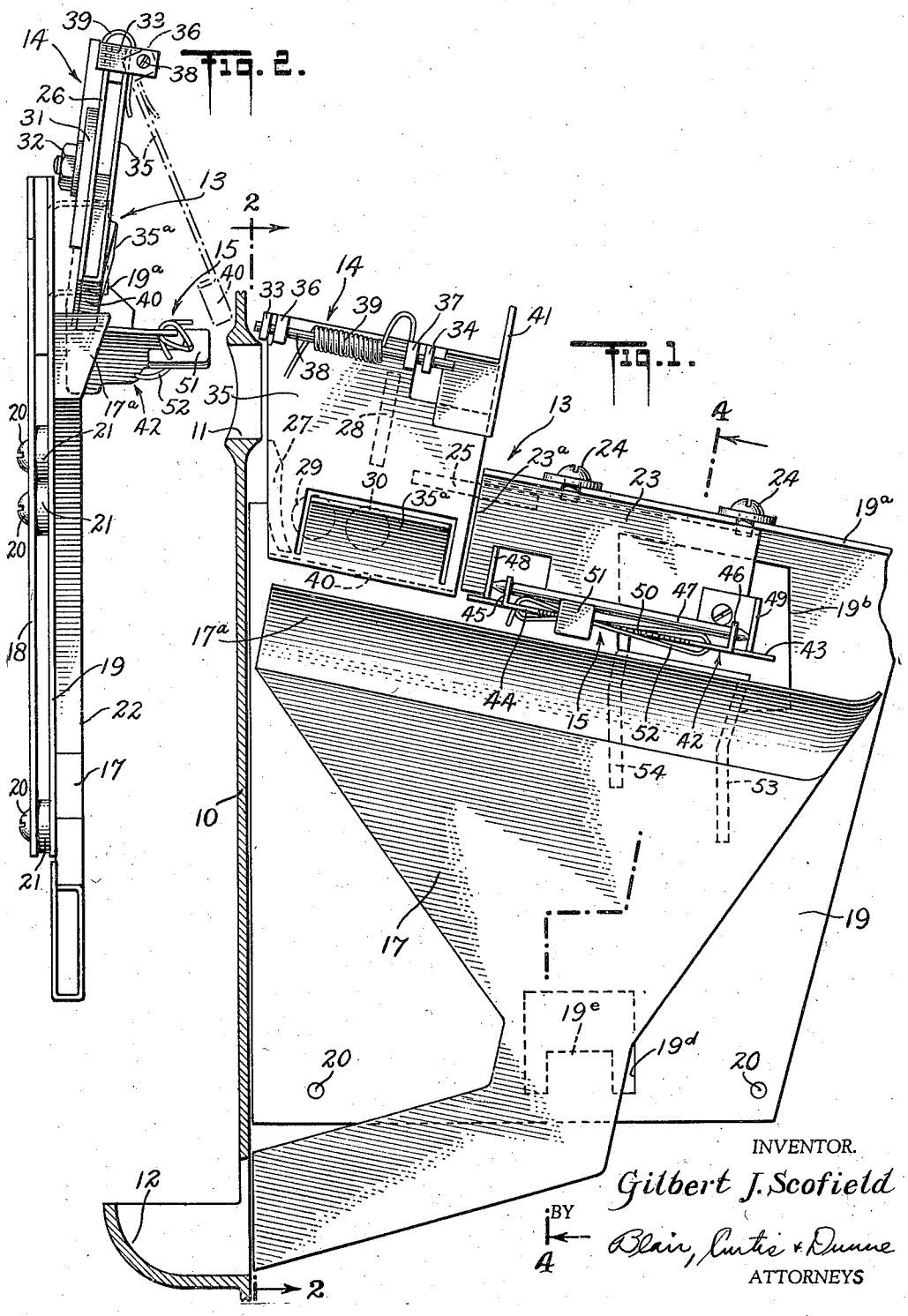
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COIN DETECTOR MECHANISM

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COIN DETECTOR MECHANISM

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Fig. 3.

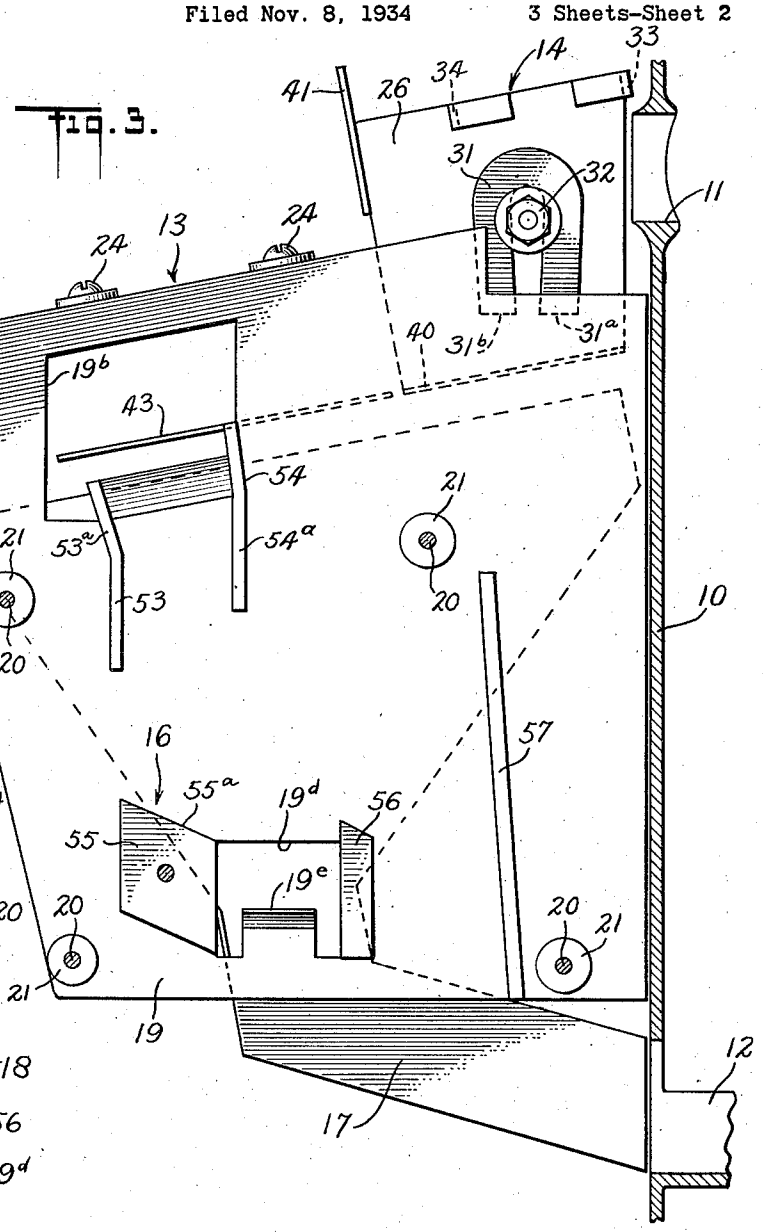


Fig. 4.

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Fig. 5.

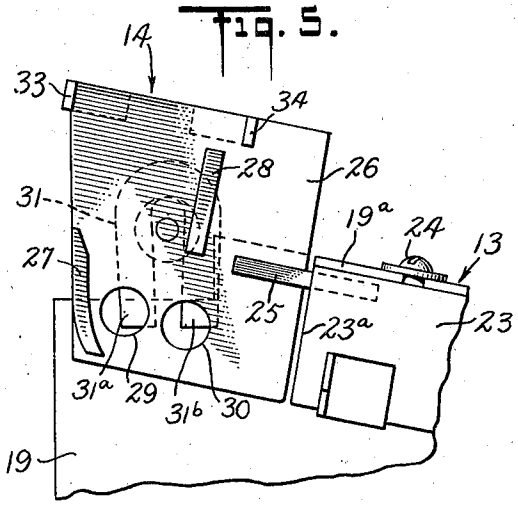


Fig. 6.

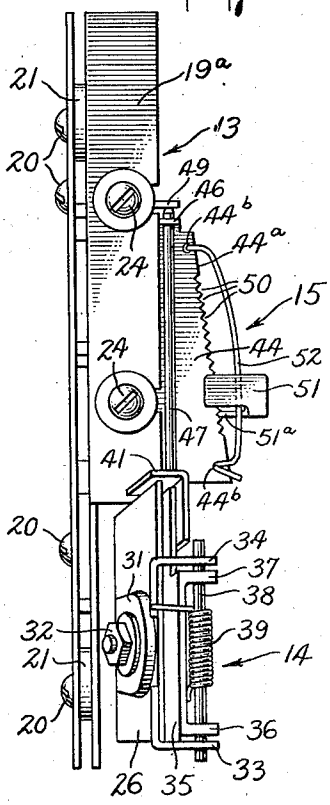
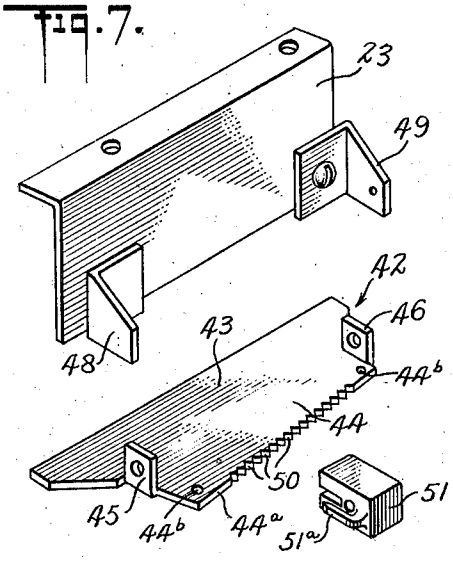


Fig. 7.



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UNITED STATES PATENT OFFICE

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COIN DETECTOR MECHANISM

Gilbert J. Scofield, Loudonville, N. Y.

Application November 8, 1934, Serial No. 752,051

7 Claims. (Cl. 194—103)

This invention relates to a coin detecting apparatus for use in combination with a coin-operated vending machine or the like and is a continuation in part of my copending application filed December 8, 1933, having Serial Number 701,411.

One of the objects of this invention is to provide a coin detector mechanism which is simple and thoroughly practical in construction and operation. Another object is to provide a mechanism of the above nature, the component parts of which may be rapidly and easily manufactured, and readily assembled by unskilled labor. Another object is to provide a mechanism of the above nature, which is compact in size and adaptable for use in connection with a great variety of coin-operated mechanisms. Another object is to provide a mechanism of the above nature, capable of withstanding constant use over extended periods of time without need of repair. Another object is to provide a mechanism of the above nature, which will reliably and quickly detect, reject, and return bogus coins, while permitting the quick passage of legitimate coins so that apparatus in association therewith may be quickly operated. Other objects will be in part apparent and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combination of elements, and arrangements of parts, as exemplified in the structure to be hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is shown one of the various possible embodiments of this invention,

Figure 1 is a front elevation of my mechanism, showing several of the detecting devices and the return chute;

Figure 2 is a sectional elevation, taken along the line 2—2 of Figure 1;

Figure 3 is a rear elevation of my mechanism, showing other of the various detecting devices;

Figure 4 is a sectional elevation, taken along the line 4—4 of Figure 1;

Figure 5 is a fragmentary, front elevation of one of the detecting devices;

Figure 6 is a top-plan view of my mechanism; and

Figure 7 is a developed perspective view of another of my detecting devices.

Similar reference characters refer to similar parts throughout the several figures of the drawings.

As conducive to a clearer understanding of my invention, it might be here pointed out that many coin-operated devices, such as vending machines, or subway turnstiles, are either unprovided with any sort of coin detecting and rejecting apparatus or, if so provided, the coin detectors so used are of such impractical nature as to preclude a desirable quick operation of the apparatus or ready detection of bogus coins. Many of these coin detectors are characterized by such slowness of operation as to cause an unreasonable delay before the vending machine or the like can be operated. Other detectors reject only certain types of counterfeits, as for example an underweight or overweight coin. Still others are so highly complicated and delicate that they frequently get out of order and are difficult to repair. Such detectors are apt to be not only difficult to manufacture but also quite expensive, thus precluding their use in large numbers, as would be necessary, for example, in their application to the turnstiles in a subway system in a large city. Another object of this invention is to provide a coin detector in which the above conditions, in addition to many other difficulties, are completely and practically rectified.

Referring now to Figure 1 of the drawings, a side plate 10 has provided therein a coin-entry slot 11 and a return pocket 12. Plate 10 may form a part of the exterior casing of the apparatus, the other portions of the casing not being shown. Coin-entry slot 11 is preferably slightly larger than the diameter of the coin meant to be inserted therethrough, thus preventing the admission of coins of the wrong denomination as well as oversized slugs or the like. The term "slug" is used as descriptive of a counterfeit coin, that is, an illegitimate metal disc. Thus a legitimate coin or a slug of proper diameter inserted into the mechanism through slot 11 falls into a coin chute, generally indicated at 13, coin chute 13 being inclined toward the rear of the apparatus, thus being at an angle with the base of the apparatus. Under most circumstances, I have found an angle of 12 degrees best suited for this purpose.

Generally coin chute 13 comprises a detecting and scavenging device generally indicated at 14, (Figures 1, 3, 5) adapted to detect and reject slugs formed from the wrong metal, very light slugs formed from leather or the like and also slugs having a diameter less than that of a legitimate coin, all as will be more fully described hereinafter. Coin chute 13 also includes a de-

tector device generally indicated at 15 (Figures 1, 4, 6) which is capable, for example, of detecting and rejecting slugs of improper weight, as will be more fully described hereinafter.

Assuming that a slug passes by scavenger device 14 and detector 15 without rejection, it must still encounter another detecting device, generally indicated at 16, as is more clearly shown in Figure 3; detector 16 can detect and reject a slug having specific gravity or modulus of elasticity different than that of a legitimate coin. A return chute 17 (Figure 1) is so disposed with relation to the several detectors that all slugs rejected thereby are received therein and dropped into return pocket 12, as will be clear later. Accordingly it may be seen at the outset that with this apparatus coins are tested for size, composition, weight and specific gravity, thus making it virtually impossible to cause the operation of a vending machine, turnstile or the like to which my coin detector is attached, with a bogus coin.

As may be more clearly seen in Figures 2 and 4, a pair of plates, 18 and 19, are secured in spaced relation by means of screws 20 which extend through plate 18, a suitable number of spacers 21 and are preferably threaded into plate 19. Plates 18 and 19 are preferably of sheet metal of suitable gauge and thus may be rapidly stamped out of flat stock.

Plate 19 forms the inner wall of return chute 17, and a suitable cover plate 22 (Figure 2) forms the exterior wall thereof. The upper portion 17*a* (Figure 1) of return chute 17 is disposed immediately below coin chute 13 and extends beyond the end thereof. Thus, counterfeits or slugs rejected by detectors 14 and 15 will drop into return chute 17 and fall therethrough to be deposited in return pocket 12.

Plate 19 has a flange 19*a* formed along the top thereof (see Figures 1 and 4) and to this flange is secured a guide plate 23 by screws 24. As may be more clearly seen in Figure 5, a supporting bar 25 is disposed between plates 23 and 19 and is secured to plate 23 in any suitable manner, as by spot welding, for example. Bar 25 extends beyond edge 23*a* of plate 23 and has secured thereto a coin guide 26 forming a part of scavenging device 14. Guide 26 has attached thereto a pair of parts 27 and 28 suitably disposed to direct a coin past a pair of apertures 29 and 30 extending through coin guide 26. A magnet, or the like, 31 (Figure 3) is secured to the side of guide 26 opposite plates 27 and 28 preferably by a nut and washer 32; magnet 31 may be properly positioned and secured so that its end portions 31*a* and 31*b* are exposed to holes or apertures 29 and 30. Coins passing along guide 26 are subject to magnetic influence in this manner.

Guide 26 also has extending therefrom a pair of lugs 33 and 34 (Figure 5) upon which is pivotally mounted a scavenger 35 (Figures 1 and 6). Scavenger 35 is also provided with a pair of lugs 36 and 37 (Figures 1 and 6) and a pin 38 extends through these lugs, and lugs 36 and 37 respectively thus may pivot about pin 38 as an axis in directions toward and away from guide 26. Disposed about pin 38 I provide a coiled spring 39, one end of which bears against guide 26 and the other end of which bears against scavenger 35, thus urging scavenger 35 against guide 26, the closed position of scavenger 35. Scavenger 35 is provided with a flange 40, the inner edge of which is forced against guide 26, (Figures 1 and 2) thus to form the upper portion of chute 13.

As best shown in Figures 1 and 2 a portion 35*a* of scavenger 35 is cut away and extends outwardly therefrom as viewed in Figure 1. The distance between the edge of the scavenger immediately above portion 35*a* and coin track 40 is less than the diameter of the coin to be received in my detector. Accordingly, if this coin is a nickel, for example, upon being directed to coin track 40 it rests against scavenger 35 and is thus free to roll down coin track 40 unimpeded. On the other hand, if the diameter of the coin or slug inserted in slot 11 is smaller than that of a nickel, the coin or slug upon landing on coin track 40 falls over on portion 35*a* of the scavenger and is usually prevented from leaving coin track 40 when it engages the edge of the scavenger adjacent the lower section of portion 35*a* as viewed in Figure 1.

Suitably secured to and extending upwardly and to the rear of scavenger 35, I have provided a scavenger-operating arm 41 (Figures 1 and 6). Arm 41 is in operative relationship with the operating lever (not shown) of the vending machine, turnstile, or the like, in which the coin detector is installed. Hence, upon an attempted operation of the vending machine, arm 41 is actuated to move track 40 away from guide 26, for example, to the dotted line position (Figure 2) hence to dump any slugs on the track into the return chute 17. Often various pieces of trash are maliciously inserted in slot 11 to fall on the scavenger. These may be so light that they will remain where they land thus tending to clog the chute. However, attempted actuation of the machine is sufficient to move the scavenger far enough to dump such articles into the return chute. Furthermore, futile operation of the machine after insertion of a slug is generally accompanied by impatient jiggling of the apparatus which in turn jiggles the scavenger to aid its dumping action.

A legitimate coin or an undetected bogus coin, having passed through scavenging device, next enters detector 15. Detector 15 comprises a balanced gate, generally indicated at 42 (Figures 1, 2, 4, and 7), and as is more clearly shown in Figure 7, gate 42 includes a coin track 43 (see Figure 4). A pair of lugs 45 and 46 (Figure 7) extend upwardly from body portion 44 and have holes therein, which receive a pin 47 (Figure 1), the ends of which are preferably pointed and are mounted in suitable pockets formed in a pair of lugs 48 and 49 (Figure 7), secured to plate 23. Thus gate 42 is provided with a substantially frictionless pivot to aid in the balancing thereof, as will be clear later.

The longitudinal edge 44*a* of body portion 44 is at an angle to pin 47. Although several values might be chosen for this, I have discovered that an angle is preferable under most circumstances. A number of notches 50 are preferably formed along edge 44*a* (Figure 6) and a spring piece 52 is secured to portion 44 adjacent the teeth, the ends thereof extending through holes 44*b* in portion 44. A weight 51 is slidably mounted on spring piece 52 and has a detent 51*a* formed therein. Edge 44*a* fits within a slot in weight 51 and the inner surface of detent 51*a* is pointed to fit into any of the notches 50. Thus, weight 51 may be positioned along edge 44*a* and maintained in any desired position by notches 50.

The angle of chute 13 determines the speed at which a coin travels therealong and similarly

the distance between the center of the mass of weight 51 and pin 47 (forming an axis about which gate 42 pivots) determines the speed at which pivoting of the gate takes place. Accordingly, there is a definite relation between these two angles. The values given above have been found to work satisfactorily although I fully realize that other angular values as well as other combinations thereof might be chosen and used to good advantage.

Referring again to Figure 1, an aperture 19b is provided in plate 19, this aperture opening into the space between plates 19 and 18 (Figure 4) and coextensive with substantially the lower portion of track 43 as viewed in Figure 1. The space between plates 18 and 19 forms a passageway leading to actuating parts of the vending apparatus. The upper portion of track 43, as viewed in Figures 1 and 4, is positioned above return chute 17. Thus when weight 51 is in proper adjustment, a slug weighing more than a legitimate coin rolling down chute 13 over scavenging device 14 and on gate 42 causes a quick tipping of gate 42, that is, gate 42 will open while the slug is traveling over the upper portion of track 43 and will accordingly fall therefrom into return chute 17. If a legitimate coin is inserted in slot 11, it rolls down chute 13 onto gate 42 but the gate does not tip until the coin is over opening 19b so that the coin is directed down to the actuating parts of the mechanism. However, under extraordinary circumstances, a slug may be just the proper weight and thus land on the passageway formed by plates 18 and 19.

After entering aperture 19b legitimate coins and slugs of just the proper weight drop downwardly (Figure 4) and follow a course of travel to be more fuly described hereinafter.

It follows from the above that a slug, which is lighter than a legitimate coin, will traverse the full extent of track 43 before the gate 42 tips sufficiently to dump it into the return chute or aperture 19b and thus falls off the end thereof into return chute 17 (Figure 1). Accordingly, it will be seen that the great majority of slugs whether lighter or heavier than legitimate coins will be detected and rejected by gate 42 alone. It will further be seen that one side of coin chute 13 comprises coin guide 26 (Figure 2) and the upper part of plate 19, and that the opposite side of coin chute 13 comprises scavenger 35 (Figure 2) and plate 23 (Figure 4), while the track of coin chute 13 comprises track 40 and track 43 of scavenger 35 and gate 42 respectively.

As is more clearly shown in Figure 2, coin chute 13 is inclined from the vertical, the angle of inclination being preferably on the order of 10 degrees, and, as may be seen in Figure 1, coin chute 13 is inclined from the horizontal, the angle of inclination being preferably on the order of 12 degrees. While variations of these angles may give satisfactory results under certain circumstances I have found it preferable that they be substantially the degree stated for practical purposes.

After a legitimate coin or an undetected slug has fallen through aperture 19b, it falls downwardly between plates 18 and 19 and between a pair of guide strips 53 and 54 (Figure 3), which are secured to plate 19 in any suitable manner, as, for example, by spot welding. Guide strip 53 includes a portion 53a which is inclined with respect to a portion 54a of guide strip 54, portion 54a preferably being substantially vertical. Thus, the coin or slug, after falling through aperture 19b, first impinges against portion 53a, rebounds therefrom, and impinges against portion 54a, which compensates and corrects the angle of downward travel of the slug or coin so that the coin will descend downwardly in a substantially vertical path.

Positioned below and substantially centrally of guide strips 53 and 54, I have provided a bounce anvil 55 or the like (Figures 3 and 4), which may be secured to plate 19 in any suitable manner. Bounce anvil 55 has a top surface 55a preferably inclined from the horizontal at an angle preferably on the order of 23 degrees. Anvil 55 is preferably so positioned that the falling slug or coin impinges upon surface 55a at substantially the central portion thereof.

An aperture 19d in plate 19 opens into return chute 17 and is disposed between anvil 55 and a hurdle or guide strip 56 (Figure 3). A deflecting lip 19e extends from aperture 19d between plates 18 and 19 (see Figure 4). Hurdle 56 is of such height and is so spaced from anvil 56 that a legitimate coin, after rebounding from surface 55a jumps over hurdle 56 and is guided downwardly by guide strip 57 between plates 18 and 19 into the coin-operated mechanism of the vending machine, turnstile or the like. A counterfeit or slug, however, has a specific gravity or modulus of elasticity different from that of the legitimate coin and hence its rebound is not sufficient to carry it over hurdle 56; therefore, it falls between anvil 55 and hurdle 56 and is deflected by deflector 19e into return chute 17. It will now be seen that anvil 55 and hurdle 56 comprise detector 16 mentioned hereinabove.

It should here be noted that the various angles and dimensions mentioned hereinabove bear a definite relationship to one another and are variable according to the denomination of the coin for which the detector is adapted. For purposes of illustration the mechanism herein described is adapted for testing a five cent piece, and the various angles have been accordingly defined. It will readily be seen that variations would have to be made to accommodate pennies, dimes, quarters, or half-dollar pieces.

Furthermore these angular values have a definite relation to each other. For example, a change in the angle of slope of chute 13 might seriously affect the value of the most desirable angle to be employed on edge 44a of gate 42 (Figure 7). Also the weight of weight 51 has a definite relation to these angles as it will be understood that the speed at which a coin or slug travels over gate 42 has a definite bearing on the speed with which gate 42 dumps a coin into return chute 17 or aperture 19b.

In operation if a slug of proper diameter is inserted through coin slot 11 (Figure 1), it is guided downwardly by guide strips 27 and 28, past apertures 29 and 30 onto scavenger track 40. If the slug is responsive to magnetic attraction it is held from rolling down coin chute 13 by magnet 31, and upon the attempted operation of the vending machine, scavenger 35 opens and the slug is rejected and returned. If the slug is not attracted by magnet 31 but has a diameter less than that of the proper or legitimate coin, it will fall against portion 35a of scavenger 35 and it will be impeded by abutting against the edge of scavenger 35 adjacent the lower section of portion 35a to be later rejected by the scavenging device upon actuation of the vending machine as more fully described above. Furthermore, if the slug is very light, that is made from leather, it

may stop on the scavenging device of its own accord. Attempted actuation of the machine causes the scavenging device to cast these slugs, as well as other trash which may be maliciously inserted, into the return chute.

If the slug is non-magnetic, it rolls down track 40 undisturbed onto track 43 of gate 42 (Figure 1). If the slug is heavier than a legitimate coin, gate 42 opens prematurely and the slug falls therefrom into return chute 17. If the slug is underweight, it traverses the full extent of track 43 and falls off the lower end thereof into return chute 17.

Assuming that the slug has the weight of a legitimate coin, this being an unusual circumstance, its weight causes gate 42 to open at the proper time to permit the slug to fall through aperture 19b (Figure 3) and pass between guides 53 and 54. The slug impinges first against portion 53a, thence against portion 54a (Figure 3), and is accordingly directed downwardly to surface 55a of anvil 55. As the resiliency of the slug bears a definite relationship to its specific gravity and modulus of elasticity, the slug does not rebound from anvil 55 to the same extent as a legitimate coin. Accordingly, the slug does not clear hurdle 56 but is deflected through aperture 19d into return chute 17, thence to be deposited into return pocket 12.

It follows that a legitimate coin inserted in slot 11 rolls down chute 13 and is dumped by gate 42 into aperture 19b where, as best shown in Figure 3, it strikes portion 53a then portion 54a. Next it falls downwardly upon the anvil 55. Due to its modulus of elasticity and inherent resiliency it gathers momentum with each bounce until it finally bounces over hurdle 56 to be directed to the coin actuated parts.

It is particularly important to note the very fine degree of adjustment obtainable from the counterweight 51. As explained above, the angle of edge 44a (Figure 7) is substantially 5 degrees with respect to the pivotal axis of the gate 42. Accordingly as weight 51 is moved along edge 44a, the distance it moves toward or away from the pivotal axis of the gate is very small in proportion to the longitudinal movement of the weight. The notches 50 are small so that the weight may be held in any number of positions along the gate. Accordingly I have found it possible to achieve an extremely fine adjustment of the gate, this being highly desirable to enable the gate to select slugs which are almost the same weight as legitimate coins. This is particularly important due to the fact that legitimate coins, after continued use, often become worn and are accordingly a bit lighter than a new coin. It is quite necessary to have the coin detecting apparatus receive such coins rather than reject them due to their variance in weight. Due to the fine adjustment of counterweight 51, it is possible to have this gate operate properly when such coins pass thereover and still reject slugs which are almost the same weight.

I have found that a legitimate coin will pass through my coin detector in about one second, and that a slug will be detected, rejected and returned in substantially the same short space of time or less. This rapid action, in addition to the compactness of the detector, renders the device particularly well suited for use in combination with coin-operated mechanisms of any type.

It will thus be seen that there has been provided in this invention an apparatus in which the various objects hereinbefore stated, together with many thoroughly practical advantages, are successfully achieved. Most of the parts of the apparatus may be easily and rapidly stamped from inexpensive sheet metal, thus necessitating little or no skilled labor, either in the manufacture of the parts or in the assembly thereof. As there are but few moving parts and these sufficiently sturdy to withstand long continued use, the life of the apparatus is great and the necessity for repair slight. It will be understood, of course, that the specific values above, given by way of illustration, are not to be interpreted in a limiting sense and are merely illustrative, as the shape and dimensions of the various parts may be varied, depending for example upon operating conditions and the characteristics of the coin-operated mechanism to which the detector is to be attached.

As many possible embodiments may be made of the mechanical features of the above invention all without departing from the scope of the invention, it is to be understood that all matter hereinabove set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In coin detector construction, in combination, an inclined coin chute, a gate pivotally associated with said coin chute and forming a portion thereof, one of the edges of said gate being at an angle with respect to its pivotal axis, a weight slidably mounted on said edge, means for maintaining said weight at any set position along said edge, whereby the weight necessary to open said gate may be definitely predetermined, a return chute opening beneath a portion of said gate, a coin passageway located beneath another portion of said gate, whereby said gate drops coins into said passageway and overweight slugs into said chute.

2 In coin detector construction, in combination, an inclined coin chute, the inclination of said chute with the horizontal being on the order of 12 degrees, and the inclination of said chute with the vertical being on the order of 10 degrees, and means for detecting and rejecting overweight and underweight slugs and forming a part of said chute, said last-mentioned means including a pivoted gate having slidably mounted along one edge thereof a weight, said edge being inclined at an angle on the order of 5 degrees with respect to the pivotal axis of the gate.

3. In coin detector construction, in combination, an inclined coin chute, means for detecting and rejecting overweight and underweight slugs, said last-mentioned means including a pivotable gate having slidably mounted along one edge thereof a weight, said edge being inclined substantially at an angle on the order of 5 degrees with respect to the pivotal axis of the gate.

4. In coin detector construction, in combination, a pair of plate members secured together in spaced relationship, one of said plate members having an aperture formed therein, a gate member pivotally secured to one of said plate members, said gate member having a coin track extending into the space between said plates, and a counterweight slidably mounted along one edge of said gate member, said edge being inclined with respect to the pivotal axis of said gate member, said gate member being balanced by said counterweight to prematurely open upon the passage thereover of a slug heavier than a legitimate coin and to permit the passage of a legitimate coin through said aperture.

5. In coin detector construction, in combination, means for detecting and rejecting overweight and underweight slugs, said means comprising an inclined coin chute and including a pivotable gate having one of its edges inclined with respect to its pivotal axis, said edge having a plurality of notches formed therealong, a weight member slidably mounted on said edge and having a detent adapted to engage one of said notches, and spring means for releasably retaining said detent in engagement with said notches.

6. In coin detector construction, in combination, an inclined coin chute, a gate pivotally associated with said coin chute and forming a portion thereof, said gate including a portion over which coins are directed to roll, the pivotal axis of said gate being slightly spaced from said portion, one of the edges of said gate being at an angle with respect to said pivotal axis, a weight slidably mounted on said edge, means for maintaining said weight at any set position along said edge, whereby the weight necessary to open said gate may be definitely predetermined, and coin receiving means beneath said gate.

7. In coin detector construction, in combination, means forming a coin chute, said means including a part pivotally associated with said chute and forming a portion thereof, a member associated with said chute and movable longitudinally thereof to vary at will the balance of said part, said member being moved to a position on said part wherein the part is prematurely pivoted upon the passage thereover of an overweight slug, and remains unmoved upon the passage thereover of an underweight slug, and means movable transversely of the pivotal axis of said part to yieldably hold said member in engagement with said part at any predetermined position thereon.

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