

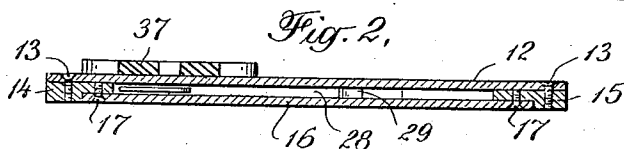
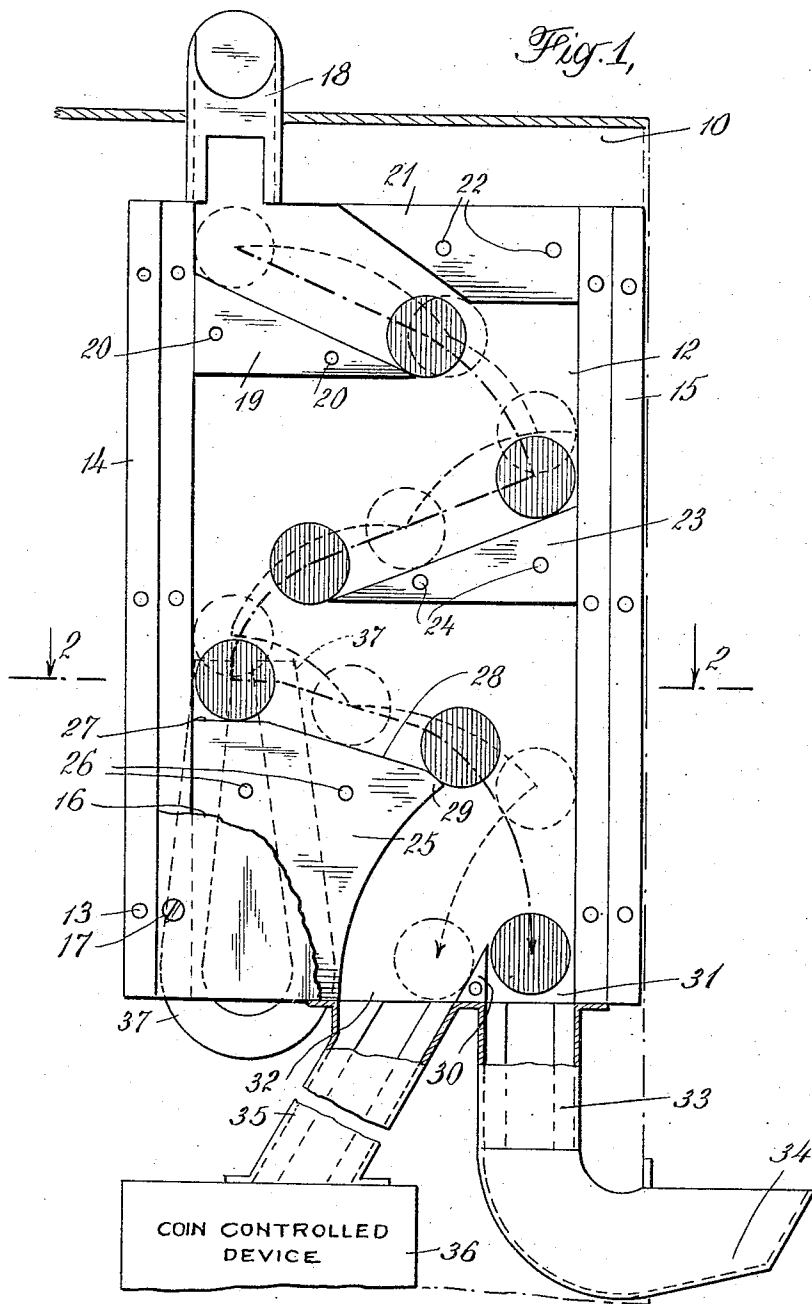
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E. DE RYSS

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SPURIOUS COIN DETECTOR AND EJECTOR

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INVENTOR
Emil de Ryss
 BY
Emile de Ryss, Maurice Edmond
 ATTORNEYS

UNITED STATES PATENT OFFICE

EMIL DE RYSS, OF SCARSDALE, NEW YORK

SPURIOUS COIN DETECTOR AND EJECTOR

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This invention relates to spurious coin detectors and ejectors and has particular reference to a device for discriminating between spurious and bona fide coins inserted in coin-controlled machines for the purpose of purchase, and for ejecting the spurious coins while utilizing the bona fide coins.

Coin detectors used heretofore relied for their effectiveness on the weight, diameter, thickness of the coin or the like, but, as counterfeit coins are usually approximately the weight and size of the corresponding bona fide coins, they would operate the machine, while bona fide coins which had been mutilated or worn thin and thus become light, would be rejected. Other former spurious coin detectors, such as the electrical types, were too slow and complicated to be effective in installations where the machines were operated rapidly, and they were also too delicate to be durable. Accordingly, many objections to the former coin detectors have arisen, which has rendered their value questionable.

The spurious coin detector and ejector of this invention obviates the objections of the former types and is positive, rapid and infallible in its action. It operates upon the scleroscopic principle, that is to say, it takes advantage of the resiliency or springiness of metal of which bona fide coins are made, as compared to lesser resiliency of a spurious coin, which might have other characteristics identical to the bona fide coin, such as weight, diameter, thickness, hardness, "ring", electrical conductivity or resistance, and the like. Specific gravity also enters into the problem, as it affects the trajectory of the coin before and after impact.

In order to illustrate the use of the scleroscopic principle in the device of this invention, assume that a bona fide coin and any number of spurious coins of the same supposed denomination, which might be identical in appearance, weight, and size to the bona fide coin, are dropped from the same point upon a hard or firm surface. It will be found that in every case the bona fide coin bounces higher than the spurious coin, whether the latter is made of iron, iron alloys, steel, lead

or zinc alloys, and the like. Thus, the bona fide and spurious coins can be discriminated positively, quickly, easily, automatically, and without previous separation or examination.

One particular form of the apparatus of this invention includes a housing, preferably of rigid metal, with a coin slot at or near the top, preferably three rigid inclined planes arranged in zigzag fashion to form three passes or flights of decreasing steepness. Above the end of the first inclined plane is an overhead anvil, and the beginning of the last inclined plane is made horizontal while at the discharge end of the third inclined plane is a wall or partition which separates two chutes. One of these chutes leads to the coin-controlled mechanism of the machine and is adapted to receive bona fide coins, while the other chute leads to a return cup or the like and is adapted to receive spurious coins and return them to the person who attempted to operate the machine therewith.

In operation, a coin of proper denomination inserted in the coin slot drops edgewise upon the first inclined plane, bounces from the rigid surface thereof, strikes the overhead anvil, and is deflected downwardly with increased velocity upon the second inclined plane, along which it bounces until it rebounds from the opposite rigid side wall of the housing, and drops upon the horizontal surface of the third plane to bounce down the same, the several impacts to which the coin was subjected during its passage having been additive or cumulative so that the rebound from this last side wall is accentuated accordingly. If the coin is bona fide, the rebound will be considerable and it will fly over the top of the wall or partition below the end of the last coin flight and drop into the chute leading to the coin-controlled mechanism adapted to actuate or control article vending apparatus, unlocking or preparing mechanism, change-making devices, or the like.

However, if the coin inserted in the coin slot is spurious, the accumulated bounces thereof in passing through the several flights of the apparatus will be insufficient to carry it over the wall or partition and it will strike the latter and fall into the return chute to be

rejected and returned to the person who inserted it into the coin slot. The resiliency or springiness of spurious coins is generally less than that of bona fide coins and renders them amenable to detection and rejection by the device of this invention. The slugs of low resiliency do not rebound sufficiently from the first inclined plane to engage the overhead anvil, so that their resiliency is not accentuated at this point. Also, the slugs drop off the end of the second plane without engaging the side wall, so that they fall straight down on the horizontal portion of the third plane and consequently rebound straight up, whereby they have no start down the third plane and frequently have insufficient velocity to reach the side wall and so drop directly into the ejector chute. Thus, the several flights through which the coins are passed through the device decrease the rebound of slugs and in this way serve to accentuate the difference between good coins and slugs, whereby the discrimination of the device is sharp and more critical.

The nearest approach to bona fide coins, insofar as resiliency or springiness is concerned, is found in slugs containing the common magnetic metals such as iron, steel, or their alloys, and in order to make their detection certain, no matter how closely the resiliency of the corresponding bona fide coin is imitated, a magnet is placed at the beginning of the last flight to retard the rebound of spurious coins of magnetic metal, so that they will drop into the ejector chute.

It will be seen that the spurious coin detector and ejector of this invention automatically discriminates between good coins and slugs with an unusual degree of accuracy and positiveness, and at the same time it is rugged, fool-proof, simple and has no moving parts. For a better understanding of this invention a preferred embodiment thereof will be described in connection with the accompanying drawing, in which

Figure 1 is an interior view of the spurious coin detector and ejector of this invention as seen when the cover plate is removed; and

Fig. 2 is a transverse section thereof as seen along the line 2—2 of Fig. 1.

In this drawing, numeral 10 designates a frame upon which the device of this invention may be mounted, and may consist of a change making machine frame, coin controlled telephone casing, merchandise or service vending machine housing, or the like. The device of this invention preferably consists of a back plate 12 upon the front of which is secured by screws 13 a pair of rigid metallic strips 14 and 15 which may be referred to as vertical anvils or anvil guides since they guide the coins which bounce therefrom to the next lowest inclined anvil. These vertical anvils or anvil guides may be straight or have an irregular configuration,

so long as they extend upwardly from the upper ends of the inclined anvils to guide the descending coins thereto. These strips 14 and 15 are preferably made of brass or other resilient material and are recessed on their inner edges for the reception of front cover plate 16, which is removably secured to the strips by screws 17, and is spaced from the back plate 12 of a sufficient distance to accommodate a coin of predetermined denomination, as seen in Fig. 2.

Communicating with the interior of the housing thus formed is a coin chute 18, which is preferably arranged to discharge into one side of the housing a coin inserted therein, such as the left side as seen in Fig. 1, and is arranged to accommodate a coin of proper predetermined denomination. Placed immediately below the discharge end of coin chute 18, so that the latter directs a coin thereupon, is an inclined anvil 19 preferably of solid metal such as brass and shaped in the form of a triangular inclined plane secured to the back plate 12 by means of the screws or rivets 20. By careful experiment and calculation, the proper pitch of this first inclined anvil 19 has been found to be between 23° and 27°, depending upon the size and weight of the coin which is to be inserted in the coin chute 18.

Spaced above the discharge or lower end of first inclined anvil 19 is an overhead anvil 21, also secured to the back plate 12 by screws or rivets 22. This overhead anvil 21 is also preferably formed of heavy metal, such as brass, so as to be rigid. The left hand edge of this overhead anvil 21 slopes upwardly as illustrated, the shortest distance between it and the first inclined anvil 19 being slightly greater than the diameter of the coin which coin chute 18 accommodates.

Located immediately below the discharge or lower end of first inclined anvil 19 and sloping downwardly from right hand vertical anvil 15, is a second inclined anvil 23, also formed of brass or other heavy metal so as to be rigid, and secured by screws or rivets 24 to the back plate 12. By careful experiment, the proper pitch of this second inclined anvil 23 has been found to lie between 20° and 23°.

Mounted immediately below the discharge or lower end of second inclined anvil 23 and located adjacent left hand vertical anvil 14 is a third inclined anvil 25, also formed of brass or other heavy metal so as to be rigid, and secured to the back plate 12 by means of screws or rivets 26. The upper edge of this third anvil 25 is made with a horizontal portion to form a surface which serves as a horizontal anvil 27 located adjacent the left hand vertical anvil 14, and from which the inclined surface 28 of third inclined anvil 25 slopes downwardly. By careful experiment, the proper pitch of this third inclined

surface 28 has been found to be around 15° . The lower or discharge end 29 of this third inclined anvil 25 is curved downwardly as illustrated in Fig. 1.

5 Secured to back plate 12 below the discharge end 29 of third inclined anvil 25 and spaced from the right hand vertical anvil 15, is a partition 30 dividing the lower open end of the housing into two outlets 31 and
10 32. Communicating with outlet 31 is an ejector chute 33 which preferably terminates in a return cup 34, as illustrated. Outlet 32 communicates with a receiving chute 35 which discharges into a coin controlled device 36 of any form, such as a coin or token vending machine, telephone contact device, merchandise or service vending machine, or the like, the particular apparatus which the purchase coin controls being immaterial
15 to the present invention, as the invention is adapted to any use wherein the detection and ejection of spurious coins is desired.

Suitably secured to the back plate 12 is a permanent magnet 37, whose poles lie adjacent horizontal anvil 27, as seen in Fig. 1, so as to influence magnetic coins rebounding from this horizontal anvil 27 and adjacent anvils.

It will be observed that the three inclined
20 anvils, 19, 23, and 28, are arranged in zigzag fashion between the back plate and the front plate 16 and have decreasing degrees of steepness, and the vertical anvils 14 and 15 are located at the beginnings and ends of
25 each flight of this zigzag arrangement. Accordingly, the coin inserted in coin chute 18 follows a zigzag path through the device, engaging each of the anvils in each pass if a genuine coin of proper denomination, and
30 missing some of these anvils if a spurious coin, even though its weight and dimensions may be identical to those of the correspondent genuine coin. This is the general rule in regard to spurious coins, but it has some exceptions which will be discussed later.

In operation, a prospective purchaser of coins or tokens, merchandise, service, or the like, drops a coin of proper denomination into the coin chute 18. Assuming first that the
35 coin so dropped into the coin chute 18 is genuine, it will follow the path indicated by the unshaded phantom coin in Fig. 1. The first effect is a rebound from the upper end of first inclined anvil 19, this rebound being
40 considerable and causing the coin to engage overhead anvil 21, following the trajectory indicated in Fig. 1. The overhead anvil 21 deflects the coin downwardly with increased velocity, so that it strikes the right hand
45 vertical anvil 15 before it engages the second inclined anvil 23. The coin then rebounds from second inclined anvil 23 against the left hand vertical anvil 14, missing the horizontal anvil 27, and rebounding from the
50 third inclined anvil 28 against the right hand

vertical anvil 15 as indicated. The resilient genuine coin, during its three flights through the zigzag passes of the device has had its rebound or resilient effect accentuated because of the additive results of its rebounds
55 from the vertical and successive inclined anvils. It accordingly strikes the right hand anvil adjacent the discharge end 29 of lower anvil 25 with considerable force, so that it rebounds therefrom over the partition 30
60 and into the receiving chute 35 to operate the coin controlled device 36, whatever it may be.

Now, assuming that the coin dropped in coin chute 18 is spurious, and assuming further that it is an extremely heavy slug
65 of low resiliency, such as one whose principal ingredient is lead, and which will operate most coin controlled devices because of its weight, the lead slug, in falling by gravity through coin chute 18 scarcely rebounds at
70 all from inclined anvil 19, but rolls down it without engaging overhead anvil 21, since it does not bound up to engage the latter. Having a specific gravity considerably higher than the specific gravity of a genuine coin,
75 its trajectory off the end of inclined anvil 19 is low, and so it drops almost directly downwardly upon the second inclined anvil 23 without engaging right hand vertical anvil 15, or at least without engaging the latter
80 with sufficient force to cause the slug to rebound therefrom, and the slug follows the trajectory indicated by the shaded coin in Fig. 1. The lead slug scarcely rebounds from the second inclined anvil 23, but rolls
85 down it and off the discharge end thereof with relatively low velocity, that is to say, velocity which has not been augmented by successive rebounds from the preceding anvils, as was the case with the genuine coin.
90 Accordingly, the lead slug drops directly upon the horizontal anvil 27, and as its angle of incidence on this horizontal anvil 27 is small, it bounces almost directly upwardly, though it may engage the left hand anvil 14
95 lightly. Then, depending upon its composition, it may bounce one or two more times upon horizontal anvil 27 before descending third inclined anvil 28. Having lost most of its velocity by this time, the slug simply rolls
100 off the discharge end 29 of anvil 25 directly into the ejector chute 33, which discharges it into cup 34 to be returned to the person who attempted to operate the coin controlled device 36 therewith.

The action of the spurious coin just described depends upon its composition, and though the majority of slugs contain a large quantity of lead and act as described above,
105 certain types are made of more resilient materials and rebound through the device to a degree greater than the lead slug, but less than the genuine coin. However, in general, the resultant resilient effect of slugs passing
110 through the device is less than that of genuine

coins, and the slugs do not have a sufficient rebound from the right hand vertical anvil at the end of the third flight to fly over partition 30. On the contrary, they strike this partition on the right hand side and drop into ejector chute 33 after rebounding insufficiently from right hand anvil 15, or they miss the partition altogether and drop directly into the ejector chute 33.

It has been found that slugs made of magnetic metals, such as iron, steel, or their alloys, more closely approach the resiliency or springiness of corresponding genuine coins, though their specific gravities are considerably lower. Under ordinary circumstances, more resilient coins of magnetic metal are rejected by the device because they are lighter than the corresponding genuine coin and have sufficiently less resiliency to render their passage over partition 30 impossible. However, in case the resiliency of a magnetic slug of this description is equal or correspondingly greater than the corresponding genuine coin so that it might fly over the partition 30, a magnet 37 placed at the end of the second flight adjacent the horizontal anvil 27 retards the rebound of the magnetic slug at this point, so that its augmented resiliency up to this point is damped and it simply rolls down the third inclined anvil 28 into the ejector chute 33. At least the back plate 12 upon which the magnet 37 is mounted is made of brass or some other permeable metal, so that the magnetic flux of the magnet is not shielded from the path of the coins passing through the device.

It will be seen that the spurious coin detector and ejector of this invention has many advantages over those used heretofore, in that it embodies a means for accentuating or augmenting the natural resilient effects of all genuine coins and for decreasing the natural resilient effects of spurious coins after they have passed through the several flights in the device and have engaged the numerous anvils therein. The peculiar arrangement of the anvils, both inclined, vertical, and the overhead anvil associated with the first inclined anvil, as well as the decreasing pitch of the inclined anvils, serves to procure these peculiar results whereby all spurious coins are ejected and all genuine coins are received, even though the latter may be slightly mutilated or worn thin. It is also preferred that the inclined anvils 19, 23, and 25 be made adjustable so as to vary their pitch within the limits described to accommodate coins of different denomination, although in most cases the device will have to be changed throughout when used with coins of different denominations, because of the wide differences in sizes between coins of different denominations.

It is apparent that the device of this invention is extremely simple, inexpensive, and in-

fallible in its operation. It has no movable parts to get out of order, it is strong and rugged, and cannot be tampered with nor rendered ineffective from outside without materially changing its whole structure.

While a preferred embodiment of this invention has been illustrated and described herein, it is to be understood that this invention is not to be limited thereby, but is susceptible of various changes in form and detail within its scope.

I claim:

1. In a spurious coin detector and ejector, the combination of a plurality of inclined anvils arranged in zigzag series, a coin guide leading to the first anvil, the inclination of said anvils decreasing from first to last, and a partition adjacent the discharge end of the last anvil for separating spurious coins from genuine coins in accordance with their resultant resilient effects after traversing said anvils.

2. In a spurious coin detector and ejector, the combination of a plurality of inclined anvils arranged in zigzag series, a coin guide leading to the first anvil, a substantially vertical anvil adjacent the discharge end of each inclined anvil, and a partition adjacent the discharge end of the last inclined anvil and spaced from the corresponding vertical anvil for separating spurious coins from genuine coins in accordance with their resultant resilient effects after traversing said anvils.

3. In a spurious coin detector and ejector, the combination of a plurality of inclined anvils arranged in zigzag series, a coin guide leading to the first anvil, a deflecting anvil above the discharge end of one of said inclined anvils for downwardly deflecting a coin rebounding from the corresponding inclined anvil, and a partition adjacent the discharge end of the last inclined anvil for separating spurious coins in accordance with their resultant resilient effects after traversing said anvils.

4. In a spurious coin detector and ejector, the combination of a plurality of inclined anvils arranged in zigzag series, a coin guide leading to the first anvil, a substantially horizontal anvil associated with one of said inclined anvils, and a partition adjacent the discharge end of the last inclined anvil for separating spurious coins in accordance with their resultant resilient effects after traversing said anvils.

5. In a spurious coin detector and ejector, the combination of a plurality of inclined anvils arranged in zigzag series, a coin guide leading to the first anvil, a deflecting anvil above the discharge end of one of said inclined anvils, a substantially vertical anvil adjacent the discharge end of one of said inclined anvils, and a partition adjacent the discharge end of the last inclined anvil for separating spurious coins in accordance with

their resultant resilient effects after traversing said anvils.

6. In a spurious coin detector and ejector, the combination of a plurality of inclined anvils arranged in zigzag series, a coin guide leading to the first anvil, a substantially horizontal anvil associated with one of said inclined anvils, a substantially vertical anvil adjacent the discharge end of one of said inclined anvils, and a partition adjacent the discharge end of the last inclined anvil for separating spurious coins in accordance with their resultant resilient effects after traversing said anvils.

7. In a spurious coin detector and ejector, the combination of a plurality of inclined anvils arranged in zigzag series, a coin guide leading to the first anvil, a magnet adjacent one of said anvils for retarding the rebound of spurious coins having magnetic properties, and a partition adjacent the discharge end of the last inclined anvil for separating spurious coins in accordance with their resultant resilient effects after traversing said anvils.

8. In a spurious coin detector and ejector, the combination of a plurality of inclined anvils arranged in zigzag series, a coin guide leading to the first anvil, a deflecting anvil above the discharge end of one of said inclined anvils, a substantially horizontal anvil associated with one of said inclined anvils, and a partition adjacent the discharge end of the last inclined anvil for separating spurious coins in accordance with their resultant resilient effects after traversing said anvils.

9. In a spurious coin detector and ejector, the combination of a substantially horizontal anvil, means for guiding a coin to said anvil, an inclined anvil associated with said horizontal anvil and leading downwardly therefrom, and a substantially vertical anvil adjacent said horizontal anvil, said horizontal anvil extending between said vertical and inclined anvils.

10. In a spurious coin detector and ejector, the combination of a frame having side walls, a plurality of inclined anvils arranged in zigzag fashion between said walls, a coin chute leading to the first inclined anvil, and a partition adjacent the discharge end of the last anvil and adjacent the corresponding side wall, whereby the genuine and spurious coins are separated in accordance with their resultant resilient effects after traversing the successive anvils.

11. In a spurious coin detector and ejector, the combination of a housing having closely spaced front and rear walls and rigid side walls, a coin guide at the upper end of said housing, a pair of substantially parallel inclined anvils spaced one above the other between said front and rear walls and leading downwardly from one of said side walls and terminating short of the opposite side wall, a third inclined anvil between said anvils lead-

ing downwardly in the opposite direction from said opposite side wall and terminating short of the said one side wall, and a partition adjacent the discharge end of the last anvil and adjacent the corresponding side wall, whereby the genuine and spurious coins are separated in accordance with their resultant resilient effects after traversing the successive anvils.

12. In a spurious coin detector and ejector, the combination of a frame, a plurality of inclined anvils arranged in the frame in downward zigzag series, a deflecting anvil adjacent the discharge end of at least one of said anvils for downwardly deflecting a coin rebounding from said one anvil, guide members extending upwardly from the upper end of said anvils for directing coins on the corresponding anvils, and a partition adjacent the discharge end of the last inclined anvil for separating spurious coins from genuine coins in accordance with their resultant resilient effects after traversing the successive anvils.

13. In a spurious coin detector and ejector, the combination of a frame having closely spaced walls permitting a coin to freely move flatwise between them, a coin chute leading between the walls, a downwardly inclined anvil between the walls below the discharge end of the coin chute, an anvil guide extending upwardly from the upper end of said inclined anvil, a second inclined anvil below the first anvil and extending downwardly in the opposite direction therefrom, a second anvil guide extending upwardly from the upper end of the second anvil adjacent the lower end of the first anvil and spaced therefrom, a third inclined anvil below the second inclined anvil and extending downwardly in the opposite direction therefrom, a third anvil guide extending upwardly from the upper end of the third anvil adjacent the lower end of the second anvil and spaced therefrom, a fourth anvil guide adjacent the free end of the third anvil and spaced therefrom, and a partition below the lower end of the third inclined anvil and spaced from the fourth anvil guide for separating spurious coins and genuine coins in accordance with their resultant resilient effects.

14. In a spurious coin detector and ejector, the combination of a frame, a coin chute thereon, a plurality of inclined anvils arranged in downward zigzag series in the frame, the upper inclined anvil lying beneath the coin chute, an anvil guide mounted on the frame and extending upwardly from the upper end of each inclined anvil for directing coins on the corresponding inclined anvils, the lower end of each inclined anvil being spaced from the anvil guide of the next lower inclined anvil, a rebound anvil mounted on the frame opposite the lower end of the lowest inclined anvil, and a partition mounted

on the frame adjacent the lower end of this lowest inclined anvil and spaced from said rebound anvil for separating spurious coins from genuine coins in accordance with their resultant resilient effects after traversing the successive anvils.

15. In a spurious coin detector and ejector, the combination of a frame, a coin chute thereon, a plurality of inclined anvils arranged in downward zigzag series in the frame, the upper anvil lying beneath the coin chute, an anvil guide mounted on the frame and extending upwardly from the upper end of each inclined anvil for directing coins on the corresponding inclined anvils, the lower end of each inclined anvil being spaced from the guide of the next lower inclined anvil, a rebound anvil mounted on the frame opposite the lower end of the lowest inclined anvil, a partition mounted on the frame adjacent the lower end of this lowest inclined anvil and spaced from said rebound inclined anvil for separating spurious coins from genuine coins in accordance with their resultant resilient effects after traversing the successive anvils, and a deflecting anvil mounted on the frame to overhang the discharge end of at least one of said inclined anvils and spaced therefrom for downwardly deflecting a coin rebounding from said one anvil.

In testimony whereof I affix my signature.
EMIL DE RYSS.

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