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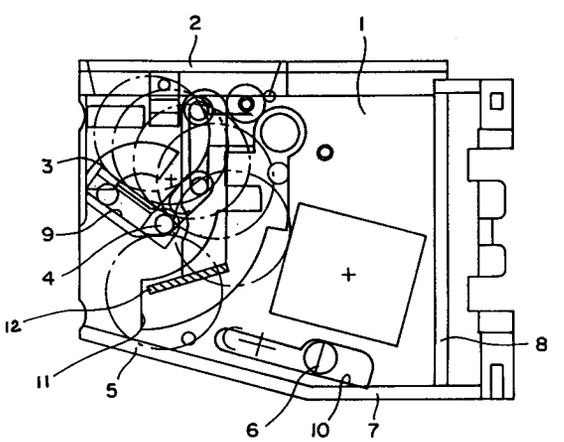
(54) Coin selecting apparatus.

(57) A coin selecting apparatus allows the selection of coins having both strong and weak magnetism, or no magnetism. A first magnet 4 is provided at the entry end of a coin guide path 3. This first magnet has a weak attractive force, but it is sufficient to attract ferrous counterfeit coins. A second magnet 6 having a strong attractive force is disposed in a direction downward and to the right of the first magnet. This magnet absorbs weakly magnetic or paramagnetic coins. 100 yen coins made of non-magnetic materials continue to roll in the direction downward and to the right without being attracted onto the first or second magnets.

FIG. 1



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This invention relates to a coin selecting apparatus which selects coins based on differences in magnet properties, and more particularly, to a coin selecting apparatus which selects coins based on differences in the magnetism of coins used in coin operated gaming machines or the like.

As described in Japanese Utility Model Laid-Open Publication No. 54-74597 filed by the present applicant, in a coin selecting apparatus of this type, by providing a single nearly cylindrical magnet at the outlet end of a coin rolling path bottom plate, 100 yen coins made of paramagnetic materials (brass, copper, aluminum and so forth) pass over the magnet without being subjected to its magnetic force. On the other hand, ferromagnetic (iron, stainless steel, nickel and so forth) counterfeit coins are reversed as a result of their direction of movement being changed to a direction around the circumference of the magnet due to its attractive force. Reversed coins drop into a return path as a result of their dead weight and inertia overcoming the attractive force of the magnet, and are returned to a return outlet.

However, in the coin selecting apparatus of the prior art described above, since only a single magnet is provided, the apparatus is limited to simply uniformly selecting paramagnetic coins and ferromagnetic coins based on the absence or presence of magnetism. Thus, it is impossible for the apparatus to select or distinguish coins having different magnetic intensities, such as those used in coin operated gaming machines and the like.

Therefore, in consideration of the above disadvantage of the prior art, an object of this invention is to provide a coin selecting apparatus that effectively allows the selection of coins having both strong and weak magnetism, irrespective of only the presence or absence of magnetism.

According to the invention, a coin selecting apparatus which selects and distinguishes between paramagnetic, ferromagnetic, and non-magnetic coins comprises a first magnet positioned along a rolling direction of incoming coins, and a second magnet positioned beneath the first magnet and farther along in the rolling direction. The first magnet has a relatively weak magnetic intensity, which passes paramagnetic coins and attracts ferromagnetic coins. The second magnet has a stronger intensity which attracts paramagnetic coins that has passed by the first magnet.

The first magnet reverses the rolling direction of ferromagnetic coins and causes them to drop by their inertia and dead weight through a first exit opening and the second magnet similarly reverses and drops paramagnetic coins through a second exit opening. Non-magnetic coins pass both magnets and exit through a third opening.

Since a first magnet having a relatively weak intensity of magnetization and a second magnet having a stronger intensity of magnetization are disposed in succession along a coin path, only ferromagnetic coins are selected by the first magnet. Next, paramagnetic coins, which pass by the first magnet without being attracted, are selected by the second magnet. Furthermore, non-magnetic coins are selected as a result of passing by the second magnet.

In the accompanying drawings: =

Fig. 1 is a cross-sectional view of a coin selecting apparatus of the present invention showing the dropping of strongly magnetic coins.

Fig. 2 is a cross-sectional view of the coin selecting apparatus showing the dropping of weakly magnetic coins.

As shown in Figs. 1 and 2, the coin selecting apparatus has a stationary side plate (not shown) and movable side plate 1 mutually opposed in parallel and at a prescribed clearance, and a coin entrance 2 open in the left side of the upper end between the stationary and movable side plates. This coin entrance 2 has a prescribed diameter (e.g., 21.25 mm) and thickness (e.g., 1.9 mm) to allow the passage of coins having dimensions equal to or less than stipulated dimensions.

Coin guide path 3 is arranged nearly directly below coin entrance 2, and is inclined to the right side of the drawing. Coin guide path 3 allows coins that have entered the apparatus to roll along a direction downward and to the right from the left side of the drawing.

A first magnet 4, having a cylindrical shape and having a weak magnetic intensity on the order of a flux density of 500-1 KG, is provided on the right end of coin guide path 3. The first magnet 4 attracts ferromagnetic materials (iron, stainless steel, nickel and so forth), counterfeit coins, and so forth. Since the first magnet 4 has a cylindrical shape, the direction of movement of coins rolling downward and to the right is reversed as a result of being attracted to and rolling around the circumference of the first magnet 4. Reversed coins drop as a result of their dead weight and inertia overcoming the magnetic attraction of the first magnet 4, and are returned to a first return outlet 5.

In addition, a canceling mechanism is provided near the right side of the first magnet. This canceling mechanism is composed of an aperture 11 in the movable side plate 1, and an arm 12 provided so that one end is fixed relative to the swinging of movable side plate 1 and the other end faces the stationary side plate from the direction of movable side plate 1 with aperture 11 in between. In case reversed coins stop in the state of being suspended vertically from the first magnet 4 without dropping, when movable side plate 1 swings out-

ward from the drawing, since one end of arm 12 is fixed relative to the swinging of the movable side plate 1, the other end protrudes to the stationary side plate through aperture 11. The other end of protruding arm 12 makes contact with coins suspended from the first magnet 4 causing them to drop into the first return outlet 5.

On the other hand, paramagnetic coins consisting of, for example, 98% brass and 2% iron, roll in the direction downward and to the right without being attracted onto the first magnet 4. Similarly, 100 yen coins and so forth made of non-magnetic materials (brass, copper, aluminum and so forth) also roll downward and to the right without being attracted onto the first magnet.

A second magnet 6 having a cylindrical shape and a strong magnetic intensity on the order of a flux density of 2K-4KG is provided in the direction downward and to the right of the first magnet 4. The second magnet 6 attracts paramagnetic coins that have passed the first magnet 4. Since the second magnet 6 has a cylindrical shape, paramagnetic coins that have passed by the first magnet are reversed as a result of their direction of movement being changed to a direction around the circumference of the second magnet 6. These coins drop as a result of their dead weight and inertia overcoming the magnetic attraction of the second magnet 6, causing them to be received in normal coin receiving outlet 7.

On the other hand, 100 yen coins and so forth made of non-magnetic materials roll in the direction downward and to the right without being attracted onto the second magnet 6. These coins then proceed to a second return outlet 8.

The first and second magnets 4 and 6 are mounted movably in adjustment slots 9 and 10 in the movable side plate 1, and allow adjustment of the rolling and dropping locations of coins. In addition, although the first and second magnets are cylindrical in the present embodiment, they are not restricted to this shape. It is also self-evident that the magnetic flux densities of the first and second magnets can be suitably altered corresponding to related physical quantities including coin weight, coin magnetism and so forth.

Claims

1. A coin selecting apparatus for selecting and discriminating paramagnetic coins having a relatively weak magnetism, ferromagnetic coins having a relatively strong magnetism, and non-magnetic coins comprising: a first magnet (4) positioned along a coin travel path and a second magnet (6) positioned beneath and laterally offset from said first magnet along said path, wherein said first magnet has a relatively weak magnetic intensity which passes paramagnetic coins and attracts ferromagnetic coins, and changes a direction of travel of ferromagnetic coins, and said second magnet has a relatively strong magnetic intensity which attracts paramagnetic coins that have passed by said first magnet member, and changes a direction of travel of paramagnetic coins.

2. The coin selecting apparatus as set forth in claim 1, wherein said first magnet reverses the direction of travel of ferromagnetic coins and causes them to drop by inertia and dead weight, and said second magnet reverses the direction of travel of paramagnetic coins and causes them to drop by inertia and dead weight.

3. The coin selecting apparatus as set forth in claim 2, wherein said first and second magnets have an essentially cylindrical outside surface.

FIG. 1

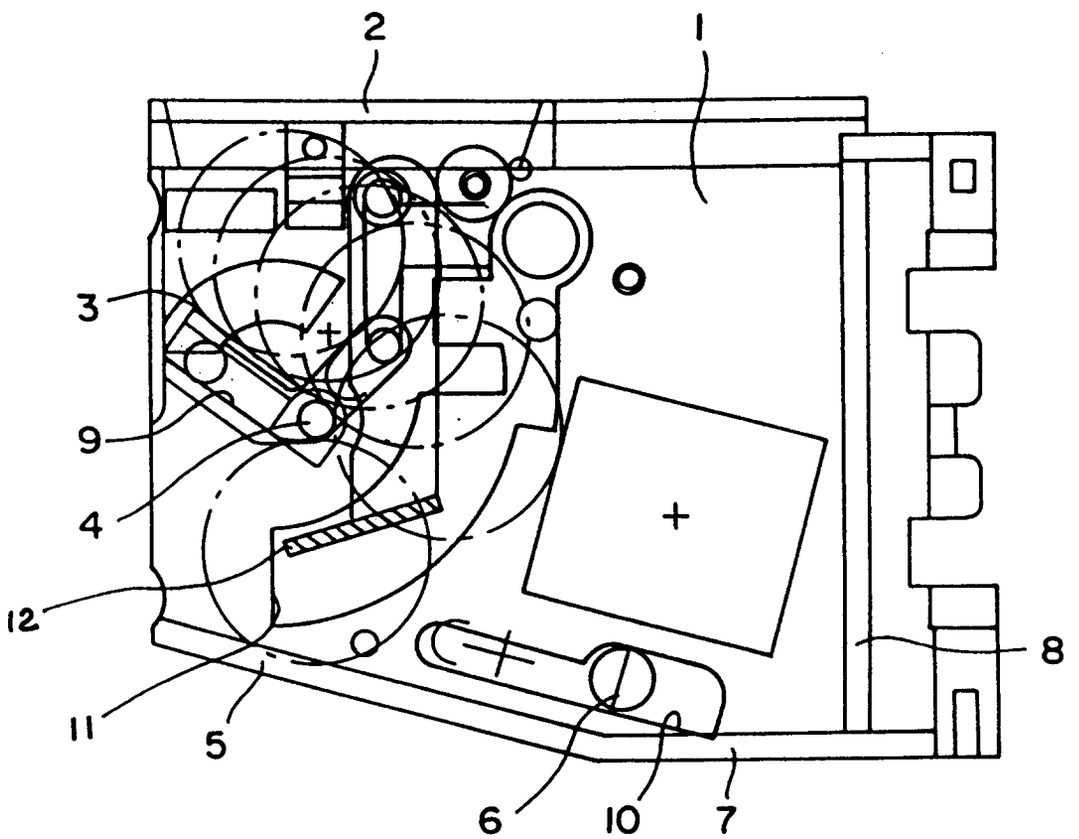
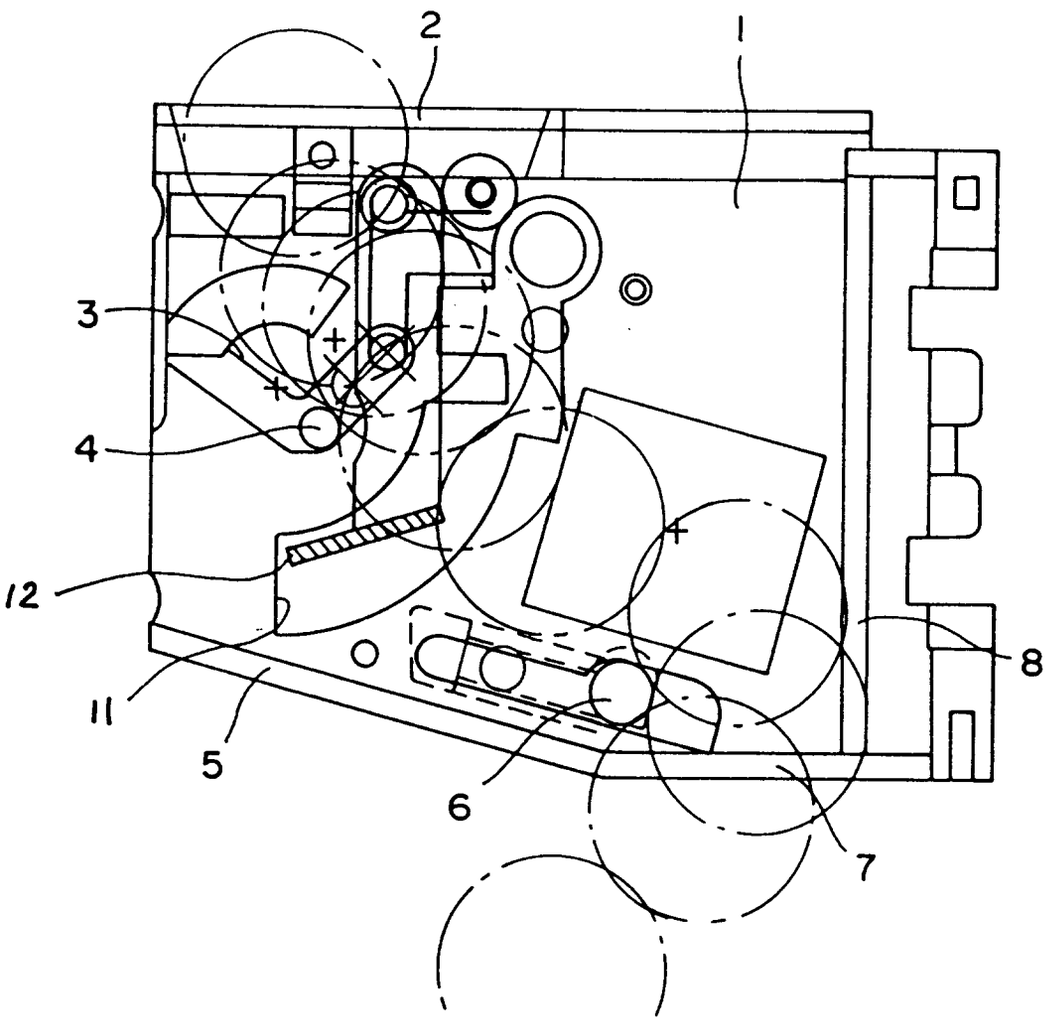


FIG. 2



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EUROPEAN SEARCH REPORT

Application Number
EP 94 30 1629

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	GB-A-2 254 179 (ASAHI SEIKO KABUSHIKI KAISHA) * claim 1; figure 5 *	1	G07F3/02
A	US-A-2 528 690 (FOUSHEE) * claim 1; figure 7 *	1-3	
A	DE-A-25 42 295 (NSM APPARATENBAU GMBH KG) * claim 1; figure 1 *	1-3	
A	DE-A-27 03 770 (DEUTSCHE BUNDESPOST) * claim 1; figure 1 *	1-3	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

G07F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	11 July 1994	Kirsten, K

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
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E : earlier patent document, but published on, or after the filing date
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