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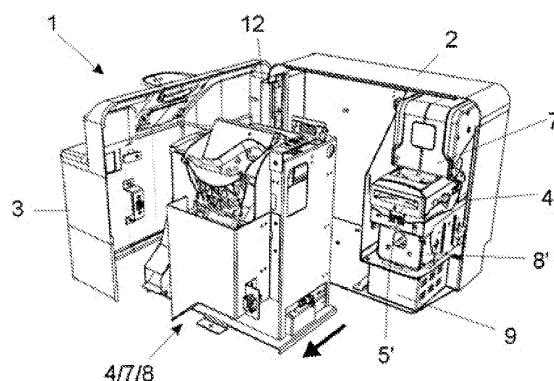
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(54) **CASH MANAGEMENT MACHINE**

(57) The present application provides an MEMS loudspeaker, comprising a substrate having an acoustic cavity, and at least two electroacoustic transducers fixed on the substrate; acoustic wave transmission directions of the electroacoustic transducers both facing the acoustic cavity, a sound outlet hole communicated with the acoustic cavity being formed in the substrate in a penetrating manner, and the acoustic wave transmission directions of the at least two electroacoustic transducers

being intersected. The MEMS loudspeaker in the embodiments at least comprises the two electroacoustic transducers, and the transmission directions of the sound waves emitted by the two electroacoustic transducers are intersected, so that the sound waves of the two electroacoustic transducers can be superposed, the audio output level can be further improved, and the overall acoustic performance of the MEMS loudspeaker in the embodiments is greatly improved.



**FIG. 7**

**Description****OBJECT OF THE INVENTION**

**[0001]** The invention, as expressed in the wording of the present descriptive memory, concerns a cash management machine that brings, to the function for which it is intended, advantages and characteristics, which are described in detail below, and which represent an improvement on the current state of the art.

**[0002]** The subject matter of the present invention consists of a cash management machine, and possibly banknotes, of the type used in shops or vending machines for the automatic collection and return of change, the structural configuration of which has, advantageously, a compact arrangement in such a way as to minimise the space occupied by the machine.

**FIELD OF APPLICATION OF THE INVENTION**

**[0003]** The field of application of the present invention falls within the sector of industry dedicated to the manufacture of automatic cash management machine.

**BACKGROUND TO THE INVENTION**

**[0004]** Machines of this type, such as the one in question here, are well known on the market for their ability to automatically manage the cashing and giving change in commercial transactions when it is given in cash, preferably with coins in vending machines, e.g. for drinks, or in shops so that, in addition to being quicker and safer, contact with the money is avoided by shop staff, which is always a desirable hygiene measure but mandatory in certain types of shops, especially those dealing with food-stuffs.

**[0005]** Such machines, in general, suitably housed in an external casing, basically comprise the following elements:

- a coin validation module, which checks and detects the authenticity of the coins that are introduced into the machine through the corresponding inlets that communicate directly with this module, being ejected through an outlet tray in the event of detecting that they are not authentic;
- a coin recycling module, from which coins are returned as change, via the same outlet tray, in subsequent transactions;
- a coin collection drawer, to which coins are sent from the recycling module at checkout, which is removable to allow the machine to be emptied and the collection to be stored in the bank;
- a banknote validation module, which checks and detects the authenticity of the banknotes fed into the

machine through the corresponding inlet which communicates directly with this module, and ejects them if it detects that they are not genuine;

- 5 - a banknote recycling module, from which banknotes are stored to be returned as change, via the same outlet, in subsequent transactions;
- 10 - a banknote collection drawer, to which banknotes are sent from the recycling module when cashing up, which is of a removable nature to allow the machine to be emptied and the collection to be stored in the bank; and
- 15 - a computer control module which, equipped with the appropriate software, manages the operation of each of the above-mentioned modules.

**[0006]** The problem with this type of machine, especially in the coin part, and to which the present invention is intended to provide a solution, is the volume that they tend to occupy, since, until now, the validation, recycling and collection modules are usually arranged one on top of the other, in such a way that the coins fall by gravity from the validation module into the recycling module and, from there, they also fall by gravity into the collection drawer. This means, therefore, that the machine occupies a considerable amount of space, mainly in height, which can be a disadvantage, especially given the limited space available in vending machines and in shops of all kinds.

**[0007]** The aim of the present invention is therefore the development of a new compact cash management machine wherein the space occupied by itself is optimally minimised and the function for which it is properly intended is at the same time maintained.

**[0008]** Furthermore, by reference to the state of the art, it should be noted that, at least from the applicant's side, there is no other machine of similar application having the same or similar technical and structural characteristics to those of the machine claimed.

**EXPLANATION OF THE INVENTION**

**[0009]** The cash management machine that the invention proposes is configured as the ideal solution to the aforementioned objective, and the features that make it possible and distinguish it are conveniently included in the final claims that accompany the present description.

**[0010]** Specifically, what the invention proposes, as noted above, is a cash management machine, coins and banknotes, of the type used in shops or vending machines for the automatic collection and return of change, whose structural configuration presents, advantageously, a compact layout in an optimal way to minimise the space occupied by the same.

**[0011]** For this purpose, and more specifically, the machine of the invention comprises, in a known manner and

housed in an external casing, the following elements:

- a coin validation module which checks and detects the authenticity of coins fed into it via at least one inlet;
- an outlet tray, to which coins not validated in the validation module and change coins are sent;
- a coin recycling module, to which coins validated in the validation module are sent and from which they are returned as change, via the outlet tray, in subsequent transactions;
- a collection drawer, to which the coins accumulated in the recycling module are sent when cashing up, which is removable to allow the machine to be emptied and the collection to be stored in the bank;
- optionally, a banknote validation module, which checks and detects the authenticity of the banknotes fed into the machine through the corresponding inlet that communicates directly with this module, and ejects them if it detects that they are not genuine;
- optionally a banknote recycling module, from which banknotes are stored to be returned as change, via the same outlet, in subsequent transactions;
- optionally a banknote collection drawer, to which banknotes are sent from the recycling module at checkout, which is removable to allow the machine to be emptied and the collection to be stored in the bank; and
- a computer control module consisting of specific hardware and software which manages the operation of each of the above modules.

**[0012]** In this way, the machine of the invention is essentially distinguishable,

- on the one hand, by the fact that the coin collection drawer, instead of being located lower than the recycling module as usual, is located to one side of it, both being located at the same level on the lower part of the outer casing and communicated with each other by means of a frame-shaped piece which, as a deflector, directs the flow of coins from the side wall of the recycling module towards the coin collection drawer located next to it, and,
- on the other hand, by the fact that the coin validation module is embedded in the recycling module by means of a cut-out in the side casing of the recycling module together with a suitable support system.

**[0013]** In this way, both the height and the thickness

of the assembly are drastically reduced, because instead of adding the height of the validation module to the recycling module and the drawer, as the validation module is embedded in the recycling module and the drawer is at the same height as the recycling module, the overall height of the machine casing is reduced to the height of the non-embedded validation module plus the height of the recycling module and the drawer, and the thickness is also limited to little more than the thickness of the recycling module.

**[0014]** Furthermore, in order to facilitate access to the various modules of the machine for replacement and/or repair work, the casing consists of a rear base and a front cover that can be hinged together, with the recycling module and the collection drawer and the control module arranged in a coplanar arrangement in the base. The validation module is housed on the inside face of the cover, attached to the top of the cover by means of a support provided for this purpose, so that, when the cover is closed on the base, the validation module fits into the recess in the recycling module and is partially embedded in it.

## DESCRIPTION OF THE DRAWINGS

**[0015]** In order to complement the description being made and in order to assist in a better understanding of the features of the invention, a set of drawings is attached to this specification as an integral part thereof, in which the following is illustrated for illustrative and non-limiting purposes:

Figure 1 shows a schematic front perspective view of an example of an embodiment of the cash management machine of the invention, showing its general external configuration as well as the arrangement of the main internal elements, represented by dashed lines;

Figure 2.- Shows a schematic perspective view of the example of the cash management machine, according to the invention, shown in figure 1, in this case represented in an open position, showing the configuration and arrangement of the main internal elements it comprises;

Figure 3 shows a schematic perspective view of an enlarged detail of the interior of the machine of the invention, taken from an angle which allows the coupling piece between the recycling module and the collection drawer to be appreciated;

Figure 4.- Shows a schematic perspective view of the rear part of the base of the machine, shown without the front cover, showing the recess for connections at the rear of the machine;

Figure 5 shows a schematic perspective view of the

front of the base of the machine, showing the arrangement of the validation module, the recycling module and the collection drawer;

Figure 6.- Shows a schematic side elevation view of the modules comprising the machine of the invention, in this case represented without the external casing, showing their compact arrangement;

Figure 7.- Shows a perspective view of another example of an embodiment of the cash management machine of the invention, again shown in an open position, showing the configuration and layout of its main internal elements which, in this case, comprise a unit formed by the validation, recycling and collection drawer modules which are easily removable and dismountable;

Figures 8 and 9 show left and right-side perspective views of the removable modules shown in Figure 7; and

Figures 10 and 11 show views of the respective disassembly phases of each of the validation, recycling and collection modules that make up the removable assembly.

lection to be stored in the bank, there being preferably an outlet (17) expressly provided for this purpose in the said module (7);

- 5 - optionally a banknote validation module (4'), which checks and detects the authenticity of the banknotes fed into the machine through a second banknote inlet (5') which communicates directly with this module, being ejected through the same if it detects that the banknotes are not genuine;
- 10 - optionally a banknote recycling module (7'), from which banknotes are stored to be returned as change, via the same outlet, in subsequent transactions;
- 15 - optionally a banknote collection drawer (8'), to which banknotes are sent from the recycling module at checkout, which is removable to allow the machine to be emptied and the collection to be stored in the bank; and
- 20 - a computer control module (9) which, consisting of specific hardware and software, manages the operation of each of the above-mentioned modules (4, 7, 8).
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## PREFERRED EMBODIMENT OF THE INVENTION

[0016] In view of the abovementioned figures, and in accordance with the numbering adopted, it is possible to see in them an example of a non-exhaustive example of an embodiment.

[0017] The cash management machine of the invention, comprising as described in detail below, is a limited version of the cash management machine of the invention, comprising as described in detail below.

[0018] Thus, as can be seen in these figures, the machine (1) of the invention comprises, housed inside a casing (2, 3), at least:

- a coin validation module (4), which checks and detects the authenticity of coins fed into it through at least one inlet (5);
- a coin outlet tray (6), to which coins not validated in the validation module (4) and change coins are sent;
- a coin recycling module (7), to which coins that have been validated as good in the validation module (4) are sent and from which, if necessary, they are returned as change, via the outlet tray (6), preferably passing through an ejector ramp (13);
- a collection drawer (8), to which the coins accumulated in the recycling module (7) are sent when cashing up, and which is removable from the casing (2, 3) to allow the machine to be emptied and the col-

[0019] Said machine (1) is essentially distinguished in that the validation modules (4) and recycling module (7) and the collection drawer (8) are arranged inside the casing (2, 3) to form a compact unit which optimises the space they occupy so that it is as small as possible.

[0020] In particular, the collection drawer (8) is located to one side of the recycling module (7), both being located at the same level on the underside of the casing (2, 3) and preferably connected to each other by means of a coupling piece (10) in the form of a deflector frame, which directs the flow of coins from the side wall of the recycling module (7) towards the collection drawer (8), and where the validation module (4) is partially embedded in the recycling module (7), being housed in a recess (11) provided for this purpose in the upper front part of the recycling module (7).

[0021] This reduces at least the height (h) of the casing (2, 3) to approximately the height of the recycling module (7).

[0022] In a preferred embodiment, the height (h) of the casing (2, 3) is only about 331 mm.

[0023] Furthermore, in this preferred embodiment, the outer casing of the machine (1) is made up of a rear base (2) and a front cover (3) which is hinged, preferably laterally, by means of a hinge joint (12), the recycling module (7) and the collection drawer (8) being fixed to the rear base (2), both resting on the lower part of the same, while the validation module (4) is attached to the inside face of the front cover (3), at the top of the same, resting on the ejection ramp (13) provided for this purpose, in such a position that, when closing the cover (3) of the

casing on the base (2), the validation module (4) is fitted into the recess (11) of the recycling module (7), being partially embedded in the same.

**[0024]** It should be noted that, as shown in Figure 4, the rear of the rear base (2) of the machine casing has a space for access to the connections (14) for the power supply and machine identification data.

**[0025]** In another preferred embodiment, where the external casing of the machine (1) is also made up of a rear base (2) and a front cover (3) that can be hinged, preferably laterally, by means of a hinge joint (12), the assembly formed by the validation module (4), the recycling module (7) and the collection drawer (8) is an assembly that forms a removable block (4, 7, 8) that fits into a recess provided for this purpose in the rear base (2) and the front cover (3), the recycling module (7) and the collection drawer (8) is an assembly which forms a removable block (4, 7, 8) which fits into a recess provided for this purpose in the rear base (2) and is easily removable and dismountable thanks to the existence of respective quick connectors (15) which facilitate its assembly and disassembly.

**[0026]** Having sufficiently described the nature of the present invention, as well as the manner of putting it into practice, it is not considered necessary to explain it further in order for any person skilled in the art to understand its scope and the advantages derived from it.

## Claims

1. Cash management machine, comprising, housed within a casing (2, 3), at least: a coin validation module (4), with an inlet (5) for coins; an outlet tray (6) for unvalidated coins or for change; a coin recycling module (7), where coins that have been validated in the coin validation module (4) go and from which, if necessary, they are returned as change; a removable collection drawer (8), to which coins are sent when cashing up; and a computer control module (9), with specific hardware and software, which manages the operation of these elements, is **characterised in that** the validation (4) and recycling (7) modules and the cash drawer (8) are arranged inside the casing (2, 3) forming a compact assembly which optimises the space occupied so that this space is as small as possible; wherein the collection drawer (8) is located on one side of the recycling module (7), both being located at the same level on the lower part of the casing (2, 3) and in communication with each other; and wherein the validation module (4) is partially embedded in the recycling module (7), housed in a recess (11) made for this purpose in the upper front part of said recycling module (7).
2. Cash management machine according to claim 1, **characterised in that** the height (h) of the casing (2, 3) is reduced to approximately the height of the recycling module (7).
3. Cash management machine according to claims 1 and 2, **characterised in that** the height (h) of the casing (2, 3) is approximately 331 mm.
4. Cash management machine according to any of the previous claims, **characterised in that** the external casing of the machine (1) is made up of a rear base (2) and a front cover (3) that can be hinged by means of a hinge joint (12).
5. Cash management machine, according to the previous claims, **characterised in that** the recycling module (7) and the cash drawer (8) are fixed to the rear base (2), both resting on the lower part of the same, while the validation module (4) is fixed to the inner side of the front cover (3), in the upper part of the same, resting on the ejection ramp (13) provided for this purpose, and in a position in such a way that, when closing the cover (3) of the casing on the base (2), the validation module (4) is fitted into the recess (11) of the recycling module (7), being partially embedded in the same.
6. Cash management machine according to any one of claims 1, 2 or 5, **characterised in that** the recycling module (7) and the cash drawer (8) are connected to each other by means of a coupling piece (10) in the form of a deflector frame, which directs the flow of coins from the side wall of the recycling module (7) towards the collection drawer (8).
7. Cash management machine according to claims 1 to 4, **characterised in that** the validation module (4), the recycling module (7) and the collection drawer (8) form a unit which forms a removable block (4, 7, 8) which fits into a recess provided for this purpose in the rear base (2) of the casing.
8. Cash management machine according to claim 7, **characterised in that** the unit comprising the removable block of the validation module (4), the recycling module (7) and the collection drawer (8) incorporates quick connectors (15).

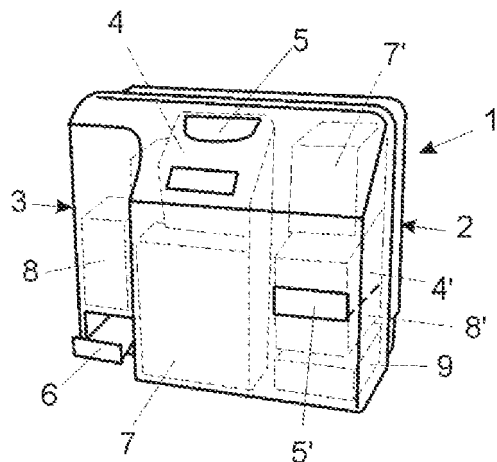


FIG. 1

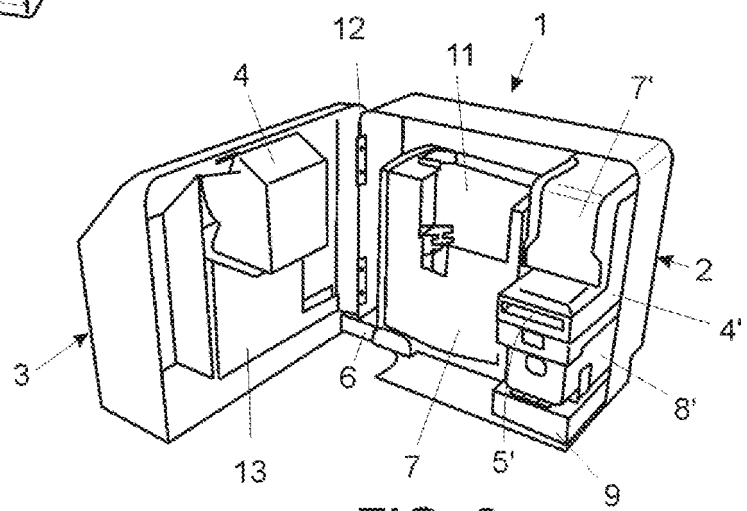


FIG. 2

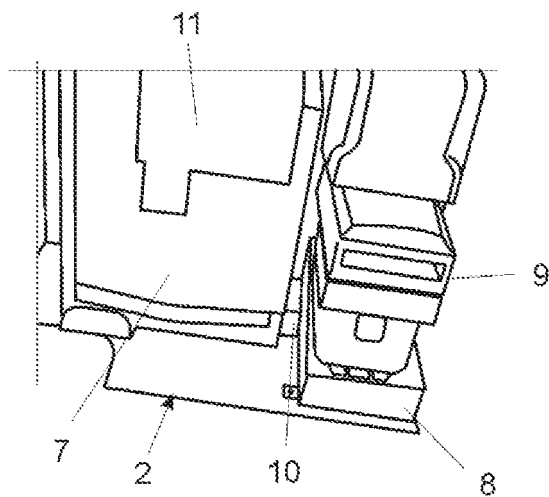


FIG. 3

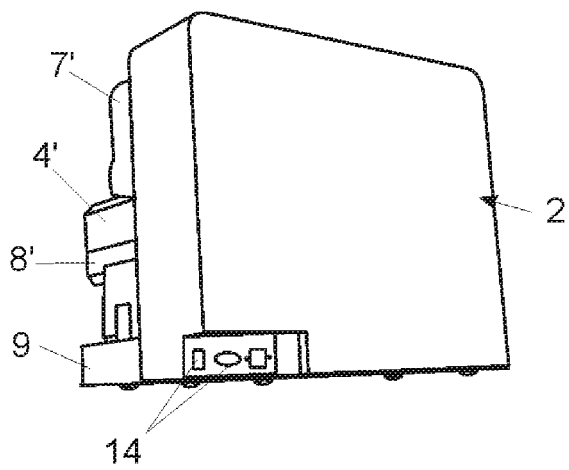


FIG. 4

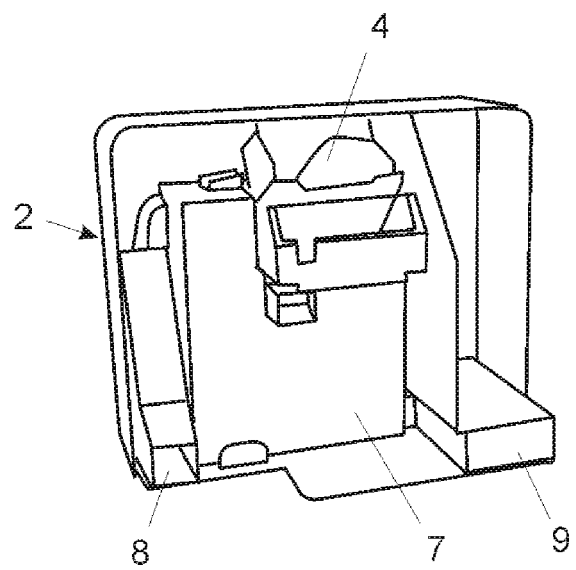


FIG. 5

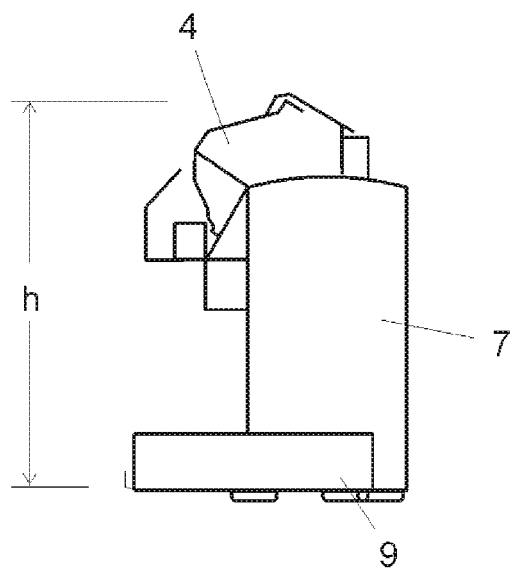


FIG. 6

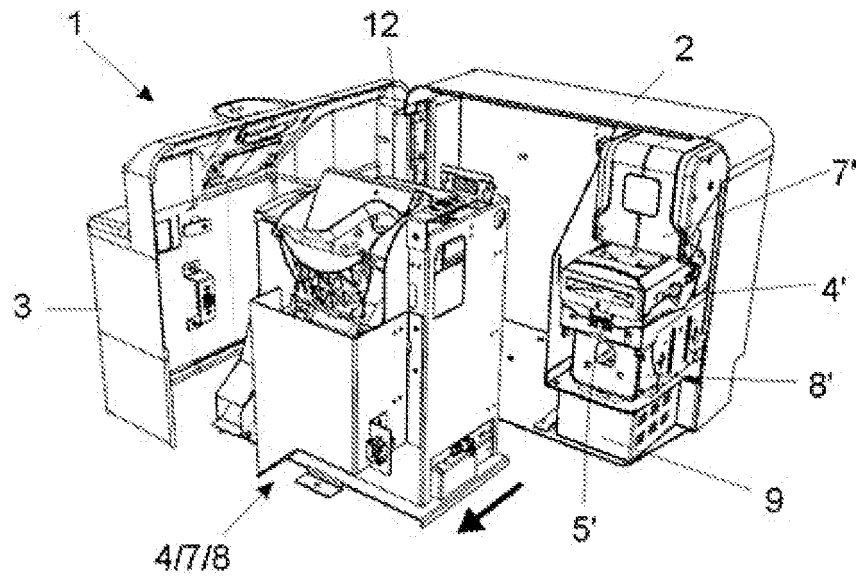


FIG. 7

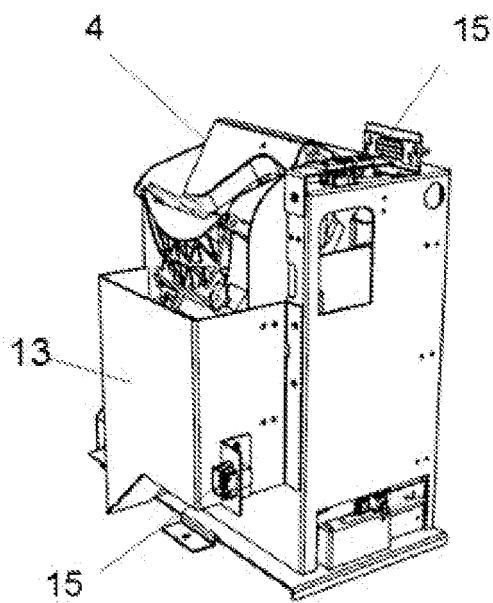


FIG. 8

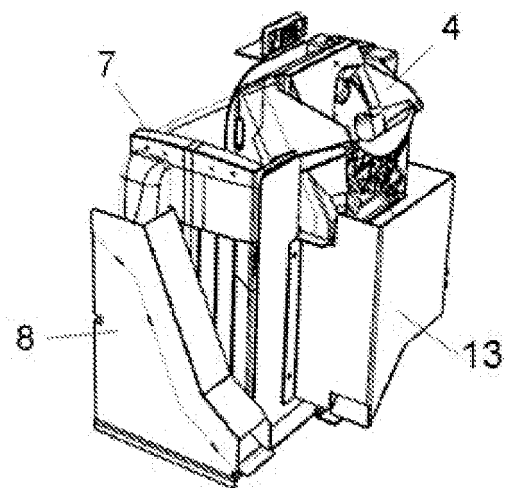


FIG. 9

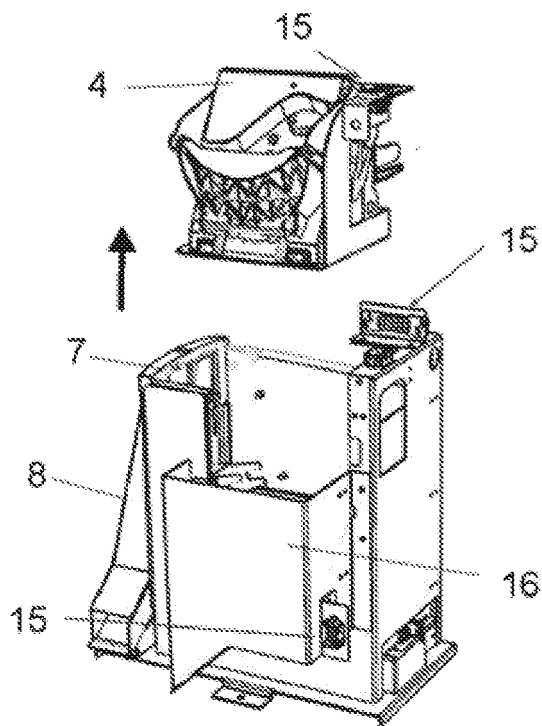


FIG. 10

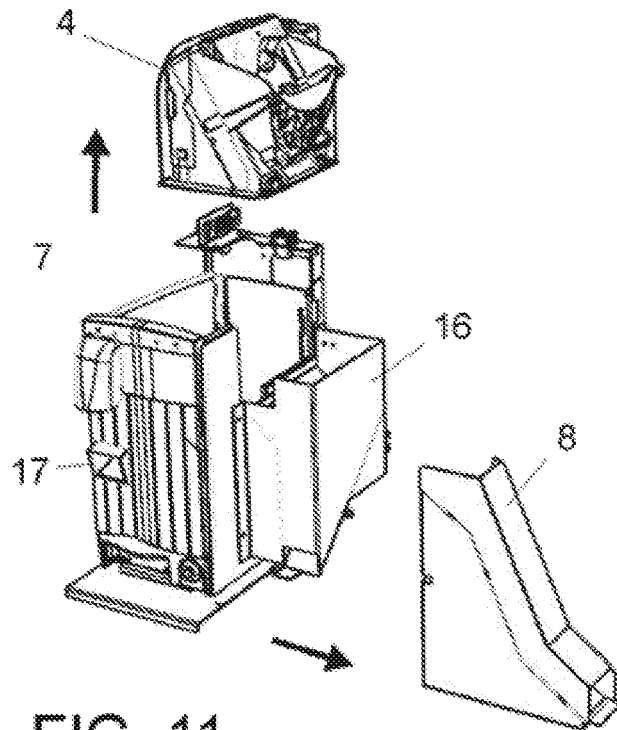


FIG. 11

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2022/070041

## A. CLASSIFICATION OF SUBJECT MATTER

**G07D11/00** (2019.01)

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

**G07D**

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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