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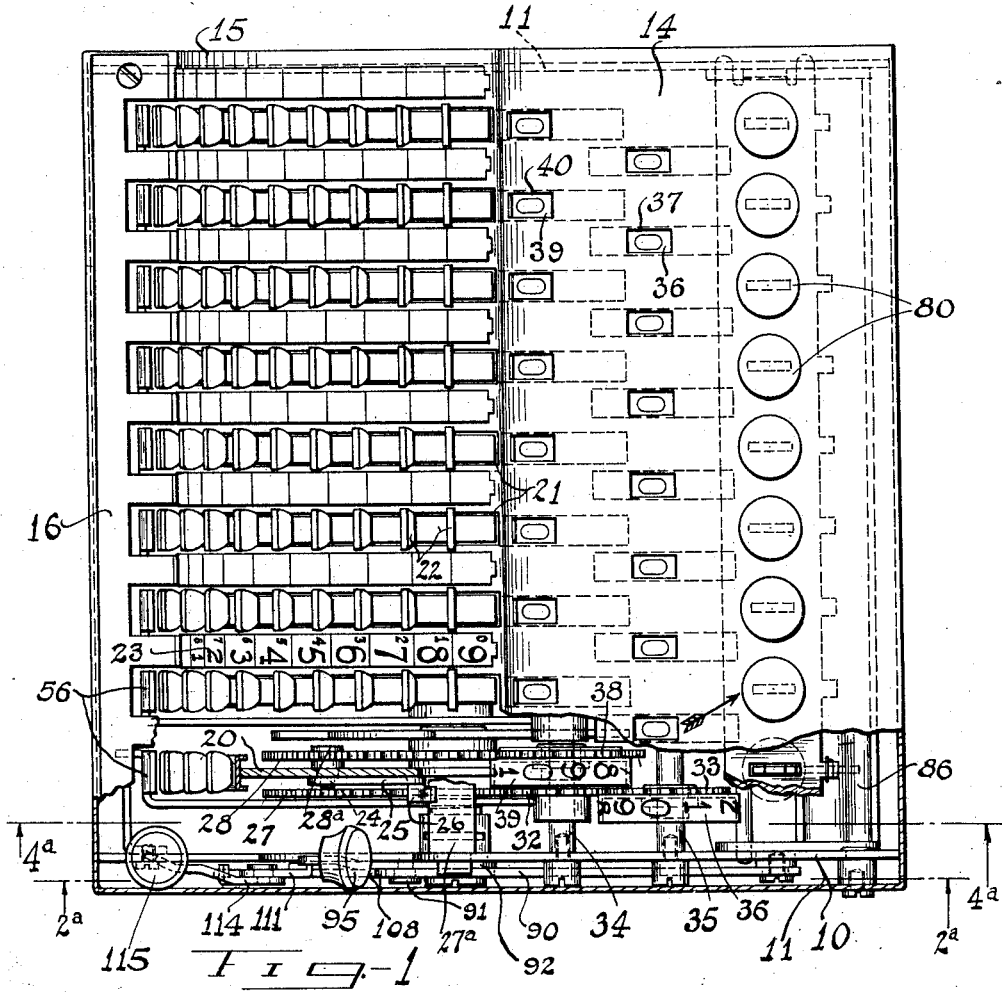
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1,787,259

CALCULATING MACHINE

Filed Jan. 15, 1927

4 Sheets-Sheet 1



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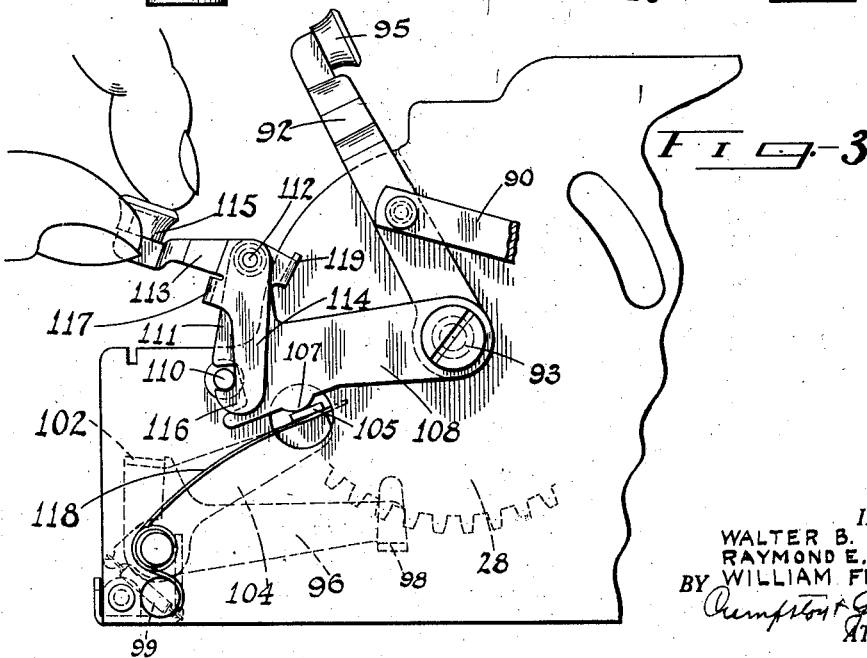
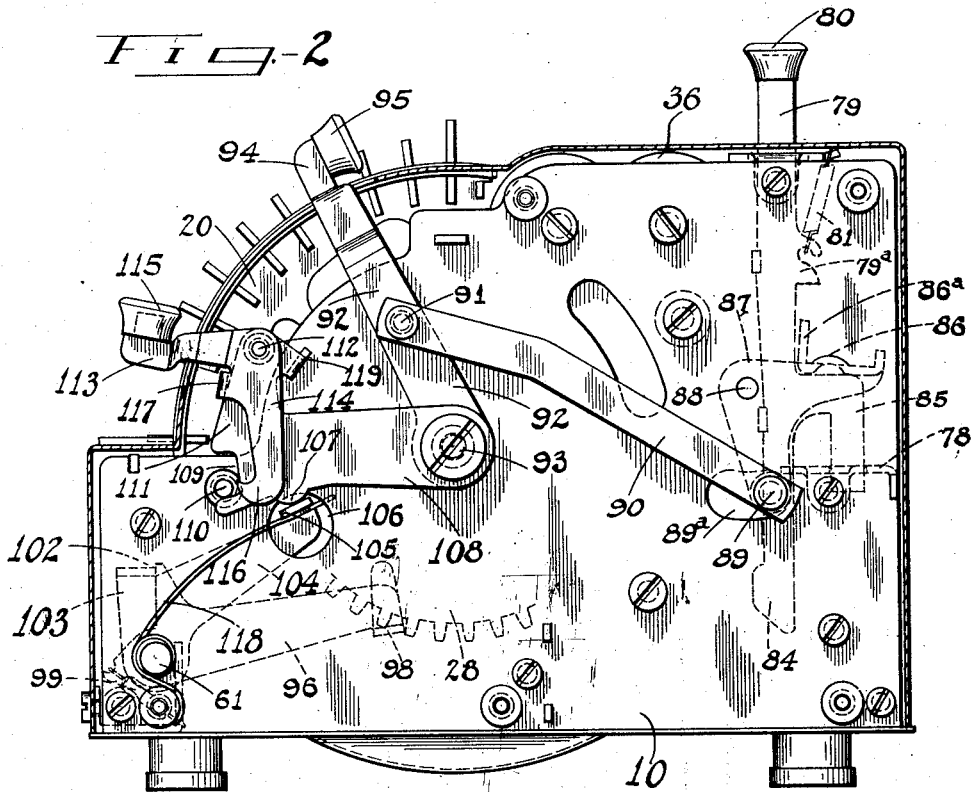
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4 Sheets-Sheet 2



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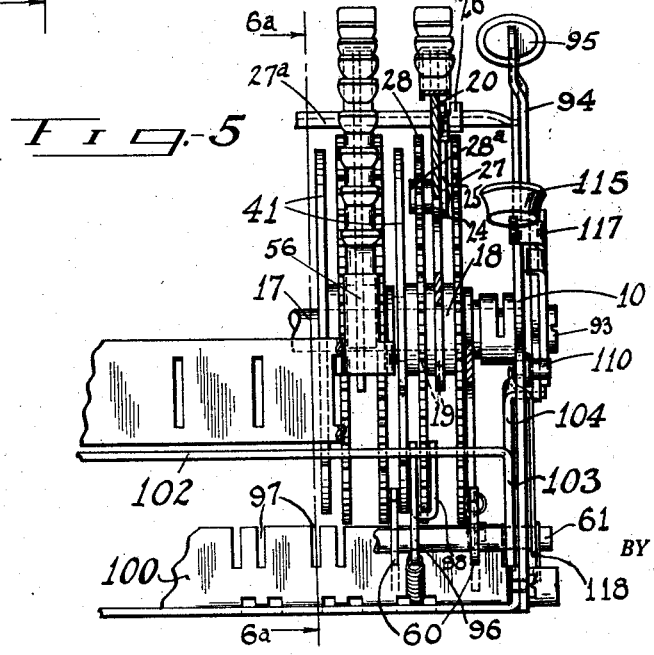
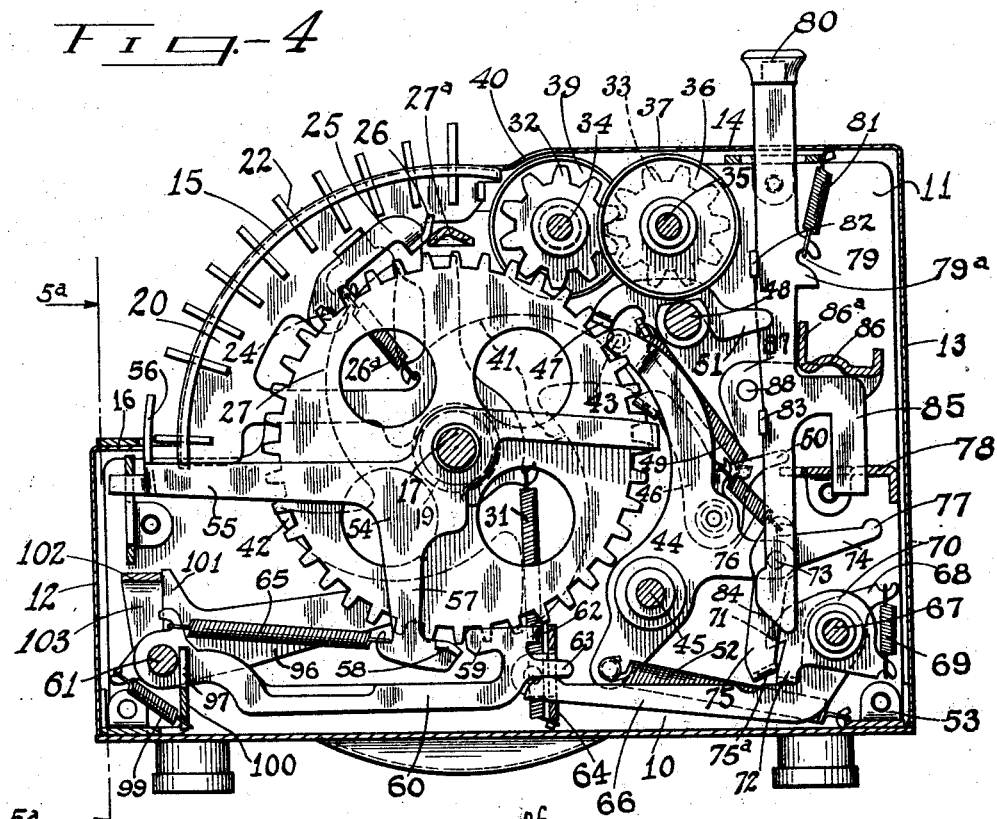
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4 Sheets-Sheet 3



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4 Sheets-Sheet 4

FIG. 6

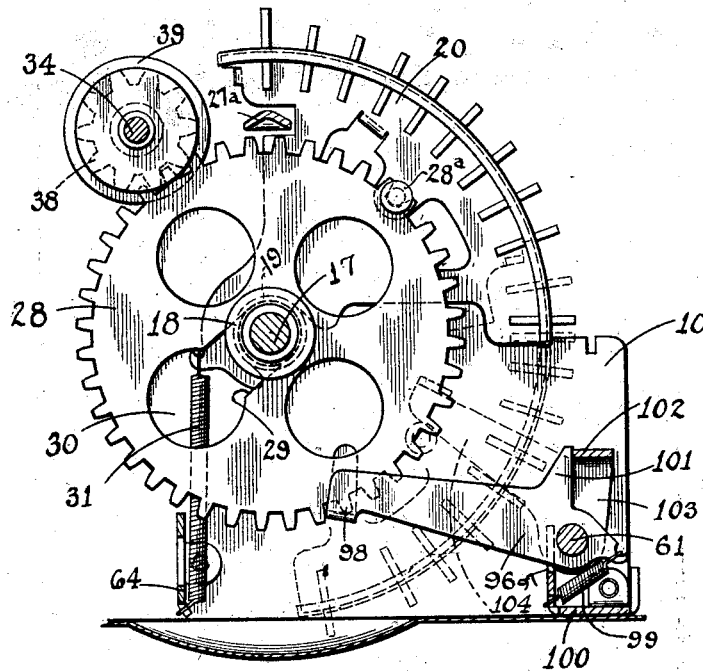
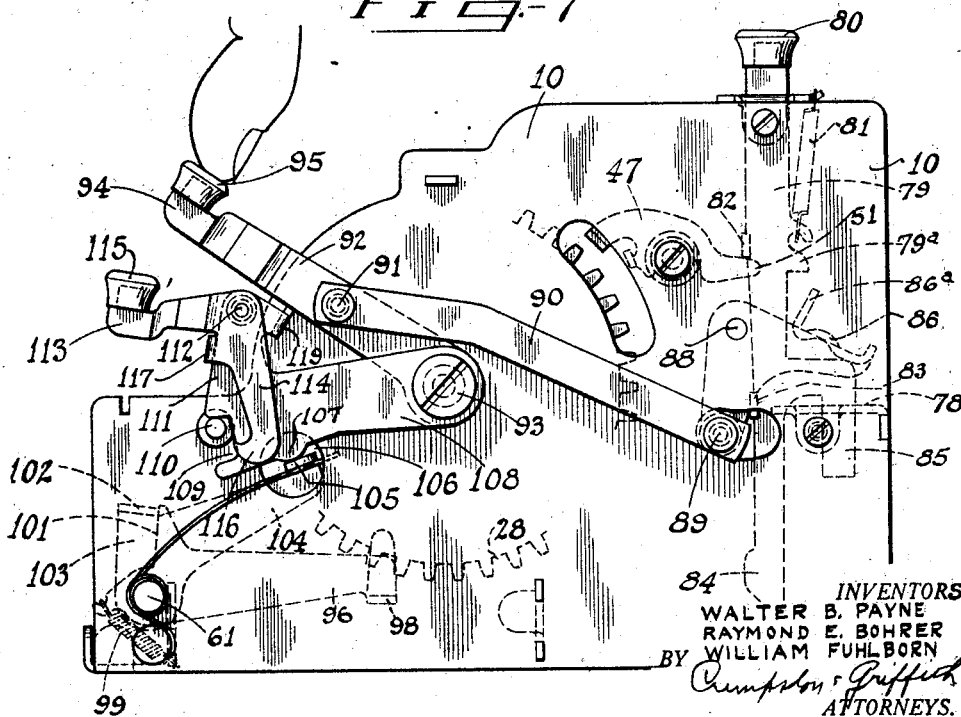


FIG. 7



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UNITED STATES PATENT OFFICE

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CALCULATING MACHINE

Application filed January 15, 1927. Serial No. 161,451.

The present invention relates to calculating machines and has for one object to provide an improved machine of this class in which an indicating totalizer mechanism is combined with an item indicating mechanism of the manually operable type with suitable transfer mechanism provided for the totalizing wheels and having the further object of providing a machine of this character of a simple and practical form and one convenient to operate and efficient in service.

A further object is to provide an improved machine of this class having means for clearing the totalizer or accumulating mechanism and the item indicating mechanism simultaneously or separately and independently as desired.

Another object is to provide control means for operating the machine which is designed to prevent unauthorized clearance of certain indicating parts by persons unfamiliar with the construction and operation of the machine at such times for example, as it may be desired to temporarily retain the set-up of a partial or final result.

A further object is to provide means by which to temporarily retain the item indicators in set-up position in order to afford an opportunity to verify the figures indicated thereby.

Another object is to provide means by which the operating or setting up sectors may either be retained in set-up position until manually released or permitted to return to initial position immediately upon release and without the necessity of the usual and subsequent manual tripping operations.

A further object is to provide means for correcting errors made in the setting-up operations at any point of the indicating mechanism without clearance of the entire number of actuated indicator units.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a top plan view of a machine em-

bodying the present invention with the casing partly broken away;

Fig. 2 is a sectional elevation taken on line 2a—2a of Fig. 1, showing the parts in normal release position;

Fig. 3 is a similar view partly broken away showing the manner of locking the holding devices for the item indicating mechanism in release position;

Fig. 4 is a sectional elevation taken on the line 4a—4a of Fig. 1, showing the indicator control mechanisms of the machine in normal position;

Fig. 5 is a fragmentary sectional elevation taken on line 5a—5a of Fig. 4;

Fig. 6 is a sectional elevation taken on line 6a—6a of Fig. 5 and

Fig. 7 is an elevation similar to Fig. 2 with the resetting mechanism shown in clearing position.

Similar reference numerals throughout the several views indicate the same parts.

One of the primary objects of the present invention is to provide calculating machines of the type described herein with totalizing mechanism, the individual units of which may be cleared separately, whereby any error on the part of the operator may be corrected without having to clear the entire mechanism. It is also the purpose to provide means for clearing either set of indicators independently of the other as well as to clear one by the means provided for clearing the other.

The invention shown and described herein by way of illustration of the principles involved embodies a calculating or computing machine of the general type disclosed in Letters Patent No. 1,398,068, granted Nov. 22, 1921, to Fred H. Doerr. In addition to the accumulator and other mechanisms disclosed by this patent the present machine embodies both an item indicating and a totalizing or accumulator mechanism, the latter being arranged for operation by the former and both being adapted for simultaneous clearance, although either may be cleared independently of the other. In addition to this feature, the present machine embodies means for holding the operating sectors in any position to which they are moved in the setting-up opera-

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tions, with means provided for simultaneously clearing any number of them that may be pulled down by means of a single tripping element and independently of the clearing means for the totalizer mechanism. However, an additional tripping element is provided for simultaneously clearing both indicating mechanisms. Means is also provided for correcting an error in the setting-up operations whereby any totalizing wheel may be returned to zero position without disturbing or changing the positions of the remaining totalizing wheels.

Referring more particularly to the drawings, a frame 10 is shown having thereon a casing comprising end walls 11 and front and rear walls 12 and 13 respectively. The rear wall rises the full height of the machine and is connected with the front wall by a horizontal top portion 14, a forwardly and downwardly curved portion 15 and at the front of the latter a horizontal step or table 16 to which the top of the front wall is secured. At 17 is a main shaft having its ends supported in the end walls 11.

Rotatably carried on the main shaft 17 are a plurality of operating units each including a sleeve or hub 18, Figure 5. Pivotaly carried in a circumferential slot 19 in each hub is an actuator in the form of a sector like plate 20, the circumferential portion of which extends adjacent a corresponding one of a plurality of slots 21 formed in the portion 15 of the casing, Figure 1. This part of each sector carries a series of projections 22 extending through the casing slot and forming recesses between them for engagement by the finger to swing the sector to register a digit. The casing strips between the slots 21 are marked with the digits as at 23 for operating the sectors, as well understood in the art, the sector recess opposite a selected digit being adapted to receive the finger to permit that portion of the sector to be swung down to the table 16.

Each of said sectors has pivotaly mounted thereon at 24, Figure 4, a dog 25 having a transversely extending end 26 moved by spring means 26a when the sector is swung into engagement with the teeth of a disc 27 fixed on the corresponding rotary hub 18. As each sector is swung downwardly to correspond with a selected digit its dog 25 engages and rotates the corresponding disc 27. In the uppermost or zero position of each actuator 20 its dog strikes and is raised by a bar 27a extending across the machine so that in this position the disc 27 is released.

Also carried loosely on the hub 18 and adjacent to the sector 27 is a toothed disc 28, Figures 5 and 6, which is similar to disk 27 and which is actuated by and moves with the sector 20 through the medium of a stud 28a which has an elongated head provided with a grooved portion which engages in one

of the notches between the teeth of the disc. The disc 28 has an elongated slot 29 enlarged at 30 to permit the hub 18 to pass there-through whereby the disc can be easily assembled upon the hub by moving it to central position and within the grooved portion of the hub, at which time the stud 28a is moved between two of the teeth of the disc at a point opposite the elongated slot 29 thereby locking the disc in position on the hub. The sector 20 is retained on the hub 18 by the tension of a spring 31 by which it is returned to initial position when released after being pulled down.

Each disc 27 has its teeth meshing with those of a gear 32 loose on a shaft 34 and in turn, said gear meshes with the teeth of a similar gear 33 loose on a shaft 35 of an accumulator or totalizer mechanism, including indicator wheels 36 connected with the gears 33 which are also loose on shaft 35, the wheels 36 being visible through openings 37 in the top of the casing, the accumulators of the different orders being connected by transfer mechanism hereinafter described.

Each disc 28 has its teeth meshing with those of a pinion 38, Figure 6, of an item indicator mechanism carried on the shaft 34 and including a series of indicator wheels 39 visible through openings 40 in the top of the casing and located between the pinions 32 and 38. The item indicator wheels 39 are rotated by the disc 28 when the sector 20 is pulled down and when the sectors are returned to initial position the item indicator wheels are returned to zero position. This condition is not true, however, with respect to the accumulator or totalizer wheels as will appear hereinafter.

The transfer mechanism comprises a cam disc 41 fixed on each hub 18, rotated as described, by the disc 27 of the same hub. Since the gear ratio of the disc to its pinion 32 is 4 to 1, the cam disc has its periphery divided into four cam surfaces 42, Figure 4. Riding on the periphery of the cam is a roller 43 of a lever 44 pivotaly supported on a cross shaft 45. Each lever has pivoted thereon a pawl 46 engaging the adjacent disc 27 of the next higher numerical order. Each disc 27 is held against reverse movement by a pawl 47 pivotaly supported on a cross shaft 48, both pawls 46 and 47 being moved into engagement with the teeth of the disc by a common spring 49 connecting the same. These pawls are formed with tail portions 50 and 51 respectively for operation by the clearing means as hereafter described. Each transfer lever 44 is pressed toward its cam disc by a spring 52 secured thereto and to a cross bar 53 of the frame and it is apparent from the arrangement of these parts that the pressure of the lever upon the cam disc is such as to rotate the latter in a reverse direction when released, together with the gear 27,

whereby said lever 44 forms the motive means for clearing the machine as hereafter described. It is evident that as the cam disc is rotated in operation its lever 44 is swung outwardly by one of the cam surfaces 42 as the corresponding actuator is operated and when in any order the sum of any selected digit with the digit already registered in that order is in excess of 9, the lever drops from the top of one cam to the bottom of the next. As the lever is thus swung outwardly and inwardly its dog 46 is moved first in an idle and then an active direction to rotate the next disc 27 through a space corresponding to the digit 1 so that a transfer is accomplished, as well understood in the art.

To prevent overflow during the operation of an actuator means are provided for engaging and arresting the rotation of each disc 27 comprising a lever 54 for each order, pivotally supported on the main shaft 17 and having a forwardly extending arm 55 carrying a spur 56 projecting upwardly through an opening in the casing shelf 16 below the corresponding actuator. As a selected finger means of the latter is swung down to the shelf 16, the operator's finger strikes and depresses spur 56 and thereby swings the lever 55. The latter has a depending arm 57 provided with a camming surface 58 for engagement with an extension 59 on a lever 60 pivoted on a transverse shaft 61. Lever 60 has a finger 62 extending transversely in position for engagement with the teeth of the corresponding disc 27. The lever has also an extension 63 riding in a slot in a frame bar 64 for guiding the lever. A spring 65 is connected with lever 60 and also with lever 54 and holds the spur 56 raised and lever 60 depressed. When the spur is depressed, however, the cam surface 58 of lever 54 engages extension 59 of lever 60 and raises the latter so that its finger 62 is brought into arresting engagement with the teeth of disc 27 as the selected actuator digit portion is brought down to the shelf 16.

The means for preventing overthrow by the transfer mechanism comprises the spring actuated lever 60 described above and a lever 66 the forward end of which rides in a slot in the frame bar 64 in engagement with the under side of the extension 63 of lever 60 for raising the latter. Lever 66 is pivotally mounted on a cross shaft 67 and has a tail portion 68 connected by a spring 69 with a tail portion of member 70 pivoted on shaft 67 and having a beveled shoulder 71 and a stop portion 72 for engagement with the lever 66 whereby member 70 is adapted to yieldably actuate lever 66.

The transfer lever 44 has pivotally mounted thereon at 73 a lever 74 the lower arm 75 of which is provided with a laterally extending finger 75a adapted to ride upon the upper side of the shoulder 71 to a point be-

neath the same as shown in Figure 4 whenever a sector 26 is pulled down. A spring 76 connects levers 46 and 74 and holds the latter in position to normally maintain its upper arm 77 in engagement with a frame bar 78 and it is apparent from this construction that, as lever 44 is swung outwardly in operation, its lever 74 is lowered and the finger 75a thereof swung beneath shoulder 71 of member 70 as stated above. The parts remain in this position until clearance of the totalizer mechanism is effected as hereinafter described. When the upper end of lever 44 swings into one of the cam notches it is raised and the finger 75a engages shoulder 71 and swings past the same but in doing so causes member 70 to swing on shaft 67 whereby it raises lever 66 which in turn raises lever 60 and arrests the movement of the disc 27.

The means for clearing the totalizer mechanism, which may also be employed to clear the item indicating mechanism at the same time if it has not been previously cleared by depressing button 95, comprises preferably a plurality of vertical bars 79 each having its upper end projecting through the top portion 14 of the casing and carrying a button 80. Each bar is normally urged upwardly by a spring 81 connected therewith and with the frame and carries a pair of spurs 82 and 83 for engagement, when depressed, with the tail portions 50 and 51 of levers or pawls 46 and 47 respectively for swinging the latter to release the corresponding disc 27, so that the lever 44 cooperating with the attached transfer cam may rotate the parts to zero position, as well understood in the art. The cam portion 84 of bar 79 when depressed engages the finger 75a and moves it clear of member 70 during the clearing movement as will be understood. Each bar 79 has an offset downwardly extended portion 85 which is guided in the plate 78 carried by the frame. A cross bar 86 carried by arms 87 pivoted on the casing at 88 engages the upper sides of the offset portions 85 of the bars 79. Member 87 at the right hand side of the machine has pivotally connected therewith at 89 (Figs. 2 and 7) one end of a clearing link 90 the other end of which is pivotally connected at 91 with a clearing lever 92 pivoted on the frame at 93 and having an end 94 projecting through a slot at one end of the casing and carrying a finger piece or button 95. It is evident from this construction that, as finger piece 95 is depressed, member 87 is swung so that the bar 86 lowers all of the clearing bars 79 and thereby clears the whole machine.

The means for controlling the item indicating mechanism will now be described referring especially to Fig. 6. The disc 28 which is actuated by and which moves with the sector 20 has its teeth engaging with the end 98 of the release dog 96 carried on the crossrod 61. The dog is normally held in

engagement with the teeth of the disc by a spring 99 connected therewith and with the frame through the front stay plate 100, said plate having guide slots 97, Figures 5 and 6 which retain the dogs 96 in proper relation with respect to the disc 28. The upwardly extending portions 101 of the dogs lie in the path of a yoke bar 102 having down turned ends 103 carried by the rod 61. At the right side of the machine the down turned portion 103 of the yoke has an extended arm 104 (Figs. 2 and 7) which is provided with an outwardly turned finger 105 projecting through an opening 106 in the end frame portion 10 and adapted to be engaged by the cam portion 107 of an arm 108 pivoted on the frame at 93, Figure 7. The arm 108 is provided with a slot or cut-away portion 109 in which is secured a stud 110 carried by the frame. The stud limits the movement of the arm 108 so that it can only move the length of the slot. Carried on the upwardly extending portion 111 of the arm and pivoted at 112 is a bell crank latching or locking lever having forwardly and downwardly extending arms 113 and 114 respectively. The arm 113 carries an operating button 115 and the arm 114 has a hook shaped end 116 which is adapted to be latched under the stud 110 as in Figure 3 when it is desired to have the sectors 20 return to initial position immediately upon release of the same without the usual tripping operation but which is normally in the position shown in Figs. 2 and 7 when it is desired to have the indicating wheels 39 remain in set-up position to give the person using the machine an opportunity to verify any particular set of figures chosen. The lug 117 of the latch arm 114 acts upon the front side of the portion 111 of the arm 108 when the latch is depressed to release the item indicating mechanism by depressing arm 104 to release lever 96. A spring 118 serves to return the yoke 102 and arm 104 to normal position when latch 114 is released. A projecting portion 119 of arm 108 is disposed in the path of the clearing lever 92 and when said lever is depressed, as in Figure 7, the arm 108 is also actuated, thereby clearing the accumulating and item mechanisms simultaneously. The return of the clearing mechanism to normal position is limited through engagement of the pivot pin 89 with the end frame plate 10, the pin operating in a slot 89a of the plate, Fig. 2.

In order to prevent independent operation of the keys 80 and clearing bars 79 to avoid changing the set-up for any given number of totalizing wheels by unauthorized persons attempting to manipulate the machine, lugs 79a are provided on the clearing bars 79 in position to strike the upstanding portion 86a of the transverse bar 86 when the keys have been depressed a predetermined amount. This means is provided for securing the totalizing

mechanism against inadvertent disturbance for the purpose of retaining registration of a partial or final result while use of the machine is temporarily discontinued. The manner of releasing or resetting the totalizing wheels, one independently of another, as when it may be desired to correct an error will now be described.

Release and return of the gears 27 for operating the totalizing wheels through the medium of the pinions 32 must be effected by releasing the latching dogs 46 and 47, which is done by movement of the lugs 83 and 82 on the release bar 79 downwardly far enough to engage and depress the tail portions 50 and 51 respectively of the latches. Movement of the bar 79 downwardly at this time also causes the cam portion 84 thereof to engage the portion 75a of the latch 75 whereby it is moved out of holding position with respect to member 70 at which time spring 69 will rock member 70 to depress lever 66 thus releasing lever 60 and freeing gear 27. The lug 79a is so positioned as not to strike the portion 86a of the bar 86 until the lug 83 on clearing bar 79 engages and releases latch 46 which occurs before lug 82 engages the tail end 51 of latch 47. However lug 79a will engage the portion 86a of the cross bar 86 before the lug 82 is permitted to release latch 47. In order therefore to effect release of the latch 47 the operator will first move the clearing lever 92 downwardly a slight amount or a sufficient distance to swing the upstanding portion 86a out of the path of the lug 79a so that the lug 82 may effect release of the latch 47 and permit the gear 27 to return the totalizing wheels to zero position. This method of operation not being understood by the average person unfamiliar with the machine, affords a safeguard against resetting of the totalizing wheels to zero position by mere depression of the keys 80. Clearance of the entire machine as before stated may be effected by depressing the clearing lever 92 as indicated in Figure 7 whereby the transverse bar 86 is made to depress the vertical bars 79 which in turn release the latching dogs for the gears 27 while the latching dogs 96 for the gears 28 are released when the lever 92 engages and depresses the portion 119 of lever 108 thereby causing the latter to depress arm 104 which moves the yoke 102 to operate and release the latch dogs 96.

In the normal calculating operations of the machine the operator selects the amounts desired and actuates the corresponding sectors in their respective banks, advancing them to proper position. The dogs 96 ratcheting over the teeth of the gears 28 retain the sectors in their advanced position except when it is desired to have them return immediately upon release as explained hereinafter. The indicator wheels are advanced correspondingly and the mechanism remains set until the op-

erator, after verifying the set-up, depresses the button 115 thereby actuating the arm 108 and in turn, the yoke 102 which releases the dogs 96 and allows the sectors and the item indicating mechanism to return to initial position, the amount being retained by the accumulating mechanism. This operation may be repeated as often as desired, the amount in each set-up being accumulated on the totalizer wheels 36. When it is desired to clear the entire machine the button 95 is depressed its full stroke thereby clearing the accumulating and item indicating mechanisms simultaneously as explained above.

The mechanism may also be adjusted so that it is possible to operate the sectors in the same manner as previously described and have them return immediately upon release to initial position. This result is obtained by moving the latch 114 from the position shown in Figure 2 to that shown in Figure 3 which is accomplished by first moving it downwardly and then swinging its lower end forwardly beneath the stud 110. The downward movement of the latch depresses arm 108 which in turn depresses lever 104 thereby moving yoke 102 to lower each of the latch dogs 96 as indicated in Figure 3 whereby the gears 28 are left free to be returned by the springs 31. Of the above described methods of operating item indicating mechanism either may be chosen as preferred.

We claim as our invention:

1. In a calculating machine, a frame, a shaft adapted to be supported thereby and having a grooved hub thereon, a gear disposed centrally upon the shaft within the groove, said gear having an elongated slot extending from its central portion toward its periphery, the inner end of the slot being of a width less than the diameter of the hub and its opposite end being large enough to permit the hub to pass therethrough whereby to facilitate application of the gear to the shaft by inserting it thereon and moving it transversely to said central position within the groove, a rotary indicator adapted to be actuated by the gear, and manually operable means for rotating the gear in one direction.

2. In a calculating machine, a frame, a shaft carried thereby, a gear free to rotate upon the shaft, a manually operable oscillatory member for the gear having a portion adapted to partially surround the shaft and arranged to be applied thereto by a movement transversely thereof and having another portion adapted to engage a tooth of the gear to effect rotation of the latter, a rotary indicator, a driving pinion therefor meshing with the teeth of the gear, and means for moving the gear in a direction opposite to that in which it is moved by manual operation.

3. In a calculating machine, the combi-

nation with an oscillatory operating member, of gear means operatively connected to said oscillatory member to oscillate therewith in both directions, gear means operatively connected to said oscillatory member to move therewith in one direction, a pair of shafts, a gear on one of said shafts meshing with one of said gear means, an indicating device operatively connected to said gear, a second gear on said one of said shafts operatively connected to the other of said gear means, a gear on the second of said shafts meshing with said second gear, and an indicating device operatively connected to said gear on said second shaft.

4. In a calculating machine, the combination with an oscillatory operating member, of gear means fixed to said member to oscillate therewith in both directions, other gear means mounted for rotation concentrically with said member, a pawl operatively connecting said member to said other gear means to move the latter when said member oscillates in one direction, a pair of shafts, two gears mounted on one of said shafts and each meshing with one of said gear means, an indicating device mounted between said two gears and operatively connected to one of them, a gear mounted on the other of said shafts and meshing with the other of said two gears, and an indicating device operatively connected to said gear on said other shaft.

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