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(54) **Device to discriminate and supply coins**

(57) A device to discriminate and supply coins (9) includes a support (5) for a container (2) of coins (9), with an entry (3) and an exit (4), a dish type means (10), having housings (11), to carry at least one coin (9), moreover the dish type means (10) is pivotably guided in a seat (6) of the support (5) by means of a first actuator (30), a slot (7) of the seat (6) is placed in proximity of the exit (4) for the exit of single coins (9) using shunter means (8) engaged to the support (5), or to an element adjacent to support (5) and fixed thereto, near the slot (7) and actuated by a second actuator (18), finally a magnetic sensor (40) is fixed to support (5) and is destined to detect the metal composition of each coin (9).

The device (1) includes a first sensor (31) to measure the angular position of the motor shaft (32) of the first

actuator (30), a second sensor (15) to measure the angular position of the dish type means (10), a feeler means (20) hinged to the support (5) near the slot (7), almost tangent to the external edge of the dish type means (10) in a condition initial (I) and moved with respect to the edge of the dish type means (10) at the condition of exit (F) of each coin (9) from the housing (11), a third sensor (25) engaged with the support (5) and intended to detect the movement of the feeler means (20) in the passage from the condition initial (I) to the condition of exit (F), a unit of control (60) fit either to receive signals from the sensors first (31), second (15), third (25) and magnetic (40), both to identify the par value of the coin (9) and to control the actuators first (30) and second (18) for the distribution (E) or the retaining (R) of the examined coin (9).

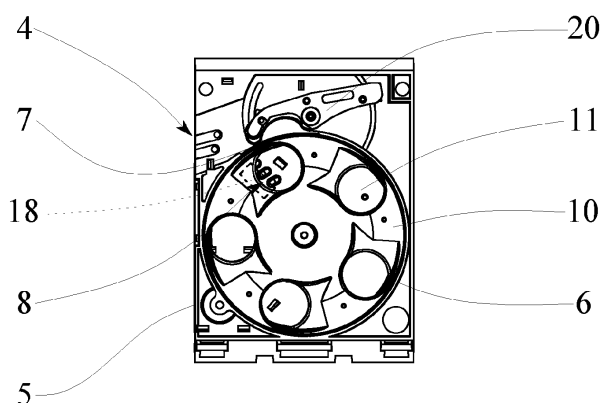


FIG.2

Description

[0001] The present invention refers to the field of machines for managing coins and tokens and refers to a device to discriminate and supply coins.

[0002] Coins discriminator and supplier devices are known, the so called hopper, typically installed within products distributor devices or moneychanger devices, that supply the predefined amount extracting the necessary coins from a container that accommodates only a determined and limited coins types for example coins of 0,50, 1 or 2 euro value. The known device containers are filled by an operator who inserts only predefined coins after having controlled the value of these latter.

[0003] Said devices perform a simplified control on the number and type of the coins to supply through measurements of the weight or geometric or physical characteristics of the same coins.

[0004] The measure of the physical characteristics is made by magnetic sensor means, generally realized as ferrite meter, that allows determining the coin alloy and the coin value is determined from said alloy.

[0005] The main disadvantage of the known devices refers to the capacity to supply the desired amount only extracting the necessary coins from a container inside which there are exclusively coins with par values limited to some types.

[0006] An additional disadvantage refers to the difficulty in carrying out the value and of the authenticity automatic control of the coins inserted into the container by any user and not only by the responsible operator of the container supplying.

[0007] The main object of the device of the present invention is to propose a coin discriminator and supplier device fit to supply the desired amount extracting the coins from a container inside which there are any par value coins.

[0008] Further object is to propose an economical device, of limited size and that can replace the hopper in use to improve the control and the coin management in the product distributor devices in general, in the moneychanger devices or in the coin deliverers.

[0009] Another object is to propose a device fit to extract from the container the coins, evaluate their value, the number and separate them according to their use destination.

[0010] The characteristics of the invention are in the follower showed with particular reference to the enclosed figures wherein:

- figure 1 shows a perspective view of the device object of the present invention;
- figure 2 shows a front schematic view of the figure 1 device interior;
- figure 3 shows a front schematic view of the figure 1 device interior;
- figure 4 shows a front schematic view of the figure 1 device wherein some components have been re-

moved to better shown others;

- figure 5 shows a top-front perspective view of a disc means;
- figure 6 shows a front schematic view of an actuator means combined with a first sensor;
- figure 7 shows a front schematic view of a lever means;
- figure 8 shows a front schematic view of the figure 1 device interior in a coins detection condition by a ferrite means;
- figure 9 shows a front schematic view of the figure 1 device interior in a starting measuring condition of the coin diameter that corresponds to a coin expelling condition;
- figure 10 shows a front schematic view of the figure 1 device interior in a coin diameter measuring condition corresponding to a coin exit condition;
- figure 11 shows a front schematic view of the figure 1 device interior in a coin expelling condition that corresponds to a teeth lifted condition;
- figure 12 shows a front schematic view of the figure 1 device interior in a coin re-inserting condition corresponding to a teeth lowered condition;
- figure 13 shows a top-front perspective view of a different embodiment of the figure 1 device.

[0011] According to figures from 1 to 13, numeral 1 refers to a device to discriminate and supply coins 9.

[0012] In the preferred embodiment, shown in figures 1-12, the device 1 includes a support 5 placed almost centrally respect to the device and to which a coin container 9 is fixed.

[0013] Said container 2 is shaped like a hopper and is equipped with an entry 3 for inserting the coins 9 placed at the top of the device 1.

[0014] On the support 5 side face is placed an exit 4 for supplying the coins 9 from the device 1.

[0015] The device 1 includes a disc means 10 placed on the support 5 and constrained to the same by a seat means 6 of the support 5 carrying out a revolving constraint. The rotation is controlled by a first actuator means 30 that is engaged with the support 5 and interacts with the disc means 10.

[0016] The disc means 10 includes housings 11, each one thereof is arranged to carry one or more coins 9.

[0017] Near the exit 4 there is a slot 7 of the seat means 6 allowing the exit of single coins 9, carried by the disc means 10, from the corresponding housings 11.

[0018] Shunters means 8 engaged with the support 5 near the slot 7 and activated by a second actuator 18 at an exit condition F allow the exit of coins 9.

[0019] Said shunters means 8 consist of teeth 19 movable by the second actuator 18 between two extreme conditions.

[0020] The first condition is a lowered condition M in which the teeth 19 do not protrude from the support 5, in such a way that no coins 9 are deviated outside to the housing 11 towards the slot 7, in retaining condition R of

coin 9 in the housing 11.

[0021] The second condition is a lifted condition N in which the teeth 19 protrude from the support 5 and interfere with the coin 9 edge in the housing 11 in correspondence of the slot 7. In this way the coin 9 is deviated respect to the followed path during its transport operated by the disc means 10 and exits from the housing 11, at the exit condition F or the distribution condition E of coin 9 from the device 1.

[0022] Moreover the shunter means 8, passing from the lowered condition M to the lifted condition N, expel the coin 9 from the housing 11 at a re-insertion condition of coin 9 into container 2.

[0023] A magnetic sensor 40, made of a ferrite sensor, is engaged with the support 5, or to an element adjacent the support 5 itself and to the latter constrained, fit to detect each metal alloy of each coin 9 when said coin passes over the sensor. The magnetic sensor 40 detects information about the coin metal nature for a first evaluation of the same coin par value.

[0024] The device 1 moreover includes a first sensor 31 to measure the angular position of the motor shaft 32 of the first actuator 30. Said first sensor 31 includes a rotor 34 integral with the motor shaft 32 and a first light emitter-receiver 35 connected to the support 5.

[0025] Said device 1 includes a second sensor 15 to measure the angular position of the disc means 10. Said second sensor 15 includes a second light emitter-receiver 16 that interacts with a plurality of protrusions 24 placed on the disc means 10.

[0026] The device 1 includes a lever means 20 that is hinged to the support 5 near the slot 7.

[0027] In an initial condition I the lever means 20 is almost tangent to the external edge of the disc means 10, while in exit condition F of coin 9 said lever means 20 is moved with respect to the edge of the disc means 10.

[0028] To control the lever means 20, the device comprises a third sensor 25 engaged with the support 5 to detect the lever means 20 movement in the passage from initial condition I to exit condition F.

[0029] Said third sensor 25 includes a second light emitter 21 and a second light receiver 22 placed on the support 5 in correspondence of the swept area of lever means 20. On the lever means 20 is fixed a second prism means 23 which optically connects the second emitter 21 and the second receiver 22 when the lever means 20 moves to the exit condition F.

[0030] The device 1 includes moreover a control unit 60 that manages all the signals coming from sensors and controls the actuators to carry out the different operating conditions.

[0031] In particular said control unit 60 receives the signals coming from the first sensor 31, the second sensor 15 and the third sensor 25 to identify the diameter of the coin 9 that passes near the slot 7.

[0032] The control unit 60, instead, receives the signals coming both from the magnetic sensor 40 both from the second sensor 15 to define the coin par value through

the identification of the coin metal alloy.

[0033] Moreover the control unit 60 controls only the first actuator 30 to operate the disc means 10 rotation and the coin 9 transport and in combination with the second actuator 18 activate or the coin 9 distribution condition E or the coin 9 retaining condition R.

[0034] In a first variant of the device 1, the second sensor 15 includes a first prism means 12, integral with the disc means 10, a first light emitter 13 and a first light receiver 14, both integral with the support 5.

[0035] Said first emitter 13 and a first receiver 14 are optically communicating when the first prism means 12 passes over said first emitter 13 and first receiver 14 during the rotation of the disc means 10.

[0036] In a second embodiment of the device 1, the third sensor 25 includes two second emitters 21, two second receivers 22 and two second prism means 23 placed in order to allow the light passage when the lever means 20 is rotated of two different corners that correspond respectively to the initial condition I and to the exit condition F.

[0037] In a third embodiment of the device 1, includes a separator means 50 engaged with the device 1 in correspondence of the exit 4.

[0038] Said separator 50 is provided with more exits 51 and is fit to address each coin 9, identified from the control unit 60 and supplied by the device 1, toward a specific exit 51 relative to value attributed to the coin 9.

[0039] One of the exits 51 of the separator 50 is designed to the discard of the coin 9 of which the control unit 60 identify correctly its value or that is not according to coin types accepted by the device 1.

[0040] The operation of the preferred embodiment of the device 1 provides that the user fills the container 2 with coins 9 through the entry 3.

[0041] The disc means 10 collects one or more coins using the housing 11 and transports them when said disc means 10 is moved by the first actuator means 30.

[0042] The control unit 60 drives the activation of the actuator means, first 30 and second 18, according to the signals received from the sensors, first 31, second 15 and third 25.

[0043] In particular the second sensor 15 provides to the control unit 60 a signal corresponding to the angular position of the disc means 10 with respect to the support 5. This signal allows to the control unit 60 to determinate the position of each housing 11 of disc means 10 with respect to sensors and slot 7.

[0044] Once the disc means 10 angular position is determined the control unit 60 drives the disc means 10 rotation by means of first actuator 30 and the consequent coin 9 transport. During the rotation, the coin 9 passes over the magnetic sensor 40 that carries out a scanning of the same coin and sends to control unit 60 a signal relative to alloy of coin 9 during the detection condition A.

[0045] If the information supplied by the magnetic sensor 50 is detected by the control unit 60 as corresponding to a known coin 9, the control unit 60 drives the execution

of the following measurements, otherwise the coin 9 is considered not corresponding and its position on the disc means 10 is memorized.

[0046] Then the coin 9, if is recognized as corresponding, passes at a point at a determined distance from the slot 7 and the control unit 60 initializes the first sensor 31 at starting measuring condition B of the coin 9 diameter.

[0047] Then, while the coin 9 is transported by the disc means 10, the control unit 60 memorizes the number of revolutions and/or turn fractions carried out by the motor shaft 32 and measured by the first sensor means 31.

[0048] When the coin 9, deviated by the shunter means 8 and partially pushed outside the slot 7, comes into contact with the lever means 20 shifting it from its initial condition I, the third sensor 25 sends a signal to the control unit 60 which starts the end measuring condition C. In this condition the control unit 60 interrupts the memorization of the revolutions and/or revolutions fractions number carried out by the motor shaft 32 and then associates this number to the diameter of the coin 9.

[0049] In fact, a coin 9 of large diameter needs a limited number of motor shaft 32 revolutions to carry out the end measuring condition C, while a smaller coin 9 needs a greater revolutions number.

[0050] To improve quality and precision of said measure, the first actuator 30 acts through gears onto the disc means 10 in such a way that each one revolution of disc means 10 corresponds to an high revolution number of motor shaft 32.

[0051] When the coin 9 diameter end measuring condition C is terminated the control unit 60 check that the data relative to diameter and alloy both corresponds to those associated to the required coin 9. If this condition is verified the coin 9 is expelled carrying out the distribution condition E in which shunter means 8 are in the lifted condition N.

[0052] If this condition is not verified the control unit 60 drives the inversion of the first actuator 30 and consequently of the disc means 10 and a new execution of the coin 9 diameter starting measuring condition B and end measuring condition C.

[0053] Said new execution is carried out a selected number of times and user set.

[0054] If, following the new coin 9 diameter measuring, some inconsistencies are detected between the coin 9 identification carried out by the magnetic sensor 40 and the diameter measure, the control unit 60 drives the inversion of the first actuator 30, in such a way to put completely the coin 9 into the housing 11, and successively the shunter means 8 actuation at lowered condition M and the actuation of the first actuator 30 in the normal driving direction.

[0055] In this way the coin 9 is not expelled and remains in the housing 11 at the retaining condition R.

[0056] If the coin 9 is not expelled it is possible to carry out the re-immission condition of same into the container 2, combining the lowered condition N and, immediately after, the lifted on condition M of the shunter means 8

when the coin passes over these latter in such a way that said shunter means 8 push the coin 9 outside from the housing 11 towards the container 2.

[0057] The first variant of the embodiment of the device 1 provides a similar operation to that described for the preferred embodiment.

[0058] The second variant of the device 1 provides a double control on the position of the lever means 20 through the couple of third sensors 25.

[0059] A first detection is carried out when begins the starting measuring condition B and the lever means 20 is at the initial condition I while the second detection is carried out when the lever means 20 is at the exit condition F at the ending measuring condition C.

[0060] The third embodiment of the device 1 allows the best coins management as the separator 50 addresses the different coins 9 expelled by the device 1 toward different exits 51 according to their values identified by the control unit 60.

[0061] The third variant allows also the discard of the coins 9 not correctly identified by the control unit 60 by addressing the same toward a specific exit 51.

[0062] The main advantage of the device of the present invention is to supply a coin discriminator and supplier device fit to supply the desired amount extracting the coins from a container inside which there are any par value coins.

[0063] Further advantage is to supply an economical device, of limited size and that can replace the hopper at present on duty to improve the control and the coins management in the product distributor devices in general, in the moneychanger devices or in the coin deliverers.

[0064] Another advantage is to supply a device able to extract from the container the coins, evaluate their value, the number and separate them according on their use destination.

Claims

1. Device to discriminate and supply coins (9) comprising at least:

- a support (5) for a coins (9) container (2), having an entry (3) for the coins (9) inserting and an exit (4) for supplying the coins (9);
- a disc means (10) having a plurality of housings (11), each of which is arranged to carry at least one coin (9), the disc means (10) being guided in a swivel way in a seat (6) of the support (5) by a first actuator (30) that interacts with the disc means (10);
- a slot (7) of the seat (6) near the exit (4) for a single coin (9) exit from the corresponding housings (11);
- shunter means (8) engaged to the support (5) near the slot (7) and actuated by a second actuator (18) in correspondence with an exit con-

- dition (F) of each coin (9) from the housing (11);
 - a magnetic sensor (40) engaged with the support (5), or with an element adjacent to the support (5) itself and engaged thereto, fit to detect each coin (9) metal composition;
 said device (1) being **characterized by** comprising at least:
 - a first sensor (31) to measure the angular position of the motor shaft (32) of the first actuator (30);
 - a second sensor (15) to measure the angular position of the disc means (10), engaged with the support (5) near the seat (6);
 - a scanning lever means (20) hinged to the support (5) near the slot (7), almost tangent to the external edge of the disc means (10) in a initial condition (I) and moved with respect to the edge of the disc means (10) at exit condition (F) of each coin (9) from the housing (11);
 - a third sensor (25) engaged to the support (5) and intended to detect the movement of the scanning lever means (20) in the passage from the initial condition (I) to the exit condition (F);
 - a control unit (60) suitable to receive either signals from the first sensor (31), from the second sensor (15) and from the third sensor (25), in order to identify the coin (9) diameter near the slot (7), both signals from the magnetic sensor (40) and from the second sensor (15) in order to define the coin (9) value near the slot (7); the control unit (60) being able to control the first actuator (30) and the second actuator (18) for the activation of either an expelling condition (E) of a desired coin (9), when the latter is in proximity of the slot (7) and is the desired coin (9), or the activation of a coin (9) retaining condition (R) in the housing (11) when coin (9) is not according to the desired coin or is not been correctly identified.
2. Device according to claim 1 **characterized in that** the first sensor (31) includes a rotor (34) integral with the motor shaft (32) and a light emitter-receiver (35) connected to the support (5).
 3. Device according to any of the preceding claims **characterized in that** the second sensor (15) includes a second light emitter-receiver (16) that interacts with a plurality of protrusions (24) placed on the disc means (10).
 4. Device according to claim 1 or the claim 2 **characterized in that** the second sensor (15) comprises at least one first prism means (12), integral with the disc means (10), a first light emitter (13) and a first light receiver (14), both integral with the support (5), said first emitter (13) and first receiver (14) are optically communicating when the first prism means (12) passes in correspondence to said first emitter (13) and first receiver (14) during the disc means (10) rotation.
 5. Device according to any of the preceding claims **characterized in that** the third sensor (25) includes:
 - at least a second light emitter (21) and at least a second light receiver (22) placed on the support (5) in correspondence of the area swept by the scanning lever means (20);
 - at least a second prism (23) means fixed to the scanning lever means (20) which connects optically the second emitter (21) and the second receiver (22) when the scanning lever means (20) moves at the exit condition (F).
 6. Device according to claim 5 **characterized in that** the third sensor (25) includes two second emitters (21), two second receivers (22) and two second means with prism (23) placed in such a way to allow the light passage when the scanning lever means (20) is rotated by two different angles corresponding respectively to the initial condition (I) and to exit condition (F).
 7. Device according to any of the preceding claims **characterized in that** the shunter means (8) consist of teeth (19) movable between two extreme conditions:
 - a lowered condition (M) in which the teeth (19) do not protrude from the support (5) and no coin (9) is deviated from the housing (11) towards the slot (7), at the coin (9) retaining condition (R) in the housing (11);
 - a lifted condition (N) in which the teeth (19) protrude from the support (5) and interfere with the coin (9) edge in the housing (11) near the slot (7) in order to exit the coin (9) from the housing (11), at the exit condition (F) and expelling condition (E).
 8. Device according to claim 7 **characterized in that** the shunter means (8) passing from the lowered condition (M) to the lifted condition (N) expel the coin (9) from the housing (11) in correspondence with a coin (9) reinsertion condition into the container (2).
 9. Device according to any of the preceding claims **characterized in** comprising a separator means (50) provided with a plurality of exits (51), engaged with the device (1) in correspondence of the exit (4) and fit to address each coin (9), identified by the control unit (60) and supplied by the device (1), toward a specific exit (51) relative to the value attributed to the coin (9).

10. Device according to claim 9 **characterized in that** one of the exits (51) is fit to discard the coin (9) whose value is not been correctly determined by the control unit (60.)

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FIG.1

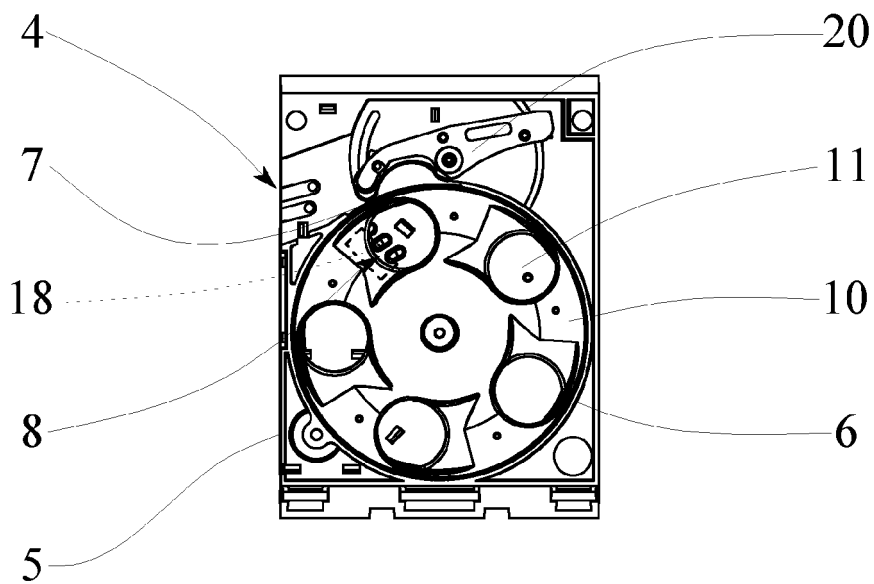
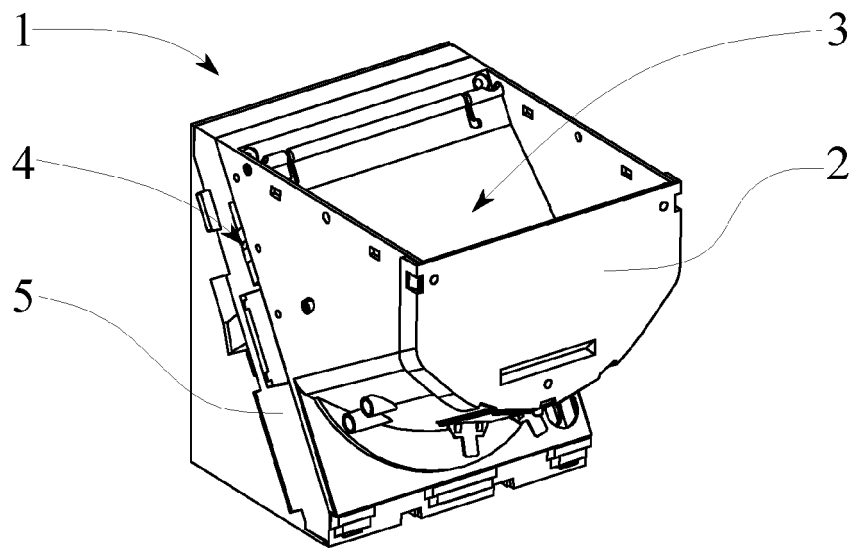


FIG.2

FIG.3

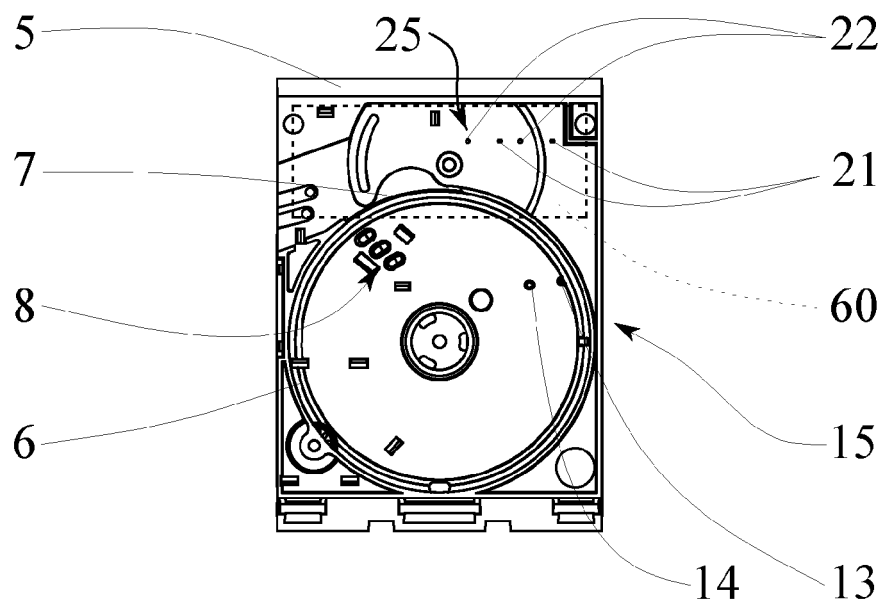
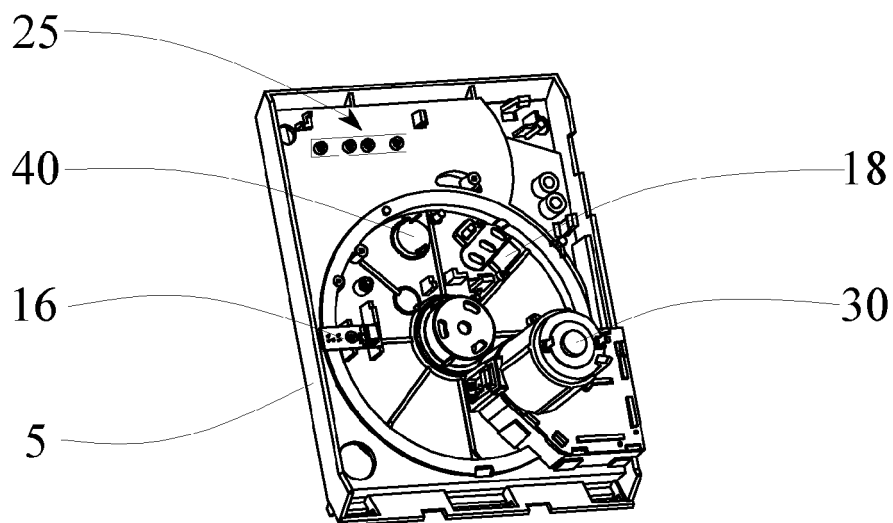


FIG.4

FIG.5

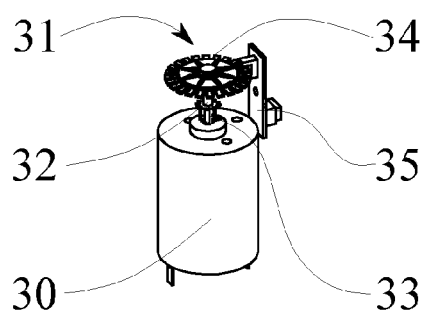
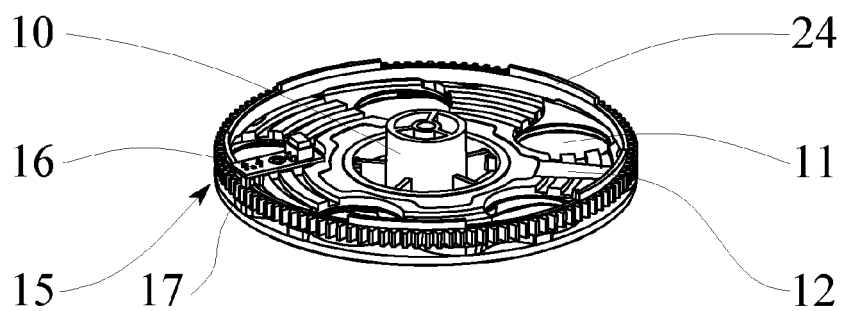


FIG.6

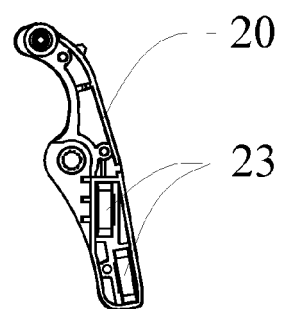


FIG.7

FIG.8

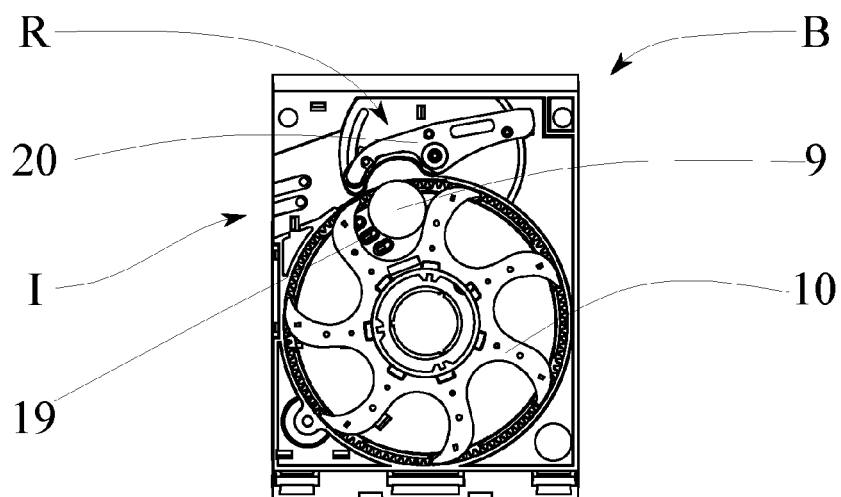
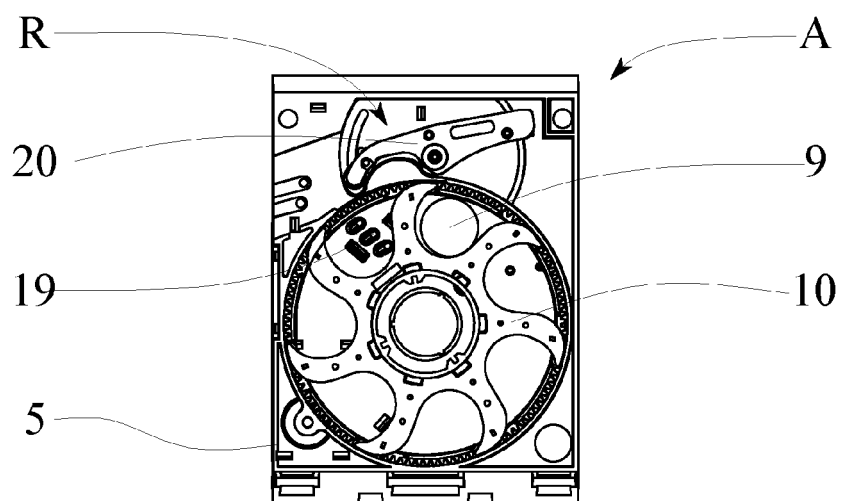


FIG.9

FIG.10

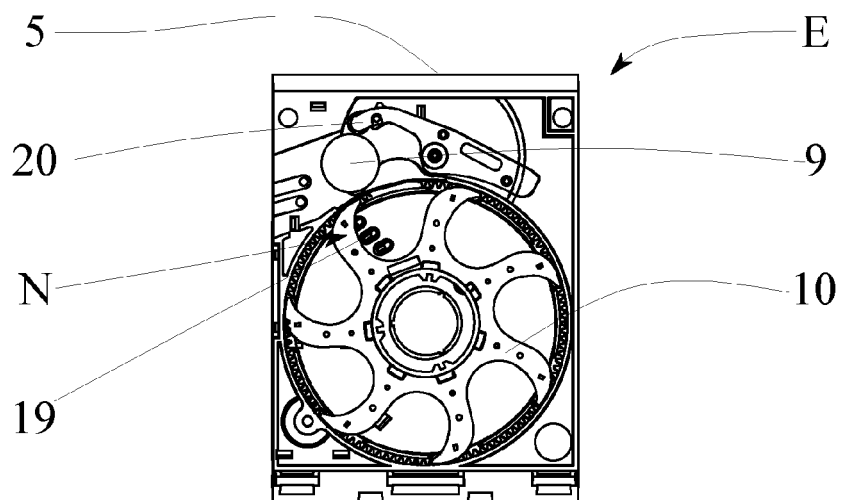
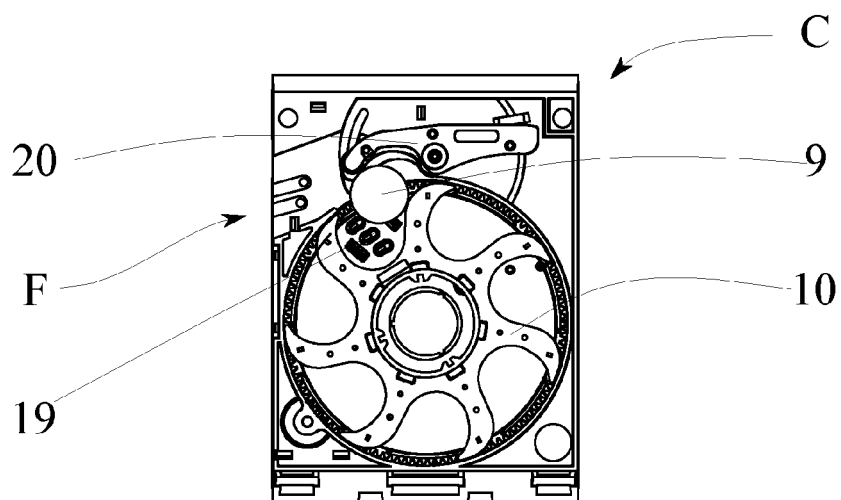


FIG.11

FIG.12

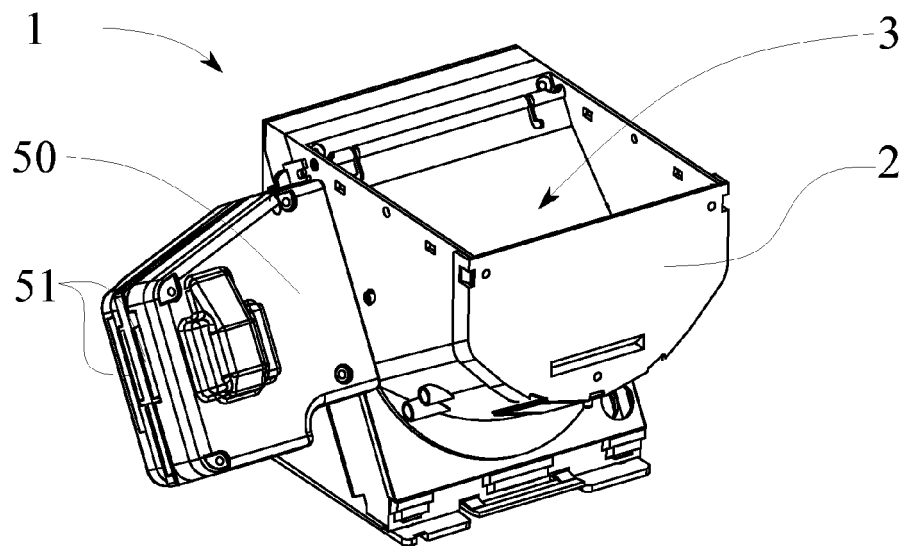
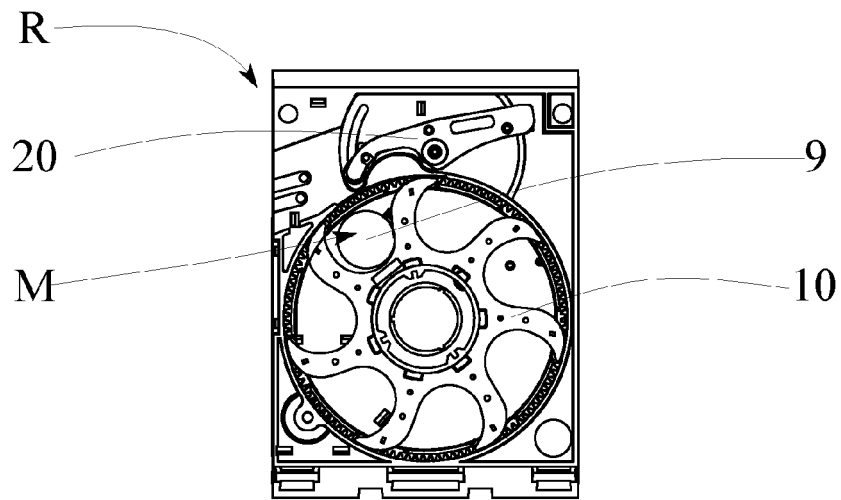


FIG.13



EUROPEAN SEARCH REPORT

Application Number
EP 11 19 2783

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 020 818 A1 (AZKOYEN MEDIOS DE PAGO S A [ES]) 19 July 2000 (2000-07-19)	1,2,7,8	INV.
Y	* abstract *	3-6,9,10	G07D3/12
	* column 23 - column 33 *		G07D3/14
	* paragraph [0002] - paragraph [0009] *		G07D5/02
	* figure ALL *		G07D5/08
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A	* abstract *	1,2,4-8	
	* figures 1-3, 7A, 7B, 8, 10, 11 *		
	* column 6, line 46 - column 7, line 7 *		
	* column 15, line 7 - line 13 *		

Y	EP 2 146 330 A2 (ALBERICI S P A [IT]) 20 January 2010 (2010-01-20)	4	
A	* abstract *	1-3,5-10	
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	* figure ALL *		

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A	* abstract *	1-4,7-10	G07D
	* figures 8-10 *		

The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		29 February 2012	Mandato, Davide
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone		T : theory or principle underlying the invention	
Y : particularly relevant if combined with another document of the same category		E : earlier patent document, but published on, or after the filing date	
A : technological background		D : document cited in the application	
O : non-written disclosure		L : document cited for other reasons	
P : intermediate document		& : member of the same patent family, corresponding document	

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 11 19 2783

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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