Nov. 29, 1938. A. C. SMITH 2,138,055

SLUG ELIMINATOR FOR VENDING MACHINES

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Fig. 1.

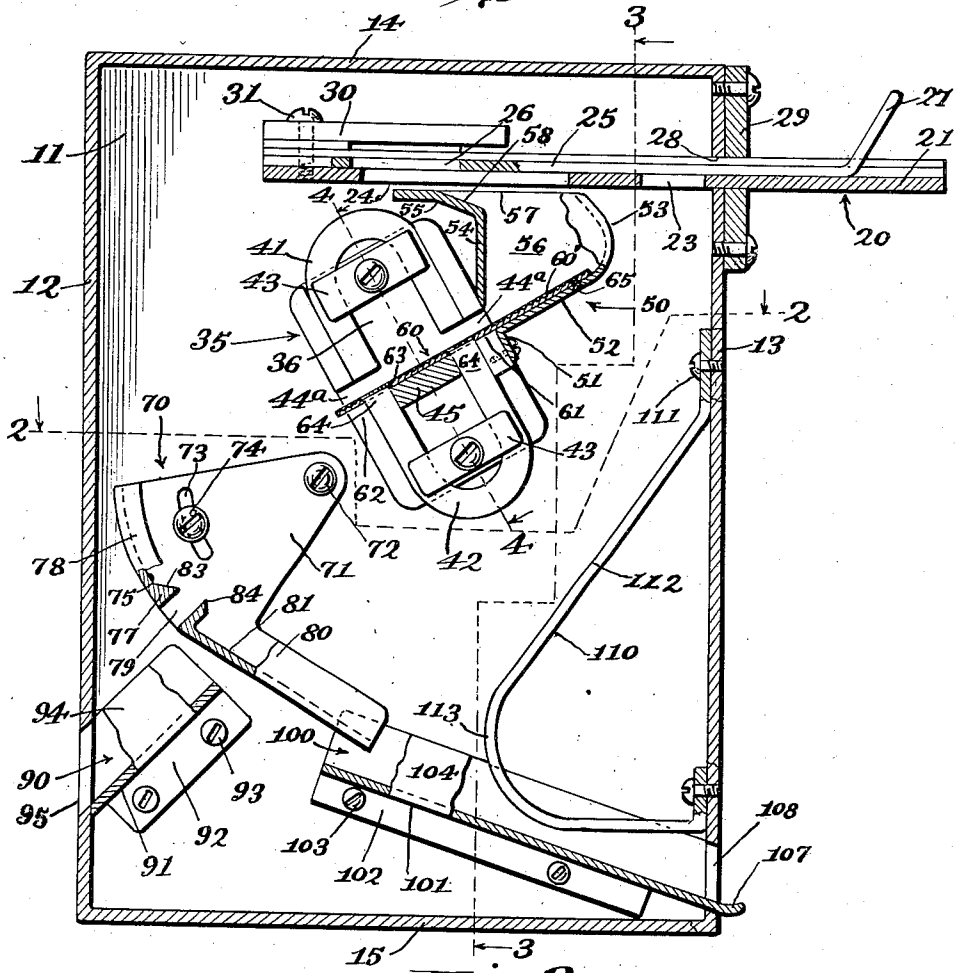
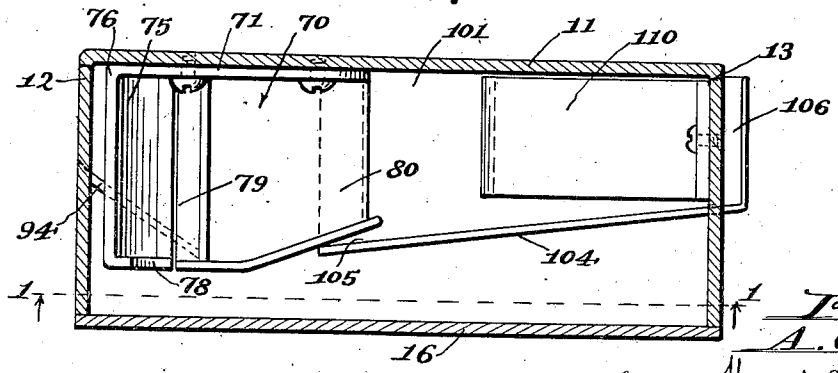


Fig. 2.



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Fig. 3.

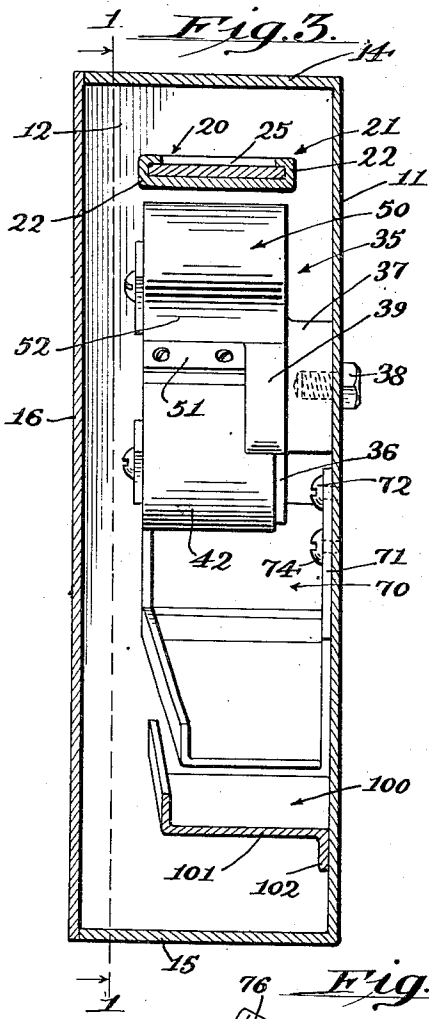


Fig. 4.

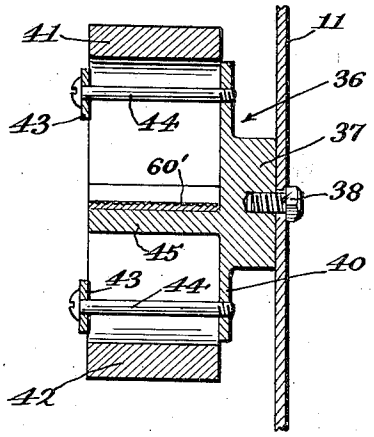


Fig. 5.

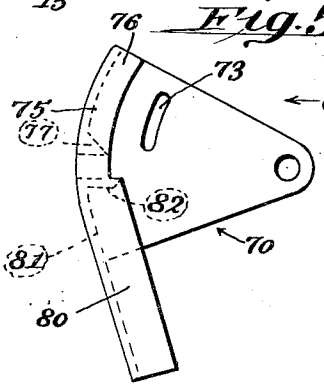
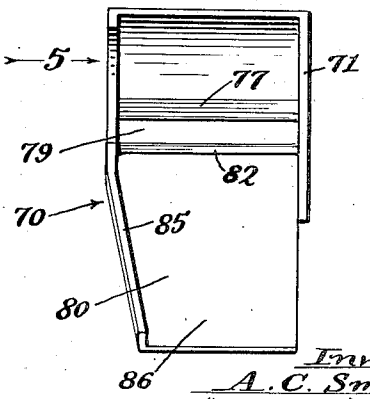


Fig. 6.



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UNITED STATES PATENT OFFICE

2,138,055

SLUG ELIMINATOR FOR VENDING MACHINES

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Application April 22, 1936, Serial No. 75,738

15 Claims. (Cl. 194—101)

My invention relates to a device for separating slugs and counterfeit coins and other devices sometimes used in coin actuated or controlled vending machines, from the proper coins, in which one of the objects and features of my invention is in providing a main segregating or separating series of devices which by various adjustments will be operative for various coins such as nickels, dimes, quarter, half and one dollar coins. However, the device for inserting the coins is made to accommodate a coin of a particular denomination and the device may be changed to be actuated by coins of different denominations by a change of the inserting device or changing the usual type of coin slide.

One of the main objects and features of my invention is in the provision of a combination magnetic action and friction separator for coins and slugs. In this the coins slide on a friction plate, the coins and slugs being flat on the plate and pass in a magnetic field between preferably two permanent U shaped magnets. This causes a difference in the velocity of a downward sliding movement at an angle to the horizontal so that there is a change developing in the momentum of the particular coins and slug causing these to have a different trajectory when leaving the friction plate. A detail feature of the magnetic and friction separator is that this may be adjusted to rotate on a horizontal axis and thus change the inclination of the friction plate on which the coins slide. The magnets may also be adjusted different distances apart and are preferably arranged with their poles parallel to the sliding movement of the coins on the friction plate.

Another feature of my invention resides in a coin selector which is formed of a structure which may be adjusted on a pivot turned on an angle, this having an opening in its periphery which opening may be positioned in the trajectory of the particular coil for which the mechanism is to be used, then such coin as it follows a curved trajectory from the friction plate passes through such opening to a coin chute to be conveyed to a coin controlled vending machine or the like. Above and below this opening the coin and slug selector or segregator is provided with a solid floor structure on which slugs or spurious coins will strike, these having a trajectory which causes them to miss the opening. In order to catch such slugs or spurious coins which have a trajectory very slightly different from that of a correct coin, knifelike blades are used above and below the opening, these blades having a bevel to respectively deflect slugs striking the upper blade upwardly, and the lower blade downwardly. The portion of this segregator or selector below the opening is designated as having a pan, as the slugs fall into this pan. Those which catch below the opening either on the lower blade or dropping directly in the pan, will slide downwardly and those which strike the floor of the selector above the opening will bounce downwardly clear of the opening and clearing the blade below the opening and fall into the pan for ejection. Any slugs or spurious coins which reach this pan portion of the selector or segregator slide downwardly to a coin chute and are there ejected.

My device is designed to segregate nonmagnetic slugs, as the magnetic slugs are returned to the operator by the coin slide mechanism, this being provided with a well known type of magnetic slug returning device. However, if there are any slugs or coins which are of undersize, they are immediately dropped inside the box or housing containing my various devices and drop into the slug chute. Above the slug chute opening I provide an internal structural device so positioned that it prevents persons from inserting a bent wire or rod or the like, in the attempt to dearrange the friction and magnetic separator.

I wish to bring out that an important feature of my invention is the corelation of the friction slide for coins and slugs having the magnets and the adjustable coin and slug segregator or selector. In fact, I find that quite an efficient apparatus may be made by using a sloping friction plate over which the coins and slugs slide downwardly on a flat face, especially when this friction plate is of soft metal and roughened on the surface, such as being knurled. This gives such discharge velocities for good coins and both under and over weight slugs, causing a separation and thus a segregation in the selector device. However, the action is much improved by using magnets so that the coins and slugs sliding downwardly on the friction plate pass through a magnetic field. I wish to also bring out that the device may be manually adjusted and tested for the coin desired to secure the correct slope of the friction plate and the coin selector or segregator being adjusted to allow passage of such coins but to catch the slugs. If it is desired to set the device for coins of a different denomination, the slope of the friction plate with its magnets is altered and also the position of the coin selector or segregator.

My invention is illustrated in connection with the accompanying drawings in which Figure 1

may be considered as a vertical section on the line 1—1 of Figure 2 or 3 taken in the direction of the arrows, this showing the main portions of the device in elevation with sections partly broken away to illustrate details.

Figure 2 is a horizontal section on the line 2—2 of Figure 1 in the direction of the arrows.

Figure 3 is a vertical section on the line 3—3 of Figure 1 in the direction of the arrows.

Figure 4 is a longitudinal section on the line 4—4 of Figure 1 through the main magnetic and friction separator.

Figure 5 is a side elevation of the coin selector taken in the direction of the arrow 5 of Figure 6.

Figure 6 is a plan of the coin selector taken in the direction of the arrow 6 of Figure 5.

In my invention I employ what may be termed a back or wall plate 11 on which the main portions of the device are mounted. For convenience there are side walls 12 and 13 and top and bottom walls 14 and 15 extending outwardly at right angles from the back wall 11 forming thus a shallow rectangular box over which may be placed a cover plate 16.

In the upper portion of the device there is a coin slide 20 which employs a guide bar 21. This bar has marginal edges 22 and is provided with a perforation 23 in the bottom for discharging pennies or small slugs and an opening 24 for discharging the proper sized coins and slugs which may be dropped. The coin pusher slide 25 slides on the guide bar, the edges being guided in the marginal edges 22. This coin slide has a pocket 26 therein to receive the coins or slugs. A handle end 27 is used by the operator to manipulate the coin slide. The guide and the slide pass through an opening 28 in the side wall 13 and also through an opening in a cover plate 29. A horseshoe magnet 30 is secured by a screw 31 to the inner end of the guide bar 21 and has its poles positioned above the location of the pocket 26 when the coin pusher slide 25 is in its innermost position.

Below the coin pusher slide for insertion of the coins, I employ a magnetic and friction coin and slug separator designated by the assembly numeral 35. This has a supporting frame 36 with a lug 37 attached by a pivot screw 38 to the back wall or panel 11. Flanges 39 extend outwardly from the lug 37 at right angles to the panel 11. There is also a plate 40 parallel to the panel 11 from which plate the flanges 39 extend on opposite sides. Confined to the plate 40 by these flanges there are two permanent U shaped magnets, such being an upper magnet 41 and a lower magnet 42, each secured in place by a clamping bar 43 and a bolt 44 threaded into the plate 40. The flanges 39 have a notch 44*a* cut in each flange and between the arms of the lower magnet there is a supporting arm 45 which is preferably formed integral with the lug 37.

An upper coin chute 50 has a flange 51 secured to the flange 39 on one side of the plate 40 and from this the chute has a lower wall 52 extending upwardly on a slope and having an upper curved end 53. A substantially vertical wall 54 extends upwardly from the upper side of the notch 44*a* on the flange to which the chute 50 is attached. This vertical wall has a diverging end 55. The opposite sides 56 are vertical and parallel, thus forming an open mouth 57 at the top for entrance of coins dropped from the pocket or coin receiver 26 of the coin slide, there being a slope 58 in the upper chute to guide coins.

The friction sliding structure comprises a soft metal plate 60 preferably made of copper and roughened or knurled on its upper surface 60'. This fits over the wall 52 of the chute 50, has a bearing on the shoulder 61 and 62 on each of the flanges 39 below the notch 44*a*. It also rests on the arm 45. The plate 60 preferably has two perforations 63 in which the poles 64 of the lower magnet 42 are pressed in. However, these poles do not project above the surface of the copper plate 60. This plate is held in place by means of screws 65 extending through the wall 52 of the chute 50. The copper plate 60 extends slightly beyond the side of one of the flanges 39.

The manner of operation and functioning of the combination friction and magnetic separator for coins and slugs is substantially as follows: It will be apparent that this assembly may be rotated by the clamping pivot screw 38 in order to incline the upper surface of a copper plate 60 at different angles depending on the particular coins to be used in this device.

As above mentioned, for certain types of a simple device a soft metal friction plate, such as a copper plate preferably roughened on its upper surface, may be used without the magnets. The slope would then be adjusted to develop a definite trajectory for the coins desired. Slugs will then have a different trajectory. I find that slugs of light weight will have a higher path than heavy slugs and hence as a rule the light weight slugs will have a higher path of travel than the heavy slugs and the heavy weight slugs a lower trajectory, the trajectory of the desired coins being intermediate.

Therefore I select or segregate by an adjustable device which I designate as a coin and slug separator or selector, designated by the assembly numeral 70. This has a side plate 71 fastened by a pivot screw 72 to the wall plate 11. It is also provided with an arcuate slot 73 through which operates a set screw 74 for adjusting the position of the device in reference to the path taken by the coins and slugs from the magnetic and friction separator 35. Extending upwardly at right angles to the plate 71 there is a curved floor 75 extending from the upper edge 76 of the plate 71. This terminates in an upwardly extending knifelike blade 77. There is also a side flange 78 opposite the plate 71. Below the knifelike blade 77 there is a transverse slot or opening 79 extending from the plate 71 outwardly the full width of the curved floor 75. A slug receiving pan 80 is positioned below this slot 79 and has a floor 81 the same width as the floor 75 from the plate 71 at its upper portion. This has a knifelike blade 82 parallel to the blade 77 but extending upwardly towards the pivot 72 a greater distance. Both of these blades have a beveled edge, the blade 77 having its beveled edge 83 extending upwardly and the blade 82 having an edge 84 sloping downwardly. A flange 85 extends upwardly from the floor 81 of the slug pan 80 and converges towards the lower end as indicated at 86.

A coin chute 90 is formed of a plate having a floor 91, a right angle flange 92 secured to the wall 11 by screws 93 and a converging upper flange 94 extending to an opening 95 in the lower part of the wall 12. This is positioned to engage coins which pass through the slot 79 of the coin separator 70.

A slug chute 100 has a sloping floor 101, a lower right angle flange 102 secured to the wall 11 by screws 103. This also has an upwardly extending flange 104. The floor is widest at the upper portion 105 which is positioned below the discharge

end 86 of the slug pan 80. The floor converges, being narrowest at its discharge end 106, which is a slight upward curve as indicated at 107, this end passing through an opening 108 in the wall 13.

Inside the wall 13 and above the slug opening 108, I provide an obstructing device designated as a guard 110. This has its upper end secured to the wall 13 by a screw 111. It has a downwardly sloping face 112 and a nose 113 projecting a considerable distance into the box or cabinet construction. The main purpose of this is to form an internal obstruction so that persons cannot insert a bent wire, rod or similar instrument and thereby endeavor to de-arrange the magnetic and friction plate separator 35. This device does not interfere with slugs which drop through the perforation 23 as it merely deflects these to the slug chute 100 whence they are discharged.

In the operation of the coin and slug separator 70 this is adjusted by the screw 72 and the set screw 74 so that the desired size of coin to be used in the machine after discharge from the magnetic selector 35 has a trajectory which causes such coin to pass through the opening 79 and thus drop on to the coin chute 90. If a slug travels at a higher velocity it may engage the upper blade structure 77 possibly on the bevel 83 or the floor portion 75 and will topple over the blade 82 into the slug pan 80, sliding downwardly to the slug chute 100. Other slugs which do not have sufficient momentum follow a trajectory closer to the vertical than the proper coin. These will either be caught by the lower blade 82 or fall directly into the slug pan 80, usually contacting the floor 81 and sliding downwardly to the slug chute 100.

It will be noted by my invention that I have two main devices for separating or segregating coins and slugs which cooperate together, these being the magnet and friction plate assembly designated 35 and the separator or segregator defined by the assembly numeral 70. As above described, in some simple devices a friction plate such as 60 alone may be used without the magnets and this may be adjusted to change its inclination but of course as the inclination of the friction plate 60 with or without the magnets is changed, it is necessary to alter the position of the segregating device 70 so that the correct coins will pass through the slot or opening 79 and the slugs strike either above or below the opening on the upper floor portion 75 or the lower pan portion 80. My invention also comprehends in combination with the friction plate device 35 with or without the magnets, using any type of suitable device which will separate or segregate the coins and slugs having a different free trajectory in their drop from the lower end of the friction plate. It will also be obvious that my invention comprehends a structure for passing coins on a slope downwardly over the poles of a magnet whether or no a friction plate is used, as these poles may be arranged to form the surface on which the coins slide. It will also be obvious that the separator or segregator device 70 may be used with other devices which give a different trajectory for the path of correct coins and either light or heavy slugs so that by adjusting segregator 70 it may separate the coins from the slugs.

Various changes may be made in the details of the construction without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. In a slug eliminator, a coin chute having a sloping metal friction plate for sliding coins on one side, a U shaped magnet having its two poles positioned in the line of travel of a coin and means positioned below the lower end of the friction plate to separate coins and slugs in accordance with the path of their trajectory after leaving the friction plate, the friction plate and the magnet being rotatably mounted on a horizontal pivot having its axis aligning with the friction plate between the poles of the magnet to change the inclination of the plate and the poles of the magnet.

2. In a slug eliminator, a coin and slug separator having a side plate, means for pivoting said plate to the wall of a fixed structure, a curved floor and a slug pan extending laterally from the said plate, there being a slot-like opening between the lower end of the curved floor and the upper end of the slug pan for passage of the desired coins.

3. In a slug eliminator as described in claim 2, the lower portion of the curved floor having a knifelike blade, the upper portion of the slug pan having a knifelike blade, the said blades being on opposite sides of the slot-like opening and extending towards the pivot.

4. In a slug eliminator, a coin and slug separator including a flat side plate having a pivot adjacent its upper end for attachment to a vertical wall, an upper curved floor extending laterally from the side plate in an arc, a slug pan extending outwardly from the said plate substantially tangent to the said arc, the curved floor and the slug pan each having a marginal flange, there being a slot-like opening extending from the said plate between the lower end of the curved floor and the slug pan, the lower end of the curved floor having a knifelike blade, the upper end of the slug pan having a second knifelike blade, said blades defining the upper and lower portions of the slot-like opening, said blades extending towards the pivot, the second blade being of greater heighth than the first blade.

5. In a slug eliminator, a housing structure, a coin chute having a supporting frame with a metal friction plate positioned therein, said plate having a plane upper surface, a magnet secured to the frame and having its poles positioned adjacent the friction plate and spaced longitudinally in the direction of travel of coins on the plate, means to rotatably pivot the frame on the housing structure with the axis of rotation located substantially in the plane of the surface of the friction plate between the poles of the magnet and means to guide coins to the upper end of the friction plate, the said mounting being adapted for changing the inclination of the friction plate together with the magnet.

6. In a slug eliminator as claimed in claim 5, the friction plate having a pair of perforations, the magnet secured in the frame having its poles extending into the said perforations whereby the ends of the poles are positioned closely contiguous to coins sliding down the friction plate.

7. In a slug eliminator, a housing structure, a coin chute including a supporting frame with upper and lower flanges and a notch between said flanges for passage of coins, a soft metal friction plate mounted in the frame and extending through the said notches, said plate having a plane upper surface, an upper magnet adjustably mounted in the frame and having its poles guided by the upper and lower flanges, the poles being

spaced apart in the direction of travel of a coin sliding downwardly in the friction plate whereby the lower ends of the poles may be adjusted in relation to the thickness of a coin, a pivotal mounting for the supporting frame on the housing with the axis of rotation transverse to the friction plate and in substantial alignment with the surface of said plate between the poles of the magnet.

8. In a slug eliminator, a coin and slug separator having a structure with two floor sections separated by a slot, the upper floor section having a concave curve on its upper surface, the lower floor section being plane, a housing structure and means to pivot the segregator to the housing structure to change the position of the slot in reference to a horizontal plane through the pivot.

9. In a slug eliminator as claimed in claim 8, an upper blade secured to the upper portion of the floor at the upper edge of the slot.

10. In a slug eliminator as claimed in claim 8, a lower blade secured to the lower floor at the lower edge of the slot.

11. In a slug eliminator as claimed in claim 8, an upper blade formed integral with the upper floor at the upper edge of the slot, a lower blade at the lower edge of the slot formed integral with the lower portion of the floor, the said blades forming an extension of the said slot, the upper blade having a bevel facing upwardly and the lower blade having a bevel facing downwardly.

12. In a slug eliminator, a coin and slug separator comprising in combination a housing structure, a side plate pivoted to the housing structure on a horizontal pivot, a floor structure connected to the plate at right angles thereto and having an upper floor section concavely curved on its upper surface and a lower floor section with a plane upper surface, the floor sections being separated by a slot, there being side flanges opposite the side plate extending upwardly from each floor section and means to adjust the side plate with the parts connected thereto to change the position of the slot in reference to a horizontal plane through the pivot.

13. In a slug eliminator as claimed in claim 12, the upper floor section having an upper blade and the lower floor section having a lower blade, said blades being positioned at the edge of the said slot and forming an extension of said slot towards the pivot whereby the axial center between the blades is on a radial line from the pivot.

14. In a slug eliminator, a sloping friction plate for sliding coins and slugs on their flat undersurface by gravity, a pair of magnets, one positioned below and the other above the plate leaving a path between the poles of the two magnets for the passage of coins and slugs whereby coins and slugs have a different trajectory path after leaving the lower end of the friction plate, the friction plate and the magnets being mounted on a supporting structure, the said supporting structure being pivotally mounted on a fixed structure having its axis aligning with the friction plate and between the poles of the magnets whereby the slope of the friction plate may be altered for coins of different denominations.

15. In a slug eliminator, a housing structure having a sloping soft metal friction plate, said plate having a plane surface, means to direct coins and slugs to slide downwardly by gravity on the friction plate with the underside of the coins and slugs in contact therewith whereby due to the momentum developed by the coins and slugs when leaving the lower end of said friction plate, the coins and slugs follow different trajectories, the friction plate being rotatable on a transverse pivot positioned between the ends of said plate and substantially in alignment with the surface of the plate to change its inclination to the horizontal and a segregating means located below the lower end of the friction plate with means to change the position of the segregating means to segregate the coins from the slugs when their trajectories are changed by the angular rotation of the friction plate on its pivot.

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