July 27, 1937. A. OTT 2,088,092

ACCOUNTING AND BOOKKEEPING MACHINE

Filed Dec. 3, 1931 3 Sheets-Sheet 1

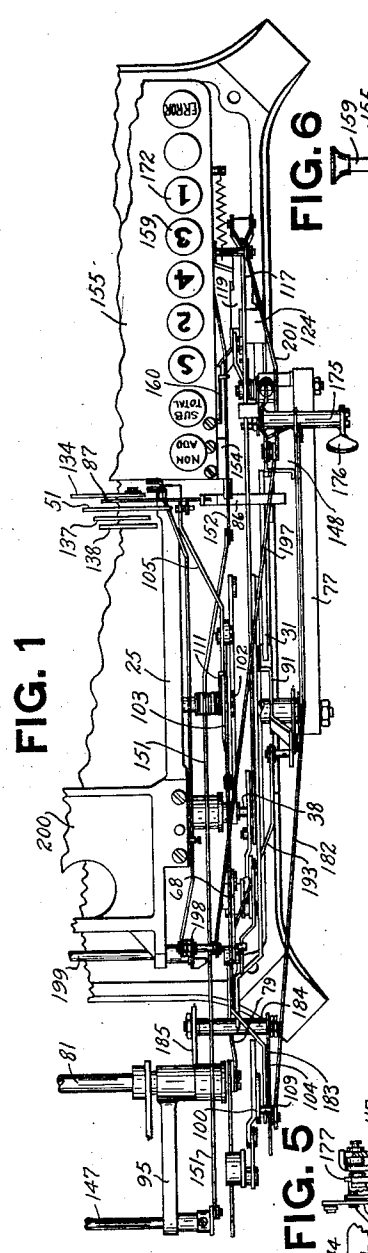

FIG. 1

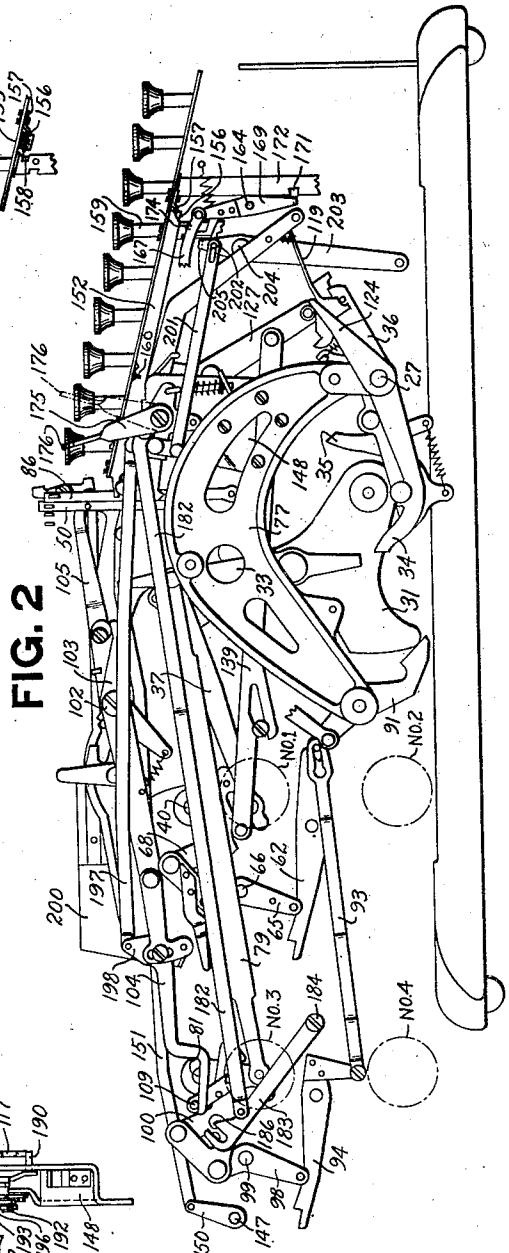

FIG. 2

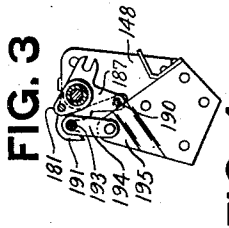

FIG. 3

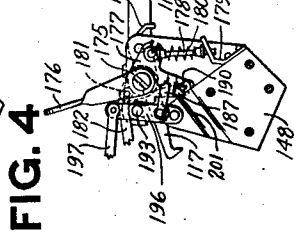

FIG. 4

FIG. 5

FIG. 6

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ACCOUNTING AND BOOKKEEPING MACHINE

Filed Dec. 3, 1931 3 Sheets-Sheet 2

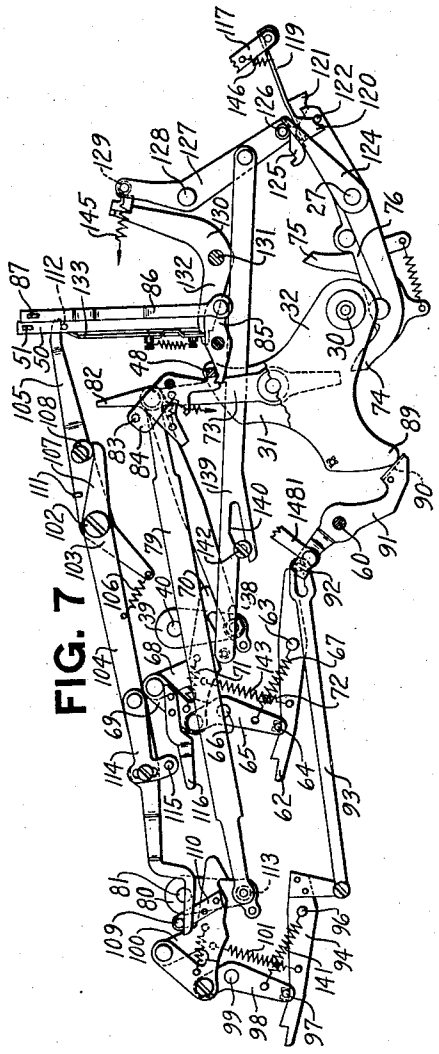

FIG. 7

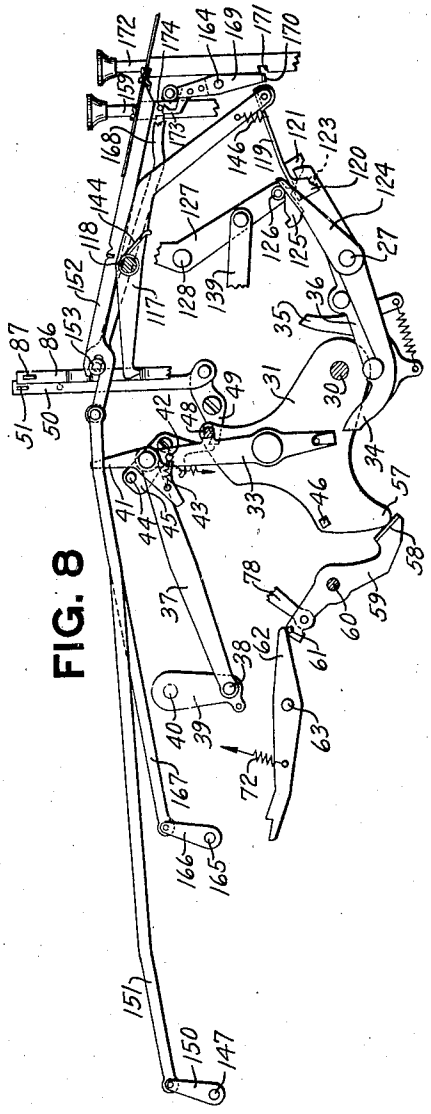

FIG. 8

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ACCOUNTING AND BOOKKEEPING MACHINE

Filed Dec. 3, 1931 3 Sheets-Sheet 3

FIG. 9

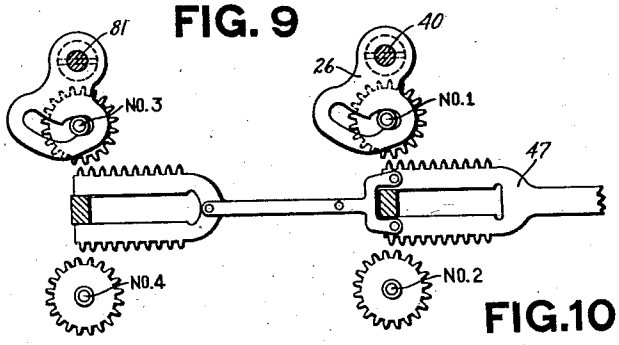

FIG.10

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Patented July 27, 1937 2,088,092

UNITED STATES PATENT OFFICE

2,088,092

ACCOUNTING AND BOOKKEEPING MACHINE

Albert Ott, Zurich, Switzerland, assignor to The National Cash Register Company, Dayton, Ohio, a corporation of Maryland

Application December 3, 1931, Serial No. 578,690

20 Claims. (Cl. 235—60)

This invention relates to accounting or bookkeeping machines of the well-known Ellis type, such as are illustrated and described in Letters Patent of the United States, Nos. 1,197,276 and 1,197,278, issued September 5, 1916 to Halcomb Ellis; Patent No. 1,203,863, issued November 7, 1916 to Halcomb Ellis; Patent No. 1,819,084, issued August 18, 1931 to Emil John Ens; and Patent No. 1,609,768, granted December 7, 1926 to N. W. Perkins.

Heretofore when an overdraft occurred in the add-subtract totalizer of the type of machine referred to above, the complement of this overdraft remained in said totalizer. For example, let us assume that an overdraft of one hnudred dollars has occurred. A reading of the overdrawn totalizer gave the complement of this amount or 9,999,900.00. As it was desirable that the positive rather than the negative amount of the overdraft be printed, it was necessary to operate the machine through several complete cycles in order to transpose and print the negative overdraft as a positive amount.

One of the objects of this invention is to make it possible, when desirable, to tie two add-subtract totalizers together in such a manner that one of said totalizers is always complementary to the other, so that when one totalizer is overdrawn, a reading of the other totalizer will give the positive amount of the overdraft.

Another object is to provide means for locking the total key of either totalizer while said totalizer is in an overdrawn condition.

Another object is to supply means for enabling or disabling the overdraft feature at will.

With these and incidental objects in view, the invention includes certain novel features of construction and combinations of parts, the essential elements of which are set forth in appended claims and a preferred form or 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 left side of the machine embodying the present invention, and shows the overdraft mechanism.

Fig. 2 is a left side elevation showing the overdraft mechanism.

Fig. 3 is a detail view of a portion of the overdraft disabling mechanism.

Fig. 4 is an assembly illustrating the overdraft disabling lever and its supporting brackets.

Fig. 5 is a view showing the side spacing of a portion of the mechanism illustrated in Fig. 4.

Fig. 6 is a detail showing part of the No. 3 total key locking mechanism.

Fig. 7 is a view of the overdraft and totalizer controlling mechanism as observed from the left of the machine.

Fig. 8 is a view taken from the left side of the machine and shows in detail the total key locking mechanism and part of the totalizer controlling mechanism.

Fig. 9 shows in detail the left end of the totalizer lines and a portion of an actuator rack.

Fig. 10 is a perspective illustration of the add and subtract hanging bars, and a fragment of a tabulating stop bar, which has assembled thereon traveling carriage tabulating stops.

General description

The machine of the present invention, as previously stated, is of the well-known Ellis type, having a plurality of totalizers which are actuated by key-controlled reciprocating racks.

The keyboard is of conventional adding machine construction having a plurality of keys arranged in denominational rows. There is also a row of control keys located on the left of the keyboard which control the functions of the different totalizers.

The machine is operated by a constantly running electric motor of conventional design which is clutched to the machine operating mechanism by the depression of a touch bar, and is automatically de-clutched therefrom at the end of machine operations.

The machine in preferred form has four totalizers arranged in parallel pairs, one above the other, at the rear of the machine. The two upper totalizers are adapted for addition and subtraction, while the lower totalizers are of straight adding type. The wheels of the add-subtract totalizers are rotated in one direction for addition, and in the opposite direction for subtraction. There is a dual transfer mechanism for each add-subtract totalizer, which shifts automatically to accommodate the type of transaction being made.

The overdraft feature is incorporated in the two add-substract totalizers, so that when one of these totalizers is selected for an additive operation, the other is automatically selected for a substractive operation, and vice versa; the result being that when either of the totalizers is overdrawn, a reading of the other totalizer will give the positive amount of said overdraft, which is the result desired.

The machine of the instant invention is equipped with the usual type of traveling car-

riage, and printing means to print amounts and totals thereof. If desired, the machine may also be equipped with a typewriter keyboard and type.

All the totalizers are selected for addition by means of stops cooperating with hanging bar levers, said stops being arranged in desired location upon the traveling carriage.

When using the overdraft feature of the instant machine, the two add-subtract totalizers are also selected for addition or subtraction by means of stops located in predetermined positions upon the traveling carriage. These stops are arranged so that when one add-subtract totalizer is selected for addition, the other totalizer is selected for subtraction.

Locking mechanism has been provided which locks the total key of either add-subtract totalizer against depression whenever said totalizer is in an overdrawn or negative condition. Also, an interlock has been incorporated between the total keys for the two add-subtract totalizers, which prevents the simultaneous depression of these keys. In the description to follow the mechanism outlined above will be explained in detail.

Detailed description

As stated in the preceding general description, the machine of the instant invention has four totalizers (Figs. 2 and 9) supported between a pair of main frames **25**, only one here shown in Fig. 1, which for convenience will be numbered as has heretofore been the custom. The upper front totalizer or accumulator (Fig. 2) will be called No. 1, the lower front No. 2, the upper rear No. 3, and the lower rear No. 4, as they are designated in the above mentioned Ens patent.

The two upper totalizers, Nos. 1 and 3, are adapted for both addition and subtraction. These two totalizers and their associated mechanisms are substantial duplicates of each other, and are substantially the same as that which has been fully described in the Ellis Patent No. 1,203,863, referred to above, and Patent No. 1,508,267, issued September 9, 1924, to F. W. Bernau. It is, therefore, thought unnecessary to again treat this mechanism in detail.

Operating mechanism

Referring to Figs. 2, 7 and 8, each time the machine is operated a main operating shaft **30** is oscillated through an angle of approximately 60 degrees by mechanism not here shown, but shown in the Ellis Patent No. 1,197,276, its initial movement being clockwise. Secured to the shaft **30** is a pair of symmetrical operating plates **31** and **32**, which operate in unison with said shaft **30**.

Add and subtract mechanism for the No. 1 totalizer

The operating plate **31** (Fig. 8) has pivoted thereon a flying lever **33**, the lower end of which is arranged to cooperate with a pair of pawls **34** and **35** pivoted on a subtract control lever **36** which is pivoted on a stud **37** secured between the left side frame **25** and a sub-frame **77** (Fig. 2). A link **37** (Fig. 8) pivotally connects the upper end of the lever **33** with a stud **38** in a crank **39** secured to a shaft **40** journaled in a pair of front totalizer frames not here shown. Secured to the shaft **40** is a pair of cam arms **26** (Fig. 9—one only here shown) having cut therein cam slots which cooperate with a pair of rollers pivoted on either end of the No. 1 totalizer shaft, which is mounted in a pivoting frame (not shown) supported between the front totalizer frames. The No. 1 totalizer shaft has rotatably mounted thereon a plurality of totalizer wheels adapted to cooperate with a plurality of actuator racks **47**.

Pivoted on the upper end of the flying lever **33** is a pawl **41** urged counter-clockwise against the stop stud **42** by spring **43**. The upper end of the pawl **41** is adapted to cooperate with a stud **44** in a controlling crank **45** pivoted to the left machine frame **25**. The lower end of the pawl **41** is arranged to cooperate with a square stud **46** carried by the plate **31**.

The upper arm of the lever **33** has thereon a flat surface which cooperates with a square stud **48**, which connects the plates **31** and **32**.

In additive operations the initial clockwise movement of the operating plate **31** causes the lower end of the pawl **41** to be engaged, the stud **46** to rock the shaft **40** counter-clockwise to engage the No. 1 totalizer wheels with the actuator racks **47**. The return movement counter-clockwise of the plate **31** causes the stud **48** to engage the flying lever **33**, to rock the shaft **40** clockwise, thereby disengaging the No. 1 totalizer wheels from the actuator racks **47**.

The lower end of the controlling crank **45** (Fig. 8) is adapted to cooperate with the left end of a controlling latch **49** pivoted to the left side frame. The right end of the latch **49** is pivoted to the lower end of an add hanging bar **50**, whose upper end is slotted to receive the left end of an add hanging bar lever **51** (Figs. 8 and 10) for the No. 1 totalizer. The lever **51** is pivoted on a stud **52** carried by a tabulating frame (not here shown). The right-hand end of the lever **51** has an upturned extension **53** adapted to cooperate with a lug **54** on a tabulating stop **55** carried by a tabulating stop bar **56** secured to the usual traveling carriage (not shown).

The plate **31** (Fig. 8) has a nose **57** which cooperates with a bent extension **58** on a lever **59** pivoted at **60** to the frame **25**. Pivoted on the upper end of the lever **59** (Fig. 8) is a link **78** having in its upper end a slot adapted to cooperate with the stud **44** in the crank **45** to restore said crank near the end of an add operation. The upper end of the lever **59** has therein a stud **61** which cooperates with a latch **62** pivoted at **63** to the frame **25**. The latch **62** is notched on its left end (Fig. 7) to engage a stud **64** in a lever **65** secured to a transfer shaft **66** also journaled in the front totalizer frames. A spring **67** urges the lever **65** and shaft **66** counter-clockwise to restore the transfer mechanism to normal position. Pivoted on the upper end of the lever **65** is a flexible latch **68** composed of a hinge member **69** and a hook member **70**, each having adjacent flat portions which are held in contact by a spring **71**. A spring **72** is tensioned between the flexible latch **68** and latch **62** to urge said latches in a clockwise direction, thereby enabling them to perform their functions satisfactorily.

Add and subtract mechanism for the No. 3 totalizer

The adding and subtracting mechanism for the No. 3 totalizer is similar in every respect to that of the No. 1 totalizer explained above. Therefore, the No. 3 mechanism will be treated somewhat briefly in the following description.

Pivoted on the operating plate **32** (Fig. 7) is a flying lever **73**, the lower end of which is adapted to cooperate with a pair of pawls **74** and

75, pivoted on a control lever 76 also pivoted on the stud 27. The lever 73 cooperates with the stud 48 in the same manner as the lever 33 to disengage the No. 3 totalizer wheels from the actuators 47 in adding operations. A link 79 (Fig. 7) connects the flying lever 73 with a stud 113 in a crank 80 secured on a shaft 81 journaled in a pair of rear totalizer frames 95 (one only here shown in Fig. 1). A pawl 82 pivoted on the upper end of the lever 73 is identical to and operates exactly the same in relation to the No. 3 totalizer as the pawl 41 does to the No. 1 totalizer.

The upper end of the pawl 82 cooperates with a stud 83 in a controlling crank 84 pivoted to the frame 25. The lower end of the crank 84 is adapted to engage a latch 85 also pivoted to the frame 25. The right-hand end of the latch 85 is pivoted to a hanging bar 86 (Figs. 7 and 10), whose upper end is slotted to receive a hanging bar lever 87 for the No. 3 totalizer. The lever 87 is pivoted on the stud 52 and has an upturned extension on its right-hand end which is adapted to cooperate with a lug on a tabulating stop 88, which is similar to the stop 55 and selects the No. 3 totalizer for add operations in tabulated positions of the traveling carriage.

The operating plate 32 (Fig. 7) has a nose 89 which cooperates with a right-angled extension 90 on a lever 91 also pivoted at 60 to the frame 25. Pivoted on the upper end of the lever 91 is a link 1481 having in its upper end a slot adapted to cooperate with the stud 83 in the crank 84 to restore said crank near the end of an adding operation. The upper end of the lever 91 has therein a stud 92 which extends through a slot in a link 93 whose left end is pivoted to an arm of a latch 94 pivoted at 96 to the rear totalizer frame 95. The latch 94 is notched on its left end to engage a stud 97 in a lever 98 secured to a transfer shaft 99 journaled in the frame 95. Pivoted on the upper end of the lever 98 is a flexible latch 100 which is substantially a duplicate of the latch 68. A spring 101 is tensioned between the latches 94 and 100 to urge said latches clockwise. A spring 141 urges the arm 98 and shaft 99 counter-clockwise to restore the transfer mechanism to normal position.

Overdraft mechanism

A stud 102 (Fig. 7) secured to the frame 25 has pivoted thereon a flexible member 103 composed of levers 104 and 105. A spring 106 is tensioned to hold an arm 107 of the lever 104 in contact with an eccentric adjuster 108 carried by the lever 105. The left end of the lever 104 is arranged to cooperate with a stud 109 in a plate 110 secured to the latch 100. A torsion spring 111 urges the member 103 clockwise to normally hold the latch 100 in ineffective position, as shown in Fig. 7. The right-hand end of the lever 105 cooperates with a stud 112 carried by the No. 1 hanging bar 50. The lever 104 carries an adjustable arm 114 having therein a stud 115 which is adapted to cooperate with an arm 116 carried by the latch 68. The hook members of the latches 68 and 100 are adapted to lock over the studs 38 and 113, respectively, for a purpose to be later described.

The hanging bar 86 (Figs. 2, 8 and 10) has a horizontal surface formed thereon, which is adapted to cooperate with a nose of a lever 117 pivoted on a stud 118 carried by a bracket 148 secured to the sub-frame 77. The right-hand end of the lever 117 has pivoted thereto a selecting plate 119 which has formed thereon a pair of selecting lugs 120 and 121. The lug 120 is arranged to cooperate with a pin 122 (Fig. 7) in the No. 3 totalizer control lever 76, and the lug 121 (Fig. 8) is adapted to cooperate with a pin 123 carried by the No. 1 totalizer lever 36. The top surface of the plate 119 cooperates with a subtracting cam lever 124 pivoted on the stud 27. The lever 124 has an extension 125 adapted to cooperate with a roller 126 carried by a substracting latch 127 pivoted at 128 to the frame 25.

The upper end of the latch 127 (Fig. 7) carries a stud 129 adapted to cooperate with a subtracting lever 130 pivoted on the stud 131 carried by the frame 25. An arm 132 of the lever 130 is connected by a link 133 to subtract hanging bar lever 134 (Fig. 10) pivoted on the stud 52. The lever 134 has on its right end an upturned extension 135 arranged to cooperate with the lug 136 on the stops 55 and 88. Pivoted also on the stud 52 is a pair of hanging bar levers 137 and 138 which coact with stops on the tabulating bar 56 to condition the Nos. 2 and 4 totalizers for add operations when the traveling carriage is tabulated to predetermined positions. Pivoted on the latch 127 is a link 139 (Fig. 7) having cut therein a cam slot 140 adapted to cooperate with a stud 142 on the frame 25. The left end of the link 139 carries a stud 143 which cooperates with the lower edge of the hook member 70 of the flexible latch 68.

When the traveling carriage is tabulated to a particular position where it is desired to add in No. 3 totalizer and subtract in No. 1, a lug 160 on the stop 88 selects the No. 3 totalizer for an add operation by engaging and rocking the hanging bar lever 87 clockwise. This lifts the hanging bar 86 (Fig. 8) rocking the lever 117 clockwise, to shift the selecting plate 119 to the left, where the lug 121 will be in operative alinement with the stud 123. Simultaneously with the above operation, the lug 136 on the stop 88 contacts and rocks the subtract hanging bar lever 134 (Fig. 10), the lever 130 (Fig. 7), and the latch 127 clockwise. The roller 126 (Figs. 7 and 8) on the lever 127 coacting with the extension 125 rocks the cam lever 124 clockwise. The lever 124 forces the selecting plate 119 downwardly, which, through the lug 121 and pin 123, rocks the lever 36 and pawls 34 and 35 clockwise to condition the No. 1 totalizer for a subtract operation.

Clockwise movement of the lever 127 (Fig. 7) moves the link 139 to the left, causing the cam slot 140 in cooperation with the stud 142 to lower the left end of the link 139 to allow the latch 68 to move to a position where the hook member 70 will be in the path of the stud 38 on the No. 1 totalizer engaging arm 39. Initial movement clockwise of the operating plate 31 (Fig. 8) releases the lever 59 and causes the lower end of the flying lever 33 to contact the pawl 34, to rock the arm 39 and shaft 40 counter-clockwise, in the manner fully described in the above mentioned patents. This causes the stud 38 to engage the hook lever 70, thereby rocking the shaft 66 clockwise. The clockwise movement of the shaft 66 shifts the transfer mechanism for the No. 1 totalizer to its subtract position. The releasing of the lever 59, as explained above, renders the latch 62 effective, which under tension of the spring 72 (Fig. 7) engages the stud 64 in the arm 65 to retain the transfer mechanism in substract position.

When the cycle of operation is nearly completed the nose 57 on the plate 31 engages and rocks the lever 59 clockwise to move the latch 62 counter-clockwise, thereby releasing the arm 65,

which, under tension of the spring 67, rocks the shaft 66 counter-clockwise to restore the transfer mechanism to normal adding position.

When the No. 3 hanging bar lever 87 (Figs. 8 and 10) is released by changing the position of the traveling carriage, the torsion spring 144 (Fig. 8) rocks the lever 117 counter-clockwise to return the selecting plate 119 to its normal position, in which it is shown in Fig. 8. Likewise, releasing of the subtract hanging bar lever 134 by shifting the traveling carriage allows the latch 127, link 139 and flexible latch 68 to be restored to normal positions by means of a spring 145 (Fig. 7). A spring 146, tensioned between the levers 117 and selecting plate 119, likewise restores the plate 119 and cam lever 124 to normal positions as shown in Figs. 7 and 8.

The No. 1 totalizer is selected for addition and the No. 3 totalizer for subtraction by tabulating the traveling carriage to a position where the lug 54 on the stop 55 will engage the extension 53 of the add hanging bar lever 51, and the lug 136 will engage the extension 135 of the subtract lever 134, rocking said lever clockwise. The clockwise movement of the lever 51 lifts the bar 50 (Fig. 7), which, by means of the stud 112, rocks the lever 103 counter-clockwise to lower the flexible latch 108 so that the hook thereon will be in operative alinement with the stud 113 carried by the crank 89 for the No. 3 totalizer. Counter-clockwise movement of the lever 103 also moves the stud 115 in the path of the arm 116 to block the movement of the flexible latch 68 so that the moving of the latch 127 and link 139 by the rocking of the subtract hanging bar as explained above, will have no effect on said flexible latch 68. The clockwise rocking of the latch 127 rocks the cam lever 124 clockwise, causing the lug 120 (Fig. 7) to engage the stud 122 to rock the lever 76 clockwise to condition the No. 3 totalizer for a subtract operation, which is similar to that of the No. 1 totalizer explained above.

Initial movement clockwise of the operating plate 32 (Fig. 7) releases the lever 91 and the latch 94, and causes the flying lever 73 to engage the pawl 74 to rock crank 88 and shaft 81 counter-clockwise. The hook on the latch 108, cooperating with the stud 113, rocks the shaft 99 and lever 98 clockwise to shift the transfer mechanism for the No. 3 totalizer to subtract position. When the lever 98 reaches the extent of its clockwise movement the stud 97 is engaged by the latch 94 to hold the No. 3 transfer mechanism in subtract position until the cycle of operation is nearly complete. The nose 89 on the plate 32 then engages and rocks the lever 91 clockwise, disengaging the latch 94 from the stud 97. The spring 141 then restores the No. 3 transfer mechanism to its normal adding position.

Total key locking means

Means are provided for locking the total key for the No. 3 totalizer when this totalizer has a negative amount thereon. The means for locking the No. 1 total key under like conditions is substantially the same as that shown in the patents cited below, and therefore, it will be briefly treated herein. Reference may be had to Patent No. 1,508,267, issued September 9, 1924, to F. W. Bernau, and Patent No. 1,609,768, issued to N. W. Perkins December 7, 1926, for a detailed description of the locking mechanism for the No. 1 total key when an overdraft occurs.

The means for locking the No. 3 total key when an overdraft occurs in the No. 3 totalizer will now be explained. Referring to Figs. 1 and 2, an overdraft shaft 147 for the No. 3 totalizer pivoted between the rear totalizer frames 95 is automatically rocked counter-clockwise when an overdraft occurs in the No. 3 totalizer, and is automatically returned to original position whenever the No. 3 totalizer is restored to a positive condition. The means for operating the No. 3 overdraft shaft 147 is identical to that of the No. 1 overdraft shaft, as described in the patents referred to above. Therefore, it is thought unnecessary to include a lengthy description of this mechanism herein. Secured to the shaft 147 (Fig. 8) is an arm 150 pivotally connected by a link 151 to a pitman 152. The pitman 152 is slidably mounted on the machine by having its left end slotted to embrace a stud 153 in a bracket 154 (Fig. 1) secured to a keyboard plate 155. The forward end of the pitman 152 has formed thereon a lug 156 (Fig. 6) supported by a bracket 157 also secured to the keyboard plate 155. The lug 156 is arranged to cooperate with a notch 158 in the stem of a No. 3 total key 159.

When an overdraft occurs in the No. 3 totalizer, causing the overdraft shaft 147 to rock counter-clockwise, the pitman 152 is moved thereby toward the rear, causing the lug 156 to enter the notch 158, thus locking the No. 3 total key against depression. The instant the No. 3 totalizer is restored to a positive condition by adding therein an amount larger than that of the overdraft, the shaft 147 is returned clockwise to normal position, thereby unlocking the No. 3 total key. A spring 160 (Figs. 1 and 2) secured to the keyboard plate 155 is arranged to cooperate with two notches in the pitman 152 to retain said pitman in either its forward or rearward position.

The No. 1 totalizer has an overdraft shaft 165 (Fig. 8) journaled in the front totalizer frames, and has secured thereon an arm 166 similar to the arm 150. The arm 166 is connected by a link 167 to a pitman 168 (Figs. 2 and 8) having a slot which embraces a stud (not shown, but like stud 153) carried by the tabulating frame. The forward end of the pitman 168 is pivotally connected to a lock lever 169 pivoted at 164 to the frame 25. The lower end of the lever 169 has bent thereon a lug 170 adapted to engage a notch 171 in a No. 1 total key 172.

The occurrence of an overdraft in the No. 1 totalizer rocks the overdraft shaft 165 counter-clockwise, causing the lug 170 to enter the notch 171 to lock the No. 1 total key 172 against depression when a negative amount is in the No. 1 totalizer. Restoration of the No. 1 totalizer to a positive condition rocks the overdraft shaft 165 clockwise, removing the lug 170 from the notch 171 thereby unlocking the No. 1 total key.

Interlocking mechanism for the No. 1 and No. 3 total keys

As an added precaution against depressing both the No. 1 and No. 3 total keys simultaneously, an interlock between these keys has been added. Secured to the lock lever 169 (Fig. 8) is an arm having a hook 173 adapted to cooperate with a stud 174 carried by the No. 3 total key 159. Thus it can be seen that depression of the No. 3 total key 159 causes the stud 174 to engage the hook 173 to force the lever 169 counter-clockwise, causing the lug 170 thereon to enter the notch 171, thereby locking the No. 1 total key 172 against depression. Again depression of the No. 1 total

key causes the notch 171 to pass beyond the lug 170, thereby blocking the counter-clockwise movement of the lever 169. This holds the hook 173 in the path of the stud 174, thus preventing depression of the No. 3 total key when the No. 1 key is depressed.

Subtract disabling mechanism

Mechanism has been provided by which the subtracting mechanism for the No. 3 totalizer may be disabled in order to make said totalizer a straight adding totalizer. Such mechanism will now be explained.

Pivoted on the braket 148 (Figs. 2 and 4) is a multi-armed lever 175 having a finger-piece 176. The lever 175 has an arm 177 to which is pivoted a plunger 178, the lower end of which extends through a hole in an angle piece 179 secured to the bracket 148. A compression spring 180 wound around the plunger 178 is tensioned to retain the lever 175 in either its forward or rearward position. An arm 181 of the lever 175 is pivotally connected by a link 182 to a latch 183 (Fig. 2) pivoted to a stud 184 in a left carrying plate 185 (Fig. 1). The upper end of the latch 183 has therein an open ended slot 186 adapted to hook over the stud 109 carried by the flexible latch 100. Another arm 187 (Figs. 3 and 4) of the lever 175 has therein a stud 190 arranged to cooperate with the lower edge of the lever 117 for a purpose to be later described.

Another arm 191 (Fig. 3) of the lever 175 is hooked-shaped to latch over a stud 193 in the upper end of a link 194 whose lower end is pivoted to an extension 195 of the bracket 148. Also pivoted on the stud 193 (Figs. 2 and 4) is a lever 196 having its upper end pivotally connected by a link 197 to a crank 198 secured to a ribbon color shifting shaft 199 journaled in a top frame 200 supported between the main frames of the machine. The lower arm of the lever 196 has pivoted thereto the rear end of a link 201, the front end of which is slotted to embrace a stud 202 secured in the No. 3 total key latch 203 pivoted at 204 to the frame 25. The upper end of the latch 203 has bent thereon a lug 205 adapted to enter a notch 206 in the No. 3 total key 159.

With the lever 175 in the position shown in Figs. 2 and 4, the subtract mechanism for the No. 3 totalizer is effective, as also is the ribbon color-shifting mechanism. If there is no need for the direct overdraft feature, and it is desired to use the No. 3 totalizer as a straight adder only, all that is required is the moving of the multi-armed lever 175, through its finger piece 176, clockwise to its disabling position, as shown by dot-and-dash lines in Fig. 2. This causes the latch 183 to hook over the stud 109 to retain the flexible transfer shifting pawl 100 in ineffective position. Likewise, when the lever 175 is in its disabling position the stud 190 engages the lower edge of the lever 117 thereby moving said lever 117 and the selecting plate 119 (Fig. 8) to a position where only the No. 1 totalizer may be conditioned for a subtract operation.

When the lever 175 is in position to allow subtraction in the No. 3 totalizer, the hook 191 (Fig. 3) engages the stud 193, holding it and the link 194 stationary. As the pivot point 193 for the lever 196 (Fig. 4) is now held stationary, the clockwise rocking of the latch 203 when the No. 3 total key is depressed, through the link 201, (Figs. 2 and 4), lever 196 and link 197 rocks the crank 198 and shaft 199 counter-clockwise, to shift the ribbon mechanism to a position where the red portion of a brichrome ribbon will be alined with the printing type in order to print an overdraft in a distinctive color.

Moving the lever 175 clockwise to ineffective position removes the hook 191 (Fig. 3) from the stud 193, so that depression of the No. 3 total key causes the link 194 to pivot idly. Thus, the connection between the latch 203 and shaft 199 is disabled, so that when the overdraft feature is not in use, depression of the No. 3 total key 159 will have no effect on the ribbon shifting mechanism.

Statement of operation

As an example of the use of the above described overdraft mechanism, let us assume that a depositor in a certain bank has a balance of one thousand dollars on his checking account. This depositor issued three checks, one for five hundred dollars, another for four hundred dollars, and a third for two hundred dollars, thereby overdrawing his account one hundred dollars. The present invention makes it possible to print the positive amount of the above overdraft at the time of its occurrence, without having to take the machine through a series of operations to transpose a complementary overdraft into a positive amount, as has heretofore been necessary. With this thought in mind a sequence of operation will be given, in which the No. 3 totalizer will be used to print the positive overdraft. This is merely a matter of choice, as the No. 1 totalizer may, if desired, be used to print the positive overdraft.

Assuming both the No. 1 and No. 3 totalizers to be standing at zero, the old balance of one thousand dollars is simultaneously added in the No. 1 totalizer and subtracted from the No. 3 totalizer, and printed in the proper column on a work sheet, having a plurality of columnar divisions. This is accomplished by properly locating the stop 55 upon the traveling carriage tabulating stop bar 56. Next the checks of five hundred dollars, four hundred dollars and two hundred dollars, issued against this balance of one thousand dollars, are subtracted therefrom in the No. 1 totalizer, and simultaneously added to the complement of the balance in the No. 3 totalizer, and at the same time printed upon the work sheet. This results in an overdraft of one hundred dollars, which leaves the complement thereof in the No. 1 totalizer, and the positive amount of one hundred dollars in the No. 3 totalizer. Generally three columns of the work sheet are used for the listing of checks. This, however, may be varied if desired. For each check listing column a stop 88 is properly located upon the tabulating stop bar 56, and as previously stated, selects the No. 3 totalizer for additive and the No. 1 totalizer for subtractive operations.

The next step is the tabulating of the traveling carriage to a new balance column on the work sheet, and in this position a stop is used which selects both the No. 1 and No. 3 totalizers for addition, whereby when the operator takes the new balance or the overdraft of the account, that sum cleared from either totalizer is added into the other totalizer. As hereinbefore set out, the occurrence of an overdraft automatically locks the total key in the overdrawn totalizer, and in the instant example, as the No. 1 totalizer has been overdrawn, its total key 172 is automatically locked thereby. The adding of the several checks to the complementary old balance places the No. 3 totalizer in a positive condition, thereby unlocking

its total key 159. The fact that an overdraft exists is made manifest to the operator when an attempt is made to strike a new balance by taking a total from the No. 1 accumulator from which the several checks have been subtracted.

The No. 3 total key is then depressed to take the total of the No. 3 totalizer to ascertain the amount of the overdraft. Since a total operation supersedes an adding operation, the fact that the No. 3 totalizer had previously been selected for an add operation does not in any way interfere with the succeeding total taking operation. Therefore, the depression of the No. 3 total key, and operation of the machine results in the clearing of the No. 3 totalizer, the printing of the positive or direct overdraft, and the clearing of the No. 1 totalizer by adding the positive overdraft to the complement contained in said No. 1 totalizer. An illustration of the condition of the No. 1 and No. 3 totalizers at different stages of an overdraft operation is given below:

No. 1		*No. 3*	
Add $1000	0,001,000.00	Subt. $1000	9,999,000.00
Subt. $500	0,000,500.00	Add $500	9,999,500.00
Subt. $400	0,000,100.00	Add $400	9,999,900.00
Subt. $200	9,999,900.00	Add $200	0,000,100.00

No. 3 totalizer is now cleared by—

Adding $100 ..... 0,000,000.00 Subtracting $100 .... 0,000,000.00

In summarizing it will be seen: That, the No. 1 and No. 3 totalizers may be used alternately for addition or subtraction. That, it matters not in which totalizer an overdraft operation is begun. That the use of the overdraft feature described herein is discretionary, but when being used, the No. 1 and No. 3 totalizers are coupled together, so that when you add in one, you automatically subtract from the other, and vice versa. That, when using the overdraft feature the total keys for the No. 1 and No. 3 totalizers are automatically locked when their respective totalizer is overdrawn, and released when said totalizer is restored to a positive condition, which in effect makes said keys indicative of the plus or minus condition of their respective totalizers.

While the form of mechanism herein shown and described 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 herein disclosed, for it is susceptible of embodiment in various forms all coming within the scope of the claims which follow.

What is claimed is:

1. In a machine of the class described, the combination of a plurality of add-subtract totalizers; means for conditioning said totalizers for add operations; means for conditioning said totalizers for subtract operations; means common to the totalizers for operating the subtractive conditioning means; selecting means intermediate the operating means and the subtractive conditioning means; and means for shifting the selecting means when one totalizer is conditioned for addition so that another totalizer may be automatically conditioned for subtraction by said operating means.

2. In a machine of the class described, the combination of a plurality of add-subtract totalizers; additive conditioning means for each totalizer; subtractive conditioning means for each totalizer; means common to the totalizers for operating the subtractive conditioning means; selecting means intermediate the subtractive conditioning means and said operating means, said selecting means arranged to normally select a particular totalizer for subtraction; and means for shifting the selecting means to select another totalizer for subtraction when said particular totalizer is selected for addition.

3. In a machine of the class described having a traveling carriage, the combination of two add-subtract totalizers; normally ineffective additive conditioning means for each totalizer; normally ineffective subtractive conditioning means for each totalizer; means operated by the traveling carriage for rendering effective the additive conditioning means of either totalizer; and means operated by the additive conditioning means for one totalizer for rendering effective the subtractive conditioning means of the other totalizer.

4. In a machine of the class described having a traveling carriage, the combination of two add-subtract totalizers; additive conditioning means for each totalizer; subtractive conditioning means for each totalizer; means on the traveling carriage for operating the additive conditioning means of either totalizer; means controlled by said traveling carriage for operating the subtractive conditioning means for either totalizer; and means controlled by the additive conditioning means of one add-subtract totalizer for causing the subtractive operating means to be effectively coupled to the subtractive conditioning means of the other add-subtract totalizer.

5. In a machine of the class described having a traveling carriage, the combination of two add-subtract totalizers; additive conditioning means for each totalizer; subtractive conditioning means for each totalizer; a subtractive operating means for both totalizers; means on the traveling carriage for making the additive conditioning means of either totalizer effective; means on the traveling carriage for making the subtractive operating mechanism effective; and means controlled by the additive conditioning means of one totalizer for causing the subtractive conditioning means of the other totalizer to be effective and simultaneously making ineffective the other subtractive conditioning means.

6. In a machine of the class described having a traveling carriage, the combination of two add-subtract totalizers; total taking means for each totalizer; means controlled by the traveling carriage in one position thereof for selecting one totalizer for addition and the other totalizer for subtraction, to add an amount in said one totalizer and subtract it from said other totalizer to obtain the complement of the amount on said one totalizer; means controlled by the traveling carriage in another position thereof for selecting said other totalizer for addition and said one totalizer for subtraction to subtract an amount from said one totalizer and simultaneously add said amount to the complement in said other totalizer; and means for automatically locking the total taking means of either totalizer when an overdraft occurs therein.

7. In a machine of the class described, the combination of two add-subtract totalizers; a shiftable add-subtract control means for the carrying mechanism of each totalizer; means for shifting the control means; an additive conditioning means for each totalizer; a shiftable subtractive conditioning means for both totalizers normally in position to condition a certain totalizer for subtraction; a traveling carriage; means on said traveling carriage for operating the additive conditioning means of a particular add-subtract totalizer and simultaneously effectuat-

ing the subtractive conditioning means; means operated by said additive conditioning means of the particular totalizer for making effective said carrying mechanism control means of said certain totalizer and simultaneously disabling the carrying mechanism control means of said particular totalizer; means on said traveling carriage for operating the additive conditioning means of said certain totalizer; and means operated by said last mentioned additive conditioning means for shifting the subtractive conditioning means to a position where said particular totalizer will be conditioned for subtraction simultaneous with the conditioning of said certain totalizer for addition.

8. In a machine of the class described having a traveling carriage, the combination of two add-subtract totalizers; a shiftable control means for the carrying mechanism of each totalizer; and selecting means for both totalizers; means on the traveling carriage for making effective the add selecting means of one totalizer; means operated by the add selecting means for making effective the control means for the carrying mechanism of the other totalizer and simultaneously disabling the control means for the carrying mechanism of said one totalizer.

9. In a machine of the class described having a traveling carriage, the combination of two totalizers adapted for addition and subtraction; means controlled by the traveling carriage in a predetermined position for causing amounts to be added in one totalizer and simultaneously subtracted from the other; means controlled by said traveling carriage in another predetermined position for causing amounts to be subtracted from said one totalizer and added to the other totalizer so that the amounts in said totalizers are always complementary to each other; total taking means for each totalizer; and means controlled by each totalizer for locking its total taking means when an overdraft occurs therein to compel the totalizing of the unlocked totalizer to ascertain the positive amount of the overdraft.

10. In a machine of the class described, the combination of an add-subtract totalizer; another add-subtract totalizer in which the subtract mechanism is normally disabled; manipulative means for enabling the subtract mechanism of the last mentioned totalizer; means for controlling the operations of the two totalizers so that when either totalizer is selected for addition the other is automatically selected for subtraction to always maintain the amounts in said totalizers complementary to each other; total taking means for each totalizer; and means for locking the total taking means of either totalizer when an overdraft occurs therein, said locking means also adapted to unlock the total taking means when the overdrafted totalizer is restored to positive condition.

11. In a machine of the class described, the combination of a plurality of accumulators capable of adding amounts therein and subtracting amounts therefrom, means for selecting the totalizers for actuation in such a manner that one totalizer always contains the complement of the other totalizer; actuating means for said totalizers; a device associated with each totalizer to control the clearing thereof to ascertain the balance therein; means associated with each of said devices to lock the same when the accumulator associated therewith contains a negative amount; and a manipulative means to render said locking means ineffective.

12. In a machine of the class described, the combination of two algebraic totalizers and mechanism so arranged that when one totalizer is selected for addition, the other is automatically selected for subtraction, and vice versa, whereby one of said totalizers accumulates a positive amount while the other accumulates a complementary amount or overdraft; total taking means for each totalizer; and means controlled by each totalizer for locking its total taking means when an overdraft occurs therein, so that a total may be taken from only the non-overdrawn totalizer.

13. In a machine of the class described, the combination of two algebraic totalizers; means so arranged that when one of the totalizers is selected for addition the other is selected for subtraction and vice versa, whereby one of said totalizers accumulates a positive amount while the other accumulates a complementary amount or overdraft; total taking means for each totalizer; and means effective only when an overdraft occurs in either totalizer for locking the total taking means of the overdrawn totalizer until said totalizer is restored to positive condition.

14. In a machine of the class described, the combination of two algebraic totalizers; means so arranged that when either totalizer is selected for addition the other is selected for subtraction and vice versa, whereby one of the totalizers accumulates a positive amount while the other accumulates a complementary amount or overdraft; total taking means for each totalizer; and means associated with each totalizer for locking its respective total taking means when said totalizer is overdrawn, said locking means also adapted to unlock the total taking means when its associated totalizer is restored to positive condition.

15. In a machine of the class described the combination of a plurality of algebraic accumulators, actuating means therefor, means for compelling said accumulators to receive simultaneous entries of opposite signs whereby one of said accumulators accumulates a positive total while the other accumulates the complement thereof, manipulative total taking control means for each accumulator, and means for automatically locking the total taking control means associated with the totalizer containing an overdraft.

16. In a machine of the class described the combination of a plurality of algebraic accumulators, actuating means therefor, means for compelling said accumulators to receive simultaneous entries of opposite signs whereby one of said accumulators accumulates a positive total while the other accumulates the complement thereof, manipulative total taking control means for each accumulator, and means for automatically locking one of the total taking control means whenever an amount is standing on the totalizers.

17. In a machine of the class described the combination of a plurality of algebraic accumulators, actuating means therefor, means for compelling said accumulators to receive simultaneous entries of opposite signs whereby one of said accumulators accumulates a positive total while the other accumulates the complement thereof, manipulative total taking control means for each accumulator, means for automatically locking one of the total taking control means whenever an amount is standing on the totalizers, and manipulative means to render said compelling means and said locking means ineffective.

18. In a machine of the class described, the

combination of two totalizers adapted for both addition and subtraction, subtraction control mechanism for said two totalizers, means to selectively control the addition of an amount into either one of said totalizers, control means to operate the last mentioned means and the subtraction control mechanism, and means operated as an incident to the operation of the control means for disabling the subtraction control mechanism for the selected totalizer and for simultaneously compelling the subtraction of that amount from the other totalizer.

19. In a machine of the class described, the combination of a plurality of accumulators, separate accumulator engaging means for each accumulator whereby each accumulator may be controlled to receive positive and negative entries, actuating means for the accumulators, means to jointly control the separate accumulator engaging means to compel the accumulators to receive the same entries in opposite signs so that one accumulator will contain a positive total while the other contains the complement of this total, and manually operable means for disabling said compelling means whereby one of said accumulators is operable to receive additive entries without corresponding negative entries being made in said other accumulator.

20. In a machine of the class described, the combination of a plurality of accumulators; actuating means therefor; a main actuating shaft; accumulator engaging mechanisms individual to each accumulator, each of said engaging mechanisms comprising a separate train of mechanism between the main actuating shaft and its accumulator; adding and subtracting control means for each engaging mechanism whereby the accumulators can be controlled to receive positive or negative entries; means to selectively control the adding and subtracting control means for each of the accumulator engaging means to compel the accumulators to receive entries in opposite signs whereby one of the accumulators accumulates a positive total while the other accumulates the complement thereof; and means to disable the compelling means whereby the entries may be entered either positively or negatively in one of the accumulators without a corresponding entry into the other.

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