July 22, 1947. H. P. LUHN 2,424,322

ENTRY RETAINING DEVICE FOR TOTALIZERS

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FIG. 1.

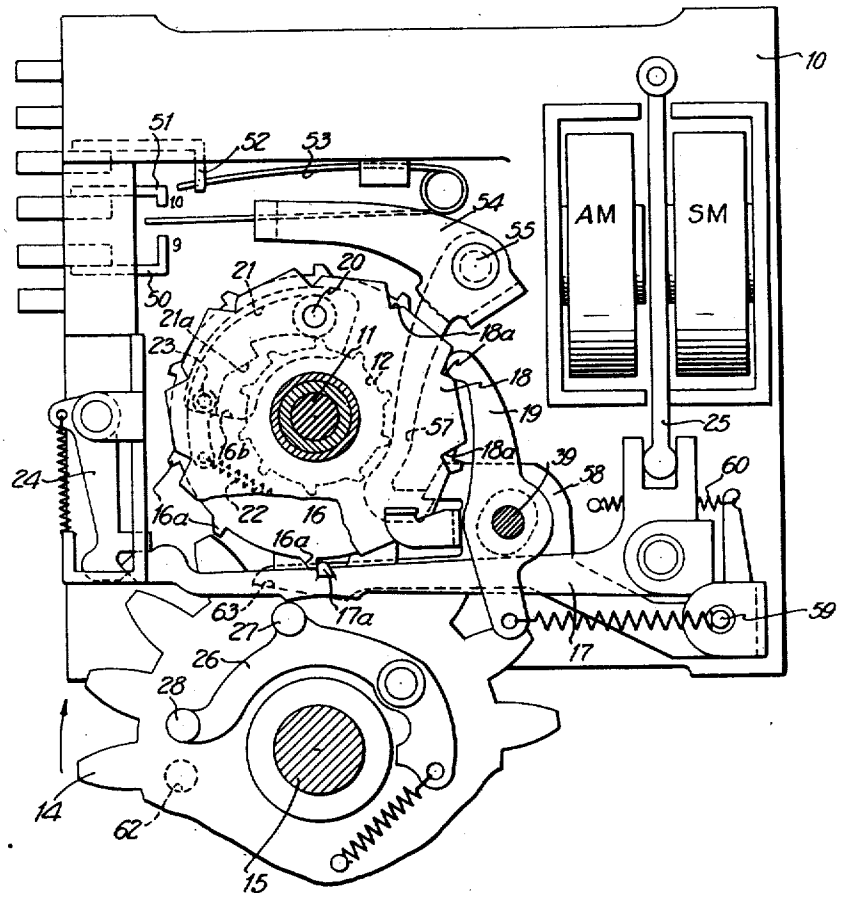
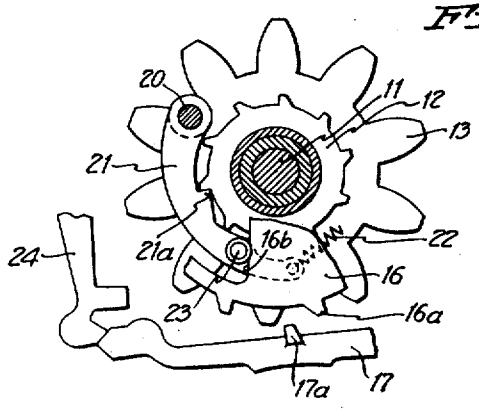


FIG. 2.



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FIG. 3.

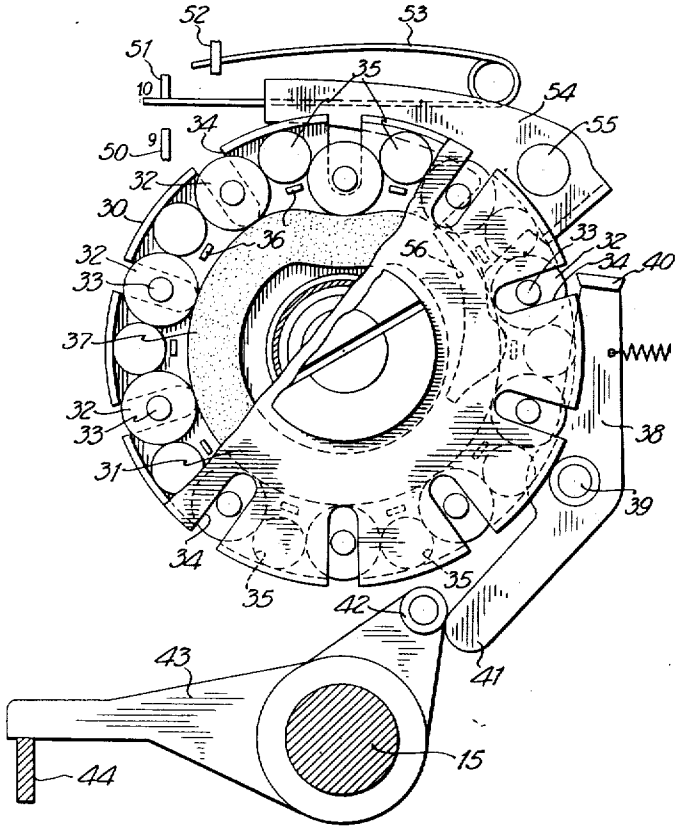
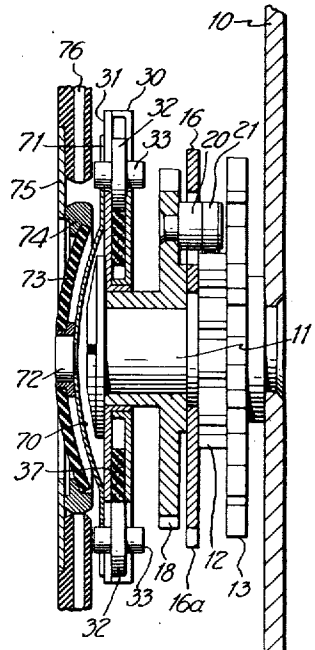


FIG. 4.



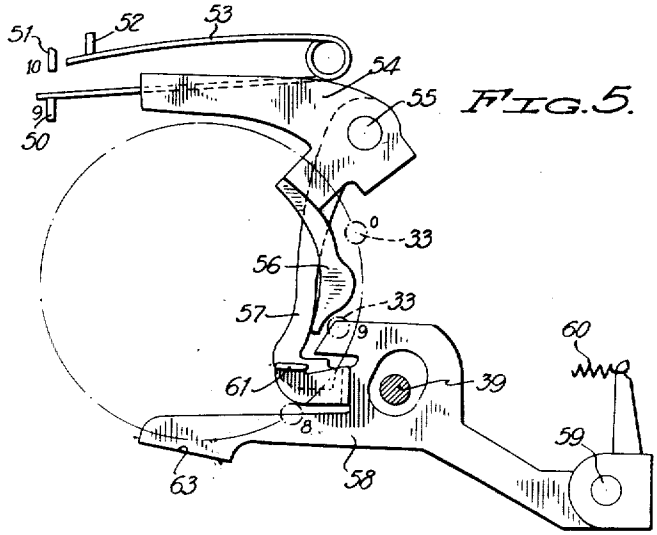


FIG. 5.

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FIG. 6.

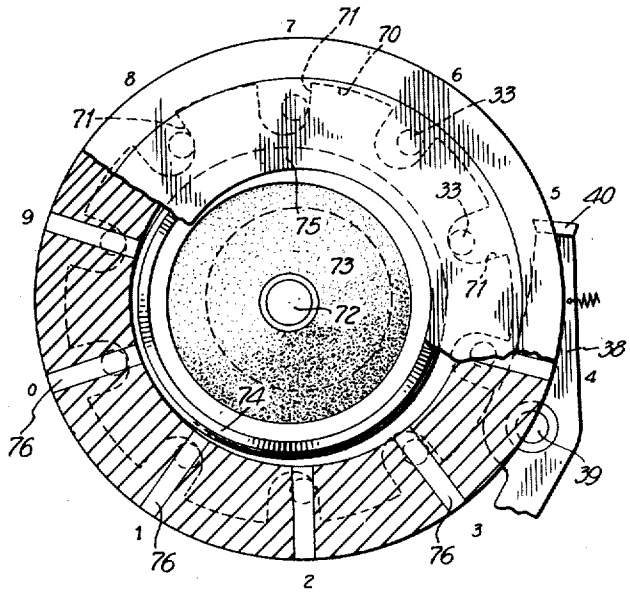


FIG. 7.

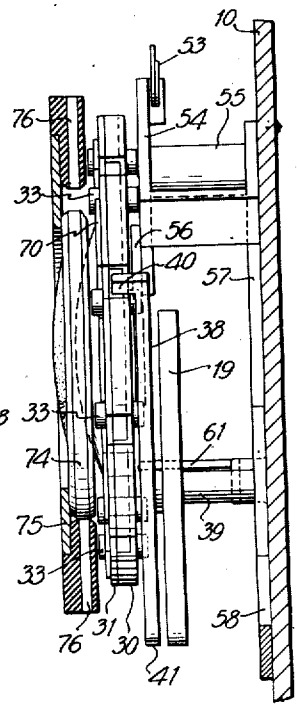
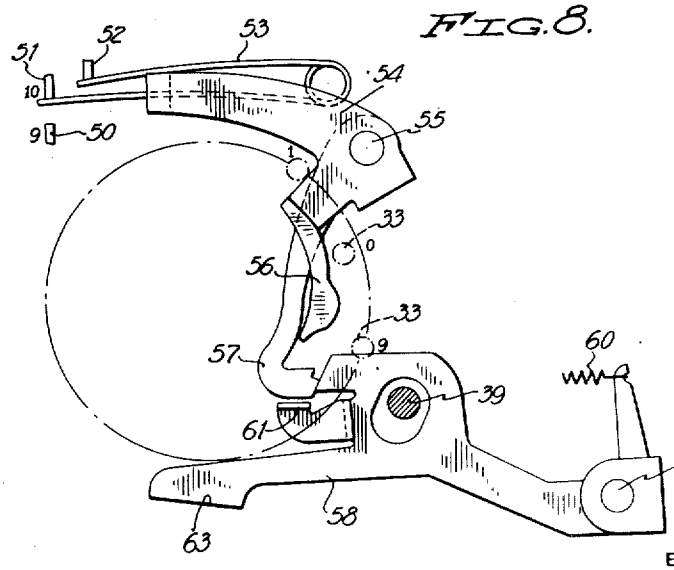


FIG. 8.



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2,424,322

UNITED STATES PATENT OFFICE

2,424,322

ENTRY RETAINING DEVICE FOR TOTALIZERS

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Application June 25, 1945, Serial No. 601,421

6 Claims. (Cl. 235—61.6)

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This invention is concerned with improving the structure and operation of an accumulating mechanism of the type disclosed in Patent 2,150,227. Briefly, the accumulating mechanism of this patent is as follows. The accumulators receive values derived from record cards. Each accumulator order is mounted on an individual plate and comprises a register device and a drive device with clutching means between them. The clutching means is controlled by a clutch lever provided on one arm, with an armature disposed between so-called "advance" and "stop" magnets. To enter a true number, the advance magnet is energized at a differential time of the cycle selected by a representation of the number on a record card. Energization of the advance magnet moves the armature and lever in a direction to cause clutching of the register device to the drive device.

After being driven a differential amount equivalent to the number, a mechanical knock-off in the drive gearing restores the clutching lever to declutching position, causing the register device to stop. In order to reset the register device to zero, the advance magnet is energized to initiate rotation of the register or adding wheel and, when this reaches zero position, it closes a circuit through the stop magnet to disengage the drive and leave the adding wheel at zero or home position. This resetting operation generally requires what is called a cycle of operation.

It is the principal object of the present invention to provide an adding or register wheel for an accumulator wherein the setting on the adding wheel may be zeroized without the necessity of turning the wheel through a cycle of operations or any part of a cycle. For this purpose the adding wheel is provided with a series of ten interposer disks arranged in a circle, each disk radially slidable to an outer position, where it is in the circle or to an inner position where it is out of the circle. The spacing of the disks is such that one of them is always out of the circle. A resetting lever is provided to shift the disks from their outer to inner position. This shifting takes place at a fixed point. Any advance of the adding wheel after such resetting will position the shifted disk in accordance with the digital value in the adding wheel, and the amount entered is determined or measured by the extent that the shifted disk is advanced from the setting position. To reset the setting, it is only necessary to now shift whatever disk is standing at the resetting position, and such shifting of the new disk will automatically cause

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return of the previously shifted disk to its outer position and in such condition the adding wheel represents a zero setting.

A further object of the invention is to provide improved and novel readout devices wherein digital readout connections may be shifted from a significant digit setting to a zero setting without requiring a cycle of operations of the adding wheel.

A further object is to provide improved devices for operating tens carry control devices.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a side view of the accumulator plate unit showing the drive gear for the adding clutch mechanism.

Fig. 2 is a detail showing a manner of operation of the adding clutch device with the parts in the clutched condition.

Fig. 3 is a view showing the adding wheel and the resetting mechanism therefor with the readout device omitted to show the structure beneath.

Fig. 4 is a vertical sectional elevation through the adding wheel with the readout device included at the left of the view.

Fig. 5 is a detail of the tens carry control mechanism.

Fig. 6 is a detail of the readout device.

Fig. 7 is a side elevation of the adding mechanism.

Fig. 8 is a further view of the tens carry control levers.

The accumulator plate unit comprises a mounting plate 10 which has fixed to it a post 11 carrying a drive device comprising rigidly united ratchet 12 and gear 13. Gear 13 is continuously driven by a gear 14 fixed on the shaft 15 which makes one revolution a cycle and has sixteen teeth, while gear 13 has ten teeth. Rotatably carried by a hub of ratchet 12 is a disk 16 having ten teeth 16a adapted to be engaged by a tooth 17a of the long arm of the clutch lever 17 to hold the disk against rotation in a counterclockwise direction as viewed in Fig. 1. At the side of disk 16 is a register or adding wheel 18 rotatable on post 11 and provided with ten peripheral notches 18a. Wheel 18 may take any of ten rotative positions, and in any of these positions a spring pressed lever 19 engages with a notch 18a of the wheel to hold it impositively

and to center it in the position to which it has been rotated.

Pivoted on wheel 18 by a stud 20 is a clutch dog 21 whose single tooth 21a is biased toward driving ratchet 12 by a spring 22 (Fig. 2). In the position shown in Fig. 1 the clutch lever 17 is in declutching position. Its tooth 17a is restraining rotation of disk 16 counterclockwise and clutch dog 21 is clear of ratchet 12. The clutch dog is being held clear of ratchet 12 by coaction of a pin 23 on the dog with the outer portion of a cam edge 16b of disk 16. When the clutch lever 17 is dropped to cause its tooth 17a to release the disk 16 for counterclockwise movement, the spring 22 is effective to rock the clutch dog 21 into engagement with ratchet 12. During this movement of the clutch dog, its pin 23 rides down the cam edge 16b of disk 16 and cams the disk counterclockwise until its tooth 16a previously engaged by tooth 17a is to the right of the latter tooth. The parts are then in clutching position shown in Fig. 2, and the adding wheel is coupled to the drive device 12, 13 for rotation.

Through engagement of the pin 23 of the clutch dog with cam edge 16b, disk 16 is forced to rotate counterclockwise together with the adding wheel. When the clutch lever 17 is returned to upper, declutching position, its tooth 17a intercepts a tooth 16a of disk 16 and stops the disk. The adding wheel and clutch dog continue rotating while cam edge 16b of disk 16 cams the pin 23 of the clutch dog outwardly until it is again in its outer position. As the pin 23 is cammed outwardly, clutch dog 21 moves clear of the ratchet 12 and declutches the adding wheel from the driving means. The wheel is then held and centered in its new position by lever 19. The clutch lever 17 is held in either clutching or declutching position by a spring pressed detenting latch 24. The clutch lever 17 has a short arm swiveled to the lower end of an armature 25, which is disposed between advance magnet AM and a stop magnet SM mounted on plate 10. Energization of magnet AM rocks armature 25 clockwise to lower the lever 17 and energization of magnet SM rocks armature 25 counterclockwise to raise lever 17.

A mechanical knock-off for moving the clutch lever 17 from lower to upper, declutching position comprises a lever 26 pivoted to the side of cyclically and continuously rotating gear 14. Lever 26 is provided with a pair of spaced knock-off pins 27, 28 adapted during clockwise rotation of gear 14 to ride in succession under an edge of lever 17. Assuming the clutch lever to be in lower position when either pin 27 or 28 engages the lower edge of the lever, it cams the lever upwardly to reseat its wedge-shaped tip in the notch of latch 24 as shown in Fig. 1. The knock-off pin 27 is effective at a fixed point of the cycle to cause the adding wheel to be arrested after entry of a true or natural value. The knock-off pin 28 serves at the end of a cyclical carry to cause the lever 17 to be reset after a carry entry.

The foregoing briefly describes the operation of the entering mechanism of the well-known form of accumulator. The manner in which the improvements of the present invention are applied thereto will now be set forth.

Referring to Figs. 3 and 4, the adding wheel 18 has secured thereto a wheel 30 which will accordingly advance integrally with adding wheel 18 when the latter is driven through the clutch devices described. This wheel 30 is disk-shaped and provided with a cover plate 31 to form an enclosed circular area, in which there is disposed ten disks or interposers 32 each with oppositely extending stems 33 riding in radial slots 34 of the wheel 30 and its cover plate 31, so that each disk is radially movable toward or away from the center of the wheel. These slots are wider than the diameter of stems 33 to permit slight circumferential movement of the disks. Between the disks 32 are rollers 35 retained by the outer upturned edge of the wheel 30 and projections 36. The spacing of the diameters of the disks 32 and rollers 35 is such that one of the disks 32 is always in an inner or "squeezed out" position as shown in Fig. 3. A ring 37 of resilient material, preferably rubber, is positioned within enclosed area of wheel 30 with its outer periphery abutting all of the disks 32 and exerting pressure against all of them.

With the parts in the position shown in Fig. 3, if one of the rollers in outer position is now forcibly urged toward the center of the wheel, it will move away from the adjoining rollers 35 and press against ring 37 at that point. At the same time, the tension in ring 37 against the disk 32, which is already in the center position, will force this disk to its outer position, thereby engaging and shifting the disks and rollers to the left and right thereof to displace them circumferentially and to take up the space provided by movement of the new disk 32 to the center position, which latter disk will now be held in the inner position while all other disks are held in the outer position. For descriptive purposes, it may be said that a disk 32, when in its inner position is "set" and when in its outer position is "unset" or "non-set," and that setting of any disk 32 will cause return of any previously set disk to its non-set position.

In Fig. 3 a lever 38 pivoted at 39 has a lateral extension 40 located as shown in what may be termed a resetting or zero setting position. Arm 41 of lever 38 lies in the path of a pin 42 in a lever 43 loose on shaft 15. A bail 44 extending beneath lever 43, when raised, will rock the lever clockwise and pin 42 will thereupon rock lever 38 in the opposite direction to force extension 40 against the roller 32 in line therewith, so that this roller is shifted to its set position, and as a result, any other previously set disk will be shifted back to its non-set position. The bail 44 is operated whenever it is desired to reset the device and, as stated, such resetting consists in effecting a setting of the disk 32 standing opposite extension 40 at the time.

If now the advance magnet AM is energized, clutching will be effected and wheel 30 will advance until declutching is mechanically effected or until stop magnet SM is energized. In Fig. 3 the wheel 30 is shown as having been advanced counterclockwise two steps from the resetting position and accordingly represents an entry of 2 in the adding wheel. Briefly, an entry in the digital adding wheel is represented by the extent a set disk 32 is advanced from the reset or zero position and resetting is effected by moving the disk standing in the reset position to its set position, which is accomplished by the positioning of all other disks in their non-set positions.

When an adding wheel moves from 9 to or past zero during a cycle, a carry must be effected to the next higher order. If the latter order is in the 9 position at the carry time, a further carry must take place to the second higher order. The latter carry is known as the long carry while the other carry is known as the short carry. The long carry is controlled by "9" carry contact 50 and the short carry by a "10" carry contact 51 (Figs. 1 and 3). Above contact 51 is a common

carry contact 52. These carry contacts are embedded in the usual insulating molding fastened to plate 10 and the circuits controlled thereby are well known, so that they need not be explained herein. A hair-pin type of contact spring 53 is positioned to have one end constantly engaging contact 52, while the lower leg is movable between contacts 50 and 51. The lower leg bears upon and is insulated from a lever 54. This lever is pivoted to plate 10 at 55 and integral therewith is an arm 56 offset so as to lie in the plane of rotation of stems 33 of the disks 32. A second arm 57 integral with lever 54 lies in the plane of lever 58 pivoted at 59 and biased counterclockwise by a spring 60. Levers 57, 58 are normally in latching engagement as shown in Fig. 1, in which position the lower leg of contact spring 53 is in mid-position between contacts 50 and 51. Lever 58 has integral therewith a lateral extension 61 which, as seen in Fig. 7, extends into the plane of movement of the stems 33. This extension is so located that as the set disk 32 moves from the 8 to the 9 position, the related stem 33 will engage extension 61 and rock lever 58 clockwise as stem 33 first lifts and then passes under extension 61. Rocking of lever 58 will disengage it from lever 57, so that the latter under the tension of spring 53 is rocked counterclockwise to the position shown in Fig. 5, wherein the lower leg of spring 53 engages the "9" contact 50, where it will remain if the set disk does not advance beyond the 9 position. When a set disk advances from the 9 to the zero position, the stem 33 thereof will engage lever 56 and rock it to its extreme clockwise position, wherein the lower leg of spring 53 engages the 10 contact 51. When levers 56 and 57 are so rocked, lever 58 will rock counterclockwise to latch the levers in the 10 position, as shown in Fig. 8. After the period in the cycle that carry operations take place under control of circuits through the carry contacts, a pin 62 in gear 14 (Fig. 1) will strike the inclined surface 63 of lever 58 to rock the latter back to the position of Fig. 1 and lever 57 will accordingly rock back to its mid-position as shown.

Briefly, then from the normal mid-position lever 57 is rocked counterclockwise to take a 9 setting whenever a set disk moves from the 8 to the 9 position, and the lever 57 is rocked clockwise to its 10 position whenever such disk moves from the 9 to the zero position, and such 10 setting remains latched until released by pin 62 at the appropriate time in the cycle of the machine.

Referring to Figs. 4 and 6, the cover plate 31 of the disk supporting wheel has slidable thereon a dished plate 70 with notches 71 straddling the ten stems 33. The center of plate 70 has a post 72 on which is mounted a rubber disk 73 whose outer edge supports a metallic ring 74. The tension of disk 73 urges ring 74 into contact with a metallic contact ring 75 which is stationary. Spaced about ring 74 are ten contact segments 76 suitably held in an insulating molding. These contact segments have a digital value as indicated. Whenever a disk 32 is given a setting at the zero position, as explained, its stem 33 will act upon the bottom of the related notch 71 in plate 70 and slide the plate into a position as indicated in Fig. 6, where it is eccentric to the wheel 30 with the centers of the plate and wheel being offset on a diameter extending through the stem 33 of the set disk. This will bring the ring 74 into contact with the zero segment 76 and will furnish an electrical connection from the common ring 75 through the ring 74 of this zero segment 76. This offset or eccentric relationship will be maintained as the adding wheel is subsequently advanced, and as such advance occurs ring 74 will roll on the circle connecting the ends of segments 76, so that contact will be made in succession with the 1, 2, 3, etc., segments 76. Thus, if the wheel is advanced four steps, ring 74 will contact the 4 segment 76 and establish electrical connection between this segment and the common ring 75.

As is well known, the circuits through these segments are completed during so-called total taking operations while the adding wheels are at rest. The particular circuit connection is not part of the present invention and not specifically shown herein. Upon resetting or zeroizing of the adding wheel, as explained, that is, when lever 38 is rocked to shift the disk 32 standing in the zero position, the related stem 33 will engage plate 70 and effect shifting thereof so that it moves from whatever segment 76 it may be in contact with to the zero segment 76. Such movement is brought about by contact of stem 33 with the curved edges of the related notch 71, which edges serve as cam surfaces to rock the plate 70 to its new position.

There is thus provided an adding wheel wherein resetting is effected without incurring any rotary or other movement of the adding wheel, and it is not necessary to go through a cycle of machine operation to reset, as is required in prior machines. The accompanying setting of the readout device also takes place in the short period required to shift a disk 32, and it will be noted that the readout positioning plate 70 will rock the shortest distance from whatever position it may occupy to the reset or zero contacting position.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention therefore to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In an order of an accumulator, a wheel having ten disks thereon arranged in a circle, each disk being slidable radially between an inner and outer position, resilient means biasing all wheels toward their outer positions, interlocking devices between the disks whereby, when any disk is in its inner position, all other disks are held in their outer positions, said interlocking devices being effective, when any disk is moved from its outer to inner position, to enable said resilient means to shift all other disks to their outer positions and retain them there, a reset member positioned at a fixed point adjacent the periphery of the wheel and operable to shift the disk at said point to its inner position, means for advancing the wheel from said shifting position to rotative positions representative of the digits, said rotative positions being determined by the degree of advance of the shifted disk from said shifting position, a tens carry control device, and means controlled by the shifted disk for operating said carry control device in accordance with carry requirements.

2. In an order of an accumulator, a wheel having ten disks thereon arranged in a circle, each

disk being slidable radially between an inner and outer position, resilient means biasing all wheels toward their outer positions, interlocking devices between the disks whereby, when any disk is in its inner position, all other disks are held in their outer positions, said interlocking devices being effective, when any disk is moved from its outer to inner position, to enable said resilient means to shift all other disks to their outer positions and retain them there, a reset member positioned at a fixed point adjacent the periphery of the wheel and operable to shift the disk at said point to its inner position, means for advancing the wheel from said shifting position to rotative positions representative of the digits, said rotative positions being determined by the degree of advance of the shifted disk from said shifting position, a tens carry control device having a normal, a carry and a carry-on-carry position, means controlled by the shifted disk when the wheel advances from a rotative position representing 8 to a rotative position representing 9 for shifting said carry control device to its carry-on-carry position, and means controlled by the shifted disk when the wheel advances from a rotative position representing 9 to its initial shifting position for shifting said carry control device to its carry position.

3. In an order of an accumulator having an adding wheel and means for rotating said wheel through different angles to enter digital values therein, in combination with a plurality of interposers spaced in a ring on said wheel and rotatable therewith, each interposer being movable between a set and a non-set position, resilient means biasing all interposers toward their non-set positions, a setting device located at a predetermined point adjacent the periphery of the wheel and operative to set the interposer at said point to establish a zero condition for the wheel, interlocking devices between the interposers whereby setting of one interposer will enable the resilient means to shift all others to their non-set position and retain them there, advance of the wheel from said zero position causing advance of the set interposer an angle measured from the setting position and corresponding to the digital value entered, and subsequent operation of said setting device establishing a new zero condition for the wheel by setting the interposer adjacent thereto and enabling the resilient means to shift the previously set and advanced interposer to its non-set position.

4. In an order of an accumulator having an adding wheel and means for rotating said wheel through different angles to enter digital values therein, in combination with a plurality of interposer elements spaced on said wheel, there being one for each of the digits, each shiftable between a set and a non-set position, means for impositively urging all interposers into unset position, said interposers being interlocked so that one of them is in its set position and prevented

from moving to its unset position, a reset condition of the wheel being constituted by the setting of an interposer standing in a predetermined position with respect to an axis of the wheel and a non-setting of the remaining interposers, advance of the wheel bringing any of said interposers to said predetermined position with respect to an axis of the wheel, a resetting device located at said position and operable to set the interposer thereat, said impositive urging means being thereupon effective to unset the others to establish a reset condition on the wheel, subsequent digital advance of the wheel being measured by the advance of the set interposer from the said position.

5. An adding wheel for an accumulator comprising a ring of ten elements each having a set and a non-set position, and interlocked so that only one element may be in set position at any one time, resilient means for holding all other elements in an unset position and urging the set element toward unset position, a member for effecting a setting of the element in a predetermined position with respect to the axis of the wheel to establish a reset condition thereof, the setting of such element enabling the resilient means to move the previously set element to unset position, means for rotating the wheel to enter digital values therein, the extent of movement being measurable by the advance of the set element from said predetermined position, subsequent operation of said member establishing a new reset condition of the wheel by setting whichever element occupies said predetermined position.

6. A readout device for an order of an accumulator comprising a set of circumferentially spaced contact segments, one for each of the digits, an adding wheel concentric therewith, a contact ring eccentrically positionable on said wheel and rotatable therewith to tangentially contact said ring of segments, whereby as the adding wheel rotates said contact ring will successively engage the segments, means for engaging the ring at a fixed point with respect to the axis of the wheel to shift the ring across the face of the wheel, and guide means effective upon said shifting to guide the movement of the ring so that its center lies in a common line through the center of the wheel and said fixed point and contacts the ring of segments at a point on said common line.

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