March 7, 1944. E. G. WEILER 2,343,352

COIN SELECTOR FOR COIN CONTROLLED MACHINES

Filed May 28, 1938 3 Sheets-Sheet 1

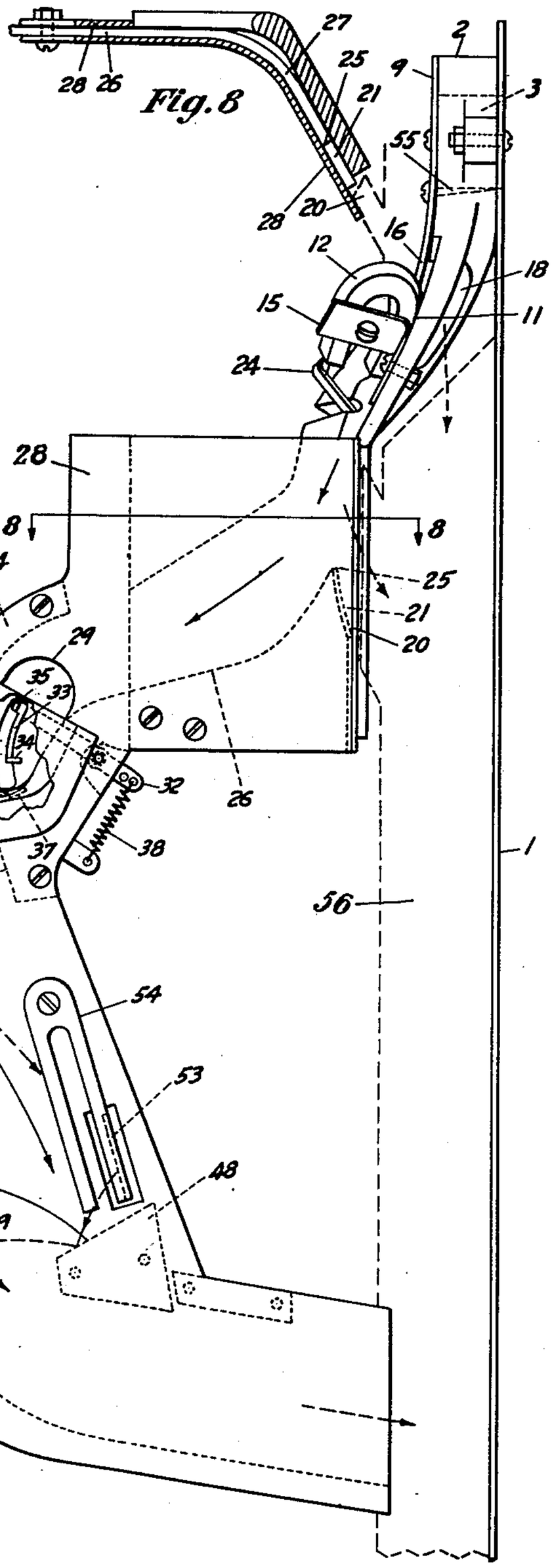

Fig. 8

Fig. 9

Fig. 1

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COIN SELECTOR FOR COIN CONTROLLED MACHINES

Filed May 28, 1938 3 Sheets-Sheet 2

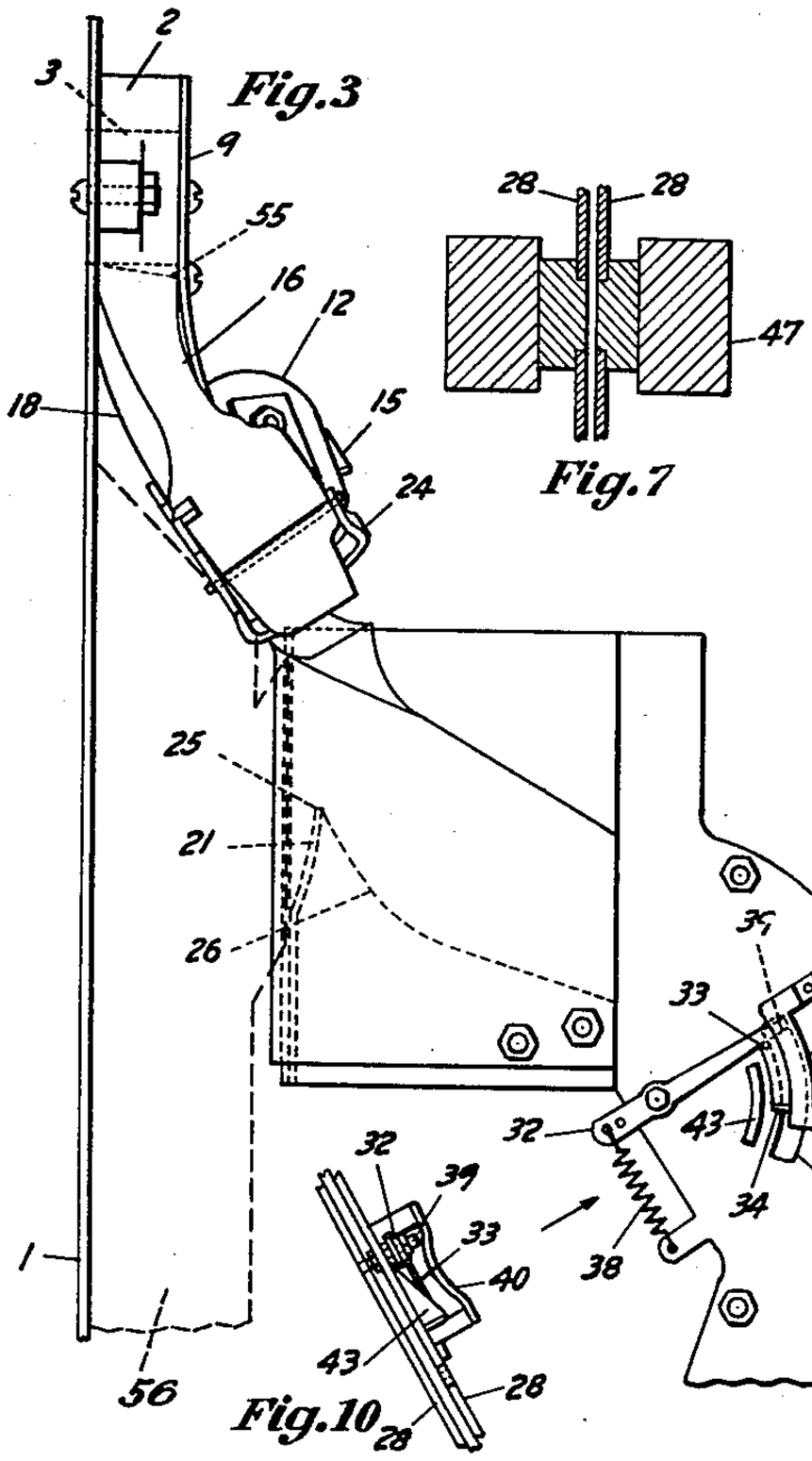

Fig.3

Fig.7

Fig.10

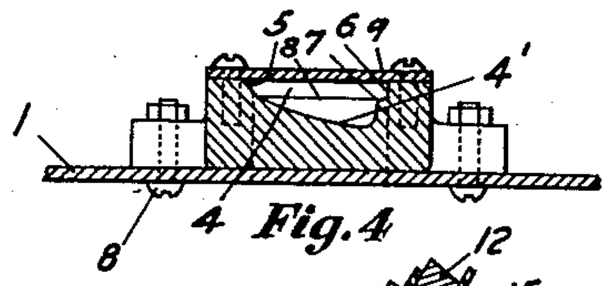

Fig.4

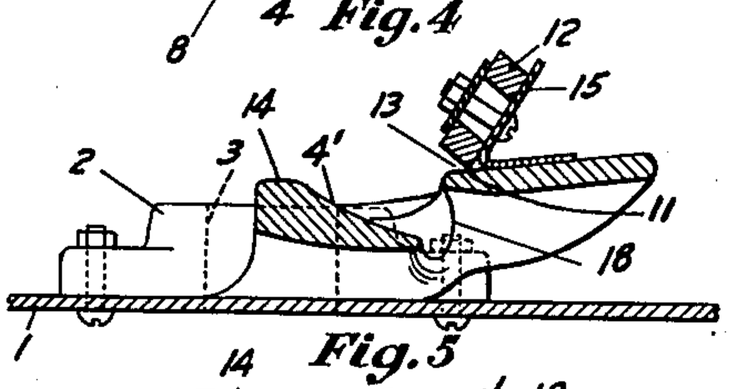

Fig.5

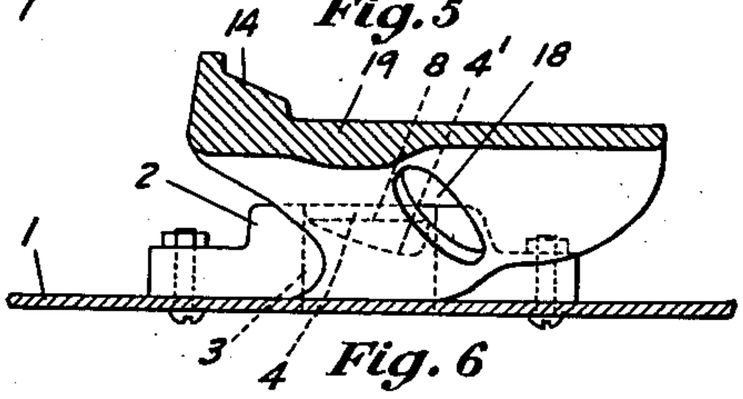

Fig.6

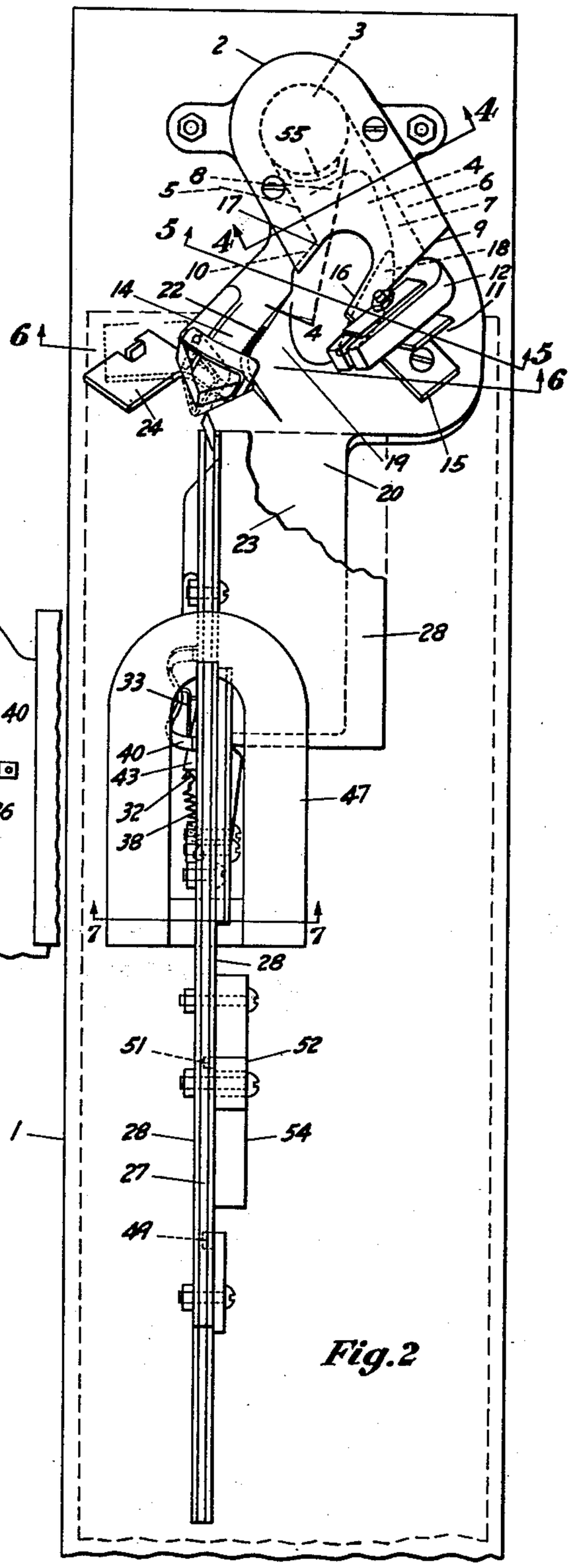

Fig.2

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Filed May 28, 1938 3 Sheets-Sheet 3

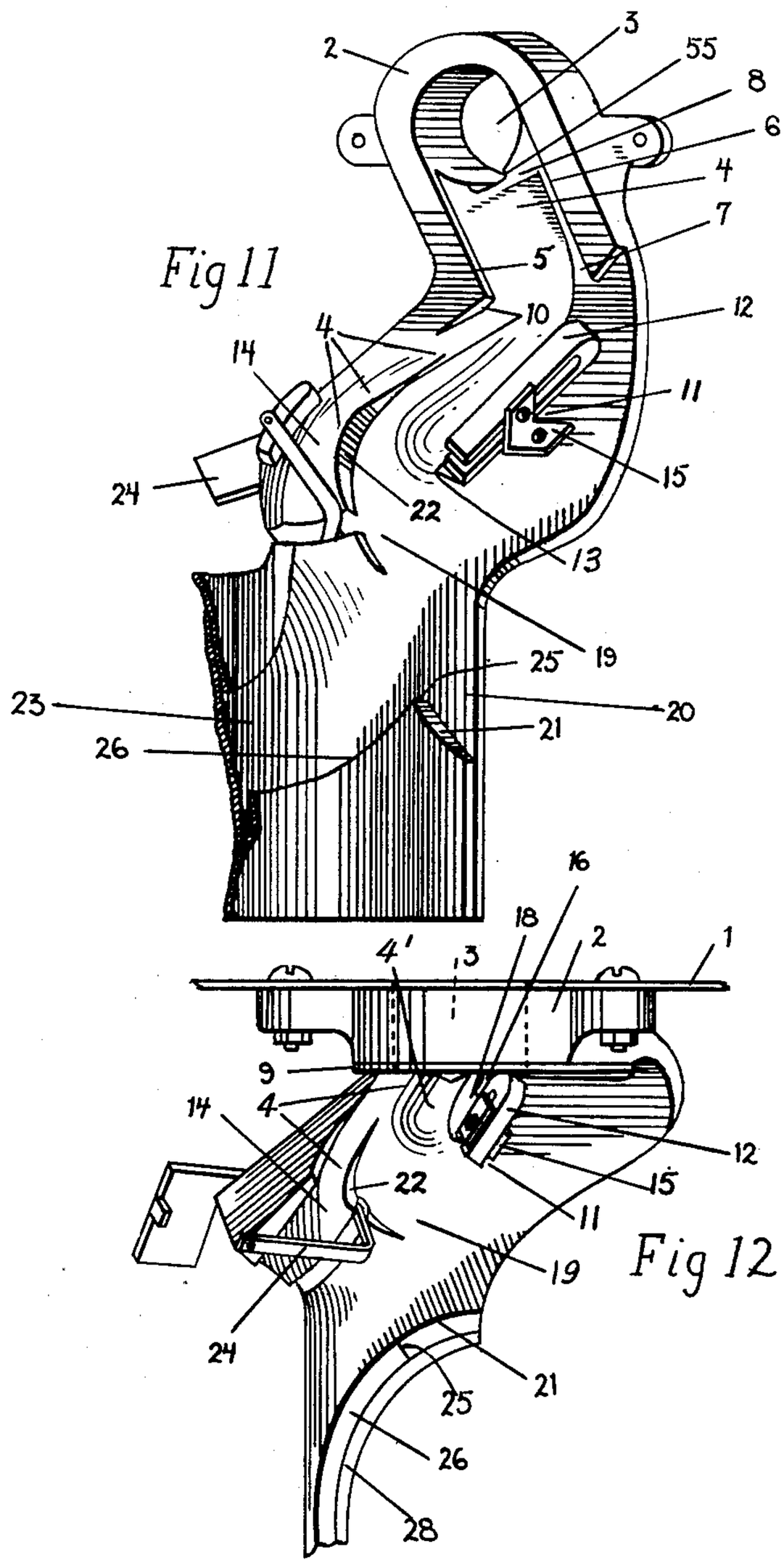

Fig 11

Fig 12

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2,343,352

UNITED STATES PATENT OFFICE

2,343,352

COIN SELECTOR FOR COIN CONTROLLED MACHINES

Edward G. Weiler, Columbus, Ohio

Application May 28, 1938, Serial No. 210,692

8 Claims. (Cl. 194—102)

The invention to be hereinafter disclosed relates to coin selectors for coin controlled machines.

A great many such selectors are well known, all aiming at the same general result—i. e., greater efficiency in elimination of slugs and objects other than genuine coins.

The known devices apply, respectively, various separate individual tests, and, frequently, combine two or more such tests. One difficulty in existing devices having combined tests is the conflict of tests, resulting in one test offsetting or counteracting another test. Another difficulty is the proper order or sequence of tests. To have greatest efficiency, the sequence must be such that the coin, etc., leaving any one test will not have any characteristics which can interfere with any succeeding test on the same coin. An important objection in such devices is omission of one or more tests determining spurious coins, with the result that spurious coins having some characteristics of good coins are retained in the machine.

The main objects of the present invention are to provide a simple, efficient, compact coin selector of inexpensive manufacture and thoroughly exhaustive in its coin selection tests, eliminating the maximum of spurious and imperfect coins and slugs.

In the drawings:

Fig. 1 is a side elevation of the invention in operative position, only the front plate, in edge view, of a vending machine, being shown, with slug chute in dotted lines;

Fig. 2 is a rear elevation of Fig. 1;

Fig. 3 is a fragmentary side elevation opposite to Fig. 1;

Figs. 4, 5, 6 and 7 are cross sections on lines 4—4, 5—5, 6—6 and 7—7 respectively, of Fig. 2, looking in the direction of the arrows;

Figs. 8 and 9 are cross sections on lines 8—8, and 9—9 respectively of Fig. 1, looking in the direction of the arrows;

Fig. 10 is an elevation of the lever and cam mechanism, looking in the direction of the arrow in Fig. 3, with spring connection omitted;

Fig. 11 is a perspective view, enlarged, of the upper part of the device shown in Fig. 2, taken at an angle from the right, omitting the plates 1, 9 and 28 and showing the merging of incline 14 and channel 4; and

Fig. 12 is an enlarged top plan view of the upper part of Fig. 2 corresponding to that shown in Fig. 11.

For clearness and simplicity, the drawings illustrate a machine having one main coin runway, only and that, devised for a five cent piece or coin in standard United States currency. The invention is readily applicable to a plurality of such five cent piece coin runways or chutes in a single machine, as will be obvious. Also, it is readily applicable to coin runways or chutes for coins of various other denominations, and to a plurality of runways or chutes, in a single machine, some or all runways being for coins of denominations different from all or some of the other runways or chutes.

Broadly, the invention functions to eliminate, successively, coins of excessive diameter, excessive thickness, appreciably deficient diameter, appreciably deficient thickness, small irregular bodies both non-magnetic and magnetic, coins of excessive weight, coins of excessive softness, coins of deficient weight, perforated coins, coins having other than normal electrical conductivity, and coins having other than normal resiliency or hardness and rebound properties. The above eliminations leave only coins having all of the properties and requirements of genuine coins, physically considered.

Throughout the following description a selector having a single coin runway or chute, and constructed for United States nickels, or five-cent pieces in U. S. currency, will be referred to.

Preferably, the selector is mounted upon and carried on one or another of the usual encasing walls, sides or frame members 1, of the machine. At a suitable place in the upper part of this wall is securely fastened, in any usual and well known manner, a throat piece 2, of suitable material. Preferably, it is removably secured. This throat piece is provided with a bore 3 extending completely through it, in the direction of its thickness, from front to rear. This bore is, throughout, of the exact diameter of the coin for which the selector is adapted, in this instance, for a nickel in U. S. currency. And, of course, the wall or plate 1 in line with the throat opening 3 is correspondingly cut out. A simple and economical method of manufacture of the throat piece 2 is by casting, though it is to be clearly understood that it may be produced in any other practical and acceptable manner. Preferably, bore 3 extends completely through throat piece 2, from front to back. The inclined surfaces 11, 14 and 19, shown in Fig. 11, are formed as a part of the casting of the throat piece.

Extending downwardly beginning in a plane perpendicular to the axis of bore 3 and communicating at its upper end with the rear end

of bore 3 throughout its width is a channel 4, Figs. 2 and 4, slightly inclined edgewise and having width and depth equal to the diameter and thickness, respectively, of a genuine U. S. nickel. The side walls 5 and 6 of the upper part of channel 4 are preferably formed integrally as a part of throat piece 2 and the rear wall is formed by a cap plate 9 which is preferably a flat plate of outline and measurements to lie parallel to and slightly spaced rearwardly from front plate 1, on walls 5 and 6 and on the wall around the bore 3 and at its lower end the cap plate 9 is curved inwardly away from front plate 1 to accommodate a curve in channel 4, as explained later, and is removably secured by screws or the like as will be clear on reference to Figs. 1 and 2 of the drawings.

The side walls 5 and 6 of channel 4 are abrupt and of a height equal to the thickness of a nickel so that as the nickel passes through bore 3, it will exactly aline with the upper end of channel 4 into which it will pass by gravity. Since the beginning of channel 4 is at an angle, i. e., edgewise downwardly inclined, the nickel gravitates on to the lower side wall 5 along which it will roll. Along the opposite wall 6 extends a narrow supporting shelf or surface 7. That part of the channel 4 lying between walls 5 and 6 is of the same width from end to end, i. e., equal to the diameter of a nickel. The walls 5 and 6 merge into the wall of bore 3 at diametrically opposite points and with undiminished height, the lower wall of bore 3 between these points of merger being cut away to a depth equal to the thickness of a nickel, leaving a narrow bridge 8 extending from wall 5 to wall 6 and around the lower side of bore 3. Bridge 8, shelf 7, and the bottom of each side wall 5 and 6, are the thickness of a nickel below the tops of walls 5 and 6 and below the inner face of cap plate 9, forming the channel 4, as shown in Fig. 4. Consequently, a genuine U. S. nickel inserted through the bore 3 will enter the shallow channel 4 between bridge 8 and cap plate 9 and roll along wall 5, while being guided and supported at its opposite side by the surface 7.

At about the ends of walls 5 and 6, which ends are in approximately the same horizontal plane, the nickel is caused to abruptly change its direction. The whole channel 4 is curved inwardly away from supporting plate 1 and the part below this curve is also edgewise downwardly inclined at an angle opposite to that of the upper part of the channel. Thus, the junction of the upper and lower parts of channel 4 form an elbow, the center of the elbow being approximately alined with the lower ends of walls 5 and 6, the shape of the elbow being such as to provide both an edgewise and a lateral bend or curve in the channel 4. The depth of the curved portion of the channel 4 is somewhat greater than the thickness of a nickel to permit the nickel to be deflected in the channel without binding. That part of the coin passageway below the elbow which is referred to herein as the lower branch of channel 4, consists essentially of guiding surfaces 11, 14 and 19 and the edge of a magnet 12, Fig. 11, which guide and support the coin principally at its opposite edges and being laterally inclined, is not necessarily provided with an upper wall throughout its full length. It is to be understood that the path followed by a genuine nickel down to the lower end of surface 19, Fig. 2, is to be considered a continuation of channel 4. The uppermost edge of the lower branch of channel 4 is indicated in Figs. 11 and 12, its opposite edge at this point being the V-channel 13, channel 4 at this point not being provided with an upper plate or cover.

Wall 10 is a continuation of, but at an angle to wall 5, and for a short distance, serves as the upper edge of the lower branch of channel 4. The shelf or surface 7, which at its upper end is parallel to the front plate 1, is at its lower end, curved rearwardly away from the front plate 1 and merges into the flat surface 11. The surface 11 in turn merges into the surface 19, the lower part of which is curved, as shown in Fig. 11.

Because of the angular disposition of walls 5 and 6, the horizontal distance between their ends at the approximate center of the elbow is greater than the shortest distance between the walls 5 and 6 and, therefore, greater than the diameter of a nickel. At this point, where the nickel is caused to change its direction both edgewise and laterally, the floor or surface 7 is correspondingly broadened so that it will continue to support the nickel, and merges into the surface 11. The bottom of the channel 4 for a distance above and below the bend in channel 4 is dished, gouged or depressed to form a depression 4', Figs. 2 and 11, which merges with the uppermost end of an inclined surface 14, extends along the bottom of wall 10, said depression in the floor of channel 4 beginning with zero depression along the bottom of wall 10 and being deepest along the edges of surfaces 7 and 11, and is completely cut through at its lowermost end forming an opening 18 for the ejection of certain slugs, as explained later.

The edge of the surfaces 7 along the depresed portion 4' of the floor of the channel 4 is spaced from wall 5, a distance somewhat less than the diameter of a nickel, and merges into the edge of surface 11 to form approximately an arc with its center at the junction of walls 5 and 10, the edge of surface 11 that is opposite wall 10 being spaced therefrom a distance slightly greater than the distance between wall 5 and the edge of floor 7, but slightly less than the diameter of a nickel. This gradually increasing distance between the edges of surfaces 7 and 11 and the opposite wall is provided so that a coin or other object that is too small to extend from wall 5 to the edge of floor 7 or the edge of surface 11 will, aided by its momentum and the abrupt change in direction at this point, drop into the depressed portion 4' of the coin channel and be ejected through an opening 18 at the bottom of the depressed portion 4' of the coin channel without any possibility of becoming stuck in the coin channel. In order to prevent any possibility of coins binding or lodging at the point where slightly undersize coins are separated from genuine coins, wall 10 merges into an inclined surface 14 and then resumes again as an edge along the surface 14, as shown in Fig. 11, so that when one edge of a coin that is only slightly undersize drops into the depressed portion 4' of the coin channel, it will, at the point of separation for coins of this size, be supported at its opposite edge by the inclined surface 14 free of any contact with the wall 10. This will prevent any possibility of such a coin becoming stuck between wall 10 and the edge of surface 11 and the coin will be carried by gravity deeper into the depressed portion 4' of the coin channel and be ejected through the opening 18 in the bottom of this channel. Objects appreciably

smaller than a genuine nickel will be carried freely by gravity aided by their momentum along the depression 4' in the channel and be ejected through the opening 18.

Along the surface 11, leading downwardly from the end of wall 6, with its lower branch approximately parallel to the upper part of wall 10, and spaced from said wall 10 a distance approximately equal to the diameter of a nickel, is mounted a horseshoe type permanent magnet 12. It is supported in position by a small bracket 15 secured to the surface 11. This magnet performs several functions, including that of magnetic separation. It acts as a stop, limit or guide wall in the same way as walls 5 and 6 act. As the nickel leaves wall 6 and shelf 7, it engages, gravitates along and is supported by the near branch of magnet 12 together with the continuation of shelf 7, which constitutes the surface 11. Magnet 12 is mounted at a sharp incline, relative to surface 11, so that its lower branch and the surface 11 provide a narrow V-shaped channel 13. This V-channel serves as the lowermost edge of a portion of the coin channel 4 below the elbow.

Assume that there is a coin with its edge overlapping and resting upon the surface 11. As it travels downwardly along the V-shaped channel 13 from the end of wall 6 toward the end of the magnet 12, its edge will engage the branch of the magnet which will limit the depth to which it will sink into the V-channel. Thus, a nickel of standard thickness will sink to a predetermined distance into V-channel 13, while one of less than standard thickness would sink to a correspondingly greater depth. In assembling, the magnet is so mounted that a nickel of standard diameter and thickness will extend from its seat in V-channel 13 exactly to the base of wall 10 where it joins wall 5. Wall 10 continues from the end of wall 5 and merges into the inclined surface 14, Fig. 11.

From the point where the upper end of curved incline 14 merges into the depressed bottom 4' of channel 4, the surface of incline 14 widens and also rises relative to the plane of surface 19 down to a point approximately opposite the lower end of the magnet 12 and from that point it flattens out and merges with the surface 19. The curved surface 14 down to its highest point is also inclined relative to the plane of surface 19 so as to tend to crowd coins traveling along it deeper into the V-channel 13.

In Figs. 5 and 6, cross sections of incline 14 at its upper end or beginning and at its highest point, respectively, are shown. As the incline 14 rises and curves to the left, in Fig. 2, its inner edge also rises above the floor of channel 4, forming a wall 10 approximately perpendicular to the plane of surface 19, said wall having the same curvature in plan as the inner edge of incline 14 with the high point of the wall about midway of the length of the curve and decreasing to zero in opposite directions from that point. Although this wall is not actually an uninterrupted continuation of the wall 10 previously referred to, it is in substance a continuation thereof being interrupted only for a short distance where it merges with incline 14, Fig. 11. Therefore, the same numeral 10 has been applied to it. The curve of wall 10 swings gradually outwardly from the V-channel 13 and downwardly about the lower end of magnet 12 and the shortest distance from the seating point of a genuine nickel at the lower end of the V-channel 13 to the wall 10 is very slightly less than the diameter of a nickel, while the distance between the lower end of the V-channel 13 and the wall 10 at a somewhat lower point is greater than the diameter of a nickel. The purpose of this gradually increasing distance is to prevent slightly undersize coins that slip off of wall 10 from sticking between wall 10 and the magnet. Consequently, as a genuine nickel rolls downwardly with its edge in V-channel 13, it will follow along the base of upper wall 10 until it reaches the upper end of incline 14. It will then follow along incline 14, with its edge supported thereby, the slope of incline 14 causing the coin to be fully seated in the V-channel 13.

As an illustration, assume that a nickel which has been rubbed excessively thin is started through the machine. Its edge will drop further into V-channel 13 than a nickel of proper thickness and therefore its opposite edge will slip off of the edge of incline 14 and drop down along wall 10. Its edge will engage the curved wall 10 which will deflect the thin nickel over the surface 19 into a refund opening 20.

It should be noted that the entire channel 4, including both branches of the elbow, is very steeply inclined so that the force of gravity will have full effect. Likewise, the throat piece 2 is so disposed that the coin will tend to roll successively along and follow wall 5 and, if a genuine nickel, the inclined surface 14, while its opposite edge is supported and guided by the V-channel 13.

Preferably, the throat piece 2, down to a point just above the ends of walls 5 and 6 lies between two parallel planes and is adapted to be seated against and parallel with wall 1. At about that point it is bodily deflected at a considerable angle, in the direction of its thickness, so that, when assembled on wall 1 the deflected portion will diverge, downwardly and inwardly, from the wall. Due to the rather sharp curve at the elbow and the sharp drop from bore 3 to the edge of magnet 12, the coins might tip out of the throat at this point. To guard against this, the cap plate 9 extends to and slightly beyond the ends of walls 5 and 6 and may partially overlap that part of the magnet adjacent wall 6, so that, as the coin strikes the magnet and is deflected at a sharp angle, the cap plate will overlie it and prevent its tipping out. This overlapping portion of cap plate 9 is deflected as at 16, where it overlies the elbow and magnet, to correspond with the deflection of the throat piece and is notched out or cut away from that point toward the junction between walls 5 and 10, as at edge 17, to permit free passage of the coin in its changed direction along the deflected portion of the throat piece. It should be noted that the path of travel of the coin from bore 3 to the elbow of the throat piece is vertical, that there is no gliding or sliding, the weight of the coin being mostly on its edge on wall 5; whereas, from the elbow to the end of the throat piece the path of travel is an incline, and there is a gliding and sliding motion, the weight of the coin being mostly on its edges or on its face.

By inclining the channel 4 in this way it is possible to use gravity to remove or scavenge out a very considerable proportion of slugs and other worthless objects in the first stages of coin selection, and to avoid imposing them upon subsequent testing or selecting devices. For this purpose, the entire channel floor between shelf

7 and the base of wall 5, and between bridge 8 and a point adjacent the lower end of magnet 12 is cut out, gouged, depressed or dished. The dished portion 4' is made as an incline beginning with zero along the base of walls 5 and 10 and running to maximum depth along shelf 7. For automatic gravity ejection from this deepened channel, the bottom of the deepened channel 4' is cut completely through to provide a discharge outlet 18 acting as a scavenger through which slugs and other waste may drop into a return channel 56. All coins of diameter less than the distance between wall 5 and shelf 7 will be scavenged through opening 18 and most of the pieces of irregular shape or outline, but small enough to pass through bore 3. When coins or other objects drop on to the arcuate incline 4' leading to opening 18, they cannot contact the magnet and, therefore, cannot be held by it to clog the selector. The scavenger, therefore, removes all objects of appreciably deficient diameter and most of the irregularly shaped objects, both magnetic and non-magnetic.

Up to this point, the selector has eliminated objects of too great diameter, too great thickness, appreciable shortness of diameter, and a large proportion of irregularly shaped objects.

It will be noticed that channel 4 extends considerably below the end of magnet 12 and the dished out portion, such extended portion 19 being flat, like the bridge 8 and in continuation of and merging with the surface 11. Wall 10, interrupted by incline 14, extends downwardly around surface 19 in somewhat of a crescent. The apex or deeper portion of this crescent-like curve of wall 10 is at a greater distance from the lower end of the V-channel 13 than is that portion of incline 14 extending upwardly therefrom and slightly greater than the diameter of a genuine United States nickel. Likewise, the shortest distance between the normal seating position of a standard nickel in V-channel 13 and wall 10, at a point below the beginning of incline 14 is very slightly less than the diameter of a standard nickel. Assume that a standard nickel starts along wall 10 toward the beginning of incline 14. Its momentum will carry it along the incline 14 above the perpendicular face of wall 10 and onward to the weight detector, as will later appear. However, if the diameter is only very slightly less than standard, it will follow the beginning of incline 14 only part way and then drop down the perpendicular wall 10 to the surface 19, gravitating along the edge of wall 10 and over surface 19 and finally pass out through the discharge opening 20, over the guide plate 21 and into the return chute 56. In this way, objects of standard diameter but less than standard thickness, and objects of sufficient diameter to be supported by shelf 7 but, nevertheless, of less than standard diameter, are eliminated.

Next magnetic coins are removed. A nickel of the currency of the Dominion of Canada, for instance, has substantially all of the dimensions, hardness characteristics and weight of the U. S. nickel. Consequently, if it were not magnetic, it would follow the path of the standard U. S. nickel, riding along the inclined arc 14. But, the Canadian nickel is magnetic. Therefore, the pull of magnet 12 sufficiently counteracts the momentum of that coin to make it miss the arcuate incline 14 and, instead, follow along the surface 19, around the lower curved end of wall 10 and out through the discharge opening 20. And, of course, other magnetic objects of similar dimensions would be similarly eliminated.

Coins of standard dimensions but of softer than standard material, due to such softness, create proportionately greater friction or drag, with correspondingly decreased momentum. Because of decreased momentum, they follow the arcuate incline 14 only part way and then drop down wall 10 to the surface 19 and follow over surface along wall 19 to the discharge 20, thereby eliminating softer than standard coins. Coins heavier than standard, whether or not of standard hardness, will have proportionately increased friction and retardation and be similarly eliminated. To increase the drag or friction and consequent retardation, wall 10 may be serrated as at 22, so that, as the coin edge engages these serrations, there will be increased friction, further retarding it and also tendin ; to cause it to rotate. And, of course, such rotation still further increases the frictional drag. Consequently, coins of standard dimensions but either more than standard weight or more than standard softness, will not have sufficient momentum to follow incline 14. They will drop to the surface 19 and follow wall 10 to discharge opening 20. So, at this point, soft coins, thin coins, coins slightly under standard diameter, coins of greater than standard weight and magnetic coins, are eliminated.

At this point, it is advisable to go somewhat into detail as to the arcuate incline 14. It will be noticed that it begins at the base of wall 10 considerably in advance of the beginning of surface 19 and considerably in advance of the beginning of the curve in the lower part of the wall 10. It slants upwardly along wall 10 around the curve bounding the surface of 19 and down to the plane of surface 19, just in advance of the discharge 20. Its contour, disposition and function is generally similar to that of a "bank" around the outer edge a race track or highway curve. As it follows wall 10, it tilts laterally, the tilt or slant decreasing steadily or steadily flattening out and merging into surface 19, from start to finish. Likewise it steadily and regularly increases in width from start to finish. The highest point of the inside edge of the incline is, approximately, at the sharpest or most abrupt part of the curve of wall 10 bounding the surface 19. Upward from this highest point it merges into the depressed floor 4' of the channel 4 and downwardly from this point it merges into the surface 19. Its lateral tilt is greatest or steepest at its upper end. It is also narrowest at its upper end. It widens gradually to its lower end which takes the form of a broad flat chute 23, leading both to the discharge 20 and to the upper end of a main coin runway. It is spirally disposed relatively to the lower end of channel 4 and the lower end of magnet 12. Genuine U. S. nickels will slide along this runway, after leaving the arcuate incline 14. They slide along the flattened lower part of incline 14, face down, on the incline. Their momentum will carry them along the incline which will guide them to chute 23 which will guide full-weight coins into the upper end of the coin runway. As the coin approaches the chute preliminary to entering the main runway, it encounters one end of a small weighted lever 24 pivotally mounted so that said end extends swingingly into the path of the nickel. The lever weight is so cal-

culated that its resistance will not deflect a nickel of standard weight from the path leading directly into the upper end of the coin runway 26. However, any coin which is of less than standard weight, even very slightly less, will be proportionately deflected toward the discharge opening 20. A very slight deflection will carry its centre of gravity beyond the ridge point 25, separating discharge 20 from the main coin runway 26. The coin, so deflected, will drop on ridge point 25 with its center of gravity on the side toward the discharge and will, therefore, be guided into and through discharge 20. As will be clear, incline 14 is grooved concentrically with the pivot of lever 24 to provide free travel of the lever end, as it is engaged by the coins. The pivoted lever offers exactly the right resistance to a nickel of standard weight. Various other resistance devices may be used. For instance, a spring in place of the weight; or a sliding member either weighted or spring actuated. So, as the coin passes the lever 24, all light weight coins are eliminated through discharge 20. In the selector illustrated, the chute 23 in continuation of incline 14, is turned on a gradual spiral about its longitudinal centre line or axis through an angle of 90° so that, in following incline 14 and chute 23, a standard weight nickel will have been turned from its position at the start of the incline 14 through an angle of 90°. Throughout that travel it will have been travelling on its face or in sliding contact with the surface of the incline and chute. The particular angular relation may be varied widely and almost without limit. The curvature or contour of the chute surface will be varied to correspond so that it will direct full-weight coins into the main coin runway 26 and light-weight coins beyond the ridge-point 25.

A simple, practical and economical way to make the throat piece 2 is by casting. The several surfaces (curved and flat) walls, bridge, bore, scavenger slot, chute, etc., may all be easily formed in one piece and as one operation. Then, the cap plate may be easily attached and the weighted lever and magnet easily attached. It may, of course, be easily made in several other ways.

Preferably, the runways through which the coins pass after leaving the chute, may be made by assembling two or more metal plates in spaced relation, the spacers defining the respective paths and separating the plates sufficiently to secure free non-binding travel of the nickel along the respective paths. For ease, speed, and economy of assembly, repair, adjustment and assembly, the plates and spacers may be bolted together. This assemblage may be easily and quickly bolted or otherwise removably connected to the throat piece in proper position to receive therefrom the coins.

Assume the runways and throat piece have been assembled in operative relation, and a standard U. S. nickel, in currency, has passed the lever 24. It will slide freely into the upper end of the main coin runway 26 defined by the spacing or filler blocks 27 between the parallel plates 28 which constitute the side walls of the runway. Through the upper part of one side plate an ejection opening 29 is provided. In general outline it is elliptical. Its lower end is considerably enlarged on one side of the longitudinal axis as at 30. The width of this opening from the upper end to the beginning of the enlargement 30 is appreciably less than the diameter of a nickel and than the width of the coin runway. It parallels the runway, lies between the blocks 27 defining the runway, and extends from one filler block 27 toward the other, leaving an overhanging plate flange 31 extending along its opposite edge. A nickel dropping through the runway will roll, edgewise, by gravity, along the edge of block 27 defining the lower boundary of the runway. With no force acting laterally on the nickel to tip or push it outwardly through opening 29, flange 31 will amply retain it as it rolls downwardly. At this point, the solid coins are separated from the perforated coins by a very simple selector. Approximately concentric with the longitudinal axis of 29, but on a considerably shorter axis or radius, a swinging arm 32 is mounted on the opposite plate. It is loosely pivoted to swing in a plane parallel to plate 28 and to rock in a plane perpendicular thereto, such movements being either simultaneous or separate. On one end it carries an arc shaped bar 33 of a length equal to the radius of a nickel. The free end of this bar is offset to form a coin seat 34 while the opposite end, where it joins 32, is provided with an ejector pin 35. Arc bar 33 is concentric with the pivot of the arm 32. Its ejector and coin seat project through and travel in an arcuate slot 36. This slot, of course, is of the same radius, as arm 32 and bar 33. Its upper end is at the approximate longitudinal center of 29. Its lower end is appreciably nearer the lower side of opening 29. So, as coin seat 34 and pin 35 are moved downwardly in slot 36, as will later appear, they move from the upper side toward the lower side of opening 29. As they reach the extreme lower end of their travel, coin seat 34 is received by a notch 37 in spacing block 27, so that it will be out of the path of travel of a coin rolling downwardly along the edge of the spacing block. A tension spring 38, connected to plate 28 and arm 32 acts to maintain arm 32 with coin seat 34 and pin 35 in the upper end of slot 36. Preferably, coin seat 34 is grooved to receive and slide over the inner edge of slot 36. This maintains coin seat 34 at all times in the correct position relatively to the coin runway to properly receive and support a coin. Since ejector pin 35 is spaced from coin seat 34 a distance equal to the radius of a nickel, its projection through slot 36 must be prevented until the nickel has passed beyond it and seated on 34. For that purpose, that branch of pivot arm 32 to which spring 38 is attached, is offset considerably from the supporting plate 28. Consequently, it pulls that end down toward the plate and rocks the opposite end away, drawing the ejector pin 35, back, out of slot 36. Coin seat 34, however, is held in its proper operative position by engagement with the edge of slot 36. Assume that a solid or imperforate nickel starts along the runway toward coin seat 34. As it engages 34 it will draw arm 32 down, against the tension of spring 38. As it travels downward a stud, pin or other projection 39 on the back or outer side of 33 where it joins 32, riding along an overhanging cam 40 gradually projects ejector pin 35 against the face of the nickel, forcing it outwardly from seat 34. Since flange 31 overlaps part of the upper edge, and the lower edge is free, the lower edge will slip from its seat. This is timed to occur as the coin approaches the enlarged lower portion of opening 29. The coin then simply slides from the main runway through the enlargement 30, over the beveled edge thereof and into the upper end of the by-pass runway 41. Bevel-

ling of this edge, removes all obstruction and assists in easy, smooth sliding of the coin. It is substantially a straight vertical downward drop, with full gravity fall from seat 34 and enlargement 30 into the upper end of 41.

Assume now, that a slug or other object having the weight, dimensions, etc., of a nickel and having a central perforation or opening reaches seat 34. It will ride down with the seat but the pin 35 will not move it from its seat. It will not be rejected into the by-pass. The ejector pin 35 will pass freely into the central opening. As the seat 34 approaches its lower limit it will also have moved laterally from near the center of the runway to a point just beyond the lower end of the side of the runway nearest the pivot of arm 32. As it reaches this position, it will pass into a small notch or recess in the spacing block so that it will not present an obstruction to a coin travelling along the edge of the block in the runway. Ejector pin 35 must be withdrawn from the perforation, of course, before the coin can roll from its seat 34. For this purpose, a small cam 43 is mounted on plate 28 in the path of swing of 32. As soon as the ejector pin 35 has been projected, as above explained, cam 43 begins its withdrawal, during the continued downward travel of 32, completing it before the seat reaches its lower limit, so that the coin is free to follow the runway as soon as it rolls from seat 34. It will be clear, that in this downward swing, the seat 34, originally practically directly under the center of gravity of the nickel, gradually moves far to one side so that the coin is free to roll off of the seat as the seat reaches its lower limit. As it does roll off, the flange 31, which has continually overlapped it, maintains it in the runway 26, through which it gravitates without further interruption, to the slug outlet 42.

Returning, now, to the nickel which has been ejected into the by-pass 41. This by-pass may be a simple narrow plate having an upper end slightly deflected outwardly and overlapping the lower enlarged portion 30 and provided with a short peripheral rib or flange 44 defining the by-pass. This by-pass, preferably, is either soldered or welded to plate 28 in a downwardly inclined direction leading to and communicating with an opening 45 therethrough. Opening 45 communicates with the upper end of a second short coin runway 46 between the two side plates 28. Both the edge of opening 45 and the edge of the flange 44 at the lower end of by-pass 41 are suitably bevelled to provide easy, smooth, lateral transfer movement of the nickel from by-pass 41 through opening 45 into runway 46. It will be noticed that a coin travelling along runway 46 has reversed its direction, relatively to its travel through by-pass 41. The reversal starts immediately following the transfer. At the moment of transfer the coin is brought, momentarily, to a dead stop or rest on the incline at the upper end of runway 46. Therefore, all coins from the by-pass will have the same starting speed as they leave the upper end of the return runway 46. By starting from rest, every genuine nickel will acquire the same momentum on its flight or trajectory to the anvil described later; all will strike the anvil at the same point, with the same force, and all will rebound equally through the same arc.

Toward the lower end of runway 46 is disposed a horse-shoe or permanent magnet 47 so arranged that the runway includes and passes through the air-gap between the pole pieces. As the coins pass through this air-gap, the magnetic flux will act upon them and retard or slow them in proportion to their electric conductivity. Each coin, as it leaves, the lower end of the runway 46 will follow a definite curved path or trajectory in a free fall or flight, the paths differing according to the electric conductivity of the respective coin. At the bottom of this fall or flight is secured an anvil or rebound block 48. Every standard nickel leaving the air-gap of the magnet will land squarely, edge-on, on anvil 48 and will rebound in an upward curve toward magnet 47. In doing so, it will pass above the slug outlet 42, above barrier 49 and drop into and through a coin outlet 50. Barrier 49 is simply a finger carried by a small bar or plate which is adjustably mounted on plate 28. In the present instance, this adjustable mounting is simply a slot in the bar and a tightening or clamping screw passed through the slot and turned into the plate. The finger of the barrier 49 projects through a slot in one plate 28 and extends across the space between the plates so that a standard nickel rebounding from anvil 48 would have to rise above or hurdle it in order to drop into the coin outlet. The rebound path depends both on the trajectory of the nickel in its flight from runway 46 and on the resilience of the metal of the nickel. If the electric conductivity of a coin inserted in the device corresponds to that of the standard nickel and the resulting trajectory similarly corresponds, but the coin does not have standard resilience, it will not rebound over the barrier and into the coin outlet, regardless of the fact that it might strike the anvil along the right trajectory and at the right point on the anvil. So, in assembling, barrier 49 will be adjusted to the point where nickels of standard conductivity and standard resiliency, on rebounding from anvil 50, will just clear the barrier.

Coins having greater conductivity than that of standard nickels and passing through the air-gap between the poles of the magnet will be retarded proportionately more and will have trajectories correspondingly shorter. All such coins are intercepted by a deflector bar 51 extending across the space between plates 28. It projects through a slot in one plate. It is carried on one end of one prong of a tuning fork 52, which is adjustable on one of the plates 28 by means of screw and slot connections similar to that of the barrier. The slot is so disposed, of course, as to permit adjustment of the deflector 51 toward and from the trajectory paths of the coins. As such coins strike the deflector bar they will bounce forward and upward and finally land on anvil 48. Due to excessive retardation and subsequent deflection, they will strike the anvil at different points, different angles and with different forces than they would if they were standard nickels. In rebounding, therefore, they will not clear the barrier but will pass out through the slug outlet 42. In assembling, a number of standard nickels will be run through the selector and the tuning fork 52 will be adjusted until the standard nickels just exactly clear or miss the bar 51. This is easily determined by the clear and definite ring of the fork every time bar 51 is struck, and failure to ring when missed.

Coins having less conductivity than that of standard nickels and passing through the air-gap will be retarded proportionately less and will

have trajectories correspondingly greater. All such coins are intercepted by a back-stop 53, similar to bar 51, except that it is of considerably greater length. It, too, is carried on one prong of a tuning fork 54, mounted on one of the plates 28 by a screw. The back-stop, plate or bar 53 projects through a slot in plate 28 and is so proportioned as to extend upwardly approximately at right angles to the operative edge of anvil 48. In assembling, it is disposed a short distance from the edge of the anvil most remote from the slug outlet 42. Coins of deficient conductivity will strike the back-stop 53 and will either be deflected directly into the slug outlet or on to the anvil and then into the slug outlet. This tuning fork will, also, give an audible sound when the back-stop 53 is struck. In assembling, tuning fork 54 will be preliminarily set in approximate position and a number of genuine nickels will be run through the selector. If the nickels do not strike the back-stop at first, the fork will be swung on its screw until nickels do strike. Then it will be backed off until nickels fail to strike. At that point it will be set or tightened.

It has been found in practice that coins striking either the deflector bar 51 or the back-stop 53, even though they are not appreciably deflected thereby and even though they may have the same resilience as a genuine nickel, have their ability to rebound reduced so that they are in effect trapped between the barrier 49 and the anvil and pass out through the slug outlet 42. This arrangement provides positive separation and permits a very accurate adjustment of the device which is further facilitated and made more practical by the audible indication of improper adjustment as explained above.

So, at this point, nickels of incorrect conductivity or incorrect resiliency will be eliminated.

The course of a coin through the selector is indicated by arrows, full line arrows showing the path of a genuine coin, while dotted arrows show paths of rejections, for various defects.

There may be times, infrequent, however, when a coin that is very slightly too large either in diameter or in thickness, becomes stuck in the throat piece. To readily, easily and quickly remove such a notch 55 is provided. This may be in the form of a groove in the inner wall of bore 3 and extending radially and from the front through bridge 8, or it may be as an arcuate notch eccentric to bore 3 and extending from the front through the bridge 8. If a groove, the stuck coin may be removed by running a wire back through the groove and hooking the coin from the rear. If a notch, the coin may be removed by engaging the edge with the tip of a finger.

It is thought that the construction, operation and use of the invention will be clear from the preceding detailed description.

Many changes may be made in the construction, arrangement and disposition of the various parts of the invention within the scope of the appended claims without in any way departing from the field of the invention, and it is meant to include all such within this application wherein only one preferred construction and arrangement has been illustrated by way of example and with no thought of limiting the invention by such illustration.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. In combination in a coin selector, a coin entrance having a bore of the diameter of the respective genuine coin, a passageway leading therefrom having a thickness equal to the thickness of said coin, an elbow slightly curved laterally leading from said passageway to a coin channel, said channel being inclined laterally and also inclined edgewise, the lowermost edge of said channel comprising a V-groove and the uppermost edge of said channel comprising a coin-supporting surface so inclined as to tend to crowd the coins into the V-groove and to impart a somewhat spiral motion to the coins, said coin-supporting surface merging with an inclined surface below the lower end of said V-groove, said coin channel having its lower plate cut away to such a distance from the V-groove as to cause coins thinner or smaller in diameter than genuine coins to slip off the inner edge of said coin-supporting surface and be ejected, said coin-supporting surface being adapted to guide genuine coins into a deposit channel.

2. In combination in a coin selector, a coin entrance having a bore of the diameter of the respective genuine coin, a passageway leading therefrom having a thickness equal to the thickness of said coin, an elbow slightly curved laterally leading from said passageway to a coin channel, said channel being inclined laterally and also inclined edgewise the lowermost edge of said channel comprising a V-groove and the uppermost edge of said channel comprising a coin-supporting surface which merges with an inclined surface below the lower end of said V-groove, means to provide a field of magnetic flux at the lower end of said V-groove, said coin channel having its lower plate cut away to such a distance from the V-groove as to allow coins deflected by said magnetic field to slip off the inner edge of said coin-supporting surface and be ejected, said supporting surface being adapted to guide genuine coins into a deposit channel.

3. In combination in a coin selector, a coin entrance having a bore of the diameter of the respective genuine coin, a passageway leading therefrom having a thickness equal to the thickness of said coin, a coin channel leading from said passageway in an inclined plane, said coin channel being also inclined edgewise, the lowermost edge of said channel comprising a V-groove and the uppermost edge of said channel comprising a coin-supporting surface so inclined, relative to the plane of said channel, as to tend to crowd coins into said V-groove, said coin-supporting surface merging with an inclined surface below the lower end of said V-groove, said coin channel having its lower plate cut away to such a distance from the V-groove as to cause coins thinner or smaller in diameter than genuine coins to slip off the inner edge of said coin-supporting surface and be ejected, said coin-supporting surface being also adapted to guide genuine coins into a deposit outlet.

4. In combination in a coin selector, a coin entrance having a bore of the diameter of the respective genuine coin, a passageway leading therefrom having a thickness equal to the thickness of said coin, a coin channel leading from said passageway in an inclined plane said coin channel being also inclined edgewise, the lowermost edge of said channel comprising a V-groove and the uppermost edge of said channel compris-

ing a coin-supporting surface which merges with an inclined surface below the end of said V-groove, means to provide a field of magnetic flux at the lower end of said V-groove, said coin channel having its lower plate cut away to such a distance from the V-groove as to allow coins deflected by the magnetic field to slip off the inner edge of said coin-supporting surface and be ejected, said coin-supporting surface being also adapted to guide genuine coins into a deposit channel.

5. In combination in a coin selector, a coin entrance having a bore of the diameter of the respective genuine coin, a passageway leading therefrom having a thickness equal to the thickness of said coin, a coin channel leading from said passageway in an inclined plane said coin channel being also inclined edgewise, the lowermost edge of said channel comprising a V-groove and the uppermost edge of said channel comprising a coin-supporting surface which merges with an inclined surface below the lower end of said V-groove, a weighted lever extending into the coin channel opposite to and below the lower end of said V-groove, said coin channel having its lower plate cut away to such a distance from the V-groove as to allow coins deflected by the weighted lever to a greater extent than genuine coins to slip off the inner edge of said coin-supporting surface and be ejected, said coin-supporting surface being adapted to guide genuine coins into the deposit channel.

6. In combination in a coin selector, a coin entrance having a bore of the diameter of the respective genuine coin, a passageway leading therefrom having a thickness equal to the thickness of said coin, a channel leading from said passageway inclined both laterally and edgewise of which the lowermost edge is in the form of a V-groove a portion of the walls at the lower end of said V-groove being a permanent magnet, means opposite the lower end of said V-groove adapted to deflect into a coin return chute magnetic objects and objects thinner or smaller in diameter than a genuine coin said means serving also to guide genuine coins into a deposit outlet.

7. In combination in a coin selector, a coin entrance having a bore of the diameter of the respective genuine coin, a passageway leading therefrom having a thickness equal to the thickness of said coin, a channel leading from said passageway inclined both laterally and edgewise of which the lowermost edge is in the form of a V-groove a portion of the walls at the lower end of said V-groove being a permanent magnet, a weighted lever extending into the coin channel on the opposite side of the channel from the V-groove adapted to engage coins just after they leave the V-groove means opposite the lower end of said V-groove to deflect into a coin-return chute magnetic objects, objects thinner or smaller in diameter than a genuine coin and objects of lesser weight than a genuine coin said means serving also to guide genuine coins into a deposit outlet.

8. In combination in a coin selector, a coin entrance having the bore of the diameter of the respective genuine coin, an edgewise inclined passageway leading therefrom in a substantially vertical plane said passageway having a thickness equal to the thickness of said coin, an elbow slightly curved laterally leading from said passageway to a coin channel, said coin channel being inclined rearwardly and also inclined edgewise in the opposite direction to the edgewise incline of said passageway, the edge of said coin channel below the short side of the elbow merging into a surface that is approximately in the plane of the inclined coin channel, the floor of said elbow and of said inclined coin channel being partially cut away leaving a narrow ledge to support and deflect genuine coins and adapted to eject through an opening in the bottom of the cut-away portion objects smaller than a genuine coin which are not so deflected and to guide genuine coins into the deposit channel.

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