United States Patent

Hennessy

[15] **3,642,108**

[45] **Feb. 15, 1972**

[54] COIN TOTALIZING APPARATUS

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[73] Assignee: **The Vendo Company**, Kansas City, Mo.

[22] Filed: **July 7, 1970**

[21] Appl. No.: **52,805**

[52] **U.S. Cl.** ..... **194/1 L**

[51] **Int. Cl.** **G07f 5/08**

[58] **Field of Search** ..... 194/9 R, 1 M, 10, 1 L, 1 N

[56] **References Cited**

UNITED STATES PATENTS

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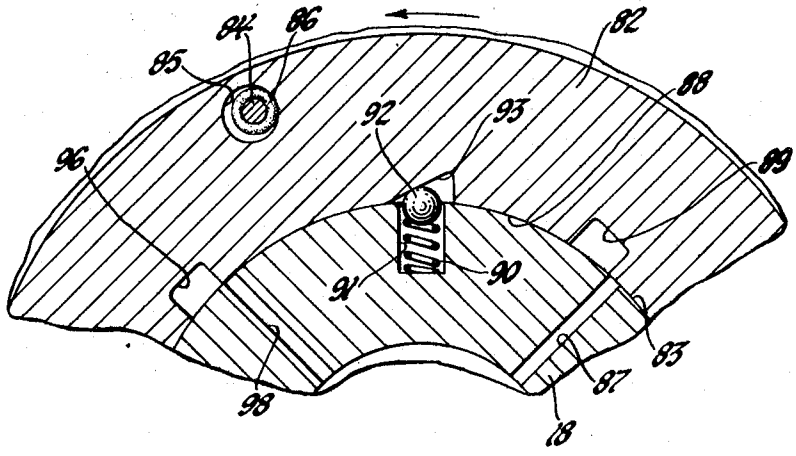
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[57] **ABSTRACT**

In an electromechanical coin totalizer, an escapement mechanism controls the movement of a totalizer arm in response to the deposit of coins of different denominations. The mechanism includes a first, fixed row of teeth on the arm and a second row of teeth shiftably carried by the arm for limited movement of the two rows of teeth relative to each other. The deposit of a coin of the largest denomination accommodated by the totalizer releases the totalizer arm and causes a retainer to engage and hold the second row of teeth to limit the movement of the totalizer arm, whereupon the second row is then released for return movement to its normal disposition in relation to the first row and the totalizer arm is relocked after having shifted through a displacement representing the value of such coin. When coins of lesser denomination are deposited, the first row is employed to control incremental movement of the arm.

8 Claims, 11 Drawing Figures



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SHEET 1 OF 2

Fig.2.

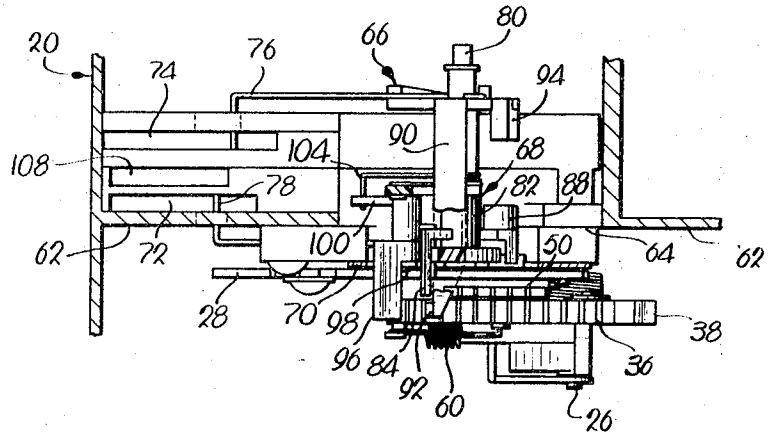


Fig.1.

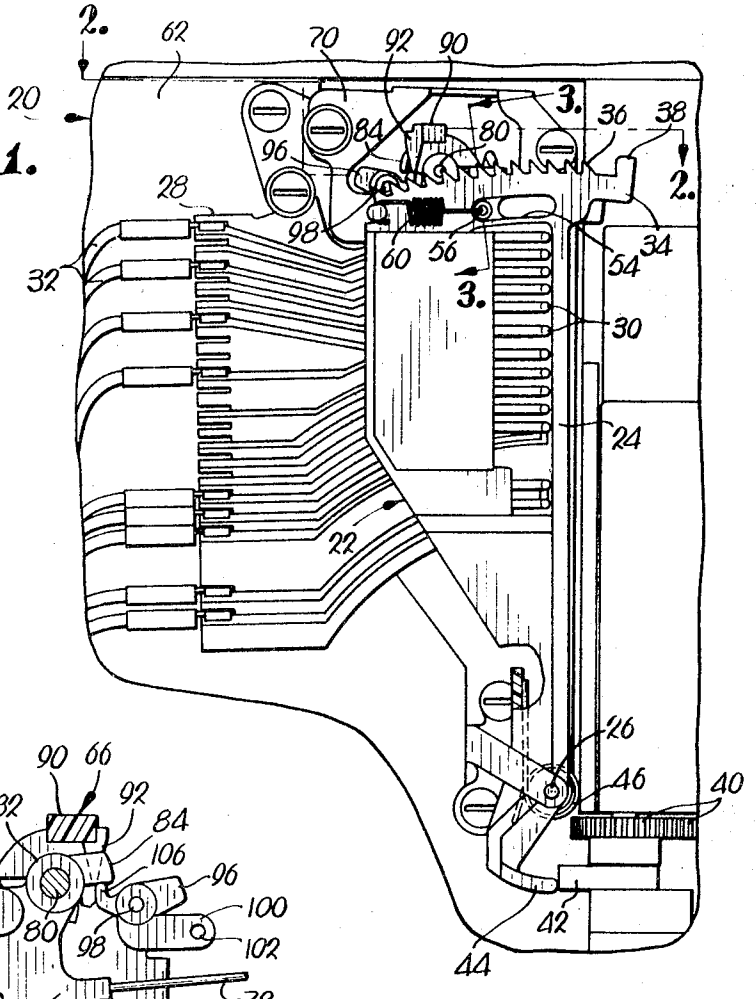


Fig.3.

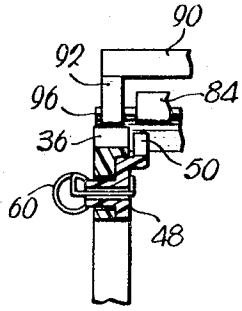
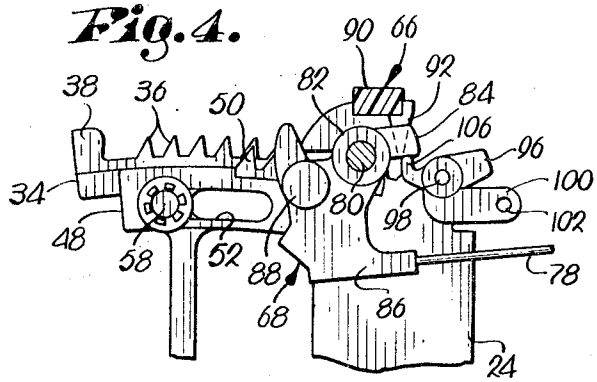


Fig.4.



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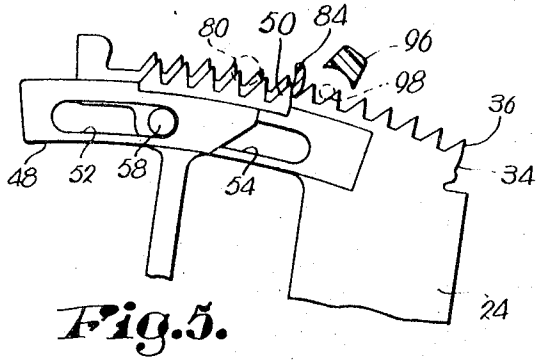


Fig.5.

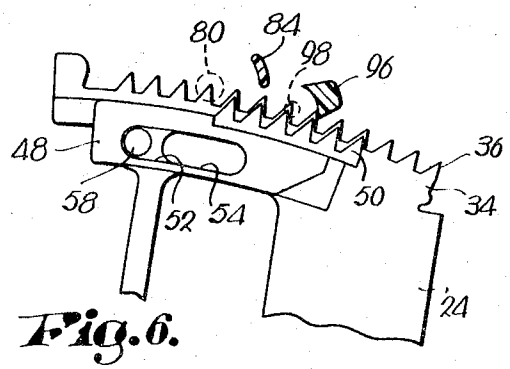


Fig.6.

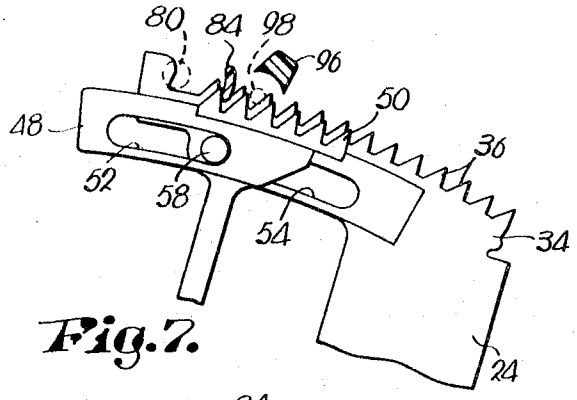


Fig.7.

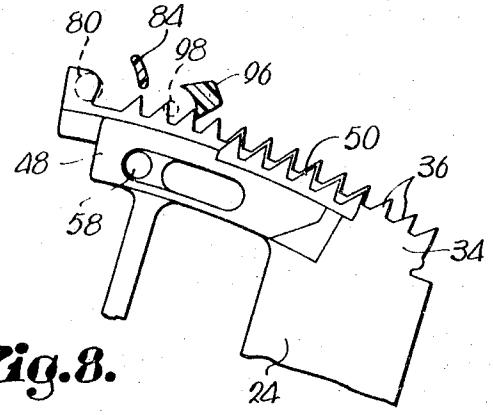


Fig.8.

Fig.9.

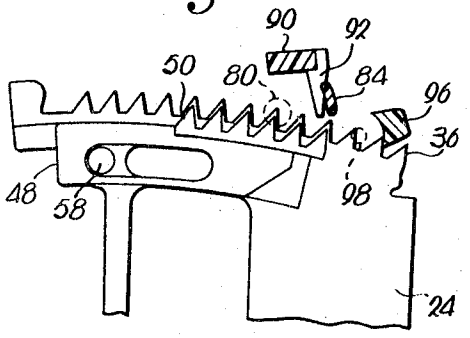


Fig.10.

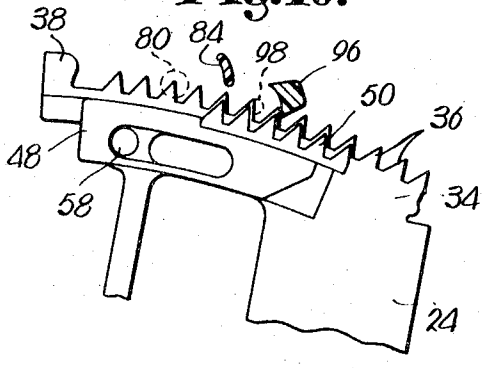
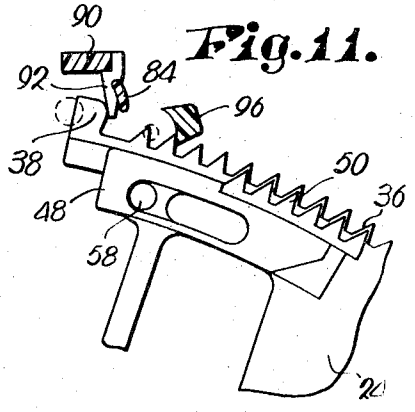


Fig.11.



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COIN TOTALIZING APPARATUS

This invention relates to coin totalizers for vending machines and other applications requiring the totalization of deposited coinage and, in particular, to an improved coin operated escapement mechanism for controlling the movement of a totalizer arm.

U.S. Pat. No. 3,406,803, to Offutt et al., owned by the assignee herein, discloses a coin-operated escapement mechanism which is utilized to control a totalizer rotor or arm forming a part of an electromechanical coin totalization arrangement. Although quite satisfactory from an operational standpoint, the mechanism in such patent is inherently limited with respect to the maximum value of coinage that may be totalized since no means is provided to accumulate the value of over one coin of the largest denomination accommodated (a U.S. quarter). Furthermore, the deposit of a quarter causes complete release of the totalizer arm for movement to its position of maximum displacement, thereby preventing the totalizer from accumulating the value of a quarter in combination with any coins of lesser value.

It is, therefore, the primary object of the present invention to provide a coin-operated escapement mechanism for controlling the movement of a totalizer arm wherein the mechanism is capable of responding to the successive deposit of coins of the largest denomination handled by the totalizer, as well as the deposit of coins of a lesser denomination.

As a corollary to the foregoing object, it is an important aim of this invention to provide such a mechanism which is also capable of responding to the deposit of the coin of largest denomination in combination with a lesser coin in any order.

Other objects and advantages of the invention will become clear as the detailed description proceeds.

In the drawings:

FIG. 1 is a front view of a portion of a coin changer and acceptor, showing the totalizer escapement mechanism of the present invention;

FIG. 2 is a horizontal sectional view taken along line 2—2 of FIG. 1, certain parts being broken away for clarity;

FIG. 3 is an enlarged, fragmentary, cross-sectional view taken along line 3—3 of FIG. 1;

FIG. 4 is an enlarged, detail view of the escapement mechanism looking from the rear with respect to the changer and acceptor, the nickel actuated device being broken away and a portion thereof revealed in cross section;

FIG. 5 is a view similar to FIG. 4 but showing the mechanism at the time of deposit of a quarter, all components of the coin-responsive devices being broken away except those parts that cooperate with the two rows of teeth in order to clearly show the relationship between such parts and the teeth;

FIG. 6 is a view similar to FIG. 5 showing the mechanism after totalization of the quarter has been completed;

FIG. 7 is a view analogous to FIG. 5 and shows the mechanism upon deposit of a second quarter;

FIG. 8 is a view analogous to FIG. 6 showing the mechanism after totalization of the second quarter has been completed;

FIG. 9 shows the condition of the mechanism after the deposit of one nickel;

FIG. 10 shows the condition of the mechanism after the deposit of one nickel and a quarter; and

FIG. 11 shows the maximum credit condition of the mechanism.

A coin changer and acceptor 20 for use in a vending machine is shown fragmentarily in FIGS. 1 and 2 and comprises a conventional acceptor mechanism and a coin totalizer which are utilized in conjunction with change payout apparatus (not illustrated). A totalizer member in the nature of a rotor 22 includes an upright arm 24 swingable about a pivot 26 located adjacent its lower end. The pivot 26 defines a horizontal axis, thus the arm 24 swings in a vertical plane across a vertically disposed printed circuit board 28. The arm 24 carries a number of wipers 30 which make contact with the conductive lands on the circuit board 28, connections to the circuit pattern being made via leads 32 which extend to the

control circuitry (not shown) of the vending machine. The circuit pattern on the board 28 and the manner in which an electrical vend command is initiated and change determined forms no part of the present invention; thus the details of the circuit pattern are not illustrated. For an example of a circuit arrangement suitable for use, with appropriate modification, in conjunction with the totalizer member 22, reference may be made to the aforesaid patent.

The upper end of the totalizer arm 24 is provided with an arcuate peripheral portion 34 having a radius which extends through the axis defined by the pivot 26. Thus, the peripheral portion 34 describes an arc of an imaginary circle having its center at the pivot 26. A row of 13 teeth 36 is formed on the peripheral portion 34, the last tooth 36 being spaced from a stop 38. In this respect, the leftmost tooth 36 will be referred to herein as the lead tooth, since forward motion of the arm 24 is in a counterclockwise sense about the pivot 26 as viewed in FIG. 1. The totalizer member 22 is shown in FIG. 1 in its standby, zero credit position prior to deposit of coinage.

The motor that drives the change payout apparatus is not illustrated but would be located to the right of the fragmentary showing of FIG. 1. Accordingly, the gears 40 transmit drive to a return cam 42 which is engageable with a lateral projection 44 on the lower end of the arm 24 beneath the pivot 26. A spring 46 yieldably biases the arm 24 in the counterclockwise direction, it being appreciated that cam 42 thus acts against the bias of the spring 46 in returning the totalizer member 22 to its standby position. It should be understood that, although the lobe of the return cam 42 is shown in FIG. 1 engaging the projection 44 on the arm 24, the lobe would be rotated to a disposition out of engagement with the projection 44 before the end of the vend cycle in order to free the arm 24 for counterclockwise rotation the next time coinage is deposited, as will now be described.

Rotation of the totalizer arm 24 is controlled by an escapement mechanism at the upper end of the arm 24. An arcuate segment 48 is provided with a row of six teeth 50 and is mounted on the arcuate peripheral portion 34 of arm 24 in parallel relationship thereto. The segment 48 is longitudinally slotted at 52 and the portion 34 is correspondingly slotted at 54. A pair of pins 56 and 58 on the segment 48 and the portion 34 extend through slots 54 and 52 respectively, thereby permitting relative movement of the arm 24 and the segment 48 through a predetermined, limited distance. This distance is somewhat less than the value of the coin of largest denomination accommodated by the apparatus which, in the instant example, is a U.S. quarter. A return spring 60 secured to the arm 24 is connected to the pin 56 projecting from the segment 48 in order to yieldably hold the segment 48 in the normal disposition thereof relative to arm 24 best illustrated in FIGS. 4 and 6.

The housing structure of the coin changer has a vertical wall 62 provided with an opening 64 which facilitates the mounting of a nickel-responsive device 66 and a quarter-responsive device 68 forming a part of the escapement mechanism. A mounting plate 70 supports the devices 66 and 68 and is secured in spaced relationship to the wall 62 with the devices 66 and 68 extending into and through the opening 64. Partition structure behind the wall 62 defines a vertically extending quarter coin channel 72 adjacent the wall 62, and a vertically extending nickel coin channel 74 spaced rearwardly of the wall 62. A nickel coin feeler 76 of the device 66 is of L-shaped configuration and projects into the nickel channel 74. Likewise, an L-shaped quarter coin feeler 78 of the device 68 extends through the wall 62 into the quarter coin channel 72.

The mounting plate 70 supports a horizontal shaft 80 upon which both of the devices 66 and 68 are rotatably mounted. The quarter-responsive device 68 has a hub 82 (FIG. 4) rotatable on the shaft 80. An L-shaped retainer 84 integral with the hub 82 projects radially therefrom and then parallel with the axis of the shaft 80 as is clear in FIG. 2. An integral leg 86 depends from the hub 82 and mounts the quarter coin feeler 78. A counterweight 88 on the upper portion of the leg

86 places a counterclockwise bias on the device 68 as viewed in FIG. 4.

The nickel-responsive device 66 has a horizontal bar 90 spaced above shaft 80 and hub 82 and extending parallel to the axis of shaft 80 generally toward the peripheral portion 34 of the totalizer arm 24. A pawl 92 is provided on the forward end of the bar 90 and is aligned with the row of teeth 36. The retainer 84, however, extends only to a location overlying the teeth 50 of the arcuate segment 48, thus the pawl 92 and the retainer 84 are disposed for engagement with the teeth 36 and the teeth 50 respectively. A counterweight 94 also biases the nickel-responsive device 66 in a counterclockwise sense about the axis of the shaft 80, as viewed in FIG. 4.

A rocker catch 96 is mounted on a pivot 98 and projects in front of the lead tooth 36 of the totalizer arm 24, as is clear in FIGS. 1 and 2. Accordingly, the catch 96 forms a locking element which in the standby condition of the totalizer holds the arm 24 in the position illustrated in FIGS. 1, 2 and 4 by engagement of the free end of the catch 96 with the lead tooth 36. A crank arm 100 is integral with the hub portion of the rocker catch 96 and has an aperture 102 therein receiving one end of a spring 104 mounted on the shaft 80. The spring 104 biases the catch 96 in a clockwise sense about the pivot 98 (FIG. 4) to yieldably hold the catch 96 interlocked with one of the teeth 36, depending upon the position of the totalizer arm 24. A finger 106 integral with the catch 96 may be seen in FIG. 4 in underlying engagement with the retainer 84 of the quarter-responsive device 68. The finger 106 is also in underlying engagement with an adjacent portion of the nickel-responsive device 66 so that actuation of either of the devices 66 or 68 causes the finger 106 to be depressed, thereby rotating the catch 96 upwardly clear of the teeth 36.

In illustrating the operation of the escapement mechanism it will first be assumed that a quarter has been deposited. The quarter coin, after being validated in the acceptor, gravitates therefrom along the quarter channel 72 and strikes the quarter coin feeler 78. As viewed in FIG. 4, this rotates the retainer 84 clockwise with the feeler 78 to shift the retainer 84 downwardly to a location in front of the lead tooth 50 of the segment 48. This is depicted in FIG. 5 where it may also be seen that the catch 96 has been rotated in a counterclockwise sense into clearing relationship to the teeth 36 on the totalizer arm 24. This action occurs by virtue of the location of the finger 106 beneath the retainer 84, the finger 106 being depressed as discussed above whenever either of the devices 66 or 68 is actuated. In FIGS. 5–11 the shaft 80 and the pivot 98 are shown in phantom lines to illustrate the axis of rotation of the retainer 84 and the pawl 92, and the axis of rotation of the catch 96.

From viewing FIG. 5 it may be appreciated that the totalizer arm 24 has been allowed to swing in a clockwise direction through a displacement somewhat greater than that permitted by the slots 52 and 54 and the pins 56 and 58. At the moment that the quarter coin feeler 78 was struck by the quarter coin the catch 96 was raised clear of the lead tooth 36 while the retainer 84 was simultaneously lowered to a position directly in the path of travel of the teeth 50 of the segment 48. After a short distance of travel of the arm 24 and the segment 48 in unison, the lead tooth 50 was brought into engagement with the retainer 84 and subsequent movement of the totalizer arm 24 was permitted by the slot 52. It should be noted in this respect that the spring 46 biasing the arm 24 is stronger than the return spring 60 that biases the segment 48. Accordingly, while the quarter coin feeler 78 is still depressed, the totalizer ultimately assumes the condition illustrated in FIG. 5. As the feeler 78 returns to its normal position under the action of the counterweight 88 as the quarter passes on down the channel 72, the retainer 84 likewise returns to its normal position as illustrated in FIG. 6. Simultaneously, of course, the rocker catch 96 is released and returns to its normal position but now in engagement with the sixth tooth 36 rather than the lead tooth 36. Accordingly, the totalizer arm 24 has advanced five teeth which corresponds to a displacement representing a value of 25 cents, each of the teeth 36 corresponding to 5 cents of credit.

The foregoing action is repeated if a second quarter is then deposited, as depicted in FIGS. 7 and 8. Again the catch 96 is raised and the retainer 84 is lowered, but the retainer 84 now engages the sixth tooth 50 of the segment 48 due to the previous five-tooth displacement of the totalizer arm 24. FIG. 8 shows the components after returning to their standby positions. The catch 96 is now in engagement with the eleventh tooth 36 of the totalizer arm 24, thus the latter has shifted through a total length of travel equal to ten of the teeth 36.

Operation in response to the initial deposit of a nickel is depicted in FIG. 9, the various components being shown after return to their normal positions following the nickel deposit. It may be seen that the catch 96 is now engaging the second tooth 36 and that, therefore, the totalizer arm 24 has advanced one tooth. At the time that the nickel was deposited and the nickel coin feeler 76 struck by the gravitating coin, the pawl 92 shifted downwardly between a pair of adjacent teeth 36 to permit the lead tooth 36 to advance beyond the catch 96, the latter having been raised clear of the teeth 36 simultaneously with downward movement of the pawl 92.

FIG. 10 illustrates that the mechanism is capable of totalizing a combined deposit of a nickel and a quarter as well as the successive deposit of two quarters previously illustrated in FIGS. 7 and 8. When the quarter was deposited after the establishment of 5 cents of credit, the retainer 84 shifted downwardly to a position between the first and second teeth 50 of the segment 48. Otherwise, the operation in crediting the 25 cents was the same as previously described.

The totalizer illustrated herein has a total credit capacity of 55 cents, this being shown in FIG. 11 where it may be seen that an appropriate combination of deposited coinage has released the arm 24 for movement limited only by engagement of the stop 38 with the nickel pawl 92, which serves to limit the movement of the arm 24 since it is disposed directly in the path of the raised stop 38. Additional teeth may be added to the peripheral portion 34 of the arm 24 and to the arcuate segment 48 in order to increase the amount of credit that may be accumulated. Furthermore, it may be seen in FIG. 2 that an additional coin channel 108 is provided which may be utilized to accommodate a coin of another denomination, such as a dime. In practical utilization of the invention the capability of totalizing dime deposits will oftentimes be desired, in which case a dime-responsive device would be added to the escapement mechanism and permit movement of the totalizer arm 24 a distance equal to two teeth 36 each time a dime is deposited. An exemplary device suitable for this purpose is shown and described in the aforesaid patent. In FIG. 11, for example, the 55 cents of credit could be the result of a deposit of a quarter and three dimes, as might be the case in a vending machine where the customer desired a 50 cent product and did not have exact change.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In apparatus for totalizing the value of deposited coinage:

a first totalizer member shiftable in a direction away from a standby, zero credit position, the length of travel of said first member away from said position being proportional to the established credit;

a second totalizer member shiftably carried by said first member for limited movement of the members relative to each other;

a shiftable locking element normally engaging said first member and holding the same against movement in said direction;

a coin actuatable device having a feeler engageable by said coin of predetermined denomination upon deposit thereof, means responsive to engagement of said feeler by said coin for effecting disengagement of said element from said first member to release the latter for movement in said direction through a predetermined displacement representing the value of said coin, and a shiftable

retainer operable to engage and hold said second member during movement of the released first member to limit movement thereof in said direction; and

means biasing said second member in said direction to return the second member to its normal disposition relative to the first member upon release of the second member by disengagement of said retainer therefrom.

2. In apparatus as claimed in claim 1,

said second member being mounted on said first member.

3. In apparatus as claimed in claim 1,

said first member including an arm swingable in said direction about a pivotal axis,

said arm having an end remote from said axis provided with an arcuate peripheral portion disposed for engagement by said locking element and having a radius extending from said axis,

said second member being mounted on said arm adjacent said peripheral portion.

4. In apparatus as claimed in claim 1,

each of said first and second members having spaced teeth disposed for successive engagement by said locking element and said retainer respectively upon the deposit of more than one of said coins,

the spacing between successively engaged teeth on said first member being equal to the spacing between successively engaged teeth on said second member.

5. In apparatus as claimed in claim 1,

each of said first and second members having a row of teeth disposed for engagement by said locking element and said retainer respectively and permitting increments of movement of said members in said direction corresponding to the value of a coin of a second, lesser denomination; and

a second coin actuatable device having a feeler engageable by said coin of lesser denomination upon deposit thereof,

a pawl shiftable to a momentary position between a pair of adjacent teeth of said first member in response to engagement of said feeler of the second device by said coin of lesser denomination, and means effecting disengagement of said locking element from said first member as the pawl assumes said momentary position to release the first member for movement in said direction until the first member is stopped by said pawl.

6. In apparatus as claimed in claim 5,

the number of teeth in each of said rows thereof corresponding to said displacement being equal to the common denominator of both of said denominations.

7. In apparatus as claimed in claim 6,

the total number of teeth of said second member being sufficient to provide a tooth for engagement by said retainer upon the deposit of two coins of said predetermined, larger denomination in succession,

said first member having at least twice as many teeth as said second member.

8. In apparatus as claimed in claim 5,

said first member including an arm swingable in said direction about a pivotal axis,

said arm having an end remote from said axis presenting an arcuate peripheral portion provided with said teeth of the first member and having a radius extending from said axis,

said second member being of arcuate configuration and mounted on said arm adjacent said peripheral portion in parallel relationship thereto,

said rows of teeth being disposed in generally aligned, side-by-side relationship when said members are in their normal relative dispositions.

* * * * *

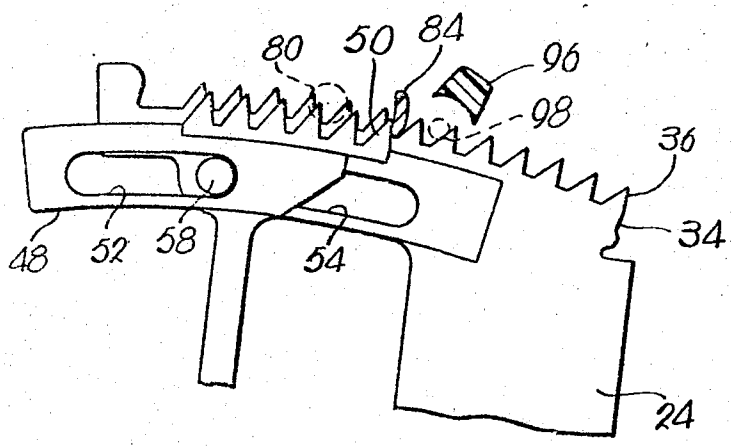
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,642,108 Dated February 15, 1972

Inventor(s) John A. Hennessy

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet the figure should appear as shown below:



Signed and sealed this 24th day of September 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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