

Sept. 23, 1958

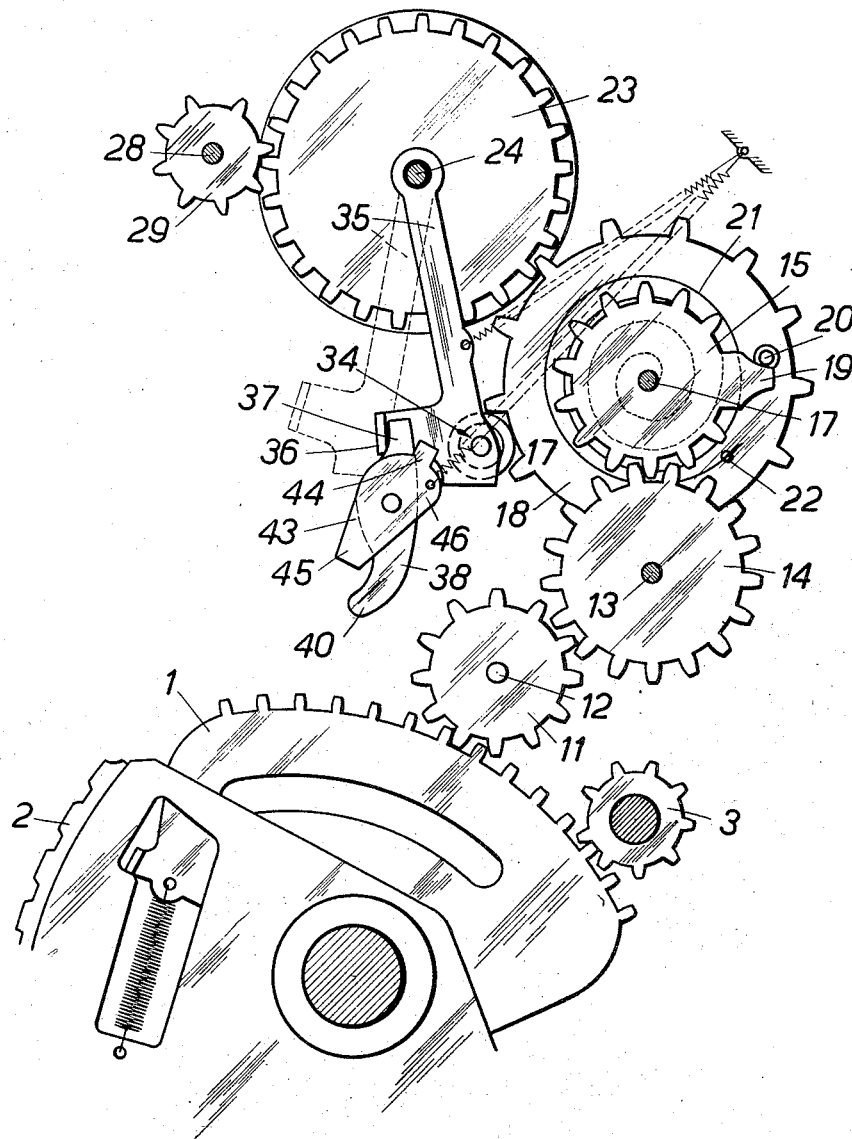
L. M. ANDERSEN
VISIBLE INDICATING DEVICE FOR ADDING MACHINES
OF THE PRINTING TYPE, SUCH
AS FOR CASH REGISTERS

2,853,233

Filed March 2, 1955

4 Sheets-Sheet 1

FIG. 1.



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4 Sheets-Sheet 2

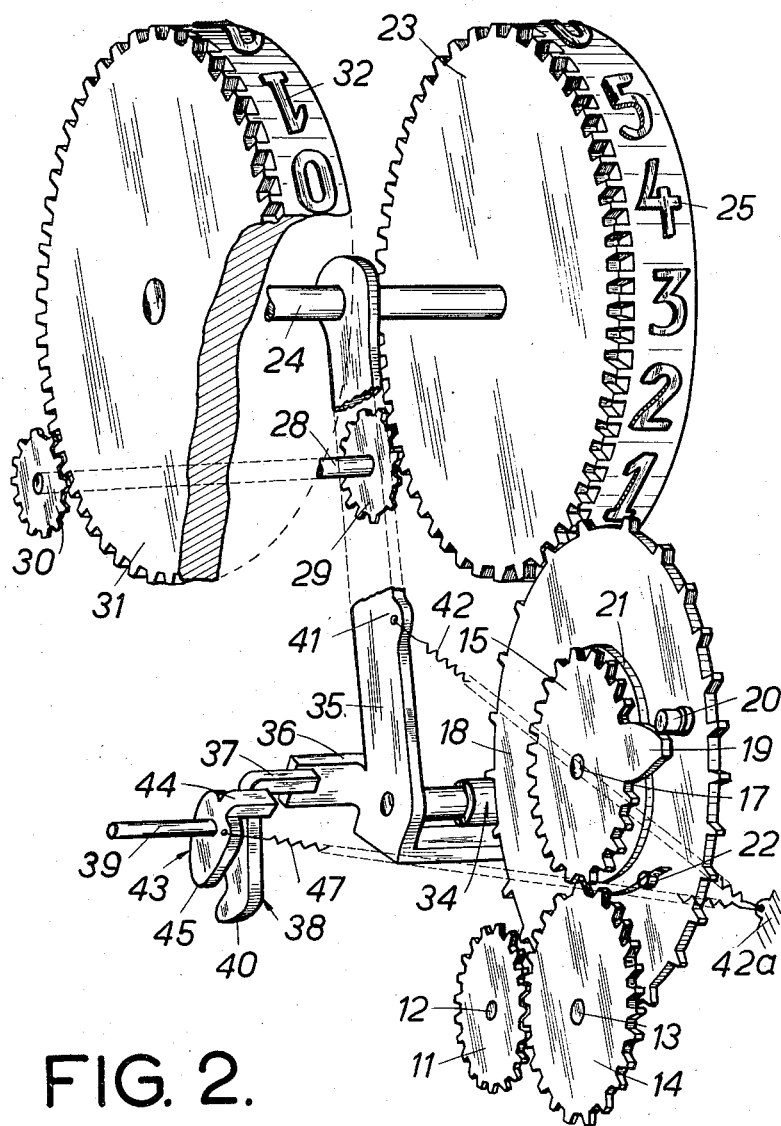


FIG. 2.

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4 Sheets-Sheet 3

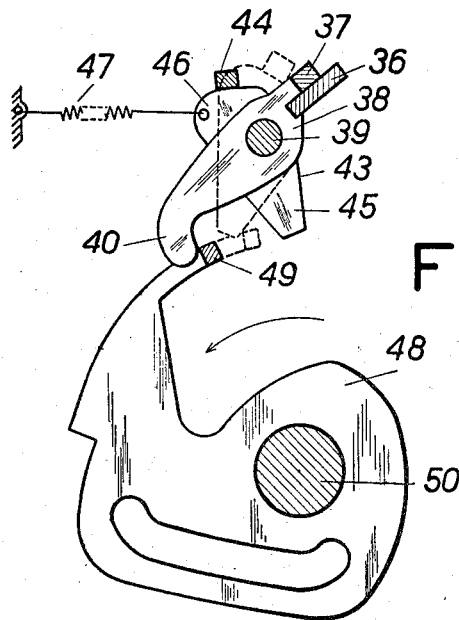
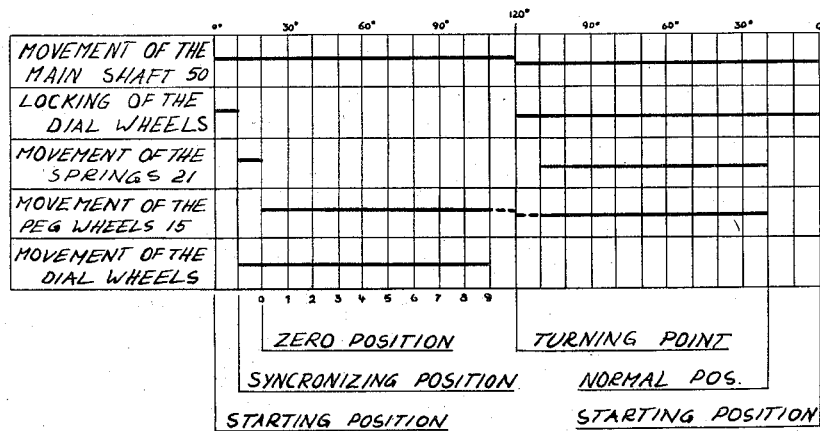


FIG. 3.

FIG. 5.



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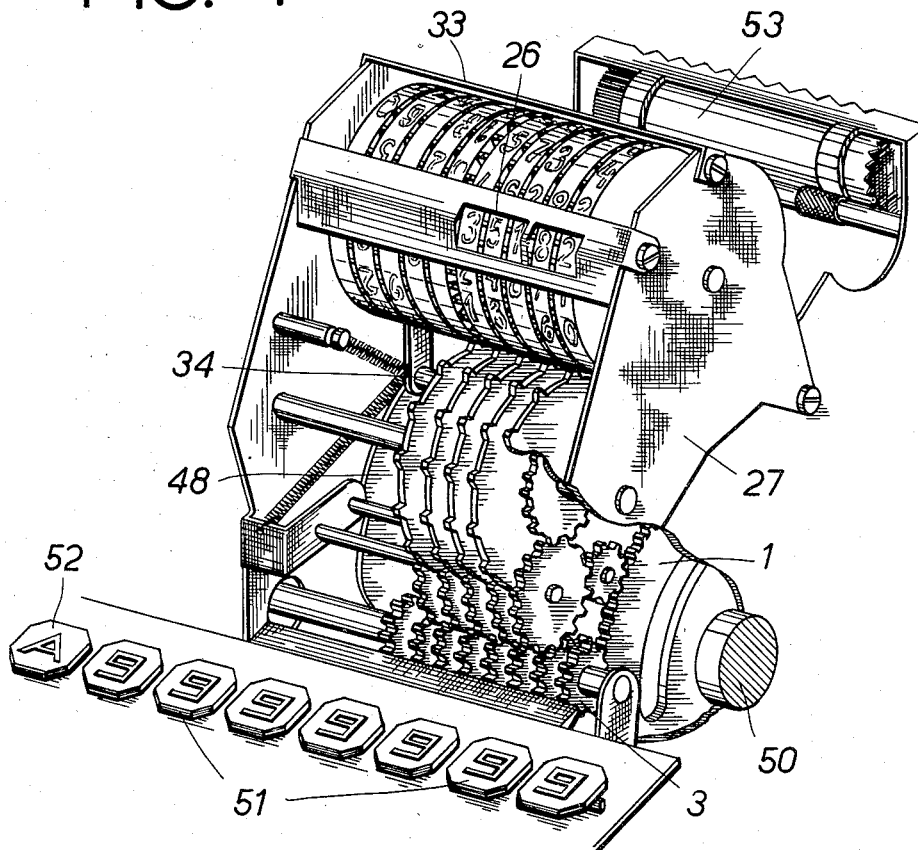
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FIG. 4



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VISIBLE INDICATING DEVICE FOR ADDING MACHINES OF THE PRINTING TYPE, SUCH AS FOR CASH REGISTERS

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Application March 2, 1955, Serial No. 491,591

Claims priority, application Norway March 4, 1954

3 Claims. (Cl. 235—23)

This invention relates to a visible indication device for adding machines of the printing type which prints the amount registered in the machine on a paper tape roll and simultaneously accumulates said amount in an accumulator mechanism.

It is an object of the invention to provide a device for visibly indicating the registered amount in a special window. The indication is additional to a printing on the tape roll.

It is another object of the invention to provide a device for visibly indicating the registered amount in two directions so that the amount may be simultaneously indicated to the adding machine operator and to a second viewer who is presumably a customer.

It is a further object of the invention to provide a device of the kind aforesaid which is highly reliable and easy to install.

It is a further object of the invention to provide a cash register having a two-way visible indication control as well as a usual registration on a tape roll of the registered amount.

The above and other objects of the invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawings, but it is to be expressly understood that said drawings are employed merely to facilitate the description of the invention as a whole and not to define the limits thereof, reference being had to the appended claims for this purpose.

In the drawings:

Figure 1 is a fragmentary side elevation, somewhat simplified, of the visible indication device for one digit, constructed in accordance with the invention.

Figure 2 is a perspective view of the device according to Fig. 1.

Figure 3 is an enlarged perspective view illustrating a release mechanism for retaining or latching members of the device.

Figure 4 is a perspective view of the entire device when properly located on a cash register.

Figure 5 is a timing diagram illustrating the sequence of movement of various of the elements.

In the following description and the accompanying drawings, the indication mechanism for one digit is disclosed. It should be noted that the actual mechanism in practice preferably contains means for indicating a plurality of digits, mostly five digits, according to the requirements. However, the multiplication of the mechanism for the remaining digits should be obvious and readily provided by one skilled in the art.

The device illustrated in the drawings is specially designed to suit the requirements of the adding machine disclosed in Norwegian Patent No. 72,027 when said machine is used in a cash register. However, it should be noted that this only represents a preferred embodiment and that the invention should not be limited to the sole use in said machine, but may be useful also in other adding machines of the kind aforesaid.

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Referring first of all to Figure 1, the adding machine contains a toothed sector piece 1 controlling the movement of a type strip 2 and also meshing with an accumulator gear 3 in the position as shown. By means of a mechanism not shown in the drawings, the sector piece 1 is moved in clockwise direction over a distance corresponding to N times the tooth spacing, when the digit N is registered in the adding machine by its key control. It should be unnecessary to deal with the mechanism moving the sector piece to any detail, as such toothed moving members are conventional in almost every mechanically controlled adding machine.

In such adding machines, at least one toothed member corresponding to the toothed sector piece 1 is moved a number of teeth corresponding to said digit registered, whereby a type bar or strip associated with and controlled by said toothed member is moved a corresponding distance. The distance between the types is regulated to correspond to the movement of the toothed member, so that the type for digit N is properly located in alignment with the recording ribbon and platen, in other words, in print position after the movement. In the adding machine according to said Norwegian Patent No. 72,027, the platen is then hammered against the types in order to print the type images on the paper tape roll.

Thereupon, the adding machine mechanism is returned to its starting position to be ready for a new registering cycle.

The accumulator gear 3 meshes with the toothed sector piece 1 during one direction of the reciprocating movement of the toothed sector piece 1, in order to move the accumulator gear as many teeth as the registered digit; the adding machine "adds" or counts.

The above mentioned features should suffice for a clear understanding of the principles upon which the present invention is based. The device according to the invention comprises an indication driving gear 11 pivotally mounted on a shaft 12, a second shaft 13 has a transmission gear 14 pivotally mounted thereon. Said transmission gear 14 in turn meshes with a toothed driving coupling wheel 15 which is rotatably mounted on a shaft 17 and forms the drive member of a one way coupling. The driven member of the one way coupling is represented by a driven coupling wheel 18 rotatably mounted coaxially with the drive wheel 15 on the shaft 17. The one way coupling is obtained by said drive wheel 15 being provided with a radially extending peg 19 engaging in drive position an axially extending pin 20 secured to the driven wheel 18. Thus, the coupling is releasable over a distance slightly less than one full turn of the wheels 15 and 18.

A spiral spring 21 is wound on the shaft 17 between the wheels 15 and 18 and connects the wheels 15 and 18 by being at its inner end secured to the drive wheel 15 (not shown) and at its outer end secured to the driven wheel 18 at 22.

In order to enable easier explanation, the driving coupling wheel 15 is hereinafter designated "the peg wheel 15," while the driven coupling wheel 18 is designated "the pin wheel 18."

The spiral spring 21 urges the peg wheel 15 to constant engagement with the pin wheel 18. Each of the wheels 15 and 18, however, may be moved away from the engaging position by movement in a corresponding direction against the force from the spring 21.

The periphery of the pin wheel 18 is indented, the indentation meshing with a corresponding indentation upon an indication dial wheel 23 rotatably mounted on a shaft 24.

As appears readily from Figure 2, the indentation-free cylindrical periphery of this last-mentioned dial wheel is provided with digit images indicated at 25, one

of said digits being visible through a window 26 in a housing 27 supporting the device (see Fig. 4).

In order also to be able to indicate the digit indication in a further direction, one end of a shaft 28 has keyed thereto a pinion 29 meshing with the indentation of the dial wheel. A second pinion 30 is keyed to the opposite end of the shaft 28 and is constantly meshing with the indentation on the periphery of a second indication dial wheel 31, which also is freely mounted upon the shaft 24 and which carries digit images 32 upon its indentation free cylinder face. One of said digit images is visible through a window 33 in the housing 27 and is the same as the digit image indicated by the wheel 23 through the window 26.

In order to be able to lock the indication dial wheels in indication positions, a locking ratchet rod 34 is by means of a yoke 35 mounted for pivotation about the shaft 24, one arm of said yoke being shown in the figures. Thereby, the ratchet rod may be swung from an inactive position, which is drawn with dashes in Figure 1, and to an active position as shown in full lines in Figures 1 and 2.

The yoke 35, as appears readily from Figure 2, is provided with an outwardly directed lug 36, against which a corresponding lug 37 at one end of a lever 38 is engaged. The lever 38 is pivotally mounted intermediate its ends on a pin 39 secured to the housing 27, and has a lower arm 40. This arm is engaged in a manner which will be explained in greater detail.

Further, a lug 41 on the yoke arm 35 carries one end of a spring 42, the other end of which is attached to the housing at 42a. The spring 42 acts to force the ratchet rod 34 to locking position and acts as a return spring for the ratchet rod 34.

As particularly shown in Fig. 3, the above-mentioned lever arm 38 with its lug 37 and the lower branch 40, is, as stated above, pivotally mounted on a pin 39. The same pin also has pivotally mounted thereon another arm lever 43 provided with a lug 44 at its upper end. The lug 37 engages the upper branch or arm of the lever 43 which also is provided with a lower branch 45.

A cam piece 48 is keyed to a suitable shaft in the adding machine. The cam piece 48 has, in the starting position of the machine, its forward edge located just before the branch 45 of the lever 43. With special reference to Figure 3, this segment piece is first of all moved during the counting period of the adding machine in the direction of the arrow, i. e. in a counter-clockwise direction, thereby rocking the lever 43 in the opposite direction. The arm 38 and consequently also the lug 36 is moved in a clockwise direction, whereby the ratchet rod is moved to inactive position. Preferably, the movement is synchronized with the counting period of the machine such as to move the ratchet rod to inactive position before starting the counting and the moving of the type carrying strip to print position.

Because the ratchet rod must be out of engagement during the forward movement, but in engagement during return to starting position, it is necessary that the cam piece 48 release its engagement with the lever 43 during the last part of this return period. Therefore, the length of the cam piece is regulated such as to release the lever in its end position. The end and release positions are drawn with full lines in Figure 3.

However, the ratchet rod must, in this position, still remain in inactive position, and this end of the cam piece, therefore, carries a pin 49 engaging the branch 40 of the lever 38.

Consequently, the lever 38 engages the lug 36 and maintains the ratchet rod in inactive position, but releases the ratchet rod as soon as the return movement starts. However, the lever 43 is then rocked in the opposite direction and also does not support the ratchet rod in inactive position.

In the adding machine structure as disclosed, the cam piece is keyed to a shaft 50, which in Norwegian Patent

No. 72,027 is designated "the main shaft 12." This shaft 50 always has a full movement at registering and adding, i. e. independent of the registered amount.

The general mode of operation will next be explained in detail.

When counting, the cam piece 48 is moved as aforesaid, whereby the ratchet rod is moved to inactive position. It is now assumed that the digit five is to be accumulated, printed and indicated, due to operation of the corresponding key five for the desired digit.

In the starting position, as mentioned above, and as is readily apparent in the drawings, the indication dial wheels 23 and 31 are locked by said ratchet rod being engaged between two teeth on the periphery of the pin wheel 18.

When now moving the parts of the machine from their starting position, the ratchet rod 34 is immediately moved to the left and out of engagement with the pin wheel 18 by the cam 48 engaging the lever 43. Thereby, the pin wheel 18 is moved by the spring 21 in a clockwise direction, until the pin 20 engages the peg 19.

This position, in which the ratchet rod releases the pin wheel 18, is regulated so as to correspond to or to be located before the zero position of the machine, i. e. the position in which only zeros are printed. This position may also be designated the synchronizing position, because different parts of the adding machine move to synchronizing engagement or release in said position. Thus, the adding machine as disclosed in Norwegian Patent No. 72,027 is in this position moving its accumulator mechanism to mesh with the tooth segments, when the accumulator gears, in order to print total or subtotal, are to move the type carrying strips to print position for printing the result.

The types for zero upon the type carrying strips and the image for zero upon the indicating dial wheels 23 and 31 are now located in print position and indicating position, respectively.

The toothed sector 1, the type carrying strip 4, and the cam piece 48, are now each moved over an angle corresponding to the toothed sector 1 being moved a number of teeth corresponding to the digit listed. Hereby, the type strip 4 as well as the indication dial wheels 23, 31 are moved to a position in which the corresponding type (the digit five) and the corresponding digit image are moved to print position and indicating positions respectively.

The movement of the toothed sector 1 is stopped in a manner not shown upon the drawings, as soon as this position is reached. The stoppage is controlled by the keys on keyboard. This corresponds to said member being moved five teeth spacings from the zero position when the digit five is to be accumulated, printed and indicated.

However, the cam piece 48 is not stopped, but is further moved until said cam piece is moved to a position corresponding to more than nine teeth from the starting position. This member always moves the same distance, irrespective of the digit listed. Due to the cooperation of the two rocking levers 36 and 43 and their cam piece 48 and pin 49, the ratchet rod 34 will be moved to and be maintained in inactive position.

It is seen in Figure 1 that the transmission between the different gears and toothed wheels in the coupling and drive is regulated such as to move the pin wheel 18 one tooth distance when the meshing gear 11 is moved one tooth distance, the former having a greater linear distance between its teeth than the latter. In other words, the ratchet rod 36 engages between two teeth at the periphery of the pin wheel 18 and traps or locks this wheel at a distance corresponding to five teeth from the zero position. Thereby, the digit image five will also be moved to and appear in the windows 26 and 33.

During return to the starting position, the cam piece 48 is now positioned on the opposite side of the lower branch

of the rocking lever 43, whereby the rocking lever 43 is rocked by the cam piece 48 in the opposite direction such as to release the engagement between the lugs 36, 37. During return to the zero position the rocking lever 38 will also be located in inactive position. The cam piece 48 releases its engagement with the lever 43 before reaching the end position as aforesaid, and said lever, therefore, rocks back into the starting position.

When the machine during its return passes the position for the digit five, the toothed sector 1 also starts to retract. The drive gear 11 and the transmission gear 14 retract correspondingly, and so also the peg wheel 15. But because of the one way coupling between the peg and the pin, and also because the ratchet rod 34 locks the pin 18, this wheel and consequently the indicating dial wheels 23, 31 remain in indicating position when the peg 19 is moved in clockwise direction.

During the return, the accumulator gear 3 also meshes with the toothed segment 1.

The indicated digit remains visible, locked by the ratchet rod 34, until said rod is moved to inactive position in a new printing, counting and indicating cycle, as the peg wheel 15 remains in zero position, the release of said peg wheel permits the spring 21 to urge the pin to engage the peg. It is obvious that device is set to let the images of zero be visible in the windows 26, 33 in zero position.

While now referring specifically to Figure 4, it appears from this figure how the indicating mechanism is located on an adding machine embodied as a cash register. This machine is a so-called "full keyboard" adding machine by being provided with one key for each cipher to be listed. In the embodiment as disclosed, there are thus seven digit key rows 51, and a character key row 52. The latter key is used for printing certain marks on the control tape roll running over a roll 53.

Normally, the machine is covered by a main casing not shown upon the drawings.

It appears from the embodiment as shown that the window 26 is located towards the operator, that is the shop clerk, and indicates in the same direction as the key board, while the window 33 is located towards the front of the register, that is towards the customer.

Hereby, it is obtained that the window 33 indicates the listed amount to a customer at the outer side of the shop counter, while the amount cashed also is visible to the sales clerk, i. e. through the window 26.

When used in another embodiment of a printing adding machine, it is obvious that this location of the indication dials also will be preferred, while perhaps modifying the device such as to suit the construction of the adding machine in question, for which the device is to be used.

Thus, it should be noted that the coupling of the device when used in connection with the adding machine as disclosed in Norwegian Patent No. 72,027, should be given a certain clearance ahead of the zero position to allow for the suppression of zeros, as well as to allow for the movement of the carry over mechanism, the latter being arranged in a special manner in said machine.

It appears further from Figure 4 that when more than one digit as set forth above, is to be indicated, the different transmission and coupling gears for the further digits are mounted coaxially on the respectively spindles and shafts in the mechanism. It should be unnecessary to discuss how such multiplication of the digit indication mechanism is obtained.

Figure 5, which is a timing diagram, illustrates in the first line that the shaft 50 of the adding machine proper moves in a counter-clockwise direction from its starting position through an angle of 120° to a turning point and then returns in clockwise direction back to its starting position. In the actual adding machine the movement is in a sequence of steps, each consisting of an angle of 10°, there being a total of twelve steps. The first step is the synchronizing step, whereupon follows a movement to

zero position as a second step, nine counting steps, and a zero suppressing step.

In the second line the dial wheels are locked during the first step and during all return movement.

The third row shows that the springs are active during the second step and during the return movement.

There will now be obvious to those skilled in the art many modifications and variations, utilizing the principles set forth and realizing many or all of the objects and advantages of the apparatus described but which do not depart essentially from the spirit of the invention.

What I claim is:

1. Digit indicating apparatus comprising toothed control means, a set of digit indicating wheels, first and second gear trains, first and second gear wheels including teeth, a spindle, a spiral spring, said first and second gear wheels being arranged in spaced relationship on said spindle to be freely rotatable thereon, said first gear train coupling said first gear wheel to said toothed control means to rotate said gear wheel in accordance with the movement of said control means, said second gear train coupling said second gear wheel to said set of digit indicating wheels, a first abutment on said first gear wheel, a second abutment on said second gear wheel, said first and second abutments being adapted for engagement so as to allow said second gear wheel to be forced in one direction by interengagement between said first and second abutments and to allow said second gear wheel to remain in its position by movement of said first gear wheel in the opposite direction, said spiral spring being coiled around said spindle between said first and second gear wheels and secured at opposite ends to a respective one thereof so as to urge said first abutment releasably against said second abutment, ratchet means, means for moving said ratchet means to active and inactive positions, said ratchet means engaging in said active position between two adjacent teeth on the circumference of said second gear wheels, means for moving said ratchet means to said active position by the movement of said control means in a predetermined one of two opposite directions and to said inactive position by movement of said control means in the opposite direction, a second spindle, said set of indicating wheels being freely mounted on said second spindle, two levers freely mounted in spaced axial relationship on said spindle at their inner ends, the outer ends of said levers carrying said ratchet means, a first lug on the outer end of one of said levers, a lever arm system, and a second lug in said lever arm system and controlled by the direction of movement of said reciprocal control means, said first lug engaging said second lug in the inactive position of said ratchet means.

2. A digit indicating apparatus according to claim 1, wherein said lever system comprises two double arm rocking levers, a stud rockably supporting the latter said lever, a cam for engaging the ends of said levers, a reciprocal-shaft drive means supporting said cam and arranged for imparting a reciprocal movement over a constant angle to the shaft during an indicating cycle.

3. A device according to claim 2, wherein said cam engages one of the latter said levers for movement towards engaging position, said cam having an abutment at its forward end for engaging said other of the latter said lever while simultaneously releasing said one lever which is thereby enabled to swing in opposite, releasing direction.

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