May 14, 1968 H. B. NIELSEN 3,382,962

GATE OPENING MECHANISM FOR COIN TESTING DEVICE

Filed May 31, 1967 3 Sheets-Sheet 1

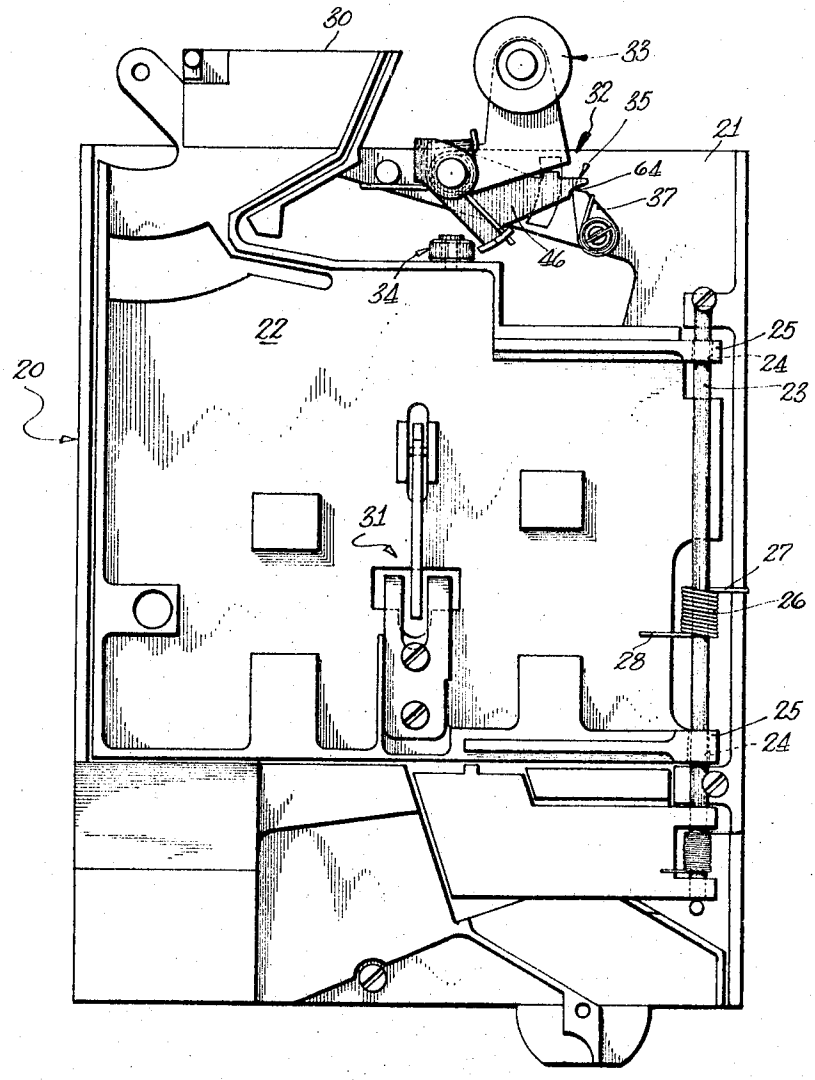


Fig. 1.

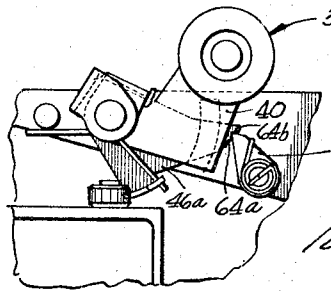


Fig. 5.

INVENTOR
Helmer B. Nielsen
BY Weir, Marshall
MacRae & Lamb
PATENT AGENT

May 14, 1968 H. B. NIELSEN 3,382,962

GATE OPENING MECHANISM FOR COIN TESTING DEVICE

Filed May 31, 1967 3 Sheets-Sheet 2

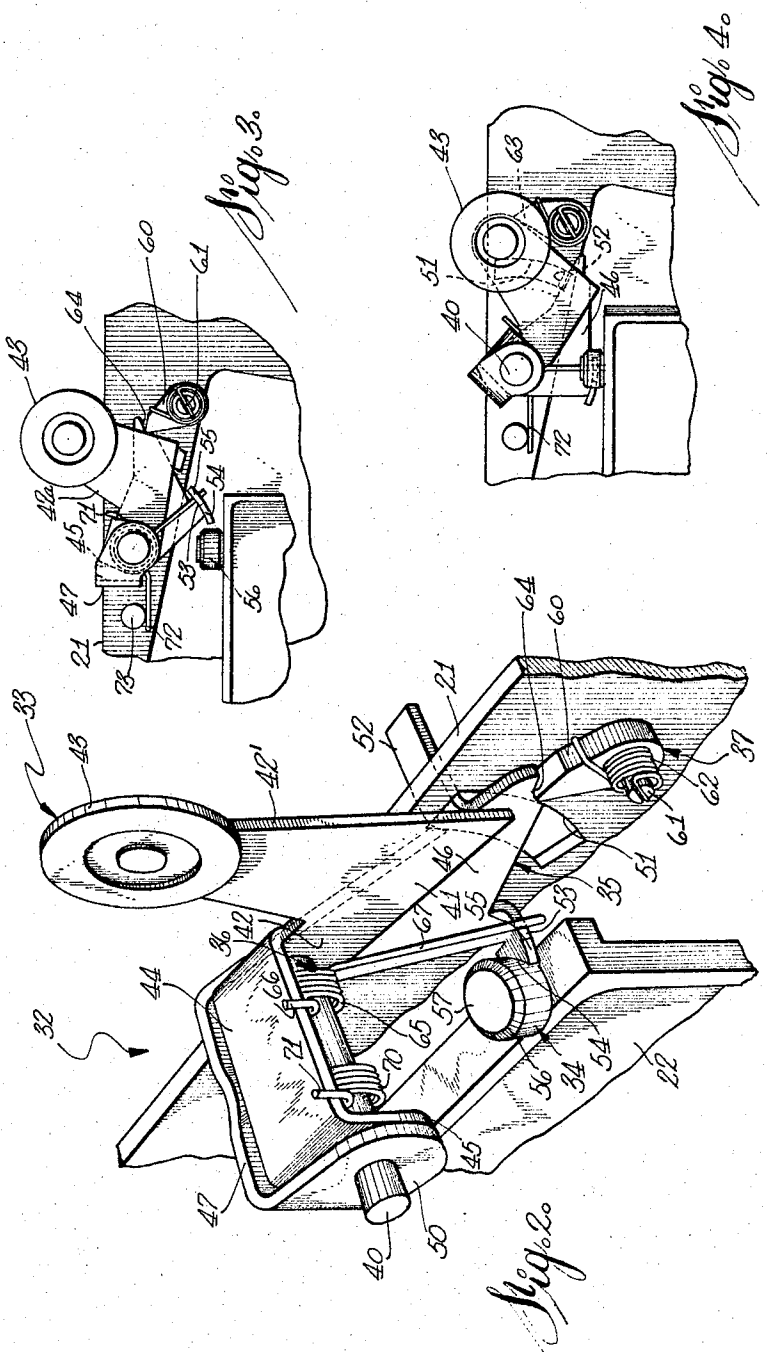


Fig. 3.

Fig. 4.

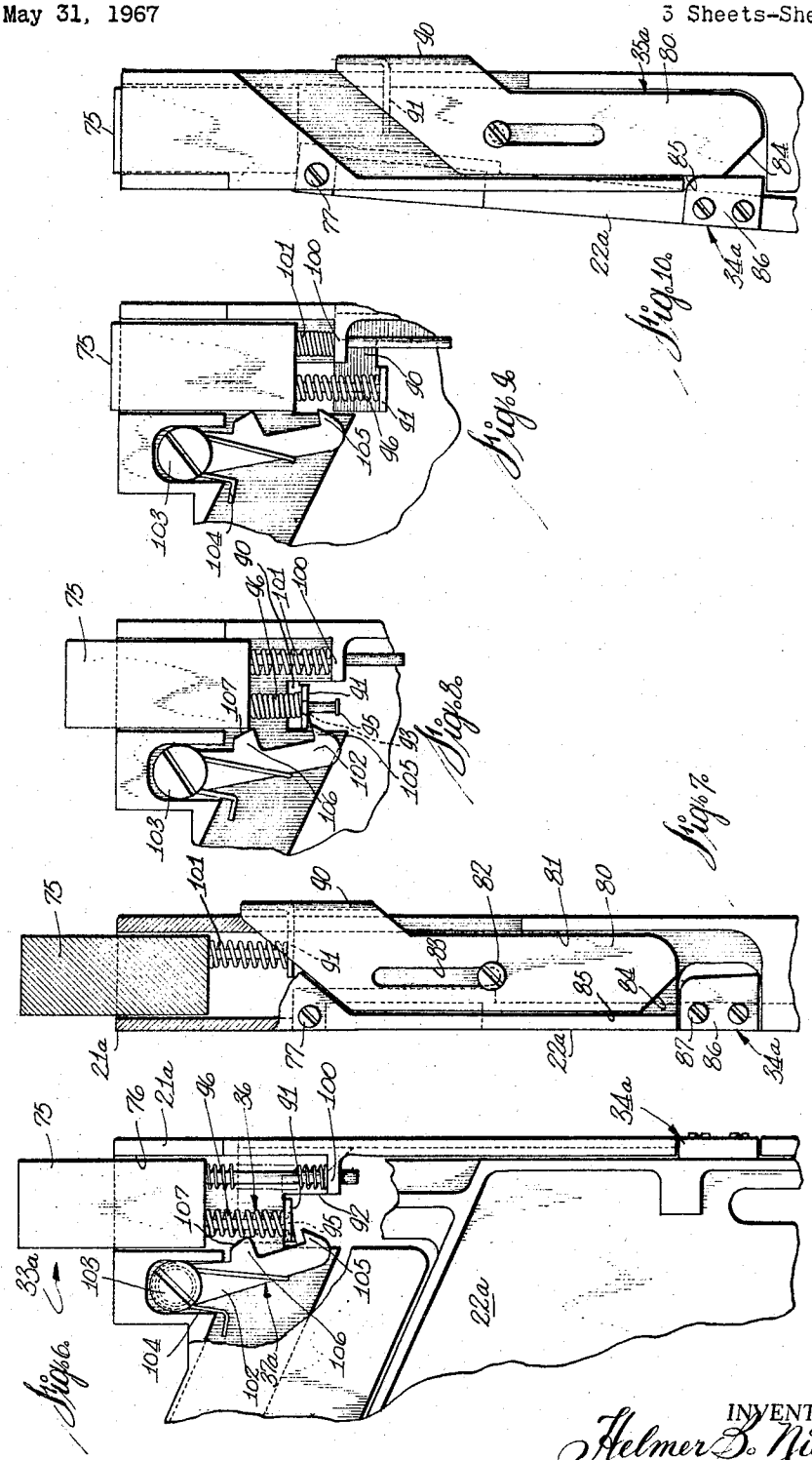
Fig. 2.

INVENTOR
Helmer B. Nielsen
BY Weir, Marshall
MacCoe & Lamb
PATENT AGENT

May 14, 1968 H. B. NIELSEN 3,382,962

GATE OPENING MECHANISM FOR COIN TESTING DEVICE

Filed May 31, 1967 3 Sheets-Sheet 3



INVENTOR
Helmer B. Nielsen
BY Weir, Marshall
Mac Lae & Lamb.
PATENT AGENT

United States Patent Office 3,382,962 Patented May 14, 1968

3,382,962

GATE OPENING MECHANISM FOR COIN TESTING DEVICE

Helmer B. Nielsen, 12 Ellen St., P.O. Box 760, Streetsville, Ontario, Canada

Filed May 31, 1967, Ser. No. 642,599
Claims priority, application Canada, Apr. 13, 1967, 987,775
28 Claims. (Cl. 194—97)

ABSTRACT OF THE DISCLOSURE

A mechanism for applying a force to a gate of a coin testing device for opening the gate with a snap action. A spring means is provided between a manually operable actuating member and a gate opening cam which is normally latched in an inoperative position, the spring being arranged to store energy by movement of the actuating member during initial movement of the actuating member and to transmit the energy to the cam and force it quickly to a gate opening position when the actuating member reaches a position to cause unlatching of the cam.

Background of the invention

In coin sorting devices utilized in automatic vending machines it is common practice to provide a coin passage by way of a frame or stationary member and a gate hinged to the stationary member and being spaced therefrom in a closed position a distance sufficient to permit edgewise travel of the coins in the passage. Along the passage one or more coin testing means are usually arranged for checking each coin travelling in the passage and permitting each authentic coin to travel out of the coin sorting device and into a changer or other switching mechanism for initiating the vend cycle of the vending machine. A spurious coin or slug becomes jammed, however, in the testing means, and it must be possible to free each jammed coin to return the coin sorting device to an operable condition. Thus, there is provided a mechanism which is connected to a reject button on the outside of the vending machine, the mechanism being adapted to swing the gate to an open position and thereby permit the jammed coin to fall freely to a reject or return chute.

With known devices it has been frequently found by the customer that if the gate is opened very slowly, or by vibrating the reject button, the jammed coin can be made to fall into one of the acceptable coin chutes below the sorting device. Also, customers have discovered that by depressing the reject button very slightly, the passage is widened sufficiently to permit the spurious coin to pass the testing means and travel into an acceptable coin chute. Another approach taken with known devices to have a spurious coin enter an acceptable coin chute is that of punching the button very quickly after the spurious coin is stopped by the testing means so that the gate opens and closes very quickly. With this approach the opening of the gate clears the jammed coin, but the gate may return quickly enough to strike the cleared coin as it is falling from the testing means. After being struck by the gate the coin may be made at times to ricochet into the acceptable coin chute. Although each of the above described approaches involves an element of chance, the person attempting to operate the machine with the spurious coins

can try time and time again, since until the spurious coin is accepted it is returned to the person by way of the return chute. Thus, the person frequently can experiment at will until a successful manipulation of the reject button is achieved.

Summary

According to the present invention there is provided a cam element on the gate and a cam element on the frame, one of the cam elements being enageable with the other on movement relative to the other from an inactive first position to a second position for opening the gate. An actuating member, which is directly acted upon by the reject button, is included in the gate opening mechanism of the present invention and is movable from a first inactive position to a second position. A spring means is arranged to be deformed to a loaded state by movement of the actuating member towards its second position for storing energy in said spring means, and when in the loaded or cocked state, the spring is arranged to urge the one cam element to its second position. However, to hold the one cam element from moving from its first position under the urging effect of the spring means, a latch member is provided which engages the one cam element. The actuating member has a portion which engages the latch member after cocking the spring means and which pushes the latch member to a position for releasing the one cam element so that the energy stored in the cocked spring is utilized to drive the one cam element to its second position and to thereby force the gate open. The energy, which is stored in the spring means, is expended to open the gate, therefore, after the one cam element is unlatched. Accordingly, in the gate opening mechanism of the present invention the actual gate opening member is directly responsive only to a very limited extend to any movement of the reject button.

Preferably, there is provided a lost motion means for permitting initial movement of the actuating member back towards its inactive position prior to return of the one cam element relative to the other cam element. Thus, the return movement of the one cam element is delayed resulting in a delay in the return of the gate so that it can be ensured that any spurious coin which might be freed by the opening movement of the gate is clear of the gate before the return of the gate.

Brief description of drawings

In the accompanying drawings, which show certain embodiments of the invention, by way of example,

FIGURE 1 is a front elevational view of a coin sorting device incorporating one embodiment of the gate opening mechanism of the present invention;

FIGURE 2 is an enlarged perspective view of the gate opening mechanism shown in FIGURE 1;

FIGURE 3 is a fragmentary view of the coin sorting device shown in FIGURE 1, showing the gate opening device during movement of the actuating member towards its second position from its inactive position;

FIGURE 4 is similar to FIGURE 3, but showing the actuating member in its second position;

FIGURE 5, which appears on the same sheet of drawings as FIGURE 1, is a view similar to FIGURE 3, but showing a slightly modified form of the present invention during return of the actuating member towards its inactive position;

FIGURE 6 is a fragmentary front elevational view of

a coin sorting device incorporating another embodiment of the present invention;

FIGURE 7 is a side elevational view of the embodiment of the invention shown in FIGURE 6.

FIGURE 8 is a fragmentary front elevational view of the embodiment of the invention shown in FIGURE 6 and showing the actuating member during movement towards its second position from its inactive position;

FIGURE 9 is a view similar to FIGURE 8, but showing the actuating member in its second position; and

FIGURE 10 is a side view, like FIGURE 7, but showing the positions of the cam elements when the actuating member is in its second position.

Description of preferred embodiments

Referring now to FIGURE 1, it may be seen that coin sorting device **20** includes a stationary member or frame **21** which is fixed within the vending machine (not shown), and hinged to frame **21** is a gate **22**. The gate **22** is hinged by way of a vertical shaft **23** carried by frame **21** and passing through aligned openings **24**, **24** in lugs **25**, **25** of the gate. Encircling shaft **23** is a torsional coil spring **26** having one end **27** in engagement with frame **21** and the other end **28** in engagement with gate **22** for biasing said gate to an operative or closed position. In the operative or closed position, the gate **22** is parallel to frame **21** to define a thin passage for edgewise travel of coins therebetween. Thus, after the coins enter the coin sorting device **20** by way of a hopper **30**, they are initially sorted into their respective denominations by means (not shown) and travel on into the passage between the frame **21** and gate **22** for further testing. In the passage various means may be provided for detecting spurious coins or slugs, and these means may include, for example, a thickness gauging device **31**, which is shown in more detail in my U.S. patent application Ser. No. 529,315, filed Feb. 23, 1966. The coins which have the proper tested characteristics are permitted to pass the coin testing means and to travel out of the bottom of the coin sorting device and into aligned passages for the accepted coins in another device (not shown), such as a coin changer, located below coin sorting device **20**. The spurious coins are caught by the coin testing means and must be cleared, and this is done by providing a gate opening mechanism **32**, which on depression of a reject button (not shown) on the outside of the vending machine, forces the gate **22** to swing to an open position against the biasing effect of spring **26**. As the gate **22** is opened, the spurious coin held by the coin testing means is freed and permitted to fall into a coin return chute (not shown) below the coin sorting device **20**.

Referring to FIGURES 1 to 4, and particularly FIGURE 2, the embodiment of the invention shown includes an actuating member **33**, a cam element or member **34** carried by the gate, and a cam element **35** carried by the frame member and movable relative to cam member **34**. A spring means **36** is located between actuating member **33** and cam element **35** and is adapted to be cocked as actuating member **33** is depressed. A latch member **37** engages cam element **35** and normally prevents movement of the cam element **35** towards a door opening position.

A pintle **40** is fixed to the frame **21** and extends outwardly over the gate **22**. The actuating member **33**, which is linked to the reject button, includes a plate-like arm **41** having a main portion **42** parallel to frame **21** and an upward projection **42'** carrying a bearing roller **43**. The arm **41**, which may be stamped from sheet metal, has a laterally extending flange **44** extending parallel to pintle **40** but is spaced outward from the pintle. The flange **44** terminates in a bent tab **45**, and tab **45** and main portion **42** of arm **41** have aligned openings which receive the pintle **40** so that arm **41** is rotatably mounted on pintle **40**. Thus, as upward portion **42'** is depressed by operation of the reject button, the arm rotates through a short arc from the inactive position shown in FIGURES 1 and 2 to a final position shown in FIGURE 4.

The cam member **35** may also be stamped from sheet material and includes a flat plate portion **46** located between arm **41** and frame **21**. Plate portion **46** also has a flange **47** projecting perpendicularly therefrom so that it extends parallel to pintle **40** but is spaced from the pintle. Flange **47** terminates in an appendage **50** which is parallel to plate portion **46** and appendage **50** and plate portion **46** have aligned openings which receive pintle **40**. Thus, cam member **35** is also mounted for rotation on pintle **40**, and as plate portion **46** and appendage **50** straddle main portion **42** and tab **45** of arm **41**, the cam member can, to a certain extent, rotate independently of arm **41**. However, flanges **44** and **47** are disposed for engagement as will be described in more detail below.

Frame **21** is provided with an arcuate slot **51** which is struck about the axis of pintle **40**. Plate portion **46** of cam element **35** has an outwardly bent tab **52** which projects into slot **51** so that engagement of tab **52** with opposite ends of slot **51** define the limits of arcuate travel by cam member **35**. The plate portion **46** also has an outstanding portion or tab **53** which may in cross-section define an arc struck about the axis of pintle **40**. The tab **53** is ramped to provide a cam surface **54** slanting outwardly and away from plate portion **46** (FIGURE 2), the cam surface **54** terminating at an outer land **55**, which may slant slightly back towards the plate portion **46**.

The cam element **34** consists of a cam follower or roller **56** on gate **22** and in the path of travel of cam surface **54**. The roller **56** is mounted on a stub shaft **57** projecting upward from the gate **22**, and the roller is preferably mounted so that its axis of rotation intersects the axis of the pintle, and therefore, the axis of rotation of the cam member **35**.

The latch member **37** includes a dog **60** mounted for rotation on a short pintle **61** which projects from frame **21** parallel to pintle **40**. The dog **60** is biased in a counter-clockwise direction, as viewed in the figures, and thus towards cam member **35**, by a torsional coil spring **62** which encircles pintle **61** outwards of dog **60**. The outer end of pintle **61** is slotted to hold one end of spring **62**, and the other end of spring **62** bears against the dog **60**. Dog **60** has a nose portion **63** which is normally received in a notch **64** in plate portion **46** of cam member **35**. The dog **60** is thicker than plate portion **46**, or at least nose portion **63** is made to extend laterally from one side of plate portion **46** and into the path of the main portion of arm **41** during travel of the arm from its inactive position towards its fully depressed position. Thus, as will be described in more detail below, the arm engages dog **60** during its downward travel (FIGURE 3) and displaces the dog **60** from notch **64**.

The spring means **36** consists of a torsional coil spring **65** encircling pintle **40** under flanges **44** and **47** of arm **41** and cam member **35**, respectively, the spring **65** having one end **66** bearing against flange **44** and its other end **67** bearing against cam defining tab **53**. Thus, as arm **41** is initially depressed, and **66** is turned clockwise, as viewed in the drawings, relative to end **67** which is held by cam member **35** in its latched or inactive position. Accordingly, spring **65** is wound to a loaded state.

Also encircling pintle **40** under flanges **44** and **47** is a return spring **70** which is also a torsional coil spring. Spring **70** has one end **71** bearing against flange **44** and another end **72** bearing against a projection **73** on frame member **21**. Thus, as arm **41** is depressed energy is stored in spring **70** for returning arm **41** and also cam member **35** to their normal inactive positions after arm **41** has reached its fully depressed position.

Prior to a customer activating the reject button the

gate opening mechanism 32 is in the position shown in FIGURES 1 and 2. As the reject button is pushed to a reject position, arm 41 is depressed, and as was explained above, during initial depression, i.e., until arm 41 reaches the position shown in FIGURE 3, spring 65 is wound up so that the initial energy put into the mechanism by the pushing of the reject button is stored in spring 65. Having been placed in a loaded state, end 67 of spring 65 strongly urges cam member 35 from its inactive position in which tab 52 is at the upper end of arcuate slot 51 and towards the door opening position. The cam member 35 is held against any such movement, however, by dog 60, the nose portion 63 of which is received in notch 64.

Having reached the position shown in FIGURE 3, the side edge of upward portion 42' of arm 41 engages nose portion 63 and further downward movement of arm 41 pushes dog 60 clockwise entirely from notch 64. At this stage, the cam member 35 is pivoted quickly to its second or gate opening position. This action moves cam surface 54 against roller 56 and causes roller 56 to quickly ride up cam surface 54, and as lug 52 engages the lower end of slot 51, roller 56 comes to rest on land 55, at which time the gate 22 has been pushed against the biasing effect of spring 26 to its fully open position. In view of the fact a substantial force must be applied to the rejection button to load spring 65, this force cannot be released from arm 41 sufficiently at the instant to dog 60 unlatches cam member 35 and instantaneously relieves the resistance provided by the loaded spring 65 to prevent arm 41 from continuing on down to its second position shown in FIGURE 4. During the continued downward movement of the arm, the nose portion 63 of dog 60 simply slides along the upward portion of the arm. While this downward movement of arm 41 is taking place, the lug 52 of cam member 35 engages the lower end of slot 51, as is described above, and this engagement termminates the travel of the cam member 35 in a clockwise direction, with the gate 22 being held in its open position due to engagement of roller 56 with land 55 of the cam member 35.

Thus, it can be understood from the above, that unless the reject button is pushed with sufficient force to load spring 65 and release the dog 60, the cam member 35 does not move at all, and therefore, gate 22 remains stationary in its closed position. If sufficient force is applied to release the dog 60 after loading spring 65 the gate quickly snaps to a fully open position. Accordingly, other than to fully open the gate 22, no opening movement of the gate from the normally closed position can be directly controlled by manipulation of the reject button. Moreover, as the arm 41 swings downwardly somewhat past the cam member 35 after lug 52 engages the lower end of slot 51 before coming to a stop in its second position, flange 44 of arm 41 is separated from flange 47. Thus, even if the reject button is quickly released in an attempt to have the gate 22 snap back towards the frame 21 for the reason discussed above, lost motion is provided during the initial return of the arm 41. On release of the reject button return spring 70, which has been loaded by the downward movement of arm 41, commences to force the arm back up. However, due to the relative positions of arm 41 and cam member 35 during the initial return of arm 41, spring 65 is still loaded sufficiently to bias cam member 35 downwardly. Moreover, since roller 56 engages land 55, which slants slightly towards plate portion 46 in a direction opposite to cam surface 54, the force of the roller against the land 55 provided by spring 26 which urges the gate to a closed position, also tends to prevent the cam member 35 from starting to return to its inactive position. Eventually, however, flange 44 engages flange 47 of the cam member 35 so that the cam member 35 is forced to return to its initial position with the arm, and therefore the gate is permitted to close. Accordingly, any spurious coins released during the opening of the gate are provided with sufficient time to fall free of the device before the gate 22 starts to return to its closed position.

It is further preferable to shape notch 64 in a manner to permit dog 60 to commence entering into the notch prior to the time cam member 35 has returned entirely to its inactive position in order that the cam member becomes latched before the gate 22 is fully closed. This is desirable so that as the gate approaches its closed position, it becomes impossible to reopen it by again pressing the reject button and all direct control of the movement of the gate is lost. In other words, once dog 60 commences to enter the notch it is necessary to go through the above-mentioned cycle which includes the loading of spring 65 and releasing latch member 37 to reopen the gate.

In FIGURE 5, there is shown a slightly modified form of the cam member 33 which is designed to even further reduce the direct control of movement of the cam member by the reject button during closing of the gate. Plate portion 46*a* of the cam member is provided with an additional notch 64*b* which is before notch 64*a* in the direction of rotation of the cam member from its second to its inactive position. During return of the arm 41 and cam member 35 towards their inactive position and when flange 44 is in engagement with flange 47, additional notch 64*b* is exposed to dog 60, once dog 60 moves into the notch, any attempt to again open the gate before it is permitted to fully close results in a snap action of the cam member from its intermediate latched position much the same as the action encountered during usual opening of the gate.

Turning now to the embodiment shown in FIGURES 6 to 10, it will be noted that the actuating member 33*a* is in the form of a plunger 75 which may be exposed externally of the vending machine for depression by the person operating the machine. Stationary member or frame 21*a* is provided with a channel 76 in which plunger 75 is mounted for linear reciprocation. Gate 22*a*, like gate 22, is normally parallel to and spaced slightly from frame 21*a* to define a coin passage, and the gate 22*a* is hinged to the frame by a screw 77 so that the gate may swing about a substantially horizontal axis to an open position as is shown in FIGURE 10.

Mounted on gate 22*a* is a cam element 34*a* which is engaged by a movable cam member 35*a* on downward movement of plunger 75, there being provided a spring means 36*a* for storing energy during initial depression of plunger 72 and a latch member 37*a* for holding cam member 35*a* until spring means 36 has been placed in a loaded state.

Cam member 35*a* comprises an elongated plate portion 80 which is mounted for reciprocation in a direction parallel to the movement of plunger 75. Plate portion 80 is guided in an open channel 81 provided in the side edge of frame 21*a* and is held in the channel 81 by a headed screw 82 which extends through an elongated slot 83 in plate portion 80. The engagement of screw 82 with opposite ends of slot 83 may also define the limits of the stroke of the cam member 35*a*.

The lower end of plate portion 80 is ramped or beveled to define a slanted cam surface 84 which terminates at a side edge surface of the plate member 80 defining an elongated land 85. Cam element 34*a* is in the form of a lug 86 secured to gate 22*a* by screws 87, and when the gate 22*a* is in its normally closed position, lug 86 projects into channel 81 directly in the path of downward travel of cam surface 84. Thus, as plate portion 80 is driven downwardly in the manner hereinafter described, cam surface 84 engages lug 86 so that on continued downward movement of the cam member 35*a*, gate 22*a* is forced to its open position as lug 86 rides out cam

surface 84 and gate 22a is held in its open position while lug 86 rides along land 85.

At the upper end of plate portion 80 there is provided a flange 90 which extends perpendicularly relative to plate portion 80 and projects behind frame 21a. Projecting forwardly from flange 90 is lug 91 which extends through opening 92 in frame 21a and is located below plunger 75. Lug 91 has a bore 93 therethrough, and a pin 94, which is fixed to the plunger 75 and extends forwardly therefrom in the direction of travel of the plunger from its inactive position, projects through bore 93. The lower or free end of pin 94 is provided with a head 95 for engagement with lug 91. Spring means 36 is in the form of a compression coil spring 96 which encircles pin 94 and has its opposite ends in engagement with plunger 75 and lug 91.

Also projecting from plunger 74 parallel to pin 94 is a guide pin 97 which extends through a bore in a stationary projection 100 provided by frame 21a. The projection 100 extends in front of and is spaced from plunger 75 in the direction of travel of the plunger from its inactive position. A return spring 101, which is also in the form of a compression coil spring, encircles guide pin 97 and at opposite ends engages plunger 75 and projection 100.

Latch member 37a includes an arm 102 pivotally connected to frame 21a by a screw 103. The arm 102 depends from the screw 103, and the lower end of the arm is biased against lug 91 by a wire spring 104 encircling screw 103 having one end bearing against the arm and the other against frame 21a. The lower end of arm 102 is provided with a hook portion 105 for engagement with the bottom of lug 91 so that unless arm 102 is displaced, hook portion 105 prevents downward movement of cam member 35a. The arm 102 has a projection 106 above hook portion 105, and the projection has a beveled surface 107 extending into the downward path of travel of plunger 75 between plunger 75 and lug 91.

In operation, initial depression of plunger 75 from the position shown in FIGURE 6 pushes lug 91 down into engagement with hook portion 105 by way of the force being transmitted through spring 96. Once lug 91 engages hook portion 105, continued downward movement of plunger 76 compresses spring 96 between the plunger and lug 91 since lug 91 is held stationary. As spring 96 becomes heavily loaded (FIGURE 8), the plunger 75 engages the beveled surface 107 of the projection 106 and thereby forces the arm 102 away from lug 91. Thus, the hook portion 105 is caused to release the lug 91, and the energy which has been stored in compressing spring 96 is quickly expanded in forcing the cam member 35a downwardly to its gate opening position. As is explained above, downward movement of the cam member 35a brings the cam surface 84 into engagement with the lug 86 to force the gate open, and the lug 86 eventually rides along the land 85 and holds the gate open.

The instantaneous release of the upward force applied to the bottom of plunger 75 by the compressed spring 96 results in plunger 75 continuing on downward to its lowermost or second position shown in FIGURE 9. All of the time plunger 75 is travelling downward, i.e., from its first position (FIGURE 6) to its second position (FIGURE 9), the return spring 101 is being compressed, and when plunger 75 is released from the position shown in FIGURE 9 by the operator of the vending machine, the return spring 101 immediately commences to return the plunger to its initial position. During initial return of the plunger 75 the head 95, which at this stage engages the bottom of lug 91, pulls cam member 35a up also. However, in view of the fact lug 86 is in engagement with land 85 (FIGURE 10), there exists, in a sense, a lost motion since the gate 22a is still held open. Thus, since the gate does not start to close until the cam member 35 has travelled upward enough to permit lug 86 to start to ride down cam surface 84, there exists in this embodiment, as in the previously described embodiment, a slight delay to ensure that the freed coins clear the device before the gate is permitted to return.

As the plunger 75 and cam member 35a approach their upper or inactive positions, the hook portion 105 of the arm 102 returns to its position under lug 91. At this stage it is only possible to reopen the gate by again compressing spring 96 and again releasing latch member 37a in the previously described manner.

Although preferred embodiments of the invention have been described in detail above, it will be obvious to those skilled in the art that various modifications can be made to those embodiments without departing from the spirit of the invention defined in the appended claims.

I claim:

1. In a coin sorting device having a frame member and a gate member adjacent to said frame member and movable away from said frame member to an open position, a gate opening mechanism comprising a first cam element carried by said gate member and a second cam element carried by said frame member, one of said cam elements being engageable with the other cam element and being movable relative to said other cam element from an inactive first position to a second position for opening said gate member, an actuating means movable from a first inactive position to a second position, spring means deformable to a loaded state by movement of said actuating means towards said second position for storing energy in said spring means, said spring means in said loaded state urging said one cam element towards said second position, a latch member engaging said one cam element and being movable from a hold position to a releasing position for permitting movement of said one cam element to move to said second position under the urging effect of said spring means, said actuating means having a portion engageable with said latch member for moving said latch member to said releasing position subsequent to loading said spring means.

2. A mechanism as defined in claim 1, and further comprising a second spring means deformable to a loaded state by movement of said actuating means to said second position, said second spring means in said loaded state urging return of said actuating means and said one cam element to said inactive first positions.

3. A mechanism as defined in claim 1, wherein lost motion means is provided for permitting initial movement of said actuating means toward said first inactive position prior to return movement of said one cam element relative to said other cam.

4. In a coin sorting device having a wall defining stationary member, a wall defining gate adjacent said stationary member and in a closed position forming a coin passageway therebetween, said gate being hinged to said stationary member for swinging movement away from said stationary member to an open position, means biasing said gate to said closed position, the improvement of a gate opening mechanism comprising a cam member on said stationary member, a cam follower member mounted on said gate, said cam member being mounted for movement to a second position from an inactive first position for engaging said follower member and forcing said gate to said open position, an actuating member mounted on said stationary member and being depressible from an inactive first position to a gate opening second position, a spring engaging said actuating member and said cam member, said spring being deformable to a loaded state between said actuating and cam member by movement of said actuating member towards said second position and in said loaded state urging said cam member towards said second position, and a latch in one position engaging said cam member for holding said cam member in said first position and being movable towards a release position, said actuating member having a portion engageable with said latch for moving said latch to said release

position during movement towards said second position and subsequent to loading said spring.

5. A mechanism as defined in claim 4, and further comprising a first pintle carried by and having its axis extending outwardly from said stationary member, wherein said actuating member includes an arm mounted on said pintle for arcuate movement between said first and second positions in a plane substantially parallel to said stationary member, and wherein said cam member is mounted on said pintle for arcuate movement between said first and second positions in a plane substantially parallel to said stationary member and gate in said closed position.

6. A mechanism as defined in claim 5, wherein said spring comprises a torsional coil spring encircling said pintle and having one end in engagement with said arm and the other end in engagement with said cam member.

7. A mechanism as defined in claim 5, wherein said cam member includes a plate portion parallel to said stationary member, and an outstanding portion formed on said plate portion and projecting away from said stationary member, said outstanding portion being ramped to provide a cam surface.

8. A mechanism as defined in claim 7, wherein said outstanding portion consists of a tab bent out from said plate portion, said tab in cross-section defining an arc struck about the pintle axis.

9. A mechanism as defined in claim 7, wherein said cam follower member includes a roller engageable with said cam surface, said roller being mounted on said gate about an axis intersecting the pintle axis.

10. A mechanism as defined in claim 7, and further comprising a second pintle fixed to said stationary member and projecting parallel to said first pintle, wherein said plate portion of said cam member has a latch receiving notch, and wherein said latch comprises a dog pivotably mounted on said second pintle and having a nose portion for reception in said notch, and spring means for biasing said dog to a cam member engaging position.

11. A mechanism as defined in claim 10 wherein said plate portion is provided with a second notch located before said latch receiving notch in the direction of return travel of said cam member from said second position to said first position, said second notch being exposed for reception of said nose portion during said return travel prior to said nose portion being received in said latch receiving notch for providing an intermediate latched position of said cam member.

12. A mechanism as defined in claim 10, wherein said plate portion and said arm are in side-by-side relationship, and wherein said nose portion of said dog extends laterally from said plate position and into the path of arcuate travel of said arm from said first position to said second position.

13. A mechanism as defined in claim 7, wherein said arm comprises a laterally extending flange parallel to and spaced from said pintle, said flange terminating in a bent tab portion parallel to said arm, said tab portion and said arm having aligned openings receiving said pintle and rotatably mounting said arm on said pintle, and wherein said spring comprises a torsional coil spring encircling said pintle and underlying said flange, said spring having one end in engagement with said arm and the other end in engagement with said outstanding portion of said cam member.

14. A mechanism as defined in claim 13, and further comprising a return spring means in the form of a second torsional coil spring encircling said pintle and underlying said flange, said second spring having one end in engagement with said flange and the other end in engagement with said stationary member for deformation to a loaded state by movement of said arm to said second position, said second spring in said loaded state urging return of said arm to said first position.

15. A mechanism as defined in claim 14, wherein said plate portion of said cam member is located between said arm and said stationary member, said stationary member having a slot struck arcuately about said pintle axis, said plate portion having a turned out tab extending into said slot, said turned out tab being engageable with opposite ends of said slot for defining said first and second positions of said cam member.

16. A mechanism as defined in claim 14, wherein said plate portion of said cam member has a laterally extending flange parallel to and spaced from said pintle, said flange of said plate portion terminating in an appendage parallel to said plate portion, said plate portion and appendage having aligned openings receiving said pintle with said plate portion and appendage straddling said arm and tab portion, said flanges of said arm and plate portion being separated in said second positions but being engageable during return of said arm for returning said cam member to said first position, whereby initial return of said arm from said second position is permitted prior to return of said cam member from said second position.

17. A mechanism as defined in claim 4, wherein said actuating member is a plunger mounted for linear reciprocation on said stationary member, and wherein said cam member is mounted on said stationary member for linear reciprocation substantially parallel to the reciprocation of said plunger.

18. A mechanism as defined in claim 17, wherein said cam member comprises an elongated member having a ramped portion providing a cam surface extending at an incline relative to the direction of reciprocation of said cam member, and wherein said cam follower comprises an element fixed to said gate and projecting into the path of travel of said cam surface during movement of said cam member to said second position.

19. A mechanism as defined in claim 18, and further comprising a spring means for returning both said plunger and said cam member from said second positions to said first positions.

20. A mechanism as defined in claim 19, wherein said cam member includes an elongated follower engaging land after said cam surface in the direction of travel of said cam member to said second position, said land being disposed for engaging said follower and holding said gate in said open position during final movement of said cam member towards and initial movement away from said second position.

21. A mechanism as defined in claim 17, wherein said stationary member is provided with channels defining guides for said plunger and cam member.

22. A mechanism as defined in claim 17, wherein said cam member includes a portion extending in front of and spaced from said plunger in the direction of travel of said plunger, and wherein said spring is a first compression spring between said plunger and the extending portion of said cam member.

23. A mechanism as defined in claim 22, and further comprising a second spring engaging said plunger and being deformed to a loaded state during movement of said plunger to said second position for returning said plunger to said first position.

24. A mechanism as defined in claim 23, wherein said extending portion of said cam member consists of a lug disposed perpendicular to the direction of travel of said plunger and having a bore the axis of which is parallel to the direction of travel of said plunger, and wherein said plunger has a pin secured thereto, said pin having an outer free end extending through said bore and a head on said free end engageable with said lug during return movement of said plunger from said second position for returning said cam member from said second position to said first position.

25. A mechanism as defined in claim 24, wherein said latch comprises an arm pivotably connected to said stationary member and having a hook portion for engaging

said lug, and spring means biasing said hook portion to a lug engaging position.

26. A mechanism as defined in claim **24**, wherein said first spring comprises a coil spring encircling said pin between said plunger and said lug.

27. A mechanism as defined in claim **26**, wherein said arm includes a projection extending between said plunger and said lug and into the path of travel of said plunger towards said second position, whereby engagement of said plunger with said projection of said arm pushes said arm from said lug engaging position.

28. A mechanism as defined in claim **23**, wherein said stationary member is provided with a projection extending in front of and spaced from said plunger in the direction of travel of said plunger, said projection having a bore therein parallel to the direction of travel of said plunger, wherein said plunger has a forwardly projecting

guide pin reciprocably received in the bore of said projection, and wherein said second spring comprises a compression coil spring between said plunger and projection and encircling said guide pin.

References Cited

UNITED STATES PATENTS

2,239,050	4/1941	Patzer et al.	194—101 X
2,339,823	1/1944	Vogel	194—97
2,461,314	2/1949	Davis et al.	194—97
2,827,996	3/1958	Haverstick	194—99
3,169,625	2/1965	Peterson	194—99 X
3,193,075	7/1965	Okolischan et al.	194—100

SAMUEL F. COLEMAN, *Primary Examiner.*