Nov. 14, 1961 E. H. PLACKE ET AL 3,008,637

COMPLEMENTAL KEYBOARD

Filed Sept. 8, 1958 3 Sheets-Sheet 1

FIG.1

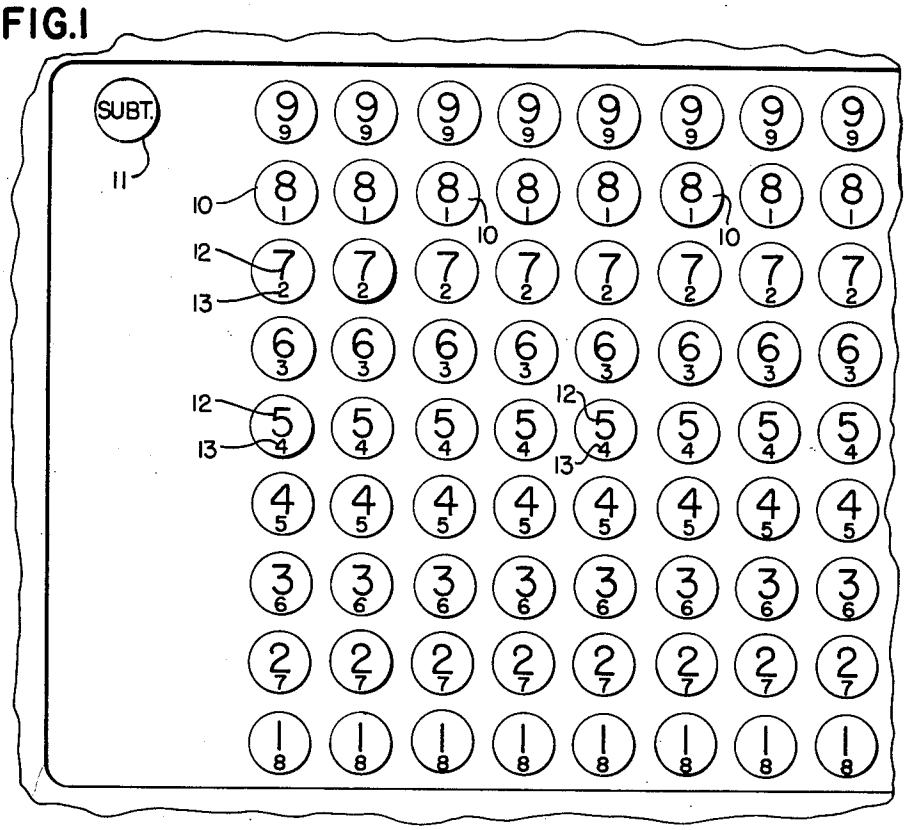
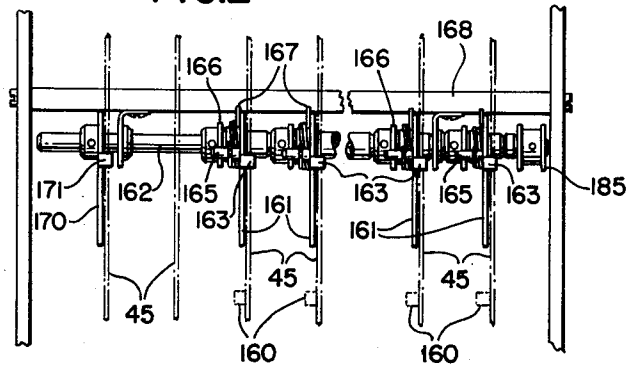


FIG.2



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COMPLEMENTAL KEYBOARD

Filed Sept. 8, 1958 3 Sheets-Sheet 2

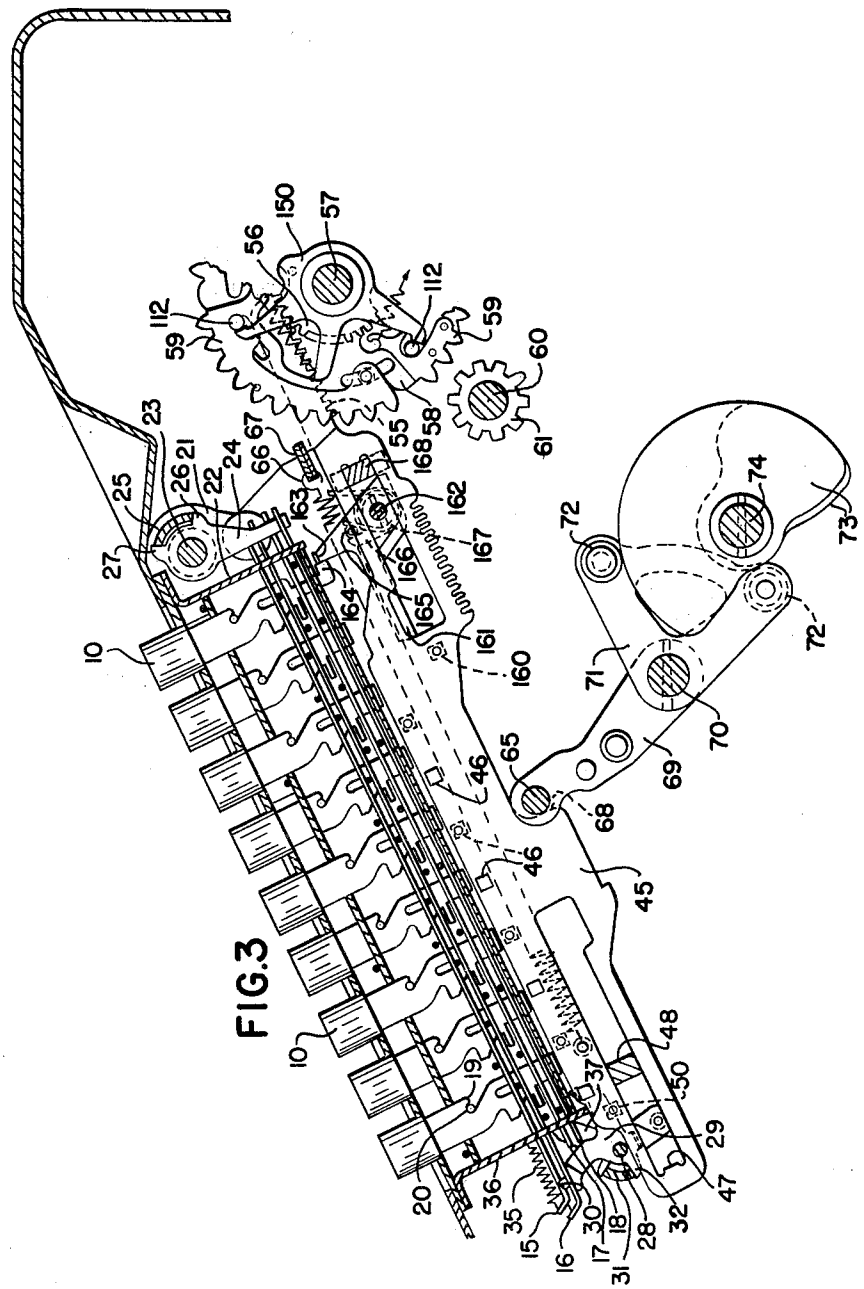


FIG.3

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COMPLEMENTAL KEYBOARD

Filed Sept. 8, 1958 3 Sheets-Sheet 3

FIG.4

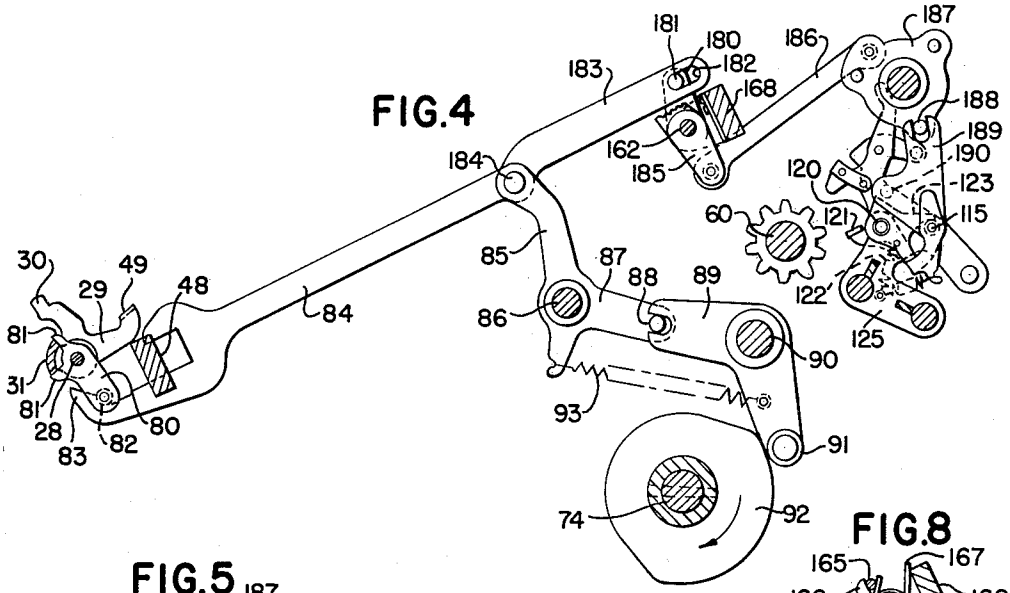


FIG.8

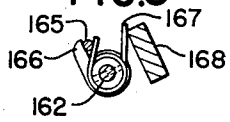


FIG.5

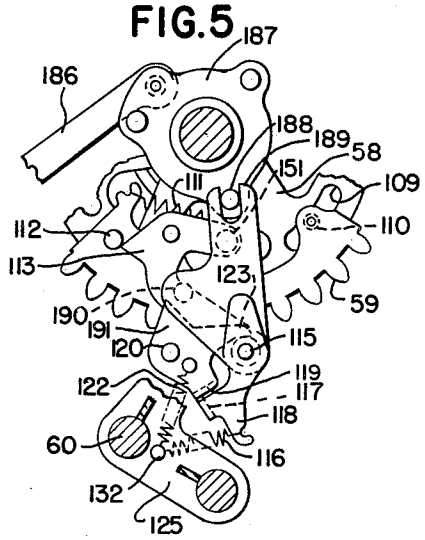


FIG.6

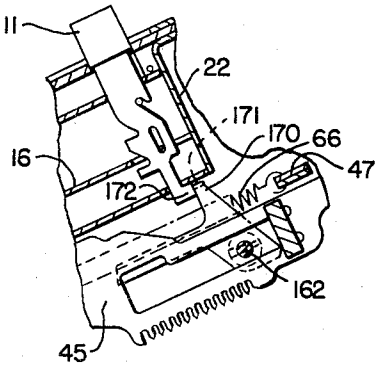
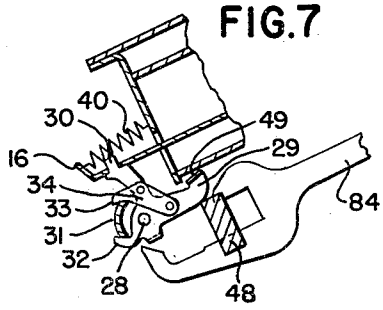


FIG.7



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United States Patent Office 3,008,637 Patented Nov. 14, 1961

3,008,637

COMPLEMENTAL KEYBOARD

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Filed Sept. 8, 1958, Ser. No. 759,818
4 Claims. (Cl. 235—145)

This invention relates to subtract mechanism controlled by a complementary keyboard.

The principal object of the invention is to provide a novel complementary keyboard to set up amounts to be subtracted by setting up the actual amount to be subtracted.

Another object of the invention is to provide a subtract mechanism wherein it is not necessary to set up zeros on the keyboard or to consider the "fugitive 1" in setting up the amount to be subtracted.

The specific object of the invention is to provide a subtract mechanism wherein a subtract key sets up a condition whereby the amount actuator racks add "9" in rows where no key is depressed, the amount actuator racks are arrested at "zero" in rows where "9" keys are depressed, and the tens transfer is tripped in the pennies bank to add the "fugitive 1".

With these and other objects in view, the invention includes certain novel features of construction and combinations of parts, a preferred embodiment of which is hereinafter described with reference to the drawings which accompany and form a part of this specification.

Of said drawings:

FIG. 1 is a top plan view of the keyboard of the machine.

FIG. 2 is a detail view, in top plan, showing the auxiliary zero stops which are under control of the subtract key.

FIG. 3 is a side elevation of an amount bank differential mechanism.

FIG. 4 is a detail side elevational view of the normal zero stop release mechanism, and the units order transfer tripping mechanism.

FIG. 5 is a detail view of the units order tens transfer tripping mechanism.

FIG. 6 is a detail view of the subtract key.

FIG. 7 is a detail view showing the normal zero stop mechanism.

FIG. 8 is a detail view of a part of the mechanism shown in FIG. 3.

General description

The invention is shown applied to a machine of the type disclosed in the United States Patent No. 2,616,623, issued to Mayo A. Goodbar et al. on November 4, 1952, and comprises a novel means for converting the keyboard of such a machine for setting complements on the keys for subtracting from a totalizer by adding the complement of the amount to be subtracted.

To convert such a keyboard for complementary addition, each of the keys is provided with a small character which, except for the "9" keys, is a complement of "9." The "9" keys are provided with a small numeral "9" instead of the "0," as is customary to complementary keyboards.

When items are being added into the totalizers of the machine, the large numerals are used to set up the amount on the keyboard, as is usual in the machines described in said patent.

To condition the machine for subtract operations, a "subtract" key is depressed. Depression of the "subtract" key sets up certain controls to cause the following operations to take place during the ensuing machine operation:

(1) Depression of a "9" key sets up a control to arrest the differential actuator in the zero position.

(2) Depression of no key in an amount row releases the amount actuator to move to the "9" position to add "9" in the totalizer element.

(3) Depression of the subtract key conditions a means to trip the tens transfer in the units bank to enter the "fugitive 1".

The result of these controls is to permit the operator to depress keys according to the small characters which represent the amount to be subtracted without stepping up "1" in the lowest significant order, as is the case with known complementary keyboards. In other words, the present arrangement permits the operator to set up amounts to be subtracted on the small figure character in the same way he sets up the amounts to be added by using the large characters.

The totalizer in the machine is provided with two overflow wheels, thus providing ten orders therein.

To illustrate the results obtained, assume that the amount of 1457.45 is standing on the totalizer, and that 29.50 is to be subtracted therefrom. In this case, the operator will depress the subtract key and the small characters representing 29.50. The depressed subtract key sets up the following control:

(1) Causes "9" to be added in the six highest order totalizer wheels, and in the units totalizer wheel, since no keys are depressed to control entries in these seven totalizer wheels.

(2) Causes the units of dollars totalizer actuator to be arrested in the "0" position in which the "9" key is depressed.

(3) Causes the tens transfer to be tripped in the units of pennies row to add the "fugitive 1".

The following result is obtained:

00001457.45—Old Balance
99999970.49—Amount added
1—"Fugitive 1"

00001427.95—New Balance

Detailed description

The invention is shown applied to a machine of the type disclosed in the above-mentioned United States Patent No. 2,616,623, issued to Mayo A. Goodbar et al. on November 4, 1952. As shown in FIG. 1, the keyboard of a machine is provided with eight rows of amount keys **10**, and a subtract key **11**. The machine is also provided with a plurality of rows of control keys, which are not shown herein, since they form no part of the present invention. Each key **10** is provided with a large numeral **12**, which numerals are used to index an amount to be added into the totalizer of the machine. Each key is also provided with a small numeral **13**, which numerals are used to index the amount to be subtracted from the totalizer in the machine.

As fully explained in the above-mentioned patent, each bank of amount keys includes a full complement of nine keys **10** (FIG. 3). Coacting with each bank of amount keys are four control members, including a flexible detent member **15**, a zero stop actuating member **16**, a locking detent member **17**, and an interlocking plate member **18**, which provides means for preventing release of the machine by the depression of certain control keys after an amount key has been depressed in the manner described in the above-mentioned patent. Each control member **15**, **16**, **17**, and **18** is provided with a slot for each key, through which the keys project.

The rear end of each key **10** is notched, as shown in FIG. 3, to receive a spring **20**, which spring reaches across the keyboard frame, from the right to the left,

as viewed in FIG. 1, and from the front of the machine in the manner described in the above-mentioned patent.

Rotatively supported in a flange 21 of the back frame 22 of the keyboard frame is a machine release shaft 23, which carries an arm 24 engaged with a yoke 25 by a pair of ears 26 and 27 formed thereon. The arm 24 projects into a slot in an interlocking plate number 18.

Mounted near the front of the keyboard frame 36, on ears 37, is a zero stop control shaft 28, on which zero stops 29 (see also FIGS. 4 and 7), one for each amount bank differential, are pivotally mounted. The upper end of each zero stop 29 has a finger 30 projecting into a slot of its associated zero-stop-actuating member 16. Also pivotally carried by the shaft 28 is a yoke 31, which normally engages a finger 32 formed on the zero stop 29, by which the zero stops 29 are controlled, in a manner hereinafter described.

The flexible detent member 15 is held in engagement with a cam edge on the forward end of each key by a spring 35, which tensions the flexible detent member 15 towards the rear of the machine. When an amount key 10 is depressed, the flexible detent member is first cammed towards the left (FIG. 3), and, after the shoulder at the end of the cam edge of the key passes out of the slot of the flexible detent member 15, the spring 35 moves the detent member 15 to the right (FIG. 3) to position the detent member over the shoulder on the key to hold the key in depressed position, as fully disclosed in said Goodbar et al. patent.

Amount differential mechanism

Located beneath each bank of keys 10 (FIG. 3) is a differential actuator slide 45. The actuator slide 45 is provided with eight square studs 46, four of which project from one side of the actuator slide 45, and the other four project from the opposite side of the actuator slide 45. The keys 10 are in staggered relation with the actuator slide 45, so that the ends of the keys alternately cooperate with the studs 46 on one side, and the studs 46 on the other side of the actuator slide 45. The studs 46 are so located on the actuator slide 45 that they are controlled by the digit keys 1 to 8, respectively. The actuator slide 45 is provided with a stop surface 47 near its front end, which engages a cross bar 48 to arrest the actuator slide 45 in its "9" position. If during adding operations no amount key is depressed, a flange 49 on the zero stop pawl moves into the path of a stud 50 of the actuator slide 45, to arrest the actuator slide 45 in "0" position, which position is one step from the home position of the actuator slide 45.

The actuator slide 45 is provided with teeth 55 meshing with a differential segment 56, rotatably mounted on a shaft 57, supported by the framework of the machine. Secured to the segment 56 is an actuator-supporting member 58. Slidably mounted on the actuator-supporting member 58 is an actuator rack 59, one such rack being provided for each totalizer line 60, on which totalizer wheels 61 are mounted. The number of actuating racks 59 for each order depends on the number of totalizer lines 60 provided in the machine.

Upon operation of the machine with an amount key 10 depressed, the actuator slide 45 moves an extent commensurate with the value of the depressed key and, through the teeth 55, rocks the segment 56 and the actuator-supporting member 58 a like distance. This sets the actuator racks 59 to a position representing the value of the depressed amount key 10. After the actuator racks 59 have thus been set, one or more of the totalizer wheels are engaged with the actuator racks 59, and the actuator racks 59 are thereafter returned to home position. In returning to home position, the segment 56 and the actuator racks 59 are rotated backwardly a number of steps corresponding to the value of the depressed key, thus entering said amount into whichever totalizer, or totalizers, have been engaged therewith. After the amount has been added therein, the totalizers are disengaged from the actuator racks 59.

Timing of movement of the differential actuator slide 45 is controlled by a leading frame, including a universal rod 65 (FIG. 3). A spring 66, secured to the differential actuator slide 45 at one end, and to a cross plate 67 at its other end, supported by the machine framework, normally maintains a shoulder 68, on the differential actuator slide 45, against the universal rod 65. The universal rod 65 is supported by a plurality of arms 69 (only one being shown) secured to a shaft 70. Also secured to the shaft 70 is a cam arm 71 having rollers 72 coacting with a pair of cam plates 73 secured to a main shaft 74.

During the operation of the machine, the cam plates 73 rotate clockwise (FIG. 3) to rock the arms 69 and 71 first clockwise (FIG. 3) and then counter-clockwise, to move the rod 65 to the right (FIG. 3) and then back to normal position. When the rod 65 moves toward the right, the spring 66 moves the differential actuator slide 45 to the right until the slide is arrested by a stud 46 thereon coming into contact with a depressed key 1 to 8, or the surface 47 engages the cross bar 48, which arrests the differential actuator slide 45 in the "9" position, or the zero stop pawl 29 arrests the differential actuator slide 45 in zero position, whereupon the rod 65 completes its clockwise movement. Near the end of the machine operation, when the rod 65 is restored to its home position by the cam plates 73, the rod 65 picks up the differential actuator slide 45 and restores it to its home position, which position is one step beyond the zero position. During this return or movement toward home position, the differential actuator slide 45, through the connection described above, rocks the actuator rack 59 backwardly a number of steps commensurate with the value of the depressed keys, thus entering the amount into the totalizing wheel 61.

A more detailed description of the operation of the differential mechanism may be had by referring to the above-mentioned Goodbar patent.

Zero stop mechanism

A zero stop pawl 29 (FIG. 4) is provided for each amount differential to arrest the differential actuator slide 45 in zero position in the event no amount key is depressed for adding operations. As hereinafter described, the zero stop pawl 29 is disabled for subtract operations. The zero stop pawl 29 is normally in an ineffective position; that is, the flange 49 (FIG. 7) thereon is normally out of the path of the stud 50 on the differential actuator slide 45. The yoke 31, mounted on the shaft 28, normally maintains the zero stops 29 in ineffective position by engaging a forwardly-extending toe 32 of the zero stop 29. The yoke 31 is maintained in its normal position by an arm 80 (FIG. 4) loosely mounted on the shaft 28 and having two toes 81 straddling the yoke 31. The lower end of the arm 80 has mounted thereon a stud 82, which projects behind a finger or upstanding formation 83 of a slide 84. The rear end of the slide 84 is pivoted on a bell crank 85, pivoted on a shaft 86, said bell crank having a rearwardly-extending arm 87 carrying a stud 88 projecting into a notch in the forward end of a lever 89. The lever 89 is provided with a roller 91, which is normally held in engagement with a cam 92 by a spring 93 stretched between one arm of the bell crank 85 and a stud on the lever 89. The lever 89 is pivotally mounted on a shaft 90, and the cam 92 is secured to the main cam shaft 74.

Near the beginning of the operation of the machine, when the main cam shaft 74 and the cam 92 rotate clockwise (FIG. 4), the spring 93 rocks the lever 89 clockwise. This movement of the lever 89, through the bell crank 85, shifts the slide 84 to the left (FIG. 4), thus releasing the arm 80 to rock clockwise. Clockwise movement of the arm 80 rocks the yoke 31 likewise clockwise, and this movement of the yoke 31 permits the zero stop pawl

29 to be rocked by a spring 40 to position the flange 49 thereon into the path of the stud 50 on the differential actuator slide 45. When no amount key is depressed, the zero stop actuator member 16 is free to move in the manner described in the above-mentioned patent. When the differential actuator slide 45 is released by movement of the universal rod 65, the flange 49, having been moved into the path of the stud 50, arrests the differential actuator slide 45 in zero position.

During the operation of the machine with the amount key 10 depressed, the zero stop actuator member 16, coacting with the depressed key, prevents the zero stop 29 from moving into the effective position. When during this operation the cam 92 rocks the arm 89, and the bell crank 85, to move the slide 84 toward the left (FIG. 4), the finger or upstanding formation 83 moves away from the stud 82 and near the end of the operation is restored in contact with the stud 82.

When no key is depressed in the amount bank, the zero stop actuator member 16 is free to operate, not being blocked by any key, and is free to move to the right when the slide 84 is moved to the left (FIG. 4). This permits the spring 40 to rock the zero stop 29 to position the flange 49 behind the stud 50.

Tens transfer mechanism

As illustrated in the above-mentioned Goodbar patent, the machine is provided with three totalizer lines, with a tens transfer mechanism for each line whereby "one" is carried to the next higher order wheel when the lower order wheel passes from "9" to "0." Inasmuch as the tens transfer mechanisms for all three totalizer lines are identical, only the one associated with the front totalizer will be described.

The carry-over of one unit in the next higher order wheel is effected by permitting movement of the actuator rack 59, mounted on the actuator-supporting member 58, one step in addition to the extent of movement that the actuator rack 59 moves under control of the depressed amount keys. This extra step of movement is relative to the actuator-supporting member 58. The actuator rack 59 is provided with two studs 110, only one of which is shown in FIG. 5. The studs 110 project into slots 109 in the actuator-supporting member 58. A spring 111, connected to one end of the rack 59, tends to move the rack 59 counter-clockwise, as viewed in FIG. 5. When the actuator-supporting member 58 is in the normal position—that is, in the position in which the member 58 comes to rest after the operation of the machine—a stud 112 on the actuator rack 59 rests against the forward end of an arm 113, as shown in FIG. 5. When in this position, the actuator rack is in its home or normal position; that is to say, no transfer has been effected. When a transfer is to be effected, the arm 113 is rocked clockwise to withdraw its free end out of the path of movement of the stud 112 to permit the actuator rack 59 to move one step farther, thus adding an extra unit into the totalizer element engaged therewith.

The arm 113 is mounted to pivot on a rod 115 carried by a plurality of frames 125, one arm 113 and one frame 125 being provided for each order of the totalizer. A spring 116, connected to the lower end of an arm 118 and at its other end to a rod 132, carried by all the frames 125, normally maintains a flange 117, forming a yoke between the arm 113 and the arm 118, in contact with a yoke 119. The yoke 119 is carried on a rod 120 also supported by the frames 125. The forward end of the arm 113 is in the path of movement of the stud 112 on the actuator rack 59 when the flange 117 contacts the yoke 119. One arm of the yoke 119 is provided with a flange 121 projecting into the path of movement of a long tooth of a totalizer wheel 61. The yoke 119 is spring-urged clockwise by a spring 122, stretched between one arm of the yoke 119 and the rod 132, to maintain a tail 123 on one arm of the yoke 119 against the rod 115.

When the totalizer wheel 61 is engaged with the actuator rack 59, and the actuator rack 59, traveling counter-clockwise (FIGS. 3 and 5), rotates the totalizer wheel 61 from the "9" position to the "0" position, the long tooth on the totalizer wheel 61 strikes the flange 121 (FIG. 4) and rocks the yoke 119 counter-clockwise against the action of the spring 122. This counter-clockwise movement of the yoke 119 withdraws it from contact with the flange 117 and permits the spring 116 to rock the arm 113 clockwise out of the path of movement of the stud 112 on the actuator rack 59 for the next highest order. When the actuator support member 58 in the next higher order moves its associated actuator rack 59 to its home position, the actuator rack 59 moves one extra step to enter one unit into the next highest totalizer order.

Immediately after the amounts, including the tens transfer, have been entered into the totalizer, the totalizer wheels 61 are disengaged from the actuator racks 59, and thereafter all tripped transfer arms 113, and actuator racks 59, are restored to the normal position. The means for restoring the tens transfer mechanism and the actuator racks 59 comprises a plate 150 for each order of the totalizer. All of the plates 150 are pinned to the shaft 57, which shaft receives a rocking movement near the end of each operation of the machine, whereby the arms of the plate 150, engaging the stud 112, restore the actuator racks 59 to their normal positions. In addition to restoring the actuator racks 59 to their normal positions, the arm 150, by means not shown, engages the studs 151 to restore the arms 113 to their normal positions to restore the tripped transfer mechanism.

For a more detailed description of the tens transfer mechanism, and the means for restoring it, reference may be had to the above-mentioned Goodbar patent.

Subtract operation

As pointed out above, the keyboard of the machine is provided with the usual complementary numbers. That is, the amounts added are indicated by the large digits 12, and the complements thereof are indicated by the small digits 13. Such a keyboard arrangement is well known. However, in the machines heretofore provided for subtracting, by adding complements, it is required that the lower significant order numeral be stepped up by one digit when the amount is set up thereon. In the present machine, the operator sets up the complement by reading the small numerals and depressing the keys exactly as she would when setting up the amounts to be added, and the operator need pay no attention to the stepping up of the lowest significant order amount. For example, to subtract 29.50 from any totalizer, the small digits 29.50 are depressed instead of 0000002–4–, as is usual with complementary keyboards heretofore known.

The controls for effecting the proper addition of amounts so that the operator need not take into consideration the stepping up of the lowest significant number is automatically controlled by the depression of the subtract key 11. It will be noted, by inspecting FIG. 1, that the keyboard arrangement differs from the ordinary complementary keyboard by having a small 9 below the large 9 key instead of the 0, so that the operator need not take into consideration the setting up of zeros on the keyboard illustrated herein.

Depression of a subtract key 11 controls the various functions of the machine for subtracting, by setting up the following three conditions:

(1) It prevents the normal zero stop pawls 29 from moving into effective position in the banks where no key is depressed.

(2) Release of a special zero stop pawl in the banks where a 9 key is depressed.

(3) Sets up a condition to trip the units order tens transfer mechanism to enter the "fugitive 1" during the subtract operation.

The means for preventing the normal zero stop pawls

29 from moving into effective position during subtract operation is shown in FIG. 7. This mechanism is the one in the highest order amount bank in which the subtract key 11 is located. Depression of the subtract key 11 engages and locks the zero stop actuating member 16 against movement. Thus the zero stop 29 for this order is prevented from moving into effective position. This zero stop 29 is provided with a plate 34 having a finger 33, which engages the upper side of the yoke 31, and the finger 32 on the zero stop 29 engages the under side of the yoke 31. All of the stops 29 for the amount banks engage the under side of the yoke 31, and, since the yoke 31 is held against movement by the subtract key 11 when depressed, none of the zero stops 29 can be moved into effective position during an operation in which the subtract key 11 is depressed.

The normal operating mechanism for lowering the zero stops 29, shown in FIG. 4, moves idly during an operation during which the subtract key 11 is depressed. Since the yoke 31 is held against movement by the zero stop actuating member 16 and the subtract key 11, the arm 80 will not rock when the slide 84 is moved to the left (FIG. 4). Therefore, during operations in which the subtract key 11 is depressed, none of the zero stops 29 can move into effective position.

The mechanism for arresting the differential actuator slide 45 in "zero" position in those banks where a "9" key is depressed is as follows:

Each differential actuator slide 45 is provided with a special zero stop stud 160 (FIGS. 2 and 3), which engages the end of a special zero stop pawl 161 loosely mounted on a shaft 162. The upper end of the pawl 161 is provided with a flange 163 engaging the lower end 164 of the "9" key 10.

The depression of a "9" key removes the lower end 164 from in front of the flange 163 on the zero stop pawl 161. However, the zero stop pawl 161 cannot move immediately, since a stud 165 thereon is normally held in engagement with an arm 166 secured to the shaft 162, by a spring 167, one end of which engages the stud 165 and the other end engaging against a frame 168. The spring 167 maintains the stud 165 against the arm 166 until the shaft 162 is released for operation.

Also secured to the shaft 162, is a position adjacent the subtract key 11 (FIG. 6), is an arm 170 having a flange 171 engaging the lower end 172 of the subtract key 11. When the subtract key 11 is depressed, the end 172 of the subtract key is moved below the flange 171, thus permitting the arm 170 and the shaft 162 to rock counter-clockwise (FIG. 6). Counter-clockwise movement of the shaft 162 rocks all of the arms 166, one in each amount bank, in a similar direction, thus releasing the pawls 161 in those banks where a "9" key has been depressed, whereupon the spring 167 of the bank in which the "9" key is depressed rocks the zero stop pawl 161 to present its end into the path of movement of the special zero stop stud 160 of the differential actuator slide 45.

Thus, when the subtract key 11 is depressed together with a "9" key, then, during the operation of the machine, the differential actuator slide 45 is arrested in a "zero" position.

The rocking of the shaft 162 is not effective immediately upon depression of the subtract key 11. Such rocking movement is delayed until during the machine operation, and as controlled by the cam 92 (FIG. 4).

Secured to the shaft 162 is an arm 180 (FIG. 4) having a stud 181 at its upper end. The stud 181 projects into a slot 182 of a link 183 pivoted on a stud 184, in the slide 84 and extending through the arm 85. The stud 181 normally lies in the left-hand end of the slot 182, and therefore, when the link 183 is in the normal position, shown in FIG. 4, the arm 180 cannot rock; therefore the shaft 162 is held against rocking movement. During the machine operation, when the cam 92 is rotated, and the lever 89 is rocked, in the manner described above, to rock the bell crank 85 and shift the slide 84 toward the left, (FIG. 4) the link 183 is also shifted to the left, thus releasing the arm 180 and the shaft 162 to the action of the springs 167.

Rocking of the shaft 162 also enters the "fugitive 1" into the lowest order totalizer element. Secured to the shaft 162 (FIG. 4) is an arm 185, having connected thereto a link 186, pivoted to a tens transfer lever disc 187. The disc 187 is provided with a stud 188 for each totalizer line, which engages a notched arm 189 pivoted on the beforementioned rod 115. The notched arm 189 is provided with a stud 190 lying in the path of an arm 191 which lies in the path of flange 117 of the arm 113. Therefore, when the arm 180 is rocked upon shifting of the link 186, the arm 185, and the shaft 162, the arm 191 is rocked to withdraw the arm 191 from engagement with the flange 117, thus tripping the tens transfer into the units order.

Thus the depression of the subtract key 11 holds the normal zero stops out of effective position, trips the penny tens transfer mechanism, and also releases an auxiliary zero stop lever to arrest the differential actuator slides 45 in zero position, in those orders where a "9" key is depressed.

This causes the complement of the number being subtracted to add and print by the printing mechanism, but the operator sets up the actual amount on the small figures the same as she would set the amount up on large figures when adding.

Example: To subtract 29.50 from any totalizer with a ten-place accumulation, from an amount of 1457.45, all that the operator need do is to depress the subtract key 11 and the keys bearing the small characters representing 29.50. The subtract key 11 will permit all rows to add "9" except in those rows that have keys depressed. In the example, the rows 2, 3, and 4 will have amounts set up thereon. Since the "9" key is depressed in row 3, this differential actuator will be arrested in zero by the special zero stop pawls 161. Since no key is depressed in rows 1, 5, 6, 7, 8, 9, and 10, the differential actuator slides 45 in these rows will add "9." The "fugitive 1" is also entered into the units order. The result of such a subtract operation will be as follows:

00001457.45	old total
99999970.49	complement of 29.50
1	"fugitive 1"
00001427.95	new total

While the form of mechanism shown and described herein is admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to the one form or embodiment disclosed herein, for it is susceptible of embodiment in various other forms.

What is claimed is:

1. In a machine of the class described, a complementary keyboard including a plurality of amount banks of keys, each bank having keys numbered "1" to "9"; a subtract key; a differential actuator controlled by each amount bank of keys; a zero stop related to each amount bank of keys for controlling a related differential actuator; a mechanism operated during a machine operation and controlled by the related banks of keys to render any zero stops effective when no amount key in a related bank is depressed; disabling means controlled by the subtract key, when depressed, to arrest all the zero stops in an ineffective position even though no amount key in their related banak is depressed; a normally disabled special zero stop for each actuator to arrest the actuator in zero position when enabled; control means on the subtract key for normally maintaining all of the special zero stops in an ineffective position and operable upon depression of said subtract key to enable the special zero stop; control means on the "9" key of each amount bank for normally maintaining the related special zero

stop in an ineffective position and operable upon depression of said subtract key to enable the special zero stop; other means for maintaining the special zero stop in an ineffective position; and means connecting said mechanism and said other means whereby during a machine operation with the subtract key depressed, said other means is actuated to release the special zero stop for movement into an effective position for those banks in which a "9" key is depressed to enter and print "0" in the orders in which the "9" key is depressed.

2. In a machine of the class described, a complementary keyboard including a plurality of amount blanks of keys, each bank having keys numbered "1" to "9"; a subtract key; a differential actuator controlled by each amount bank of keys; a zero stop related to each amount bank of keys for controlling a related differential actuator; a mechanism operated during a machine operation and controlled by the related banks of keys to render any zero stops effective when no amount key in a related bank is depressed; disabling means controlled by the subtract key, when depressed, to arrest all the zero stops in an ineffective position even through no amount key in their related bank is depressed; a fixed stop to arrest each differential actuator in the "9" position when the related zero stop is disabled upon the depression of the subtract key, to print a "9" in the orders in which no key is depressed; a normally disabled special zero stop for each actuator to arrest the actuator in zero position when enabled; control means on the subtract key for normally maintaining all of the special zero stops in an ineffective position and operable upon depression of said subtract key to enable the special zero stop; control means on the "9" key of each amount bank for normally maintaining the related special zero stop in an ineffective position and operable upon depression of said subtract key to enable the special zero stop; other means for maintaining the special zero stop in an ineffective position; and means connecting said mechanism and said other means whereby during a machine operation with the subtract key depressed, said other means is actuated to release the special zero stop for movement into an effective position for those banks in which a "9" key is depressed to enter and print "0" in the orders in which the "9" key is depressed.

3. In a machine of the class described, a complementary keyboard including a plurality of amount banks of keys, each bank having keys numbered "1" to "9"; a subtract key; a differential actuator controlled by each amount bank of keys; a zero stop related to each amount bank of keys for controlling a related differential actuator; a mechanism operated during a machine operation and controlled by the related banks of keys to render any zero stops effective when no amount key in a related bank is depressed; a normally disabled special zero stop for each actuator to arrest the actuator in zero position when enabled; and means controlled by the subtract key, when depressed, to arrest all the zero stops in an ineffective position even though no amount key in their related bank is depressed and to enable the special zero stop, in those banks in which a "9" key is depressed.

4. In a machine of the class described, a complementary keyboard including a plurality of amount banks of keys, each bank having keys numbered "1" and "9"; a subtract key; a totalizer; a differential actautor controlled by each amount bank of keys for entering amounts into the totalizer; a zero stop related to each amount bank for arresting a related differential actuator in zero position; disabling means controlled by the subtract key, when depressed, to arrest all the zero stops in an ineffective position even though no amount key in their related bank is depressed to permit the differential actuators to enter nines in the orders where no amount key is depressed; a normally disabled special zero stop for each actuator to arrest the actuator in zero position when enabled; and means under joint control of the subtract key and any "9" key for normally maintaining the related special zero stop in an ineffective position and operable to render the special zero stops effective when both the subtract key and a "9" key in any related bank have been depressed to arrest the related differential actuators in "0" position in any bank in which a "9" key is depressed.

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