

[54] **COIN ORIENTING, SORTING AND DISPENSING APPARATUS**
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[57] **ABSTRACT**

Randomly oriented coins are moved along a series of upwardly inclined ramps to orient the coins in a single plane and to separate stacked coins. The ramps are covered with a mohair fabric which has been treated so as to make it resistive of deformation in one direction and compliant in another direction. The ramps are vibrated to move the coins along the fabric. Non-jamming gates and bars are provided to assure that none of the coins are stacked on one another. The oriented coins are directed from the end of the last ramp into a chute in which they are held in a vertical plane. In one embodiment, retractable stops are provided for holding and dispensing a predetermined number of coins from the chute. In a second embodiment, the chute is provided with sized slots for sorting the coins by denominations. A limit switch is provided to stop the vibrator and, thus, the feeding of coins to the chute when the chute is filled.

[56] **References Cited**

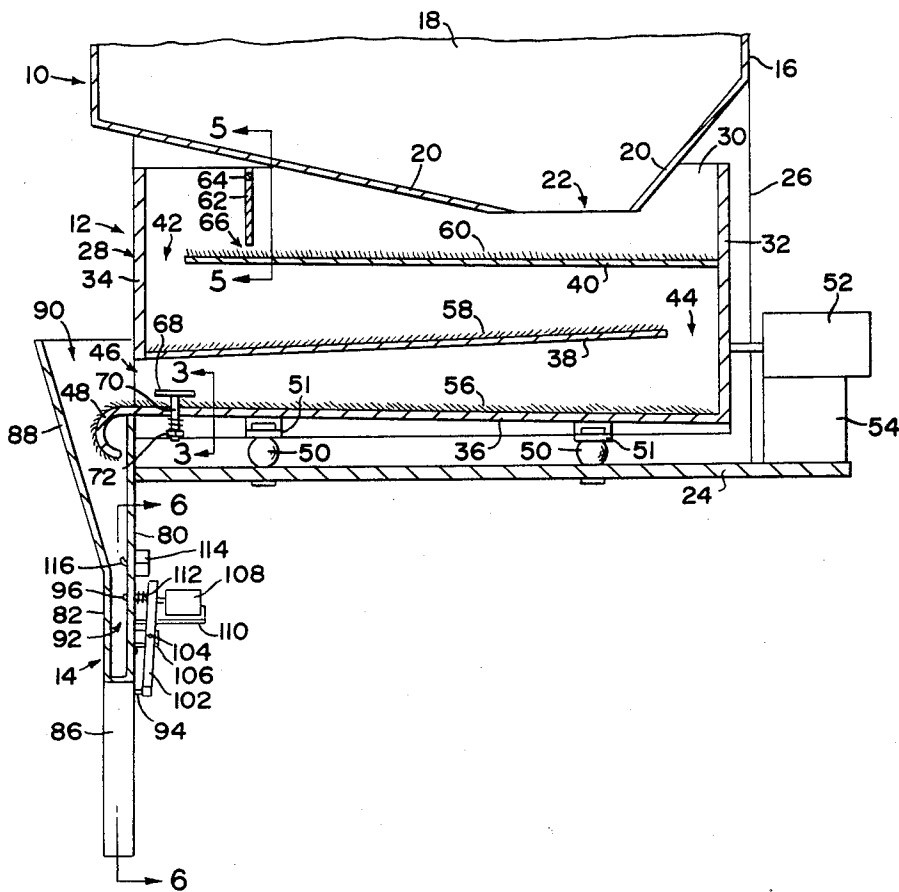
UNITED STATES PATENTS

2,149,444	3/1939	Kohlmann.....	133/3
1,601,247	9/1926	Garbarini.....	46/1 C
1,433,942	10/1922	Doldt.....	133/3 D
986,939	3/1911	Nott.....	133/3 D
1,327,357	1/1920	Rogers.....	133/3
2,908,420	10/1959	Hoffmann et al.....	221/156 X
3,173,431	3/1965	Chichester et al.....	194/9 R X
575,715	1/1897	Hertzberg.....	133/5 R

FOREIGN PATENTS OR APPLICATIONS

448,881	5/1949	Italy.....	198/220
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11 Claims, 10 Drawing Figures



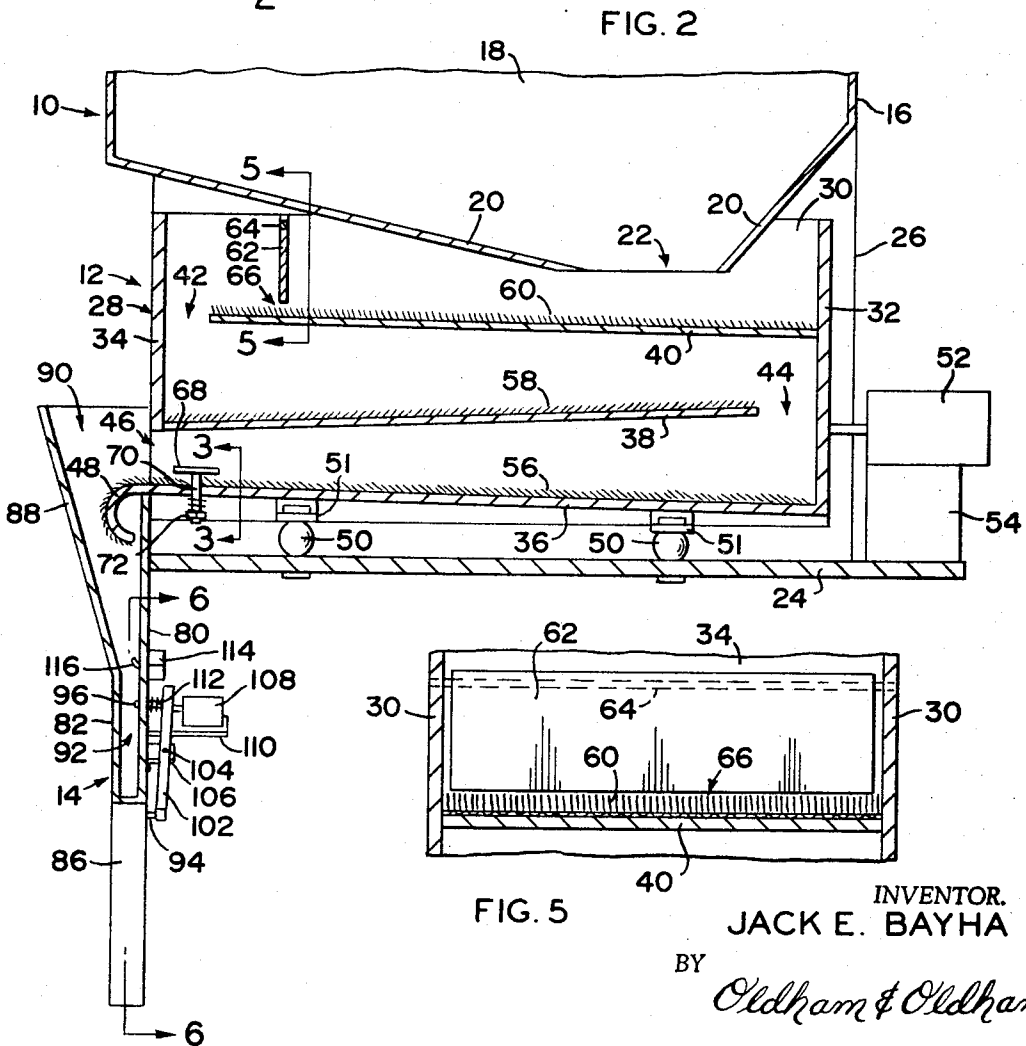
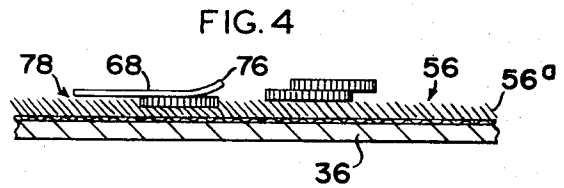
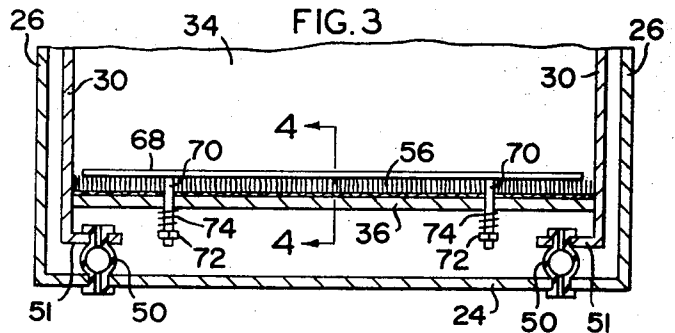
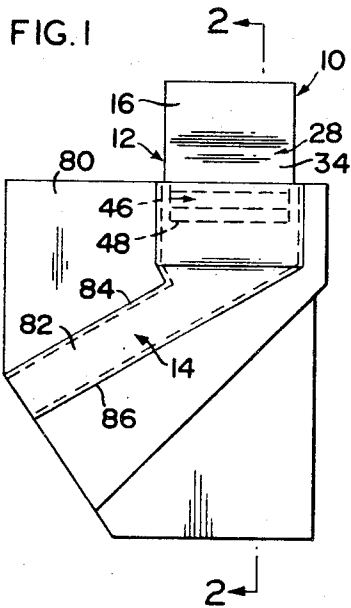


FIG. 5

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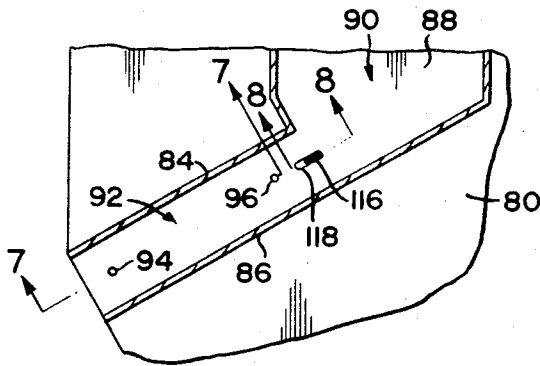


FIG. 6

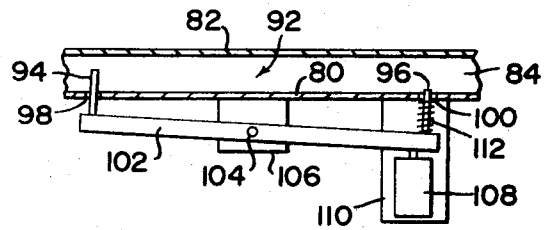


FIG. 7

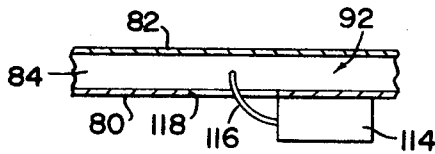


FIG. 8

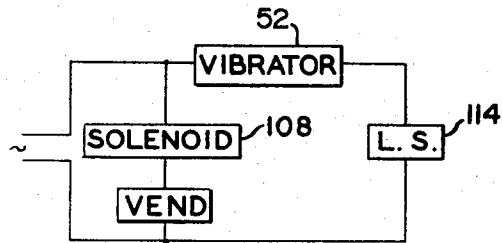


FIG. 9

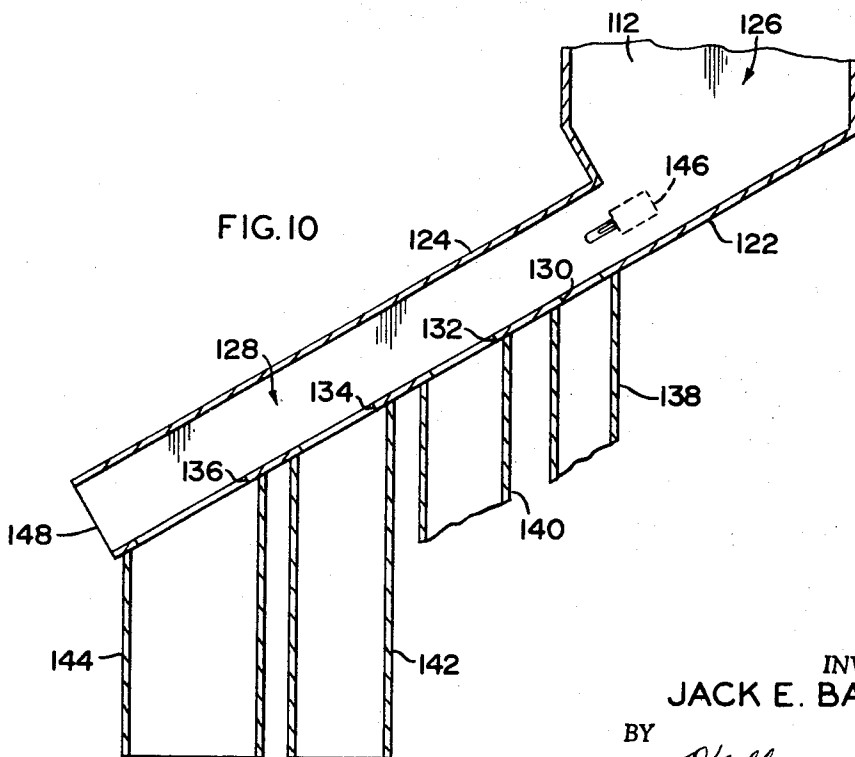


FIG. 10

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COIN ORIENTING, SORTING AND DISPENSING APPARATUS

In the handling and sorting of large quantities of coins, the considerations of accuracy, labor costs, and time dictate that the sorting of the coins be accomplished automatically. Various arrangements have been proposed and are used for accomplishing the automatic aligning and sorting of coins. The prior devices however, have generally been of complex construction. As a result, such devices are subject to frequent mechanical breakdowns. The complexity of the prior devices also contributes to their costs and makes them unsuitable for intermittent use or for the sorting of small quantities of coins. Many of the prior art devices are also subject to jamming when a misoriented or bent coin attempts to pass through the apparatus.

It is the primary object of the present invention to provide a device which is capable of orienting and sorting coins which is of simple and trouble-free construction. It is also an object of the invention to provide a coin sorting device which may be intermittently operated to sort small quantities of coins. A further object of the present invention is the provision of a coin orienting and sorting device which is not subject to jamming. It is also an object of the present invention to provide such a device which may be employed to sort and dispense a predetermined quantity of coins upon receipt of a vend signal.

The above objectives are accomplished in accordance with the principles of the invention set out herein by providing a coin orienting device which orients the coins in a non-stacked condition in a horizontal plane and by the provision of a coin receiving chute in connection with the orienting device. The orienting device employs inclined ramps or trays covered with a mohair fabric which has been treated so as to make it resistive to deformation in one direction and compliant in another and is driven by a simple vibrator unit. The coin receiving chute holds the coins in non-overlapping vertical relation and may be provided with cooperating retractable stops for dispensing a predetermined quantity of coins from the chute.

For a more complete understanding of the invention reference should be had to the following specification and the accompanying drawing wherein there is shown a preferred embodiment of the invention.

In the drawing:

FIG. 1 is a side elevational view of the coin orienting and dispensing device of the present invention;

FIG. 2 is a sectional view taken along the line 2-2 of FIG. 1;

FIG. 3 is a fragmentary sectional view taken along the line 3-3 of FIG. 2;

FIG. 4 is a fragmentary sectional view, on an enlarged scale, taken along the line 4-4 of FIG. 3;

FIG. 5 is a fragmentary sectional view taken along the line 5-5 of FIG. 2,

FIG. 6 is a sectional view taken along the line 6-6 of FIG. 2 and showing the coin receiving chute;

FIG. 7 is a fragmentary sectional view taken along the line 7-7 of FIG. 6;

FIG. 8 is a fragmentary sectional view taken along the line 8-8 of FIG. 6;

FIG. 9 is a schematic showing of the control circuitry employed in the coin orienting and sorting apparatus of the present invention; and

FIG. 10 is a sectional view similar to that of FIG. 6 but showing a modified form of the coin receiving chute.

The apparatus of the present invention consists essentially of a coin receiving hopper 10, a coin orienting device 12, and a coin dispensing chute 14. The coin receiving hopper 10 has end walls 16, side walls 18, and sloping bottom walls 20. An opening 22 is provided at the bottom of the hopper 10 for permitting coins to drop into the orienting apparatus 12.

The orienting apparatus, illustrated in detail in FIGS. 2-5, has a base 24 and a pair of spaced vertical side members 26 which are mounted on the base 24. The upper ends of the side members 26 also serve to support the feed hopper 10. Slidably mounted between the side plates 26 is an open topped box-like housing 28 having side walls 30, end walls 32 and 34, a floor 36, and intermediate ramps or trays 38 and 40. The upper tray 40 is inclined slightly upwardly toward the left and terminates short of the end wall 34 providing an opening 42. The intermediate ramp 38 is inclined slightly upwardly toward the right and terminates short of the end wall 32 providing an opening 44. The bottom ramp or floor 36 is inclined upwardly to the left and extends through an opening 46 in the lower portion of the end wall 34. The end portion of the floor 36 terminates in a rounded portion 48. The box-like housing 28 is supported by compliant rubber mounts 50 fastened to brackets 51 at the lower ends of the side walls 30 and to the base 24. The end wall 28 is connected to a reciprocating vibrator 52 which is mounted on the base 24 by a suitable bracket 54. This vibrator imparts vibratory motion to the box-like housing 28 causing the housing to vibrate back and forth supported by the compliant mounts 50. The upper surface of the floor 36 and the ramps 38 and 40 are covered with a treated mohair fabric 56-58 respectively. This fabric is of a commercially available type such as made by Collins & Aikman of Roxboro, N. Carolina and is so treated by slanting its pile as to be resistant to deformation in one direction and compliant in the opposite direction. This characteristic of the treated fabric may be employed to cause relatively light objects to move across the fabric when the fabric is subjected to vibrations. This can be seen in FIG. 4 where the pile 56a of the fabric 56 is slanted toward the left. When the fabric 56 moves toward the left the pile 56a is resistive to relative motion between fabric and the object resting on the fabric, and as a result, the object is moved along with the fabric. When the fabric moves in the opposite direction the fibers are compliant and tend to move relative to the object resting on the fabric. As a result, the object remains stationary while the fabric moves beneath it. The fabric layers 56-60 are all mounted so that motion of an object resting thereon occurs in the upwardly inclined direction of the respective ramp. Thus, the fabric layers 56 and 60 are mounted so as to move a coin toward the left and the fabric layer 58 is mounted to move a coin to the right, when viewed as in FIG. 2.

Adjacent the opening 42 at the end of the upper intermediate ramp 40 there is provided a gate 62 which is hinged on a pin 64 supported by the side walls 30. The gate 62 depends downwardly toward the fabric covering 60 of the tray 40. An opening 66 is provided between the lower end of the gate 62 and the tray 40. Closely adjacent the curved end portion 48 of the floor 36 there is provided a horizontal plate 68 which is sup-

ported by bolts 70 extending downwardly through the floor 36 and having nuts 72 and coil springs 74 for holding the plate 68 in position. The leading edge 76 of the plate 68 is curved slightly upwardly and the plate normally rides a short distance 78 above the surface of the fabric 56 covering the floor 36.

The operation of the coin orienting device 12 will now be described. The hopper 10 contains a quantity of coins which are randomly oriented. These coins drop through the opening 22 onto the fabric covering 60 of the upper most ramp 40. While most of the coins will rest flat on the ramp 40, they may be in stacked relation. Assuming that the vibrator 52 is energized, the box-like enclosure 28 will be vibrating as will the ramp 38 and 40. As described above, the fabric 60 is positioned so that vibration will tend to move an object resting on the surface of the fabric 60 toward the left, when viewed as in FIG. 2. As a result, coins will be gradually moved from beneath the opening 22 toward the gap 42 at the upper end of the ramp 40. The slight upward inclination of the ramp 40 tends to cause only the lower most coins to move, these coins sliding out from beneath the coins stacked above them. As the coins continue moving along the ramp 40, they pass through the opening 66 between the tray and the hinged gate 62. This gate serves to restrain the upper coins of any stacked coin pairs which may be traveling along the ramp 40. Thus, the gate 62 serves to separate the coins of stacked pairs. If a bent coin moves toward the opening 66, the gate 62 will serve to permit the coin to pass rather than allowing it to jam. As the coins reach the edge of the ramp 40 they drop through the opening 42 onto the lower end of the second ramp 38. Should any stacked pairs of coins move to the end of the ramp 40, they are likely to be separated at this point as one or the other of the stacked coins will tend to fall first and begin moving along the ramp 38 before the second coin falls. As previously mentioned, the fabric covering 58 of the ramp 38 is positioned to cause the coins to move toward the right, that is toward the opening 44. As the coins reach the opening 44, they drop onto the floor 36 of the box-like enclosure 28. The dropping of coins through the opening 44 also serves to separate any stacked pairs which may have traveled through the previous portions of the apparatus. The fabric 56 is positioned so that coins tend to travel toward the opening 46 at the upper end of the floor 36. As the coins have traveled along the ramps 40 and 38 and the floor 36 they are separated from one another as described above, and are also spaced from one another. While, normally, no stacked coin pairs will be present on the floor 36, the plate 68 serves as a guard to assure that only single coins are delivered through the opening 46. As shown in FIG. 4, the space 78 between the plate 68 and the upper surface of the fabric 56 is slightly less than the thickness of one coin so that as the coins travel under the plate 68 they are pressed slightly into the fabric. Should a stacked pair of coins approach the plate 68, the leading edge 76 while is bent upwardly will strike and retain the top coin of the stacked pair while the lower coin moves under the plate 68. In order to assure that no jamming occurs, the plate 68 is biased by means of the springs 74 so that it can float upwardly should a bent coin attempt to pass underneath. As the coins pass through the opening 46, they lie flat on the fabric surface 56 and no stacked pairs of coins reach this point. The downwardly curved

end portion 48 of the floor 36 serves to turn the coins so that they are oriented in a vertical plane.

The coin sorting and dispensing portion 14 is illustrated in FIGS. 2, 6-8. This device has a vertical rear plate 80 which extends downwardly from the opening 46 of the coin orienting assembly. A front plate 82 is mounted on the plate 80 and spaced therefrom by side members 84 and 86. The side members 84 and 86 and the plates 80 and 82 define a slot or chute 92 which is of a thickness only slightly greater than the thickness of one coin and only slightly wider than the width of one coin. The upper portion 88 of the front plate 82 is bent outwardly to provide an enlarged coin receiving chamber 90. These plates 80 and 82 are mounted so that the rounded end portion 48 of the floor 36 of the coin orienting device 12 projects into the receiving chamber 90.

A pair of pins 94 and 96 project into the chute 92 through holes 98 and 100, respectively, in the rear plate 80. These pins are spaced from one another by a distance sufficient to permit a given quantity of coins to be held in the chute between the two pins. As will be seen from FIG. 7, the pins 94 and 96 are mounted on opposite ends of a bar 102 which pivots about a pin 104 supported by suitable brackets 106 at the midpoint of the bar 102. A solenoid 108, mounted on a suitable support 110 is provided for pivoting the bar and a coil spring 112 is provided for returning the bar to its normal position when the solenoid is deenergized. A switch 114 is mounted on the outer surface of the rear plate 82 and has its operating lever 116 projecting into the chute 92 through an opening 118 in the plate 82. This switch is preferably of the type not having a time delay feature so that the switch is responsive to the mere passage of a coin over the opening 118 which causes the vibrator to go on and off assisting in coin action.

The operation of the above-described embodiment of the dispensing portion of the apparatus will now be described. As explained above, the coins passing around the edge 48 of the floor 36 are turned into a vertical plane as they pass this edge and no stacked pairs of coins are present. The front to rear depth of the receiving chamber 90 is sufficiently small that the coins are not able to turn to a horizontal position but are directed downwardly into the chute 92. As the coins move down the chute 92 they are stopped by the lower pin 94. When a sufficient number of coins have accumulated in the chute 92, one coin will rest over the slot 118 thus pressing down the actuating lever 116 and opening the switch 114. This will deactivate the vibrator 52, stopping the supply of coins to the sorting and dispensing apparatus 14. As previously described, the distance between the pins 94 and 96 is sufficient to allow a predetermined number of coins to be held in this area. Such an arrangement is particularly suited for use in a dispensing apparatus such as a dollar bill changer where it is desired to dispense a predetermined number of coins. Thus, for example, if the unit is intended to dispense four quarters in change for one dollar bill, the pins 94 and 96 will be separated sufficiently to permit four quarters to be positioned between the two pins. It should be noted that the pins 94 and 96 are located below the longitudinal centerline of the chute 92 and in the region between two coins so that it is not possible for a coin to interfere with the movement of either pin, allowing the accidental discharge of an extra coin or

the jamming of the chute 92. Upon receipt of a vend signal from, for example, a dollar bill validation device, the solenoid 108 will operate rocking the arm 102 about the pivot and causing the pin 96 to move into the chute 92 while the pin 94 is withdrawn from the chute. The coins in the chute below the pin 96 are now free to move outwardly at the end of the chute and are thereby dispensed. The pin 96 holds any other coins which may be in the chute 92 and prevents there being dispensed. Upon completion of the vend cycle, the solenoid 108 is deenergized and the spring 112 causes the arm 102 to rock back to its normal position bringing the pin 94 into the chute and removing the pin 96 from the chute. Any coins which have been retained above the pin 96 now roll downwardly to be retained by the pin 94 and the switch 114 is again energized, in turn energizing the vibrator 52 and supplying additional coins.

FIG. 10 illustrates a modified form of the coin receiving and sorting assembly. In this embodiment there is provided a rear plate 122, a front plate (not shown), and side members 122 and 124 which define a receiving chamber 126 and a chute 128. The lower side member 122 is provided with a number of slots 130-136 at intervals along the length of the chute 128 and these slots are arranged in progressively increasing sizes. Where the device is to be used to sort pennys, nickels, dimes and quarters, the slots are made of such dimensions as to successively pass the smallest of the coins, i.e. a dime, the next smallest and so on. Thus, the slot 130 is of a size slightly greater than the thickness and diameter of a dime but not as great as the thickness and diameter of a penny. Each of the slots 130-136 leads to a magazine 138-144, respectively, in which the sorted coins are stacked. A limit switch 146 may be provided for interrupting the operation of the vibrator in the event the chute becomes filled with coins. Also, the lower end 148 of the chute may be open to permit rejected coins to be discharged.

It should be understood that changes and/or additions may be made in and to the described embodiments of the invention without departing from the scope thereof. Thus, while in the described embodiments the ramps are inclined upwardly, it is contemplated that these ramps may be level or inclined slightly downwardly. Reference should therefore be made to the appended claims in determining the true scope of the invention.

What is claimed is:

1. A coin handling device, comprising:

a feed hopper;

a housing having side walls and end walls;

a plurality of ramps in vertically spaced relation to one another, each of the ramps being connected to the side walls, the lowermost ramp being connected to one of the end walls and extending through an opening in the opposite end wall, alternate ones of the ramps being connected to opposite ones of the end walls and inclined upwardly therefrom at a shallow angle, each ramp except the lowermost terminating short of the end wall adjacent the upper end of the ramp, the uppermost ramp receiving coins from the hopper at a point adjacent the lower end of the ramp, each ramp being covered on its coin receiving surface with a fabric which is resistive to deformation in a first direction and compliant in another direction, the fabric being oriented so as to cause movement of the

coins upwardly along the ramps upon vibration of the ramps;

a gate member positioned above one of the ramps a distance less than the thickness of two coins and movable to prevent jamming; and
a vibrator connected to the housing.

2. The device according to claim 1 wherein said gate member comprises a vertical plate pivotally connected at its upper end to said side walls.

3. The device according to claim 1 wherein said gate member comprises a horizontal plate extending across one of said ramps parallel to the front wall, said plate being supported by pins extending through said ramp and carrying biasing means to allow said plate to move upwardly as a bent coin passes under said plate.

4. The device according to claim 1 wherein the end of said third ramp extending through said front wall is bent downwardly, the fabric covering said ramp extending around the bent portion.

5. A coin orienting device, comprising:

a frame;

a housing carried by said frame and having side, front and rear walls and a plurality of ramps in vertically spaced relation within said walls, alternate ones of said ramps being inclined upward toward said front and rear walls, respectively, the lowermost of said ramps extending through an opening in said front wall and bent downwardly to provide a rounded end portion short of the front or rear wall adjacent the upper end of the ramp, each of said ramps being covered with a fabric which is resistive to deformation in one direction and compliant in another, the fabric covering extending around said end portion of said lowermost ramp, the fabric on each ramp being mounted so as to cause movement of an object resting thereon in the upwardly inclined direction of the ramp;

a vibrator mounted on said frame and connected to said housing to vibrate said housing in a front-to-rear direction; and

a feed hopper mounted above said housing for supplying coins to the uppermost of said ramps.

6. The device according to claim 5 further including a coin receiving chute having a receiving chamber surrounding said end portion of said lowermost ramp, a lower portion extending from said chamber for holding coins in single file vertical relation, and dispensing means for releasing coins from said lower portion.

7. The device according to claim 6 wherein said dispensing means comprises a plurality of slots in the bottom surface of said lower portion, the one of said slots closest said chamber being of dimensions greater than the thickness and diameter of the smallest coin being handled but less than the thickness and diameter of the next smallest coin, successive ones of said slots accepting successively larger coins.

8. The device according to claim 6 wherein said dispensing means comprises first and second pins extending into said lower portion to obstruct the passage of a coin therethrough, said pins being separated from one another by a distance equal to the sum of the diameters of a predetermined number of coins, and means for normally holding said first pin in said lower portion and said second pin retracted from said lower portion and for retracting said first pin while simultaneously inserting said second pin into said lower portion.

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9. The device according to claim 8 wherein said means comprises a bar pivotally mounted at its mid-point and mounting said first and second pins at opposite ends thereof.

10. The device according to claim 9 further including a solenoid for moving said bar from its first to second position upon receipt of a vend signal and biasing means to return said bar to its first position upon termi-

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nation of the operation of said solenoid.

11. The device according to claim 8 further including a switch responsive to the number of coins in said lower portion of said chute, said switch interrupting the operation of said vibrator when said chute has received a predetermined number of coins.

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