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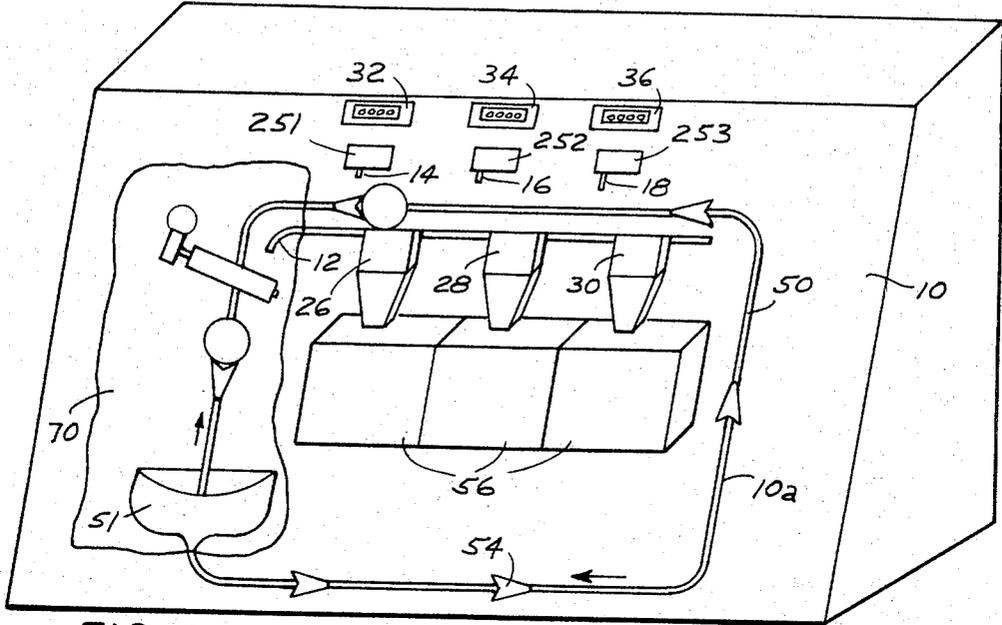
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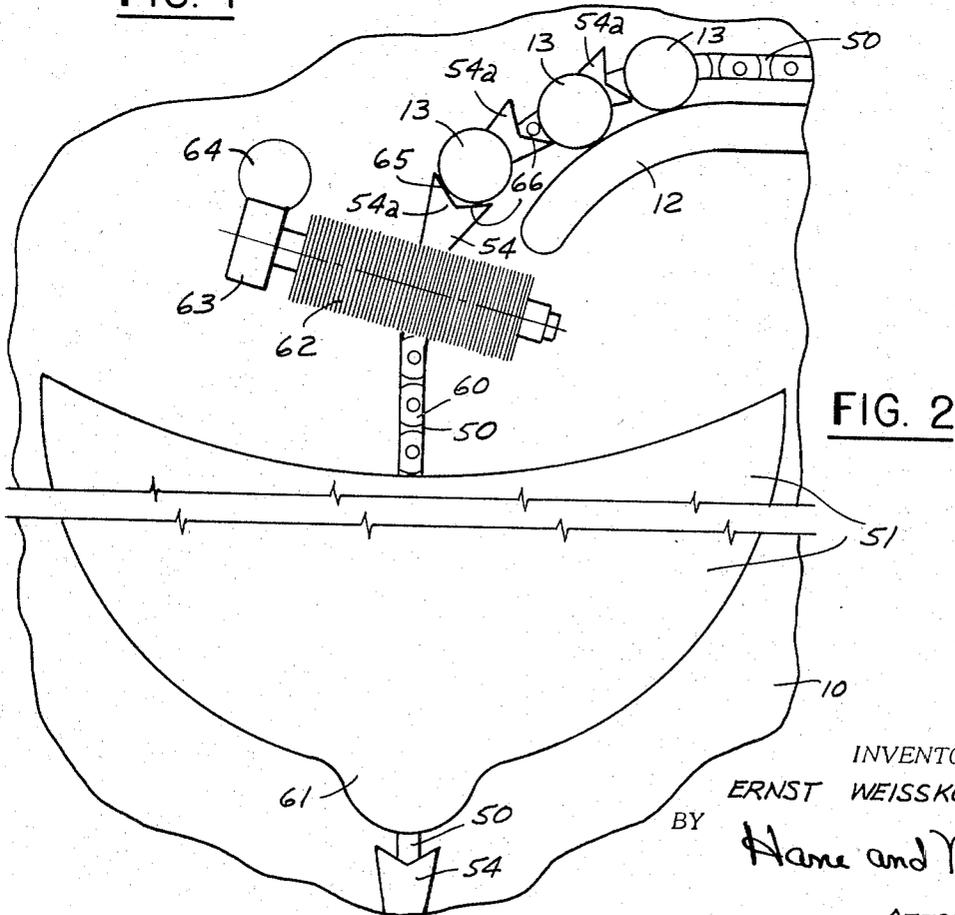
COIN-SORTING AND COUNTING MACHINE

Filed April 12, 1966

2 Sheets-Sheet 1



**FIG. 1**



**FIG. 2**

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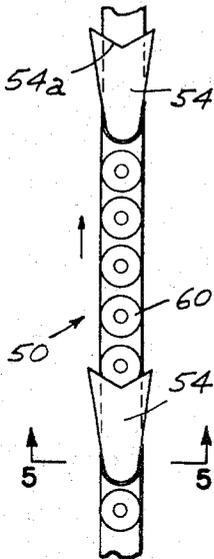


FIG. 3

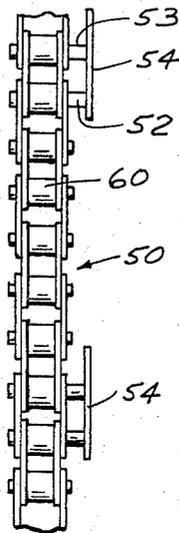


FIG. 4

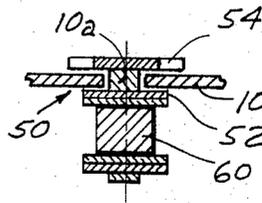


FIG. 5

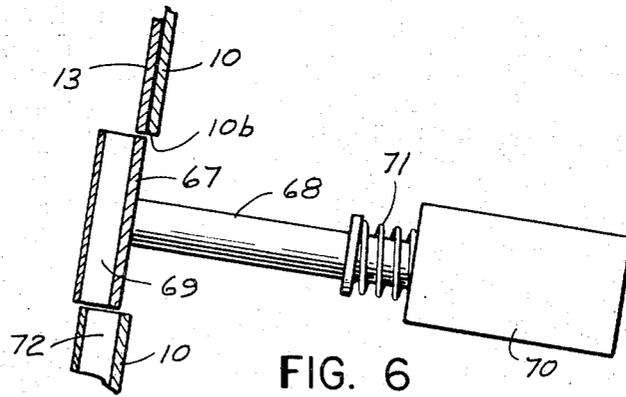


FIG. 6

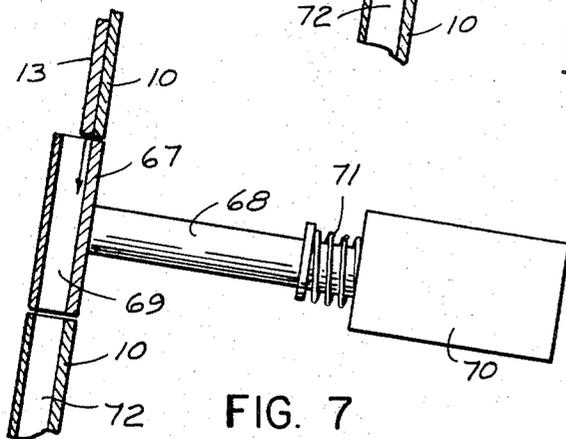


FIG. 7

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**COIN-SORTING AND COUNTING MACHINE**

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**ABSTRACT OF THE DISCLOSURE**

A coin-sorting and counting machine in which the coins are guided through the machine by means of endless conveyors mounting gripper plates having at its leading end two gripper points for seating a gripped coin therebetween, thereby stabilizing the coins while travelling through the machine so that coaction between the coins and detecting means for different denominations of the coins is effectively obtained. The machine further comprises coin-ejecting means into which the coins are positively guided when and while the coins are pushed off a guide rail for the same.

The present invention relates to a coin-sorting and counting machine. The term "coin" is not intended to be limited to coins in the strict sense of the word, but is intended to encompass chips, tokens and other similar items.

There are known, for instance, from applicant's prior Patent 3,002,601, machines of this kind in which the coins to be sorted and counted are guided edgewise, one by one, on a horizontal or slightly slanted guide rail mounted on a preferably rearwardly inclined front panel of the machine housing. The coins are pushed along the guide rail by guide pins secured to an endless belt conveyor and protrude from the front of the panel. Coin diameter detectors are disposed above the guide rail for detecting the diameters of the passing coins. The spacings of the detectors from the guide rail decrease in the direction of travel of the coins, and each spacing is somewhat less than the diameter of the coins to be detected by the respective detector. When one of the detectors is actuated by a coin of the respective diameter, it sends an electric signal to a counter and also to an ejecting means for pushing the respective coin from the guide rail. The pushed-off coin is then guided into a suitable coin bin, for instance, by the action of gravity. The detectors preferably comprise suitable switches, such as microswitches, the contact arms of which constitute probe elements and are engaged by a coin having the diameter assigned to the respective detector.

The coins to be sorted and counted are fed into the path of the guide pins as the same move along the guide rail by suitable feeding means, such as a rotary feed disk with radial guide ribs.

It has been found that the coins, when being transferred from the feed means to the guide rail, may perform free and uncontrollable movements, and they may also perform such movements when and while they are pushed off the guide rail. Free and uncontrollable coin movements tend to interfere with a reliable and accurate operation of the machine.

It is a broad object of the invention to provide a novel and improved coin-sorting and counting machine of the general kind above referred to in which free and uncontrollable movements of the coins during sorting and counting thereof are effectively prevented.

A more specific object of the invention is to provide a novel and improved machine of the general kind above referred to in which the coins are positively guided while being transported, one by one, from a receptacle contain-

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ing a supply of intermingled coins of different diameters upon the guide rail and along the same.

Another more specific object of the invention is to provide a novel and improved machine of the general kind above referred to including coin-ejecting means into which the coins are positively guided when and while being pushed off the guide rail.

The afore-pointed-out objects, features and advantages, and other objects, features and advantages which will be pointed out hereinafter, may be attained by replacing the belt conveyor used in the previously discussed prior art machine by a link chain conveyor which is guided behind the front panel parallel thereto and supports at least two gripper plates moving in unison with the conveyor parallel to the plane of the front side of the panel at a lengthwise spacing of at least the diameter of the largest coin to be sorted and counted. The gripper plates may be mounted on the conveyor by means of pins and serve to lift the coins, one by one, out of supply receptacle, to set the coins upon the guide rail in an edgewise position, and to push the coins along said rail while continuously and positively guiding the same. The front panel of the machine preferably has a passage slot for the guide pins which is only slightly wider than the diameter of the pin, to prevent the coins from falling into the interior of the machine.

Each gripper plate has gripper points facing forwardly in the direction of travel. These gripper points are preferably formed by giving the leading end of each plate a generally V-shaped or swallowtail-shaped configuration. The spread of the points is such that the coins will be retained therebetween, and the lower branch of the V-shaped or swallowtail end of the plate is so positioned that its distance from the guide rail is such that coins with the smallest diameter will be gripped and guided by the gripper plates.

To prevent free and uncontrollable movements of the coins when the same are pushed off the guide rail, the invention further provides for each different diameter of coins to be sorted by a detector, and posteriorly of each detector, as seen in the direction of travel of the coins, a gap in the guide rail, or at least in the upper edge thereof, which has a width equal to the spacing of the last detector in the direction of travel of the coins from the guide rail. Each of the gaps can be bridged by a chute of preferably rectangular cross section substantially matching the cross-sectional outline of a coin and leading to one of the coin-collecting bins. The chute is displaceable transversely of the guide rail, and one wall of the chute, preferably the rear wall thereof, is biased by a directional force means, such as a spring, into a position of alignment with the guide rail in which it bridges the gap. A suitable electromagnetic means is provided for each chute and is so controlled that actuation thereof withdraws the respective chute out of its aligned or bridging position against the action of the spring, thus opening the gap and causing a coin reaching the gap to fall into the chute by gravity. While falling through the chute the coin is safely guided at its sides and also at its edges. Each electromagnetic means is controlled by the respective detector when the same is actuated by a coin, and to this end is connected with the same in a suitable control circuit. The detectors also are used to operate a counter when actuated.

Instead of moving the upper edge of the chute out of alignment with the guide rail by transversely displacing the entire chute, the edge of the chute wall can also be moved out of alignment by tilting the entire chute through a suitable angle. However, such tilting of the chute changes the direction of fall of the coins through the chute, which is not desirable in some instances.

In the accompanying drawing, a preferred embodiment of the invention is shown by way of illustration, and not by way of limitation.

In the drawing:

FIG. 1 is a perspective diagrammatic view, partly in section, of a coin-sorting and counting machine according to the invention;

FIG. 2 is a detail view of the part of the mechanism visible through a cut-out in the front panel of the machine, on an enlarged scale;

FIG. 3 is a plan view of part of the conveyor chain of the machine;

FIG. 4 is a side view of FIG. 3;

FIG. 5 is a section taken on line V—V of FIG. 3;

FIG. 6 is a diagrammatic sectional side view of one of the coin-ejecting means of the machine in one operational position thereof; and

FIG. 7 is a view similar to FIG. 6, but showing the ejecting means in a different operational position.

Referring now to the figures in detail, the coin-sorting and counting machine as exemplified in the figures comprises a housing of suitable design having a front panel 10, which preferably is rearwardly slanted. Panel 10 includes an endless slot 10a behind which a chain link conveyor 50 travels along a path parallel to the plane of panel 10 and extending upwardly from a receptacle 51 for a supply of intermingled coins of different diameters to be sorted and counted substantially parallel to and above a guide rail 12 and back to supply container 51. Guide rail 12 is mounted on panel 10 substantially horizontally or slightly slanted.

Referring to FIGS. 3, 4 and 5, conveyor chain 50 mounts several pairs of support pins 52 and 53, each pair supporting one gripper plate 54. The pins are suitably secured to links 60 of the chain. Two pins for each gripper plate are generally advisable to stabilize the plate, but in principle, one pin may be sufficient. The pins extend through slot 10a so that the gripper plates will travel on the front side of the panel substantially parallel to the plane thereof. The leading end of each gripper plate, in the direction of travel of the chain, has a generally V-shaped or swallowtail-shaped portion 54a for guiding a coin between the branches of the V portion, as is shown in FIG. 2 for a coin 13. The gripper plates enter the supply receptacle 51 at the bottom end 61 thereof and travel upwardly within the receptacle. While passing through the receptacle each gripper plate picks up a coin 13, sets the same edgewise upon guide rail 12 and pushes the coin along the guide rail past contact arms 14, 16 and 18 of switches 251, 252 and 253, respectively, such as microswitches. The spacings of the contact arms from the guide rail decrease in the direction of travel of the coins on the guide rail. The distance of each contact arm from the guide rail is selected in accordance with the diameter of a type of coin to be detected by the contact arm and is slightly less than the diameter of the assigned coin.

As is evident, a coin having a smaller diameter than the coin diameter for which, for instance, contact arm 14 is set will pass this arm without engaging the same. However, a coin large enough to engage arm 14 will cause operation of switch 251. This switch will actuate a counter 32 and also will actuate an ejecting means for ejecting the detected coin from the guide rail and into a chute 26, through which the coin passes into one of collection bins 56. The operation of the ejecting means will be more fully explained in connection with FIGS. 6 and 7.

Similarly, counters 34 and 36 are associated with switches 16 and 18, respectively. Switches 16 and 18 also coact with ejecting means for moving detected coins into chutes 28 and 30, respectively, leading to the respective collection bins 56, one bin being provided for each chute.

Front panel 10, which provides in effect a backstop for coins as they are pushed along guide rail 12, may be

omitted, and the guide rail may be suitably tilted to support the coins as they move edgewise along the guide rail. A cover plate is then preferably provided to protect the mechanism of the machine against coins and other items which may fall into the machine. A cover plate may also be provided if it is desirable to conceal the sorting operation.

Referring now to FIG. 2, this figure shows in detail the parts of the mechanism visible through a cut-out area 70 encircled in FIG. 1. One of the gripper plates 54 is shown in three successive positions as it travels along slot 10a. As stated before, the gripper plates travel upwardly through receptacle 51 toward the leading end of guide rail 12. Just before reaching this end they pass a rotary brush 62 driven by suitable gears 63 and 64. The brush strips any coin which is not properly seated between the flanks 65 and 66 of a V-portion 54a, but has been taken along nevertheless in some fashion by the gripper plate. The stripped coins fall back into receptacle 51, but a coin which is properly seated in V-portion 54a is pressed against the flanks 65 and 66 by brush 62. In the first shown position of the gripper plate, the coin is seated symmetrically between flanks 65 and 66; in the second position the coin has started to roll toward guide rail 12 due to the tilt of the gripper plate and is now resting only against the flank 66 of the gripper plate; and in the third position the coin is resting fully on the guide rail and is now pushed forward by the gripper plate. As is evident, the gripper plate, and more particularly the V-shaped end 54a thereof, serves a dual purpose, namely, to lift successive coins out of receptacle 51 and to guide the same along the guide rail without permitting free and uncontrolled movements of the coins.

FIGS. 6 and 7 show ejecting means for removing a coin large enough to operate the contact arm 14, 16 or 18 of the respective switch 251, 252 or 253 from the guide rail. These means should be visualized as being incorporated in the machine of FIG. 1.

As stated before, one ejecting means is associated with each of switches 251, 252 and 253 and the counters 32, 34 and 36, respectively, connected thereto. Each of the ejecting means comprises a chute 69 which is fitted in a gap provided for the purpose in the upper edge of guide rail 12. The rear wall 67 of chute 69 is movable from the position of FIG. 6 into the position of FIG. 7, and vice versa. In the position of FIG. 6 rear wall 67 bridges the gap in the guide rail, thus constituting a continuation thereof. Accordingly, a coin 13 which has not activated a switch associated with the respective ejecting means will simply pass the gap by falling across rear wall 67. However, in the position of FIG. 7 rear wall 67 is withdrawn into a cut-out 10b in front panel 10. Accordingly, coin 13 will fall into chute 69 and through the chute into a second chute 72 communicating with one of the collecting bins 56.

The position of each chute 69 is controlled by a solenoid 70 having an armature 68 mounting the chute. A spring 71 biases the chute into the position of FIG. 6; that is, into the position in which rear wall 67 forms a bridge across the respective gap in the guide rail. Energization of solenoid 70 withdraws the armature, and with it chute 69, into the position of FIG. 7. The energization of the solenoids 70, and thus the operation of the ejecting means, are controlled by switches 251, 252 and 253, respectively, when the contact arms thereof are engaged by a coin having the diameter assigned to the respective contact arm.

The cross-sectional width of chute 72 should be at least equal to the width of chute 69, so that a coin will not be caught at the edge of chute 72 instead of falling through the chute into one of the bins 56.

The spacings of the coin diameter-detecting contact arms 14, 16 and 18 one from another should be at least equal to the width of the rear wall 67 of chute 69.

While the invention has been described in detail with respect to a certain now preferred example and embodiment thereof, it will be understood by those skilled in the art, after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended, therefore, to cover all such changes and modifications in the appended claims.

What is claimed is:

1. A coin-sorting and counting machine for sorting and counting coins of different diameters, said machine comprising, in combination, a substantially horizontally mounted guide rail, a receptacle open at its top and disposed below the level of said rail for a supply of intermingled coins to be sorted and counted, an endless conveyor guided along a path including a first portion extending through the supply receptacle substantially vertically upward therefrom, a second portion extending past and above said guide rail parallel thereto and a third portion extending back to the bottom side of the receptacle, at least two gripper plates supported on said conveyor for travel in unison therewith, said plates being spaced lengthwise by a distance at least equal to the diameter of the largest coin to be sorted and counted in the machine, the minimal distance of the gripper plates from the guide rail being less than the diameter of the smallest coin to be sorted and counted, each of said gripper plates having at its leading end two gripper points for seating a gripped coin therebetween, one of the gripper points adjacent to the guide rail being at said minimal distance from the guide rail, said gripper plates gripping coins which pass through said receptacle, one by one, and guiding the same in an edgewise position along said guide rail, coin-counting means for counting the number of coins, coin-ejecting means, one for each diameter of the coins to be sorted, for ejecting coins from the guide rail, coin diameter-detecting means disposed along the guide rail above the same, each of said detecting means being associated with one of said counting means and one of said ejecting means, each of said detecting means being activated by engagement with a coin of a predetermined diameter and in response to such activation operating the respective counting means and ejecting means for counting and ejecting, respectively, of the coins.

2. A machine according to claim 1, wherein each gripper plate has at its leading end a generally V-shaped portion.

3. A machine according to claim 1 and comprising rotary brush means for stripping from the conveyor a coin carried by the same but not seated between the gripper points of a gripper plate.

4. A coin-sorting and counting machine for sorting and counting coins of different diameters, said machine comprising, in combination, a substantially horizontally mounted guide rail, a receptacle for a supply of intermingled coins to be sorted and counted, an endless conveyor guided along a path extending from the supply receptacle past and above said guide rail parallel thereto and back to the receptacle, at least two gripper plates supported on said conveyor for travel in unison therewith, said plates being spaced lengthwise by a distance at least equal to the diameter of the largest coin to be sorted and counted in the machine, the minimal distance of the gripper plates from the guide rail being less than the diameter of the smallest coin to be sorted and counted, said gripper plates gripping coins in said receptacle, one by one, and guiding the same in an edgewise position along said guide rail, a panel mounting said guide rail on one side and forming a backstop for coins moving along said rail, said conveyor being disposed on the other side of the panel and said gripper plates on the panel side mounting the rail, said panel including a continuous slot corresponding to the conveyor path at least from the supply receptacle to the far end of the guide rail in the di-

rection of travel of the conveyor, at least one support pin for each of said gripper plates secured to the conveyor and extending through said panel slot for supporting the gripper plates on said one side of the panel, coin-counting means for counting the number of coins, coin-ejecting means, one for each diameter of the coins to be sorted, for ejecting coins from the guide rail, coin diameter-detecting means disposed along the guide rail above the same, each of said detecting means being associated with one of said counting means and one of said ejecting means, each of said detecting means being activated by engagement with a coin of a predetermined diameter and in response to such activation operating the respective counting means and ejecting means for counting and ejecting, respectively, of the coins.

5. A machine according to claim 4, wherein the distances of said detecting means from the guide rail decrease from detecting means to detecting means in the direction of travel of the coins on the guide rail, the distance of each detecting means from the guide rail being slightly less than the coin diameter to be detected by the respective detecting means.

6. A machine according to claim 4, wherein the width of said slot is slightly in excess of the peripheral outline of said pins.

7. A machine according to claim 4, wherein said endless conveyor is a chain link conveyor and each of said support pins is secured to one of the links of said chain.

8. A machine according to claim 4, wherein said detecting means comprise switch means having contact arms, each of said contact arms being engageable with a coin of a predetermined diameter, engagement of each contact arm actuating the respective switch means for operating the respective counting means and ejecting means.

9. A machine according to claim 4, wherein said guide rail includes several lengthwise spaced gaps, one for each of said ejecting means, and wherein each of said ejecting means comprises a coin drop chute having a wall transversely movable into and out of a position of alignment with one of said gaps, said wall of each of the chutes in the position of alignment thereof permitting passage of a coin past the respective gap and in the position of non-alignment causing a coin reaching the respective gap to drop into the respective chute, a directional force means for each chute biasing the respective chute into its aligned position, and electromagnetic control means for each chute coacting with the same, each of said control means being controlled by the respective detecting means to withdraw the respective chute into its non-aligned position against the action of said directional force means in response to an activation of said ejecting means.

10. A machine according to claim 9, wherein each of said chutes has a substantially rectangular cross section for guiding a coin while dropping through the chute.

11. A machine according to claim 9, wherein the lengths of the gaps are at least equal to the distance of the last detecting means as seen in the direction of travel of the coins on the guide rail.

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WALTER SOBIN, *Primary Examiner.*