

[54] **COIN HANDLING APPARATUS**

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[51] Int. Cl. **G07f 3/02**

[58] Field of Search **194/97, 102, 103**

[56] **References Cited**

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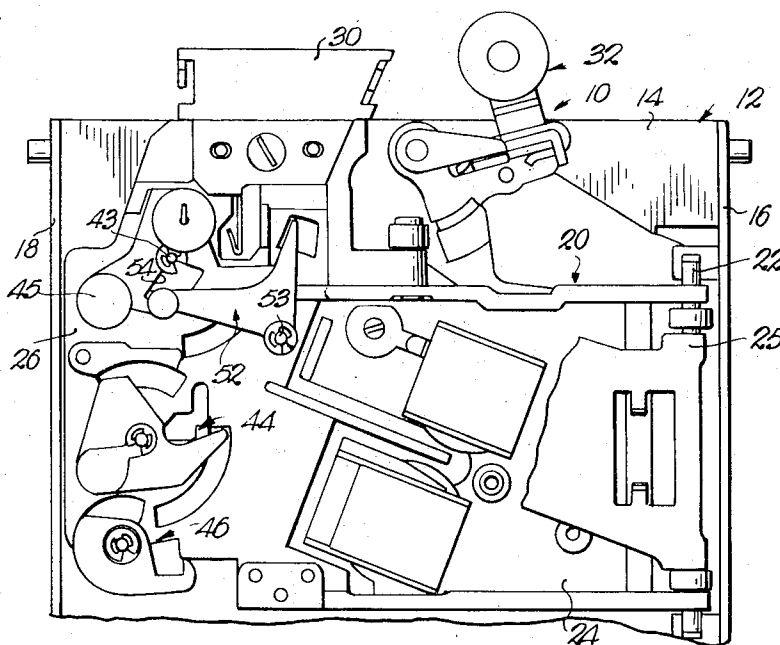
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[57] **ABSTRACT**

An auxiliary latch for a testing cradle of a coin-testing and accepting device is provided and arranged to be released by coins of the denomination to be tested by that cradle but to be non-responsive to coins of smaller diameter, even when the latter contact the cradle at considerable velocity or at an unusual angle, for assuring that coins of such smaller diameter will pass through the cradle without entering the accept path associated with the latter.

8 Claims, 6 Drawing Figures



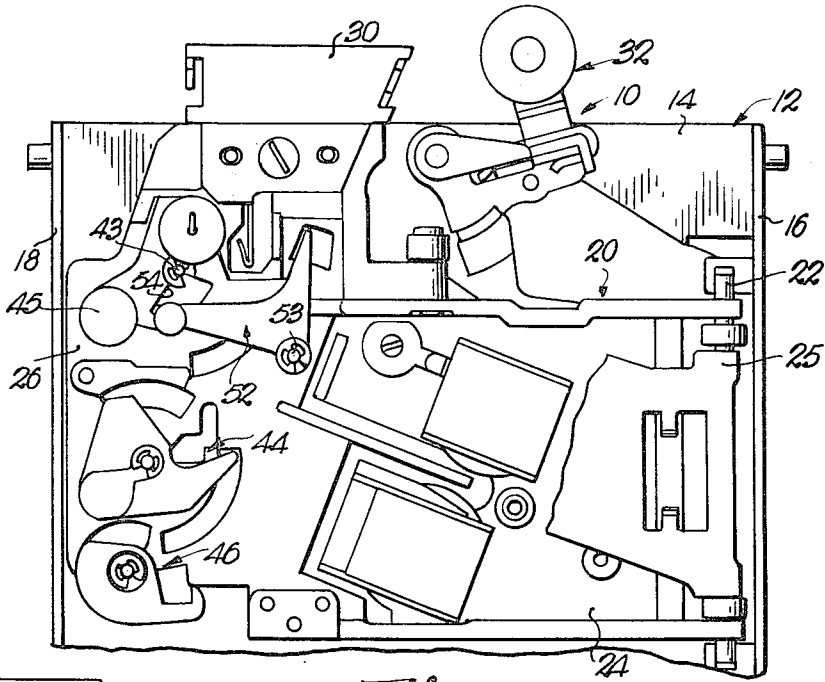


Fig. 1.

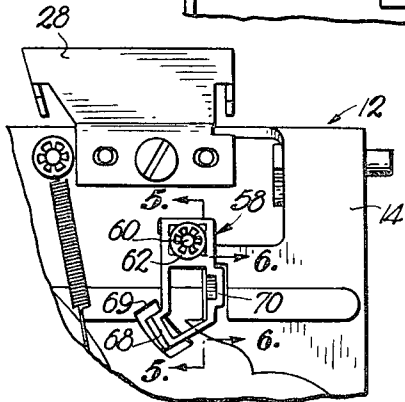


Fig. 2.

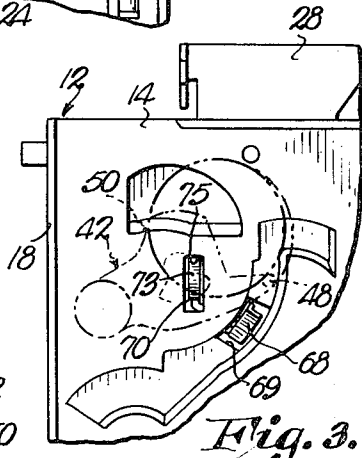


Fig. 3.

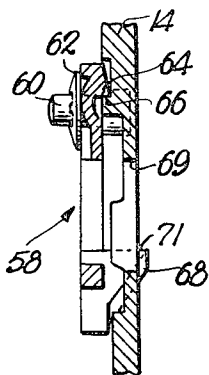


Fig. 5.

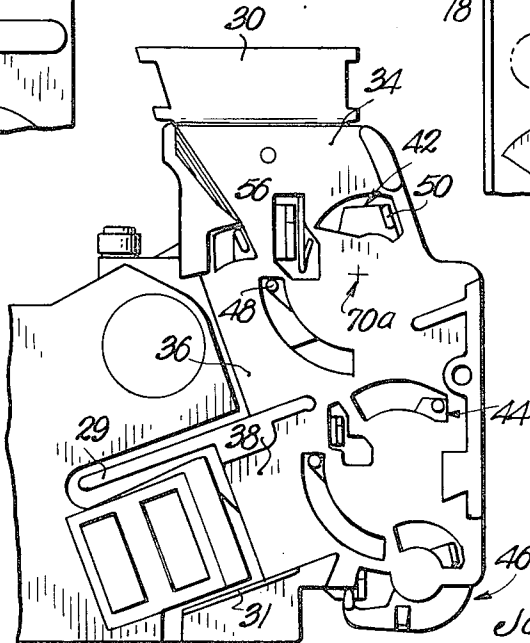


Fig. 4.



Fig. 6.

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COIN HANDLING APPARATUS

This invention relates to coin-handling equipment and, more particularly, to an improvement in coin-testing and accepting apparatus, such as employed in vending machines, which eliminates the problem of smaller customer-deposited coins, such as dimes, sometimes entering the accepting pathway for larger coins, such as quarters, instead of gravitating between the legs of the testing cradle for the larger coins to the testing means provided therebelow for the smaller coins.

Coin-accepting and rejecting devices having cradle type coin-testing structures, such as shown and described in detail in U. S. Letters Patent Nos. 3,120,300; 3,155,214; and 3,172,523, initially separate customer-deposited coins by denominations and then subject the separated coins of each denomination to a series of further authenticity tests. Such separation of coins by their denominations is carried out by passing the deposited coins through a series of generally vertically aligned coin-testing cradles, with the uppermost cradle in the series being designed to select a large coin, such as a quarter, on the basis of its diameter and weight, and to divert it into a quarter pathway for further testing and possible acceptance, while allowing smaller coins, such as dimes and nickels, to gravitate between the legs of the quarter cradle down into nickel and penny-dime cradles, which are disposed successively therebelow. At least the quarter cradle is normally provided and cooperates with additional size checking structure, known as primary "cradle locks," which are usually disposed adjacent the accepting pathway to effect a more precise diameter check of the coin than the cradle itself can perform and to preclude the cradle from tipping sufficiently to unload even a slightly undersize coin into the pathway for further testing and acceptance. Such primary cradle locks operate to releasably latch the cradle against swinging movement past a certain point in its movement toward a position for delivering a coin into the further testing and accepting pathway unless and until the coin, during such initial movement of the cradle, engages and shifts the sizing structure to release the cradle.

It has been found that upon too frequent occasions, however, and particularly in those situations in which a relatively long, steeply inclined coin chute is provided leading up to the entrance of the testing apparatus, a deposited smaller coin, such as a dime, instead of gravitating downwardly between the opposed legs of the larger coin cradle as it should, will bounce or ricochet against one leg of the cradle and between the latter and the sizing structure element of the primary cradle lock into the accepting pathway for the larger coin. Such inadvertently selected smaller coins then often continue through the remainder of the testing mechanism for the larger coin to cause the registering of an erroneously high value of credit in the machine.

Accordingly, the primary object of the present invention is to provide simple and inexpensive, yet highly reliable, means for precluding accidental admission of a smaller coin, such as a dime, past the testing cradle and into the accepting pathway provided for a larger coin.

Another important object of the invention is to provide such means employing a simple, gravity-biased, auxiliary latch which is separate from and operable independently of any primary cradle lock that may be provided, and which holds the cradle with which it is

associated against substantial tipping thereof, unless and until a sensing tab on the auxiliary latch is positively engaged by either a proper or a smaller coin, such tab being significantly disposed between and below the legs of the cradle sufficiently that a smaller coin, once it has engaged the tab for releasing the latch, is committed to a trajectory through the legs of the cradle from which it is unable to revert to the accepting pathway associated with the cradle.

A further important object of the present invention is to provide auxiliary latch means as set forth above which may be quickly and easily incorporated into the limited space and already intricate design of coin-accepting devices of types currently in use, with a minimum of modification in the basic device.

Other important objects of the present invention will be made clear or become apparent from the following description of a preferred embodiment of the invention.

In the drawing:

FIG. 1 is a fragmentary, front elevational view of coin testing and accepting apparatus illustrative of the general type of such apparatus with which the auxiliary latching means of the present invention is adapted to be used;

FIG. 2 is a fragmentary, rear elevational view of the upper corner of the apparatus of FIG. 1, showing an auxiliary latching device which embodies the preferred concepts of the present invention;

FIG. 3 is a fragmentary, elevational view of the front side of the upper corner of the apparatus of FIG. 2, showing in phantom the quarter or other larger coin cradle with such a coin supported thereon to illustrate the general relationship between the cradle, a genuine coin and the auxiliary latching device;

FIG. 4 is a fragmentary, rear elevational view of the main gate of the apparatus showing the series of coin-testing cradles thereon;

FIG. 5 is a fragmentary, enlarged, vertical cross-sectional view of the auxiliary latching device taken along line 5—5 of FIG. 2; and

FIG. 6 is a fragmentary, enlarged, vertical cross-sectional view of the auxiliary latching device taken along line 6—6 of FIG. 2.

Referring initially to FIG. 1, the coin-testing and accepting apparatus to which the invention is applied for illustration is designated broadly by the numeral 10 and is of the "three-in-one" type designed to separate and test quarters, nickels and dimes, although it is to be understood that the invention is also applicable to apparatus for handling a greater or lesser number of denominations or foreign coinage.

The apparatus 10 includes a main frame 12 having a normally vertically extending main wall 14 and a pair of integral, forwardly projecting side flanges 16 and 18. The main gate 20 of apparatus 10 is pivotally mounted on frame 12 by means of an upright pin 22 which also supports for swinging movement a secondary or magnet gate 24 and an ejector 25 shown fragmentarily only in FIG. 1. The main gate 20 includes a generally planar section 26 remote from the pin 22 which cooperates with the inner face of main wall 14, during normal operation, to define spaced, opposed sides for an assortment of coin pathways and testing zones which lead from a funnel-like, coin entrance, which is defined by a

generally U-shaped element 28 mounted on wall 14 and a mating, outwardly flared plate 30 mounted on planar section 26, to the testing cradles hereinafter identified. Other conventional structure, such as rails 29 and 31, define top and bottom limits for appropriate portions of the mentioned coin pathways and testing zones. A scavenger mechanism 32 on wall 14 is operable when needed to scavenge jammed coins or rejected slugs from the passages and testing zones within the apparatus.

As may be seen best from FIG. 4, coins which enter the apparatus 10 gravitate through a generally vertically extending pathway 34 which is successively joined by a laterally extending quarter-accepting pathway 36 and a laterally extending nickel-accepting pathway 38 therebelow. A quarter testing cradle 42 is pivotally mounted on section 26 and disposed substantially at the junction of pathways 34 and 36 while, in a similar manner, nickel cradle 44 is provided and mounted adjacent the junction of pathway 38 with the main pathway 34. The cradles 42 and 44 are generally similar in configuration and function, and, for example, the quarter cradle 42 has a pair of legs 48 and 50 which project inwardly through appropriate openings in the planar section 26 and into the zone of juncture of pathways 34 and 36. Cradle 42 is pivoted upon the axis 43 and is provided with a weight 45 for normally disposing the cradle 42 and its legs 48 and 50 in the dispositions illustrated in FIGS. 1, 3 and 4.

A size checking or primary cradle lock member 52 typically is generally V-shaped and is pivotally mounted as at 53 on the front of planar section 26 and conventionally has a lateral ear (not shown) which projects into a shouldered opening 54 in the cradle 42 to normally limit the extent of tipping of cradle 42 in a clockwise direction in FIGS. 1 and 3 until the member 52 itself has been tipped in a similar direction to free the ear thereof from the shoulder within opening 54. A coin-engaging tab 56 on the opposite leg of member 52 projects through an appropriate opening in section 26 and into the zone of juncture of pathways 34 and 36 adjacent cradle 42 and generally above leg 48 of the latter. When tab 56 is engaged by a genuine quarter on cradle 42 during the initial tipping of the latter permitted by member 52, the member 52 is shifted in a counterclockwise direction from its position of FIG. 4 to clear its ear from the shoulder in opening 54, and thereby the cradle 42 is released from the limiting effects of the member 52 in the conventional manner.

Thus, those skilled in the art will understand that a quarter entering the pathway 34 is received upon and temporarily restrained by legs 48 and 50 of cradle 42, which then starts to rock in a counterclockwise direction in FIG. 4 under the influence of the weight of the quarter, whereupon a genuine quarter engages tab 56 to release cradle 42 for further counterclockwise rotation to discharge the quarter into the pathway 36 for subsequent authenticity tests. On the other hand, nickels and dimes entering the pathway 34 should and normally do pass between the legs 48 and 50 of quarter cradle 42 from which they gravitate along pathway 34 to the lower nickel cradle. Unfortunately, however, not all of the smaller coins behave in the expected manner just noted. Some dimes, for example, will strike either the leg 50 or some portion of the structure defining

pathway 34 and will ricochet therefrom into more or less concurrent impact with the tab 56 of cradle lock 52 and the leg 48 of cradle 42, which both frees and rotates the cradle 42 sufficiently to permit the dime to enter acceptance pathway 36 between the shifted tab 56 and leg 48.

The auxiliary latch of this invention, shown most clearly in FIGS. 2, 3, 5 and 6, broadly functions to preclude sufficient movement of the leg 48 of cradle 42 away from tab 56 of primary cradle lock 52 under the influence of an errant dime or nickel to permit such smaller coin to pass therebetween into the quarter acceptance pathway 36. Thus, a dime seeking to enlarge and ricochet through the gap between tab 56 and cradle leg 48 will be precluded by the auxiliary latch of this invention from doing so, and, instead, will continue in its proper course of travel down the pathway 34 toward the dime cradle 46.

The structure for accomplishing this result comprises a generally rectangular, open-frame, auxiliary latching device 58 mounted on the rear face of wall 14 as best shown in FIGS. 2 and 5. The device 58 is somewhat loosely suspended from the wall 14 by an outwardly projecting post 60 having a "sloppy fit" passage through the device 58 and provided with a retainer 62 thereon. The upper region of latch 58 has a nose portion 64 facing wall 14, which catches on a shelf 66 formed by a depression in the rear face of wall 14 to provide a fulcrum point for swinging of the lower region of device 58 toward and away from the wall 14. A cradle stop projection 68 adjacent the lower end of device 58 normally projects through an opening 69 in the wall 14, as shown in FIG. 5, because of the disposition of the center of gravity of the device 58. The upper surface 71 of the projection 68, which may be flat as shown in FIG. 3 or may incline slightly upwardly as its tip end is approached, normally is disposed below and extends into the arcuate path of travel of the cradle leg 48 and is normally so located as to permit only relatively slight rotation of cradle 42 and travel of the cradle leg 48 away from tab 56 before leg 48 is stopped by projection 68, thereby effectively restricting the gap between tab 56 and leg 48 to prevent passage of a dime therebetween. A coin sensing projection 70 intermediate the ends of device 58 has a downwardly sloping, upper face 73 which normally projects through an opening 75 in wall 14 and into the passageway 34 below and between the cradle legs 48 and 50, with the outermost tip of projection 70 being disposed approximately in alignment with the point 70a on the planar section 26 indicated in FIG. 4.

The latch 58 is of lightweight construction, so that only relatively slight pressure is required to be exerted against the sloping face 71 of projection 70 to cause the lower end of the latch 58 and the projection 68 to swing outwardly away from their normal positions shown in FIG. 5. However, it will be appreciated that, because of the flat or upwardly inclined configuration of surface 71 of the projection 68, even a substantial amount of force directed downwardly against projection 68 by the cradle leg 48 may be borne by the latter without causing the latch 58 to shift out of its cradle-stopping position. Thus, the latch 58 is capable of reliably holding the cradle 42 against undesired rotation, yet may be easily and reliably released from its cradle-latching

disposition merely by the weight of a proper coin bearing against the inclined surface 73 of projection 70.

Reviewing the overall operation of the apparatus 10, with reference particularly to quarters and the quarter cradle 42 for purposes of illustration, a quarter, upon entering the receiving pathway 34 from the funnel 28-30, is initially prevented from downward gravitation past the entrance to accepting pathway 36 by the quarter cradle legs 48 and 50. At the instant that the quarter comes to rest in bridging relationship with the legs 48 and 50, the point 70a (FIG. 4) representing the tip of projection 70 on latch 58 is disposed slightly below the periphery of the quarter supported in cradle 42. However, as the cradle 42 begins to tip toward the accepting pathway 36, the quarter supported thereon is moved laterally toward the tab 56 of the primary cradle lock member 52 and downwardly toward the tip of projection 70 of the auxiliary latch 58. The projection 70 is engaged by the lower edge of the quarter and pushed out of its FIG. 6 position in pathway 34 slightly ahead of the engagement of the cradle leg 48 that would otherwise occur with the projection 68. By the time cradle leg 48 reaches the position at which it would otherwise be stopped by projection 68, the latter has also been swung out of its FIG. 5 position in pathway 34 to present an unobstructed path of travel for leg 48. Continued tipping of the cradle 42 then causes the quarter to engage and move tab 56 to rotate the cradle lock 52, thereby completely releasing cradle 42 and permitting it to discharge the quarter into the quarter accepting pathway 36.

In contrast, when a dime or other disc of size substantially smaller than a genuine quarter enters the receiving pathway 34, such time is precluded from ricocheting through the gap between tab 56 and cradle leg 48, because of the restricted size of such gap maintained by the auxiliary latch 58 until the latter has been released by contact of a coin with the projection 70. Further, by the time a dime reaches point 70a, where it may release the auxiliary latch 58 by movement against the projection 70 to swing the projection 68 out of its latching position, such dime is already then in a position where it has become committed to gravitate between legs 48 and 50 and continue downward movement toward the awaiting cradle 44. Thus, even those dimes which ricochet within the apparatus 10 as a result of passage through relatively long, steeply inclined coin chutes prior to reaching receiving pathway 34 are effectively precluded from entering the quarter pathway 36.

Those skilled in the art will understand that the invention may be applied to virtually any coin selecting or testing apparatus having a cradle for selecting or testing coins of a size larger than other coins which are intended to be passed through the cradle; that, although the auxiliary latch provided by the invention for the special purpose described is preferably employed in conjunction with a primary cradle lock in order to also retain the precise diameter testing achieved by the latter, the auxiliary latch will retain its utility for achieving its own function even when used without a primary cradle lock; and that various minor modifications of details of construction might be made from those disclosed to illustrate a currently preferred form of the invention. Accordingly, the invention

should be deemed limited only by the fair scope of the claims that follow.

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

1. In apparatus for testing and separating coins of a larger diameter from coins of a lesser diameter:

structure presenting a coin testing zone, a downwardly extending coin entry pathway leading to said zone, a non-selected coin pathway extending downwardly from said zone, and a coin accepting pathway extending generally laterally from said zone;

a cradle pivotally mounted on said structure for movement between a normal standby position and a shifted delivery position thereof,

said cradle having a pair of spaced legs extending into said zone for receiving and temporarily supporting a larger diameter coin entering said zone from said coin entry pathway,

said cradle being operative when moved into said delivery position thereof for discharging a larger diameter coin previously received by said legs into said coin accepting pathway,

said cradle being movable away from said standby position thereof and toward said delivery position thereof in response to the weight of a larger diameter coin previously received by said legs,

one of said legs, when said cradle is in its standby position or in a partially shifted intermediate position thereof during the initial portion of its movement toward its delivery position, extending into an entrance portion of said accepting pathway adjacent said zone and being disposed to block entry of even said lesser diameter coins into said accepting pathway,

said legs being sufficiently spaced apart to normally clear said lesser diameter coins for gravitational movement from said coin entry pathway, thence between said legs and into said non-selected coin pathway,

said cradle being vulnerable, under the influence of impact of an errant lesser diameter coin upon said one leg, to undesired movement of said cradle toward said delivery position thereof and beyond said intermediate position thereof to move said one leg out of its said blocking disposition and thereby permit said errant lesser diameter coin to enter said accepting pathway; and

cradle latching means shiftably mounted on said structure for movement between a normal cradle latching position and a shifted cradle unlatching position thereof,

said latching means including cradle engaging means operable, when said latching means is in its latching position, to restrain said cradle against movement toward its delivery position beyond said intermediate position thereof, and

coin sensing means disposed below and on a line extending vertically between said legs of said cradle and operable, when operatively engaged by either a larger diameter coin or a lesser diameter coin, to move said latching means to its unlatching position,

said coin sensing means being disposed relative to said legs for operative engagement by the edge of a

larger diameter coin supported on said legs as said cradle moves away from said standby position toward said delivery position thereof and for operative engagement by a lesser diameter coin only after the latter has sufficiently traversed a downward trajectory between said legs to be committed to continuing passage toward and into said non-selected coin pathway.

2. The invention of claim 1, wherein said latching means is movable from its latching position to its unlatching position by operative engagement of a lesser diameter coin with said coin sensing means while said cradle remains in its standby position.

3. The invention of claim 1, wherein said latching means is swingable about a substantially horizontal axis disposed in a vertical plane substantially perpendicular to the axis of pivoting of said cradle.

4. The invention of claim 3, wherein said cradle engaging means comprises a latching projection on said latching means extending into a position below said one leg and in the path of movement of the latter when said latching means is in its latching position, said latching projection being withdrawn from said path of travel of said one leg when said latching means is swung to its unlatching position.

5. The invention of claim 3, wherein said coin sensing means comprises a sensing projection on said latching means having an inclined upper surface engageable by either a larger diameter coin or a lesser diameter coin for swinging said latching means to its unlatching position.

6. The invention of claim 5, wherein said cradle engaging means comprises a latching projection on said latching means extending into a position below said one leg and in the path of movement of the latter when said latching means is in its latching position, said latching projection being withdrawn from said path of travel of said one leg when said latching means is swung to its unlatching position.

7. The invention of claim 1, wherein is provided primary cradle lock means pivotally mounted on said structure for movement between a normal locking position and a shifted unlocking position, said cradle lock means including means coupled with said cradle for restraining the latter against movement into its delivery position while said cradle lock means is in its locked position, and a coin-engageable tab extending into said testing zone generally above said one leg and on the side of the latter opposite from the other of said legs, said tab being normally operative when engaged by a larger diameter coin supported on said cradle as the latter moves toward its delivery position to shift said cradle lock means to its unlocked position, said cradle lock being vulnerable, under the influence of impact of an errant lesser diameter coin upon said tab, to undesired shifting of said cradle lock means to its unlocked position, thereby permitting said errant lesser diameter coin, upon also impactively engaging said one leg, to cause said cradle to move toward said delivery position thereof and beyond said intermediate position thereof, whereby said errant lesser diameter coin could enter said acceptance pathway except for the employment of said latching means in conjunction with said primary cradle lock means.

8. The invention of claim 7, wherein said coin sensing means of said latching means comprises a sensing projection on said latching means having an inclined upper surface engageable by either a larger diameter coin or a lesser diameter coin for swinging said latching means to its unlatching position, and said cradle engaging means comprises a latching projection on said latching means extending into a position below said one leg and in the path of movement of the latter when said latching means is in its latching position, said latching projection being withdrawn from said path of travel of said one leg when said latching means is swung to its unlatching position.

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