



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 343 122 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

10.09.2003 Bulletin 2003/37

(51) Int Cl.7: **G07D 3/12, G07D 1/08**

(21) Application number: **03002814.6**

(22) Date of filing: **07.02.2003**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT SE SI SK TR**

Designated Extension States:

AL LT LV MK RO

(72) Inventor: **Martini, Silla**

I-31037 Bessica di Loria (Treviso) (IT)

(74) Representative: **Petraz, Gilberto et al
GLP S.r.l.**

**Piazzale Cavedalis 6/2
33100 Udine (IT)**

(30) Priority: **08.02.2002 IT TV20020013**

(71) Applicant: **Martini, Silla**

I-31037 Bessica di Loria (Treviso) (IT)

(54) **Coin sorting device**

(57) Device to separate coins (14), for example the eight euro coins, tokens or other disk-shaped elements and having different diameters, comprising a fixed structure (11) provided with a hopper (15) to introduce the coins (14) to be separated, and collecting tubes (18) able to collect the coins (14) separated according to their individual diameter. A guide track (30) is arranged inclined with respect to a horizontal plane and a guide wall (31) is arranged inclined backwards with respect to the vertical plane in order to guide in their descent the coins (14) to be separated. Wedge-shaped elements (16) and diversion elements (32) are associated with the guide wall (31) and the track (30) in order to selectively divert and discharge the coins (14) into the collecting tubes (18) below.

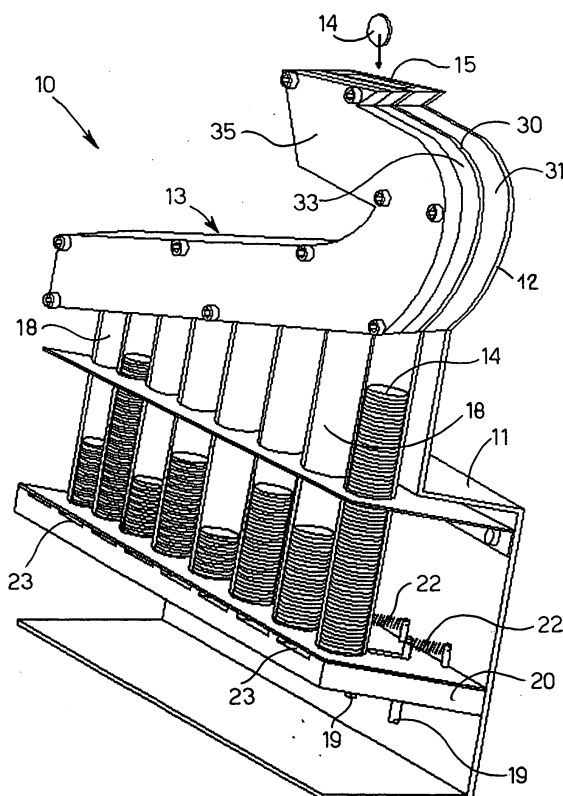


fig.1

EP 1 343 122 A2

Description

FIELD OF THE INVENTION

[0001] The present invention concerns a device to select and separate coins having different diameters, for example the eight different euro coins and relative sub-multiples. The different coins are introduced manually, also loose, into a suitable little hopper of the static device according to the present invention, which is able to intercept all the coins that descend on a suitable inclined channel, or track, to distribute them into a plurality of vertical collecting tubes. Although it refers particularly to coins, the device according to the invention is not limited thereto, and can also be applied to separate tokens or other types of disc-shaped elements, with a different diameter. Therefore, in this description, including the claims, the term coin shall be taken to include also tokens or other disc-shaped elements.

BACKGROUND OF THE INVENTION

[0002] At present there are numerous coin-counting machines and coin-selection machines on the market, intended for banks, post offices, video-game rentals, etc. Such conventional machines, especially coin-selection machines, are very expensive and function with electronic mass readers, or with electro-mechanical stratagems to separate the moving coins and systems. In every case, all these conventional machines have an electro-mechanical or manual mechanical functioning, and are subject to constant maintenance.

[0003] The purpose of the present invention is to resolve the aforesaid shortcomings, and others not cited here.

[0004] Another very important purpose that the present invention has set itself is to achieve a device able to simultaneously select a plurality of different coins, for example eight, and to separate them according to type into the appropriate collecting spaces, without using moving mechanical parts.

[0005] Another important purpose that the present invention has set itself is to achieve a coin-selection device which costs very little and that occupies very little space so that it can be accessible for all public premises.

[0006] A further purpose that the present invention has set itself is to be able to channel the selected coins into appropriate cylindrical containers, one for each type of coin, each one equipped downstream with a manual drawer-type extractor in order to facilitate the operator when giving change to customers.

[0007] Yet another very important purpose that the present invention has set itself is to be able to achieve, according to a variant, a second static device also able to count all the coins introduced, simply by electrically connecting a plurality of electric/electronic pulse counters to the metallic diversion means and to the guide track, which is also metallic. In this way, the inter-

cepted coins themselves will go to close, on each occasion, the respective electric counting circuits.

[0008] In accordance with the above purposes and to overcome the shortcomings of the state of the art, the Applicant has devised and perfected the device according to the present invention.

SUMMARY OF THE INVENTION

[0009] The device to separate coins according to the present invention is set forth and characterized in the main claim, while the dependent claims describe other innovative characteristics of the present invention.

[0010] The purposes set out above are achieved by a device according to the present invention, which is of the static type and is able to separate and also, if desired, to count, all the coins, for example the euro and its sub-multiples, which are introduced loosely into an appropriate small hopper arranged in the upper part of the device.

[0011] The invention provides a completely static device, made with conveyor and discharge channels to convey and discharge the coins, which exploit only the force of gravity. The positioning of the rigid structures which make up every part of the conveyor channels, the materials used and the size thereof, and also their shape, have been calculated to a thousandth of a millimeter so as to be able to obtain perfect synchrony of a progressive and natural separation of the coins introduced.

[0012] The device according to the present invention comprises a bearing structure, on which an apparatus is mounted arranged inclined, for the separation of the coins. The apparatus comprises a hopper to facilitate the manual introduction of the coins, a lead-in channel to distance the coins introduced from each other, a guide track, a plurality of diversion elements able to divert the coins during the obligatory descent. Below the apparatus a plurality of tubes are arranged, transparent and possible graded, for the differentiated collection, in piles, of the coins. Downstream of the collecting tubes a plurality of extractors are arranged, able to be driven by corresponding levers, for the manual extraction of the coins.

[0013] According to a variant, the device according to the invention also comprises a plurality of pulse counters, a low-tension transformer and a switch.

[0014] The aforesaid guide track is inclined by about 15-20° with respect to a horizontal plane, is made advantageously of metal, and is about 3 mm wide and about 250 mm long.

[0015] The supporting wall for the coins is made of an insulating material with a low friction coefficient, for example plastic material, and is bent backwards, by about 5°-10°, with respect to the vertical plane. This inclination is sufficient to guarantee the sliding contact of the coins that roll on the guide track. The base of the track on which the coins are able to slide is substantially perpen-

dicular to the supporting wall.

[0016] A plurality of wedge-shaped elements, or leafs cut like a goose quill, protrude from the supporting wall towards the channel formed by the track, which elements hereinafter, for the sake of simplicity, shall be called "pointed elements". For example, in the case of euro coins, including sub-multiples, there are eight pointed elements, because there are eight different coins.

[0017] The pointed elements protrude into the space above the base of the track and are distanced from each other by a value greater than the diameter of the biggest coin; they are also distanced, in a scale, from the base of the track by values proportionate to the diameters of the different coins to be separated. To be more exact, each pointed element is distanced from the base of the track by a value a little less than the diameter of the coin to be intercepted, but more than the diameter of a coin with a diameter just a little larger.

[0018] Each coin, as it descends along the inclined track, passes under the pointed elements that do not have to intercept it, and is able to be intercepted only by the corresponding pointed element and laterally diverted by said pointed element. The diverted coin exits from the track and, due to gravity, finishes in the collecting tube below.

[0019] The different coins are thus intercepted in turn by the corresponding pointed element, which millimetrically protrudes from the plane supporting wall.

[0020] First of all, the biggest coin is intercepted and then, in a scale, the other coins, so that all of them fall, due to gravity, into their own collecting tube, possibly transparent, arranging themselves one on top of the other to form a pile.

[0021] According to the present invention, the device is characterized in that it comprises first guide means inclined with respect to the horizontal plane and second guide means inclined with respect to the vertical plane and associated with the first guide means to accompany in their descent all the coins to be selected, so that the coins can slide downwards along said first guide means, with a face that slides on the second guide means; it is also characterized in that diversion means are associated with said first and second guide means in order to selectively divert and discharge the coins into corresponding collecting elements.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] These and other characteristics and advantages of the present invention will become clearer from the following detailed description of a preferential form of embodiment, given as a non-restrictive example, with reference to the attached drawings wherein:

- fig. 1 is a three-dimensional view of the device according to the present invention, showing the inclined upper apparatus 13 with the upper hopper 15

to load the coins 14. The collecting tubes 18 for the different coins 14, in this case eight, of different diameter, are well aligned above the horizontal structure 20 equipped with manual extractors 19 for the coins 14.

- figs. 2 and 3 show respectively a front view and a side view of the device according to the present invention. To be more exact, fig. 2 shows the inclined channel, or track, 30 without the conveyor dividers so as to be able to better see the descending coins 14. The eight different coins 14 (from 14a to 14h) can be seen, and in particular, starting from the top, the coin 14a with the largest diameter and the others in a scale. All the coins 14 are intercepted by the corresponding wedge-shaped diversion elements, or pointed elements 16 (from 16a to 16h). In fig. 3 the first of the eight lever mechanisms 19 can be seen, which causes a coin 14 to come out.
- fig. 4 shows the upper apparatus 13 in an exploded view; the cover 35, the frame 33 with the eight conveyor dividers 32 (from 32a to 32h), the inclined channel or track 30, and the supporting wall 31 with the hopper 15 can all be seen. The eight pointed elements 16 aligned with the outside can also be clearly seen.
- fig. 5 shows the upper apparatus, inclined, of fig. 4 with the track 30 assembled to the supporting wall 31. The eight pointed elements 16 are also inserted in the corresponding slits. Two coins 14e and 14g can also be seen descending, the first of which (14e), that is, the one further left, is intercepted by the pointed element 16e, while the second (14g) continues its descent.
- fig. 6 shows the upper apparatus, inclined, of fig. 5 with the frame 33 equipped with conveyor dividers 32 (from 32a to 32h). It can be seen that the first coin 14e is thrust laterally by the pointed element 16e thus knocking against the corresponding divider 32e before falling.
- figs. 7 and 8 show some enlarged details of figs. 5 and 6 and show better the coin 14e intercepted and detached from the supporting wall 31 hitting against the divider 32e. In fig. 7 the coin 14e can be seen, with the electric discharge S shown symbolically, indicating the possible passage of the electric current between the element 16e and the base of the track 30.
- fig. 9 shows an enlarged detail of the lateral view of the upper apparatus 13. The coins 14 of different diameters can be seen descending from the hopper 15 into the lead-in channel and which are distanced from each other.
- fig. 10 shows a right lateral view, partly in section, of the detail in fig. 9, where the hopper 15 can be seen with the coins 14 entering into the track 30. It can also be seen that the gap does not allow two coins 14 to enter simultaneously into the track 30.
- fig. 11 is a partial section, on an enlarged scale,

along the line XI-XI in fig. 2;

- fig. 12 is a section along the line XII-XII of fig. 11.

DETAILED DESCRIPTION OF A PREFERENTIAL FORM OF EMBODIMENT OF THE INVENTION

[0023] With reference to the attached figures, a device according to the present invention, indicated generally by the reference number 10, is essentially composed of a fixed bearing structure 11, which is made for example from a single metal sheet, cut and/or molded and then bent. At least an upper part 12 of the structure 11 is bent backwards by an angle α of about 5° - 10° with respect to a vertical plane V (fig. 11). Said upper part 12 (fig. 1) serves to support an inclined apparatus 13, substantially consisting of four parts 30, 31, 33 and 35, which will be described in more detail later and which are indispensable for the transport and systematic natural division of coins 14 introduced into a small hopper 15 of the apparatus 13.

[0024] Each coin 14 is immediately channeled downwards and will be intercepted by a corresponding wedge-shaped element, or pointed element 16, and will then fall into a corresponding vertical tube 18. In this case, there are eight pointed elements, from 16a to 16h, just as there are eight tubes 18.

[0025] Below the tubes 18 there is a rigid structural element 20, wherein eight drawer-type leaves are arranged, able to slide horizontally and solid with their own levers 19. Springs 22 keep the leaves resting at end-of-travel near the bearing structure 11.

[0026] Displacing the lever 19 manually towards the front part of the device 10 causes a coin 14 to exit from the corresponding slit 23.

[0027] Fig. 3 shows a lever 19 displaced completely to the left, that is, towards the front part of the device 10, and a coin 14 having exited completely from the slit 23, while the other levers 19 are in an inactive position, retained by the corresponding springs 22. After the coin 14 has been expelled, the spring 22 immediately provides to restore the drawer-type leaf after the operator releases the lever 19. By pulling the same lever 19 again, a second coin 14 of the same type will be extracted.

[0028] Fig. 2 shows eight different coins 14 (from 14a to 14h) arranged in a row. Each coin 14 is different from the other both in value and in diameter, and each of them is able to be intercepted by the corresponding pointed element 16. As can be seen, the first pointed element 16a intercepts the biggest coin 14a, which for example corresponds to the 2 euro coin; the second pointed element 16b intercepts the 50 cent coin 14b, which has an immediately smaller diameter than that of the 2 euro coin; the third pointed element 16c intercepts the 1 euro coin 14c; the fourth pointed element 16d intercepts the 20 cent coin 14d; the fifth pointed element 16e the 5 cent coin 14e; the sixth pointed element 16f the 10 cent coin 14f; the seventh pointed element 16g the 2 cent coin

14g, and finally the eighth pointed element 16h intercepts the smallest coin 14h, the 1 cent coin.

[0029] All eight coins 14a-14h listed above descend due to gravity on the inclined channel, or track 30, with one face sliding on a supporting wall 31, advantageously made of non-conductive material and inclined towards the rear part of the device 10 (fig. 11). The corresponding pointed elements 16a-16h will provide to divert their travel, to make them knock against the respective conveyor dividers 32a-32h (figs. 4, 5, 6 and 8), and fall into the corresponding tubes 18, arranging themselves in vertical piles.

[0030] Fig. 4 shows the inclined structure in an exploded view. The supporting wall 31 can be seen with the hopper 15 made in the wall 31. The pointed elements 16a-16h, shaped as goose quills, are ready to be inserted into corresponding slits, which are positioned in a scale in the supporting wall 31 and distanced from the base of the track 30 by a value proportionate to the diameter of the corresponding eight coins 14a-14h.

[0031] The conveyor channel defined by the track 30 (figs. 11 and 12) is about 3 mm, to ensure that all the coins 14 slide one after the other, and do not overtake or leapfrog each other as they descend.

[0032] In figs. 4, 5 and 6 the frame 33 can be seen, which is equipped with the eight conveyor dividers 32a-32h which serve to stop the different coins 14a-14h diverted by the pointed elements 16a-16h and to channel them into correspondence with the mouths of the tubes 18 below.

[0033] A cover 35, possibly able to be opened (fig. 12) to inspect the inside of the apparatus 13, serves to complete the closure of the conveyor dividers 32a-32h, transforming them into proper conveyor channels, and to prevent the coins 14 from jumping out.

[0034] In fig. 5 it can be seen that the track 30 is assembled to the supporting wall 31 and that the pointed elements 16a-16h too have been blocked on the corresponding slits. A 5 cent coin 14e is intercepted by the corresponding pointed element 16e, while a 2 cent coin 14g will continue to descend undisturbed and will be intercepted by the pointed element 16g that is distanced from the base of the track 30 by a value slightly less than the diameter of the coin 14g.

[0035] Fig. 6 shows the frame 33, with the conveyor dividers 32a-32h assembled to the track 30. The same coins 14e and 14g as shown in fig. 5 can also be seen; in particular, it can be seen that the coin 14e knocks against the corresponding divider 32e after meeting the pointed element 16e, which, being cut like a goose quill, causes the coin 14e to become detached from the supporting wall 31, and makes it protrude just enough to meet the divider 32e.

[0036] Figs. 7 and 8 show a coin 14e that is changing direction because of the pointed element 16e. It can also be seen that an electric charge S is symbolized on the coin 14e, to show that at that point the electric current can pass from the track 30 to the pointed element 16e

through the coin 14e itself, which is metallic. The track 30 and all the pointed elements 16a-16h are made of metal material, while the wall 31, the frame 33 and the cover 35 are made of material which does not conduct electric current, for example plastic.

[0037] It is necessary to use the electric current only if a device is made, as a variant, also able to count the coins 14. Every time that a coin 14 is intercepted by the corresponding pointed element 16, an appropriate electric/electronic pulse counter, which can be zeroed, of a conventional type and not shown in the drawings, provides to progressively count the coins 14 intercepted of the same value. In this case, eight pulse counters, or a single display with an electronic card, can register the eight counts and also add up the value of all the coins 14 (known electronic systems) diverted into each tube 18.

[0038] Fig. 8 gives a better view of the coin 14e which, inclined, knocks against the divider 32e. In fig. 8 it can be seen that the coin 14g has not yet met its own pointed element 16g and therefore continues its descent with one face sliding against the supporting wall 31.

[0039] With particular reference to figs. 9 and 10, the coins 14 descend from the hopper 15 accompanied by the track 30, which has an inclined lead-in channel for the coins 14 that have just been introduced manually. Said lead-in channel serves to prevent the coins 14 from chasing each other as they descend, and from getting attached to each other.

[0040] It can be seen that, while one coin 14' descends vertically (arrow F), the coin 14" which follows it is still supported by the lead-in channel and descends almost horizontally (arrow E), thus giving time to the preceding coin 14' to gain sufficient distance.

[0041] The descending coins 14 must be slightly distanced from each other so as not to be drawn down into the wrong tube 18 by the preceding coin 14, at the moment when the latter is intercepted by the corresponding pointed element 16 and also during the time, almost instantaneous, when it knocks against the conveyor divider 32.

[0042] In fig. 9 it can be seen that the coins 14 are distanced from each other by a few centimeters.

[0043] In figs. 9, 11 and 12 it can be seen that the coin 14b has been intercepted by the pointed element 16b and that, undisturbed, it changes direction without the following coin 14 being involved in this change of direction.

[0044] In fig. 10 it can be seen how the coins 14 enter through the hopper 15 into the lead-in channel, which is about 3 mm wide.

[0045] Since the thickness of the smallest coin, for example 1 cent, is 1.7 mm, two coins cannot enter simultaneously into said lead-in channel.

[0046] For the functioning of the device 10 as described heretofore, we shall refer particularly to figs. 2, 3 and 6, which show the track 30 inclined by about 20° with respect to the horizontal plane and the eight pointed

elements 16a-16h emerging millimetrically from the supporting wall 31. After introducing manually from the hopper 15 a 2 euro coin 14a, which is the one with the largest diameter, it can be seen that said coin 14a rolls down on the track 30 and that, after meeting the pointed element 16e, it falls down, first knocking against the corresponding divider 32a, and then finishing up inside the first tube 18 to form a pile.

[0047] Each coin 14 of a different diameter will go to meet the corresponding pointed element 16 and the corresponding divider 32, falling immediately into the corresponding tube 18.

[0048] The coins 14 introduced into the hopper 15 descend along the inclined channel 30 with a speed proportionate to the inclination of the channel 30. One face of the coin 14 remains constantly in sliding contact with the supporting wall 31, which is bent backwards by an angle α of about 5-10°. When the coins 14 meet the pointed elements 16 corresponding to their diameter, they are diverted and detached from the wall 31. The pointed elements 16 discharge the kinetic energy of the coins 14 onto the coins 14 themselves, knocking them against the dividers 32. The coins 14 are thus destabilized and fall due to gravity, onto the corresponding tubes 18.

[0049] To extract the coins 14 from the tubes 18, it is sufficient to pull the appropriate lever 19, so that the corresponding thin leaf inside the structure 20 can provide to release the last coin 14 of the pile above, in a conventional manner.

[0050] From what we have described so far, it is clear that the static device according to the present invention to separate, count and position coins in piles, for example the euro and its sub-multiples, is particularly useful for all those who have to manage money every day, in both the public and private sector, for example: tobacconists, shop keepers, cashiers in service stations, bars, banks, post offices, newsagents, railway stations and suchlike.

[0051] The present invention has been illustrated and described in its preferential form of embodiment, but it is understood that executive variants can in practice be made thereto, without departing from the field of protection of the attached claims.

[0052] For example, in an alternative form of embodiment, an electric/electronic system may be provided to count the coins, using the coins themselves to close the electric circuit between the pointed element and the track; in this way, it is possible to obtain the necessary electric pulse for the pulse counting instruments.

[0053] While the principle of the present invention remains constant, the contingent forms and the materials employed can be varied and modified at any time according to requirements.

[0054] The device according to the present invention can also be associated with any cash register and automatically provide the change for any transaction. In this case, attraction means of a conventional type, for

example of the electromagnetic type, can be associated with the levers 19 and cause one or more coins 14 to protrude from the respective slits 23, according to the value of each coin 14 and the overall value of the change to be given.

Claims

1. Device to separate coins (14), comprising a fixed structure (11) provided with introduction means (15) to introduce the coins (14) to be separated and collecting means (18) able to collect the coins (14) separated according to their individual diameter, **characterized in that** it comprises first guide means (30) inclined with respect to a horizontal plane and second guide means (31) inclined with respect to the vertical plane and associated with said first guide means (30) in order to guide in their descent said coins (14) to be separated, so that said coins (14) are able to run downwards along said first guide means (30), with one face of said coins (14) sliding on said second guide means (31), and **in that** diversion means (16, 32) are associated with said first (30) and second guide means (31) in order to selectively divert and discharge said coins (14) into said collecting means (18).
2. Device to separate coins (14) as in claim 1, **characterized in that** said first guide means comprise a conveyor channel, or track (30), with a width substantially equal to, or a little more, than the thickness of said coins (14).
3. Device to separate coins (14) as in claim 1 or 2, **characterized in that** said second guide means comprise a supporting wall (31) on which said coins (14) are able to lean while they are sliding downwards.
4. Device to separate coins (14) as in claim 2 and 3, **characterized in that** said track (30) and said supporting wall (31) are substantially perpendicular to each other.
5. Device to separate coins (14) as in any claim hereinafore, **characterized in that** the inclination of said first means with respect to said horizontal plane is about 15°-20°.
6. Device to separate coins (14) as in any claim hereinafore, **characterized in that** the inclination of said second means with respect to said vertical plane is about 5°-10°.
7. Device to separate coins (14) as in any claim hereinafore, **characterized in that** said diversion means comprise a plurality of wedge-shaped elements (16) able to intercept said coins (14) and to divert them outside said first guide means (30).
8. Device to separate coins (14) as in claim 7, **characterized in that** said diversion means comprise a plurality of divider elements (32) arranged substantially perpendicular to said wedge-shaped elements (16) in order to stop the downward travel of said coins (14) and make them fall into the collecting means (18) below.
9. Device to separate coins (14) as in claims 4 and 7, **characterized in that** said wedge-shaped elements (16) are distanced from each other by a value greater than the diameter of the biggest coin to be separated (14a), and also distanced, in a scale, from the base of said track (30) with values proportionate to the diameters of the different coins to be separated (14a-14h).
10. Device to separate coins (14) as in claim 9, **characterized in that** each wedge-shaped element (16) is distanced from the base of said track (30) by a value a little less than the diameter of the corresponding coin (14) to be intercepted and diverted, but more than the diameter of another coin (14) of a slightly larger diameter.
11. Device to separate coins (14) as in any claim hereinafore, **characterized in that** said first and second guide means are arranged in an apparatus (13) which comprises a cover (35) in the front part, possibly able to be opened.
12. Device to separate coins (14) as in any claim from 7 to 10 inclusive, **characterized in that** said collecting means comprise a plurality of vertical tubes (18), possibly transparent, arranged each in correspondence with a wedge-shaped element (16), in order to collect the coins (14) diverted by said shaped element (16) and to stack said coins (14) vertically.
13. Device to separate coins (14) as in claim 12, **characterized in that** expulsion means, with a manual or electro-mechanical command, are associated with the lower end of each vertical tube (18) in order to command the selective expulsion of the coin (14) contained therein.
14. Device to separate coins (14) as in any claim from 7 to 10 inclusive, **characterized in that** said first guide means (30) and said wedge-shaped elements (16) are made of conductive material, whereas said second guide means (31) are made of insulating material, the contact of a coin (14) with a wedge-shaped element (16) being able to electrically short-circuit said wedge-shaped element (16) with said first guide means (30) and cause an elec-

tric contact able to be used to count the coins intercepted.

15. Device to separate coins (14) as in any claim hereinbefore, **characterized in that** it also comprises electronic coin-counting means to count the coins (14) diverted into each of said collecting means (18) or taken from the latter.

10

15

20

25

30

35

40

45

50

55

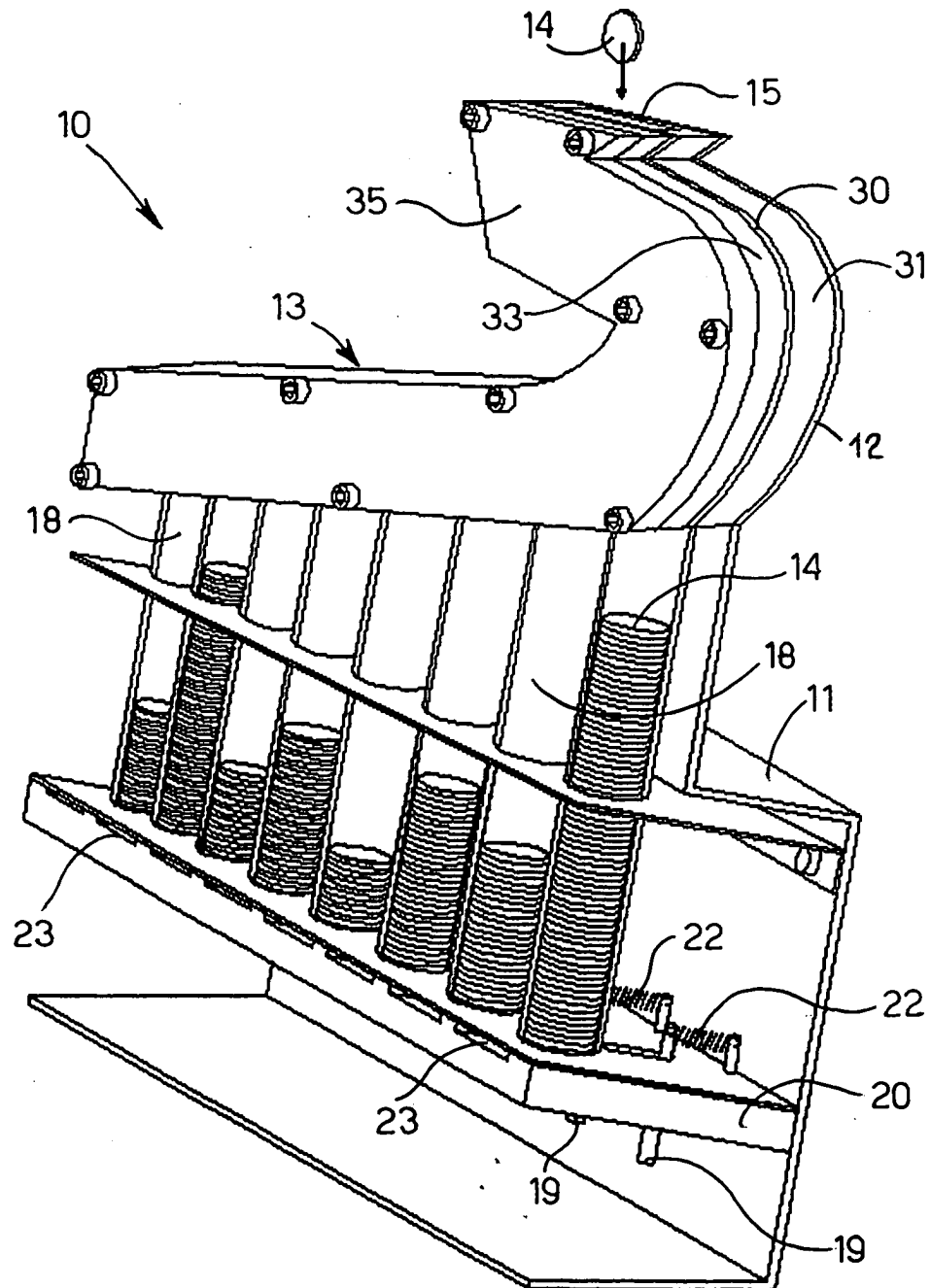
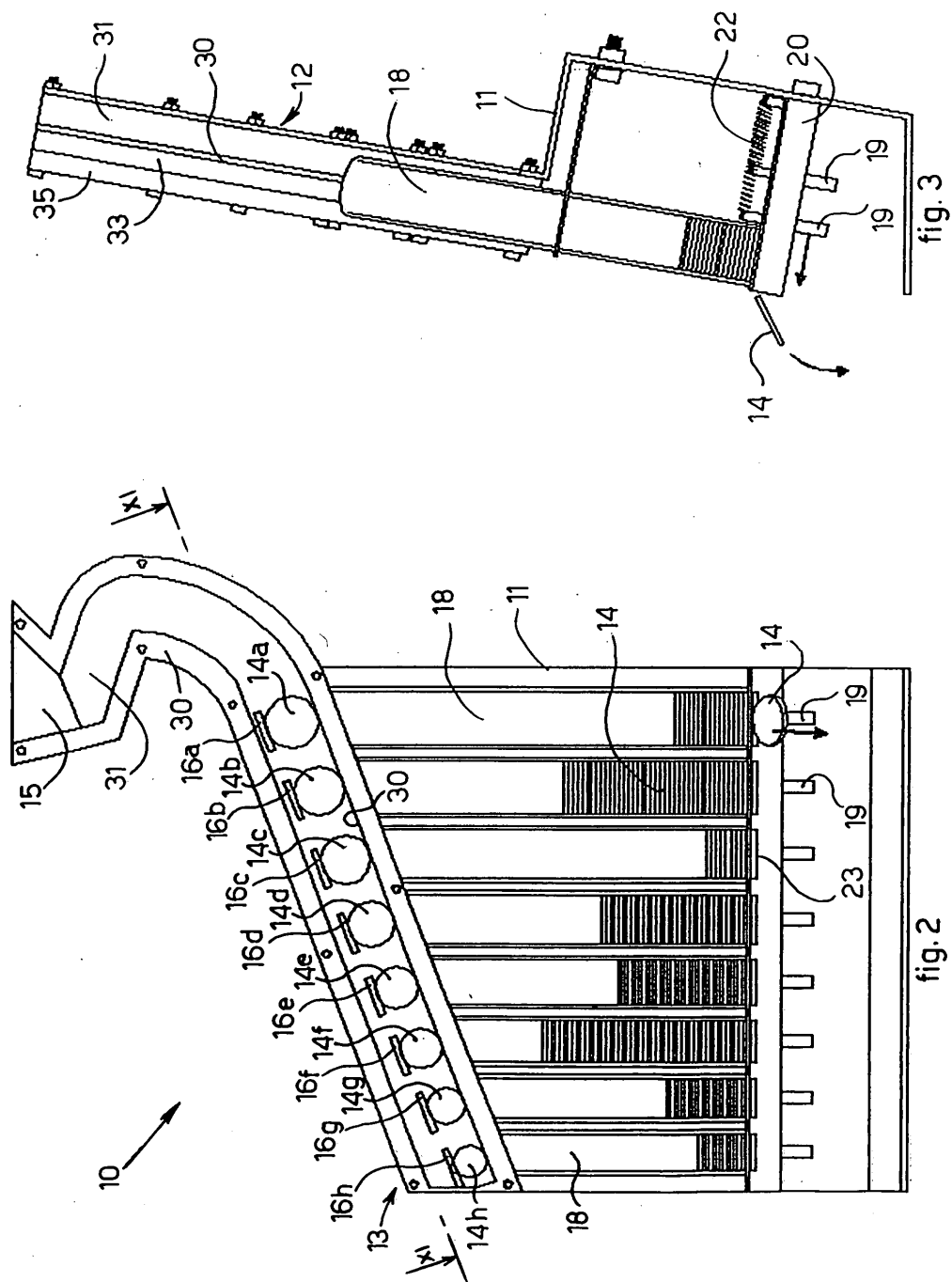


fig.1



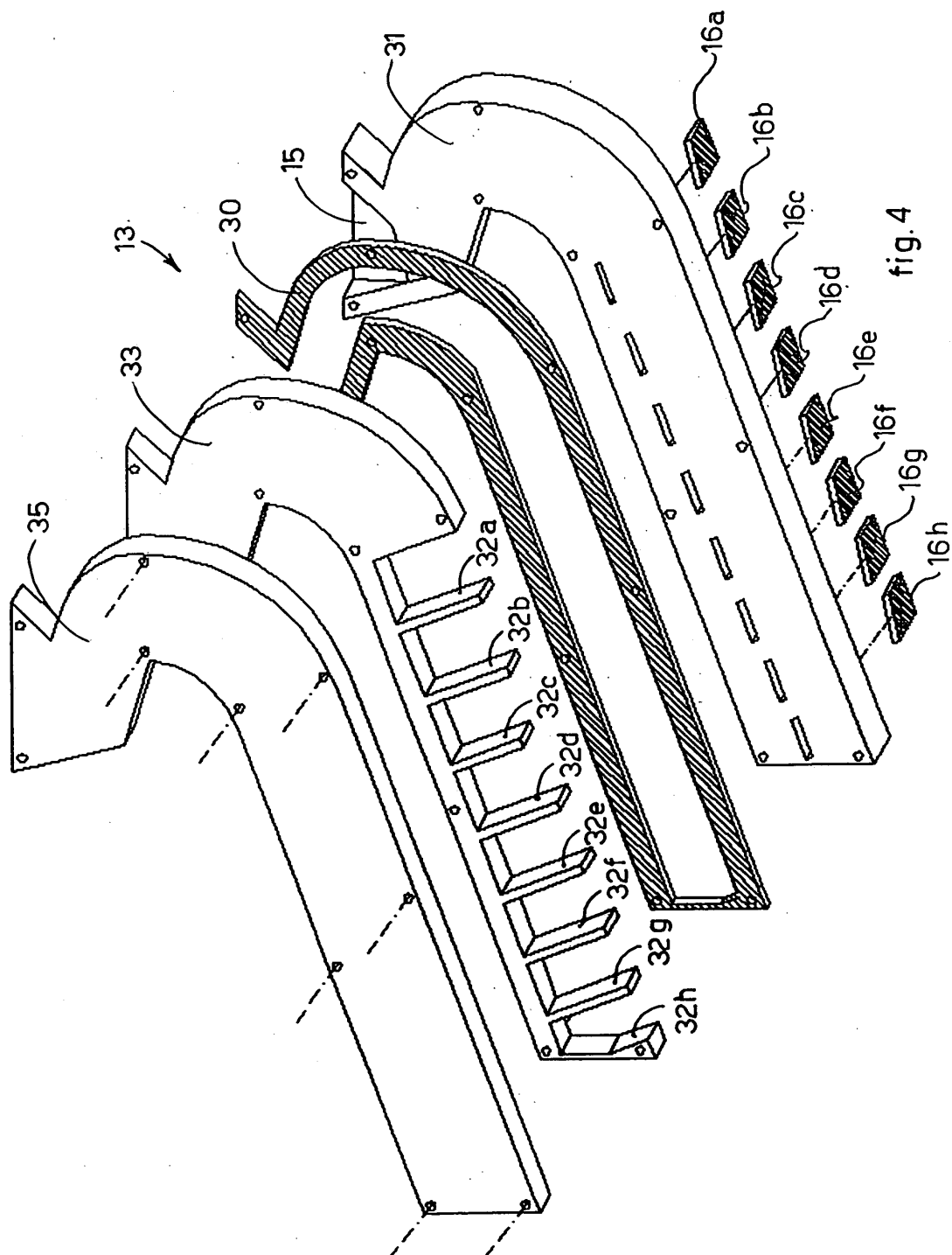


fig. 4

