May 31, 1932. E. F. BRITTEN, JR 1,860,490

ATTACHMENT FOR CALCULATING MACHINES

Filed July 22, 1929 5 Sheets-Sheet 1

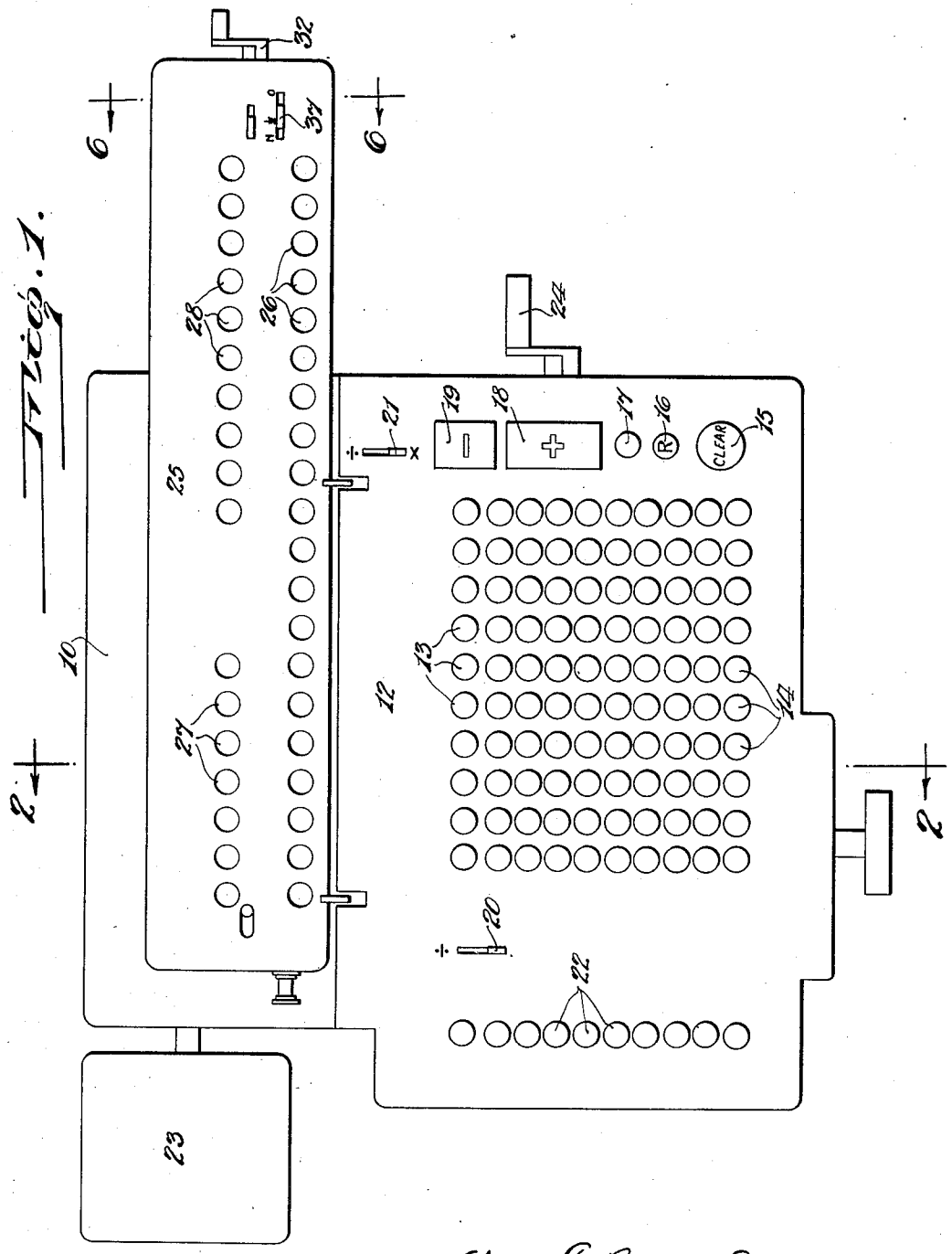

Fig. 1.

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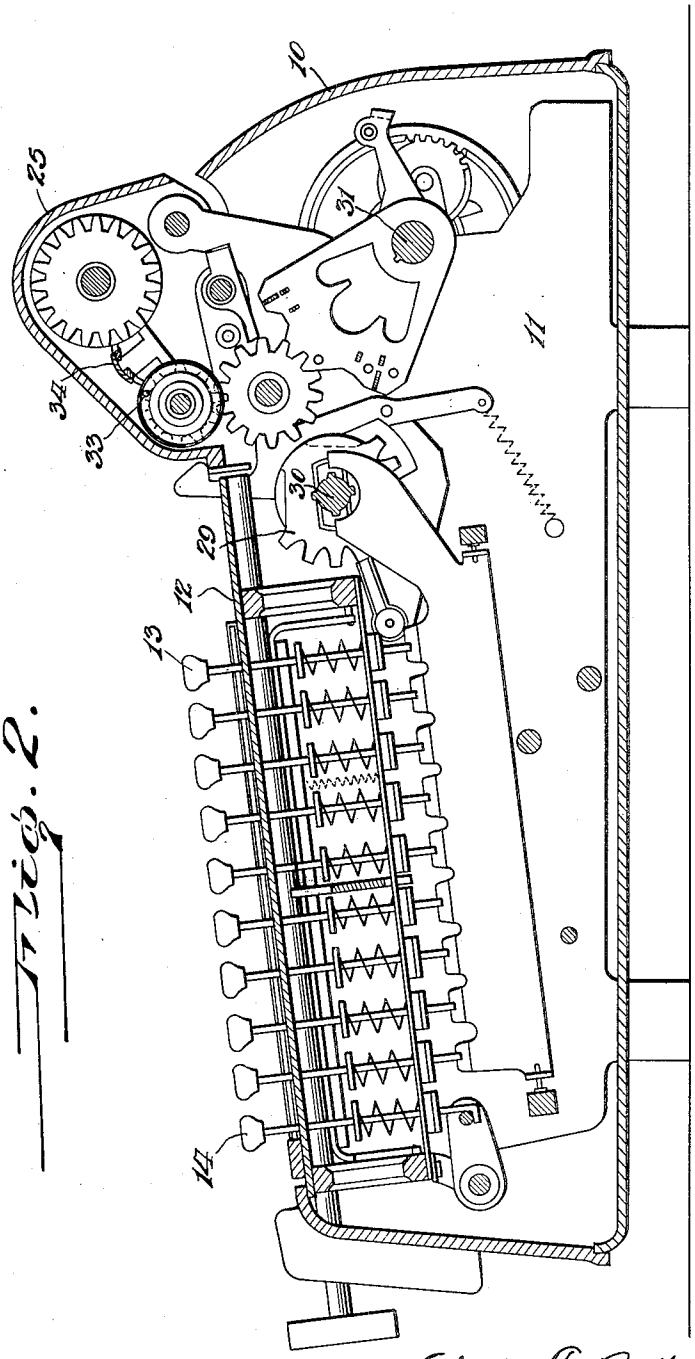

Fig. 2.

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Fig. 3.

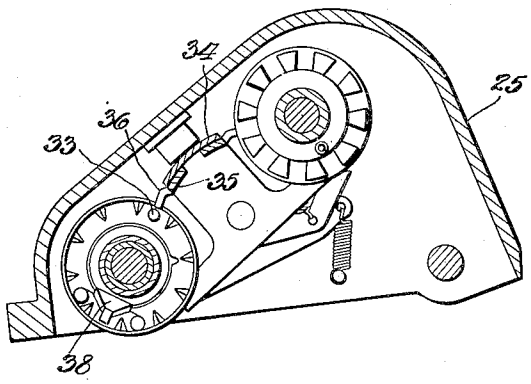

Fig. 4.

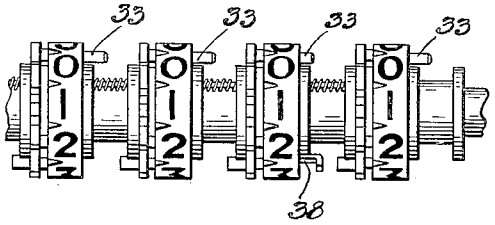

Fig. 5.

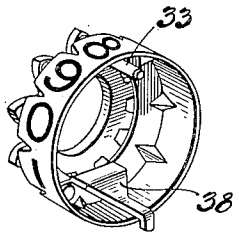

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Fig. 6.

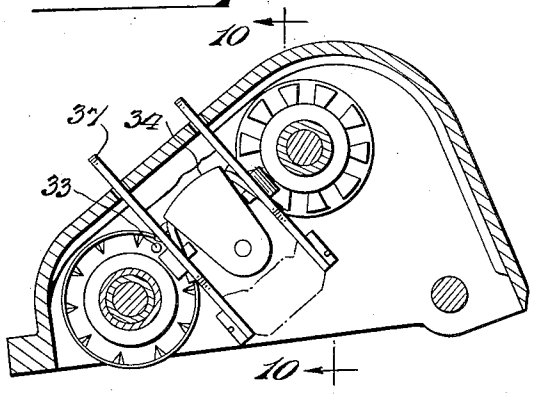

Fig. 7.

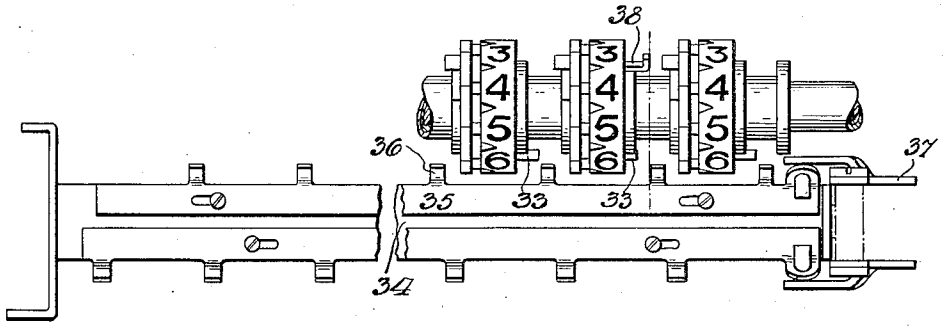

Fig. 8.

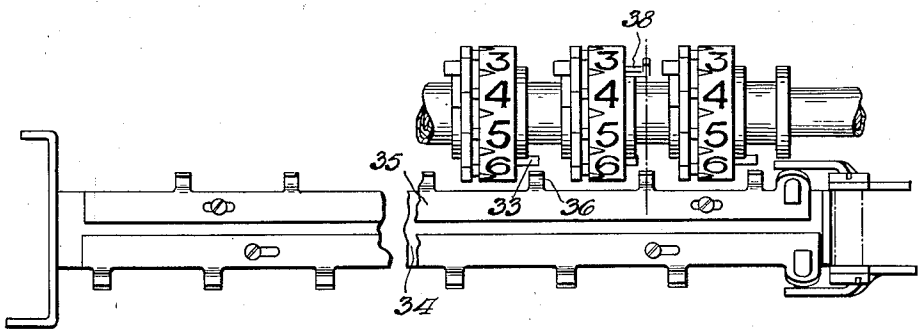

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Fig. 9.

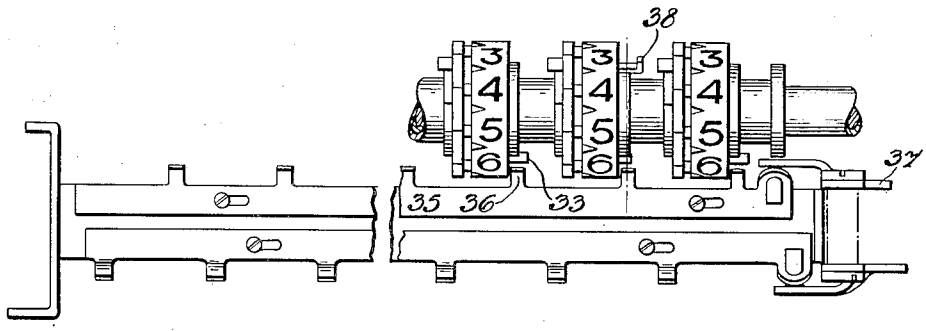


Fig. 10.

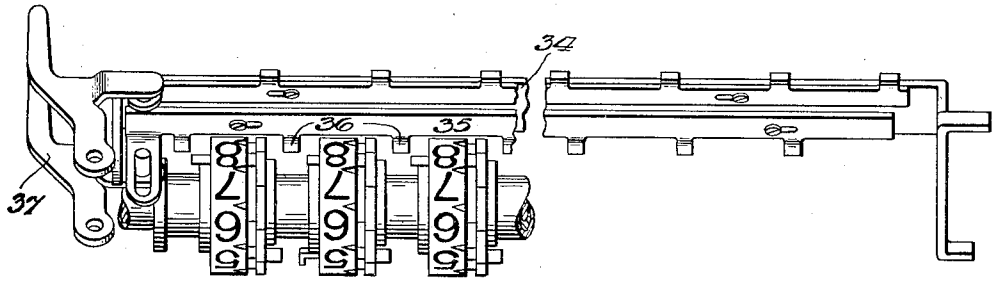
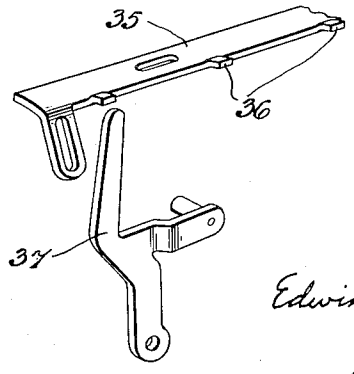


Fig. 11.



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Patented May 31, 1932 1,860,490

UNITED STATES PATENT OFFICE

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ATTACHMENT FOR CALCULATING MACHINES

Application filed July 22, 1929. Serial No. 379,948.

This invention relates to improvements in calculating machines, and particularly to calculating machines such as set forth in the pending application of E. F. Britten, Jr., Ser. No. 337,073, filed Feb. 2, 1929, and patents to George C. Chase 1,566,650, patented Dec. 22, 1925 and 1,685,074, patented Sept. 18, 1928, and known on the market as the Monroe calculating machine.

The principal object of the invention is to provide means whereby when a result is obtained in which the decimal beyond the second decimal order is five or more, the decimal of the second order will be automatically increased by one. In this manner the operator is required to read only the first two decimal positions and does not need to pay any attention to the extended decimal.

Another object is to construct a machine which may be caused to operate as above or in the normal manner at the will of the operator.

Another object is to provide a modified and improved clearing mechanism for the accumulating dials.

Other objects will be apparent from the following detailed description.

All of these objects are attained by means illustrated in the accompanying drawings, in which:

Fig. 1 is a top plan view of a machine embodying the invention.

Fig. 2 is a view taken substantially on line 2—2 of Fig. 1.

Fig. 3 is a fragmentary detail sectional view showing the "half cent" dial and associated parts.

Fig. 4 is a front elevation of several of the numeral dials including a half-cent dial.

Fig. 5 is a perspective view of a half-cent dial.

Fig. 6 is a detail section taken substantially on line 6—6 of Fig. 1.

Fig. 7 is a bottom plan view of the clearing bar in its ineffective or non-clear position.

Fig. 8 is a similar view with the clearing bar shifted to the "half-cent" position.

Fig. 9 is a similar view with the clearing bar shifted to the normal or full clearing position.

Fig. 10 is a sectional detail taken substantially on line 10—10 of Fig. 6, parts being omitted for the sake of clearness.

Fig. 11 is a detail exploded perspective of one end of the clearing bar and its actuating lever.

Like characters of reference refer to like parts in all views.

In performing certain computations on a calculating machine, as for instance in figuring percentages, it is necessary in calculators as heretofore constructed to observe the third decimal place and add one unit mentally to the second place if the third stood at "5" or more, and to disregard the readings of the third and fourth decimal places if less than "5" appeared in the third decimal place. This at times causes errors and always causes a loss of time. With the present invention, the machine may be set so as to automatically carry up one when more than five is added to the third decimal place numeral wheel, and by covering the third and fourth decimal place numeral dials, a direct reading may be had with the desired correction made. As a typical example, presume that it is desired to obtain 16%, 24%, 26%, and 34% of $213.88. If we tabulate for comparison, a table may be created as follows:

Base	Per cent	As former construction would read	As present construction would read with all dials visible	As present construction would read with 3rd and 4th decimal dials covered
213.88	16	34.2208	34.2258	34.22
	24	51.3312	51.3362	51.33
	26	55.6088	55.6138	55.61
	34	72.7192	72.7242	72.72
Total	100%			213.88

From the above table, it will be seen that with the present invention, the direct readings of the first two decimal places will total the base when the sum of the several percentages used makes 100%. It will also be noted that with the former construction it would have been necessary for the operator to disregard the third and fourth decimal places in the first two instances and to correct the second

decimal in the last two instances, all of which takes time and provides an opportunity for error.

Generally speaking, the present invention contemplates a modification of the clearing mechanism whereby when the numeral wheels are cleared, the third decimal dial (or any other dial if desired) will be turned to "5" instead of to "0". Consequently when five or more units are added to this dial, it will carry one to the dial of the next higher denominational order. While in this specification the accumulator of the third decimal place is shown as provided with this auxiliary clearing mechanism, it is to be understood that any numeral wheel or a plurality of numeral wheels could be so equipped, according to the nature and requirements of the work to be done.

Referring now to the drawings in detail, 10 represents the casing and 11 the framework of a calculating machine. By way of illustrating the application of my invention, I have chosen to show the same as incorporated in a calculating machine of the well-known Monroe construction, although this is to be considered as merely illustrative, the invention being applicable to machines of various types.

The keyboard frame is shown at 12 and guides a plurality of manipulative members as follows: digit setting keys 13, zero keys 14, keyboard clearing key 15, repeat key 16, non-repeat key 17, add operating key or plus bar 18, subtract operating key or minus bar 19, division lever 20, counter rotation-reversing shift lever 21, and multiplying keys 22. A driving motor is shown at 23, a hand operating crank at 24, and a carriage at 25. The carriage 25 carries a plurality of numeral wheels 26 and two sets of counters indicated at 27 and 28, the counters 27 being of the nineteen-point type (having no carrying mechanism and each bearing the nine significant digits running in reverse directions from a common zero, one set of significant digits being colored differently from the other), and the counters 28 being of the usual "ten-point" type with carry mechanism.

The direction of rotation of the numeral wheels and counters 26, 27 and 28 is controlled by the manipulative members 18, 19, 20 and 21, the latter serving merely to reverse driving of the counters 28 and not of the actuators.

While the selecting and actuating means used in this type of machine has been fully set forth in the pending application of E. F. Britten, Jr., Ser. No. 337,073, and other disclosures therein referred to, certain of the parts will be mentioned and their functions briefly stated. For a complete description reference may be had to the said application and disclosures.

Briefly, amounts set up in the digit setting keys 13, and thereby on differential actuating gears 29 (Fig. 2) are registered upon the differential registration wheels or numeral wheels 26 by the operation of differential gear shaft 30 and of shaft 31 whereon the tens-carry members are mounted, these shafts being connected by 1—1 ratio gears and elliptical gears (not shown). Power is derived from the motor 23 for rotating this mechanism, but the hand crank 24 may be retained as an alternative means of operation. Rotation of the differential actuating gears 29 effects registration on the numeral wheels 26 according to the setting of the digit keys 13, and each operation of the machine causes a rotation of one digit space of one counter of each of the sets 27 and 28, the counter operated being controlled by the position of the carriage.

The numeral and counter wheels 26, 27 and 28 are set to zero by turning a clearing handle or crank 32, rotation of said crank 32 in a clockwise direction (as viewed from the right-hand side of the machine) causing clearing of the counters, and rotation of said crank 32 in a counter-clockwise direction causing clearing of the numeral wheels. The present invention is particularly connected with the clearing of the numeral wheels, and only this phase of the machine will be considered.

As described in the said co-pending application, rotation of crank 32 first causes the rocking of a zero-stop carrier into cooperative relationship with the numeral wheels, and then rotation of the numeral shaft. Whether the numeral wheels are turned to zero or not depends upon whether the zero-stops are in effective position on the carrier. Referring particularly to Figs. 2, 3, and 4, it will be seen that the numeral wheels are provided with zero-stop-pins 33 which project laterally toward the right. The zero-stop carrier is shown at 34 and consists essentially of a rock bar located between and parallel with the sets of numeral wheels and counters. This bar carries one or more zero stop-slides 35 for cooperation with the numeral wheels, and formed with a plurality of stop fingers or projections 36. The slides 35 are shown in said application as each having two positions, in one of which rocking of bar 34 will bring the projections 36 into the paths of movement of the respective pins 33 so as to effect zeroizing, and in the other of which the projections 36 will clear the associated pins 33 so that rocking of bar 34 will not effect zeroizing of the numeral wheels associated with the slide 35 so set.

In the present invention the slides 35 are movable to any one of three positions,—viz. (1) clearing, (2) half-cent position, and (3) neutral or ineffective position. For this purpose each of the slides 35 is provided with a lever 37 which may be moved from one to another of such positions, and suitable

indicia may be inscribed on the carriage to indicate which position of the three possible positions, the respective slide has been moved to.

The half-cent numeral wheel, in this application shown as the second from the right, is provided with a zero stop pin 33 which is somewhat shorter than that of the other numeral wheels, and also with a half-cent stop pin 38 which is positioned diametrically across the dial from the pin 33 and has its horizontal portion nearer the center of rotation than pin 33. The free end of pin 38 is bent out radially until its end is the same distance from the center of rotation as is pin 33.

With this construction, it will be seen from Fig. 9 that when lever 37 is set in "normal" or clearing position, the stop projections 36 of slide 35 will be in co-operative position with relation to all pins 33, and accumulator-zeroizing operation of handle 32 will cause all of the accumulators associated with the slide 35 to be turned to "0". In this operation, the projection 36 coacting with the half-cent dial will be out of line with the end of the half-cent pin 38, and owing to the rest of pin 38 being set closer to the center of rotation of the dial, the pin 38 will pass the projection 36 without touching it, and the numeral wheel will always be stopped at "0".

Now, when lever 37 has been moved to the second or "half-cent" position, the projection 36 cooperating with the half-cent dial will be moved to a position where it will clear the zero pin 33 of that dial and will stand in the path of the radially bent end of pin 38 during an accumulator-zeroizing operation of crank 32. At the same time the other projections 36 have not been moved beyond the pins 33 with which they cooperate (it being remembered that pin 33 of the half-cent dial is shorter) and hence at each accumulator-zeroizing operation the numeral wheels other than the half-cent accumulator will be turned to "0" and the half-cent accumulator will be turned to "5". Consequently in subsequent accumulating operations, one will be carried up whenever five or more is added to the half-cent dial.

In the third position of lever 37 all projections 36 clear all pins 33 and 38 and numeral wheel-zeroizing operation of the crank 32 is idle.

If the machine is to be used constantly for "half-cent" work, the two numeral wheels of lowest order may be covered in any suitable manner or may be made without dials or with dials having no indicia thereon. Where the machine is to be used for various types of work, movable shutters may be provided to cover the dials when desired, or the operator may be instructed to disregard the required dials when doing "half-cent" work.

While only one "half-cent" numeral wheel has been shown, more may be used if desired, as where the machine is used for "split" work—i. e. two or more separate computations simultaneously, and as many slides 35 may be used as found desirable to do the required work. Furthermore, while this has been for convenience called a "half-cent" numeral wheel, it is applicable to machines for handling various kinds of currency. The same sort of mechanism could also be applied to the counter-clearing mechanism if found desirable. The invention is therefore applicable to a wide range of work, and hence, 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 of 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. The combination of a numeral wheel provided with a zero-setting stop and a secondary stop, a clearing bar associated with said wheel, and a stop mounted on said bar and movable from one position to another for rendering it effective with relation to the first said stop or the second said stop.

2. The combination of a numeral wheel provided with a zero-setting stop and a secondary stop, a clearing bar associated with said wheel, a stop mounted on said bar and movable from one position to another for rendering it effective with relation to the first said stop or the second said stop, and means for so moving the third said stop.

3. A numeral wheel comprising a rotatable member, a zero-setting stop on said member and positioned a predetermined distance from the axis of rotation of said member, and a second stop on said member and positioned a different distance from the axis of rotation and having a portion extended so as to be positioned the same distance from the axis of rotation as said zero-setting stop.

In testimony whereof I affix my signature.

EDWIN F. BRITTEN, JR.