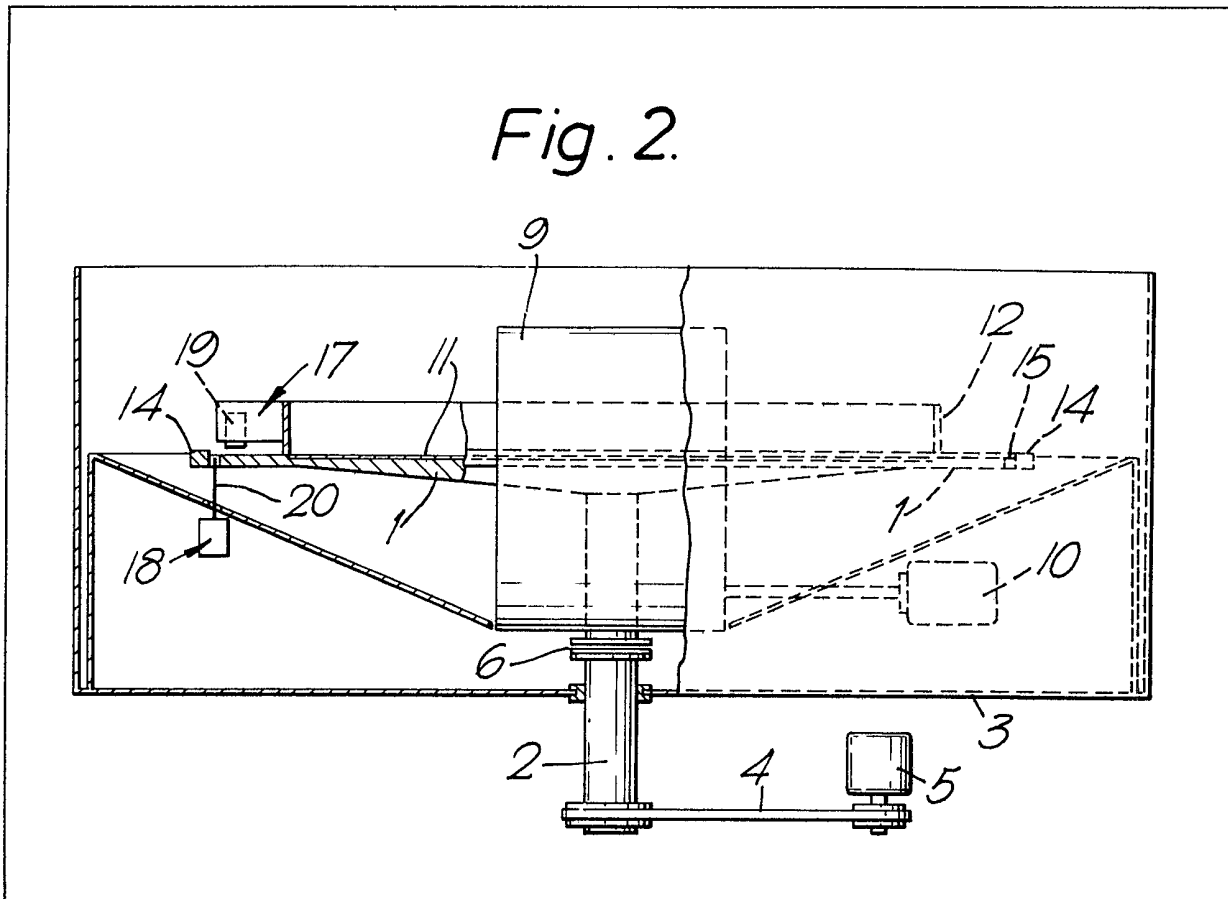


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(54) **Sorting and other selection of articles one from another**

(57) Coin to be sorted is discharged onto a rotating horizontal disc (1) to be urged, after passage through a separation slot (13) of a wear strip (12), against a stationary abutment member (14) that encircles the disc (1). The push-rod (20) of a stationary solenoid (18) at each of four stationary coin-selection stations (17) projects upwardly into the annular gap (15) between the periphery of the disc (1) and the abutment member (14). The solenoid (18) is energized transversely from coin-sensor (19) of the respective coin-selection station (17) whenever a coin that is to be selected enters that station (17) on the disc (1), so that the rod (20) moves upwardly through the gap (15) to tip the overlying coin over the abutment member (14) and thereby free it to pass from the disc (1) into an associated outlet port (21).



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.



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Fig. 2.

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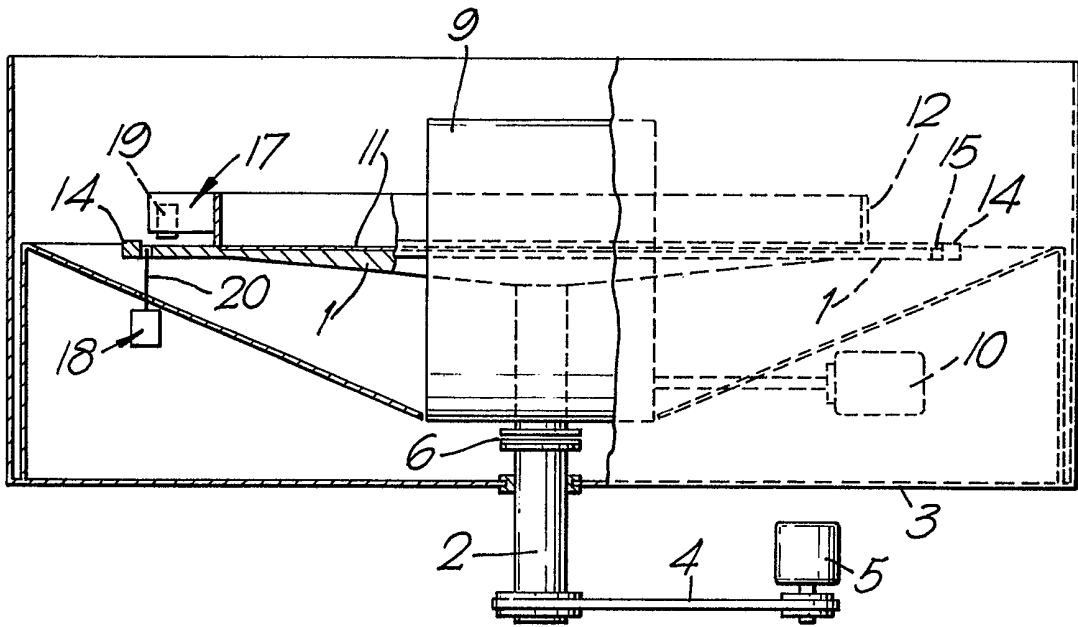


Fig. 3.

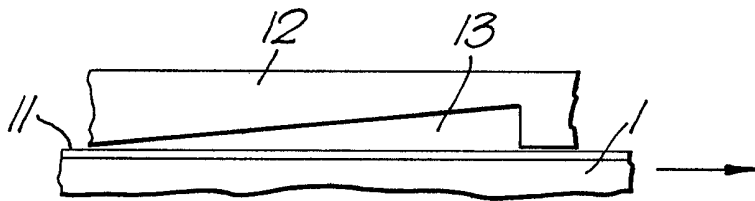


Fig. 4.

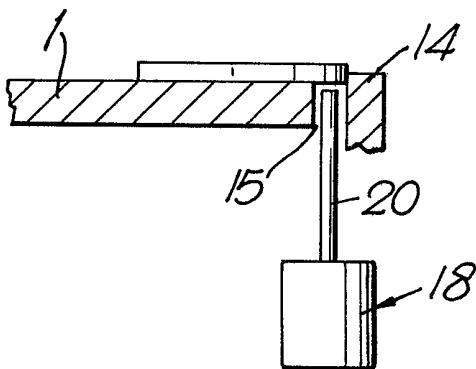
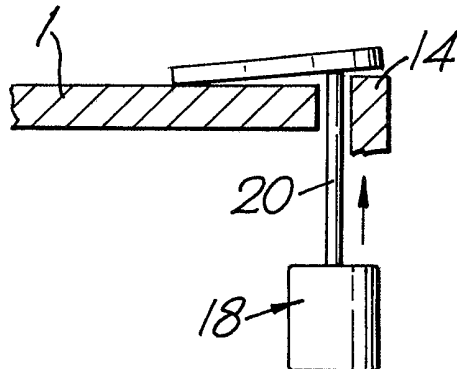


Fig. 5.



## SPECIFICATION

**Sorting and other selection of articles one from another**

5 This invention relates to sorting and other selection of articles one from another.

The invention is especially concerned with sorting and other selection of coin, and the provision of

10 apparatus for performing such operations.  
According to one aspect of the present invention there is provided a method of sorting or other selection of articles one from another, comprising the steps of discharging the articles onto a rotating

15 surface to be urged individually against an abutment at, but spaced by a gap from, the periphery of the surface for obstructing the articles from leaving the rotating surface, and selectively effecting displacement within a localized region at the periphery of the

20 surface such as to free any said article within that region from obstruction by the said abutment and enable it to pass from said surface, such displacement being effected through said gap from a position with respect to which said surface rotates to

25 displace said article and thereby free it as aforesaid.

According to another aspect of the present invention there is provided apparatus for sorting or other selection of articles one from another, comprising a rotably-mounted member, means for rotating said

30 member to urge articles discharged onto a surface of the rotating member towards the periphery of that surface, means spaced by a gap from said periphery and providing an abutment to obstruct the articles from leaving the rotating surface, and further means

35 for selectively effecting displacement at a localized region of the periphery of the surface such as to free any said article within that region from the said obstruction and enable it to pass from said surface, said further means comprising a displaceable mem-

40 ber with respect to which said rotably-mounted member rotates, and means for selectively displacing said displaceable member through said gap for freeing said article as aforesaid.

The rotating surface of the method and apparatus

45 of the present invention may be provided by a disc that is mounted horizontally to rotate about a vertical axis, and the abutment at the periphery of the disc may be a stationary member relative to which the disc rotates (however such abutment may alternatively be rotated with the disc).

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Coin-sorting apparatus in accordance with the present invention will now be described, by way of example, reference to the accompanying drawings, in which:-

55 *Figure 1* is a plan view of a coin-sorting apparatus; *Figure 2* is a side elevation of the coin-sorting apparatus of *Figure 1*;

*Figure 3* illustrates in side elevation a detail of the coin sorting apparatus of *Figures 1* and *2*; and

60 *Figures 4* and *5* illustrate in sectional side successive stages in the selection of a coin at one of the coin-selection stations of the coin-sorting apparatus *Figures 1* and *2*.

Referring to *Figures 1* and *2*, an aluminium-alloy

65 disc 1 is mounted horizontally on a vertical shaft 2

that is journaled in a base support 3 of the equipment. The shaft 2 is driven via a belt 4 by an electric motor 5 to rotate the disc 1 at high speed, in particular at some 80 to 120 revolutions per minute.

70 Rotation of the shaft 2 is communicated to the disc 1 via a friction clutch 6.

A stainless-steel hopper 7 of the equipment extends below the disc 1, and any coin entered into the bottom of the hopper 7 is raised up over the disc 1 by

75 an endless-belt elevator 9 that is driven by an electric stepping motor 10. Coin elevated in this way falls from the elevator 9 onto the disc 1 within an inner, annular region that is faced with a layer 11 of cold-rolled steel. This inner region is encircled

80 concentrically by a stationary fence or wear strip 12 that is mounted from the base support 3, just clear of the layer 11. Each coin dropped onto the layer 11 from the elevator 9 is thrown outwardly on the rotating disc 1 into abutment with the strip 12, and is

85 then drawn round with the disc 1 against the inner periphery of the obstructing strip 12 until a port 13 located beneath the elevator 9, is reached.

The port 13 is in the form of a wedge-shape aperture (see *Figure 3*) which extends throughout an arc of some forty degrees of the strip 12, and which provides a gap between the strip 12 and the disc 1 that increases progressively in height in the direction of disc rotation. The maximum height of the gap is adequate to allow the thickest coin to pass through, so each individual coin drawn round with the disc 1

90 against the strip 12 is in general no longer obstructed by the strip 12 and is free to move radially of the disc 1 beyond the strip 12, at some point within the aperture-arc of the port 13. The wedge shape of the port-aperture ensures separation of any coins that may be riding one upon the other, in that the upper coin will still be obstructed by the strip 12 after the lower coin has already become free to pass

95 through the port 13; the lower coin will, in general, move outwardly through the port 13 from beneath the upper coin causing the upper coin to fall onto the disc 1 so as itself to become free to pass through the port 13 after the leading, lower coin has moved clear of it.

110 Each coin passing through the port 13 free of the strip 12 moves rapidly outwards towards the periphery of the disc 1. A stationary stop member 14, which is mounted on the base support 3 to encircle the periphery of the rotating disc 1 with a small

115 annular gap 15 between them, projects above the level of the disc surface by an amount substantially less than the maximum coin thickness. Any bent or otherwise distorted coin reaching the member 14 will in general pass over it adjacent to the elevator 9, to fall into the hopper 7; the same will occur to any coin which at this point may be riding on top of another. Outward movement of any other coin, however, is obstructed by the encircling abutment or stop member 14 so that such coin continues to be

120 carried round with the disc 1 retained on the peripheral margin of the disc 1 against the member 14 and bridging the gap 15 (as illustrated in *Figure 4*). The peripheral margin of the disc 1 may be faced with material (for example, polyurethane) to increase the friction between the coin and the disc

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surface, so as to ensure that the coin is retained with the disc 1.

The peripheral margin of the disc 1 passes successively through four (there may be more or fewer) selection stations 17 in each revolution from the port 13. Each such station 17 includes a coin-selector unit 18 located on the base support 3 beneath the disc 1 (see Figures 2, 4 and 5), together with an electrical coin-sensor 19 mounted with the strip 12 above the disc 1 a little in advance of the unit 18 in the direction of disc rotation. The coin-sensor 19 of each station 17 responds to the entry of a coin beneath it to discriminate in accordance with pre-set criteria (for example of diameter) between coins which are to be selected at that respective station 17 and those which are not. The sensor 19 energizes its associated unit 18 transitorily whenever a coin that is to be selected is detected.

Each unit 18 includes an elongate member 20 that projects upwardly from the base member 3 into the annular gap 15 between the periphery of the rotating disc 1 and the stationary stop member 14. While the unit 18 remains unenergized the member 20 is held, for example by spring restraint, withdrawn below the level of the upper surface of the disc 1, and therefore as illustrated by Figure 4, does not interfere with the passage of coins that are being carried through the relevant selection station 17 on the disc 1. When the unit 18 is energized, however, the member 20 is moved upwards rapidly to project through the gap 15 transitorily as illustrated by Figure 5. This displaces upwardly any coin which at that time bridges the gap 15 and is being carried with the disc 1 through the selection station 17, that is say, the coin sensed by the sensor 19 of the station. The upward displacement of the coin lifts it above the stop member 14 so freeing it from radial obstruction and enabling it to pass over the member 14 (as illustrated in Figure 5), to be projected into an outlet port 21 individual to that selection station 17.

Each member 20 may be, as illustrated, in the form of a longitudinally-displaceable push-rod, and in this respect may have a flattened end within the gap 15 so as to extend the region of its action when actuated to project upwardly through that gap. Actuation of the member 20 within each unit 18 may be brought about electro-magnetically or otherwise; the unit 18 may simply be a solenoid and the member 20 a resiliently-biased plunger of the solenoid.

Any coin not selected at any of the selection stations 17 passes round with the disc 1 towards the elevator 9 and may be returned to the hopper 7. To this end, a further coin-selector unit 22 and sensor 23 (identical to the units 18 and sensors 19 respectively) are provided just in advance of the elevator 9 whereby any coin detected by the sensor 23 as remaining on the disc 1 can be selected to be projected into the hopper 7 by appropriate transitory energization of the unit 22 from the sensor 23.

The method of selection utilized in the coin-sorter described above has the especial advantage that it does not require the interaction of any mechanical device with the rotating disc 1 to remove the selected coin. Instead the selection method is

achieved simply through a transitory displacement of the otherwise stationary member 20 at the relevant location for the selection, this bringing about appropriate lifting of the coin to enable it to pass from the disc 1 over the obstruction provided by the stop member.

Instead of being of wedge-shape, the port 13 in the wear strip 12 may advantageously take the form of a uniform-width slot that is inclined upwardly along its length in the direction of disc rotation from a position just below the surface of the disc 1 to a position above that surface. The construction of a separation slot of this form and its operation are described with reference to Figure 14 of Applicant's co-pending Patent Application No. filed 29th March 1983.

#### CLAIMS

1. A method of sorting or other selection of articles one from another, comprising the steps of discharging the articles onto a rotating surface to be urged individually against an abutment at, but spaced by a gap from, the periphery of the surface for obstructing the articles from leaving the rotating surface, and selectively effecting displacement within a localized region at the periphery of the surface such as to free any said article within that region from obstruction by the said abutment and enable it to pass from said surface, such displacement being effected through said gap from a position with respect to which said surface rotates to displace said article and thereby free it as aforesaid.

2. A method according to Claim 1 wherein said rotating surface is provided by a horizontal disc or other member that is mounted to rotate about a vertical axis.

3. A method according to Claim 1 or Claim 2 wherein said abutment is a stationary member relative to which said surface rotates.

4. A method according to any one of Claims 1 to 3 wherein said displacement is effected by displacement of a push-rod through the said gap.

5. A method according to any one of Claims 1 to 4 wherein said displacement is effected electro-magnetically.

6. A method according to any one of Claims 1 to 5 wherein the said articles are coins.

7. Apparatus for sorting or other selection of articles one from another, comprising a rotably-mounted member, means for rotating said member to urge articles discharged onto a surface of the rotating member towards the periphery of that surface, means spaced by a gap from said periphery and providing an abutment to obstruct the articles from leaving the rotating surface, and further means for selectively effecting displacement at a localized region of the periphery of the surface such as to free any said article within that region from the said obstruction and enable it to pass from said surface, said further means comprising a displaceable member relative to which said rotably-mounted member rotates, and means for selectively displacing the displaceable member through said gap for freeing said article as aforesaid.

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8. Apparatus according to Claim 7 wherein said member is a horizontal disc that is mounted to rotate about a vertical axis.
9. Apparatus according to Claim 7 or Claim 8  
5 wherein said abutment is provided by a stationary member relative to which said surface rotates.
10. Apparatus according to any one of Claims 7 to 9 wherein said displaceable member is a push-rod that is displaceable longitudinally through said gap.
- 10 11. Apparatus according to any one of Claims 7 to 10 wherein said further means includes a solenoid for effecting said displacement.
12. Apparatus according to any one of Claims 7 to 11 adapted for sorting coin.
- 15 13. Apparatus for sorting coin substantially as hereinbefore described with reference to Figures 1 and 2 of the accompanying drawings.
14. A method of sorting coin substantially as hereinbefore described with reference to Figures 1 to  
20 5 of the accompanying drawings.
15. A method according to Claim 14 utilizing apparatus according to Claim 12 or 13.