Sept. 22, 1936. L. E. LENTZ 2,055,381

ZERO-SETTING MECHANISM

Filed May 26, 1933 2 Sheets-Sheet 1

Fig. 1.

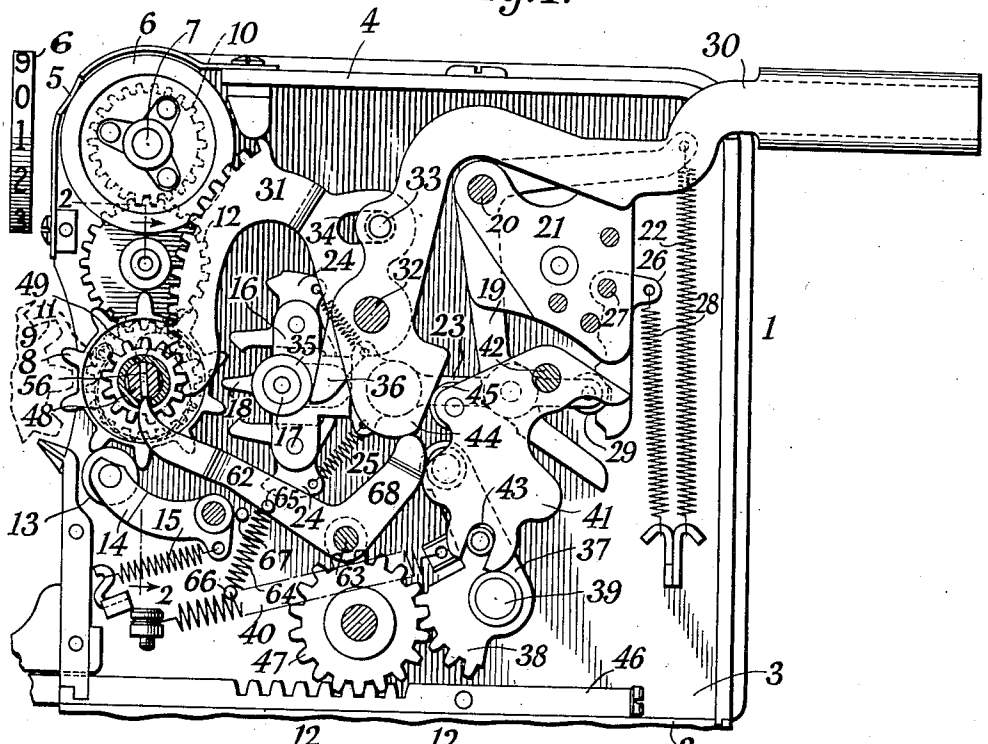


Fig. 2.

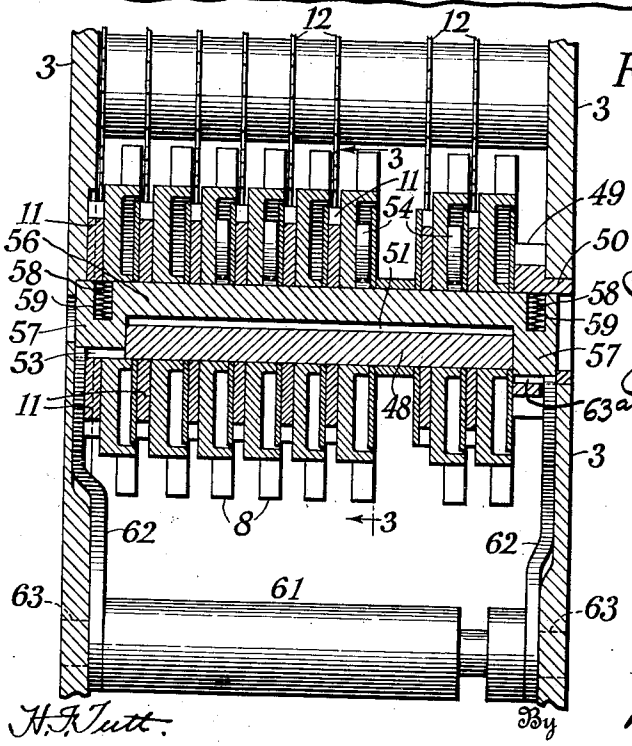
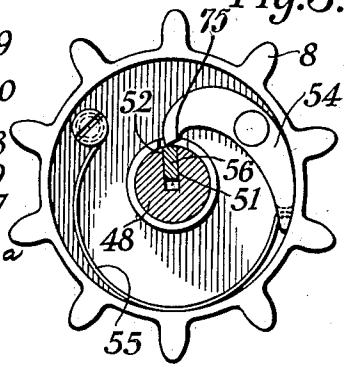


Fig. 3.



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ZERO-SETTING MECHANISM

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Fig. 4.

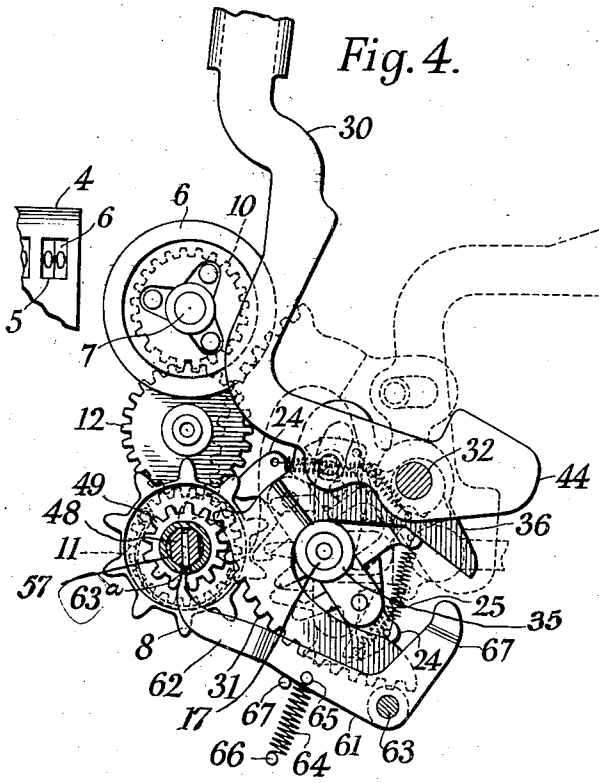


Fig. 5.

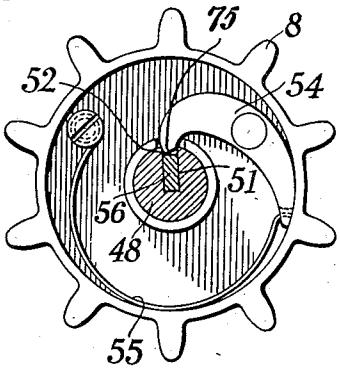


Fig. 7.

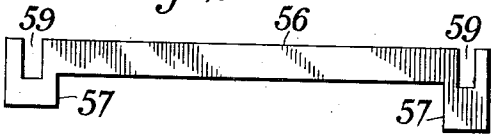


Fig. 8.

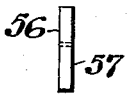


Fig. 6.

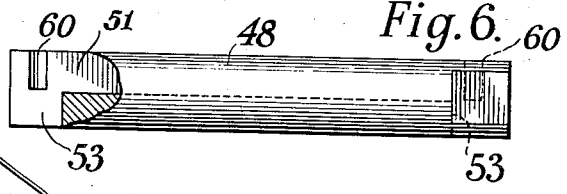
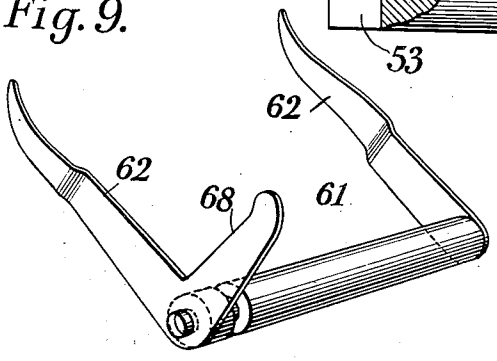


Fig. 9.



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UNITED STATES PATENT OFFICE

2,055,381

ZERO-SETTING MECHANISM

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Application May 26, 1933, Serial No. 672,961

19 Claims. (Cl. 235—144)

My invention relates to calculating mechanism, and more particularly to improvements in zero setting mechanism for registers.

The main object of my invention is to provide an efficient zero setting mechanism of relatively few parts and inexpensive construction adapted for incorporation in a register of the denominational, reversible wheel type.

Specifically, my invention seeks to provide simple and practical clutch devices on the denominational wheels of such a register, and on the shaft of said wheels, respectively, together with clutch control and shaft-rotating mechanism operative under control of a manual zero setting lever, and by a sequence of quick operations, to first clutch the wheels to the shaft, and subsequently to rotate the shaft to effect a zero setting operation after rotation of the wheels in either direction.

Other and subordinate objects will appear when the following description and claims are read in the light of the accompanying drawings.

In the drawings:

Figure 1 is a view in side elevation, parts showing in section, of a register equipped with a preferred embodiment of my invention, one side plate of the register being removed to disclose the mechanism, the parts being shown in normal position.

Fig. 2 is a vertical section taken on the line 2—2 of Fig. 1 and drawn to an enlarged scale.

Fig. 3 is a detail view taken substantially on the line 3—3 of Fig. 2, illustrating one of a series of denominational wheels of the register, a shaft upon which the series of wheels are mounted, together with cooperating clutch devices on the wheels and shaft, and a clutch control blade member in the shaft, the parts being shown in normal clutch disengaging position.

Fig. 4 is a detail view in side elevation, with parts showing in section, illustrating, in dotted lines, an initial stage in the zero setting operation and, in full lines, a final stage of the said operation.

Fig. 5 is a view similar to Fig. 3, with the parts shown in clutch engaging position.

Fig. 6 is a side elevation, partly in section, of the aforesaid shaft.

Fig. 7 is a side elevation of the blade member.

Fig. 8 is an end view of said member, and

Fig. 9 is a perspective view of a rocking element forming part of the clutch control mechanism.

The register shown in the drawings as embodying my invention, is what is known as a column register for use with the well-known Elliott-Fisher writing-computing machine of commerce, but it is to be understood that the invention is not restricted to use with this type of register alone, as will presently appear.

The register parts are enclosed in a casing 1 (Fig. 1) formed by a base 2, side walls 3, and a cover plate 4, provided in the upper front portion thereof with the usual sight opening 5. Adjacent the sight opening 5 is a series of denominational value-indicating wheels 6, bearing the usual symbols, "0" to "9", and freely rotatable on a shaft 7. Subjacent the wheels 6 is a series of denominational, toothed number wheels 8, designed to be selectively operated, clockwise for adding and counter-clockwise for subtracting, by the master wheel 9 of the Elliott-Fisher machine, in a manner well-known and requiring no explanation. Value-indicating and number wheels, 6 and 8, of corresponding denomination are geared together by means of gears 10 and 11 (see also Fig. 4) fast on said wheels, 6 and 8, respectively, and an intermediate idler gear 12. A centering and overthrow preventing roll 13 (Fig. 1) mounted upon an arm 14, tensioned by a spring 15, is provided for each number wheel 8.

The register is equipped with transfer mechanism of the type featured in U. S. Patent No. 1,576,961, issued to Harry A. Foothorap, March 16, 1926, and includes a series of transfer heads, one of which is shown at 16, cooperating with the number wheels 8 and mounted on a shaft 17 to rock in opposite directions, respectively, from a central normal position. Each transfer head 16 is provided with a trip finger 18 engaged by a transfer tooth, not shown, on a related number wheel 8, whereby said heads are tripped from central position in one direction or the other, as the case may be, when the value-indicating wheels 6 are rotated from "9" to "0" registering position or vice versa. Associated with each head 16 is actuating mechanism, including an actuator lever 19 pivoted at 20 to a stationary mounting 21, a suitably connected motor spring 22 urging said lever 19 toward the axis of its head 16, and a link 23 connecting each head 16 and its actuator lever 19 to form therewith, in the normal position of the head 16, a toggle lock resisting the urge of the motor spring 22. Combined transfer pawls and check dogs 24, tensioned by suitably connected springs 25, are provided at opposite sides of the axis of the heads 16 to engage the number wheel of next higher order and execute a transferring operation thereon, as will be clear. A detent 26, pivoted as at 27, and tensioned by a

spring 28 engages a roller 29 on each link 23 to yieldingly hold said link and the associated head 16 in normal central position.

A zero setting, or clearing lever 30, and a toothed zero setting segment 31 are mounted on a fixed pivot 32 and operatively connected, as by the pin 33 and slot 34, to effect delayed oscillation, vertically, of the segment 31 by forward and reverse movement of said lever 30. A collar 35 on the shaft 17 limits downward and upward movement of the segment 31 by contact with the inner edge of the segment and with a stop arm 36 on the latter, respectively.

A transfer restoring bail 37, including a toothed sector 38, is pivoted on a fixed shaft 39 for movement against the action of a suitably arranged spring 40, to engage the levers 19 and restore the transfer mechanism to normal position. A rocking bail actuator 41 is pivoted at 42 and operatively connected at 43 to said bail 37. A cam 44 on the zero setting lever 30 engages a roller 45 on said actuator 41 to effect a transfer restoring operation upon movement in either direction, of the lever 30, and prior to movement of the zero setting segment 31. A toothed restoring slide 46 is geared to the toothed sector 38 by a pinion 47, and projects through the front wall of the casing 1 for operation by the carriage of the Elliott-Fisher machine in a manner well-understood in the art.

The above-described cooperative arrangement of a zero setting lever, zero setting segment and transfer restoring mechanism is featured in the co-pending application of Harry A. Foothorap, Serial No. 505,905, filed December 31, 1930, and no claim is made thereto herein, except insofar as the zero setting lever and segment enter into combination with other elements as hereinafter defined.

Coming now to the specific features of my invention, a zero setting shaft 48, (Figs. 1, 2 and 4) for the number wheels 8, is journaled at one end in one side wall 3 of the casing 1, the other end having fast thereon a toothed pinion 49 meshing with the zero-setting segment 31 and provided with a hub 50 journaled in the other side wall 3 of said casing. Clutch mechanism is provided between the shaft 48 and number wheels 8, respectively, the clutch device on the shaft taking the form of a longitudinally extending substantially radial slot 51 in said shaft, providing a clutch shoulder 52, (Figs. 3 and 5) and terminating at the ends of the shaft in deep kerfs 53 extending diametrically through the shaft (Figs. 2 and 6), for a purpose presently seen. The clutch device on each of the totalizer wheels 8, includes a clutch dog 54 pivoted intermediate its ends to the web of its wheel and is backed by spring 55, the springs tending to urge the toothed ends of said dogs into the slot 51, and against said shoulder 52, and a clutch control blade member 56 accommodated in and bodily movable radially of said slot in opposite directions to open and close the latter, respectively, and thereby enable engagement and effect disengagement of the clutch devices. Blade member 56 is provided with laterally extending guides 57 seated in the kerfs 53 to limit endwise movement of the blade and to guide the blade in its radial movement, as well as to prevent cocking or skewing of the blade during such movement. Springs 58 (Fig. 2) are arranged in co-acting, registering pockets 59 and 60 formed in the blade member 56 and the shaft 48, respectively, to normally urge said member in one direction, i. e., radially inwardly of the shaft 48 to free the slot 51 and thus enable engagement of the clutch devices.

A rocking blade controlling element 61, (Figs. 9, 1, 2 and 4) including a pair of spaced apart levers 62, is pivoted at 63 to engage said levers with the lateral guides 57 of the blade member 56 to move the latter in the opposite direction, i. e., outwardly of the shaft 48 and thereby close the slot 51 and effect disengagement of the clutch devices. To permit proper engagement of one lever 62 with its related guide 57, the hub of the gear 49 is slotted as at 63 (Fig. 4). A spring 64 having its opposite ends connected to the element 61 at 65 and to a fixed stud 66, urges said element toward an ineffective position against a stop 67. Radial movement outwardly of the clutch control blade member 56 to cause the member to disengage the toothed ends of the dogs 54 from engagement with the side wall 52 of the slot 51, and to close the slot 51, is effected by operation of the zero setting lever 30, the cam 44 of which is adapted to operate upon an extension 68 on the element 61, as follows:

In the normal position of the parts, that is to say, the zero registering position of the wheels 6, as shown in Figs. 1 and 2, the shaft 48 is so located relatively to the number wheels 8 that the slot 51 is in position to enable the toothed ends of the dogs 54 to enter the same. The cam 44, however, mantains the blade-controlling element 61 in its effective position in which the levers 62 engage the ends of the lateral guides 57 of the blade member 56 to project the latter outwardly against the tension of its springs 58 so that the outer rounded edge of the blade 56 constitutes a continuation of the periphery of the shaft 48, in the before-described clutch-disengaging position, and the wheels 8 are free to rotate in either direction on said shaft. In this position of the parts, the free ends of the levers 62 one of which passes through the slot 63a in the hub of the gear 49, engage the walls of the kerfs 53 in the ends of the shaft to lock the shaft 48 in normal position. Upon initial forward movement of the zero setting lever 30, and prior to operation of the zero setting segment 31, as shown in dotted lines in Fig. 4, the cam 44 disengages the extension 68 and frees the blade-controlling element 61 for movement to ineffective position by its spring 65, whereupon the blade member 56 is bottomed in the slot 51 of the shaft 56 by its springs 58 to enable the before-described clutching action (Fig. 4). Continued advance of the zero setting lever 30 next operates the segment 31 downwardly to impart a complete rotation to the shaft 48 and set any wheel 6, registering other than zero, back to zero registering position, as shown in full lines in Fig. 4. Retraction of the zero setting lever 30 rotates the shaft 48 reversely and idly as will be clear and at the end of this operation, the cam 44 returns the blade-controlling element 61 to effective position to move the blade member 56 to cutch-disengaging position (Fig. 3) and to lock the shaft 48 against rotation.

The lateral guides 57 at the opposite ends of the clutch control blade 56 vary in length, for mechanical reasons, the right hand guide (Fig. 7) being longer than the left hand guide, and it may be of slightly less breadth, as shown.

As a result, the arms 62 of the blade-controlling elements 61 are not in direct horizontal alignment, the left hand arm 62 (Fig. 2), which is the right hand arm in Fig. 9, being positioned

slightly clockwise or spirally of the pivot 63 relatively to the remaining arm.

The operation of the invention may be understood from the foregoing in connection with the following disclosure.

It must be borne in mind that this invention has been particularly designed for use with an adding and subtracting totalizer, wherein the totalizer wheels 8 rotate in one direction or the other depending upon whether the amount is added to or subtracted from the amount already on the totalizer, though not restricted in its use thereto.

Therefore, the wheels may turn past the zero point in either direction depending upon whether the amount registered on the totalizer is positive or negative in character.

Since the arms 62 normally lock the totalizer shaft 8 in a predetermined position, where it is held throughout a calculation, the slot 51 must be normally closed to prevent the entry of the toothed ends of the dogs 54 as the wheels 8 pass to either side of zero.

For this reason means is provided in the form of the arms 62 and cam 44 which not only locks the shaft 48 against rotation, but more important still, locks the clutch-control member or blade 56 in its outermost position so that its rounded outer edge completes the peripheral surface of the shaft 48 and masks the shoulder 52 to eliminate any contact of the dogs 54 therewith.

The outer edge of the clutch-control blade 56 at its ends, strikes against the left hand side frame 3 (Fig. 2) and against the inner periphery of the hub 50 of the pinion 49 to arrest the blade with its outer edge in proper position.

The operating segment 31 is in constant mesh with the pinion 49 of the totalizer supporting and clearing shaft 48, the relation being such that when the operating segment is in its normal position at one end of its travel, (the upper end, in the embodiment shown in Fig. 1), the open side of the slot 51 is uppermost, and when the dogs 54 are then alined with the slot, the zeros on the wheels 8 are at the sight opening 5.

Addition and subtraction of amounts on the totalizer turns the wheels 8 on the shaft 48 so that the toothed ends of the dogs may lie at any of ten positions circumferentially of the shaft.

In resetting the wheels to zero, the operator swings the actuator or handle 30 from the position shown in Fig. 1 to that shown in full lines in Fig. 2.

The first step of travel of the actuator 30 in counter-clockwise direction to the dotted line position shown in Fig. 4, has no effect upon the actuator segment 31, due to the lost motion connection 33, 34, but does shift the cam 44 on the operator lever 30 to withdraw the high point of the cam from contact with the finger 68 of the blade-controlling bail 61, 62, to free the latter to the action of its spring 64.

The spring thereupon rocks the bail 61, 62, counter-clockwise, withdrawing the free ends of the supporting arms 62 from the lower ends of the lateral extensions 57 on the clutch-control blade 56, whereupon the springs 58 force the blade radially inwardly until it seats on the bottom of the slot 51 in the shaft 48.

The springs 58 assist the spring 64 in rocking the supporting arms downwardly, and cause the masking or clutch-control blade to follow until arrested by its seat in the bottom of the slot 51, thus avoiding loss of time in withdrawing the filler from the open side of the slot, and in unmasking the shoulder 52 of the shaft 48.

Immediately thereafter, the stud 33 on the operating lever 30 contacts the left hand end of the slot 34 (Fig. 1) and rocks the actuator segment 31 counter-clockwise, the segment, of course, turning the clearing pinion 49 and clearing shaft 48 in clockwise direction, through a complete rotation.

The open-sided slot 51 of the shaft thus makes a complete orbit and its shoulder 52 serves on this counter-clockwise stroke, as a hunting clutch member to collect and gather together all the clutch dogs 54 and their wheels, in whatever positions the latter may be.

In so doing, the slot 51 is presented to the dogs 54, the teeth of which successively snap into the slot under the tensions of their springs 55, whereupon the shaft 48 turns the wheels clockwise as in adding amounts.

At the end of the counter-clockwise stroke of the operating lever 30, the wheels 8 all stand at zero, the actuating segment 31 is at its lowermost limit of travel, and the operating lever is in a substantially vertical position, as shown in Fig. 4.

The operating lever 30 is now restored in clockwise direction to its normal position, together with the actuating segment 31, which latter imparts a complete rotation in the reverse (counter-clockwise) direction to the clearing pinion 49 and slotted clearing shaft 48, to return them to their normal positions.

The slot in the shaft, during such counter-clockwise rotation, merely lifts the clutch dogs 54 as the slot escapes therefrom, due to the inclination of the teeth of the dogs, as shown at 75 in Figs. 3 and 5, the spring-pressed detents 14 (Fig. 1) serving to retain the wheels 8 in their adjusted zero positions, during such reverse rotation of the shaft.

As the actuating segment 31 reaches its home position, its arm 36 contacts the hub 35 and arrests the segment.

Meanwhile, just prior to the arrival of the operating lever 30 in its normal position, the cam 44 on the operating lever wipes over the finger 68 of the blade-controlling bail 61, 62 to raise the arms 62 so that their free ends enter the wide kerfs 53 at the ends of slot 51 and contact the lower ends of the depending extensions 57 of the clutch-control blade 56 to shift the latter radially outwardly of its slot 51, so that its convex outer edge will fill up or close the slot and complete the periphery of the shaft 48.

The kerfs 53 in the shaft 51, and the slot 63 in the hub of the pinion 49, are of sufficient width to accommodate the ends of the blade-controlling arms 62, as the shaft 48 nears its home position.

The rotation of the numeral wheels 8 from their "9" to their "0" positions just as the operating lever 30 is reaching the end of its counter-clockwise stroke, trips all the carrying mechanisms 16, 18, but no carrying action can occur at this time, because, during the travel of the operating lever 30 in counter-clockwise direction, the cam 44 operates upon the bail actuator 41 to rock the latter counter-clockwise. The bail actuator 41, by its slot and pin connection 43 with the carry-restoring bail 37, rocks the restoring bail clockwise, so that by the time the carrying mechanisms are tripped, the restoring bail lies adjacent the free angularly disposed ends of the bell crank arms 19 and operates to at once restore the tripped carrying mechanisms before they have advanced sufficiently to effect a carry.

The operating lever 30, on its return to nor-

mal, withdraws the cam 44 to enable the spring 40 to return the carry-restoring bail 37 and the thereto-connected bail actuator 41 to their home positions.

It will be evident that the springs 58, in combination with the arms 62 constitute one form of means to shift the clutch-control blade inwardly and outwardly in the slot.

The foregoing constitutes a detailed description of a preferred embodiment of my invention, but it is to be understood that right is herein reserved to such modifications in structure as fall fairly within the scope of the protection prayed.

What I claim is:

1. In a register, the combination with a rotatable shaft having a longitudinally-extending slot formed therein; and a series of denominational wheels journaled on the shaft; of zero setting means for the wheels, including a dog mounted on each wheel, and having a tooth normally tending to be engaged by a wall of the slot; means to rotate the shaft to cause that wall of the slot to engage the dogs and return the wheels to zero; a filler member seated in the slot; and means to shift the filler member to cause its outer edge to completely fill the slot, and to position it to leave the outer side of the slot open.

2. In a zero setting mechanism for registers, the combination with a rotatable shaft having a longitudinally-extending slot formed therein; and a series of denominational wheels journaled on the shaft; of a dog on each wheel, having a tooth to be engaged by a wall of the slot; operating means to turn the shaft to cause that wall of the slot to engage the dogs and return the wheels to zero; a filler member shiftably mounted in the slot; and means to shift the filler member to cause its outer edge to complete the periphery of the shaft at points in the planes of the teeth of the dogs, and to depress the filler member into the slot to open the latter for engagement with the dogs.

3. In a zero setting mechanism, the combination with fixed supports; a rotatable shaft journaled in the supports, and having a longitudinally extending slot formed therein; and a series of denominational wheels journaled on the shaft; of a clutch dog on each wheel, having a tooth to be engaged by a wall of the slot; operating means to rotate the shaft to cause that wall of the slot to engage the clutch dogs and return the wheels to zero; a clutch-control member shiftably mounted in the slot; and means to shift the clutch-control member to cause it to block the inter-engagement of said wall of the slot and the dogs, and to displace the clutch-control member to enable contact of the wall of the slot with the dogs.

4. In a zero setting mechanism, the combination with a rotatable shaft; means to rotate the shaft; a series of denominational wheels journaled on the shaft; and clutch members on the respective wheels, with which the shaft coacts to restore the wheels to zero; of means movable relatively to, and under control of, the shaft-rotating means to lock the shaft against, and to release it for rotation; and means on the shaft controlled by the said shaft locking and releasing means, to enable and to prevent co-action between the clutch members and the shaft.

5. In a zero setting mechanism, the combination with a rotatable, slotted shaft; means to rotate the shaft; a series of denominational wheels journaled on the shaft; and clutch members on the respective wheels, with which one wall of the slot coacts to restore the wheels to zero; of a longitudinally-extending blade seated in and radially movable of the shaft, to control the clutching action between the wall of the slot and the wheels; and means, under control of the shaft-rotating means, to shift the blade to its effective and ineffective positions, respectively.

6. In a zero setting mechanism, the combination with a rotatable, shouldered shaft; means to rotate the shaft; a series of denominational wheels journaled on the shaft; and clutch members on the respective wheels; the shoulder on the shaft constituting a coacting clutch member adapted to engage the clutch members on the wheels to return the wheels to zero; of a clutch-control member seated in, and radially movable of, the shaft to render one of the clutch members effective or ineffective; and means to variously position the clutch-control member to enable, or to prevent, co-action between the co-acting clutch members, respectively.

7. In a zero setting mechanism, the combination with a rotatable shaft equipped with a clutch member; a series of denominational wheels journaled on the shaft; clutch members on the respective wheels to coact with the clutch member on the shaft; and means to rotate the shaft to cause its clutch member to engage the clutch members on the wheels and return the wheels to zero; of means normally masking the clutch member on the shaft; and means to shift the masking means to enable and to prevent co-action between the co-acting clutch members, respectively.

8. In a zero setting mechanism, the combination with a rotatable shaft equipped with a clutch member; a series of denominational wheels journaled on the shaft; clutch members on the respective wheels to coact with the clutch member on the shaft; and means to rotate the shaft to cause its clutch member to engage the clutch members on the wheels and return the wheels to zero; of means normally masking the clutch member on the shaft; and means under control of the shaft-rotating means to shift the masking means to effective and ineffective positions.

9. In a zero setting mechanism, the combination with a rotatable shaft equipped with a clutch member; a series of denominational wheels journaled on the shaft; clutch members on the respective wheels to coact with the clutch member on the shaft; and means to rotate the shaft to cause its clutch member to engage the clutch members on the wheels and return the wheels to zero; of means normally masking the clutch member on the shaft; and means to shift the masking means to masking and unmasking positions and to concomitantly lock the shaft against, and release the shaft for rotation, respectively.

10. In a zero setting mechanism, the combination with denominational wheels; a rotatable shaft; and co-acting clutch devices on the wheels and shaft, respectively; of a clutch-control means shiftable to masking and unmasking positions relatively to one of the clutch devices, and tensioned to assume its unmasking position; means to rotate the shaft; and means under control of the shaft-rotating means to normally hold the clutch-control means in its masking position.

11. In a zero setting mechanism, the combination with denominational wheels; a rotatable shaft; and co-acting clutch devices on the wheels and shaft, respectively; of a clutch-control means shiftable to masking and unmasking positions relatively to one of the clutch devices, and tensioned

to assume its unmasking position; means to rotate the shaft, including relatively movable actuating and operating members; a cam operable by the operating member; and means operable by the cam, to normally hold the clutch-control means in its masking position.

12. In a zero setting mechanism, the combination with a rotatable, slotted shaft; means to rotate the shaft; a series of denominational wheels journaled on the shaft; and clutch members on the respective wheels, with which one wall of the slot co-acts during rotation in one direction to restore the wheels to zero; of a longitudinally-extending blade seated in and radially movable of the shaft, to control the clutching action between the wall of the slot and the wheels; and means to shift the blade to enable and to prevent the clutching action, respectively.

13. In a zero setting mechanism, the combination with denominational wheels; of a rotatable, slotted shaft; clutch dogs on the wheels adapted to engage the slot to enable the shaft to return the wheels to zero; a masking member shiftably mounted in the slot in the shaft to open and close the slot; shaft-rotating means; and means to shift the masking member to enable, and to prevent engagement of the clutch dogs and shaft, respectively.

14. In a zero setting mechanism, the combination with a rotatable, slotted shaft; means to rotate the shaft; a series of denominational wheels journaled on the shaft; and clutch members on the wheels adapted to be engaged by one wall of the slot, to return the wheels to zero; of a clutch-control member seated in, and adapted for movement radially of, the slot to mask and unmask the slot; and means operable relatively to the clutch-control member to shift the latter to mask the slot, and disengage the clutch members therefrom, the last-named means effective in one of its positions, to lock the shaft against rotation.

15. In a zero setting mechanism, the combination with a rotatable, slotted shaft; means to rotate the shaft; a series of denominational wheels journaled on the shaft; and clutch members on the wheels adapted to be engaged by one wall of the slot in the shaft, constituting a co-acting clutch member, to return the wheels to zero; of a clutch-control member seated in, and adapted for movement radially of, the slot, to mask the slot, and positively disengage the clutch members, and to unmask the slot to enable co-action of the clutch members.

16. In a zero-resetting mechanism for registers, the combination with a rotatable, slotted zero-resetting shaft; a plurality of denominational wheels journaled thereon; a zero-resetting dog mounted on each wheel, and having a tooth normally tending to engage either wall of the slot, depending upon the direction of rotation of the wheel; and means to turn the shaft to cause one wall of the slot to engage the dogs and return the wheels to zero; of means adjustably accommodated in the slot, which means, in one of its positions lies below the outer end of the slot to enable one wall to engage the dogs, and to close the slot against the entry of the dogs, when in another position; means to normally retain the adjustable means in position to close the slot; and means to release the retaining means, to enable the adjustable means to move to its first-named position.

17. In a zero setting mechanism, the combination with a slotted shaft; a numeral wheel journaled on the shaft; and a clutch member on the wheel to engage the slot in the shaft; means to rotate the shaft in one direction to cause its slot to engage the clutch member on the wheel, and return the wheel to zero, and then reversely rotate the shaft to its initial position; of means to normally mask the slot; and means to shift the masking means alternately from and to its masking position in timed relation with the beginning and termination of the rotation of the shaft, to enable co-action between the slot and the clutch member, and to disengage the clutch member from the slot and mask the latter.

18. In a zero-resetting mechanism, the combination with a rotatable, slotted shaft; and means to rotate the shaft; of a series of denominational wheels journaled on the shaft for rotation in either direction; engaging members on the respective wheels, in contact with the shaft, and engageable thereby to restore the wheels to zero as the shaft is rotated; a control member in addition to the engaging members, having at least two positions, in one of which it enables engagement of the engaging members and the shaft, and in the other of which it positively controls the engaging members to prevent engagement thereof and the shaft; and means to shift the control member to either of said positions.

19. In a zero-resetting mechanism, the combination of a rotatable, shouldered shaft; means to rotate the shaft; a series of denominational wheels journaled on the shaft for rotation in either direction; clutch members shiftably mounted on the wheels, and in contact with the shaft the shoulder on the shaft constituting a clutch member to co-act with the clutch members on the wheels to return the wheels to zero; and a clutch-control member, in addition to the co-acting clutch members, seated in, and radially shiftable relatively to the shaft, and clutch members to control co-action between the co-acting clutch members; and means to shift the clutch-control member to enable and to prevent co-action between the co-acting clutch members, respectively.

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