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DECIMAL ROUNDING OFF MECHANISM

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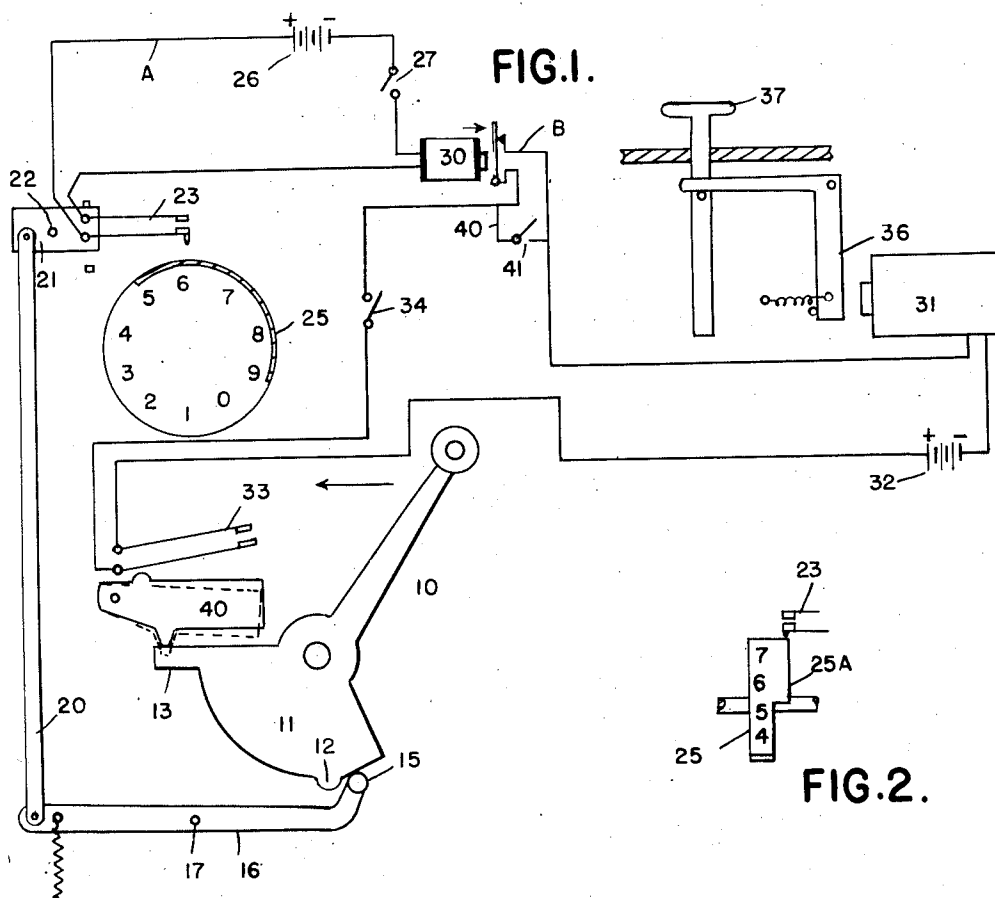
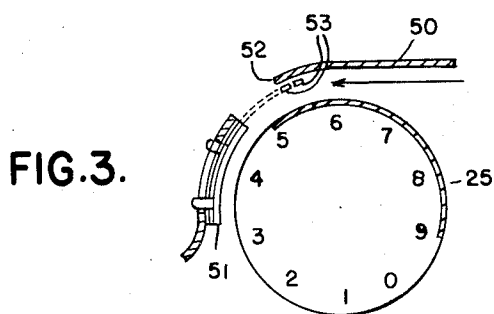


FIG.2.



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DECIMAL ROUNDING OFF MECHANISM

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7 Claims. (Cl. 235—61)

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The present invention relates to calculating machines, and specifically to automatic means adapted to determine, after a given calculation, whether or not the fractional part of a cent, if any, is five mills or more, and, if so, to provide for it in the next higher order column.

In common business practice, if a calculation involving fractions, either in numbers of units or prices per unit or both, gives a result showing mills, and the number of mills is five or more, it is customary to follow one of three procedures. One procedure is to add one cent to the result. Another procedure is to ignore the mills and a third procedure is to alternately add a cent and ignore the mills.

In any of these procedures, transcription of the result of a calculation may easily produce mistakes due to mistaken reading or failure, in the third case, to remember when to add and when to ignore.

Among the objects of the present invention is means for eliminating such possible mistakes by automatically following a selected one of the procedures mentioned.

Another object is, as stated above, means for determining, after a calculation, the position of the mills indicator and adding (to make up a cent), ignoring or alternately adding (to make up a cent), and ignoring the mills whenever five or less mills is indicated.

A typical calculating machine, such as may have the present device applied to it, is shown in the patent to Neimann, 2,346,601, issued April 11, 1944, "Calculating machine."

Still other objects and advantages will readily occur to those skilled in the art upon reference to the following description and the accompanying drawings in which

Figure 1 is a diagrammatic view showing the application of the invention to a single indicator wheel of a key operated calculating machine.

Figure 2 is a front elevation of an indicator wheel for use in the present invention.

Figure 3 is a side view of a wheel and part of a casing showing a shutter.

In the drawings, which show in schematic form, means for accomplishing the results indicated above, the cancelling lever of a calculating machine is shown at 10. This acts in the usual fashion to carry out its functions, and, since the present invention is not concerned with such functions and the mechanism used, no such mechanism is being shown.

The lever 10, in the present case, is provided with a segment 11 which carries on its periphery a small hump 12 and preferably a finger 13, the former being so placed that, at the beginning of the cancelling stroke, it acts upon a roller 15 carried upon the end of a lever 16 pivoted at 17, so as to operate the lever.

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Connected to the other end of lever 16, through link 20 is a block 21 pivoted at 22 and carried upon the block is a pair of spring contacts 23. These should be quite flexible and should extend and be adjacent to an indicator wheel 25 such as is shown.

This wheel 25 is the "mills" wheel and is shown as having a portion of its rim wider than the rest. The wide portion 25A is so located with respect to the numerals carried by the wheel that such portion is in position to coact with contacts 23 whenever any of the figures "5" to "9" are visible to the operator, or are at least in position to be seen.

Therefore, when the block 21 is moved through the action of lever 16, the contacts 23 will be closed whenever the calculation results show from five to nine mills, and, if the number of mills is less than five, there is no closing of contacts 23 since they are then opposite the narrow part of the wheel and therefore, strike nothing in their downward movement.

Contacts 23 form part of an electric circuit A including a current source 26, a suitable switch 27, and a relay 30. This latter is of a standard commercial type having movable contacts adapted to be actuated by the coil connected in circuit A so as to alternately make and break the circuit B with successive completions of circuit A. Each time, therefore, the contacts 23, in their downward movement, strike the wide portion of wheel 25, circuit A is completed (switch 27 being closed) and the relay opens or closes circuit B.

The circuit B includes a magnet or solenoid 31, a source of current 32, another pair of spring contacts 33, the switch 34, and the contacts in relay 30. When, therefore, this circuit is completed, the magnet 31 is energized and attracts its armature 36, shown as a bellcrank, and pulls down the "5-mills" key 37 of the machine.

Circuit B is completed, with switch 34 closed, through spring contacts 33 and those are moved together at the end of the return stroke of lever 10. This action is accomplished by the finger 13 striking a pivoted weighted member 40 and knocking it upward against the lower one of the contacts 33.

With the circuits A and B as described, operation of lever 10 to cancel the registration set up in the machine, at the beginning of its movement, and before the cancellation is accomplished, moves the "feeler" contacts 23 downward to find out whether or not the "mills" wheel registers five or more. If such registration exists, the contacts 23 complete the circuit A and change the relay in circuit B from "open" to "closed," or vice versa, depending upon which it happened to be before moving lever 10.

Assuming the relay to have been "open," the

movement of the lever will "close" it, but nothing will happen since the contacts 33 are open. The lever 10 in its forward and backward movement then completes its cancellation and at the end of its backward stroke, closes contacts 33, momentarily closing circuit B and thereby depressing the "mills" key 37 to set up five in the mills column preparatory for the next calculation.

So far as the preceding description is concerned, the device will alternately add and ignore the five or more mills on the mills wheel, since the relay 39 is alternately "open" and "closed."

If it is desired always to ignore the mills, it is necessary only to open switches 27 and 34. If, on the other hand, it is desired always to add five mills to the calculation, the relay 39 may be short-circuited by a shunt 40 controlled by a switch 41. Closing switches 34 and 41 will cause the energization of magnet 31 with each operation of lever 10.

In Figure 3 is shown a means which may be used, if desired, to operate the switch 27 and provide additional error prevention. In this figure, the machine casing 50 is shown as being provided with a shutter 51 adapted to open and close the slot or peephole 52 through which the register wheel 25 is visible. This shutter, when closed will hold together contacts 53 acting as switch 27, and therefore may be used to control circuit A.

While the wheel 25 is described and shown as having a wide portion to cooperate with the "feeler" it is obvious that any suitable form of wheel may be used, provided the feeler can carry out its function of determining whether or not the registered result is five mills or more, or is less than five mills.

While in the foregoing description only one key is mentioned as being operated and for a specific purpose, it is obvious that such mechanisms may be applied to a plurality of keys if desired and other purposes may be accomplished. The invention is therefore not to be limited to the specific description but only by the scope of the claims which follow:

I claim:

1. In a calculating machine having keys and accumulator wheels, a finger movable to contact a wheel, said wheel having a conformation permitting such contact only when in a predetermined position, means for causing such finger movement, means for actuating the key corresponding to said wheel, and means operably connecting the latter means to the finger moving means and adapted to cause actuation of the key when said finger contacts said wheel, said connecting means including means causing such key actuation with alternate finger-wheel contacts.

2. In a calculating machine having keys and accumulator wheels, a finger movable to contact a wheel, said wheel having a conformation permitting such contact only when in a predetermined position, means for causing such finger movement, an electric switch adapted to be closed when said finger and wheel contact and thereby complete a circuit, an alternating relay in said circuit, and means for actuating the key corresponding to said wheel and including a solenoid for moving said key, said relay adapted to alternately potentially open and close a circuit through said solenoid.

3. In a calculating machine having a reset lever, keys and accumulator wheels, a finger movable to contact a wheel, said wheel having a conformation permitting such contact only when in a predetermined position, means for causing such finger movement, an electric switch adapted to be closed when said finger and wheel contact and thereby complete a circuit, an alternating relay in said circuit, and means for actuating the key corresponding to said wheel and including a solenoid for moving said key, said relay adapted to alternately potentially open and close a circuit through said solenoid, and means actuated by said reset lever to complete the solenoid circuit when potentially closed by said relay.

4. In a calculating machine having accumulator wheels for registering the result of a calculation and a lever for returning said wheels to "zero" position, means for adding predetermined amount when one of said wheels is in a predetermined "result" position and means for detecting when said wheel is in such position, said operations of detecting and adding being accomplished during the operation of said lever in returning the wheels to "zero" position.

5. In a calculating machine constructed in accordance with claim 1, means for bypassing said alternating means whereby to cause key actuation whether or not said finger controls said wheel.

6. In a calculating machine having keys and accumulator wheels, a finger movable to contact a wheel, said wheel having a conformation permitting such contact only when in a predetermined position, means for causing such finger movement, an electric switch adapted to be closed when said finger and wheel contact and thereby complete a circuit, an alternating relay in said circuit, and means for actuating the key corresponding to said wheel and including a solenoid for moving said key, said relay adapted to alternately potentially open and close a circuit through said solenoid, and means to complete the solenoid circuit when potentially closed by said relay.

7. In a calculating machine having keys and accumulator wheels, a finger movable to contact a wheel, said wheel having a conformation permitting such contact only when in a predetermined position, means for causing such finger movement, an electric switch adapted to be closed when said finger and wheel contact and thereby complete a circuit, an alternating relay in said circuit, a second circuit, said relay adapted to alternately potentially open and close said second circuit, and means to complete the second circuit when potentially closed by said relay.

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