United States Patent [19]

Joeck

[11] **3,837,454**

[45] **Sept. 24, 1974**

[54] **COIN TESTING DEVICES**

[75] Inventor: **Willi Friedrich Joeck,** Buxtehude, Germany

[73] Assignee: **National Rejectors Inc. GMBH,** Buxtehude, Germany

[22] Filed: **Oct. 27, 1972**

[21] Appl. No.: **301,623**

[30] **Foreign Application Priority Data**

Nov. 4, 1971 Germany 2154782

[52] **U.S. Cl.** ..... **194/1 K,** 194/100 A

[51] **Int. Cl.** **G07f 3/02**

[58] **Field of Search** ..... 194/1 E, 1 K, 1 P, 97 R, 194/99–103; 133/8 R

[56] **References Cited**

UNITED STATES PATENTS

3,152,677	10/1964	Phillips	194/100 R
3,500,838	3/1970	Siefert	133/8 R

Primary Examiner—Allen N. Knowles
Assistant Examiner—Thomas E. Kocovsky
Attorney, Agent, or Firm—Rogers, Ezell & Eilers

[57] **ABSTRACT**

A coin testing device which comprises a coin slot into which coins can be inserted, a coin track leading from the slot to a coin testing means, and damping means, positioned between the slot and the testing means, for damping the movement of a coin when it is rolling along the track.

10 Claims, 5 Drawing Figures

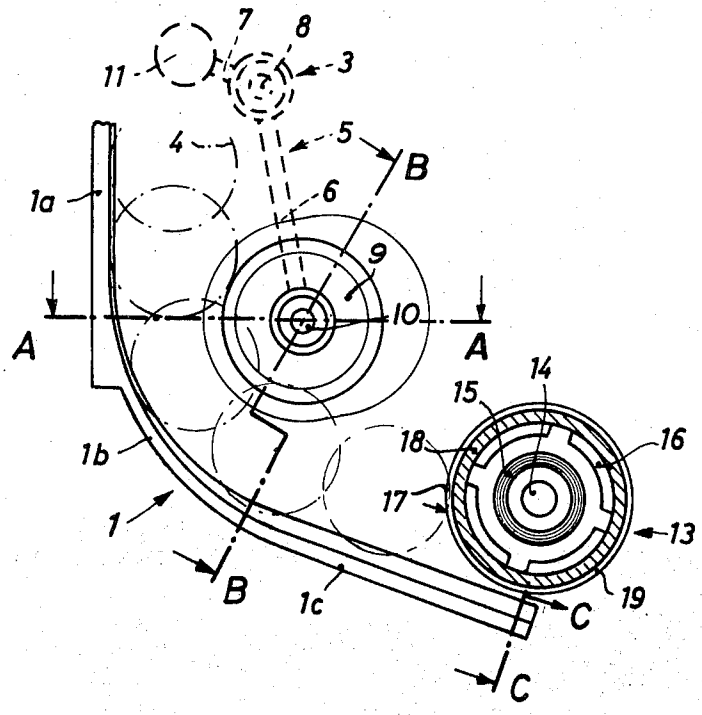


Fig. 1

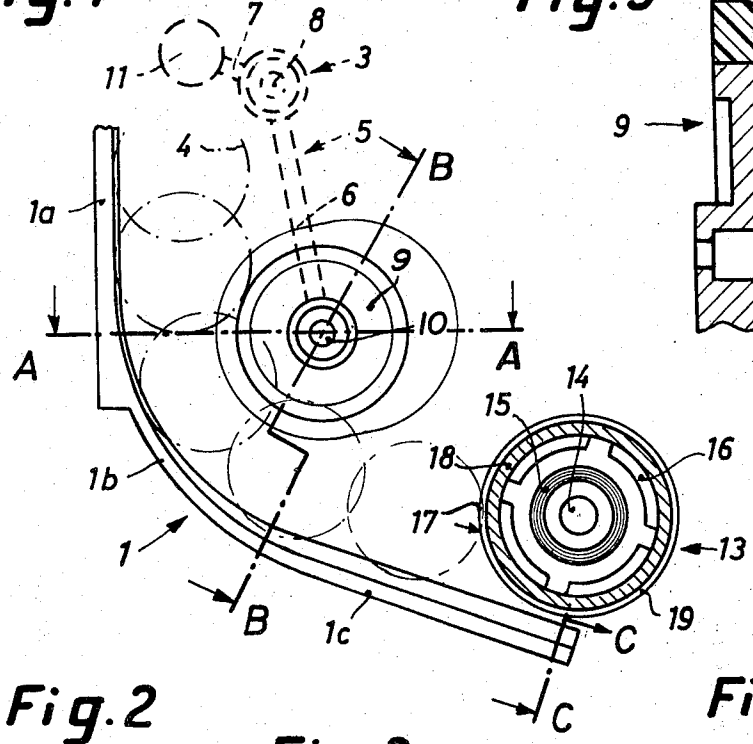


Fig. 5

Fig. 2

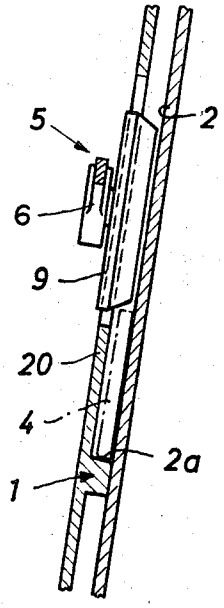


Fig. 3

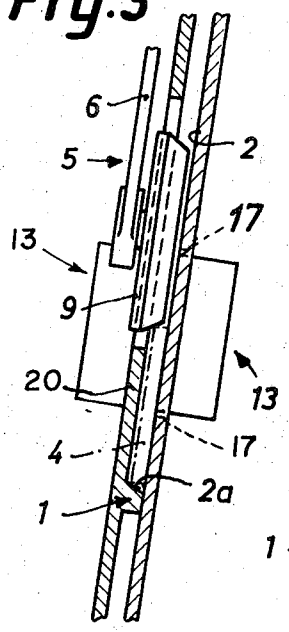
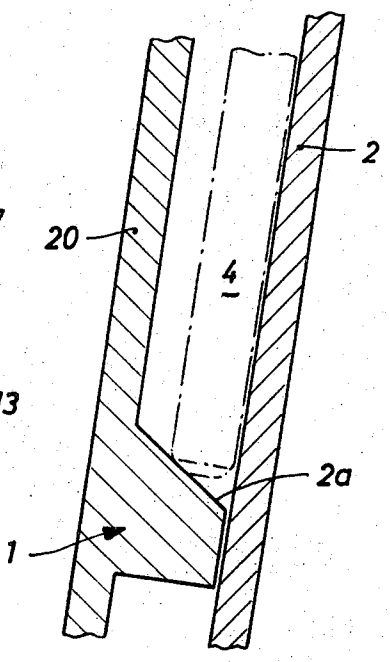


Fig. 4



COIN TESTING DEVICES

BACKGROUND OF THE INVENTION

This invention refers to a coin testing apparatus, for example for automatic machines such as automatic vending machines, in which coins of various sizes and materials can be inserted through a slot, and having test probes for determining the kind of coins inserted, and a track sloping downwards from the coin slot and having a running surface and a guiding surface for guiding the coin past a test means which may comprise test probes.

For determination of the size and material of a coin the coin may be guided past a number of test probes which set up an alternating electro-magnetic field. By rolling into this electro-magnetic field, the coil alters the impedance of the probes. By a suitable arrangement of the probes, the size and/or material of the coin can be sensed by the probes. As the running channels in the coin testing apparatus must be adjusted to take the largest coin to be tested, small coins may pass the test means in an uncontrolled manner. The results of the test are materially influenced by the smooth running and the precise position and speed of the coin in relation to the probes. For accurate recognition of the coin by the probes it is important to allow the coins to be investigated to pass the test means in a controlled manner. Moreover, the test means should test the shape of the edges of the coin.

For testing a coin the test probes may be arranged to lie opposite one another in pairs of both sides of the coin track. One of each pair is to be regarded as the primary coil and the other as the secondary coil. The test probes have an inner ferrite core on which the coil is wound. The winding itself is surrounded by ferrite shell cores which are embedded in or surrounded by plastic.

The voltage induced by the coin in the secondary coil is used to test the coin. Because of the large air gap existing for the magnetic flux between the primary and secondary shell cores, the field leaks very greatly, especially to the edges of the shell cores facing the coin track. In general, this leakage field flows around the coin and thus relatively diminishes the influence of the coin.

SUMMARY OF THE INVENTION

The object of the invention is to construct a coin testing apparatus in which the position and speed of the coin with respect to the test probes is controlled in order to improve the accuracy of the testing.

A further object of the present invention is to provide a coin testing device comprising a coin slot, a coin track leading from said slot, coin test means, coin guide means which together with said coin track define a coin path extending past said test means, and means, provided between said slot and said test means, for damping the rolling movement of a coin along said coin path.

The damping device may comprise a lever, rotatable about an axis normal to the coin track, on one end of which, in the vicinity of the running surface, is a roller rotatable about its own axis, which partly projects into the coin track and on which the coin impacts, deflecting the lever, and on the other end of which is arranged a counter weight approximately equal to the weight of

the roller, so that the lever together with the roller and counter weight returns to its position of rest after deflection by the coin.

The lever is with advantage formed in such a way that it has two arms unequal in length and forming an obtuse angle with one another, with the bisector of the angle pointing in the direction of the running surface, and the roller is fixed to the longer, downward pointing arm whilst the counter weight is fixed to the other shorter arm.

A ring of soft, elastic synthetic material, e.g. soft rubber, may be placed around the edge of the roller, to which it is firmly attached. The half of the roller projecting into the coin track is then with advantage bevelled like the frustum of a cone so as to support the movement of the coin to the running surface.

The plane in which the track lies is slightly inclined to the vertical for good guidance of the coin, so that the coin rolls on the running surface and slides along the guiding surface. The coin track inside the coin testing apparatus slopes sharply downwards directly behind the slot openings, flattens out underneath the roller and behind the roller passes into a gradual slope to the test means.

It is advantageous if the angle between the running surface and the guiding surface is 90° at the beginning of the running surface and about 45° at the test means.

The test means themselves may be test probes which have a ferrite core inside and ferrite shell cores around the winding, and having a ring of metal which conducts electricity placed around the ferrite shell and serving as a short-circuit coil placed flush against the surface of the test probe facing the running surface of the coin. It is not necessary for the axial extension of the ring to have the same measurement as the test probe; the thickness of the ring can also be about 1/4 to 1/2 the length of a probe.

The test probes are inserted in the wall of the guiding surface and in the wall lying opposite to the guiding surface in such a way that the surface of each wall facing the coin track and that of the probe with the ring lie in one plane. Each probe is cast in the wall by means of cast resin.

Instead of providing the test probe with a metal ring and inserting it in the wall with this ring — which is useful if the wall for the coin testing apparatus and other elements are made of plastics — the coin testing apparatus, the track with running surface and guiding surface can be made altogether from electrically conducting material, for example metal, the test probe is inserted in a bore in both walls corresponding to its outer diameter and secured with cast resin so that both walls themselves serve as short-circuit windings for each test probe.

Investigations have shown that in a ring of metal with good electrical conducting properties serving as a short-circuit winding which is placed around the ferrite shell cores as closely as possible to the latters' edge, the leakage field between the primary and secondary coils produces currents whose field is opposed to that of the leakage field. Consequently, the resulting composite field is bunched more strongly at the cross-section of the ferrite shell cores. Besides the relatively increased influence of the coin, a more sensitive testing of size is rendered possible. For this the common axis of the primary and the secondary coils is so arranged that the

coin is only immersed in the field between both the test coils. The degree of coupling influenced by the depth of immersion is used as measurement of the size of the coin.

The following arrangement also has the same effect as a metal ring acting as a short-circuit winding: instead of making the boundary walls of the coin track and the track itself from plastic a material which conducts electricity, for example metal, can be used for this as well. In this case, the ferrite shell cores of each test probe are fixed in walls in such a way that the latter directly clasp them and thus function as short-circuit windings. A field opposed to the leakage field of the test probe which strongly bunches the latter is set up by the currents produced in the metal walls.

Apart from the benefit of strong bunching of the leakage field, a coin testing apparatus of metal has further advatanges in that such an apparatus, compared with one made from plastic, has greater dimensional stability and therefore greater accuracy in measurement and greater rigidity in respect of outside shocks.

The mode of action of the apparatus according to the invention will be described below. The roller fixed to the lever absorbs a large amount of the energy of a coin on impart with the roller, and guides the coin part of the way through the coin testing apparatus so that it is led to the probes by the most favourable way. When the coin impacts with the roller, because of the soft rubber, it rebounds elastically and loses its energy and presses the roller or the lever upwards, running slowly beneath the roller. As soon as it is no longer in contact with the roller, it continues to run along the track which curves towards the test probe. The guiding surface, which runs parallel to the plane of the track, forms with the running surface an angle which decreases from 90° at the slot opening to the test probes. The edge of the coin thus forms with the running surface an angle which increases along the track. By this arrangement, thin coins slide deeper in the region of the probe than thick ones; on the other hand, sharp-edge coins lie higher than coins with rounded edges. The extent of the variation in the angle of the curving track to the running surface depends on the one hand on the desired influence of the thickness of the coin but on the other hand also on the friction of the coin permissible in the region of the probe. With a suitable test probe arrangement, the height of the top edge of the coin affects the result of the measurement very perceptibly.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the invention will become known by reference to the following description and accompanying drawings, in which:

FIG. 1 shows the track of a coin with a side view of one embodiment of a damping device and test probe according to the invention.

FIG. 2 is a section through A—A of FIG. 1;

FIG. 3 is a section through B—B of FIG. 1;

FIG. 4 is a section through C—C of Flg. 1 to an enlarged scale; and

FIG. 5 is a cross-sectional view of the roller.

DESCRIPTION OF PREFERRED EMBODIMENT

A coin testing apparatus, in which coins are inserted from above through a slot which is not shown, has a running surface **1** with a section **1***a* in a plane falling almost vertically, an upward curved section **1***b* and a section **1***c* inclined obliquely to the horizontal. This track **1** has a guiding surface **2** and running surface **2***a*. Above the track is a damping device **3** for coins **4** inserted from above in the coin slot. The damping device **3** consists of a lever **5** with a long arm **6** and a short arm **7.** The arms are inclined to each other at an obtuse angle with the bisector of the angle pointing to the track **1.** Lever **5** can rotate around axis **8** which is normal to the plane of the track. At the free end of the long arm **6** of lever **5** is a roller **9** which itself can rotate about an axis **10.** At the free end of the short arm **7** of lever **5** is a counter weight **11.**

Counter weight **11** is so designed that the lever system is in equilibrium when it is approximately in the position shown in the drawing. Furthermore, the moment of roller **9** about axis **8** is only slightly larger than the moment of counter weight **11** about axis **8.**

Roller **9,** shown in cross-section in FIG. **5,** is constructed as a disc with a soft rubber tire **12** on its rim. This tire **12** is bevelled like the frustum of a cone on the side which projects into the track of the coin. The roller itself consists of plastic. Instead of rubber, any other soft, elastic synthetic material can be used for the tire **12.**

At the end of track **1** are located two test probes **13** past which the coin rolls. Such a test probe **13** consists of a ferrite shell core **16** which contains the winding **15,** which is preferably of copper wire. Coil **15** with the ferrite shell core **16** is inserted into the wall **2** of the guiding surface in such a way that the surface which faces the track of the coin is flush with the guiding surface. If the wall of the guiding surface is made of plastic, a metal ring **18** of material which conducts electricity is inserted between plastic boring **17** and ferrite shell core **16**; the leakage field about the two test probes which lie opposite to one another, of which one functions as primary coil and the other, as secondary coil, sets up currents in the metal ring which in their turn produce a field which is in opposition to the leakage field. The composite field of leakage field and opposing field is strongly bunched. The two test probes lying opposite to one another are accordingly fixed one in the wall of the guiding surface and the other in a wall **20** bounding the track on the opposite side.

With advantage, however, the wall of the guiding surface and also the track boundary wall on the opposite side — on which, the running surface is formed — and the running surface itself can be made from the metal as used for the metal ring **18** (FIG. **1**). The wall of the guiding surface directly clasps the ferrite shell cores and thus acts as a short-circuit winding. The mode of operation of this arrangement is practically identical with the mode of operation of the metal ring around the ferrite shell cores. If required, the test probe together with the metal ring may be cast and thus fixed with a mouldable, hardening plastic **19,** for example cast resin, in the bore of the wall of the guiding surface and in that of the opposite boundary wall, whether of metal or plastic. In order to prevent the test probe from slipping, a lug (not shown) can be formed in the wall bore so as to fit into one of the gaps in the periphery of the shell core.

The mode of operation of the arrangement is more fully discussed below. If a coin is inserted into the coin slot from above, it falls first of all to the almost vertical section **1***a* of track **1** until it meets roller **9.** When the

coin 4 impacts on roller 9, the greater part of its kinetic energy is given up. The lever system with the roller makes way for the coin and allows it to roll slowly along the bend to the position where the roller releases the coin. Because of the inertia of the damping device, i.e., of lever 5, roller 9 and counter weight 11, the oncoming coin 4 cannot at once move the roller out of its path. On impact, it essentially gives up its kinetic energy to the rubber ring of the roller. When the coin has lifted up the roller, it possesses very little kinetic energy. After the roller has left the way free, the coin continues to roll and enters the zone of the test probes 13 at approximately the same speed. In order for the movement of the coin to be strongly damped down, it rolls very slowly around the roller and the speed at which the coin enters the alternating electro-magnetic field of the test probes is approximately equal for coins of equal size.

The running surface begins to tilt slightly at the start. As can be seen from FIGS. 2, 3 and 4, in Section A—A the running surface is only slightly inclined in relation to the guiding surface; it is much more inclined in Section B—B and in Section C—C, which is at the level of the test probes, the inclination amounts to, for example, about 45°. Because of the tilt, i.e. the inclination of the running surface in relation to the guiding surface, which forms a decreasing acute angle with the latter, the width of the coin as well as the rounding of the edge can be established. Because the coin rolls with one edge on a slanting plane, a thick coin lies higher in the region of the probe than a thin one or a coin with rounded edges. This height of the top edge of the coin enters very precisely into the result of the measurement according to the arrangement of the test probes.

The individual elements of the invention, the damping device, the twisted running surface and the arrangement of the metal ring around a test probe, or the construction of the housing of the coin testing apparatus from a metal which conducts electricity, can of course be used as well in a coin testing apparatus independently of one another. Thus, for example, a damping device in accordance with the invention is advantageous in any coin testing apparatus without the running surface of just that test apparatus needing to be twisted. The same goes for the other two elements. However, by the combination of all three elements, a coin testing apparatus can be especially advantageous in its operation.

What is claimed is:

1. A coin chute comprising a coin slot, coin test means that can help distinguish between a moving acceptable coin and a moving unacceptable coin of approximately equal size if said acceptable coin and said unacceptable coin move through essentially the same predetermined area at relatively slow speeds as they move past said coin test means, a coin track leading from said coin slot toward said coin test means, said coin track helping define a coin path which extends past said coin test means and which includes said predetermind area, and damping means, provided between said coin slot and said coin test means, which has a coin-receiving portion thereof that normally is spaced from said coin track a distance substantially shorter than the diameter of the smallest diameter acceptable coin to be tested by said coin test means but that can respond to movement of said acceptable coin along said coin path to move far enough away from said coin track to enable said acceptable coin to pass between it and said coin track, said damping means including a lever pivotally mounted above said coin track and a roller which is rotatably mounted on one end of said lever and which has a portion of the periphery thereof projecting into said coin path and a counter weight mounted on the other end of said lever, said roller being said coin-receiving portion of said damping means, said lever of said damping means being arranged to pivot far enough away from said coin track to move said roller out of the way of an acceptable or of an unacceptable coin moving along said coin path on impact with said acceptable or unacceptable coin and subsequently to return to its original position, said roller responding to said movement of said acceptable coin or of said unacceptable coin past it to rotate and thereby permit said acceptable coin or said unacceptable coin to roll along said coin track, said coin track being essentially continuous and uninterrupted adjacent said damping means, said damping means responding to said movement of said acceptable coin along said coin path to move said roller out of the way of said acceptable coin but the inertia of said damping means causing said roller to essentially remain in engagement with said acceptable coin as said acceptable coin forces said roller to move out of the way of said acceptable coin, said damping means causing said roller to hold said acceptable coin in essentially continuous and uninterrupted engagement with said coin track throughout the time said acceptable coin is in engagement with said damping means, thereby essentially causing said acceptable coin to pass through said predetermined area at a relatively slow speed, said roller of said damping means also responding to movement of said unacceptable coin along said coin path to move far enough away from said coin track to enable said unacceptable coin to pass between it and said coin track, said inertia of said damping means causing said roller to essentially remain in engagement with said unacceptable coin as said unacceptable coin forces said roller to move out of the way of said unacceptable coin, said damping means causing said roller to hold said unacceptable coin in essentially continuous and uninterrupted engagement with said coin track throughout the time said unacceptable coin is in engagement with said damping means, thereby essentially causing said unacceptable coin to pass through said predetermined area at a relatively slow speed, said damping means and said coin track being the components of said coin chute which causes said acceptable coin and said unacceptable coin to essentially move through said predetermined area at relatively slow speeds as said acceptable coin and said unacceptable coin move past said coin test means.

2. A coin chute as claimed in claim 1, in which said coin track slopes down almost vertically in the vicinity of said coin slot, shallows out in the vicinity of said damping means, and slopes down gradually in the vicinity of said coin test means, the shallowed out portion of said coin track helping said damping means to reduce the speeds of said acceptable coin and of said unacceptable coin to said predetermined speed.

3. A coin chute as claimed in claim 1, in which one wall of said coin path acts as a guiding surface, in which said one wall is inclined to the vertical so each said acceptable coin and each said unacceptable coin will incline against, and slide along, said one wall in face-to-

face engagement as each said acceptable coin or each said unacceptable coin approaches and moves past said coin test means, in which said coin test means is mounted on said one wall of said coin path, in which the portion of said coin track that is in register with said coin test means coacts with said one wall to subtend an acute angle, and in which said coin-receiving portion of said damping means urges said acceptable coin or said unacceptable coin toward said one wall and also toward the apex of said subtended acute angle.

4. A coin chute as claimed in claim **1,** in which a wall of said coin path at one side of said coin track has a bore therein to receive said coin test means, in which said coin test means includes a ferrite core and a winding that surrounds said ferrite core and a ferrite shell core that surrounds said winding, and in which the geometric center of said coin test means is spaced from said coin track a distance greater than the radius of an acceptable coin but in which at least a portion of said ferrite shell core is spaced from said coin track a distance less than the diameter of said acceptable coin, whereby the upper portion of said acceptable coin will be coextensive with just part of said coin test means as said acceptable coin moves past said coin test means.

5. A coin chute as claimed in claim **1** wherein the diameter of said roller is larger than the diameter of the largest-diameter coin to be tested by said coin test means.

6. A coin chute comprising a coin slot, coin test means that can help distinguish between an acceptable coin and an unacceptable coin of approximately equal size if said acceptable coin and said unacceptable coin move through essentially the same predetermined area as they move past said coin test means, a coin track leading from said coin slot toward said coin test means, said coin track helping define a coin path which extends past said coin test means and which includes said predetermined area, and damping means, provided between said coin slot and said coin test means, which includes a lever pivotally mounted above said coin track, a roller rotatably mounted on one end of said lever and having a portion of the periphery thereof extending into said coin path, and a counter weight mounted on said lever, said portion of said periphery of said roller being said coin-receiving portion of said damping means and normally being spaced from said coin track a distance substantially shorter than the diameter of said acceptable coin, said damping means being arranged to pivot clear of an acceptable or an unacceptable coin moving along said coin path on impact with said acceptable or unacceptable coin and subsequently to return to its original position, said lever having two arms of unequal length at an obtuse angle to each other wherein the bisector of said obtuse angle intersects said coin track, said roller being mounted on the longer arm of said lever and said counter weight being mounted on the shorter arm of said lever.

7. A coin chute comprising a coin slot, coin test means that can help distinguish between a moving acceptable coin and a moving unacceptable coin of approximately equal size if said acceptable coin and said unacceptable coin move through essentially the same predetermined area at relatively slow speeds as they move past said coin test means, a coin track leading from said coin slot toward said coin test means, said coin track helping define a coin path which extends past said coin test means and which includes said predetermined area, and damping means, provided between said coin slot and said coin test means, which has a coin-receiving portion thereof that normally is spaced from said coin track a distance substantially shorter than the diameter of the smallest diameter acceptable coin to be tested by said coin test means but that can respond to movement of said acceptable coin along said coin path to move far enough away from said coin track to enable said acceptable coin to pass between it and said coin track, said damping means including a lever pivotally mounted above said coin track and a roller which is rotatably mounted on one end of said lever and which has a portion of the periphery thereof projecting into said coin path and a counter weight mounted on the other end of said lever, said roller being said coin-receiving portion of said damping means said lever of said damping means being arranged to pivot far enough away from said coin track to move said roller out of the way of an acceptable or of an unacceptable coin moving along said coin path on impact with said acceptable or unacceptable coin and subsequently to return to its original position, said roller responding to said movement of said acceptable coin or of said unacceptable coin past it to rotate and thereby permit said acceptable coin or said unacceptable coin to roll along said coin track, said coin track being essentially continuous and uninterrupted adjacent said damping means, said damping means responding to said movement of said acceptable coin along said coin path to move said roller out of the way of said acceptable coin but the inertia of said damping means causing said roller to essentially remain in engagement with said acceptable coin as said acceptable coin forces said roller to move out of the way of said acceptable coin, said damping means causing said roller to hold said acceptable coin in essentially continuous and uninterrupted engagement with said coin track throughout the time said acceptable coin is in engagement with said damping means, thereby essentially causing said acceptable coin to pass through said predetermined area at a relatively slow speed, said roller of said damping means also responding to movement of said unacceptable coin along said coin path to move far enough away from said coin track to enable said unacceptable coin to pass between it and said coin track, said inertia of said damping means causing said roller to essentially remain in engagement with said unacceptable coin as said unacceptable coin forces said roller to move out of the way of said unacceptable coin, said damping means causing said roller to hold said unacceptable coin in essentially continuous and uninterrupted engagement with said coin track throughout the time said unacceptable coin is in engagement with said damping means, thereby essentially causing said unacceptable coin to pass through said predetermined area at a relatively slow speed, said damping means and said coin track being the components of said coin chute which cause said acceptable coin and said unacceptable coin to essentially move through said predetermined area at relatively slow speeds as said acceptable cion and said unacceptable coin move past said coin test means, said roller being provided with an outer ring of soft, resilient material which will cause said acceptable coin or said unacceptable coin to rebound elastically and lose energy when said acceptable coin or said unacceptable coin impacts with said roller, said outer ring of soft, re-

silient material coacting with the impact-induced rotation of said damping means to absorb substantial amounts of kinetic energy from each acceptable coin to be tested by said coin test means.

8. A coin chute comprising a coin slot, coin test means that can help distinguish between an acceptable coin and an unacceptable coin of approximately equal size if said acceptable coin and said unacceptable coin move through essentially the same predetermined area as they move past said coin test means, a coin track leading from said coin slot toward said coin test means, said coin track helping define a coin path which extends past said coin test means and which includes said predetermined area, and damping means, provided between said coin slot and said coin test means, which includes a lever pivotally mounted above said coin track, a roller rotatably mounted on one end of said lever and having a portion of the periphery thereof extending into said coin path, and a counter weight mounted on said lever, said portion of said periphery of said roller being said coin-receiving portion of said damping means and normally being spaced from said coin track a distance substantially shorter than the diameter of said acceptable coin, said damping means being arranged to pivot clear of an acceptable or an unacceptable coin moving along said coin path on impact with said acceptable or unacceptable coin and subsequently to return to its original position, said roller being provided with an outer ring of soft, resilient material, that part of said outer ring which projects into said coin path being beveled, the beveled portion of said outer ring coacting with an adjacent wall of said coin path to subtend an acute angle, said beveled portion of said outer ring acting to urge said acceptable coin or said unacceptable coin toward said adjacent wall of said coin path.

9. A coin chute comprising a coin slot, a plurality of coin test means that are spaced apart but that are in register with each other and that can help distinguish between an acceptable coin and an unacceptable coin of approximately equal size if said acceptable coin and said unacceptable coin move through essentially the same predetermined area at relatively slow speeds as they move past said plurality of coin test means, a coin track leading from said coin slot toward said plurality of coin test means, said coin track helping define a coin path which extends past said plurality of coin test means and which includes said predetermined area, and damping means, provided between said coin slot and said plurality of coin test means, which has a coin-receiving portion thereof that normally is spaced from said coin track a distance substantially shorter than the diameter of the smallest diameter acceptable coin to be tested by said plurality of coin test means but that can respond to movement of said acceptable coin along said coin path to move far enough away from said coin track to enable said acceptable coin to pass between it and said coin track, said coin track being essentially continuous and uninterrupted adjacent said damping means, said damping means responding to said movement of said acceptable coin along said coin path to move out of the way of said acceptable coin but the inertia of said damping means causing said damping means to essentially remain in engagement with said acceptable coin as said acceptable coin forces said damping means to move out of the way of said acceptable coin, said damping means holding said acceptable coin in essentially continuous and uninterrupted engagement with said coin track throughout the time said acceptable coin is in engagement with said damping means, thereby essentially causing said acceptable coin to pass through said predetermined area at a relatively slow speed, said coin-receiving portion of said damping means also responding to movement of said unacceptable coin along said coin path to move far enough away from said coin track to enable said unacceptable coin to pass between it and said coin track, said inertia of said damping means causing said damping means to essentially remain in engagement with said unacceptable coin as said unacceptable coin forces said damping means to move out of the way of said unacceptable coin, said damping means holding said unacceptable coin in essentially continuous and uninterrupted engagement with said coin track throughout the time said unacceptable coin is in engagement with said damping means, thereby essentially causing said unacceptable coin to pass through said predetermined area at a relatively slow speed, said damping means and said coin track being the components of said chute which cause said acceptable coin and said unacceptable coin to essentially move through said predetermined area at relatively slow speeds as said acceptable coin and said unacceptable coin move past said plurality of coin test means, said coin path having a first boundary wall and a second boundary wall, said coin track and said boundary walls being of electrically-conducting, nonmagnetic material, each of said coin test means comprising a winding and a ferrite core within said winding and a ferrite shell core surrounding said winding, bores in said boundary walls adapted to receive said plurality of coin test means such that short-circuit windings for each coin test means are formed by said boundary walls, the coin test means which is disposed within said bore in one of said boundary walls being energizable to act as a primary coil and the coin test means which is disposed within said bore in the other of said boundary walls being adapted to act as a secondary coil, and said boundary walls acting, whenever they act as said short-circuit windings, to oppose any leakage magnetic field developed by said coin test means which acts as said primary winding, and each of said boundary walls being thinner than the length of either of said ferrite shell cores, said ferrite shell cores being located and dimensioned so no acceptable coin can simultaneously engage said coin track and fully overlie either of said ferrite shell cores.

10. A coin chute comprising a coin slot, a plurality of coin test means that can help distinguish between an acceptable coin and an unacceptable coin of approximately equal size if said acceptable coin and said unacceptable coin move through essentially the same predetermined area at relatively slow speeds as they move past said plurality of coin test means, a coin track leading from said coin slot toward said plurality of coin test means, said coin track helping define a coin path which extends past said plurality of coin test means and which includes said predetermined area, and damping means, provided between said coin slot and said plurality of coin test means, which has a coin-receiving portion thereof that normally is spaced from said coin track a distance substantially shorter than the diameter of the smallest diameter acceptable coin to be tested by said plurality of coin test means but that can respond to movement of said acceptable coin along said coin path

to move far enough away from said coin track to enable said acceptable coin to pass between it and said coin track, said coin track being essentially continuous and uninterrupted adjacent said damping means, said damping means responding to said movement of said acceptable coin along said coin path to move out of the way of said acceptable coin but the inertia of said damping means causing said damping means to essentially remain in engagement with said acceptable coin as said acceptable coin forces said damping means to move out of the way of said acceptable coin, said damping means holding said acceptable coin in essentially continuous and uninterrupted engagement with said coin track throughout the time said acceptable coin is in engagement with said damping means, thereby essentially causing said acceptable coin to pass through said predetermined area at a relatively slow speed, said coin-receiving portion of said damping means also responding to movement of said unacceptable coin along said coin path to move far enough away from said coin track to enable said unacceptable coin to pass between it and said coin track, said inertia of said damping means causing said damping means to essentially remain in engagement with said unacceptable coin as said unacceptable coin forces said damping means to move out of the way of said unacceptable coin, said damping means holding said unacceptable coin in essentially continuous and uninterrupted engagement with said coin track throughout the time said unacceptable coin is in engagement with said damping means, thereby essentially causing said unacceptable coin to pass through said predetermined area at a relatively slow speed, said damping means and said coin track being the components of said coin chute which cause said acceptable coin and said unacceptable coin to essentially move through said predetermined area at relatively slow speeds as said acceptable coin and said unacceptable coin move past said plurality of coin test means, said coin path having a first boundary wall and a second boundary wall, a bore in said first boundary wall, one of said plurality of coin test means being fixed in said bore, said one coin test means comprising a winding and a ferrite core within said winding and a ferrite shell core surrounding said winding, a ring of electrically-conductive, non-magnetic material encircling said ferrite shell core to serve as a short-circuit winding, said ring of electrically-conductive, non-magnetic material being immediately adjacent said coin path, a further bore in said second boundary wall, another of said plurality of coin test means being fixed in said further bore, said other coin test means comprising a winding and a ferrite core within said winding and a ferrite shell core surrounding said winding, a further ring of electrically-conductive, non-magnetic material encircling said ferrite shell core of said other coin test means to serve as a second short-circuit winding, said further ring of electrically-conductive, non-magnetic material being immediately adjacent said coin path, the first said coin test means being energizable to act as a primary coil and said other coin test means being adapted to act as a secondary coil, and said shortcircuit windings acting to oppose any leakage magnetic field developed by the first said coin test means.

* * * * *