it will be seen that, in total taking, instead of being engaged by the actuators 21, as is usual in the art, the register to be cleared is put into engagement with the slides 5. It will thus be apparent that in a total taking cycle the register to be cleared may immediately engage the slides 5, because it is no longer necessary to allot a predetermined initial portion of the forward stroke of the machine cycle to the restoration of the actuators 21 which for purposes of transfer may have effected an additional downward travel from the position of FIG. 1, whereby the cycling speed of the machine may be further increased.

It may further be observed that in shifting the register to be cleared into engagement with the slides 5 the transfer teeth 20 are put into cooperation with the stop lugs of the fixed stop plates 43, thereby overcoming the known disadvantages first of having the register pinions arrested by the transfer pawls acting as zero stops, and second having the stop plates shifted into engagement with the register pinions at each total taking cycle.

Finally, it will be apparent that in total taking the actuators 21 may be held locked in their position of rest of FIG. 1.

Duplex Machine

The machine may be fitted with more than one register and in the present example there is provided a second register designated as 17". The transfer mechanism 35, 39, hereinabove described, may be utilized for the second

register and to this end each lever 39 is provided with a second pawl, designated 41". It may be observed that, contrary to similar constructions known in the art, the operating conditions of the transfer teeth 20 of the two registers 17' and 17" are identical, irrespective of the pawl operated, the pawls 41' and 41" being arranged in such a manner with respect to the common fulcrum 40 that said transfer teeth act on the pawls with equal leverage. This may be gathered from FIG. 1, bearing in mind that the right hand pinion of each register rotates nine steps from the position of FIG. 1 before contacting the upper face of the pawls 41' and 41", respectively.

In total taking the transfer teeth of the lower register 17" are arrested by the lower stop lug 44" of the stop plate 43.

When operating with two registers, it is apparent from FIG. 1 that for entering into one register an amount cleared from the other register it is sufficient to engage the register to be cleared with the slides 5 while the other register is engaged with the actuators 21. In this case, during the forward stroke the slides 5 clear the register engaging therewith and assume the position corresponding to the total taken and during the return stroke the actuators 21, which have followed the displacement of the corresponding slides 5, enter said total into the other register.

A similar operation may be effected also on certain conventional machines, wherein two registers are engageable with the same set of actuators. However, if in said machine the actuators are movable an additional step for purposes of transfer, like the actuators 21, it is difficult to take a sub-total from one register and at the same time transfer it into the other register, since the transfers which may occur in the second register during the return stroke disturb the first register still engaging with the actuators for the reentering of the sub-total taken during the forward stroke.

This disadvantage is overcome with the structure of the invention, since the transfer movements of the actuators 21 do not affect the slides 5.

Duplex Machine Keyboard

For facilitating the simultaneous depression of the function keys corresponding to different registers, said keys have been disposed according to the keyboard shown in FIG. 2. More particularly, the adding and subtracting keys, 51' and 52' respectively, for the register 17' are grouped together with the total and sub-total keys, 49' and 50' respectively, for the register 17". Similarly, the adding and subtracting keys 51" and 52" for the register 17" are grouped with the total and sub-total keys 49' and 50' for the register 17'.

Pin Restoring Plate

Although any suitable pin restoring plate may be used in cooperation with the pin carriage to restore the pins set in the same, as known to those skilled in the art, certain features of the restoring plate designed particularly for this machine shall now be disclosed.

As shown in FIG. 3, on a fixed shaft 207 is pivoted an arm 208 carrying a plate 209 juxtaposed to the pin carriage 4. As is known in the art, the plate 209 embraces all the pins 3 and 3' of the pin carriage when in its normal position.

A cam 149 carried by the main operating shaft 45 is adapted to engage a lug 210 protruding from the arm 208, whereby the plate 209 is rocked counterclockwise and the pins 3 and 3' thereupon encountered are restored into their normal position of FIG. 3. A spring 211 restores then the plate 209 into the position of FIG. 3.

It will be apparent that, if it is desired to disable the restoring plate 209, it is sufficient to displace the arm 208 along the shaft 207 until the lug 210 is brought out of the path of the cam 149.

Printing Mechanism

Although any suitable printing mechanism may be used in cooperation with the slides 5, certain features of the printing mechanism designed particularly for this machine are disclosed.

Referring again to FIG. 1, on each slide 5 is pivoted a rack 14 which is in mesh with a pinion 15 pivoted on a slide 83. A type wheel 16 is secured to the pinion 15. The slides 83 are horizontally movable on slotted plates 88 and 88'. Each slide 83 is urged to the left by a spring 85 and is normally held in the position of FIG. 1 by a restoring bar 86 cooperating with a bent-over lug 84 projecting laterally from each slide 83. The restoring bar 86 is supported by two links 87 pivoted on the bail 11.

At each forward stroke of the shaft 12 the bar 86 is moved to the left and the slides 83 follow in this direction under the action of their springs 85. However, after a short travel each slide is arrested by a latch 96. Thereafter the latches 96 corresponding to the orders in which a digit is to be printed are lowered, thereby unlatching the respective slides 83, which move to the left and effect printing. The restoring bar 86 and the latches 96 are known per se, and their mode of operation will not be described.

On each slide 83 is secured a lug 97 which acts as a guide for the rack 14 for the purpose of maintaining it constantly in mesh with the corresponding pinion 15. It will thus be apparent that, in contrast to know type wheel structures customarily used in calculating machines, the type wheels 16 are constantly connected to their respective slides 5, with the result of a highly simplified and lighter construction.

Type Wheels Alignment

In hitherto customary machines wherein in taking a total the register pinions are arrested by the transfer pawls acting as zero stops, the differential members move forward beyond their proper position an amount equal to the amount of the clearance left between the transfer tooth of each register pinion and the transfer pawl, said clearance being provided in order to ensure the unhindered engagement of the register with the differential members. Therefore, a total is printed above the ordinary line of printing.

In order to avoid this disadvantage, in the present machine the restoring bar 10 restored the slides 5 beyond their theoretical zero position an amount equal to the amount of the clearance left between the transfer tooth 20 and the corresponding stop lug of the stop plate 43. It is in this position of the slides 5, which is the normal position of FIG. 1, that the register to be cleared for total taking is put into engagement with the slides 5, whereby during the following forward stroke the type wheels 16 rotate an additional amount, before reaching their theoretical zero position, which is equal to the amount of the additional rotation accomplished by the register pinions due to the clearance cited. The total is, therefore, printed on the ordinary line of printing and this result is achieved without providing any extra aligning mechanism.

It may be observed that, due to the additional restoring movement of the slides 5 as described above, an equal clearance is left between the projections 13 and the teeth of the comb 46 thereby permitting the free transversal movement of the pin carriage 4.

Non Printing

The machine is provided with means, known per se, which disable the printing mechanism when desired. To this end a non print key 224 is provided on the keyboard shown in FIG. 2. According to the invention, the key 224, when shifted to the left into its operative position, enables an extra printing hammer to strike the paper for printing a special sign each time a non printing cycle is

effected, thereby enabling a check of the machine against intentional misuse.

The type for printing the special sign is carried by a three-armed lever, 226, pivotally mounted on a fixed shaft. The left hand arm of the lever 226 terminates with a bent-over lug normally disposed above the upper arm 229 of a three-armed lever 215 pivotally mounted on a fixed shaft. The lower arm of the lever 215 terminates with a roller engageable by a cam 218 secured to the main operating shaft 45. A spring 216 connected with the lever 226 tends to urge same in counterclockwise direction.

Normally the lever 226 is arrested by a stud 227 fixed to the link 87. When the latter moves to the left, as described hereinabove, the lever 226 is free to rotate counterclockwise, until arrested by a projection of a plate 95 normally lying in the path of the lower arm of the lever 226, as shown in FIG. 4.

When the non print key 224 is moved to the left (as viewed in FIG. 2) a slide 220 (see FIG. 4) connected thereto in a known manner not to be described, is shifted from its normal right hand position within a slot 219 of the plate 95. The plate 95, which is slidably mounted by means of a bar 212 fixed thereto in a slot 213 of the machine frame, is thereby shifted to the right, so that a recess 243 comes into the path of the lower arm of the lever 226.

Therefore, during a non print cycle the rotation of the lever 226 is not hindered by the plate 95 and the lever 226 rotates until its left hand arm is arrested by the upper arm 229 of the lever 215. When the cam 218 engages the roller of the lever 215 and rotates the lever 215 in clockwise direction, the upper arm 229 releases the lever 226 and the sign carried thereon is imprinted upon the paper.

From the foregoing description it will be understood that many changes may be made in the above construction, and different embodiments of the invention could be made without departing from the scope thereof. As for example, the slides 5 could exchange their function with that of the actuators 21, whereby the set of slides directly controlled by the pin carriage would be utilized for amount entering operations and the other set of slides for total taking operations. Furthermore, the actuators 21 could be put under the direct control of the pin carriage 4 and the projections 48 dispensed with, provided that the pins 3 set in the pin carriage were capable of arresting the travel both of the slides 5 and of the actuators 21. It is, therefore, intended that all matter contained in the above description, or shown in the accompanying drawings, shall be interpreted as illustrative, and not in a limiting sense.

What is claimed is:

1. In a computing machine capable of accomplishing amount entering operations and total taking operations, a register, a first set of differential members engageable with said register both in positive and negative total taking operations, a second set of differential members engageable with said register both in additive and subtractive amount entering operations, an indexing mechanism for controlling one of said sets of differential members, and means on the differential members of said controlled set for controlling the differential members of the other set.

2. In a computing machine as claimed in claim 1, means for differentially moving said first differential members through a variable number of steps, and means for differentially moving said second differential members through a variable number of steps independently of the movement of the first differential members.

3. In a computing machine, an indexing mechanism, a register, a set of differential members differentially movable through a variable number of steps under the control of said indexing mechanism and engageable with said register both in positive and negative total taking operations, a set of actuators differentially movable through a vari-

able number of steps under the control of said differential members and engageable with said register both in additive and subtractive amount entering operations, said differential members including means engageable with said actuators for so controlling said actuators.

4. In a machine as claimed in claim 3, means for differentially moving said actuators independently of the differential movement of said differential members.

5. In a computing machine, a set of reciprocable differential members, a set of limiting means for limiting the travel of said differential members in one direction, a single set of uninterrupted springs normally urging said differential members in said direction, a set of transfer means, means controlled by said transfer means for disabling said limiting means, thereby permitting of an additional travel of said differential members, and means for reversing the effect of said springs on said differential members to enable said springs to move said differential members in the opposed direction.

6. In a computing machine, a set of reciprocable differential members, a set of limiting means for limiting the travel of said differential members in one direction, a set of transfer means, means controlled by said transfer means for disabling said limiting means, thereby permitting of an additional travel of said differential members, an operating mechanism, a reciprocable bar actuated by said operating mechanism, a set of beams adapted to pivot about said bar, a fixed stop, one end of each beam engaging one of said differential members, the opposite end of said beam being engageable with said fixed stop, and a tension spring attached to each beam between said bar and said fixed stop to urge the associated differential member, a clearance corresponding substantially to said additional travel being normally left between said fixed stop and the associated beam end.

7. In a computing machine, a set of differential members, means for moving said differential members, a register, a set of reciprocable actuators engageable with said register, a set of limiting means for limiting the travel of said actuators in one direction, a set of transfer means, means controlled by said transfer means for disabling said limiting means, thereby permitting of an additional travel of said actuators, an operating mechanism, and means under the control of said operating mechanism for moving said actuators independently of the movement of said differential members, said means comprising a reciprocable bar actuated by said operating mechanism, a set of beams adapted to pivot about said bar, a fixed stop, one end of each beam engaging one of said actuators, the opposite end of said beam being engageable with said fixed stop, and a tension spring attached to each beam between said bar and said fixed stop to urge the associated differential member, a clearance corresponding substantially to said additional travel being normally left between said fixed stop and the associated beam end.

8. In a computing machine capable of making amount entering operations and total taking operations and having an amount indexing mechanism, the combination comprising a register including a cradle frame supporting two sets of intermeshing register wheels, said cradle frame being reversible for addition and subtraction, a first set of actuators engageable with either set of wheels in amount entering operations and differentially movable under the control of said amount indexing mechanism for entering amounts in said register, a second set of actuators engageable with either set of wheels in total taking operations for clearing said register, a transfer mechanism operable by either set of wheels when engaging said first set of actuators, and a set of fixed stop means for arresting either set of wheels in register clearing position when engaging said second set of actuators.

9. In a computing machine wherein amount entering and total taking operations may be executed, an indexing mechanism, a first amount representing device, a set of differential members associated with said device and

differentially movable under the control of said indexing mechanism during amount entering operations, a second amount representing device, a set of differential members associated with said second device and differentially movable under the control of the differential members associated with said first device, the differential members associated with said first device including means engageable with the other differential members for so controlling same, one of said devices including register wheels engageable by the associated differential members during amount entering operations for entering an amount therein, the other device including type carriers for printing the amounts entered into said register wheels as well as the totals taken therefrom upon clearing same, the differential members associated with said type carriers being engageable with said register wheels during total taking operations for clearing the register wheels.

10. In a computing machine as claimed in claim 9, a main operating mechanism, means controlled by said main operating mechanism for timing the movement of the differential members of one of said two sets, and means controlled by said main operating mechanism for timing the movement of the differential members of the other set, whereby the two sets of differential members are capable of moving independently one from each other.

11. In a computing machine wherein amount entering and total taking operations may be executed, an indexing mechanism, a set of type carriers, a set of differential members associated with said type carriers and differentially movable under the control of said indexing mechanism during amount entering operations, a register, a set of spring urged differential members associated with said register and engageable by the differential members associated with the type carriers to be differentially arrested thereby, the differential members associated with the register being engageable with the register during amount entering operations for entering an amount therein, the differential members associated with the type carriers being engageable with the register during total taking operations for clearing the register and moving the type carriers to a position representative of the total taken therefrom.

12. In a computing machine as claimed in claim 11, a main operating mechanism, means controlled by said main operating mechanism for timing the movement of the differential members associated with said type carriers, and means controlled by said main operating mechanism for timing the movement of the differential members associated with said register, whereby the two sets of differential members are capable of moving independently one from each other.

13. In a computing machine, a reciprocable differential member, a limiting means for limiting the travel of said differential member in a first direction, a transfer means, means controlled by said transfer means for disabling said limiting means to permit said differential member to move an additional travel in said first direction, an arm pivoted to said differential member, a stationary pivot engageable by a first portion of said arm, an operating member engageable by a second portion of said arm, and a spring acting on said arm between said stationary pivot and said operating member to normally urge said actuator into said first direction, a lost motion corresponding substantially to said additional travel being normally provided at said stationary pivot, said operating member being movable to enable said spring first to rock said arm about said differential member to eliminate said lost motion and then to rock said arm about said stationary stop to move said differential member in a second direction opposed to said first direction, thereby reversing the effect of said spring on said differential member.

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