

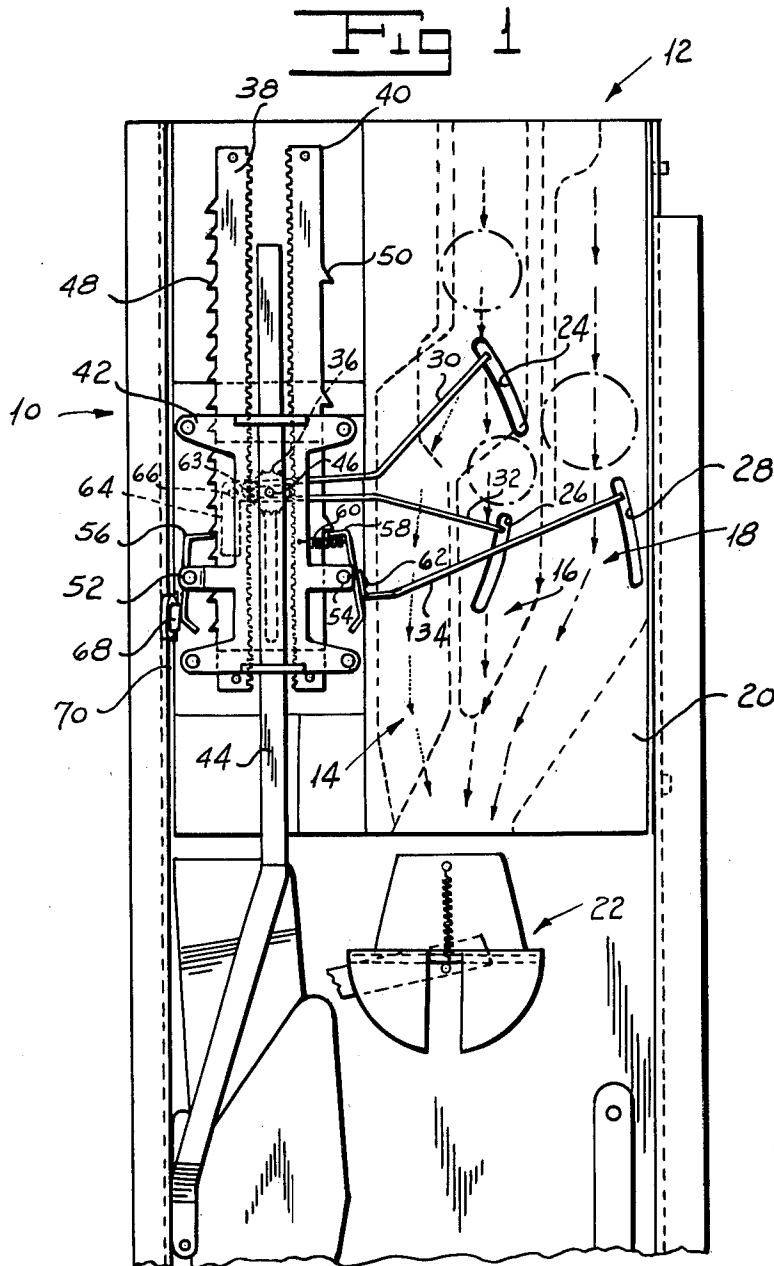
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H. D. TAYLOR
MAGNETIC BIASING MEANS

3,133,618

Filed July 25, 1960

2 Sheets-Sheet 1



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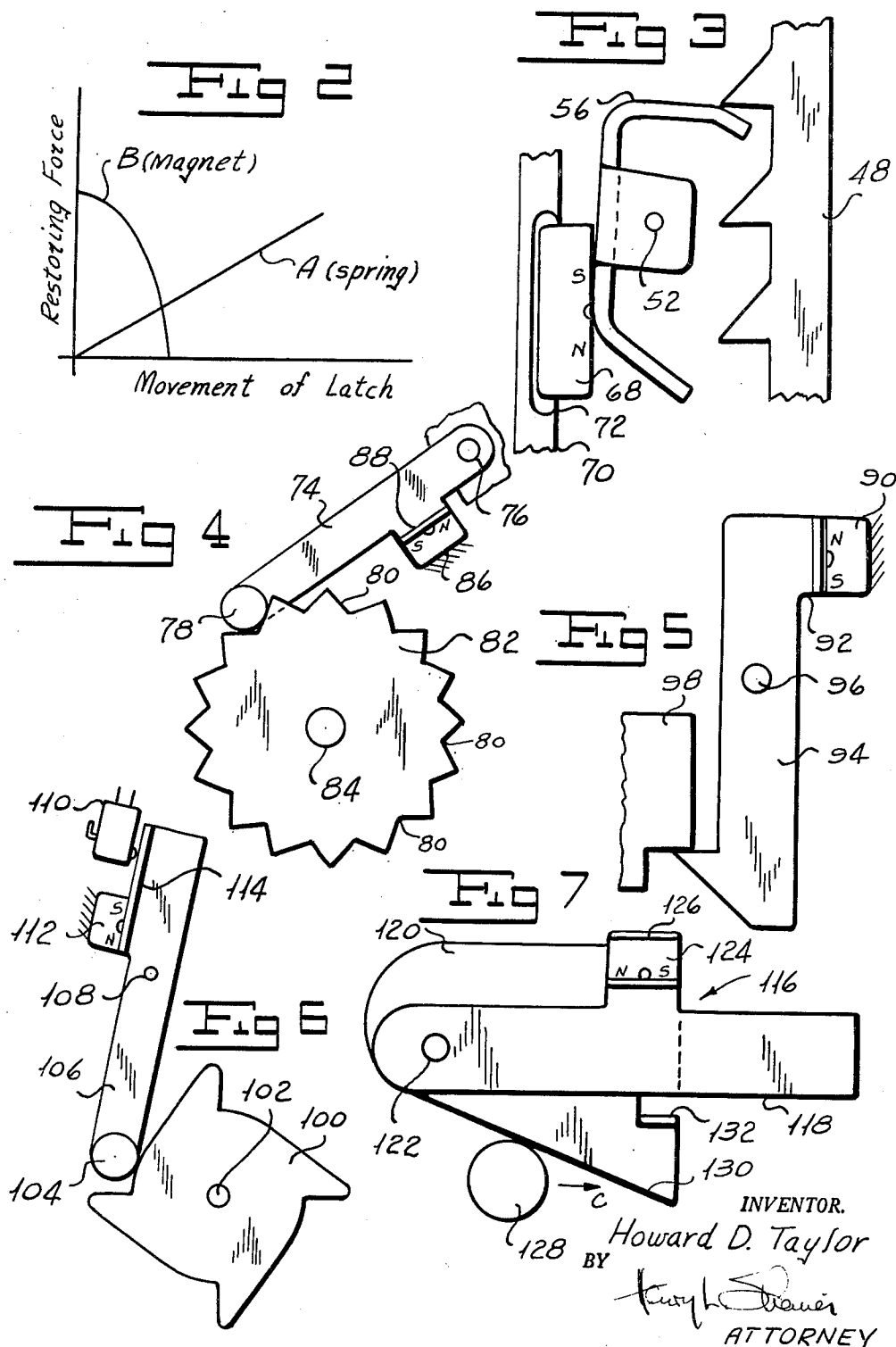
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2 Sheets-Sheet 2



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MAGNETIC BIASING MEANS

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3 Claims. (Cl. 194-18)

My invention relates to a magnetic biasing means and more particularly to a biasing means for use in an improved escapement latch of a coin totalizing mechanism of the like.

There are many instances in which a releaseable mechanism requires a large holding force and a relatively lower restoring force. The copending application of Christian Gabrielsen Serial No. 520,263 filed July 6, 1955, now Patent No. 2,957,568 discloses a Mechanical Coin Totalizer in which coins passing downwardly through the totalizer strike feelers adapted to actuate pivoted latches to permit a predetermined movement downwardly of racks to result in an aggregate movement of a rack pinion which is proportional to the sum in coins which pass through the totalizer. In the construction shown in the co-pending application springs are employed normally to bias the latches to positions at which they prevent movement downwardly of the associated racks.

In operation of the totalizer described in the co-pending application it is necessary that a latch be biased to its rack stopping position with a force sufficient to prevent it from being jarred to its released position either accidentally or intentionally by a dishonest person. While a high holding force is necessary, it is also required that a coin such as a dime for example passing through the register be able to release the mechanism. While the dime has sufficient momentum when it strikes the feeler to initiate movement of the latch to its released position, the force tending to restore the latch to its rack-locking position must not be so great as to prevent the weight of the dime from moving the latch to its fully released position. It will be appreciated, therefore, that in the operation of this escapement mechanism a holding force large enough to prevent the latch from being jarred loose must be provided and yet the restoring force must be sufficiently small to permit the latch to be moved to its fully released position by the weight of a dime. These requirements are not well satisfied by a spring since the restoring force provided by a biasing spring increases as the pivoted latch moves from its locking position to its unlocking position. Thus, if a spring sufficiently strong to provide a holding force which prevents the latch from being jarred loose is used it may be that the weight of a dime is not sufficient to move the latch to its fully released position with the result that the coin feeler catches a dime thus preventing the coin from passing through the mechanism. If on the other hand, a spring having a restoring force which is small enough to permit the latch to be moved to its fully released position by the weight of a coin such as a dime is provided, the holding force of the spring may be so small as to permit the latch readily to be jarred loose.

I have invented a magnetic biasing means which overcomes the defects of biasing means known in the prior art. My biasing means is especially adapted for use in a coin-responsive mechanism in which a large holding force and a relatively lower restoring force are required. An escapement mechanism provided with my biasing means prevents the escapement latch from being jarred loose while at the same time permitting the weight of a coin such as a dime to move the latch to its fully released position.

One object of my invention is to provide a magnetic

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biasing means which overcomes the defects of biasing means of the prior art.

Another object of my invention is to provide a magnetic biasing means which is especially adapted for use in a coin register.

A further object of my invention is to provide a magnetic biasing means for use in an escapement mechanism requiring a high holding force and a relatively lower restoring force.

Still another object of my invention is to provide a magnetic biasing means for a coin totalizer escapement to prevent the escapement latch from being jarred loose while permitting the latch to be moved by the weight of a coin to its fully unlatched position.

Other and further objects of my invention will appear from the following description.

In general my invention contemplates the provision of a magnetic biasing means for an escapement latch adapted to be released in response to the engagement of a coin with a feeler connected to the latch to permit a predetermined movement downwardly of an escapement rack associated with the latch. My biasing means normally holds the latch in its rack-stopping position with a force sufficient to prevent the latch from being jarred loose either accidentally or intentionally by a dishonest person to register a deposit of money when no deposit has been made. At the same time my biasing means permits the weight of a coin, the momentum of which has initiated movement of the latch from its released position to move the latch to its fully released position.

In the accompanying drawings which form part of the instant specification and which are to be read in conjunction therewith and in which like reference numerals are used to indicate like parts in the various views;

FIGURE 1 is a fragmentary elevation of a coin totalizer provided with my magnetic biasing means.

FIGURE 2 is a graph showing the relationship between the restoring force and the displacement of a latch for a magnet and for a spring.

FIGURE 3 is a fragmentary view illustrating the details of the form of my magnetic biasing means shown in FIGURE 1.

FIGURE 4 is a fragmentary view showing my magnetic biasing means used to bias a detent to its wheel stopping position.

FIGURE 5 is a fragmentary view showing my biasing means in use for biasing a common pivoted latch.

FIGURE 6 is a fragmentary view illustrating my magnetic biasing means used to bias a cam follower arm.

FIGURE 7 is a fragmentary view showing my magnetic biasing means used to bias a split link to its operative position.

Referring now to FIGURES 1 and 3 of the drawings, I have shown a coin totalizer indicated generally by the reference character 10 in which my magnetic biasing means has special utility. The totalizer 10 has a frame indicated generally by the reference character 12 which provides respective paths indicated generally by the reference characters 14, 16, and 18 for a nickel, a dime, and a quarter. As is explained more fully in the co-pending application referred to hereinabove, these coin paths are formed by spaced plates including an outer plate 20. For purposes of clarity I have indicated the path of a nickel by the dotted line arrows in FIGURE 1. The dime and quarter paths are indicated respectively by broken line arrows and by dot-dash arrows.

After passing through the totalizer mechanism, nickels, dimes, and quarters fall into an escrow bucket indicated generally by the reference character 22 which as is explained in the co-pending application may be operated either to accept coins or to return coins to the customer. It is to be understood of course that only good coins

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are fed to the totalizer mechanism 10 by a coin separator and slug rejecter of a suitable type known to the art. The outer plate 20 of the totalizer 10 has respective arcuate openings 24, 26, and 28. An offset portion of a feeler arm 30 extends through slot 24 into the path 14 of a nickel passing through the totalizer and through a dividing wall (not shown) into the path 16 of a dime passing through the totalizer. The offset portion of a second feeler 32 extends through slot 26 and through a slot of the dividing wall into the path of a dime passing through the totalizer. The offset portion of a third feeler arm 34 extends through slot 28 into the path 18 of a quarter passing through the totalizer.

From the structure just described it will be seen that a nickel passing through the totalizer actuates the feeler arm 30 to rotate the arm in a clockwise direction as viewed in FIGURE 1. A dime passing through the totalizer 10 first actuates the feeler 30 to rotate in a clockwise direction, and then it actuates the feeler 32 to rotate this feeler arm in a clockwise direction. A quarter passing downwardly through the totalizer actuates the feeler arm 34 to rotate this arm in a clockwise direction.

The coin totalizer shown in FIGURE 1 includes a floating pinion 36 which is engaged by a pair of racks 38 and 40 retained on the frame 12 by a plate 42. I connect a link 44 to the shaft 46 of the pinion 36. I form the racks 38 and 40 with respective escapement teeth 48 and 50. In the case where the largest denomination of coin passing through the totalizer is a quarter and the smallest denomination of coin passing through the totalizer is a nickel, the spacing between adjacent teeth 50 is five times the spacing between adjacent teeth 48.

Respective shafts 52 and 54 on the plate 42 pivotally support latches 56 and 58 normally positioned in a manner to be described hereinafter to lock racks 38 and 40 against movement. It will be understood that the racks are normally urged to move downwardly as viewed in FIGURE 1 under the influence of gravity. When the latch 56 is actuated in a manner to be described, rack 38 may move downwardly through a distance equal to the intertooth spacing of teeth 48. This produces a corresponding movement downwardly of shaft 46 and link 44. When the latch 58 is actuated once rack 40 moves downwardly under the influence of gravity through a distance equal to the intertooth spacing of teeth 50 and produces a corresponding movement downwardly of shaft 46. In this manner the link 44 has an aggregate downward movement which is proportional to the sum in coins which passes through the totalizer 10.

A spring 60 extending between the plate 42 and the latch 58 normally biases the latch to a position at which its upper arm engages a tooth 50 to lock the rack against movement. Any suitable means such for example as a screw or rivet 62 secures the feeler arm 34 to the latch 58. When a quarter traveling downwardly along its path 18 strikes the feeler 34 to move it in a clockwise direction, it moves latch 58 in a clockwise direction as viewed in FIGURE 1 to move it out of engagement with the tooth 50 to permit a predetermined movement downwardly of rack 40. After the quarter passes by the feeler 34, spring 60 moves the latch 58 to a position at which it engages the next higher tooth 50 of the rack 40.

Referring now to FIGURE 2, I have shown a curve A which illustrates the variation of the restoring force provided by a spring such as spring 60 as the latch moves from the position at which it engages a tooth 50 to its fully released position. It will be seen that as the latch moves from its latching position to its fully released position the restoring force of the spring 60 increases. I have discovered further that where a dime is the lightest coin the value of which is to be registered a spring such as spring 60 may be employed to provide a holding force for the quarter latch 58, which force is sufficient to prevent this latch from being jarred loose and still the weight of a quarter will be sufficient to move the latch

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to its fully released position against the restoring force of the spring. This same fact is true in the case of a nickel. However, as is explained hereinabove for the lightest coin such as a dime, if a spring is employed to bias the latch 56 to its locking position with sufficient force to prevent the jarring loose of the latch then the restoring force of a spring, which increases as the latch moves to its released position, may be so great as to prevent the weight of a dime from moving the latch to its fully released position after it has been initially moved from its locking position by the momentum of a dime.

I employ any suitable means such for example as a screw 63 for securing the feelers 30 and 32 to one arm of a bell crank 64 pivotally supported on a shaft 66 carried by the frame 12. When either of the feelers 30 and 32 moves in a clockwise direction, it also moves bell crank 64 in a clockwise direction to cause its other arm to strike the latch 56 to move the latch in a counterclockwise direction to its released position.

As has been explained hereinabove, I have discovered that a spring does not provide a suitable means for biasing a member such as the latch 56 to its rack-locking position. Either the holding force of the spring will not be sufficient to prevent the latch from being jarred loose or the restoring force of the spring will be too great to permit the weight of a dime in engagement with one of the feelers 30 and 32 to move the latch 56 to its fully released position. I mount a permanent magnet 68 on a side flange 70 of the frame 12 by any suitable means as by disposing the magnet 68 in a recess 72 in the flange. I form the latch 56 of magnetic material and so position the magnet 68 that it tends to rotate latch 56 in a clockwise direction to a position at which its upper arm engages a tooth 48 of the rack 38. With this arrangement when a dime strikes either the feeler 30 or the feeler 32 its momentum is sufficient to initiate movement of the lower arm of the latch 56 away from the magnet 68.

Referring again to FIGURE 2 it will be seen from the curve B that as the lower arm of the latch 56 moves away from the magnet 68 the restoring force exerted by the magnet decreases with the result that the weight of the dime is sufficient to move the latch to its fully released position. After the dime passes by the feelers 30 and 32 the magnet restores the latch 56 to its rack-locking position and it holds the latch in this position with sufficient force to prevent the latch from being jarred loose either accidentally or intentionally by a dishonest customer. It will be apparent that the same operation takes place when a nickel, a heavier coin, actuates the feeler 30. It will be understood also that as is explained hereinabove while a spring such as the spring 60 may be employed to bias the latch 58 associated with a quarter, the heaviest coin, I could as well employ a permanent magnet to bias the magnet 58 to its rack-locking position.

Referring now to FIGURE 4, I have shown my biasing means used to bias a detent arm 74 pivotally supported on a shaft 76 to a position at which a detent or roller 78 rests in a recess 80 of a wheel 82 carried by a shaft 84. In this embodiment the permanent magnet 86 acts on a magnetic flange or tab 88 formed on the arm 74. This arrangement is applicable to a situation in which the detent pin 78 should hold the wheel 82 against rotation with a force sufficient to prevent accidental rotation of the wheel while at the same time permitting a relatively lower force to complete a step of movement of the wheel once this step has been initiated.

In FIGURE 5 I have shown a permanent magnet 90 acting on a magnetic offset 92 formed on one end of a latch 94 pivotally supported on a pin 96. The other end of the latch 94 normally engages a stop 98. Magnet 90 exerts a force sufficient to prevent the latch 94 from being jarred loose while at the same time permitting a relatively lower force to complete movement of the latch to its released position once its movement in this direction has been initiated.

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FIGURE 6 shows another arrangement in which a cam wheel 100 carried by a shaft 102 may be driven to act on a follower 104 to pivot a follower arm 106 about a pin 108 to move the other end of the arm out of engagement with a switch 110. In this form of the invention a permanent magnet 112 acts on a magnetic offset 114 normally to position the arm in engagement with the switch. As is the case with the other forms of my invention in this embodiment magnet 112 exerts a force sufficient to prevent the arm 106 to be jarred to a position at which it is out of engagement with switch 110 and at the same time permits a movement of the arm to be completed in response to a relatively low driving force on cam 100 once movement of the arm has been initiated.

Referring now to FIGURE 7, I have shown a split link, indicated generally by the reference character 116, made up of link portions 118 and 120 pivotally connected by a pin 122. A permanent magnet 124 carried by one of the portions 118 and 120, such for example by the portion 118, acts on a magnetic flange 126 normally to hold the link portions in the relative position shown in the drawings. A drive pin 128 adapted to be driven by any suitable means (not shown) in the direction of the arrow C may engage the underside 130 of link portion 120 to cause the assembly of link portions 118 and 120 to be driven to the right as viewed in FIGURE 7. Magnet 124 holds the link portions together with a force sufficient to prevent them from accidentally being separated. However, once movement of the links away from each other has been initiated as by a relatively large instantaneous force supplied by pin 128, the magnet 124 permits separation of the links to be completed by a relatively lower force. A stop 132 on link portion 120 limits the movement of the link portions away from each other.

In the operation of the coin totalizer mechanism shown in FIGURE 1, quarters coming from a coin separator and slug rejector (not shown) of a suitable type shown to the art pass through the totalizer 12 along the dot-dash line path 18. In the course of their travel they engage the feeler 34 to pivot the feeler in a clockwise direction to move the latch 58 against the action of spring 60 to permit rack 40 to move downwardly. When the quarter passes by the feeler, spring 60 returns the latch to cause it to engage the next uppermost tooth 50 to stop the rack 40. This movement of the rack 40 is translated to shaft 46 through pin 36. A quarter is sufficiently heavy that it can move the latch 58 to its fully released position against the restoring force of a spring which provides a sufficiently strong holding force to prevent jarring loose of the latch 58.

A dime entering the totalizer mechanism 10 travels along the broken line path 16 successively to engage feelers 30 and 32. The momentum of a dime traveling along this path is sufficient to cause the bell crank 64 to initiate movement of the latch 56 in a counterclockwise direction away from the magnet 68. Once this movement has been initiated as is illustrated by the curve B in FIGURE 2 the restoring force of the magnet decreases as the latch moves away from the magnet so that the weight of the dime is sufficient to move the latch 56 to its fully released position to permit a step downward of rack 38. While the restoring force is sufficiently weak to permit the weight of the dime to move the latch to its fully released position, the holding force provided by the magnet when the latch 56 is in its latching position is sufficiently strong to prevent the accidental or intentional jarring loose of the latch. This same action takes place when the dime engages feeler 32 and when a nickel traveling through the mechanism 10 along the dotted line arrow path strikes the feeler 30. As a result of this operation, the totalizer 10 produces an aggregate movement proportional to the sum in coins passing through the totalizer, and it is not readily made to register deposits when no such deposits have been made when the machine is for example shaken or jarred.

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The forms of my invention shown in FIGURES 4 to 7 operate in a manner similar to that described in connection with the form of my invention shown in FIGURES 1 to 3. Once movement of the locking or latching member has been initiated it continues its movement to the fully released position in response to a force which is less than the holding force provided by the latching or biasing magnet.

It will be seen that I have accomplished the object of my invention. I have provided a magnetic biasing means which overcomes the defects of biasing means of the prior art. My magnetic biasing means is especially adapted for use in a coin-responsive totalizing mechanism. A latching mechanism including my magnetic biasing means has a holding force which is relatively large as compared with the restoring force provided. The restoring force of my magnetic biasing means decreases as the latch member moves from its latching position to its fully released position.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of my claims. It is further obvious that various changes may be made in details within the scope of my claims without departing from the spirit of my invention. It is, therefore, to be understood that my invention is not to be limited to the specific details shown and described.

Having thus described my invention, what I claim is:

1. A coin responsive mechanism including in combination a support, a totalizer member provided with escapement teeth, means mounting said totalizer member for movement on said support, an escapement latch, means mounting said latch on said support for pivotal movement from a first position at which it engages a tooth of said member to prevent movement of the member to a second position at which it releases said tooth to permit a predetermined movement of said totalizer member, a magnet having a field encompassing both said positions for normally holding said latch in said first position, means mounting said magnet in a position at which said field exerts a relatively greater force on said latch in said first position and a relatively weaker force on said latch in said second position, said magnet providing the sole force independent of the weight of the latch for restoring the latch from the second position to the first position, and means responsive to the passage of a coin through said mechanism for moving said latch to said second position against the action of said magnet.

2. A coin responsive mechanism including in combination a frame, a first totalizer member having escapement teeth, a second totalizer member having escapement teeth, means mounting said totalizer members for movement on said frame, means responsive to movement of said members for summing the movements of said members, a first escapement latch, means mounting said first latch for movement on said support from a first position at which it engages a tooth of said first member to prevent movement of said first member to a second position at which it releases said tooth to permit movement of said first member, a magnet for normally holding said first latch in its first position, a second latch, means mounting said second latch on said support for movement from a first position at which it engages a tooth of the second member to prevent movement of said second member to a second position at which it releases said tooth to permit movement of said second member, a spring for biasing said second latch to its first position, means responsive to the passage of a coin of a given denomination having a certain weight through said mechanism under the influence of gravity for moving said second latch to its second position against the action of said spring and means responsive to the passage of a second coin of another denomination having a weight which is less than said certain weight through said mechanism

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under the influence of gravity for moving said first latch to its second position against the action of said magnet.

3. In a coin mechanism, a support, a member, means mounting said member for movement on said support, a latch, interengageable means on said latch and on said member adapted to restrain said member against movement, means mounting said latch on said support for movement from a first position at which said interengageable means restrain said member against movement to a second position at which said member is free to move, a magnet having a magnetic field encompassing said first and second positions of said latch for normally holding said latch in its first position, means mounting said magnet in a position at which said field exerts a relatively greater force on said latch in said first position and a relatively weaker force on said latch in said second position, said magnet providing the sole force independent of the weight of the latch for restoring the latch from

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the second position to the first position, and means responsive to the deposit of a coin in said mechanism for moving said latch in said magnetic field to its second position at which said member is free to move whereby said magnet returns said latch to its first position following an operation of said coin responsive means.

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