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(54) **A DEVICE FOR SORTING COINS AND THE LIKE**

VORRICHTUNG ZUM SORTIEREN VON MÜNZEN UND DERGLEICHEN

DISPOSITIF DE TRIAGE DE PIÈCES ET ANALOGUE

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Description

The invention relates to a device for sorting coins and the like, comprising a body, a feeder drum, a coin track and ejecting means for coins, whereby the feeder drum is intended for feeding the coins onto the coin track and the ejecting means are intended for guiding the coins off the coin track to a collecting place desired.

Several types of machines for sorting and counting coins are known. The main parts of the machines are the coin feeder and the coin track, from which the coins are removed for instance through tubes into receptacles or the like situated below (see US-A-4 228 812).

One device of a known type comprises a feeder in the form of a drum, which drum comprises a rotary disc, from which coins are guided on the coin track. The coins roll on their sides, i.e. in the vertical position, along the coin track and are allowed to go off the coin track under the influence of gravity through outlets arranged below the track in such a way that coins of different values go into separate outlets. To this end, deflecting knives are arranged in the connection of the coin track at determined heights, which knives attend to that coins of different sizes go off the coin track at separate places so that coins of different values fall into separate receptacles. To increase the speed of the device, the coin track is inclined in such a way that the end of the coin track pointing away from the feeder drum, i.e. the free end, is situated lower than the opposite end. Because the surface of the coin track supporting the coin from the side is in the vertical position, efforts have been made to arrange the feeder drum also into a position as upright as possible. However, a vertical rotary disc is not capable of lifting coins very effectively from below upwards to a place from where they are removed from the feeder drum, and therefore, the surface of the rotary disc is provided with radial grip projections, the purpose of which is to effect that a coin grips the rotary disc better. However, grip projections do not solve very well the problem of making the coins grip the rotary disc, and therefore, the feeder drum is inclined about 20° with respect to the vertical axis. As to the object of making the coin grip the rotary disc better at the initial stage of coin lifting, it is known to make the disc flexible so that the lowest area of the disc forms a relatively big angle with respect to the vertical plane. The maximum speed of such a device is, in spite of what has been said, relatively modest, namely 800 coins per minute. One great drawback of the device is also that it needs plenty of room in the vertical direction because of the inclined coin track.

Moreover, a device is known in which coins are removed from the coin track by "shooting" at a certain moment and by utilizing a solenoid. The coin track comprises a chain, which moves the coins. On account of the above, the coin track does not need to be inclined, due to which the device needs less room in the vertical direction than the previous one. In the last-mentioned device, the feeder drum is vertical and not capable of feed-

ing coins on the coin track at a very high speed. The maximum operating speed of the device is about 400 to 500 coins per minute.

Further, a device for sorting coins is known, which comprises a horizontal path of coins provided with elongated apertures of different widths in the plane of the track, so that coins of different diameters can pass through the apertures. The smallest coin is removed (falls) through the aperture closest to the feeder drum, which aperture is the smallest one of the apertures of the coin track, and the biggest coin is removed through the aperture situated farthest away from the feeder drum. Coins are conveyed on the coin track by a belt. In this device, the feeder drum is arranged in a horizontal plane, which solution is natural on account of the horizontal coin track. An advantage of this device is the rather high speed: about 1300 to 1500 coins per minute. This high speed is possible because of the fact that the feeder drum is horizontal: a horizontal feeder drum is capable of moving the coins effectively to the periphery of the feeder drum, from where they move on the coin track at a certain place. However, a drawback of this device is that it is not capable of separating coins with a small difference in diameter because of the structure of said apertures: for efficient separation, a difference in diameter of at least about 0,4 mm is required in practice. Additionally, if there is a foreign "non-standard" coin among the coins to be sorted, which is discovered by means of an optical or inductive sensor, the device must be stopped in order to take away the foreign coin from the standard or "correct" coins and to prevent it from being mixed with "correct" coins of approximately identical diameter. (A foreign coin falls through the first aperture of the coin track which has a sufficient diameter.) Due to this, this known device is not so quick in practice as its theoretical speed gives to understand. It takes time for the coins to fall of themselves through said apertures, because of which the theoretical speed of the device cannot be very high either.

The object of the present invention is to eliminate the most substantial drawbacks associated with the devices according to the prior art. To achieve these objects, the device according to the invention is mainly characterized by the combination of the following features:

- the feeder drum is in a manner known per se in a substantially horizontal plane or at an angle α , which deviates relatively little from the horizontal plane,
- the plane defined by the coin track is inclined with respect to the feeder drum plane and forms an angle β with respect to the vertical plane, which angle is, on the one hand, big enough for the coin to be supported with its one side against the coin track under the influence of gravity and to move forward supported on this track in a controlled manner without any significant sway, and which angle is, on the

other hand, small enough for the coin to be removed in a manner known per se from the coin track mainly laterally by shooting with solenoid-controlled ejecting means, whereby the device comprises turning means for turning a coin coming from the feeder drum and being in the feeder drum plane to a plane defined by the coin track. The preferred embodiments of the device of the invention are presented in claims 2 to 13 enclosed.

The present invention is based on the idea of providing a quick-operated coin track inclined with respect to the horizontal drum feed.

The most important advantages of the device according to the invention are that its speed is considerably higher than that of the known devices and that there is no need of stopping the device, even if there are foreign coins among the coins to be counted. The sorting speed is typically 1500 to 2000 coins per minute. Further, the device can have a small size and it is capable of separating coins of only slightly differing diameters. Even coins of the same size, but of different materials, are separable when a sensing device suitable for this purpose is connected to the device.

The invention will be explained in greater detail in the following by means of one preferred embodiment with reference to the enclosed drawing, in which

Figure 1 shows a device seen from above,
Figure 2 shows the device in a partially longitudinal section,
Figure 3 illustrates an arrangement by means of which a coin is moved and turned,
Figure 4 shows a turning means from above and
Figures 5 to 7 show cross-sections along lines V-V, VI-VI and VII-VII of Figure 4.

The device of Figure 1 comprises a body 1, a feeder drum 2 supported on the body and slightly inclined with respect to the horizontal plane, into which drum coins 3 to be sorted and counted are poured, and a coin track, which is generally indicated by the reference numeral 4. When the feeder drum 2 is rotated in a direction indicated by an arrow, the coins are removed to the coin track 4 at a place 5. At the place 5 is arranged a gate with an adjustable height (for the sake of clarity not drawn), by means of which the height of the slot can be adjusted through which the coin passes. Thanks to the gate, it is possible to remove coins from the feeder drum 2 in thickness order, if desired, in such a way that the smallest coin in thickness is always removed at first. By lifting the gate to an upper position, coins of different sizes are removed simultaneously, as shown in the figure.

At the first end of the coin track 4, the position of the coin is changed in such a way that it will be in a more vertical position. For this purpose, the device comprises turning means designated 6. At a place 7 of the coin track, the coin 3 preferably forms an angle β of 10-30°

with respect to the vertical plane, cf. Figure 2. At the first end of the track, there is also a sensing unit 8, by means of which the coin is sensed. The sensing unit 8 is positioned after the turning means 6 in the moving direction of the coins. The coin is conveyed on the coin track by means of a conveying belt 9. When being conveyed, the coin rolls supported on a lower support 10 of the coin track, the coin leaning simultaneously against the conveying belt 9. When the coin is at that outlet 11 to 15 into which it shall be guided, solenoids 16 to 20 guided by the sensing unit 8 strike the ejecting means having the form of pins 21 to 24 towards the side of the coin, which makes the coin fly at full speed into the outlet desired. If the sensing unit 8 discovers a foreign coin, this is allowed to pass forward to the end of the track or conveying path, from where it is allowed to fall into a receptacle positioned below the conveying path. Alternatively, it is conceivable that one solenoidal ejecting unit is arranged to push all foreign coins into a separate outlet.

From Figure 2 is seen that a rotary disc 25 of the feeder drum, on which disc the coins lie, forms an angle α of about 5° with respect to the horizontal plane. The angle α shall be small, about 30° at the most, because otherwise it is not possible to achieve a high feed speed for the feeder drum. The value of the angle α is preferably below about 20°. It has been discovered that an exactly horizontal drum with $\alpha = 0$ is to be highly recommended, because it enables a very effective feed without problems.

The operation of the solenoids 16 to 20 of the device can be controlled as follows. When it is not possible any longer to feed coins through an outlet for a certain type of coins, for instance outlet number 11, due to the fact that the receptacle under the outlet 11 is full and must be emptied, the coin type in question is guided into another receptacle by activating another solenoid, to which is connected an empty receptacle.

Top left in Figure 1, there is a counting device 26 counting the number of the coins sorted and registering the values thereof.

Figure 3 shows more accurately how the coin is turned in the turning means 6. Figure 3 corresponds to a view from the turning means in the direction of arrows III-III in Figure 1. When a coin comes from the feeder drum to the turning means 6, it is in the horizontal plane. When moving in the turning means 6, it turns an angle of 65° to a position indicated by broken lines. When the coin leaves the turning means 6, it is thus at an angle β of 25° with respect to the vertical plane. At the middle of the turning means 6, the coin has managed to turn 32,5° with respect to the horizontal plane.

Figure 3 shows that the turning means 6 consists of a trough-like body, in which the coin propagates supported by its peripheral surface on edges 27, 28 of the trough, mainly on the lower edge 27. The coin 3 is supported with its side surface on a sliding surface 29 of the turning means, while a drive belt 30 having a round diameter is positioned against the opposite side surface

of the coin. The drive belt 30 is a flexible rubber belt, which presses by its elastic force the coin along a line situated in the middle of the side surface of the coin. Under the influence of a friction between the drive belt 30 and the coin 3, the coin moves at a speed defined by the drive belt. Thanks to its flexibility, the drive belt is capable of conveying coins in different thicknesses without being adjusted. The coin moves with a dragging or rather sliding movement in substantially straight line supported on the turning base. Said line, i.e. the moving direction of the coin, is the same as the direction of the drive belt. For the purpose of a small moving resistance, the turning base, i.e. the sliding surface 29 and the edges 27, 28, have a small friction and are made of plastic. Alternatively, the surfaces could be made for instance of hard steel, which also has a small friction against the coins and is very resistant to abrasion.

When moving within the turning means 6, the coin 3 turns continuously and steplessly along a spiral path. During the movement, the drive belt 30 presses continuously against the surface of the coin substantially at the same place, which can be seen from the position of the coin 3 with respect to the drive belt 30 drawn by broken lines. If there is no coin in the turning means 6, the drive belt takes a position in which its centre is at point 0. Thanks to the fact that the drive belt 30 has a round shape, said turning succeeds evenly. When the coin is moved, the position of the centre axis of the belt 30 changes so little that it can be said that the position does not change substantially.

Small and big coins are conveyed in the same manner in principle, the main difference being that the drive belt 30 can grip a small coin also at a place which is farther away from the middle of the side surface of the coin, i.e. closer to the edge of the side surface, which is caused by the fact that a small coin can come to the turning means in a somewhat "oblique" position.

In Figure 4, the turning means 6 is shown from above. An arrow A indicates a place at which the coin 3 comes in the horizontal plane to the turning means 6. When propagating, the coin 3 turns gradually in such a way that it forms an angle of $32,5^\circ$ with respect to the feeder drum (and the horizontal plane) at a place indicated by an arrow B and that it has turned about an angle θ of 65° with respect to the feeder drum at a place indicated by an arrow C, due to which the side surface of the coin forms an angle β of 25° with respect to the vertical axis.

Figures 5 to 7 show cross-sections of the turning means at V-V, VI-VI and VII-VII of Figure 4.

The invention has been described above by way of one preferred embodiment only, and therefore it is pointed out that the details of the invention can be realized in many ways within the scope of the enclosed claims. It is thus conceivable that the angle β is within the area of about 0 to 60° . Then the angle θ , about which the coin turns in the turning means, is between 30 and 90° , if the feeder drum is entirely horizontal. If the feeder drum is

inclined from the horizontal plane about an angle α of 20° (as in Figure 2), the angle θ is within the area 10 to 70° (or 50 to 110° , if the inclination occurs in another direction). The bigger the angle β is, the more difficult it will be to shoot the coin off the coin track, and with a very small angle the problem is that the coin is not supported well enough against the coin track, but is brought into an oscillating movement. It can then go off the track at a wrong place for instance because of the fact that its propagation speed on the coin track is not even, due to which the ejectors operate at a wrong time with respect to the position of the coin on the track. On account of this, the angle β is preferably within the area 10 to 30° .

It shall be noticed that also such a solution is possible in which the axis of the drive belt remains entirely in its place and the coin turns round the drive belt in such a way that the coin does not rotate about its own axis, but the drive belt touches the coin along a line which moves on the surface of the coin (and is not at the same place and diameter, as in the example case). In a solution of this kind, the moving direction of the coin is not quite the same as the direction of the drive belt.

The drive belt 30 does not necessarily need to be flexible: a flexible drive belt with high friction provided with means pressing the belt against coins could serve as an alternative solution, which would have a more complicated structure and be more expensive, however. The cross-section of the drive belt does not necessarily need to be round. The means 27, 28 for preventing the coin to be moved from being guided off the turning base during turning are not necessarily made in one piece with the turning base.

Claims

1. A device for sorting coins and the like, comprising a body (1), a feeder drum (2), a coin track (4) and coin ejecting means (8, 11 to 24), whereby the feeder drum (2) is intended for feeding the coins (3) onto coin track and the ejecting means (8, 11 to 24) are intended for guiding the coins (3) off the coin track (4) to a collecting place desired, **characterized** by a combination of the following features:

- the feeder drum (2) is in a manner known per se in a substantially horizontal plane or at an angle α , which deviates relatively little from the horizontal plane,
- the plane defined by the coin track (4) is inclined with respect to the feeder drum (2) plane and forms an angle β with respect to the vertical plane, which angle is, on the one hand, big enough for the coin (3) to be supported with its one side against the coin track under the influence of gravity and to move forward supported on this track in a controlled manner without any significant sway, and which angle is, on the oth-

er hand, small enough for the coin to be removed in a manner known per se from the coin track mainly laterally by shooting with solenoid-controlled (16 to 20) ejecting means (21 to 24), whereby the device comprises a turning means (6) for turning the coin coming from the feeder drum and being in the feeder drum plane to a plane defined by the coin track.

2. A device according to claim 1, **characterized** in that the angle α is smaller than approximately 30° . 10
3. A device according to claim 2, **characterized** in that the angle α is smaller than approximately 20° . 15
4. A device according to any of the foregoing claims, **characterized** in that the angle β is 0 to 60° .
5. A device according to claim 4, **characterized** in that the angle β is approximately 10 to 30° . 20
6. A device according to claim 1, **characterized** in that the turning means (6) is arranged to turn the coin continuously and steplessly in such a way that the coin is at the turning means and thus at least along a part of the track continuously in a different plane when moving on the track, which turning means (6) comprises a turning base (27 to 29) and a drive belt (30) positioned at such a distance therefrom that the coin (3) to be moved and turned can be brought between the turning base and the drive belt in such a way that the drive belt presses the coin to be moved and turned against the turning base, whereby the turning base comprises a low-friction sliding surface (29) parallel with the drive belt, which surface is positioned against the coin to be turned for guiding the coin with a dragging movement and in substantially straight line pulled by the drive belt and which surface is shaped spiral in the propagation direction of the coin for turning the coin about an axis defined by the drive belt, whereby the turning base additionally comprises means (27, 28) for preventing the coin to be moved from being guided off the turning base during turning. 25 30 35 40 45
7. A device according to claim 6, **characterized** in that the drive belt (30) is substantially parallel with the longitudinal centre axis of the sliding surface (29), whereby the drive belt is arranged to press the side surface of the coin (3) to be moved along a line situated substantially in the middle of the side surface of the coin (3). 50
8. A path according to claim 6 or 7, **characterized** in that the drive belt (30) has a round cross-section. 55
9. A path according to claim 7, **characterized** in that the drive belt (30) is flexible.

10. A device according to claim 6, **characterized** in that the sliding surface (29) is made of plastic.
11. A device according to claim 6, **characterized** in that the turning means (6) is arranged to turn the coin (3) round an axis defined by the drive belt (30) about an angle θ of at least appr. 10° and appr. 110° at the most for turning the coin to an angle β of 0 to 60° with respect to the vertical plane.
12. A device according to claim 6, **characterized** in that the spiral sliding surface (30) of the turning means (6) turns about the angle θ of 90° for turning the coin (3) to be moved mainly into vertical position.
13. A device according to claim 1, **characterized** in that the coin track (4) comprises a side and lower support (10), the lower support supporting the coin (3) from below in such a way that the coin can roll along the lower support and at the same time lean by gravity on the conveying belt (9) of the side support, which belt is arranged to touch the coin from above and to transmit the force needed for moving the coin by this contact.

Patentansprüche

1. Sortiervorrichtung für Münzen und dergleichen mit einem Grundkörper (1), einer Zuführtrommel (2), einer Münzenschiene (4) und Münzauswurfmitteln (8, 11 bis 24), wobei die Zuführtrommel (2) dafür vorgesehen ist, Münzen (3) auf die Münzenschiene zu führen und die Auswurfmittel (8, 11 bis 24) dazu vorgesehen sind, Münzen (3) von der Münzenschiene (4) zu einem ausgewählten Sammelplatz zu leiten, gekennzeichnet durch eine Kombination der folgenden Merkmale:
 - die Zuführtrommel (2) ist in an sich bekannter Weise in einer im wesentlichen horizontalen Ebene oder unter einem Winkel α angeordnet, der relativ wenig aus der horizontalen Ebene abweicht,
 - die durch die Münzenschiene (4) definierte Ebene ist gegenüber der Ebene der Zuführtrommel (2) geneigt und schließt mit der vertikalen Ebene einen Winkel β ein, welcher einerseits groß genug ist, um die Münzen (3) unter dem Einfluß der Schwerkraft stützend an einer Seite der Münzenschiene anliegen zu lassen, so daß sie von der Schiene geleitet in kontrollierter Form ohne nennenswertes Taumeln vorwärtsrollen, und welcher andererseits klein genug ist, so daß die Münzen in an sich bekannter Weise im wesentlichen quer zur Münzenschiene von dieser entfernt werden können, indem sie mit solenoid-gesteuerten (16 bis 20) Aus-

wurfmitteln (21 bis 24) ausgeschossen werden, wobei die Vorrichtung ein Wendemittel (6) aufweist, um die von der Zuführtrommel kommende und in der Zuführtrömmelebene sich befindende Münze in eine durch die Münzenschiene definierte Ebene zu drehen.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß der Winkel α kleiner ist als etwa 30°.

3. Vorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß der Winkel α kleiner ist als etwa 20°.

4. Vorrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Winkel β zwischen 0° und 60° beträgt.

5. Vorrichtung nach Anspruch 4, dadurch gekennzeichnet, daß der Winkel β etwa zwischen 10° und 30° beträgt.

6. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Wendemittel (6) so angeordnet sind, daß die Münze stetig und ohne Sprünge dergestalt gewendet wird, daß sich die Münze im Bereich der Wendemittel und demgemäß zumindest längs eines Teils der Schiene stetig in einer anderen Ebene befindet, wenn sie auf der Schiene sich bewegt, wobei die Wendemittel (6) eine Wendebasis (27 bis 29) und einen Antriebsriemen (30) aufweisen, der in einem solchen Abstand angeordnet ist, daß die zu bewegende und zu wendende Münze (3) zwischen die Wendebasis und den Antriebsriemen dergestalt gebracht werden kann, daß der Antriebsriemen die zu wendende und zu bewegende Münze gegen die Wendebasis drückt, wobei die Wendebasis eine Gleitoberfläche (29) mit niedriger Reibung aufweist, die parallel zum Antriebsriemen angeordnet ist, wobei die Oberfläche so gegen die zu wendende Münze angeordnet ist, daß die Münze in schleppender Bewegung geführt und im wesentlichen geradlinig durch den Antriebsriemen gezogen wird, wobei die Oberfläche in Vorschubrichtung spiralförmig ausgebildet ist, um die Münze um eine durch den Antriebsriemen definierte Achse zu drehen, und wobei die Wendebasis zusätzliche Mittel (27, 28) aufweist, um zu verhindern, daß die zu bewegende Münze während des Wendens die Wendebasis verläßt.

7. Vorrichtung nach Anspruch 6, dadurch gekennzeichnet, daß der Antriebsriemen (30) im wesentlichen parallel zur Längsachse der Gleitoberfläche (29) verläuft, wobei der Antriebsriemen so angeordnet ist, daß die Seitenoberfläche der Münze (3), die zu bewegen ist, längs einer Linie angepreßt ist, die im wesentlichen auf der Mitte der Seitenfläche der Münze (3) angeordnet ist.

8. Pfad nach Anspruch 6 oder 7, dadurch gekennzeichnet, daß der Antriebsriemen (30) einen runden Querschnitt aufweist.

9. Pfad nach Anspruch 7, dadurch gekennzeichnet, daß der Antriebsriemen (30) biegsam ist.

10. Vorrichtung nach Anspruch 6, dadurch gekennzeichnet, daß die Gleitoberfläche (29) aus Plastik hergestellt ist.

11. Vorrichtung nach Anspruch 6, dadurch gekennzeichnet, daß die Wendemittel (6) angeordnet sind, um die Münze (3) um einen Winkel θ von zumindest ca. 10° und höchstens ca. 110° längs einer Achse zu drehen, die durch den Antriebsriemen (30) vorgegeben ist, um die Münze in einen Winkel β zwischen 0° und 60° in bezug auf die vertikale Ebene zu bringen.

12. Vorrichtung nach Anspruch 6, dadurch gekennzeichnet, daß die spiralförmige Gleitoberfläche (30) der Wendemittel (6) um einen Winkel θ von 90° verdreht ist, um die zu bewegende Münze (3) im wesentlichen in eine senkrechte Position zu drehen.

13. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Münzenschiene (4) eine seitliche und eine untere Stütze (10) aufweist, wobei die untere Stütze die Münze (3) von unten dergestalt stützt, daß die Münze längs der unteren Stütze rollen kann und gleichzeitig unter dem Einfluß der Schwerkraft gegen den Förderriemen (9) der seitlichen Stütze lehnt, wobei der Riemen so angeordnet ist, daß er die Münze von oben berührt und so die Kraft überträgt, die zum Bewegen der Münze notwendig ist.

Revendications

1. Dispositif de triage de pièces et analogues, comprenant un corps (1), un tambour d'alimentation (2), une piste (4) pour les pièces, et des moyens (8, 11 à 24) d'éjection des pièces, le tambour d'alimentation (2) servant à alimenter la piste en pièces (3), et les moyens d'éjection (8, 11 à 24) servant à guider les pièces (3) en dehors de la piste (4) vers un endroit de rassemblement choisi, caractérisé par une combinaison des caractéristiques suivantes :

- le tambour d'alimentation (2) est disposé de manière connue en soi dans un plan sensiblement horizontal, ou à un angle α qui dévie relativement peu du plan horizontal,
- le plan défini par la piste (4) est incliné par rapport au plan du tambour d'alimentation (2) et

forme un angle β par rapport au plan vertical, cet angle étant, d'une part, assez grand pour qu'un côté de la pièce (3) soit maintenu sur la piste sous l'influence de la gravité, et que la pièce avance de manière contrôlée tout en étant maintenue sur la piste, sans oscillation significative, cet angle étant, d'autre part, assez petit pour que la pièce puisse être enlevée de manière connue en soi de la piste en particulier par le côté, en la propulsant par des moyens d'éjection (21 à 24) commandés par un électroaimant (16 à 20), le dispositif comprenant un moyen de rotation (6) pour faire tourner la pièce provenant du tambour d'alimentation et disposée dans le plan de celui-ci, vers un plan défini par la piste à pièces.

2. Dispositif selon la revendication 1, caractérisé en ce que l'angle α est inférieur à 30° environ.

3. Dispositif selon la revendication 2, caractérisé en ce que l'angle α est inférieur à 20° environ.

4. Dispositif selon l'une quelconque des revendications précédentes, caractérisé en ce que l'angle β est de 0 à 60°.

5. Dispositif selon la revendication 4, caractérisé en ce que l'angle β est de 10 à 30° environ.

6. Dispositif selon la revendication 1, caractérisé en ce que les moyens de rotation (6) sont agencés pour faire tourner la pièce en continu et sans heurts de manière à ce que la pièce soit à l'endroit des moyens de rotation, et ainsi au moins sur une partie de la piste, tout le temps dans un plan différent lorsqu'elle se déplace sur la piste, les moyens de rotation (6) comprenant une base de rotation (27 à 29) et une courroie d'entraînement (30) disposée à une distance telle de la base que la pièce (3) à déplacer et à faire tourner peut être amenée entre la base de rotation et la courroie d'entraînement de manière à ce que la courroie d'entraînement pousse la pièce à déplacer et à faire tourner contre la base de rotation, la base de rotation comprenant à cet effet une surface de coulissement à faible frottement (29) parallèle à la courroie d'entraînement, ladite surface étant placée contre la pièce à faire tourner en vue de la guider avec un mouvement de traction et sensiblement en ligne droite, entraînée par la courroie d'entraînement, ladite surface ayant une forme hélicoïdale dans la direction d'acheminement de la pièce pour faire tourner ladite pièce autour d'un axe défini par la courroie d'entraînement, la base de rotation comprenant en

outre des moyens (27, 28) qui empêchent que la pièce à déplacer soit écartée de la base de rotation pendant qu'elle tourne.

5 7. Dispositif selon la revendication 6, caractérisé en ce que la courroie d'entraînement (30) est sensiblement parallèle à l'axe central longitudinal de la surface de coulissement (29), la courroie d'entraînement étant ainsi agencée pour pousser la surface latérale de la pièce (3) à déplacer, le long d'une ligne située sensiblement au milieu de la surface latérale de la pièce (3).

10 8. Trajectoire selon la revendication 6 ou 7, caractérisée en ce que la courroie d'entraînement (30) a une section transversale ronde.

15 9. Trajectoire selon la revendication 7, caractérisée en ce que la courroie (30) est souple.

20 10. Dispositif selon la revendication 6, caractérisé en ce que la surface de coulissement (29) est réalisée en une matière plastique.

25 11. Dispositif selon la revendication 6, caractérisé en ce que les moyens de rotation (6) sont agencés pour faire tourner la pièce (3) autour d'un axe défini par la courroie d'entraînement (30), d'un angle θ d'au moins 10° environ et de 110° environ au plus pour que la pièce forme un angle β de 0 à 60° par rapport au plan vertical.

30 12. Dispositif selon la revendication 6, caractérisé en ce que la surface hélicoïdale de coulissement (29) des moyens de rotation (6) tourne d'un l'angle θ de 90°, pour que la pièce (3) à déplacer soit amenée en particulier dans la position verticale.

35 40 13. Dispositif selon la revendication 1, caractérisé en ce que la piste à pièces (4) comprend un support latéral et inférieur (10), le support inférieur soutenant la pièce (3) par le dessous de manière à ce que la pièce puisse rouler le long du support inférieur et en même temps, être appliquée par gravité sur la courroie de transport (9) du support latéral, cette courroie étant agencée pour toucher la pièce par le dessus, et pour transmettre la force nécessaire pour déplacer la pièce grâce à ce contact.

45 50 55

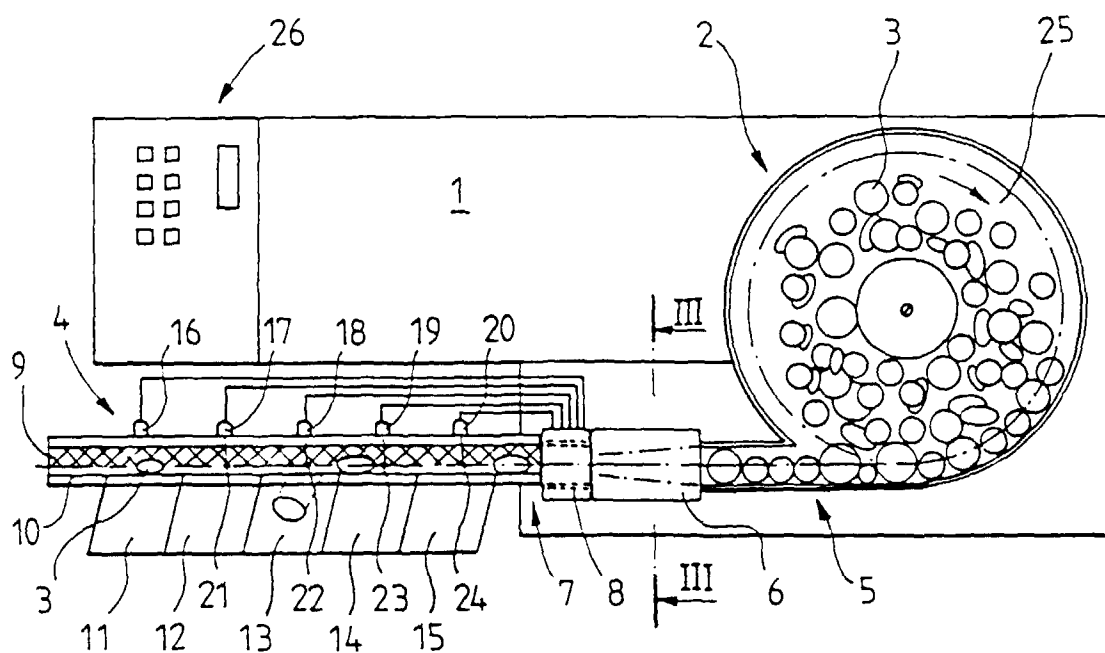


FIG. 1

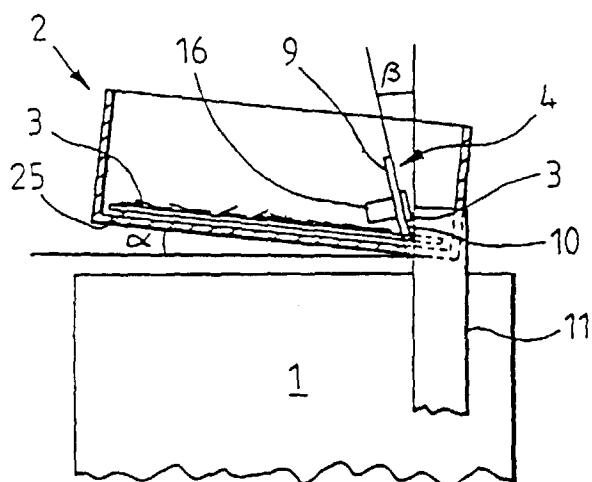


FIG. 2

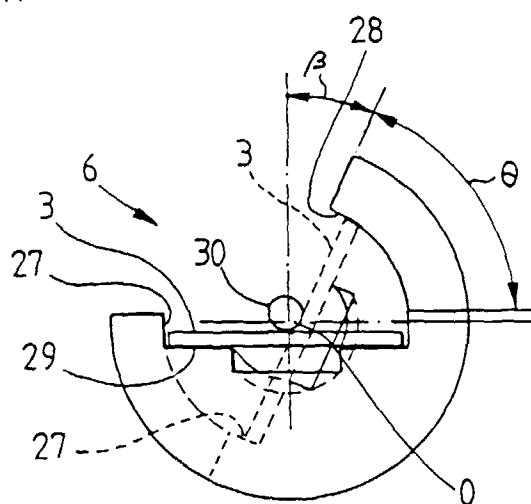


FIG. 3

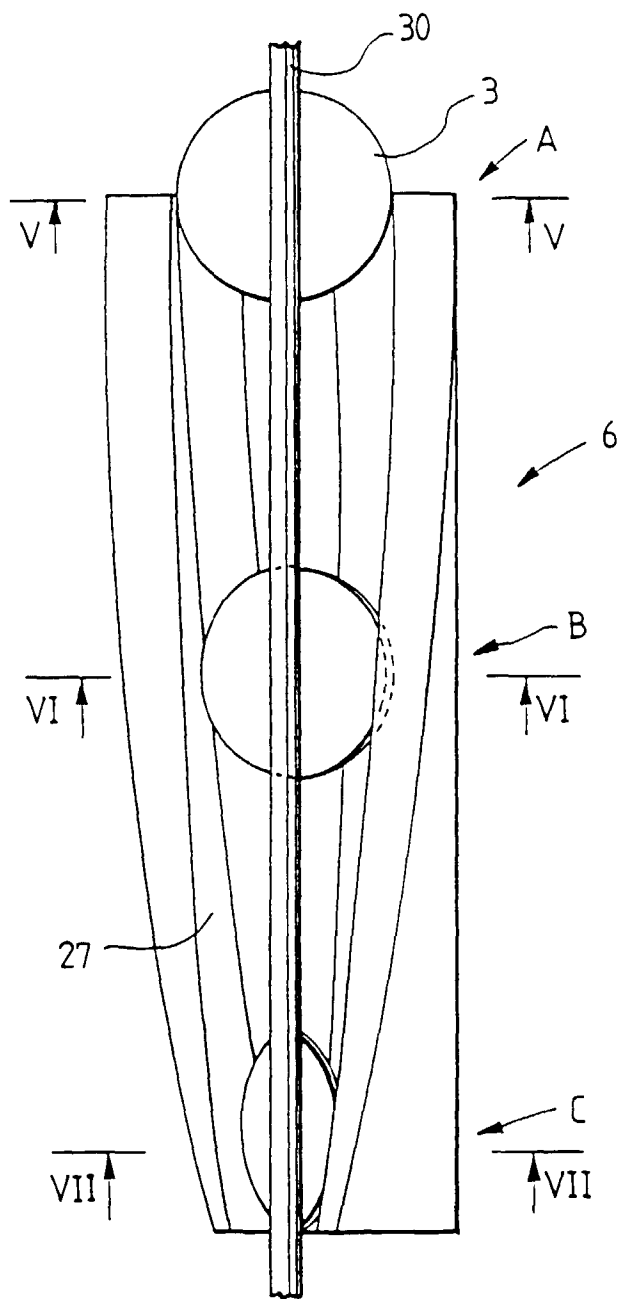


FIG. 4

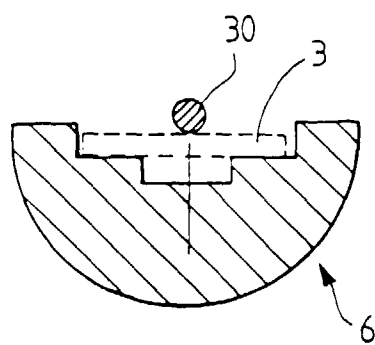


FIG. 5

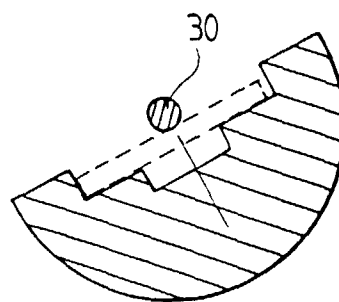


FIG. 6

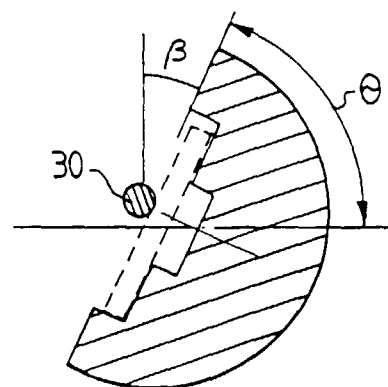


FIG. 7