United States Patent

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[32] Priority **Oct. 4, 1967**
[33] **Canada**
[31] **1,673**

[54] **COIN-HANDLING DEVICE**
41 Claims, 20 Drawing Figs.

[52] **U.S. Cl.** **194/97**
[51] **Int. Cl.** **G07f 3/02**
[50] **Field of Search** 194/97, 99, 100, 101

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Primary Examiner—Samuel F. Coleman
Attorney—Jacobi, Davidson, Lilling & Siegel

ABSTRACT: Coin-Handling devices are provided to distinguish genuine coins from spurious coins or slugs. The device includes first means to distinguish between coins and/or slugs formed from a ferromagnetic material from coins and/or slugs formed from a paramagnetic material. Preferably, the first means includes a magnet adapted to be moved into, and out of, face-to-face contact with the coin and/or slug. The device also includes either alone or in conjunction with the first means, second means which distinguishes coins and/or slugs having a smooth peripheral rim from coins and/or slugs having a serrated peripheral rim. Preferably, the second means includes a pair of pivotally mounted hangers having means such as a sharpened edge for engaging the peripheral rim of the coin and/or slug.

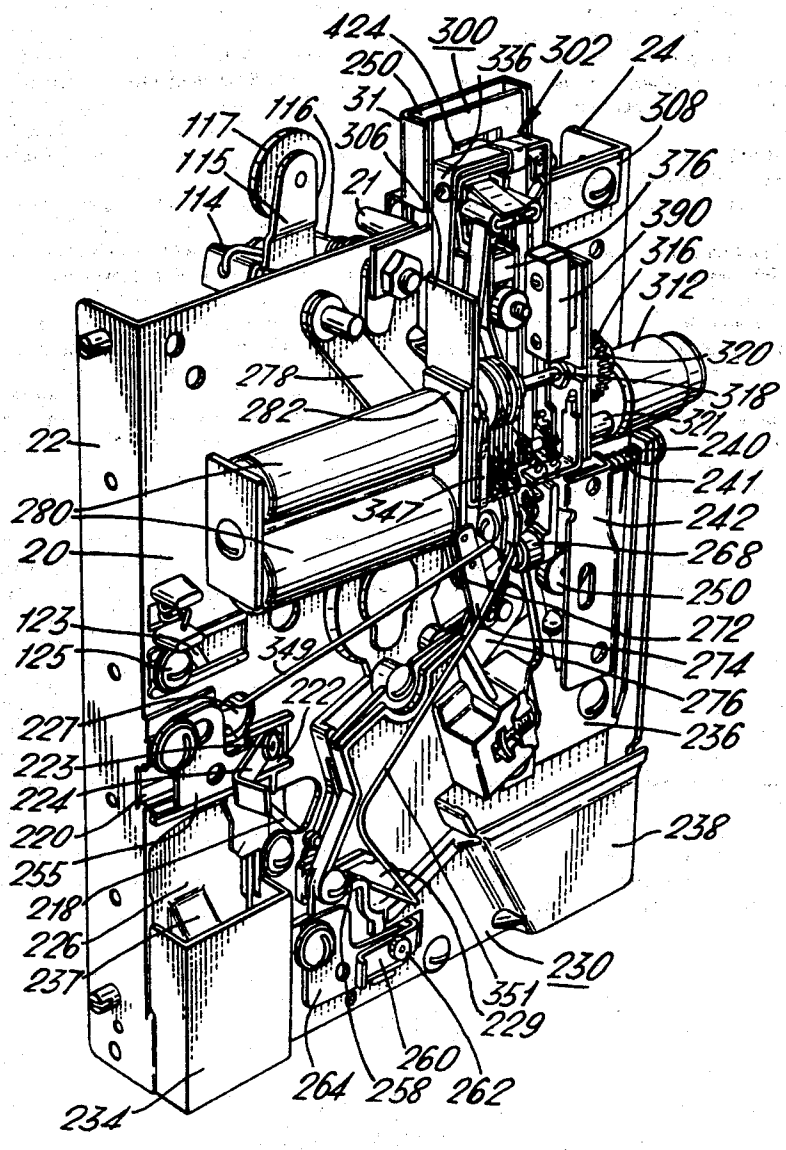
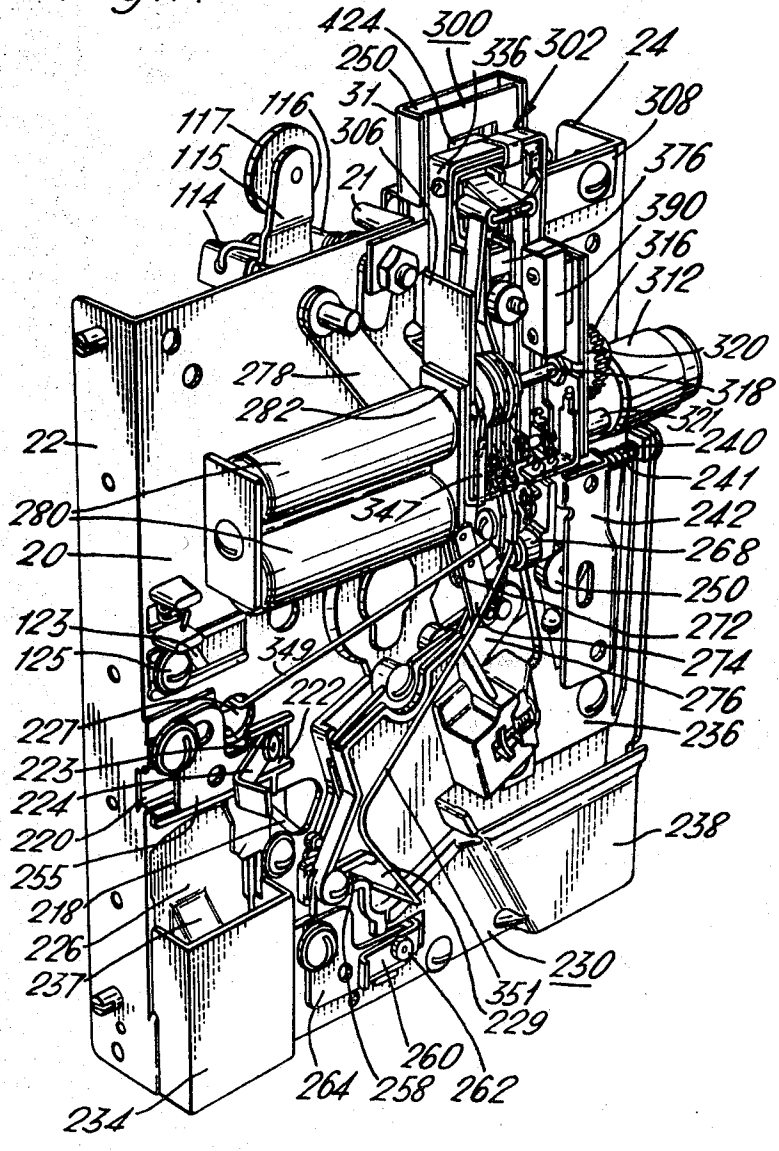


Fig. 1.



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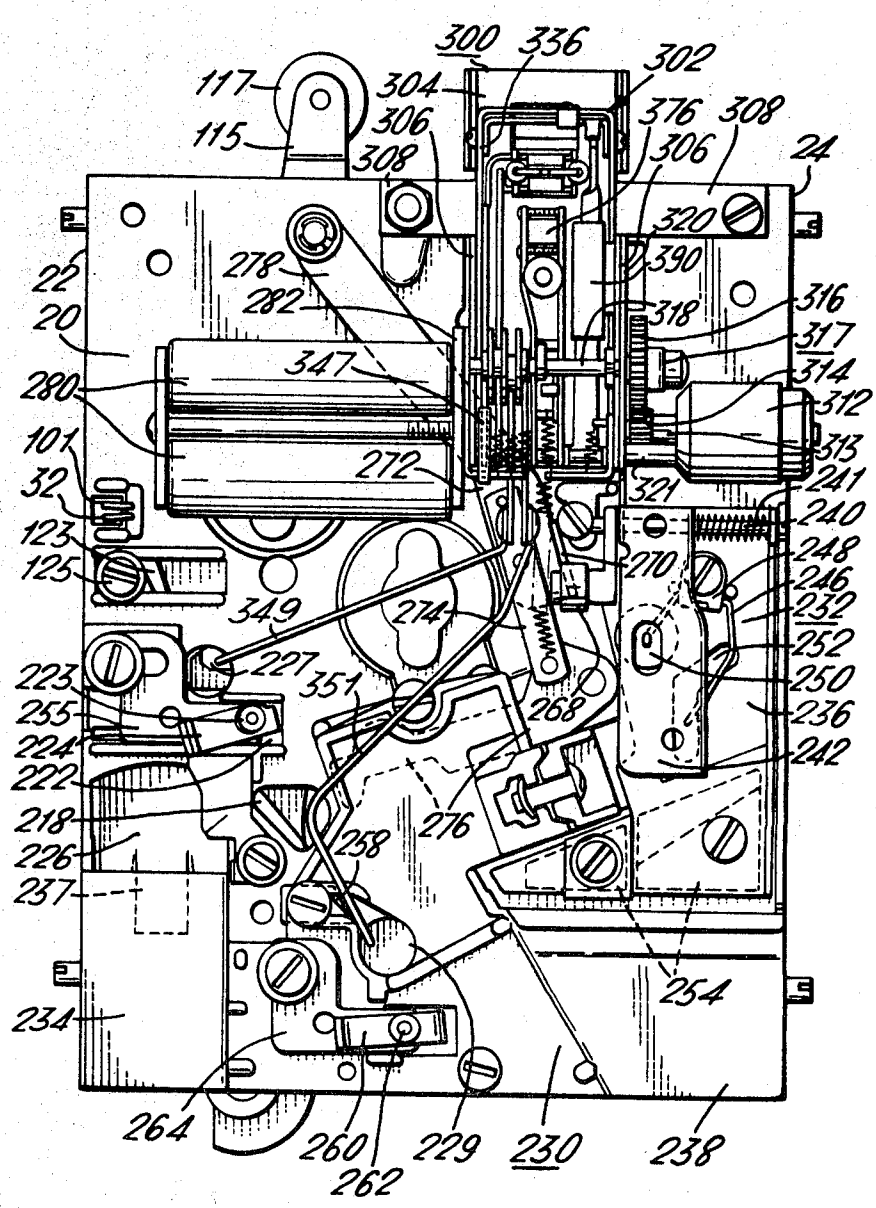
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Fig. 2.



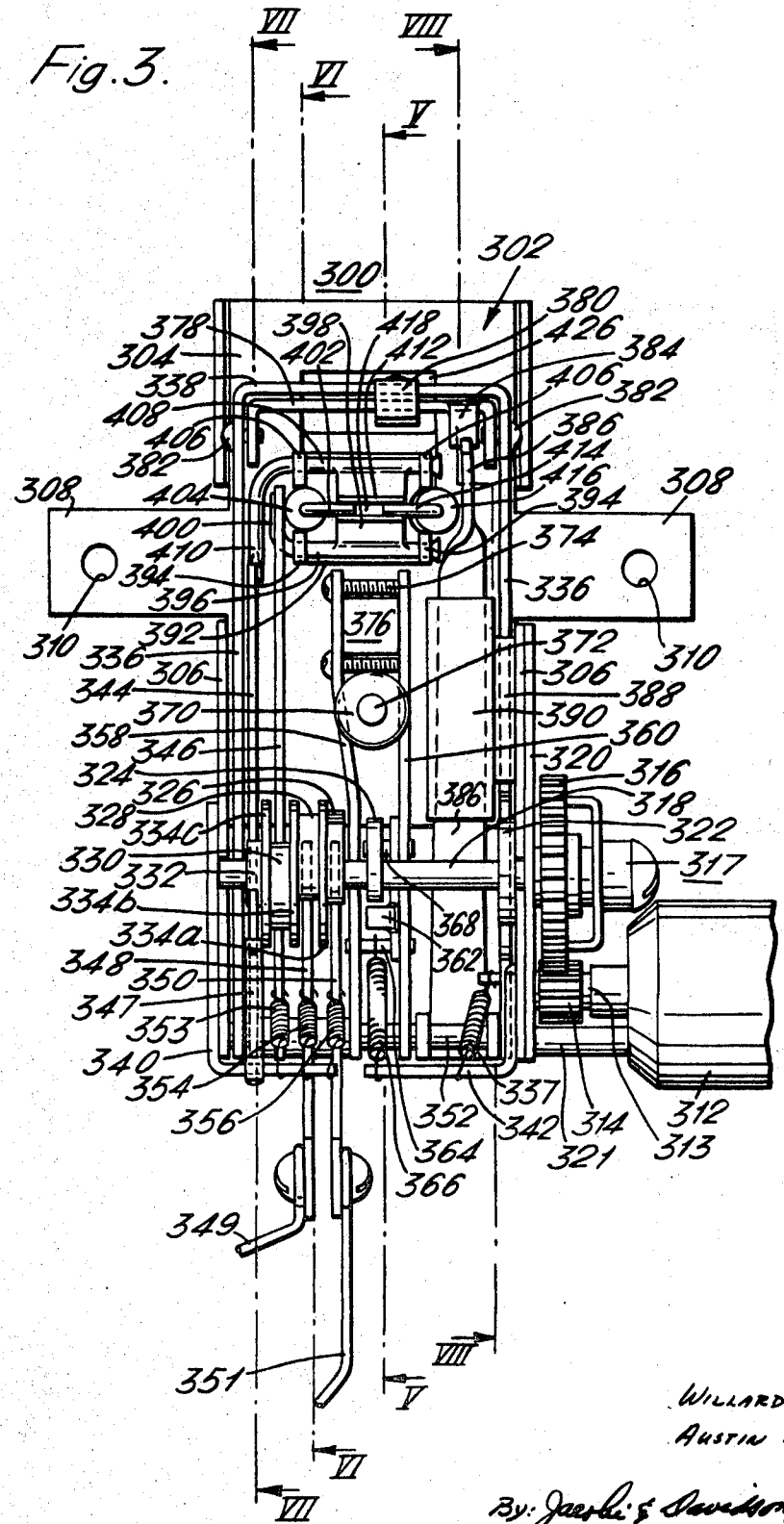
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Fig. 3.



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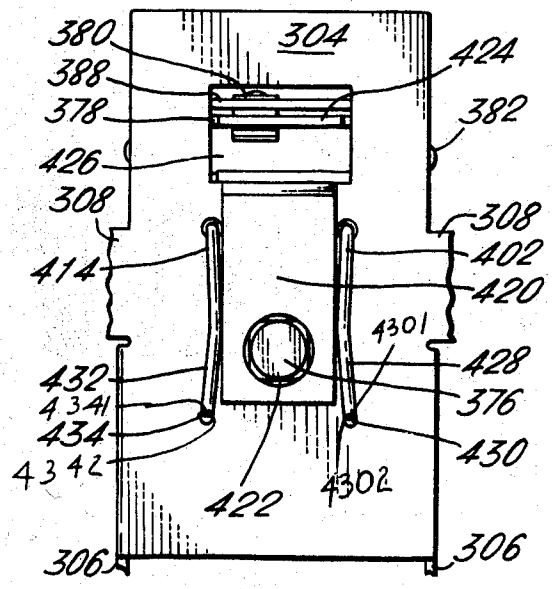


Fig. 4.

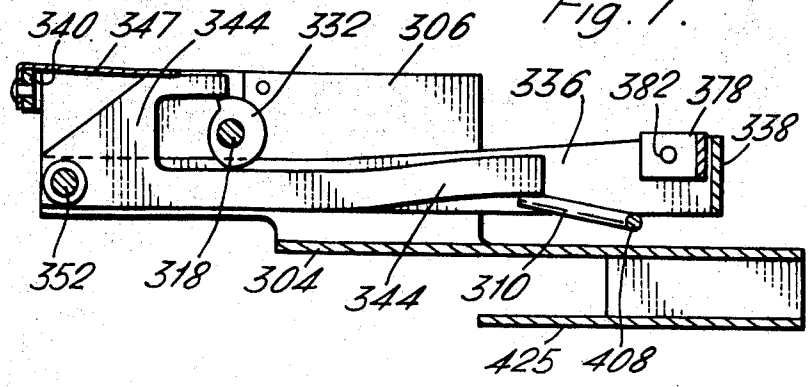


Fig. 7.

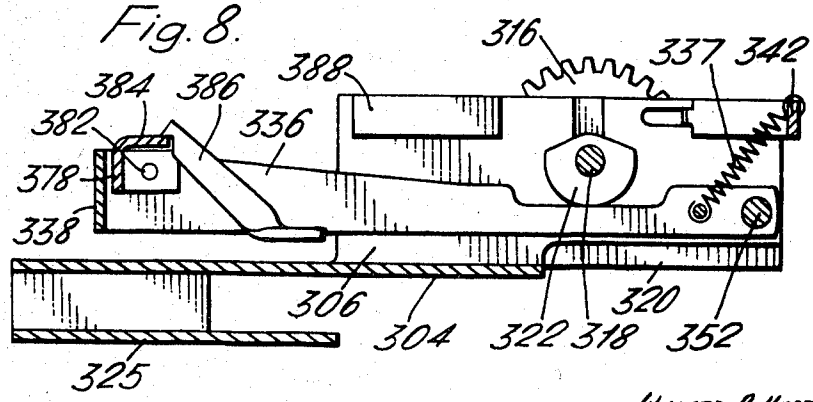


Fig. 8.

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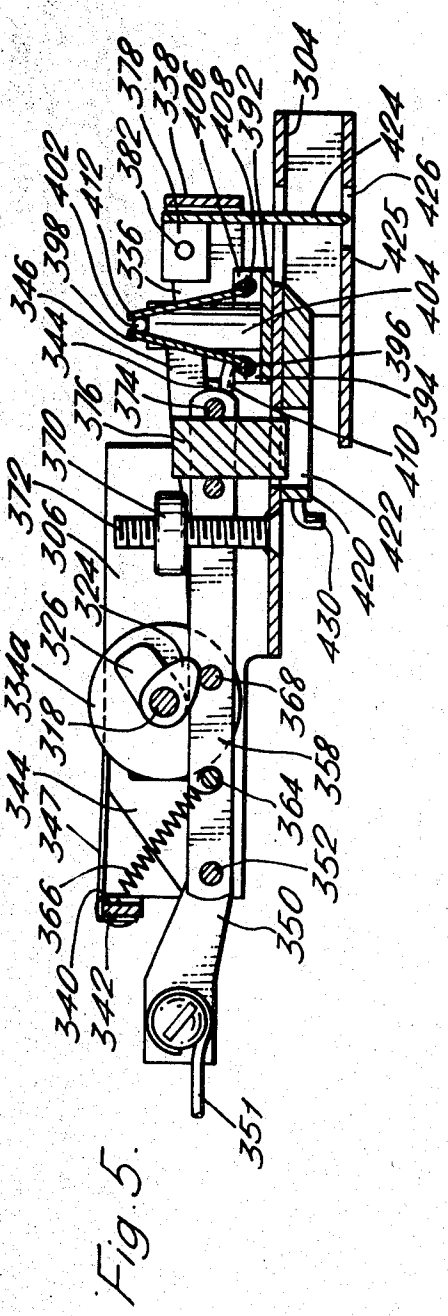


Fig. 5.

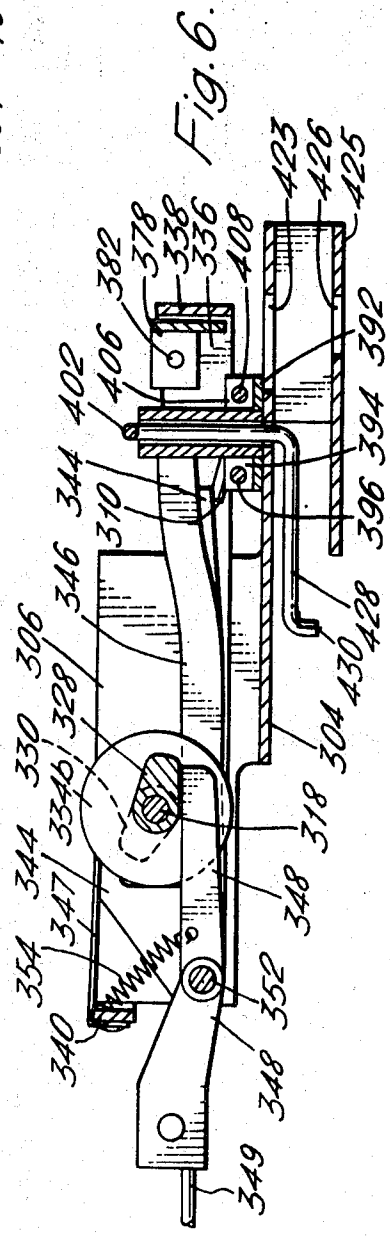


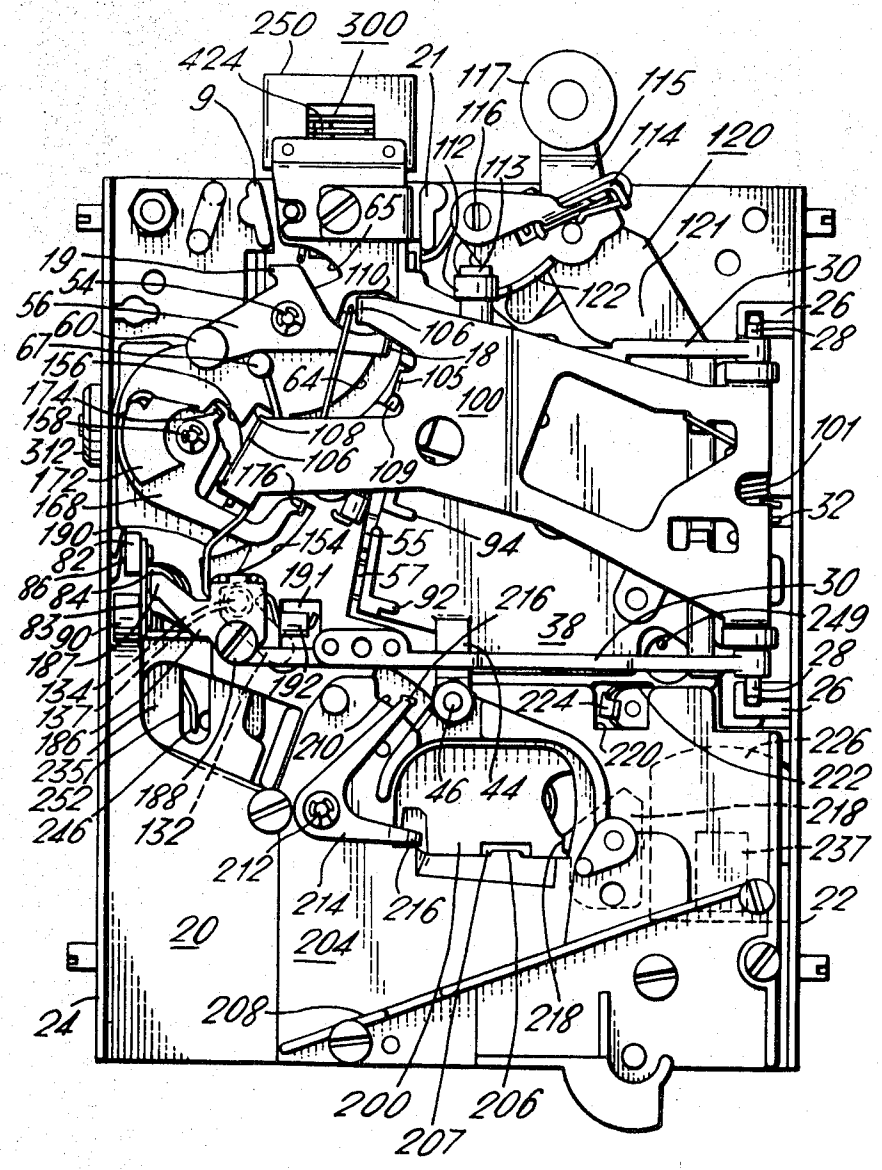
Fig. 6.

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Fig. 9



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Fig. 10.

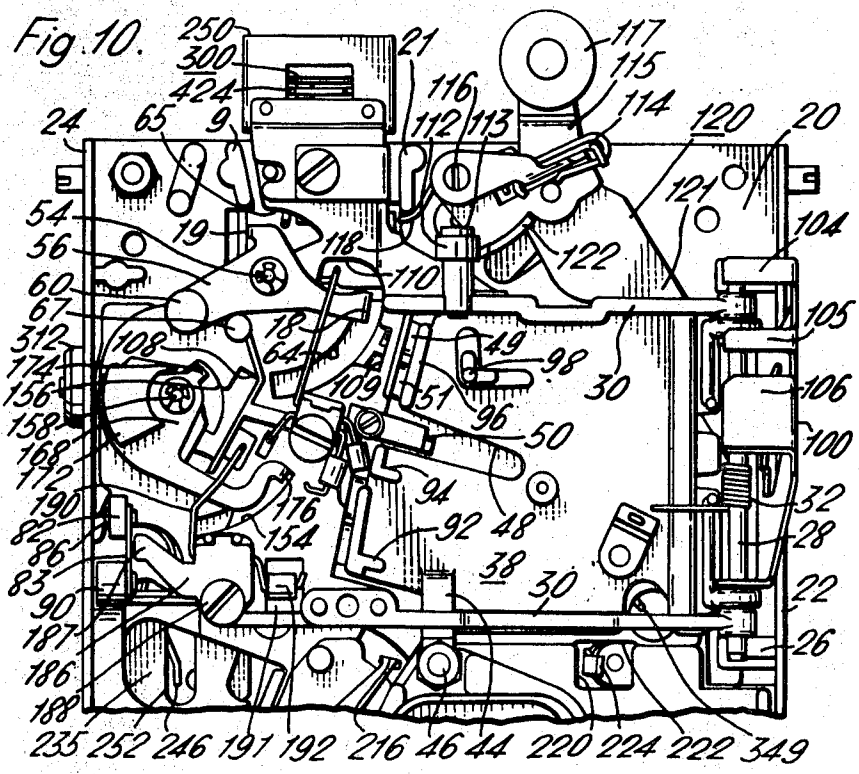
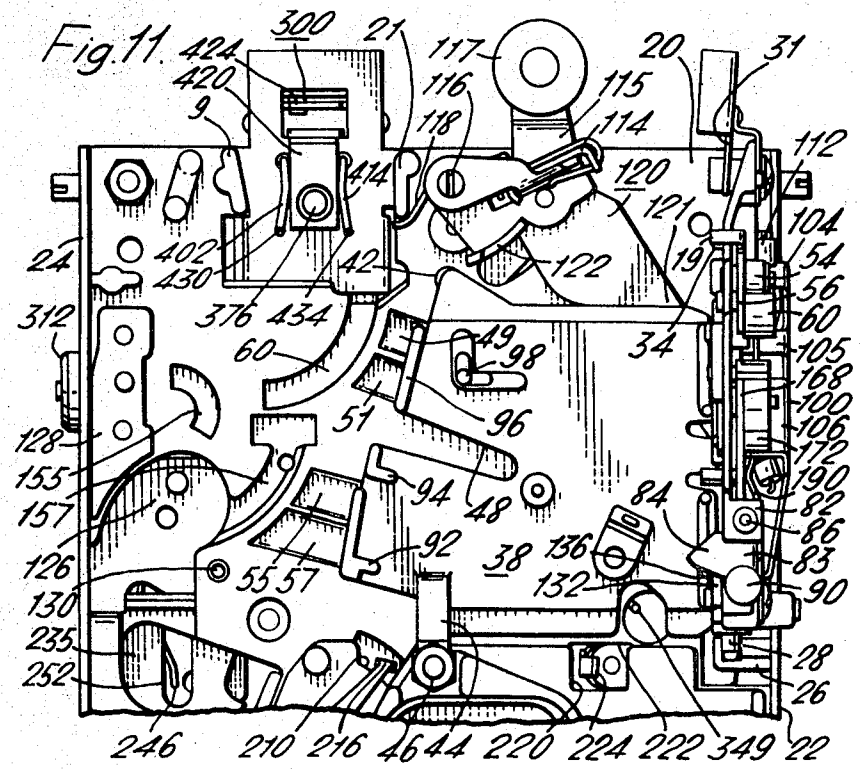


Fig. 11.



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Fig. 12.

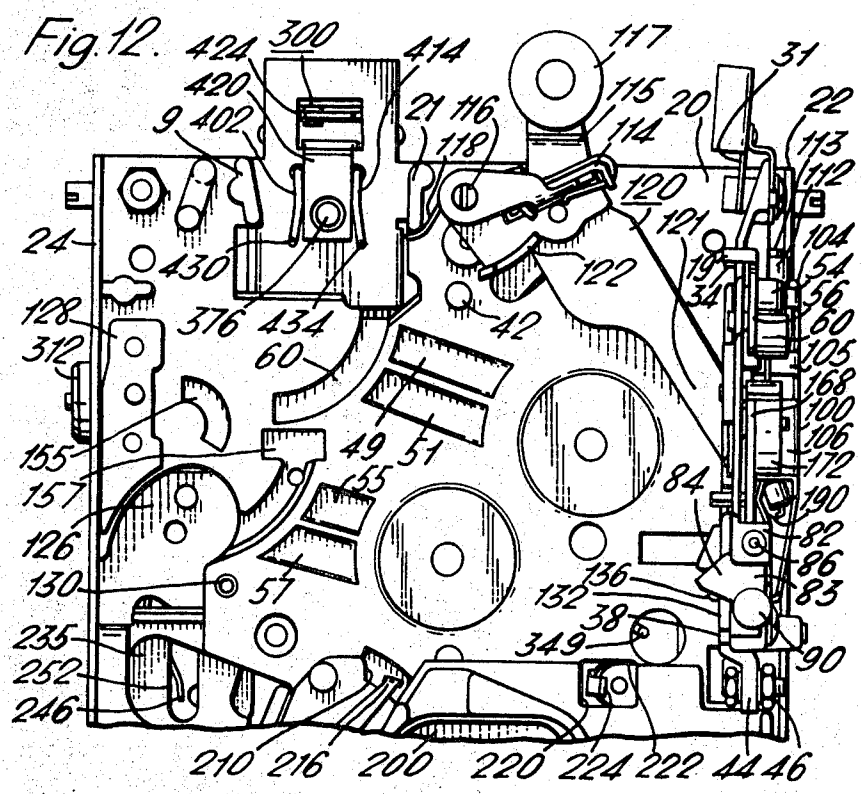
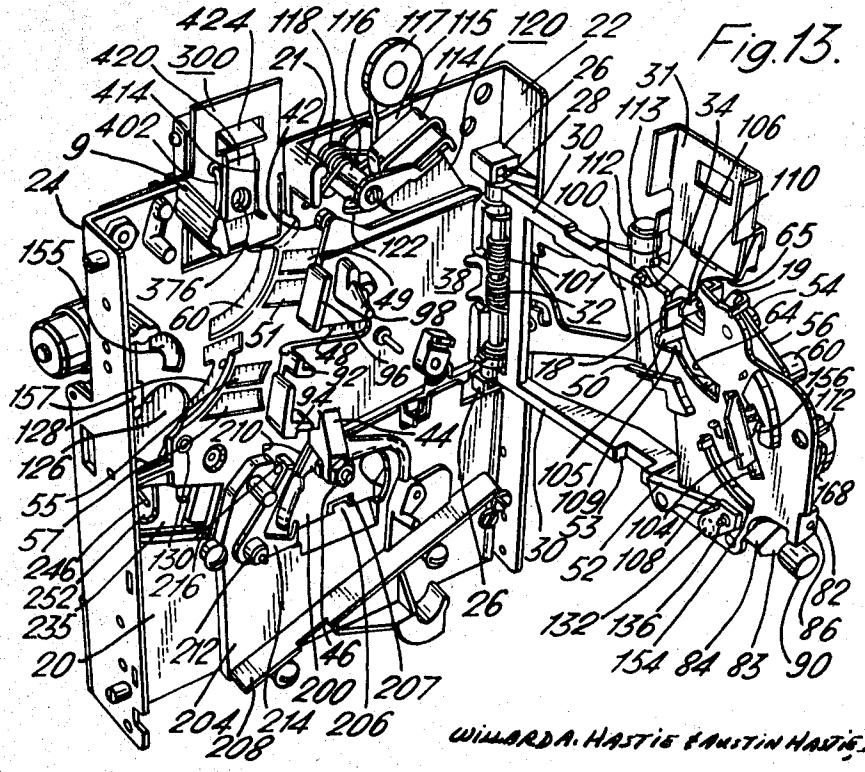


Fig. 13.



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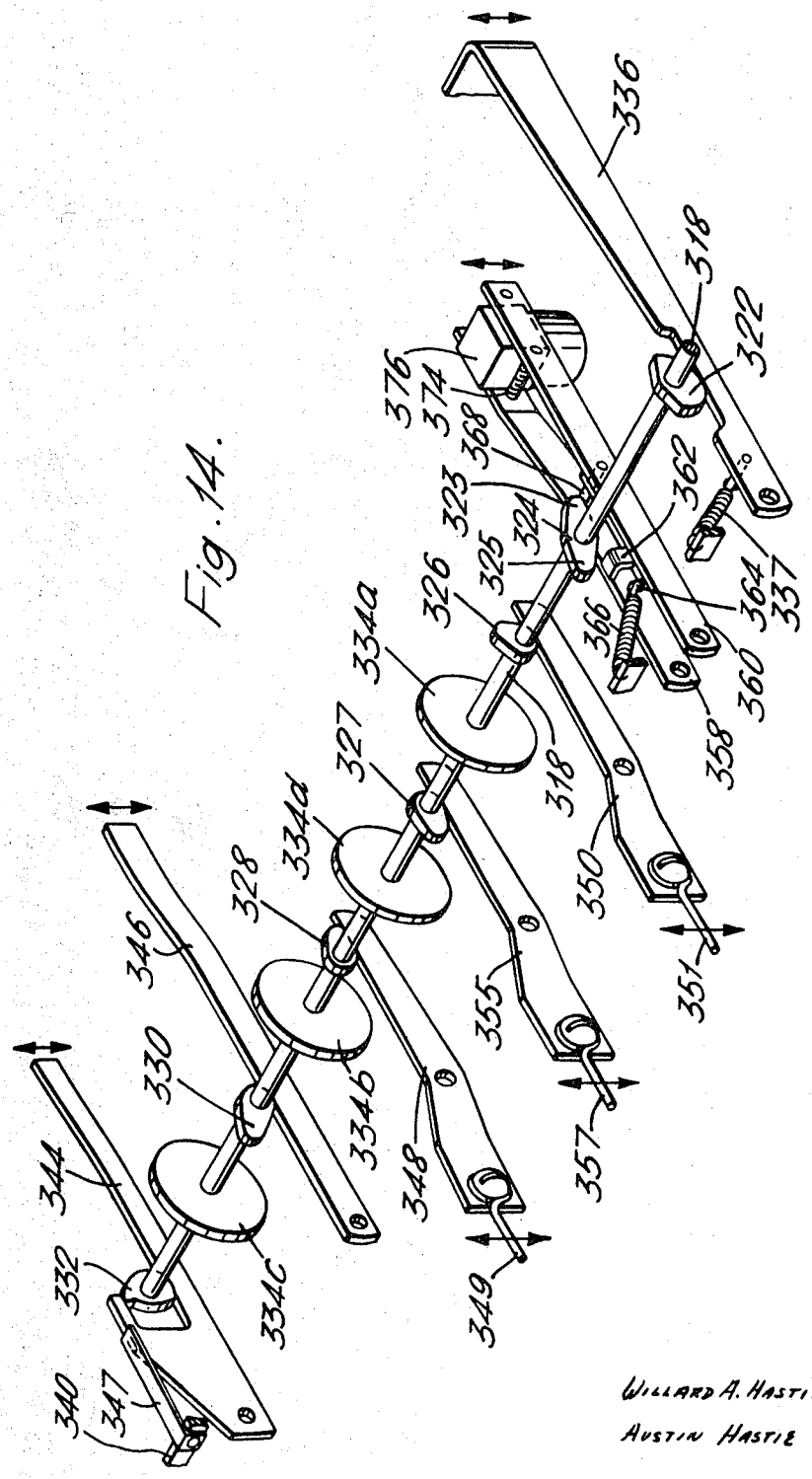


Fig. 14.

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Fig. 15.

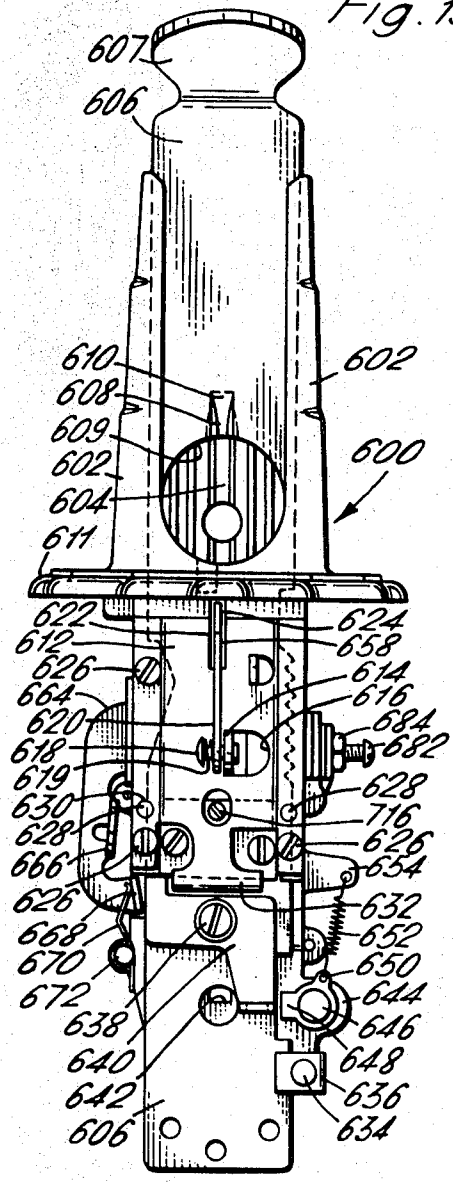
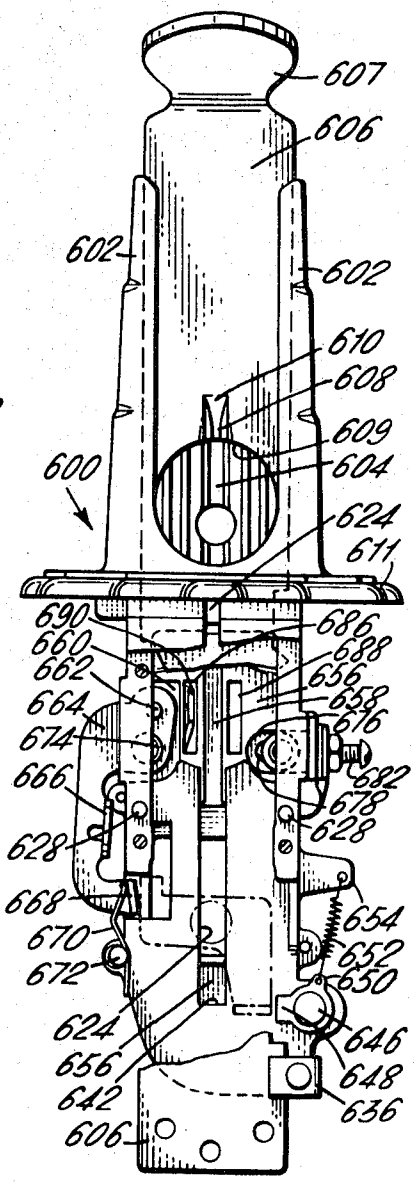


Fig. 16.



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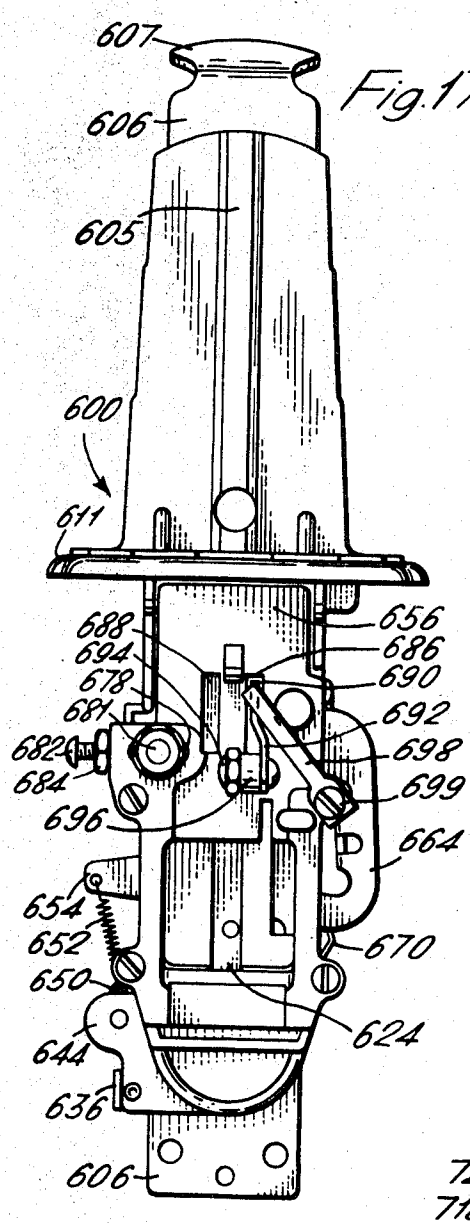


Fig. 17.

Fig. 18.

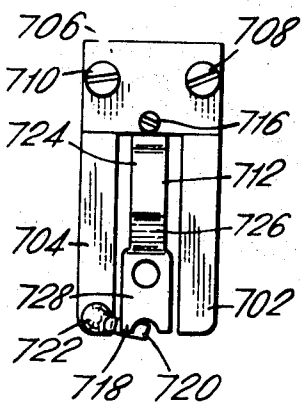
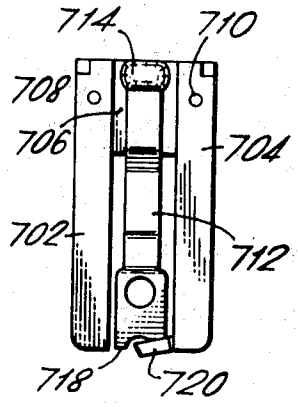


Fig. 19.



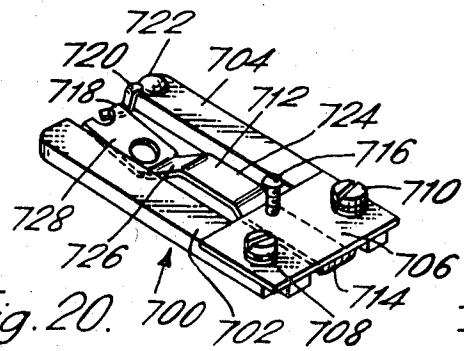


Fig. 20.

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COIN-HANDLING DEVICE

This invention relates to coin-handling devices. It relates to a construction and means for separating genuine coins from spurious coins or slugs. It also provides a structure and means for segregating certain coins according to their denomination. It also provides a novel technique for sorting and segregating coins.

It is now known that slugs and undesired coins may be separated from desired coins by eddy-current testing of the slugs and coins. By these means, slugs and coins which have electrical resistivities and/or magnetic permeabilities that are appreciably different from the electrical resistivity and/or magnetic permeability of desired coins are rejected. However, some commercially available alloys have electrical resistivities and/or magnetic permeabilities which are sufficiently close to the electrical resistivities and/or magnetic permeabilities of some of the desired coins to prevent eddy-current testing of slugs made from those alloys from separating those slugs from those desired coins. As a result, slug rejectors which were intended to accept certain desired coins and which were intended to reject all slugs and all other coins and which relied solely upon eddy-current testing have been known to accept some slugs which had electrical resistivities and/or magnetic permeabilities similar to the electrical resistivity and/or magnetic permeability of the desired coins.

Accordingly, it was proposed the art to improve the slug rejectors by using not only eddy-current testing of the coins and slugs but also testing of the weight and of the thickness of the inserted coins and slugs. The eddy-current testing enables the slug rejector to reject all slugs and coins which have electrical resistivities and/or magnetic permeabilities that are appreciably different from the electrical resistivities and/or magnetic permeabilities of desired coins, and the weight and thickness testing enables the slug rejector to reject all coins and slugs which have electrical resistivities and/or magnetic permeabilities similar to the electrical resistivity and/or magnetic permeability of the desired coins which are made from alloys that are different from the alloy of which the desired coins are made. For example, if the desired coins are made from a silver alloy, slugs that are made from a copper alloy which has electrical resistivities and/or magnetic permeabilities similar to the electrical resistivity and/or magnetic permeability of the desired coins would have specific gravities that are appreciably smaller than the specific gravity of the desired coins. This means that if slugs remain as thin as the desired coins, the slugs would not pass the weight test; and it further means that if the slugs are made thick enough to pass the weight test, the slugs would not pass the thickness test. However, if slugs are made from an alloy which has electrical resistivities and/or magnetic permeabilities similar to the electrical resistivity and/or magnetic permeability of the desired coins, but which also has a specific gravity appreciably higher than that of the desired coins, they may pass the weight test and also be accepted, since no commercial thickness tester currently rejects solely on the basis of being too thin.

In summary, then, current three-coin chutes sort coins, firstly, according to their diameter and then evaluate them by several additional tests, namely: (1) is the inserted coin underweight (too light)? (2) is the inserted coin slightly under diameter (too small)? (3) is the inserted coin over diameter (too large)? (4) is the inserted coin too thick? (5) is the inserted coin a washer? (6) is the inserted coin (a) formed from a magnetizable or magnetic alloy, or (b) if not, does it have approximately the correct electrical resistivity and/or magnetic permeability?

However, recent changes in the composition of the real coin alloys in Canadian coins have made the above-noted means for distinguishing slugs from real coins, and for segregating coins according to their denomination obsolete. Furthermore, the new real Canadian coinage alloys are so similar both in electrical resistivity properties, in magnetic permeability properties, and in density characteristics to currently available commercial alloys, that slugs can readily be prepared which would meet the electrical resistivity, and/or magnetic permeability, weight, and thickness tests of the prior coin separators. Thus, with the advent of real Canadian coinage made from alloys which exhibit paramagnetic properties, all coin chutes which differentiate between real coins and slugs by the use of eddy-current testing have been rendered obsolete. In other words, test number 6 above cannot be carried out on the new Canadian coins made from alloys which exhibit paramagnetic properties, e.g., the new Canadian 10 cent coins (dimes) and the new Canadian 25 cent coins (quarters).

This invention also relates to improvements in the segregation of genuine coins from spurious coins and/or slugs in a coin chute which includes a coin-feeding slider mechanism wherein the coin is subjected to sizing tests, surface discontinuity tests and magnetic permeability tests in order to permit only genuine coins to pass into an accepted coin chute. These latter types of devices are ones which operate on the premise that genuine coins will not be magnetic or magnetizable. Consequently, with the advent of new genuine coins in Canada which are formed out of material which is at least partially magnetic, i.e., is paramagnetic, these coin-separating devices are now rendered obsolete.

An object of one aspect of the present invention is to provide a means for distinguishing between certain real coins and slugs without the use of eddy-current testing.

An object of another aspect of the present invention is the provision of a coin separator device which may separate genuine coins made of paramagnetic material from slugs made of paramagnetic material.

It is also an object of another aspect of this invention to provide a coin-separating device which can distinguish and separate paramagnetic genuine coins from ferromagnetic and/or paramagnetic slugs.

It has now been found that a sequence of four tests can be carried out to separate genuine dimes and genuine quarters from slugs even when the coins are formed of material which exhibits paramagnetic properties. The first test is to ascertain whether the periphery of the coin is serrated, i.e., whether the edge is ribbed or milled. This test immediately rejects all smooth-edged industrial stamping slugs regardless of the material out of which they are made. The second test is carried out on the coins having a serrated periphery and determines whether the coin is magnetic or magnetizable or nonmagnetic or nonmagnetizable. If it is nonmagnetic or nonmagnetizable, it may be a slug, or it may be an old genuine coin, i.e., an old dime or quarter formed of silver or a silver alloy. These coins enter the chute and they may be accepted or rejected as desired. The magnetic or magnetizable coins are then subjected to the third and fourth tests. The third test ascertains whether the magnetic or magnetizable material is a material or an alloy of medium magnetic permeability. This will permit the rejection of all smooth-faced coins and the acceptance of imprinted coins of medium magnetic permeability. The fourth test is to ascertain whether the magnetic or magnetizable material or alloy is one of high magnetic permeability. This will permit all high magnetic permeability coins to be rejected, whether they are smooth-surfaced or imprinted.

In other words, the "serrated edge" test is designed to reject slugs which would not later be trapped by the conventional weight and thickness tests. With the advent of the new Canadian coinage which exhibit paramagnetic properties, the conventional eddy-current tests must be eliminated since the new genuine Canadian coins would adhere to the eddy-current magnet. Thus, the "serrated edge" test is a substitute for the eddy-current test, but the other conventional tests, for example, thickness, over- and under-diameter, weight and washer trap should be retained.

Tests three and four are designed to be carried out by a special sense magnet. The sense magnet responds to two characteristics of the paramagnetic alloy coin, namely a combination of surface finish and magnetic permeability. Thus, the sense magnet is designed to sense a characteristic which is the product of the magnetic permeability (μ) and the area (A) of

the coin in actual contact with the magnet. If this product is above a predetermined value, the sense magnet will retain the coin. If this product is equal to or less than a predetermined value, the magnet will release the coin. The initial magnetic permeability of nickel (used in the new coins) is about 300 and that of cold rolled steel is about 1500. Consequently, the test is designed to reject nickel slugs which are not imprinted and cold rolled steel slugs even if they are imprinted, assuming in each case that they have serrated edges.

Accordingly, by one broad aspect of this invention, there is provided, in a coin-handling device in which genuine coins may be segregated according to their denomination and in which genuine coins may be separated from spurious coins or slugs, the improvement comprising: (a) a coin passageway; (b) magnet means disposed in said coin passageway in the path of coins moving in said passageway, said magnet and said coin being relatively movable to place said coin and said magnet in face-to-face contact, whereby all magnetic or magnetizable coins and/or slugs are retained in said passageway by said magnet means for a predetermined period of time; and (c) means, positively actuated after the passage of said predetermined period of time, for urging said magnet and said coin out of face-to-face contact, said urging means being such that only those magnetic or magnetizable coins having less than a predetermined magnetic attraction are urged away from said magnet and are thereby released and pass to a coin-accepting chute, while those magnetic or magnetizable coins having more than said predetermined magnetic attraction are retained in face-to-face contact with said magnet against the force of the urging means.

By another broad aspect of this invention, there is provided in a coin-handling device in which genuine coins may be separated from spurious coins or slugs, the improvement comprising: (a) a coin passageway; (b) magnet means disposed in the coin passageway in the path of coins moving in the passageway, whereby the magnet may engage and retain all magnetic or magnetizable coins and/or slugs in the passageway for a predetermined period of time; and (c) means positively acting against the magnetic field after the passage of a predetermined period of time for releasing from the magnet means, those coins whose product of magnetic permeability (μ) and area (A) in actual contact with the magnet is equal to or less than a predetermined value, for passing those released coins to a coin-accepting chute, and for retaining, on the magnet means, those coins whose product (μ)(A) is greater than the predetermined value, e.g. for releasing imprinted paramagnetic coins, but for retaining all ferromagnetic coins as well as smooth-faced paramagnetic coins.

By still another aspect of this invention, an adapter is provided for attachment to a coin chute wherein coins are sorted and separated from one another and from spurious coins and/or slugs, said adapter comprising: (a) a coin passageway; (b) means, in said coin passageway for intercepting and stopping the movement of coins through said passageway for a first predetermined period of time, said means being first (i) positively biased to retain all coins, then (ii) movable, after said first predetermined period of time to permit smooth periphery coins to pass on while engaging and retaining serrated periphery coins, and finally (iii) positively biased to release all retained coins after a second predetermined period of time; (c) magnet means, said magnet and said coin being relatively movable to place said coin and said magnet in face-to-face contact, whereby magnetic or magnetizable coins and/or slugs are retained by said magnet means for said first predetermined period of time, while nonmagnetic or nonmagnetizable coins and/or slugs are permitted to pass to a predetermined coin chute; and (d) means positively actuated after the passage of said first predetermined period of time for urging said magnet and said coins out of face-to-face contact, said urging means being such that only those medium magnetic permeability coins having an imprinted surface are released, for passing said coins to an accepted coin chute, while simultaneously retaining high magnetic permeability coins for later passing said coins to a predetermined rejected coin chute.

By yet another aspect of this invention, a coin-sensing attachment is provided for a coin-handling device, the attachment comprising: (a) base means defining on one face a coin passageway and provided on the other face with prime mover means; (b) a U-shaped treadle having the legs thereof pivotally mounted on the other face of the base means for movement towards and away from the base means; (c) magnet means reciprocally movable into, and out of, the plane of the base means from the other face towards the one face; (d) a coin treadle including a pair of spaced apart hangers on the one face of the base, mounted for oscillation in a plane parallel to the plane of the base means; (e) means, on the other face of the base, for positively restraining the oscillation of the hangers; (f) means, on the other face of the base means, for positively causing the oscillation of the hangers; and (g) means, initiated by the entry of a coin into the coin passageway for causing the operation of the treadle (b), the magnet means (c), the means (e) and the means (f) according to a predetermined sequence.

By a still further aspect of this invention, a method is provided for segregating coins at least partially according to their denomination while segregating genuine coins from slugs which method comprises the steps of: (1) moving the coin along a selected path; (2) intercepting the coin and stopping the movement thereof; (3) bringing the stopped coin and a magnet means into relative contact; (4) sensing the presence of peripheral serrations while said coin is stopped and while the magnet means and the coin are in relative contact; (5) permitting a coin not attracted by the magnetic field and not having peripheral serrations to move along a second path; (6) urging the coin and the magnet out of relative contact; (7) permitting a coin previously attracted by the magnet means and not having peripheral serrations to move along a third path; and (8) permitting a coin previously attracted by the magnet means and having peripheral serrations to move along a fourth path; whereby coins are segregated according to the following characteristics: (A) nonmagnetizable, nonserrated; (B) nonmagnetizable, serrated; (C) high magnetic permeability (i) imprinted, nonserrated, (ii) imprinted, serrated, (iii) nonimprinted, nonserrated, and (iv) nonimprinted, serrated; and (D) medium magnetic permeability (i) imprinted, nonserrated, (ii) imprinted, serrated, (iii) nonimprinted, nonserrated, (iv) nonimprinted, serrated.

By another broad aspect of this invention, there is provided in a coin chute in which a coin is separated from a spurious coin and/or a slug by virtue of the magnetic properties thereof, the improvement comprising: (a) a coin channel bifurcated into a coin-accepting chute and a coin-rejecting chute; (b) magnet means for drawing a magnetic or magnetizable coin and/or slug towards said coin-rejecting chute; and (c) means disposed adjacent to, and upstream of, the fork and adapted to sense whether said coin has an imprinted surface and, in response to said sensing, for urging a genuine coin, which has initially been drawn towards said coin-rejecting chute, towards said coin-accepting chute.

In the accompanying drawings:

FIG. 1 is a perspective view of the front of the coin chute including the coin-handling device of an aspect of the present invention;

FIG. 2 is an elevational view of the frontal face of the coin chute including the coin-handling device of an aspect of this invention;

FIG. 3 is an elevational view of the frontal face of the coin-segregating device of an aspect of this invention;

FIG. 4 is an elevational view of the dorsal face of the coin-segregating device of an aspect of this invention;

FIG. 5 is a section along the line V–V of FIG. 3;

FIG. 6 is an elevation along the line VI–VI of FIG. 3;

FIG. 7 is a section along the line VII–VII of FIG. 3;

FIG. 8 is a section along the line VIII–VIII of FIG. 3;

FIG. 9 is an elevational view of the dorsal side of the coin-handling device of an aspect of this invention;

FIG. 10 is an elevational view of the dorsal side of the coin-handling device of an aspect of the present invention with the stripping plate pivoted through 90°;

FIG. 11 is an elevational view of the dorsal side of the coin-handling device of an aspect of the present invention in which the stripping plate and the movable gate have each been rotated through 90°;

FIG. 12 is an elevational view of the dorsal face of the coin-handling device of an aspect of the present invention in which the stripping plate, the movable gate, and the movable wall have each been rotated through 90°;

FIG. 13 is a perspective view of the coin-handling and coin-segregating device of aspects of this invention in which the stripping plate and the movable gate have been rotated through 90°,similar to FIG. 11;

FIG. 14 is an expanded perspective view of the cam shaft and an associated part of another aspect of the coin-handling device of an aspect of this invention;

FIG. 15 is a top plan view of a coin chute which includes the coin segregator of an aspect of the present invention;

FIG. 16 is a top plan view of the coin chute with the coin segregator of an aspect of this invention removed in order to reveal the internal construction of other coin-testing devices;

FIG. 17 is a bottom plan view of the coin chute as shown in FIGS. 15 and 16;

FIG. 18 is a top plan view of the coin segregator of an aspect of this invention;

FIG. 19 is a bottom plan view of the coin-segregator of an aspect of the present invention; and

FIG. 20 is an isometric view of the coin segregator of an aspect of the present invention.

Referring to FIGS. 1 to 8, it is seen that the coin-segregating device 300 of the present invention includes a coin treadle 302 having a central main portion provided with upstanding sidewalls 306 and lateral fastening wings 308. The fastening wings 308 are provided with fastening apertures 310.

The coin-segregating device is provided with an electric motor 312 having a drive gear 314 mounted on the drive shaft 313. The electric motor may be driven by electric batteries (as shown in FIGS. 1 and 2) but other means of driving the motor as by a transformer/rectifier unit connected to conventional 110 V. AC supply may be used. The drive gear 314 drives a driven gear 316 which is splined or otherwise secured to a cam shaft 318. The cam shaft is rotationally mounted on the coin-segregating device 300 by means of a cam shaft bushing plate 320. The motor is firmly secured to the coin-segregating device 300 by means of a motor-mounting pin 321.

A plurality of cams are splined onto the cam shaft at accurately predetermined locations. These cams are a treadle cam 322, a sense magnet control cam 324, a first reject coin cam 326, a second reject coin cam 328, a lower coin cradle-control cam 330 and an upper coin cradle-control cam 332. Cams 326 and 328 are separated by a cam-spacing disc 334*a*; cams 328 and 330 are separated by cam-spacing disc 334*b*; and cams 330 and 332 are separated by cam-spacing disc 334*c*. A treadle is provided by parallel spaced apart treadle arms 336 joined by an upper treadle crossarm 338 to provide a generally U-shaped treadle. The lower end of treadle arms 336 are pivotally mounted on a pivot shaft 352. Treadle cam 322 is designed to cooperate with treadle arm 336 to provide the downward phase of the oscillatory movement of the treadle.

The coin-segregating device 300 is provided with a first L-shaped bracket 340, and a second L-shaped bracket 342 whose purpose will be described hereinafter.

Cams 332, 330, 328 and 326 are designed to cooperate with and actuate and control the movement of upper coin cradle-control arm 344, lower coin cradle-control arm 346, second reject coin arm 348 and first reject coin arm 350 respectively. The lower end of each of arms 344, 346, 348 and 350 is pivotally mounted on pivot shaft 352. The upper end of arm 344 is provided with an engagement with upper coin treadle-control tongue pivot shaft 408, in a manner and for a purpose to be described hereinafter. Arm 344 is biased to be normally in contact with a camming face 410 of upper coin treadle-control tongue pivot shaft 408 by means of spring 347 secured to L-shaped bracket 340. The upper end of lower coin cradle-control arm 346 is designed to engage camming face 400 of lower coin treadle-control tongue pivot shaft 396 in a manner and for a purpose to be described hereinafter. There is some resiliency in the cooperative connection between arm 346 and face 400 to accommodate differences in diameter of a dime and a quarter, in a manner to be described hereinafter.

Second reject coin arm 348 is biased to be in engagement with cam 328 by means of a return spring 354, one end of which is secured to arm 348, the other end of which is secured to first L-shaped bracket 340. In addition, further reject coin arm 350 is biased to contact cam 326 by means of spring 356, one end of which is secured to arm 350, the other end of which is secured to L-shaped bracket 340. Arm 348 has rigidly secured thereto second coin reject wire 349, and, similarly, first reject coin arm 350 has rigidly secured thereto first coin reject wire 351.

Cam 324 is designed to engage a cam follower provided by a link rod 368 which is disposed between first sense magnet control arm 358 and second sense magnet control arm 360. Secured to second sense magnet control arm 360 is a magnet kickoff lug 362, and disposed between arms 358 and 360 is a link rod 364. Mounted on link rod 364 is a sense magnet control arm return spring 366. The other end of spring 366 is secured to second L-shaped bracket 342. The purpose and function of spring 366 will be described hereinafter. The lower ends of first and second sense magnet control arms 358 and 360 are pivotally mounted on pivot shaft 352. The limit of the pivoting movement in an upward direction is controlled by an outward limit ring 370 mounted on a limit ring mounting post 372 which is secured to central base 304. The sense magnet 374 is secured in position between the control arms 358 and 360 by means of sense magnet control arm-connecting studs 374.

Secured to the treadle by means of treadle link 380 secured to treadle crossarm 338, and to treadle arms 346 by means of treadle-connecting studs 382 is a switch treadle 378. Switch treadle 378 is provided with a switch lever-locking latch 384 which is adapted to engage a switch lever 386. Switch lever 386 is disposed in contact with the on-off contact (not shown) of a microswitch 390 which is mounted on the coin-segregating device 300 by means of a switch-spacing plate 388. Treadle 336 is biased to latch switch lever 386 onto latch 384 by means of a return spring 337, one end of which is secured to treadle arm 336, the other end of which is secured to L-shaped bracket 342.

Mounted on central base 304 is a support plate 392 provided with a pair of spaced apart brackets 394. The lower coin treadle tongue 398 is provided with a lower coin treadle-control tongue pivot shaft 396 which is pivotally mounted on brackets 394. One end 400 of shaft 396 provides a camming surface for engagement with the upper end of arm 346. Similarly, support plate 392 is provided with upper brackets 406. An upper coin treadle-control tongue 412 is secured to a pivot shaft 408 which is pivotally mounted on brackets 406. One end 410 of the pivot shaft provides a camming face for engagement with arm 344.

Secured to support plate 392 is a first bushing 404 in which is pivotally mounted a shaft portion of a first coin treadle arm 402, and a second bushing 416 in which is pivotally mounted a shaft portion of a second coin treadle arm 414. From the frontal view as shown in FIG. 3, a terminal actuating portion of first coin treadle arm 402 extends laterally across to face a corresponding terminal actuating portion of second coin treadle arm 414 which also extends laterally across, with a space 418 provided therebetween. The shaft portion of first coin treadle arm 402 then extends downwardly in bushing 404, and the shaft portion of second coin treadle arm 414 extends downwardly in bushing 416. From the dorsal view as shown in FIG. 4, an intermediate leg portion of first coin treadle arm 402 extends longitudinally downwardly to a gently outwardly flared portion 428 terminating in an upwardly bent, serrated

coin periphery engaging, and retaining, terminal portion **430**. Thus, as seen in FIG. **4**, the cross section of the terminal portion **430** is less than cylindrical, i.e. it has a flattened portion **4301**, providing a sharpened, serration engaging edge **4302**. Similarly, an intermediate leg portion of a second coin treadle arm **414** extends downwardly in a longitudinal direction to a gently outwardly flared portion **432** terminating in an upwardly bent, coin periphery (serration) engaging, and retaining, terminal portion **434**. The cross section of the terminal portion **432** is less than cylindrical, i.e. it also has a flattened portion **4321**, providing a second sharpened, serration engaging edge **4302**.

Also, as seen in FIG. **4**, the central base **304** is provided with a sense magnet-mounting plate **420** provided with an aperture **422** in which the dorsal circular cross section portion of the sensing magnet **376** is adapted to fit. The central base **304** is provided with a switch-actuating tongue access aperture **426**; the treadle crossarm **338** is provided with a dorsally extending switch-actuating tongue **424**.

Tongue **410** which contacts the upper portions of segments of coin treadle arms **402** and **414** is biased to move downwardly by spring **347** when arm **344** is out of engagement with camming face **410** of the upper coin treadle-control tongue pivot shaft **408**. This causes coin-engaging and retaining surfaces **430** and **434** to be spread apart, thereby releasing a coin having a serrated edge which had been held by engagement of the surfaces **430** and **434** with the serrated edge. Tongue **396** contacts the lower portions of segments of coin treadle arms **402** and **414** to prevent their downward movement, and hence to prevent the engaging and retaining surfaces **430** and **434** from being spread apart unless arm **346** does not engage camming face **400**. However, as mentioned before, there is some resiliency in the connection between camming face **400** and arm **346** due to spring **353**, and consequently, the engaging surfaces **430** and **434** may spread apart slightly to accommodate differences in diameter between dimes and quarters.

The coin-segregating device according to an aspect of the present invention is preferably adapted to be used in conjunction with other presently conventional coin-separating devices which separate coins by means of their weight, by means of their diameter, by means of their thickness, and by testing for the presence of apertures therethrough, and also is preferably used with presently commercially available coin-scavenging devices for the releasing of unacceptable coins or slugs. In order to provide a complete description of the cooperation between the coin-segregating device of the present invention and the coin chute embodying such coin-segregating device, reference is now made to FIGS. **1**, **2**, and **9** to **13**. Brief descriptions only will be given for these particular coin separators, it being understood that more complete descriptions may be found in one or more of the following Canadian patents: 470,637 issued Jan. 9, 1951 to Robert M. Foushee; 552,761 issued Feb. 4, 1958 to Merral P. Haverstick; 561,074 issued July 29, 1958 to John Gottfried; 561,800 issued Aug. 12, 1958 to Merral P. Haverstick; 595,941 issued Apr. 12, 1960 to Merral P. Haverstick; 745,437 issued Nov. 1, 1966 to Anton Okolischan; and 755,884 issued Apr. 4, 1967 to Anton Okolischan.

Referring to FIGS. **9** to **13** inclusive, the numeral **20** denotes the frame of the coin separator provided by the present invention. That frame is essentially a flat plate provided with a projecting flange **22** at the right-hand side thereof and with a flange **24** at the left-hand side thereof. Two ears **26** are provided on the right-hand flange **22**. The ears **26** support a pivot pin **28** and that pin rotatably supports a movable gate **30**. The gate can rotate about the pin **28** from a position in parallel relation with the center wall of the frame **20** to a position angularly disposed relative to that wall. A spring **32** encircles the pivot pin **28** and bears against the right hand flange **22** and against the gate **30**. This spring biases the gate into parallel relation with the center wall of the frame **20**. A spacer **34** is formed on the gate **30**, and that spacer engages the center wall of the frame **20** to limit the movement of the gate **30** toward the center wall of the frame **20**. This spacer will be dimensioned to enable the gate **30** to cooperate with the center wall of the frame **20** to provide the entering portion of a coin passageway.

A movable wall **38** is rotatable about the pivot pin **28**. No spring is used to bias the movable wall **38** toward the center wall of the frame **20**. A spacer **42** is provided on the center wall of the frame **20**. This spacer will be dimensioned to hold the free edge of the movable wall **38** away from the center wall of the frame **20** a distance just slightly greater than the thickness of acceptable coins. An ear **44** is provided on the bottom of the movable wall **38** and that ear carries a nut **46** which can be adjusted to serve as an adjustable spacer for the bottom of the movable wall **38**. The nut **46** will be adjusted to hold the bottom of the free edge of the movable wall **38** away from the center wall of the frame **20** the same distance that the spacer **42** holds the upper end of that free edge away from the center wall of the frame **20**. Thus, the spacers **42** and **46** assure the maintenance of the proper spacing between the free edge of the movable wall **38** and the center wall of the frame **20** to accept genuine coins, but to reject, by jamming, coins or slugs which are too thick.

A slot **48** is formed in the movable wall **38**, and that slot accommodates a runway **50** on the gate **30**, and permits that runway to move into engagement with the center wall of the frame **20**. Generally, above the runway **50** is a pair of downwardly sloping channels **49** and **51**. The gate **30** carries a second runway **52** which extends to and engages the center wall of the frame **20**. The runway **52** stops short of the ear **44** on the bottom of the movable wall **38**, and a recess **53** is provided in the bottom of the gate **30** to accommodate that ear. Coins rolling along the runway will be guided by means of parallel channels **57**, **55** and will then pass between the ear **44** and the center wall of the frame **20**.

A pivot **54** is secured to the gate **30** at a point below the coin entrance and that pivot supports a first coin-sizing gauge **56**. This coin-sizing gauge has two spaced projections **18**, **19**, which extend through slot **64** and cutaway portion **65** in the gate **30**. These projections thus extend into a coin passageway defined by the gate **30** and the frame **20**, and will intercept coins introduced into that passageway. A stop **67** is provided on the gate **30**, and it holds the coin-sizing gauge **56** in the position shown in FIG. **9** during normal conditions of operation. A weight **90** is provided on the coin-sizing gauge **56** to rotate it in a counterclockwise direction against the stop **67**. When the coin of the proper size and proper weight enters the passageway and engages the projections on the coin-sizing gauge **56**, the weight of that coin will cause the gauge **56** to rotate in a clockwise direction away from the stop **67**. The coin-sizing gauge **56** will continue to rotate with the coin until the coin can fall freely from the projections of that gauge, whereupon the weight of the gauge **56** will rotate that gauge in a counterclockwise direction. The runway **50** which is provided on the gate **30** will receive coins from the first sizing gauge **56**.

An ear **83** on the free edge of the gate **30** carries a generally V-shaped deflector **84** which is provided with a weight **90** on one of the legs thereof. The deflector **84** will be free to pivot relative to the bracket **82** on stud **86**, and thus will be free to pivot relative to the gate **30** and the center wall of the frame **20**. The weight on the one leg of the deflector **84** will bias the other leg of that deflector into the passageway defined by the gate **30** and the center wall of the frame **20**. Swinging movement of deflector **84** is limited by abutment of blade **36** with extension **187** on plate **186**.

An L-shaped baffle **92** is provided at the lower left-hand corner of wall **38**, a second baffle **94** is provided to the right and slightly above the baffle **92**, and a third baffle **96** is provided above and slightly to the right of the baffle **94**. These baffles are provided to keep coins from slipping into the space between the outer surface of the movable wall **38** and the inner surface of the gate **30** whenever the gate **30** is moved

away from the center wall of the frame **20**. If the coins tend to follow the gate **30**, the forward edges of these coins will strike the baffles **92**, **94** and **96** and will be kept from slipping to the outer surface of the movable wall **38**. A spacer **98** is provided on the wall **38**, and that spacer extends outwardly from that wall.

A stripping plate **100** is also pivoted on the pivot pin **28**, and a spring **101** is provided to urge the stripping plate toward the center wall of the frame **20**. The spring **101** encircles the pivot pin **28** and has one end bearing against the flange **22** of the frame and has the other end bearing against the stripper plate **100**. The stripper plate **100** has stripping projections **104**, **105**, and **106** formed at the free edge of that plate. The stripping projection **104** extends through an opening **108** in the gate **30** while the stripping projection **106** extends through an opening **110** in the gate **30**. The stripping projections **104**, **105** and **106** are normally spaced outwardly of the openings **108**, **109** and **110** in the gate **30**, being held away from those openings by the spacer **98**. However, whenever the gate **30** is moved outwardly and away from the center wall of the frame **20**, the openings **108**, **109** and **110** will be telescoped over the stripping projections **104**, **105** and **106** respectively and thus, the projections **104**, **105** and **106** will strip away any coins which tend to move with the gate adjacent the openings **108**, **109** and **110**. A roller **112** is pivoted on stud **113** to the upper edge of the gate **30**. A pressure plate **114** including a generally perpendicular extension **115** provided with a roller **117** thereon is mounted on a pivot **116** which is secured to the center wall of the frame **20**. The pressure plate is normally biased to the position shown in FIG. **3** by spring **101** that surrounds the pivot **116** and has one end bearing against the pressure plate **114** and has the other end bearing against the guide **21**. A wiper arm **120** is secured to and moves with the pressure plate **114**, and a cam **122** is secured to and moves with the pressure plate **114**. As the pressure plate **114** rotates about the pivot **116** to move the wiper blade **121** through the passageway, the cam **122** will engage the roller **112** on the gate **30** and rotate the gate outwardly and away from the center wall of the frame **20**. This rotation of the gate **30** will move the runways **50** and **52** away from the center wall of the frame **20**.

A second coin-sizing gauge **168** is secured to the gate **30** by being mounted on a pivot **158**. This coin-sizing gauge **168** has projections **174** and **176** thereon which extend through slots **154** and **156** in the gate **30** and are guided in channels **155** and **157** provided in the base **20**. The coin-sizing gauge **168** is disposed below and to the left of the first coin-sizing gauge **56**, and it will receive and test coins which are too small in diameter to be intercepted and momentarily held by the projections on the coin-testing gauge **56** and then delivered to the runway **50**. The second gauge **168** has a weight **172** thereon that normally holds the gauge in the position shown in FIG. **9**; whenever a coin of proper size and proper weight engages and is held by the projections **174** and **176** of the gauge **168**, that coin will cause that gauge to rotate in a clockwise direction. The gauge will continue to rotate in a clockwise direction until the coin held by the projections of that gauge can fall free and permit the weight of the gauge to rotate the gauge back to the position shown.

A bracket plate **186** is secured to the gate **30** at a point almost immediately below the gauge **168**. A feeler wire **190** is pivotally secured beneath plate **186**. A weight **192** is secured to the feeler wire **190**, and that weight, which is adapted to be disposed in channel **191** on the gate **30**, biases the upper end of the feeler wire into the passageway **155** between the gate **30** and the frame **20** adjacent the gauge **168**. The feeler wire is intended to intercept and hold coins or washers which have openings therethrough or which have abnormal surface deformations.

An opening **126** is provided in the center wall of the frame **20** to permit other coins, such as United States or Canadian ten-cent coins (dimes) to pass from the passageway between the gate **30** and the center wall of the frame **20** and preferably also to any desirable testing mechanisms mounted on the subframe **124**. This opening will be just large enough to accommodate coins such as United States or Canadian 1-cent coins (pennies) which are to be detected and rejected by mechanisms on the front side of the center plate of the frame **20**. Included in those detecting mechanisms for the "pennies" is an arcuate coin-intercepting plate **128** secured to the center wall of the frame **20**. The arcuate portion of the plate **128** is spaced above and to the left of the upper portion of the opening **126**, thus exposing an arcuate area of the center wall of the frame **20**. This arcuate area will be narrow and will reflect the difference in diameter between a "penny" and a "dime."

Dimes moving past second coin-sizing gauge **168** and passing through opening **126** will strike V-shaped deflector **84** with insufficient momentum to be deflected out of the runway, and will be permitted to enter the accepted coin chute. On the other hand, pennies moving past second coin-sizing gauge **168** and passing opening **126** will strike V-shaped deflector **84** with such momentum as to be deflected out of the runway. Thus, the penny will be deflected to the rejected coin chute, thereby preventing the blocking of the accepted coin chute with pennies.

A small centering opening **130** is provided in the center wall of the frame **20**, and a coin-intercepting element **132** is mounted on the gate **30** in register with the opening **130** in the center wall of the frame **20**. The element **132** is provided with a pivot **134** that loosely secures that element to the gate **30**. A centering pin **136** in the form of a cone is carried by the free end of the element **132**, and that pin is in register with the opening **130** in the center wall of the frame **20**. The pin **136** extends through an opening **137** in the gate **30**, and that opening is large enough to permit the free end of the element **132** to move vertically a slight distance. When the gate **30** is spaced from the center wall of the frame **20**, the free end of the element **132** will move downwardly under the influence of gravity until the shoulder that surrounds the pin **136** rests on the bottom edge of the opening **137**. At this time, the pin **136** will still be in register with the opening **130** in the center wall of the frame **20**, but the point of the pin **136** will not be precisely in register with the geometric center of the opening **130**. As the gate **30** moves toward the center wall of the frame **20**, the conical face on the pin **136** will coact with the edge of the opening **130** to raise the free end of the element **132** and thus place the upper surface of that element in precisely spaced relation to the stationary coin-intercepting element **128**. Variations in the position of the free edge of the gate **30**, due to manufacturing tolerances and wear, will be less than the centering made possible by the opening **137**, the pin **136** and the opening **130**. As a result, the coin-intercepting element **132** will always be restored to a precisely spaced relationship with the coin-intercepting element **128** whenever the gate **30** is parallel to and adjacent the center wall of the frame **20**.

The gate **30** is provided with an inclined chute **31** at the upper edge thereof, and that inclined portion coacts with the center wall of frame **20** and with two spaced guides **19** and **21** on that center wall to define an entrance for coins. This entrance is in register with the coin-intercepting surfaces of the first coin-sizing gauge **56**, and each coin introduced through the coin entrance **250** will trip microswitch actuating tongue **424** and will then be sensed by the novel coin-sensing element **300** of this invention and finally, will pass toward the gauge **56**. This gauge is dimensioned to intercept and hold all United States or Canadian 25-cent coins (quarters) and coins or slugs of that or larger size which have passed the tests provided by coin treadles **402**, **414** and by the sense magnet **376** and which are small enough to pass between the spaced guides **19** and **21**. Since all coins passing the serrated edge test will fall starting at zero velocity from the coin-engaging projections **430** and **434** to gauge **56**, if such coins are of the proper size and weight, they will cause the gauge **56** to rotate in a clockwise direction and to transfer the coins to the runway **50**. Unduly thick coins will be too thick to pass between the movable wall **38** and the

center wall of the frame **20**, and thus they will be kept from passing to the accepted coin chute.

A partition **204** is spaced from the lower portion of the frame **20** to define two coin passageways. One of the coin passageways is for coins which are intercepted and sized by the first coin-sizing gauge **56**. The other of the passageways is for coins intercepted and sized by the second coin-sizing gauge **168**. The partition **204** has an opening **200** therein. This opening is slightly above and slightly to the left of the geometric center of the partition **204**, and an inclined projection **206** extends through opening **200** and rests in a channel **207** in the frame **20**. This inclined projection **206** acts as an inclined plane and will intercept and deflect rejected coins out of the passageways defined by the partition **204** and the frame **20**.

A notch **210** is provided in the upper edge of the partition **204**, and that notch is located generally to the left of the opening **200** in the partition. The notch is V-shaped in configuration and has the apex thereof spaced inwardly from the upper edge of partition **204**. A pivot at **212** is secured to the partition **204** and a bifurcated gate **214** is rotatably mounted on that pivot. Coin-engaging projections **216** are formed on the ends of the arms of the gate **214**, and these projections extend into the passageway defined by the partition **204** and the frame **20**. The projections **216** are spaced apart to define a coin-receiving opening for the gate **214** which is large enough to receive and pass the coins which are intercepted and sized by the second gauge **168**, but which is too small to receive and pass the coins which are intercepted and sized by the first gauge **56**. It also receives smooth-edged slugs which are rejected by coin treadle **402, 414**. The coins that do leave through the opening in the gate **214** do so freely and without the interception and momentary holding provided by the coin-testing gauges **56** and **168**. The left-hand edge of the notch **210** will act as the upper stop for the gate **214** and the bottom of the opening **200** will also act as the lower stop for the gate **214**. These stops will act to define the bounds of the virtual opening provided by the gate **214**. The gate **214** will normally rest against the lower stop but it will be able to rotate upwardly with rapidity and ease.

An anvil **218** is secured between the partition **204** and the frame **20** and it is disposed below and to the right of the lower end of the runway **52**. This anvil will cause those coins moving through runway **52** to rebound to the left towards gate **214**. If the coins happen to follow a path which enables the coins to pass between the coin-receiving projections **216** of gate **214**, those coins will then follow the accepted coin duct and will be directed to the accepted coin chute. However, if the coins are authentic but follow a path which does not take them neatly between the coin-engaging projections **216** and the gate **214**, those coins will strike the projections and force the bifurcated gate **214** to rotate until those coins can pass between the projections **216** of that gate. Thereafter, those coins will enter the accepted coin duct and be directed to the accepted coin chute. The slight variations in weight, thickness and resilience of coins of the same type is great enough to cause those coins to rebound from the anvil **218** at slightly different angles. Accordingly, if the gate **214** were held stationary or if the entrance to the accepted coin duct was made just slightly larger than the diameter of the coins intercepted and held by the gauge **168**, many authentic coins would be unable to enter that duct but instead would be reflected backwardly from that duct. Such backwardly reflected coins will fall downwardly against the inclined projection **206** and be directed towards the rejected coin duct **208** and thus led to the rejected coin chute. Accordingly, to receive and pass substantially all authentic coins, it is necessary that the gate **214** rotate and that it rotate freely enough that the coins can move that gate into coin-accepting position. This is done by making the gate **214** of bifurcated form and pivoting it loosely on the pivot **212**. Moreover, by having the stops for that gate so spaced that the gate is close to the average path followed by authentic coins, the gate does not have to move far to accommodate all authentic coins. The bifurcated gate **214** also serves to reflect nickel slugs and quarter slugs to fall downwardly against the inclined projection **206** and thus be directed to the rejected coin chute.

A second partition **230** is spaced behind the frame **20** so that the partition **204** and the partition **230** are oppositely disposed of the frame **20** (see FIGS. **1** and **2**). The partition **230** and the frame **20** define a passageway for coins which are tested by a gauge **232** disposed on the rear wall of frame **20**. The coins would successfully pass between the projections or fingers of the gauges **56** and **168** without causing those gauges to rotate and would then be directed through an opening **126** in the frame **20** to a gauge **234** on a movable wall **236** mounted on the frame **20**. Thereafter, the coins would be suitably tested and directed to the duct between partition **230** and frame **20**.

A wall **238** is disposed rearwardly of the partition **230** so that partition **230** is disposed between the frame **20** and the wall **238**. The wall **238** and the partition **230** define an accepted coin chute for coins which are intercepted and sized by the coin-sizing gauge **56**. Those coins will be delivered by the gauge **56** to the runway **50** and will fall downwardly towards the momentum-absorbing lever **224** which extends through an opening **222** in the frame **20** and through an opening **220** in the partition **204**. This lever spans the passageway between the partition **204** and the frame **20** and coins falling from the runway **50** will strike that lever. The lever may be provided with a weight and the momentum of the coins which strike the lever is absorbed to some extent by the raising of the weight. Thereafter, the coins will, if they are authentic coins, fall downwardly and strike an inclined surface **237** which is formed on the partition **204**. This inclined surface extends through an opening **226** which is formed in the frame **20** and it directs coins through that opening. Any such coins will pass through and be guided by the accepted coin chute between the partition **230** and the wall **234**. If the coins which strike the lever **224** are not authentic, they will bounce to the left and will fall against the inclined plane **206** and be directed to the rejected coin chute **208**.

Slugs or spurious coins which are intercepted and held by the projections on the gauge **56** roll along the runway **50** and may strike anvil **123** and rebound to the left past the lever **224**. Whether the coins rebound from the anvil **123** or from the lever **224**, those coins would pass through a portion of the passageway through which coins gauged by the coin-testing gauge **168** must pass. In fact, the coins which rebound from the anvil **123** or the lever **224** can move sufficiently far to the left in that passageway as to attempt to enter the accepted coin duct **90**. If those coins were to enter that duct, they could not pass completely through that duct because its width is smaller than the diameter of such coins. Instead, those coins would lodge in that passageway and interfere with proper operation of the coin separator. It is to keep such coins out of the accepted coin duct that the bifurcated gate **214** is provided. The coin rebounds from the anvil **123** or from the momentum-absorbing lever **224**. If the coin rebounds from the anvil **123** or from the momentum-absorbing lever **224** and attempts to enter the accepted coin duct, that coin will engage and be held by the projections **216** on the gate **214** because those projections define an opening which is smaller than the diameter of such slugs or coins. In fact, the opening defined by the projections **216** on the gate **214** is so small that the slugs or coins cannot enter that opening sufficiently to lodge within it. Instead, they can enter only part way and must then fall backwardly toward the inclined plane **206**. This plane will then direct the slugs or coins to the rejected coin duct **208**.

A United States or Canadian 10-cent coin (dime), and coins of comparable size, which have passed the tests provided by coin treadles **402, 414** and by the sense magnet **376**, will fall through the space between the fingers **174** and **176** of the second coin-sizing gauge **168**. Accordingly, those coins are deflected toward the upper end of the coin-intercepting element **132**. As those coins reach the upper end of element **132**, they will be in register with the opening **126**; they will also be

in engagement with the rear leg of the deflector **84**. The deflector **84** will urge those coins toward the opening **126**. If they are no larger than a "dime," they will fall through that opening. Any coins which are larger than a "dime" will be unable to pass through the opening **126** because the distance between the upper left-hand portion of that opening and the upper surface of the element **132** is carefully gauged to be just larger than the diameter of a United States or Canadian "dime."

United States or Canadian 1-cent (pennies), and coins of the same size, will fall between the fingers **174** and **176** of the second coin-sizing gauge **168** and will strike the finger **176**. The weight of such coins is less than that of the nickel, and the diameter of such coins is less than that of a nickel, and, therefore, the cradle **168** is not rotated far enough to move the wire **190** out of the coin passageway. Consequently, the wire **190** deflects those coins to the left, as viewed in FIGS. **2** and **3**, until those coins engage the element **128** and will be gauged by those two elements. If the coins are slightly larger in diameter than a "penny," they will be intercepted by the elements **128** and **132**. Those coins can be freed from those elements by pressing on the pressure plate **114**, thus causing the gate **30** to move away from the center wall of the frame **20** and laterally separate the surfaces **128** and **132**. Thereupon, the coins will be insufficiently supported and will fall directly downwardly to the reject coin chute (not shown) below and in register with the elements **128** and **132**. If the coins are not oversized, they will roll between the elements **128** and **132** and will fall downwardly until they strike the deflector **84**. Since they are heavier in weight than a "dime," they will be deflected less, and will be directed to the reject coin chute.

Referring to FIGS. **1** and **2**, it is seen that the power to drive the electric motor **312** is derived from a pair of batteries **280**, suitably connected as by brackets **282** to the framework of the coin-segregating device **300** of this invention. The coin-testing gauge shown generally as **232** includes a movable base wall **236**, upon which is mounted for pivotal movement a feeler wire **246** by means of a retainer plate **248**. At one end of the feeler wire **248** is a counterweight **250**, and the other end of the wire extends through a slot **252** in the movable plate **236** and into the slot **235** formed in base plate **20**. The pivotally movable wall **236** is pivoted on pivot shaft **240** and is retained in position by a pivoted holddown plate **242**, biased in a holddown position by means of spring **241**. Feeler wire **246** senses the surface of the coin to detect any apertures or unusual surface configurations on the coin. If the coin is, in fact, not spurious, it will pass the feeler wire **246** and strike deflecting anvil **258** and is urged past reject wire **351** in a manner to be described hereinafter. Coins which pass reject wire **351** which projects through slot **229** in plate **230** are urged into contact with a second momentum-absorbing lever **260** which is pivotally mounted at **262** on a plate **264**. Such coins are directed to an accepted coin chute.

Any coins lodged therein are scavenged by means of movement of the coin-scavenging mechanism previously described. Thus, downward motion on lever **120** causes primary scavenger arm **278** to move secondary scavenger arm **272** whose motion is transmitted by a scavenging link **274** to a pivoted wiper blade **276**. Motion of the secondary scavenger arm **272** causes the camming surface **270** to contact roller **268** which serves to raise pivoted movable wall **236**.

FIG. **14** shows the arrangement of cams and levers on the cam shaft according to another aspect of this invention. It is noted that the cam shaft and cam in FIG. **14** includes cams **322**, **324**, **326**, **328**, **330** and **332** shown in FIG. **3**, and levers **344**, **346**, **348**, **350**, **358**, **360** and **336** also shown in FIG. **3**. In addition, however, there is a third coin reject wire **3511** secured to lever arm **3501** actuated by a cam **327** secured to the cam shaft **318** for the purpose of accepting or rejecting nickels.

At the beginning of the cycle, cam **330** is in its "down" position and engages arm **346** to lock treadles **402** and **414**. Also, the cam **332** is in its "up" position and engages arm **344** to maintain the treadles **402** and **414** in locked position. When a coin is inserted, it first engages tongue **424** which is urged downwardly, thereby unlatching switch-actuating arm **386** from latch **384**. This, in turn, closes the microswitch **390** which starts motor **312** and causes cam shaft **318** to start rotating. Immediately, after cam shaft **318** starts to rotate, cam **322** is disengaged from treadle arm **336**, thereby allowing treadle arm **336** to be retracted by the action of spring **337**.

Then, the first lobe **323** of the sense magnet cam **324** engages cam follower **368** to advance the sense magnet **376** into contact with the coin. At the same time, cam **322** engages treadle **336** to return the treadle, and consequently, the tongue **424** across the access passageway **250**. This prevents a second coin from being inserted before the tests on the first coin have been completed.

The first coin is now resting on coin treadles **402**, **414**, which are locked in their first condition by arm **346**. At this time, all coins are retained between terminal portions **430**, **434**. Continued rotation of the cam shaft causes cam **330** to be disengaged from arm **346** to place the coin treadles **402**, **414** in sensing position. At the same time, cam **327** engages arm **353** to cause 5-cent coin wire **355** to start retracting. The coin treadles **402**, **414** being unlocked, there is no longer any engagement between edges **4302** and **4342** with the periphery of smooth periphery coins, which therefore would tend to urge coin treadles **402**, **414** apart and be rejected. However, since the coins are in face-to-face contact with the magnet **376**, all magnetic or magnetizable coins and/or slugs will be retained on the coin treadles. All nonmagnetic or nonmagnetizable smooth-edged coins and/or slugs will, however, slip through between freely pivotally movable coin treadles **402**, **414** and be either accepted or rejected according to further tests to be conducted thereon. All serrated-edged coins and/or slugs will be retained on the coin treadles **402**, **414** by engagement of the edges **4302**, **4342** on the serrations.

Continued rotation of cam shaft **318** causes the first lobe **323** of cam **324** to be disengaged from cam follower **368** to permit spring **366** to apply sensing tension to arms **358**, **360** and hence to the magnet **376**. At this instant, paramagnetic, imprinted smooth-edged coins will be displaced from the magnet **376** and since they can now slip between freely pivotal coin treadles **402**, **414**, will be accepted. All ferromagnetic and smooth-faced paramagnetic coins and/or slugs remain on the magnet **376**.

Continued rotation of the cam shaft **318** now causes the second lobe **325** of the cam **324** to engage cam follower **368** for a second time to urge the magnet **376** into contact with the coins resting in the coin treadles **402**, **414**. At this time, cam **327** disengages arm **353** and coin reject wire **355** begins to return. Then, on further rotation of the cam shaft **318**, cam **328** engages arm **348** to cause 25 cent coin reject wire **349** to move outwardly. Then, on still further rotation of the cam shaft **318**, cam **326** engages arm **350** to start 10 coin reject wire **351** to retract. On continued rotation of the cam shaft **318**, cam **332** disengages arm **344** which allows spring plate **347** to urge treadles **402**, **414** to the open position. At this instant, nonmagnetic or nonmagnetizable serrated-edged coins start through the chute, and may be accepted or rejected as desired. Magnetic or magnetizable coins and/or slugs are held by the magnet **376**.

Continued rotation of the cam shaft **318** causes the second lobe **325** of cam **324** to disengage cam follower **368**, allowing sensing magnet spring **366** again to apply tension to cause magnet **376** to retract to release paramagnetic imprinted serrated-edged coins and/or slugs of 10 cent or 25 cent value. All other serrated smooth-faced paramagnetic and all ferromagnetic coins and/or slugs are still held by magnet **376**.

Continued rotation of the cam shaft **318** causes the first lobe **323** of cam **324** to engage the magnet kickoff lug **362**, which causes the release of all smooth-faced paramagnetic and all ferromagnetic coins and/or slugs from magnet **376**. At the same time, cam **328**, and a short time later cam **326**, are caused to disengage arms **348** and **350** respectively. This

causes the 25 cent coin reject wire **349** and the 10 coin reject wire **351** to return to the reject position. Dime or quarter slugs are, therefore, rejected.

Then, on further rotation of the cam shaft **318**, cam **332** is urged upwardly to disengage arm **344** and cam **330** is caused to engage arm **346** to lock the coin treadles **402**, **414**. Then, on still further rotation of the cam shaft **318**, cam **322** disengages treadle arm **336** to permit spring **337** to retract the treadle. This permits switch-actuating arm **386** to be latched on latch **384** which turns microswitch **390** off. The cycle is now completed on one full rotation of the cam shaft **318**.

As will be seen from the above description, the addition of the coin-handling device of the present invention to a conventional coin separator, which segregates coins in accordance with their density, and their thickness, modifies the operation of these latter devices in order to provide additional tests as to the authenticity of the coins. Thus, the coin treadle arms **402** and **414** with their attendant engaging and retaining surfaces **430**, **434** and sharp edges **4302**, **4342** enables the coin-handling device of this invention to differentiate between coins having a plurality of serrations along the face of the rim, on the one hand, and coins and slugs having smooth such rim faces, on the other hand. This differentiation is due, as described hereinabove, to the presence of the sharp edges **4302**, **4342** upon which the peripheral serration of the coins would rest when the treadle arms were unlocked, so as to hold the serrated-edged coins and to allow the smooth-edged coins to pivot the treadles **402**, **414**, and be discharged. Thus, it is possible to differentiate between Canadian 25 cent coins (quarters) and Canadian 10-cent coins (dimes) on the one hand, from Canadian 5 cent coins (nickels) and Canadian 1 cent coins (pennies) and smooth-edged industrial stamping slugs, on the other hand. By an embodiment of this invention, it is also possible to sense and accept genuine 5 cent coins, while rejecting other similar sized unserrated periphery coins and/or slugs. These slugs represent over 90 percent of all false vends using conventional coin separators. The nonserrated periphery coins and slugs are passed to a reject chute. Such coins and slugs may then be subjected to tests by conventional testing devices to determine whether they are genuine coins or slugs by comparison with genuine coin characteristics, e.g., weight, diameter, thickness and the presence of an aperture therethrough.

The sense magnet **376**, on the other hand, is adapted to engage the face of authentic coins or slugs which have been provided with a serrated rim, and also, by an embodiment of this invention, smooth-edged 5 cent coins. The sensing magnet first determines whether the coin or slug is formed of nonmagnetic or nonmagnetizable or of magnetic or magnetizable material. If it is made of nonmagnetic or nonmagnetizable material, it may be a genuine old dime or quarter or it may be a slug. Consequently, it may then either be rejected immediately or it may be subjected to tests by conventional testing devices to determine whether it is a genuine coin or a slug by comparison with genuine coin characteristics, e.g., weight, diameter, thickness and the presence of an aperture therethrough.

If it is formed of magnetic or magnetizable material, the sense magnet will determine firstly whether it is formed of medium magnetic permeability material or of high magnetic permeability material. This is accomplished by using a reciprocally movable magnet spring-biased so that it will hold all high magnetic permeability materials but will release certain medium magnetic permeability materials. The attractive force of a ferromagnetic material or a paramagnetic material to a magnet is set forth by the formula $(\mu)(A)$. wherein μ is the magnetic permeability of the material, and A is the surface area in actual contact with the end face of the magnet. The magnet is spring-biased so that it will retain only those coins whose $(\mu)(A)$ is greater than a certain value. Thus, when the magnet is sensing, all ferromagnetic materials and those paramagnetic materials having a smooth face will have a value of $(\mu)(A)$ greater than the force of the spring and so will be retained by the magnet. On the other hand, those paramagnetic materials having an imprinted face will have a value of $(\mu)(A)$ less than the force of the spring and so will be released by the magnet. Since, therefore, the magnet support is spring-loaded, when the magnet is sensing, it will release only medium magnetic permeability materials which have an imprinted surface, but will retain smooth-surfaced medium magnetic permeability materials. Consequently, when the magnet is sensing, in addition to it rejecting all high magnetic permeability materials, it will also reject smooth-surfaced medium magnetic permeability materials and will only accept imprinted medium magnetic permeability materials.

The manner in which the coin segregation of an aspect of this invention operates may be summarized briefly by the following table:

Coin	1st Test	2d Test	3d Test	4th Test
Genuine penny	Fail			
Penny slug	do			
Genuine nickel	do			
Nickel slug	do			
Genuine "old" dime	Pass	Fail		
"Old" dime slug	Fail			
"Old" dime slug serrated edge	Pass	Fail		
Genuine "new" dime	do	Pass	Pass	Pass.
"New" dime slug:				
(a) high μ	Fail			
(b) medium μ	do			
(c) serrated edge high μ	Pass	Pass	Fail	
(d) serrated edge medium μ	do	do	do	
(e) serrated edge imprinted high μ	do	do	do	
(f) serrated edge imprinted medium μ	do	do	Pass	Pass.
Genuine "old" quarter	do	Fail		
"Old" quarter slug	Fail			
"Old" quarter slug serrated edge	Pass	Fail		
Genuine "new" quarter	do	Pass	Pass	Pass.
"New" quarter slug:				
(a) high μ	Fail			
(b) medium μ	do			
(c) serrated edge high μ	Pass	Pass	Fail	
(d) serrated edge medium μ	do	do	Pass	Fail.
(e) serrated edge imprinted high μ	do	do	Fail	
(f) serrated edge imprinted medium μ	do	do	Pass	Pass.

The high degree of accuracy of the coin segregator of an aspect of this invention is clearly evident from the above table. It will be seen that the coin segregator will accept only genuine new dimes and genuine new quarters, as well as dime slugs which are formed of medium magnetic permeability material and also are edge-serrated and imprinted, and quarter slugs which are formed of medium magnetic permeability material and also are edge-serrated and are imprinted. The coin separator provided by the present invention will test four United States and/or Canadian coins, namely "pennies," "nickels," "dimes" and "quarters" as well as slugs of each. Each coin will be tested according to the four tests described as well as for size, weight and thickness and the presence of apertures therethrough. By these sequences of tests, only genuine nickels, dimes and quarters will be accepted since the two dime and quarter slugs passing the four tests described will fail one or more of the size, weight and thickness tests.

Turning now to FIG. **15**, the coin chute there shown comprises a main frame **600** provided with a pair of lateral guide channels **602**, and a central depression providing a medium guide channel **604**. Disposed in, and guided by, channels **602** and **604** is a coin-conveying slide **606** including a handle **607** and a coin-accepting aperture **609**. Adjacent the coin-accepting aperture **609** and upstream thereof along the central longitudinal axis is a depressed portion providing a median guide flange **608**, including an inclined plane **610**, whose purpose will be described hereinafter.

Disposed beyond the transverse partition **611** is a support plate **612** including an upstanding flange **614** provided by a struck-out portion **616**. A sensing figure **620** is pivotally mounted on the upstanding flange **614** by means of a pin **618**, and is urged downwardly into slot **622** in support plate **612** through slotted channel **624** and into median guide channel **604** by means of a tension spring **619**. The plate **612** is attached to the main frame **600** by means of plate-attaching

screws 626, the plate being properly positioned by means of registering of positioning apertures 630 in support plate 612 within guide posts 628 on main frame 600. The support plate 612 is also provided with a downwardly projecting spacing tongue 632.

Secured to the terminal end at one edge of the main frame 600 is a terminal guide channel 636 by means of a rivet 634. Adjacent such terminal end is a dog 648, secured by means of pin 646 to an ear 634. The dog 648 includes an apertured tab 650 through which a spring 652 is attached. This spring extends to an aperture 654 integral with the main frame 600.

Referring now to FIGS. 16 and 17, secured to the under surface of the main frame 600 is a base plate 656 provided with a median channel 658 in registry with median guide channel 604, and a lateral recess 660. Disposed in the recess 660 for pivotal rotation therein on pin 662 is a coin-sizing member 664. The coin-sizing member includes an upstanding lateral abutment post 666 and a terminal upstanding restraining lip 668. The coin-sizing member 664 is urged inwardly by means of a biasing spring 670 mounted on a post 672. The coin-sizing member has mounted thereon a coin-engaging cam 674.

Immediately opposite cam 674 is a second sizing cam 680 mounted by means of a mounting nut and bolt assembly within a lateral slot 678, formed within a lateral recess 676. The spacing and dispositioning of cam 680 is provided by means of an adjusting setscrew 682 retained in its adjusted position by means of a nut 684.

The base plate 656 is provided with a pair of longitudinally extending slots 686 and 688, one on each side of the median channel 658. An arm 692 (better seen in FIG. 17) is positioned so that an angular projection thereof 690 extends through slot 686.

As seen more clearly in FIG. 17, the arm 692 is pivotally mounted by means of pin 694 in bushing 696. A biasing spring 698 secured to the base plate 656 by means of a screw 699 serves to bias arm 692 so that its angular projection 690 extends through slot 686.

FIGS. 18, 19 and 20 show in greater detail the coin segregator of an aspect of the present invention. The coin segregator 700 comprises a magnet including longitudinally extending legs 702 and 704 secured by means of screws 708 and 710 respectively to a nonmagnetizable base plate 706. While the magnet is shown as comprising two separate legs, it is, of course, possible for the magnet to be a horseshoe magnet in which the lower ends of the legs are joined by means of a U-shaped member. Disposed between the legs 702 and 704 and extending substantially parallel thereto is a spring pressure plate 712. Pressure plate 712 is secured by conventional means 714 to the underface of the base plate 706. As seen more clearly in FIG. 20, the pressure plate 712 includes a major flat portion 724, a minor downwardly extending portion 726 and a second minor terminal upwardly extending portion 728. The end 718 of terminal portion 728 is restrained in its downward movement by means of a stop member 720 secured, by conventional means 722, to leg 704. The amount of resiliency imparted to pressure plate 712 is controlled by means of adjusting screw 716.

In operation, a coin when it is inserted in coin-accepting aperture 609 and projected inwardly is first sensed by means of the end of sensing finger 620 to ascertain whether there is a centrally positioned aperture therein. If there is such an aperture, the slide 606 is prevented from moving further, and the coin chute is inoperative until the spurious coin or slug is removed.

If there is no such centrally positioned aperture therein, the finger 620 is caused to slide in median guide flange 608 and thence upwardly along inclined plate 610 to be placed in an inoperative position.

As the coin progresses further, it is caused to rest on that portion of the base plate 656 at the area of slots 686 and 688. At this general area, the coin chute becomes bifurcated into an upper coin-rejecting chute provided by the main frame 600, and a lower coin-accepting chute provided by the base plate 656. In this area, two further tests may be conducted on the coin. The leading edge of the coin abuts stationary cam 680 and movable cam 674. If the coin is of a sufficient diameter, it causes coin-sizing member 664 to be rotated in a clockwise direction against the influence of biasing spring 670. This, in turn, causes the upstanding restraining lip 668 to be moved out of engagement with a stop member (not shown) disposed in the associated side edge of the slide 606, thereby permitting the slide to move further. If the coin is undersized, it will not pivot coin-sizing member 664 and the slide will not progress further until the slide is retracted and the coin withdrawn.

The coin chute may be operated to accept old dimes or quarters (nonmagnetic) and new dimes and quarters (paramagnetic). This is done by first disengaging projection 690 on arm 692 to prevent it from projecting through slot 686. The coin is then subjected to the influence of the magnetic field imparted by magnets 702 and 704. Thus, any ferromagnetic or paramagnetic slug or paramagnetic coin will be attracted towards the coin-rejecting chute. For genuine paramagnetic coins, however, it is necessary to provide some means for disengaging the coin from the influence of the magnetic field but not to disengage a ferromagnetic or paramagnetic slug from the influence of the magnetic field. These means are provided by the spring pressure plate 712. The spring on the pressure plate 712 is adjusted by means of 716 so that its force against a coin or slug is less than the attractive force between the magnet and the ferromagnetic or paramagnetic slug, but greater than the attractive force between a genuine paramagnetic coin and the magnet, because of the presence of embossing on the face of the genuine paramagnetic coin. Consequently, a genuine paramagnetic coin will be urged downwardly into the coin-accepting chute, against the influence of the magnetic field imparted by the magnets 702 and 704. On the other hand, the pressure plate 712 has insufficient force to urge a ferromagnetic or smooth-surfaced paramagnetic slug into the coin-accepting chute, and such slugs will, therefore, be drawn into the coin-rejecting chute.

The coin chute may also be operated to accept only paramagnetic coins (new dimes and quarters). Projection 690 on arm 692 will engage all nonmagnetic slugs and/or coins and prevent them from being accepted. However, paramagnetic and ferromagnetic coins are lifted by the magnets 702 and 704. Downward pressure by pressure plate 712 is adjusted to be just sufficient to release imprinted m paramagnetic coins from the magnet while being insufficient to release smooth-surfaced paramagnetic coins and/or slugs and all ferromagnetic coins and/or slugs. As the pressure plate 712 forces the coin downwardly, the coin engages the trailing edge of the projection 690, thereby depressing projection 690. This permits only imprinted paramagnetic coins to be accepted, and rejects nonmagnetic coins (old dimes and quarters), ferromagnetic slugs, and smooth-surfaced paramagnetic slugs.

At about this time, the dog 648 contacts a plurality of ratchet teeth (not shown) on the marginal side edge of the slide 606, in order to prevent the slide from being withdrawn until it has travelled its complete distance. The complete length of travel of the slide is determined by an abutment between a projection (not shown) on the slide 606, and the end 642 of the slotted channel 624.

After the slide has reached its terminal position, it may be withdrawn to its original starting position, which is determined by abutment a between the end of a leg of the stop member 640 against an upstanding projection on the main frame 600.

The coin segregator thus includes magnet means for inducing a magnetic field and a spring pressure plate for urging the coin downwardly. The coin segregator thus senses not only magnetic characteristics but also surface finish. An embossed or smooth-surfaced ferromagnetic slug will each be drawn toward the magnet, and a smooth-surfaced paramagnetic slug will also be drawn towards the magnet. However, an imprinted paramagnetic coin, i.e. a genuine coin, will be released from the magnet. By these means, then, it is possible for the coin

segregator of an aspect of the present invention to distinguish between ferromagnetic or smooth-surfaced paramagnetic slugs on the one hand and genuine paramagnetic coins on the other

While this aspect of this invention has been described for a single push coin chute, the present invention is also adaptable for use in multiple push coin chutes, i.e. those which can accept both dimes and quarters to provide for vending of items for 10 cents, 25 cents and 35 cents. Furthermore, while the coin segregator of this aspect of this invention has been shown added as an adapter to a push chute known commercially as the ABT push chute, it can also be used as an adapter to other commercial push chutes, e.g. those known by the Trademarks of Heath, Comet, etc. The essence of this aspect of this invention resides, however, in the provision of means which substantially simultaneously ascertains the magnetic and surface characteristics of the introduced coin, so that it may accept nonmagnetic or paramagnetic genuine coins, while rejecting ferromagnetic slugs and smooth-surfaced paramagnetic slugs.

From the foregoing description, one skilled in the art can easily ascertain the essential characteristics of this invention, and without departing from the spirit and scope thereof, can make various changes and modifications of the invention to adapt it to various usages and conditions. Consequently, such changes and modifications are properly, equitably, and "intended" to be, within the full range of equivalence of the following claims.

We claim:

1. In a coin-handling device in which genuine coins may be separated from spurious coins or slugs, the improvement comprising:
   a. a coin passageway;
   b. magnet means disposed adjacent said coin passageway to provide a magnetic field in the path of coins moving in said passageway, said magnet and said coin being relatively movable to place said coin and said magnet in face-to-face contact, whereby all magnetic or magnetizable coins and/or slugs are retained in said passageway by said magnet means for a predetermined period of time; and
   c. means, positively actuated during the passage of said predetermined period of time, for urging said magnet and said coin out of face-to-face contact, said urging means being such that only those magnetic or magnetizable coins having less than a predetermined magnetic attraction are urged away from said magnet and are thereby released and pass to a coin-accepting chute, while those magnetic or magnetizable coins having more than said predetermined magnetic attraction are retained in face-to-face contact with said magnet against the force of the urging means; and
   d. means for releasing those magnetic or magnetizable coins having more than said predetermined magnetic attraction which have been retained in face-to-face contact with said magnet against the force of the urging means.

2. The coin-handling device of claim 1 wherein said magnet means is a permanent magnet, wherein said magnet is reciprocally movable into, and out of, the plane of said passageway for coming into face-to-face contact with coins moving in said passageway, and including means for withdrawing said magnet from face-to-face contact with the coin after the passage of said predetermined period of time.

3. The coin-handling device of claim 2 wherein said magnet means are spring-biased to cause said magnet means to retain smooth-faced coins formed of medium magnetic permeability material and all coins formed of high magnetic permeability material, but to release surface imprinted coins formed of medium magnetic permeability material.

4. The coin-handling device of claim 2 wherein said magnet means is mounted on an oscillatable arm, oscillation of the arm causing reciprocation of the magnet means.

5. The coin-handling device of claim 4 wherein said arm is oscillated by engagement with a cam.

6. An adapter for attachment to a coin chute wherein coins are sorted and separated from one another and from spurious coins and/or slugs, said adapter comprising:
   a. a coin passageway;
   b. means, in said coin passageway for intercepting and stopping the movement of coins through said a passageway, said means being first:
      i. positively biased to retain all coins, then
      ii. movable, during a first predetermined period of time to release smooth periphery coins while engaging and retaining serrated periphery coins, and finally;
      iii. positively biased to release all retained coins after a second predetermined period of time;
   c. magnet means, said magnet means and said coin being relatively movable to place said coin and said magnet means in face-to-face contact, whereby magnetic or magnetizable coins and/or slugs are retained by said magnet means for said first predetermined period of time, while nonmagnetic or nonmagnetizable coins and/or slugs are released, to be retained or released by means (*b*) depending on whether said coins and/or slugs have a serrated periphery or not;
   d. means positively actuated after the passage of said first predetermined period of time for urging said magnet and said coins out of face-to-face contact, said urging means being such that only those medium magnetic permeability coins having an imprinted surface are released, to be retained or released by means (*b*) depending on whether said coins and/or slugs have a serrated periphery or not, while simultaneously retaining high magnetic permeability coins; and
   e. means, actuatable after said second period of time to release all coins retained by said magnet; whereby all smooth periphery coins and/or slugs are passed to a rejected coin chute, all smooth face coins and/or slugs are passed to the same or different rejected coin chute, and all medium magnetic permeability imprinted face, serrated edge coins are passed to an accepted coin chute.

7. The adapter of claim 6 wherein said means (*b*) comprises a coin treadle including a pair of spaced apart pivotally mounted hangers each having means for engaging the periphery of a coin.

8. The adapter of claim 7 including positively actuated means for increasing the space between selected portions of said hangers, thereby releasing coins previously retained by said hangers.

9. The adapter of claim 8 wherein said actuating means comprises a cam-operated arm adapted to engage said spaced apart hangers to pivot said hangers in opposite directions.

10. The adapter of claim 6 wherein said magnet means is a permanent magnet.

11. The adapter of claim 10 wherein said permanent magnet is reciprocally mounted to move from a first position in which it is adapted to be in face-to-face contact with a coin, and a second position in which it is adapted to be spaced from the face of said coin.

12. The adapter of claim 11 wherein the magnet is secured to a pivotally mounted cam-operated arm.

13. The adapter of claim 11 wherein the magnet is spring-biased to said second position.

14. The adapter of claim 13 wherein the strength of the spring is less than a predetermined value of (μ) (A), wherein μ is the magnetic permeability and A is the area of the coin in direct face-to-face contact with the magnet, whereby the magnet is urged away from paramagnetic coins having an imprinted face, and whereby the magnet is retained by smooth-faced paramagnetic coins and/or slugs and by all ferromagnetic coins and/or slugs.

15. A coin-sensing attachment for a coin-handling device, said attachment comprising:
   a. base means defining on one face a coin passageway;
   b. a U-shaped treadle having the legs thereof pivotally mounted on said other face of the base means for movement towards, and away from, the base means;

c. magnet means reciprocally movable into, and out of, the plane of said one face from said other face towards said one face;

d. a coin treadle including a pair of spaced apart hangers on said one face of the base, mounted for oscillation in a plane parallel to the plane of said base means;

e. means, on said other face of said base, for positively restraining the oscillation of said hangers;

f. means, on said other face of the base means, for positively causing the oscillation of said hangers; and

g. means, initiated by the entry of a coin into said coin passageway for causing the operation of said treadle (*b*), said magnet means (*c*), said means (*e*), and said means (f), according to a predetermined sequence.

16. The coin-sensing attachment of claim **15** including a motor for rotating a cam shaft having cams thereon for operating the treadle (*b*), the magnet means (*c*), the means (*e*), and the means (*f*),

17. The coin-sensing attachment of claim **16** wherein said means (*g*) comprises a tongue interceptable by the entry of the coin into the coin chute and movable to initiate operation of said motor.

18. The coin-sensing attachment of claim **17** wherein said tongue includes a transverse bar which is attached to the crossmember of said U-shaped treadle.

19. The coin-sensing attachment of claim **18** wherein said transverse bar includes a latch engageable with a motor switch operating arm.

20. The coin-sensing attachment of claim **16** wherein said magnet means comprises a permanent magnet.

21. The coin-sensing attachment of claim **20** wherein said magnet is secured between a pair of pivotally mounted arms.

22. The coin-sensing attachment of claim **21** including a cam follower associated with said pivotally mounted arms, said cam follower being operated by a cam for reciprocating said magnet.

23. The coin-sensing attachment of claim **22** including stop means for limiting the movement of said magnet out of the plane of said base means, and spring means for urging said arms against said stop means when said cam is inoperative.

24. The coin-sensing attachment of claim **23** wherein said cam has one lobe for engagement with said cam follower, whereby the magnet is urged into face-to-face contact with the coin once per cycle.

25. The coin-sensing attachment of claim **23** wherein said cam has two lobes for engagement with said cam follower, whereby the magnet is urged into face-to-face contact with the coin twice per cycle.

26. The coin-sensing attachment of claim **23** including magnet kickoff means, actuatable by said cam for positively releasing a magnetic coin held by said magnet.

27. The coin-sensing attachment of claim **15** wherein each said hanger includes:

i. a coin periphery engaging terminal portion extending outwardly from the plane of said one face of said base means, said terminal portion being, in cross section, less than cylindrical, thereby to provide coin-periphery engaging sharp edges;

ii. an intermediate leg portion extending upwardly in a plane parallel to the plane of said one face of said base;

iii. a shaft portion extending from said one face of said base means to said other face of said base means; and

iv. a terminal actuating portion extending in an inturned direction.

28. The coin-sensing attachment of claim **27** wherein the shaft portion of each of said hangers is mounted in a bushing upstanding from said other surface of said base means.

29. The coin-sensing attachment of claim **27** including: a first tongue adapted to contact a first face of said terminal actuating portion of said hangers, a shaft pivotally securing first tongue for rotation about an axis perpendicular to the axis of rotation of the shaft portion of said hangers, a camming surface projecting from one end of said shaft, and means for operating said camming surface for moving said first tongue to cause said hangers to rotate in opposite directions; and a second tongue adapted to contact an opposite face of said terminal actuating portion of said hangers, a shaft pivotally securing said second tongue for rotation about an axis perpendicular to the axis of rotation of the shaft portion of said hangers, a camming surface projecting from one end of said shaft, and means for operating said camming surface to cause said tongue to inhibit the aforesaid rotation of said hangers in opposite directions.

30. The coin-sensing attachment of claim **29** wherein the shaft of said first tongue terminates in an arm extending perpendicular to the shaft wherein a pivotally mounted arm is adapted periodically to engage said arm, and wherein a cam is adapted to operate said pivotally mounted arm.

31. The coin-sensing attachment of claim **29** wherein the shaft of said second tongue terminates in an arm extending perpendicular to said shaft, wherein a pivotally mounted arm is adapted periodically to engage said arm, and wherein a cam is adapted to operate said pivotally mounted arm.

32. In a coin chute in which a coin is separated from a spurious coin and/or a slug by virtue of the magnetic properties thereof, the improvement comprising:

a. a coin channel bifurcated into a coin-accepting chute and a coin-rejecting chute;

b. magnet means comprising a horseshoe magnet, the open legs thereof facing said fork for drawing a magnetic or magnetizable coin and/or slug towards said coin-rejecting chute; and

c. means comprising a spring pressure plate disposed between said legs of said magnet disposed adjacent to, and upstream of, said fork and adapted to sense whether said coin has an imprinted surface and, in response to said sensing, for urging a genuine coin, which has initially been drawn towards said coin-rejecting chute, towards said coin-accepting chute.

33. The coin chute of claim **32** wherein said sprung pressure plate applies, to said coin being sensed, sufficient force to disengage said magnet from a genuine paramagnetic coin, but in sufficient force to disengage either a ferromagnetic slog or a smooth-surfaced paramagnetic slug from said magnet.

34. The coin chute of claim **32** including means disposed in said coin-accepting channel for intercepting and restraining nonmagnetic coins.

35. The coin chute of claim **32** wherein said means comprises a spring-biased finger, and wherein only paramagnetic imprinted coins are urged downwardly on said finger for urging said finger out of said coin-accepting channel.

36. In a coin-handling device in which genuine coins may be segregated according to their denomination and in which genuine coins may be separated from spurious coins or slugs, the improvement comprising:

a. a coin passageway;

b. gate means comprising a coin treadle including a pair of spaced apart pivotally mounted hangers disposed in said coin passageway in the path of coins moving in said passageway, said gate means sensing the presence of serrations on the edge of said coin and retaining said coin by engagement with said serrations for a predetermined period of time; and

c. means comprising an arm operated by cam-actuated lever means adapted to engage said spaced apart hangers to pivot said hangers in opposite directions, thereby increasing the space between a selected portion of said hangers, and operative after the passage of said predetermined period of time for operating said gate means to disengage said gate means from the serrations on the edge of said coin, thereby permitting said coin to complete its passage through said passageway.

37. The coin-handling device of claim **36** including second gate means, actuatable after said predetermined period of time, to direct said coin to a preselected accepted coin chute.

38. The coin-handling device of claim **37** wherein said second gate means comprises a coin treadle including a pair of spaced apart pivotally mounted hangers.

39. The coin-handling device of claim 38 wherein said means (c) comprises an arm adapted to engage said spaced apart hangers to pivot said hangers in opposite directions, thereby increasing the space between a selected portion of said hangers.

40. The coin-handling device of claim 39 wherein said arm is operated by a cam-actuated lever.

41. The coin-handling device of claim 40 wherein said cam is mounted on a cam shaft, and wherein said cam shaft includes a second cam for actuating said second gate means.