Nov. 3, 1964 R. E. PERKINS 3,155,101

COIN SEPARATOR

Filed April 10, 1961 3 Sheets-Sheet 1

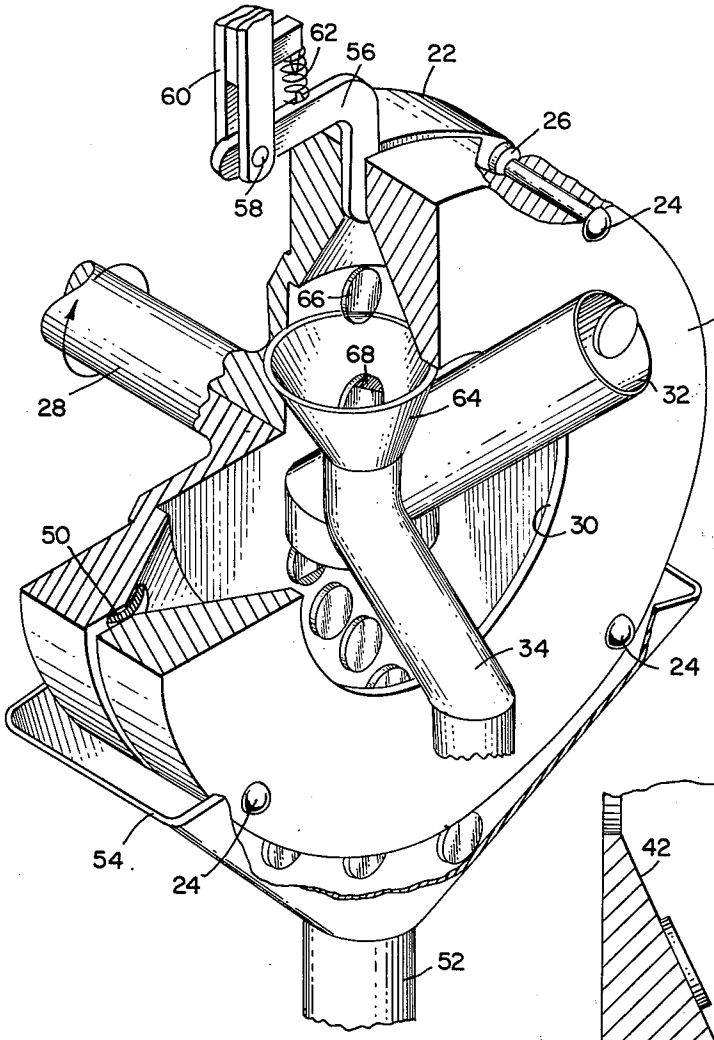


FIG. 1

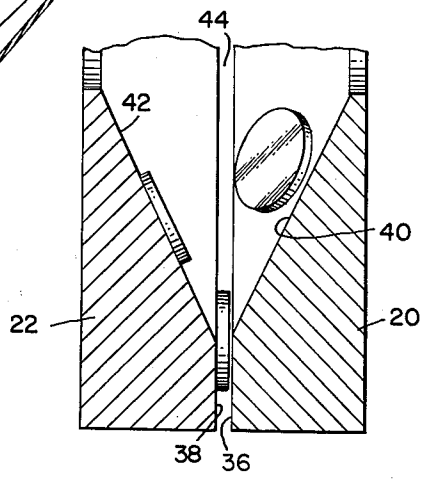


FIG. 2

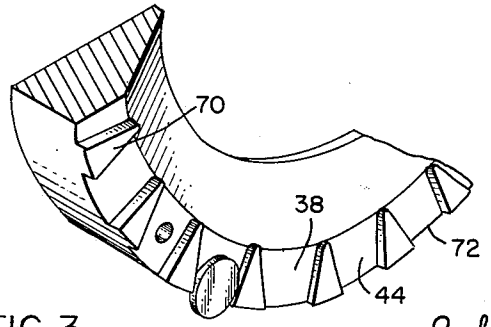


FIG. 3

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Nov. 3, 1964 R. E. PERKINS 3,155,101

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Filed April 10, 1961 3 Sheets-Sheet 2

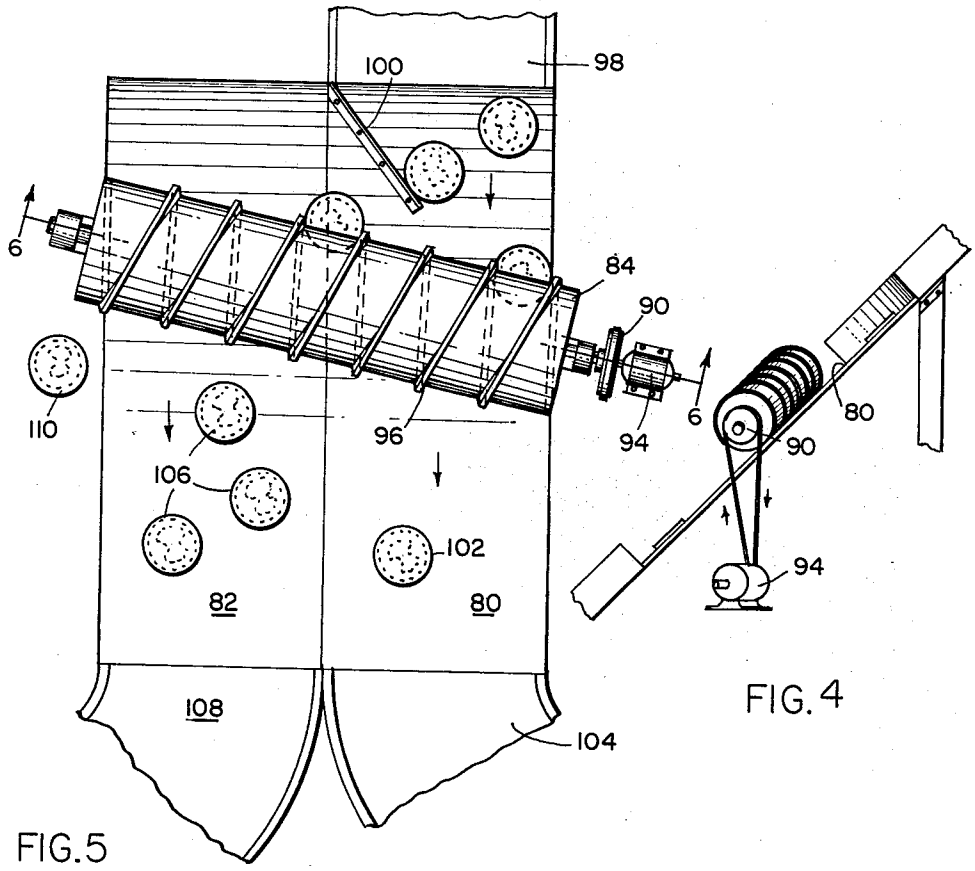


FIG. 5

FIG. 4

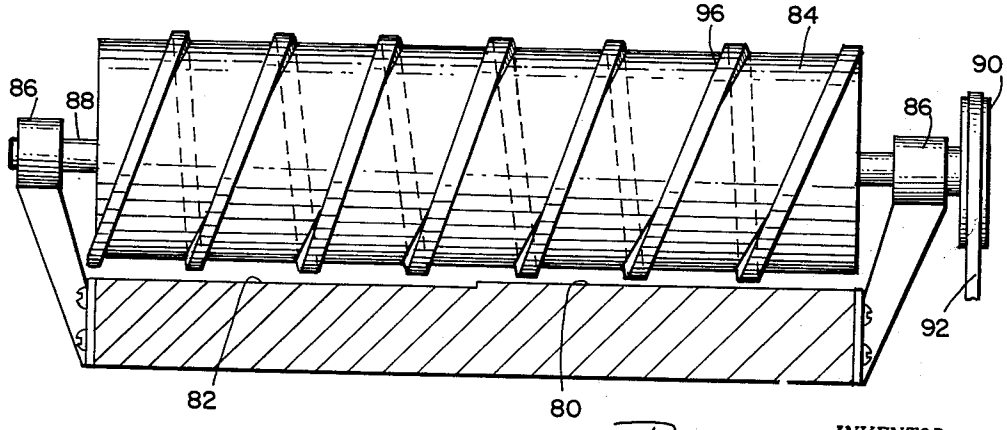


FIG. 6

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COIN SEPARATOR

Filed April 10, 1961 3 Sheets-Sheet 3

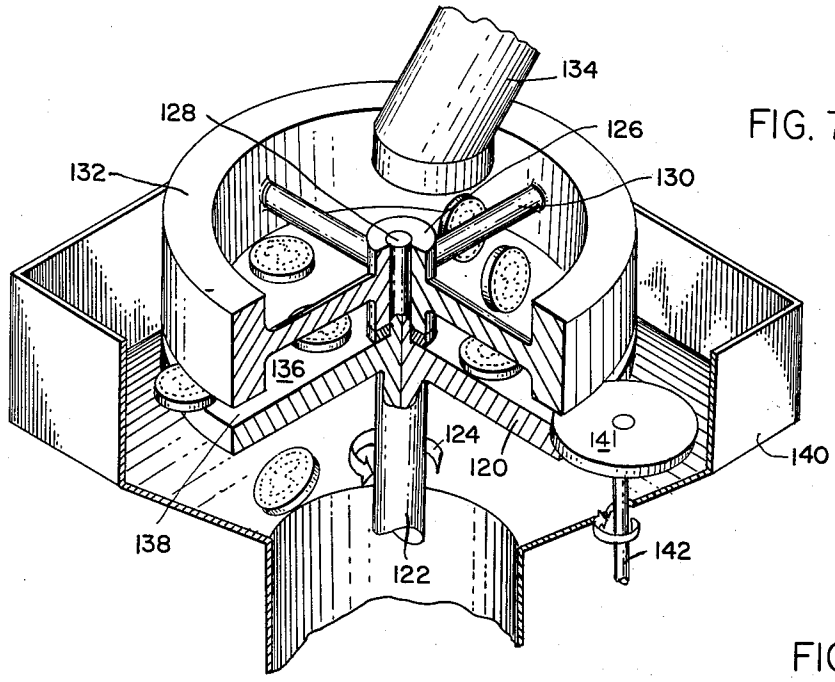


FIG. 7

FIG. 9

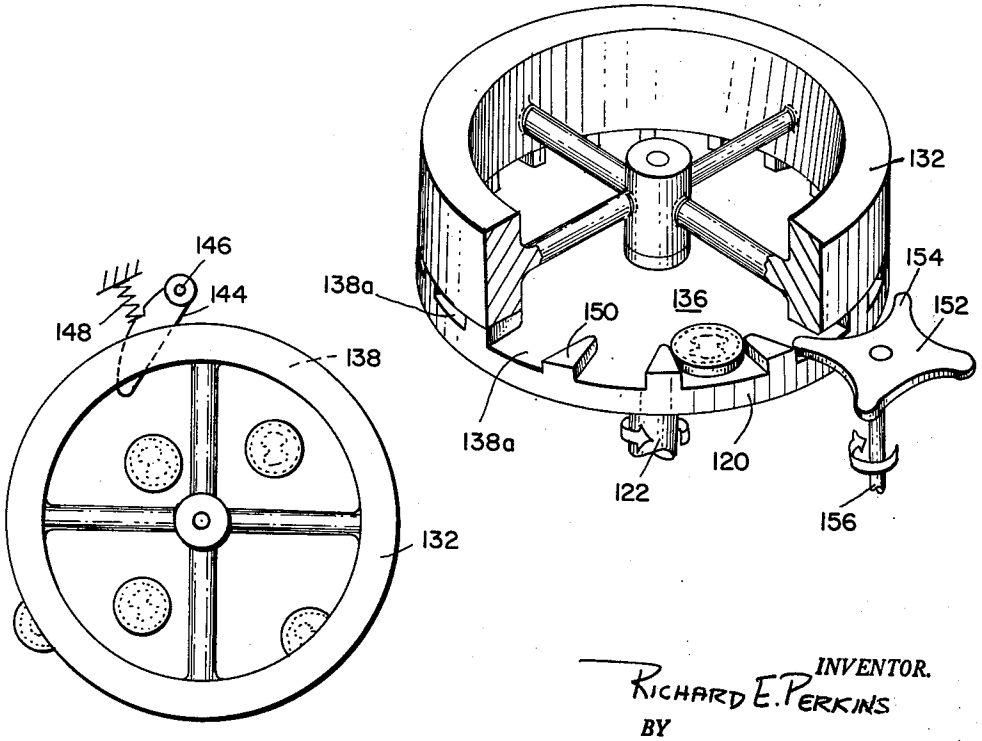


FIG. 8

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3,155,101

COIN SEPARATOR

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8 Claims. (Cl. 133—3)

This invention relates to coin handling machines and more particularly comprises a device for separating coins of a normal size from those which are in any way worn or mutilated. While this invention has numerous applications, it is particularly well suited for use in combination with equipment which may test the authenticity of coins of one or more denominations.

In recent years automatic coin handling equipment such as vending machines and change makers have come into wide use. Because worn and mutilated coins may jam or otherwise impair the operation of most coin machines, substantial effort has been made to discover inexpensive, dependable, large capacity devices for separating the worn and/or mutilated coins from coins in good condition. Such devices may be effectively used as the first stage in the coin handling machine to avoid any jamming or other form of breakdown of the other equipment in the machine.

The primary object of my invention is to provide a dependable high capacity coin separator which may be manufactured inexpensively.

Another object of my invention is to provide a coin separator which may readily be combined with other forms of coin handling equipment to prevent worn and mutilated coins from reaching the other equipment.

To accomplish these and other objects, my invention may be embodied in any one of several forms. In each of the several forms the coins being tested are passed through elongated slots of a height just in excess of the normal coin thickness so that all oversized coins will either lodge in the slots or be retained on the inlet side of the slots. To further test the coins being handled, the slot of a particular height may be subdivided into separate sections of a width just exceeding the normal diameter of coins of the denomination being tested. When coins are subjected to the two tests recited, those coins having either an oversized diameter or thickness will be separated from the other coins tested. In one embodiment of my invention the coin separator is further refined to separate out those coins having less than a prescribed minimum thickness, and in several embodiments of my invention the slots are at least equal in length to one-half the coin diameter so that bent coins will not pass through them.

These and other objects and features of my invention will be better understood and appreciated from the following detailed description of several embodiments thereof, selected for purposes of illustration, and shown in the accompanying drawing, in which:

FIG. 1 is a perspective view of one embodiment of a coin separator constructed in accordance with my invention;

FIG. 2 is a detailed cross sectional view of a portion of the separator shown in FIG. 1;

FIG. 3 is a fragmentary perspective view of a portion of the separator shown in FIG. 1 with a modification added;

FIG. 4 is a side view of a second embodiment of coin separator constructed in accordance with my invention;

FIG. 5 is an enlarged plan view of a portion of the separator shown in FIG. 4;

FIG. 6 is a cross sectional view taken along the corresponding section line of FIG. 5;

FIG. 7 is a perspective view partly in section of another embodiment of coin separator constructed in accordance with my invention;

FIG. 8 is a plan view of a coin separator slightly modified from that shown in FIG. 7; and

FIG. 9 is a perspective view partly in section of yet another coin separator constructed in accordance with my invention.

In the embodiment of my invention shown in FIGS. 1 and 2, a pair of annular discs or rings 20 and 22 are secured together by screws 24 and separated a selected distance apart by spacers 26. The discs 20 and 22 are carried by shaft 28 which is adapted to rotate the discs about their common horizontal axis.

The outer faces of the two discs may take virtually any shape but an opening 30 is provided in the center of the disc 20 through which inlet chute 32 and reject discharge chute 34 extend. The inner or facing surfaces of the two discs are provided with peripheral parallel walls 36 and 38. The parallel walls 36 and 38 form continuations of sloping walls 40 and 42 respectively that converge toward one another in a radial outward direction. Thus, as is evident in FIG. 2, the sloping walls 40 and 42 define a trough-like bin between the two discs 20 and 22, which is open at its bottom by virtue of the narrow space or slot 44 between the facing walls 36 and 38. The trough-like bin extends about the full periphery of the discs 20 and 22 as does the slot 44 defined by the facing walls 36 and 38.

It is evident in FIG. 1 that the inlet chute 32 is oriented to drop coins into the bin at the bottom of its arc defined by the periphery of the discs 20 and 22. It is evident from an inspection of FIG. 2 that certain of the coins deposited in the bin will fall through the slot 44. The width of the slot 44 as defined by the spacers 26 just exceeds the thickness of a normal coin of the particular denomination being handled by the separator. It should be borne in mind that the seperator shown is designed to separate coins of only one denomination.

As stated, coins which do not exceed the maximum thickness of acceptable coins as defined by the slot 44 will pass through the slot. Those coins which exceed the maximum thickness will be retained in the trough defined by the inclined walls 40 and 42. If a coin is bent, it may only partially enter the slot 44 and lodge there as suggested by coin 50 in FIG. 1. In FIG. 1, a good coin outlet chute 52 is shown carrying a hopper 54 in length substantially equal to the diameter of the discs 20 and 22. Thus, the hopper 54 is positioned to catch all coins which pass through the slot 44.

The shaft 28 which carries the discs 20 and 22 may be driven by any prime mover (not shown) to cause the discs to rotate about their common horizontal axis. Extending through the slot 44 at the highest point of the disc peripheries is a finger 56 pivotally supported by pin 58 on bracket 60. The finger 56 is urged to the position shown in FIGURE 1 by spring 62. As the discs rotate, coins which lodge in the slot 44 are carried to the finger 56 which dislodges the coins at the top of the arc, causing the coins to drop into the funnel 64 carried on the top of the reject discharge chute 34. Coins 66 and 68 are shown in FIG. 1 dropping into the funnel 64. The fact that the finger 56 is pivotally supported by pin 58 permits the finger to ride out of the slot 44 over the spacers 26 when the spacers reach the top of the arc defined by the disc periphery.

The coin separator illustrated in FIGS. 1 and 2 may be further refined by adding the wedge shaped dividers 70 about the slot 44 defined by the facing walls 36 and 38, as shown in FIG. 3. The minimum space between the dividers 70 may advantageously be located at the radial extreme of the discs 20 and 22 at the edge 72. If the minimum diameter at 72 between the dividers just exceeds

the normal diameter of a coin of the denomination being handled, coins having excessive diameters will lodge in the slot 44 between the dividers and be carried to the finger 56. By using the dividers 70 a more refined separation is effected and more oversized and mutilated coins will be carried to the clearing finger 56 and be discharged through the chute 34.

In the embodiment of my invention shown in FIGS. 4–6, a pair of parallel inclined planes 80 and 82 pass beneath a barrel or drum 84 supported for rotation about its axis by bearings 86 surrounding the ends of the carrying shaft 88. A pulley 90 on the end of shaft 88 is driven by a belt 92 in turn driven by the output shaft of drive motor 94. It is apparent in FIGS. 4 and 5 that the outer surface of the barrel 84 is parallel to both inclined planes 80 and 82 and that the barrel itself is inclined. The end of barrel 84 over the inclined plane 82 is at a higher elevation than the other end over plane 80.

In FIG. 6 it will be noted that the inclined plane 80 is spaced a lesser distance from the periphery of barrel 84 than is the inclined plane 82, and the surface of the drum 84 carries a flange 96 wound as a helix to form a worm-like gear from the barrel. The adjacent turns of the flange 96 are spaced apart a distance just exceeding the normal diameter of coins of the denomination being tested.

The distance between the surface of inclined plane 80 and the surface or skin of barrel 84 is just less than the minimum acceptable thickness of coins of the denomination being handled. The space between the surface of inclined plane 82 and the skin of barrel 84 defines the maximum acceptable thickness of such coins.

In operation, the embodiment of my invention shown in FIGS. 4–6 functions as follows: Coins to be separated are directed to the top of the inclined plane 80 by means of the chute 98. A guide 100 disposed at the top of the inclined plane 80 directs the coins so introduced to the right side of the plane and drum 84 as viewed in FIG. 5. Any coin so directed which is thinner than the minimum acceptable thickness of coins being tested is capable of sliding between the periphery of the drum 84 and the inclined plane 80, so long as the diameter of the thin coin does not exceed the distance between the adjacent turns of the flange 96. If a coin is thinner than the minimum acceptable thickness and meets the other requirements stated, it will pass beneath the drum 84 as suggested by the coin 102 and slide down the reject chute 104.

Those coins which do not pass beneath the drum 84 on the inclined plane 80 will be carried by the helically wound flange 96 to the left as viewed in FIG. 4 to the surface of plane 82. Those coins deposited on the plane 82 above the barrel 84 on the high side of plane 82 and which do not exceed the maximum acceptable thickness and which further do not exceed the maximum coin diameter, will slide beneath the drum 84 as is suggested by the coins 106. The coins 106 are then directed by the discharge chute 108 to a point of collection for those coins which do not exceed a maximum acceptable diameter and whose thickness is between maximum and minimum dimensions established by the distance between the planes 80 and 82 and the barrel surface.

Those coins which either exceed in diameter the space between the adjacent turns of the helically wound flange 96 and those coins whose thickness exceeds the space between the surface of inclined plane 82 and the barrel will be carried off the side of the plane 82 in a manner suggested by coin 110. A chute may be conveniently provided at that location to collect these coins.

It should be appreciated that if the diameter of drum 84 is large, the arc defined by its surface adjacent the planes will be substantially flat and may define with the planes an elongated slot to separate bent from unbent coins in the manner of the slot 44 in the embodiment of FIGS. 1–2.

In the embodiment of my invention shown in FIG. 7 a disc 120 supported on the upper end of shaft 122 rotates in the direction suggested by arrow 124. A hub 126 carried on the spindle 128 on the end of shaft 122 is provided with a number of spokes 130 which radiate outwardly from the hub and carry a cylindrical wall 132. The wall 132 and the disc 120 together define a bowl into which are deposited by means of the chute 134 those coins being tested. By virtue of the manner in which the disc 120, the hub 126 and the cylindrical wall 132 are connected together, the bowl rotates about the axis of the shaft 122.

The lower edge of the wall 132 is spaced from the upper surface 136 of the disc 120 a distance just equal to the maximum acceptable thickness of coins of the denomination being tested. Thus, coins which do not exceed the maximum acceptable thickness may pass through the slot 138 defined by the surface 136 and the lower edge of wall 132 and be deposited in the collecting box 140.

The slot 138 defined between the bottom of the wall 132 and the surface 136 has an appreciable radial length which may be substantially equal to one half the diameter of the coins being tested. With a slot of at least that length, even a slight bend in the coin will cause it to lodge in the slot 138 rather than pass through it into the collecting box 140.

It will be appreciated that the coins deposited in the bowl by the chute 134 will be thrown radially outward by centrifugal force in the direction of the slot 138 as the bowl rotates. Only those coins which are of proper thickness and which are not mutilated in a manner to have a bend across the diameter will pass to the box 140. Those coins which do not meet the standards defined by the slot will be retained in the bowl.

A clearing disc 141 carried on the end of shaft 142 extends into the slot 138 to dislodge any coins which wedge in the slot due to their abnormal thickness or curvature. In this manner, the abnormal coins will not be permitted to build up in the slot to reduce the capacity of the device.

In FIG. 8 a minor modification is shown of the embodiment of FIG. 7. In the embodiment of FIG. 8, the clearing disc 140 is replaced by a finger 144 pivotally supported on a pin 146. A spring 148 biases the finger 144 into the slot 138 and it will act to clear coins which lodge in the slot. Note that in the embodiments of FIGS. 7 and 8 the clearing mechanisms remain at the same point of arc and each point of the slot passes by that location during each revolution. It will be understood that with the embodiments of FIGS. 7 and 8 an operator should periodically remove the coins retained in the bowl to maintain the operation at maximum capacity.

In the embodiment of FIG. 9 a refinement is added to that of FIGS. 7 and 8 comparable to that suggested in FIG. 3. As in FIG. 3, dividers are employed in the slot through which the coins being tested must pass to gauge or measure the diameter of the coins. As in FIG. 3, the distance between the dividers 150 equals the maximum acceptable diameter for coins of the denomination being tested. Thus, each slot 138*a* defined in thickness by the surface 136 of disc 120 and the bottom of the cylindrical wall 132 and in width by the distance between the dividers 150 will be sized to pass only those coins which do not exceed a maximum thickness and diameter. By making the length of slot 138*a* of appreciable length (defined by the thickness of wall 132) the device is assured of trapping any coins having any appreciable degree of curvature across the diameter.

Because the slot 138 is divided into a plurality of slots 138*a* by the dividers, the clearing disc 144 may not be used and the finger 144 shown in FIG. 8 would prove somewhat less than satisfactory. These clearing mechanisms are replaced by a star wheel 152 having points 154 which will register with each of the slots 138 and remove any coins lodged in them. The shaft 156 which supports the star wheel 152 could provide the rotational drive for the bowl defined by the disc 120 and cylindrical wall 132.

In that case, the disc and cylindrical wall would be secured together and idle on the top of shaft 122.

From the foregoing description of several embodiments of my invention, those skilled in the art will appreciate that numerous modifications may be made of any one of them without departing from the spirit of my invention. Therefore, it is not my intention to limit the breadth of my invention to the specific embodiments illustrated and described. Rather, it is my intention that the breadth of this invention be determined by the appended claims and their equivalents.

What is claimed is:

1. A coin separator comprising a cylindrical drum disposed with its axis inclined, an inclined plane disposed beneath the lower end of the drum and spaced from the drum surface a distance less than the thickness of an unmutilated coin of the denomination to be handled, a second inclined plane disposed beneath the drum adjacent the first surface and on the side of the higher end of the drum, said second plane being spaced from the drum periphery a distance just in excess of the thickness of coins of the denomination to be handled, means for depositing coins to be separated on the first inclined plane above the drum, and means causing coins which fail to pass beneath the drum on the first plane to move to the second plane above the drum.

2. A coin separator as defined in claim 1 further characterized by the last recited means including power means for rotating said drum, and pushing means secured to the drum periphery for moving said coins in the direction of the higher end of the drum.

3. A device as defined in claim 2 further characterized by said pushing means comprising a flange wound about the drum periphery in the form of a helix.

4. A coin separator as defined in claim 3 further characterized by the adjacent turns of said helically wound flange being spaced apart a distance just exeeding the normal diameter of unmutilated coins of the denomination to be handled.

5. A coin separator comprising a cylindrical drum, a plane disposed beneath the drum and spaced from the drum periphery a distance less than the thickness of unmutilated coins of the denomination to be handled, a second plane disposed beneath the drum adjacent the first plane, said second plane being spaced from the drum periphery a distance just in excess of the thickness of normal coins of the denomination to be handled, means for depositing coins on the first plane on one side of the drum, means causing coins to pass along said first and second planes, means operatively connected to the drum causing the coins on the first plane which fail to pass beneath the drum to move to the second plane.

6. A coin separator as defined in claim 5 further characterized by the means operatively connected to the drum including a helically wound flange secured to the drum periphery, and means for rotating the drum.

7. A coin separator as defined in claim 6 further charterized by the adjacent turns of said helically wound flange being spaced apart a distance just exceeding the normal diameter of coins of the denomination to be handled.

8. A coin separator comprising a drum, a plane disposed adjacent the drum and spaced from the drum surface a distance less than the thickness of unmutilated coins of the denomination to be separated, a second plane disposed adjacent the first plane, means for depositing coins on the first plane on one side of the drum, means urging coins to pass to the other side of the drum on the first plane, and means operatively connected to the drum causing coins on the first plane which fail to pass to the other side of the drum to move to the second plane.

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