Sept. 12, 1967 B. G. MARTIN 3,340,980

COIN-SELECTING AND-SEPARATING APPARATUS

Filed June 16, 1966

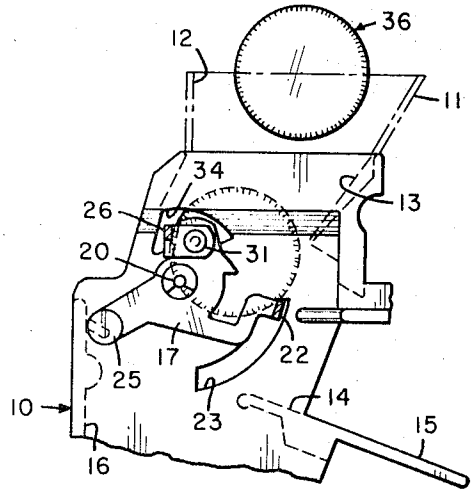

FIG. 1

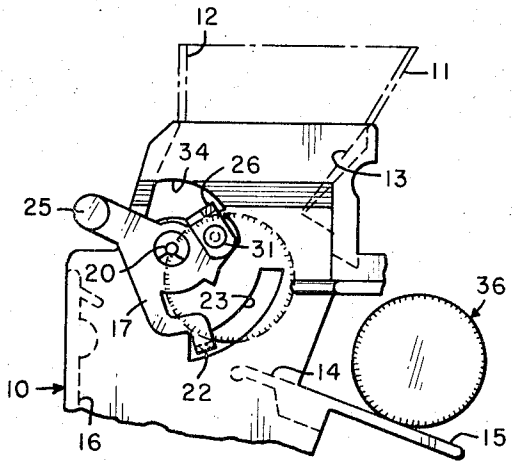

FIG. 2

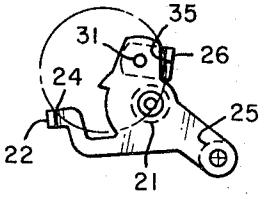

FIG. 5

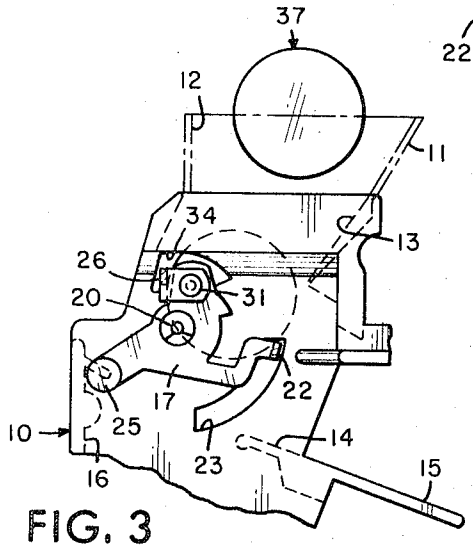

FIG. 3

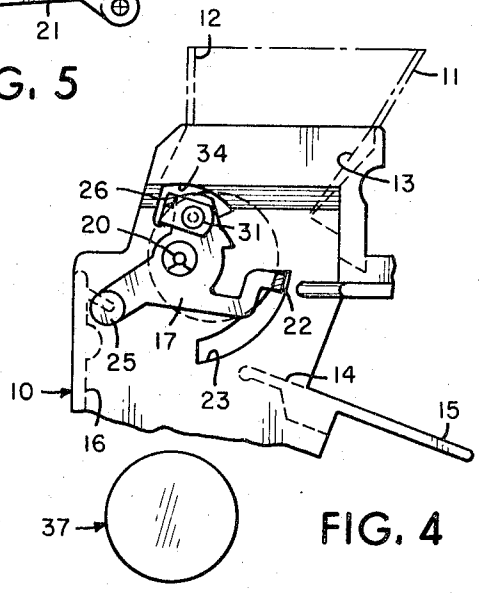

FIG. 4

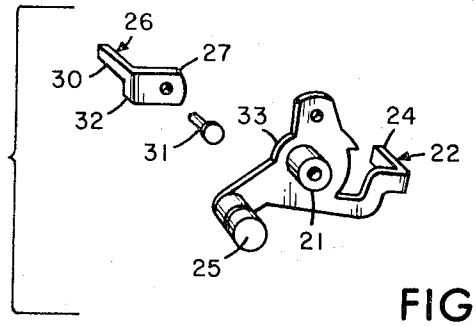

FIG. 6

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COIN-SELECTING AND -SEPARATING APPARATUS

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This invention relates generally to improvements in coin-selecting and -separating apparatus, of the type illustrated and described for example, in U.S. Patent No. 3,120,300, used in vending machines of various kinds for accepting genuine coins of proper denomination and separating all other coins and slugs.

It is an important objective to provide an improved mechanism that is sensitive to and can discriminate between extremely small differences in diameter, and to differences in the character of the edge surfaces of coins tested thereby.

The function of the heretofore coin cradle in a coin-selecting apparatus is well known in the art and is described in U.S. Patent No. 3,120,300. Briefly, such a cradle separates coins on the basis of size and weight, and transfers coins which are acceptable with respect to those characteristics to a predetermined path for subsequent tests including that of metal composition. Coins of different denominations which are closely similar in weight and diameters are not efficiently separated one from the other by such heretofore conventional cradles. Such prior cradles do not efficiently separate coins on the basis of edge surface characteristics, as for example, milled and smooth edged coins. To illustrate the type of coins that are not efficiently separated by such prior cradle are the French one-franc coin and the French 20-centime coin. These specific coins are closely similar in diameter, the franc being slightly larger and having a milled edge, and the 20-centime coin having a smooth edge.

A primary object of the present invention is to provide an improved cradle-type gauge that is extremely sensitive to small differences in coin diameter and to edge surface characteristics.

An important objective is achieved by pivotally mounting and disposing a cradle substantially at the zone of juncture of a coin-receiving path and a pair of coin-transfer paths, the cradle including catch means engaging and receiving a coin so that the cradle tilts under the weight of the coin when held by a catch means and releases the coin to one of the coin-transfer paths when tilted to a predetermined angle. Importantly, the catch means includes a yieldable support that passes certain non-selected coins other than a preselected coin by the cradle to the other coin-transfer path without effectively tilting the cradle. It is advantageous that the yieldable support passes a non-selected coin of smaller diameter than a pre-selected coin or a non-selected coin of substantially the same diameter as the pre-selected coin but with a smooth edge.

Another important objective is afforded by the structural arrangement of a pair of legs constituting the catch means a preset distance apart to support a pre-selected coin therebetween. One of the legs is fixed relative to the cradle. The other leg is movably mounted to the cradle and is yieldably movable freely from the limit determining the preset distance to increase the distance between the legs under the camming influence of certain non-selected coins to pass the non-selected coins through the legs.

Yet another important objective is attained by the relative structural arrangement of the cradle legs so that a coin tends to pivot about the fixed leg and tends to bear against the yieldably movable leg, the yieldably movable leg moving freely from the limit determining the preset

distance under a camming action by a certain non-selected coin against the yieldably movable leg to increase the distance between the yieldably movable leg and the fixed leg so as to pass such non-selected coin through the legs.

An important objective is provided by having one of the two cradle legs pivoted to the body of the cradle and freely movable in a direction to effect an increase in the spacing relationship with the opposite, fixed cradle leg. The movable cradle leg is so arranged with respect to its pivotal axis as to be slightly yieldable under the camming influence of a coin whose diameter is merely minutely greater than the predetermined initially spaced relationship of the cradle legs, but retains fixed with respect to the cradle body when supporting a coin whose diameter exceeds that of the predetermined norm for which the legs are preset.

The foregoing and numerous other objects and advantages will more clearly appear from the following detailed description of a preferred embodiment, particularly when considered in connection with the accompanying drawing, in which:

FIG. 1 is a fragmentary elevational view of the rear face of a swingable gate unit forming a part of a coin-selecting apparatus of the type illustrated in U.S. Patent No. 3,120,300, the cradle being shown in its initial operating position, supporting a pre-selected coin having a milled edge;

FIG. 2 is an elevational view similar to FIG. 1, but illustrating the cradle tilted to release the pre-selected coin to its appropriate coin-transfer path;

FIG. 3 is an elevational view similar to FIG. 1, but illustrating the cradle receiving a non-selected coin of slightly smaller diameter and having a smooth edge;

FIG. 4 is an elevational view similar to FIG. 3, but illustrating the pivoted position of the floating cradle leg in allowing the non-selected coin to pass through the cradle legs and by the cradle to another coin-transfer path;

FIG. 5 is a front elevational view of the cradle supporting a pre-selected coin, and

FIG. 6 is an exploded, perspective view of the cradle showing the construction of the cradle body and pivoted or floating cradle leg more clearly.

The coin-selecting apparatus in which the subject matter of the present invention is utilized, is obvious and well known to those skilled in this art and is of the type generally disclosed in U.S. Patent No. 3,120,300. This type of apparatus is designed to handle coins of different denominations, and is capable of segregating the coins and also accepting only genuine coins while spurious discs and coins of improper size, weight and edge characteristics are rejected.

Referring now by characters of reference to the drawing, and first to FIG. 1, it will be understood that the gate unit frame generally indicated by **10** of the coin-selecting apparatus is generally of the type conforming to the gate **18** in U.S. Patent No. 3,120,300. This gate unit frame has a number of projecting portions thereon extending toward a main wall (not shown) of the coin-selecting apparatus, and cooperates with such main wall to define separate coin paths. For example, the substantially U-shaped plate member **11** having an outwardly flared upper portion cooperates with a generally U-shaped element mounted on the upper extremity of a main wall (not shown) to define a coin entrance **12** whereby coins may be introduced into the apparatus from a suitable source such as the coin chute of a vending machine or the like mounting the coin-handling equipment. The coin entrance **12** lead to a coin-receiving path **13** that communicates with a coin-transfer path **14** partially defined by rail **15**, and with another coin-transfer path **16**.

A cradle 17 is pivotally mounted by pin 20 to the gate frame 10 substantially at the juncture of the coin paths 13, 14 and 16. The pivot pin 20 extends through a cradle hub 21.

Formed on the cradle 17 is a relatively fixed cradle leg 22. The cradle leg 22 extends through an arcuate slot 23 provided in the gate frame 10 and projects beyond the opposite side of the gate frame 10. For reasons which later appear, the fixed cradle leg 22 provides a relatively sharp coin-engaging edge 24.

Attached to the cradle 17 is a counterweight 25 tending to turn the cradle 17 in a counterclockwise direction when viewed in FIG. 1. The fixed cradle leg 22 engages the upper margin defining slot 23 under the loading of the counterweight 25 to determine the initial operating position of cradle 17.

The cradle 17 includes another cradle leg 26 yieldably mounted to the cradle 17 and spaced a preset distance from the fixed cradle leg 22 to accommodate the diameter and edge characteristic of a pre-selected coin. These cradle legs 22 and 26 constitute catch means engaging and receiving a coin, and depending upon the diameter and edge characteristics of the coin so received, will either hold the coin for subsequent transfer by the cradle 17 to its appropriate coin path or will allow the coin to pass between the legs to another coin path.

Specifically, the yieldably movable cradle leg 26 is of substantially L-shape having angularly related leg portions 27 and 30. The leg portion 27 is pivotally mounted to the cradle 17 by pin 31, and is arranged so that the leg portion 30 projects from the same side of the cradle 17 as the co-acting fixed cradle leg 22. It will be understood that a portion 32 of the pivoted cradle leg 26 engages a peripheral shoulder 33, constituting a stop means, on the cradle 17 to place the leg portion 30 in a limit determining the preset distance between the leg portion 30 and the fixed leg 22 to support a pre-selected coin therebetween. The cradle leg portion 30 extends through an aperture 34 formed in the gate frame 10. The cradle leg portion 30 is provided with a relatively sharp edge 35 adapted to engage effectively the milled edge surface of a pre-selected coin.

The fixed cradle leg 22 is lower than the pivoted or floating cradle leg 26 so that the coin engaged and received by the cradle 17 tends to pivot about the fixed cradle leg 22 and tends to bear against the pivoted cradle leg 26. The pivoted cradle leg 26 is arranged relative to the fixed cradle leg 22 and relative to the center of a pre-selected coin so that the pivoted cradle leg 26 remains fixed and cooperates with the fixed cradle leg 22 to hold such preselected coin. When the coin is held by the cradle legs 22 and 26, the weight of the coin tilts the cradle 17 from the initial operating position shown in FIG. 1 to a predetermined angle as shown in FIG. 2 in which the pre-selected coin is released and falls from the cradle 17 to the appropriate coin-transfer path 14.

However, the pivoted cradle leg 26 will move freely from the limit determining the present distance under a camming action by certain non-selected coins of smaller diameter than the pre-selected coin or a non-selected coin of substantially the same diameter as the pre-selected coin but with a smooth edge, to increase the distance between the fixed cradle leg 22 and pivoted cradle leg 26 so as to pass such non-selected coins between cradle legs 22 and 26 and thence into the other coin-transfer path 16.

It is thought that the functional advantages of the improved cradle 17 have become apparent from the foregoing detailed description of component parts, but for completeness of disclosure, the operation will be briefly described, first with respect to coins of substantially the same diameter but with different edge characteristics, and secondly with respect to coins of minutely different diameters. It will be assumed that the cradle legs 22 and 26 are spaced a preset distance so as to engage, receive and hold a pre-selected coin referred to by 36 (FIGS. 1 and 2) having a known diameter.

First, the pre-selected coin 36 having a milled edge falls into the coin-receiving path 13 and seats on and between the cradle legs 22 and 26 as shown in FIG. 1. Because the pre-selected coin 26 is of the appropriate diameter and has a milled edge, both cradle legs 22 and 26 remain fixed and hold the pre-selected coin 36. The sharp edge 35 of the pivoted cradle leg 26 effectively interengages with the milled coin edge so that the pivoted cradle leg 26 does not pivot away from the limit determining the preset distance between the cradle legs 22 and 26.

The weight of the pre-selected coin 36, unbalanced about the pivot axis defined by the cradle pin 20, causes the cradle 17 to tilt in a clockwise direction against the loading of the cradle counterweight 25. When the cradle 17 tilts from the initial operating position of FIG. 1 to a predetermined angle as shown in FIG. 2, the pre-selected coin 36 falls from the cradle legs 22 and 26 and is transferred into the appropriate coin-transfer path 14, from which the coin probably will undergo further tests for genuineness. After the pre-selected coin 36 leaves the cradle 17, the counterweight 25 returns the cradle 17 back to its original operative position illustrated in FIG. 1 adapted to receive another coin.

If another non-selected coin referred to by 37, of substantially the same diameter as the pre-selected coin 36 but having a smooth edge, is introduced into the coin-receiving path 13, such non-selected coin 37 engages the cradle legs 22 and 26 as shown in FIG. 3. However, because the non-selected coin 37 has a smooth edge, the non-selected coin 37 will tend to pivot on the lower, fixed cradle leg 22 and will slidingly bear against the pivoted cradle leg 26 whereby to cam the pivoted cradle 26 clockwise from the position shown in FIG. 3 to the raised position shown in FIG. 4. As the pivoted cradle leg 26 is cammed by the non-selected coin 37, the distance between the cradle legs 22 and 26 is increased until a point is reached so that the non-selected coin 37 falls freely through and between the cradle legs 22 and 26, and thence falls down by the cradle into the other coin-transfer path 16 as is illustrated in FIG. 4. Because this camming action of the pivoted cradle leg 26 occurs quickly, and the cradle legs 22 and 26 do not actually hold such coin 37, the coin 37 does not cause any effective tilting of the cradle 17. After the non-selected coin 37 falls free of the cradle legs 22 and 26, the pivoted cradle leg 26 will fall back under gravity to its initial position determined by the engagement of leg portion 32 with cradle shoulder 33. The cradle legs 22 and 26 are now located at the original preset distance and the cradle is conditioned for subsequent coin-selecting and -separating operation.

Secondly, it will be understood that this cradle structure is very sensitive to coins having large or only minute differences in diameter regardless of whether the coin edge is milled or smooth. For the purpose of illustration, it will be assumed that the selected coin 36 has a known diameter and can have either a milled or smooth edge. The non-selected coin 37 in this instance will have a minutely smaller diameter, and will have either a milled or smooth edge.

Obviously, in this example, the pre-selected coin 36 will be tested and separated in exactly the same manner as described in detail previously in the first example, and as shown in FIGS. 1 and 2.

The slightly smaller, non-selected coin 37 will engage the cradle 17 and will cam the pivoted cradle leg 26 in the same manner as previously described in the first example and as shown in FIGS. 3 and 4 so that the non-selected coin 37 will pass through and between the cradle legs 22 and 26, and into the other coin-transfer path 16. The same function and result will be attained by a non-selected coin 37 of much smaller diameter.

Although the invention has been described by making detailed reference to a single preferred embodiment, such

detail is to be understood in an instructive, rather than in any restrictive sense, many variants being possible within the scope of the claims hereunto appended.

I claim as my invention:

1. In a coin-selecting apparatus including structure defining a coin-receiving path and a pair of coin-transfer paths:

(a) a cradle pivotally mounted and disposed substantially at the zone of juncture of the paths,

(b) the cradle including catch means engaging and receiving a coin from the coin-receiving path, the cradle tilting under the weight of the coin when held by the catch means and releasing the coin to one of the coin-transfer paths when tilted to a predetermined angle, and

(c) the catch means including a yieldable support that passes certain non-selected coins other than a pre-selected coin by the cradle to the other coin-transfer path.

2. A coin-selecting apparatus as defined in claim 1, in which:

(d) the yieldable support passes a non-selected coin of smaller diameter than a pre-selected coin or a non-selected coin of substantially the same diameter as the pre-selected coin but with a smooth edge through the yieldable support and by the cradle to the said other coin-transfer path without effectively tilting the cradle.

3. A coin-selecting apparatus as defined in claim 1, in which:

(d) the catch means includes a pair of legs spaced a preset distance, the legs supporting the pre-selected coin therebetween during tilting of the cradle incident to transference of the coin to the said one coin-transfer path, and

(e) one of the legs is yieldably mounted to the cradle so as to increase the preset distance between the legs to pass a certain non-selected coin through the legs upon engagement with such non-selected coin.

4. A coin-selecting apparatus as defined in claim 1, in which:

(d) the catch means includes a pair of legs spaced a preset distance apart to support a pre-selected coin therebetween,

(e) one of the legs is fixed relative to the cradle, and

(f) the other leg is movably mounted to the cradle and yieldably movable freely from the limit determining the preset distance to increase the distance between the legs under the camming influence of certain non-selected coins to pass such non-selected coins through the legs.

5. A coin-selecting apparatus as defined in claim 4, in which:

(g) the yieldably movable leg passes certain non-selected coins of smaller diameter than a pre-selected coin or a non-selected coin of substantially the same diameter as the pre-selected coin but with a smooth edge, between the legs to the other coin-transfer path without effectively tilting the cradle, and

(h) at least the yieldably movable leg includes an edge adapted to engage a milled edge of the pre-selected coin to hold the pre-selected coin between the legs and cause effective tilting of the cradle.

6. A coin-selecting apparatus as defined in claim 4, in which:

(g) the yieldably movable leg is pivoted to the cradle and engages the cradle under gravity tending to maintain the pivoted leg in the limit determining the preset distance between the legs.

7. A coin-selecting apparatus as defined in claim 4, in which:

(g) the yieldably movable leg is closer to the pivot axis of the cradle than the fixed leg, and is disposed above the fixed leg.

8. A coin-selecting apparatus as defined in claim 4, in which:

(g) the fixed leg is lower than the yieldably movable leg so that a coin tends to pivot about the fixed leg and tends to bear against the yieldably movable leg, and

(h) the yieldably movable leg moves freely from the limit determining the preset distance under a camming action by a non-selected coin against the yieldably moving leg to increase the distance between the yieldably movable leg and the fixed leg so as to pass such non-selected coin through the legs.

9. A coin-selecting apparatus as defined in claim 4, in which:

(g) the yieldably movable leg has angularly related first and second leg portions,

(h) a pin pivots the first leg portion to the cradle,

(i) the second leg portion cooperates with the fixed leg to hold the pre-selected coin, and

(j) stop means engages the pivoted leg to place the said second leg portion in the limit determining the preset distance between the said second leg portion and fixed leg.

10. A coin-selecting apparatus as defined in claim 2, in which:

(e) the catch means includes a pair of spaced legs,

(f) one of the legs is fixed relative to the cradle,

(g) the other leg includes a first leg portion pivotally mounted to the cradle and includes a second leg portion cooperating with the fixed leg to hold the pre-selected coin,

(h) stop means engages the pivoted leg to place the second leg portion in a limit determining a preset distance between the second leg portion and the fixed leg to support the pre-selected coin therebetween,

(i) the fixed leg is lower than the second leg portion so that the coin tends to pivot about the fixed leg and tends to bear against the second leg portion, and

(j) the pivoted leg is yieldably movable freely from the limit determining the preset distance under the camming action by a non-selected coin against the second leg portion to increase the distance between the second leg portion and fixed leg so as to pass such non-selected coin through the legs.

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