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(54) **AUTOMATIC VENDING MACHINE**

(57) An automatic vending machine (1) of the type provided with: means (2) for selecting a product; means (2) to make a payment; means (4) for displaying the products; means for delivering the selected product, comprising a container for the products to be dispensed and means for the controlled release of the selected products; said means for dispensing the product including at least a spiral dispensing device (10), i.e. a device comprising a container consisting of a containment and transport channel (17) in which a spiral thrust element (19) suitable for containing the products among its coils and moving the products along said channel (17) by a motor (13) by rotating the thrust member (19) around its own longitudinal axis (X); at least one outlet or withdrawal compartment (5) for the release of the product dispensed by the vending machine (1). The motor (13) is arranged at said containment and transport channel (17) so as not to increase the overall dimensions of the device (10) in the direction of development of the axis (X). The outlet (5) is provided with a camera (50) adapted to produce an image of a dispensed product, an archive (51) of reference images being provided to which the image thus obtained is compared.

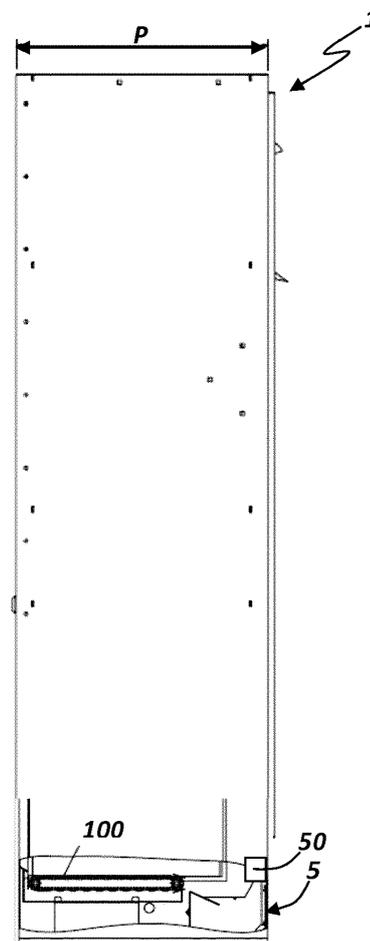


FIG. 15

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Description

[0001] The present invention relates to a vending machine capable of dispensing products of various types such as, for example, instant lottery tickets, packets of cigarettes, packages of shredded tobacco, smoker's products, food products, soft drinks, etc.

[0002] It is known that vending machines are dispensing machines that automatically supply various types of products according to a choice made and a relevant payment executed. In their usual configuration, vending machines are provided with:

- means for selecting a product, generally consisting of a keyboard with a display;
- means of payment including, for example, devices for the introduction of coins, banknotes, credit cards, magnetic supports for pre-payment systems, etc.;
- means for displaying products, for example an electronic merchandiser or a menu list, the latter supported by a display in the newest models;
- means for withdrawing the selected product, which can be differently made up according to the product; for example, a withdrawal compartment may be provided with or without a door to allow the withdrawal of the products, a dispenser of liquids in a glass, an exit slot for instant lottery tickets, etc.

[0003] The vending machines are often provided with shredded tobacco dispensing devices, i.e. devices comprising a storage compartment consisting of a containment and transport channel in which a spiral thrust element is arranged to contain shredded tobacco packages between its coils and move them packages along said channel by rotating the thrust element about its own longitudinal axis. A drawback of the vending machines provided with shredded tobacco dispensing devices relates to the corresponding space reduction for the other dispensers, a decrease that may be significant also because of the usually limited spaces that characterize the vending machines. In fact, since the vending machines are usually provided with cigarette pack dispenser devices, which are fixed to the structure of the vending machine by means of vertical uprights which support the so-called "columns" intended for cigarette packets, the fixing of the shredded tobacco dispensing devices is carried out using the said vertical uprights. For this reason, the shredded tobacco dispensing devices are mounted on the machines with the axes of the coils arranged vertically. The vertical arrangement of the shredded tobacco dispensing devices determines the location of the relevant motors in the front area of the machine, an area which is intended for housing the columns for cigarette packets, with the corresponding reduction in the number of cigarette dispensing devices in a ratio which it is usually 2 to 1. In practice, the placement of each shredded tobacco dispensing device causes the elimination of two cigarette columns, constituting a relatively important drawback

from the machine design point of view and for the relative functional operating characteristics.

[0004] A further negative aspect of spiral devices of the known type consists of the encumbrance of the motor that moves the spiral of the thrust member. Fig. 16 shows a possible embodiment of such a spiral device taken from the document US2013313280A1; the numbering used in this drawing is different from that of the other drawings because the one in document US2013313280A1 has been left. In the example of Fig. 16 the motor (50) is placed with its own output axis (51) coaxial to the axis (61) of the spiral element (62), in an area which is arranged on the right in the drawing with respect to that of the containment and handling channel (indicated with CA) of the products to be dispensed. In practice, according to this known embodiment of the spiral thrust element, a space encumbrance (indicated by XL) is determined constituting an increase in the space required within the vending machine and negatively affecting the design of the same machine, also considerably limiting the functionality of the distributor in relation to the external encumbrance. Similar space problems are also present in other solutions in which the motor (represented in Fig. 16 by the added block in dotted line 50') does not have its own output shaft coaxial with that of the spiral organ but arranged on a parallel axis and connected to that of the spiral element with appropriate angular gearbox.

[0005] Another negative aspect of the vertical arrangement relates to the possibility of undesired detachment of the shredded tobacco packages from the coils that support them. In fact, since the outlet mouth, or the product withdrawal compartment, is arranged below and the packages are pushed downwards, any stresses on the machine can cause the packs of shredded material to fall downwards in correspondence with the withdrawal compartment.

[0006] Another drawback of known vending machines relates to the means for closing the door which allows access to the inside; usually the door is closed with one or more padlocks which pass in corresponding pairs of eyelets placed between the fixed structure of the machine and the door leaf. This solution determines the protrusion of the padlocks, which are often large and have sharp edges, with the possibility of defining a hindrance for the passers-by and of causing any damage in the event of impacts.

[0007] A further drawback of the known art, also connected to the vertical positioning of the spiral devices, relates to the correct identification of the products dispensed due to the impossibility of determining with relative certainty the correspondence between the choice and the payment made with the product actually delivered.

[0008] The object of the present invention is to provide a vending machine capable of solving the aforementioned drawbacks. In particular, the present invention aims to improve the optimization of the internal arrangement of the dispensing devices with devices capable of

occupying a relatively small space and which, at the same time, are able to control which products are actually supplied by the vending machine.

[0009] This result has been achieved in accordance with the invention by adopting the idea of realizing a vending machine having the characteristics described in claim 1. Other characteristics are object of the dependent claims, such as, for example, the possibility of improving the access to the distributor automatic.

[0010] Among the advantages of the present invention is that the vending machine has an extremely small encumbrance while maintaining a functionality comparable with that of much larger machines equipped with the same number of spiral dispensing devices; that the offer provided to users with a plurality of dispensing devices, even of different types, can be extended, maintaining the convenience of use in the choice of the products of a traditional machine; that can be eliminated the padlock closing systems with the relative negative aspects; that it is possible to create an archive relating to the products actually delivered by storing the corresponding images and a possible comparison between the choice made and the image of the product delivered; that the vending machine has a relatively low cost in particular if compared with the advantages it determines; that its realization is easily achievable by the same operators who build traditional machines, without requiring particular investments.

[0011] These and further advantages and features of the present invention will be more and better understood by every person skilled in the art from the following description and with the aid of the attached drawings, given as a practical example of the invention, but not to be considered in a limiting sense, in which:

- Figs. 1 and 2 relate to a possible embodiment of the vending machine, represented, respectively, in a schematic front view with a detail illustrated by means of functional blocks (Fig. 1), in a side view with removed parts (Fig.2);
- Figs. 3, 4 and 5 relate to internal details of the machine of the example of Figs. 1-2; Fig. 3 shows a partial view from the left side, Fig. 4 a partial view from the front door and Fig. 5 a partial view from the right side;
- Figs. 6-9 relate to a possible embodiment of a shredded tobacco dispensing device with two dispensers, represented, respectively, in a schematic front view in combination with the supporting uprights (Fig. 6), in a schematic perspective view (Fig. 7), in a schematic front view (Fig. 8), and in a schematic side view (Fig. 9);
- Figs. 10-13 relate to a possible embodiment of a shredded tobacco dispensing device with two pairs of dispensers, represented, respectively, in a schematic front view in combination with the supporting uprights (Fig. 10), in a schematic perspective view (Fig. 11), in a schematic front view (Fig. 12), and in

a schematic side view (Fig. 13);

- Figs. 14 and 15 relate to another possible embodiment of the vending machine, represented, respectively, in a schematic front view with a detail illustrated by means of functional blocks (Fig. 14), in a side view with parts removed (Fig. 15); and
- Fig. 16 is a schematic side view with parts removed and others in section of an embodiment of a device with a known type of spiral thrust element.

[0012] With reference to the drawings of the accompanying figures, an automatic vending machine (1) in accordance with the present invention comprises a plurality of dispensing devices suitable for dispensing products of various types. With reference (90) are indicated devices for dispensing instant lottery tickets which equip the distributor (1); with (2) there are schematically indicated in general other delivery devices, the means to carry out the payment and / or the choice of the products and / or the possible identification of the user; the reference (4) indicates a screen or other means for displaying the products to be chosen and (5) a door or withdrawal compartment for withdrawing the dispensed products.

[0013] The same screen (4) that displays the products can be of the touch screen type so as to allow not only visualization but also product selection.

[0014] The vending machine (1) shown in the drawings is provided with a front door (6) connected to the vertical upright by means of a vertical axis hinge (7) which extends for most of the height of the distributor body.

[0015] The leaf (6) is provided with a closing block (3) which can advantageously comprise, as described below, a lock cover with magnetic coding and / or an electrically controlled lock connected to suitable recognition means capable of identify a person to allow the door to open.

[0016] In other words, the vending machine (1) is of the type provided with:

- means (2) for selecting a product and making a payment;
- means (4) for displaying the products;
- means for dispensing the selected product, including a container for the products to be dispensed and means for the controlled release of the selected products; comprised between said means for dispensing the product being at least a shredded tobacco dispenser device and the like (10), i.e. a device comprising a container consisting of a containment and transport channel (17) in which a spiral thrust element (19) is arranged, adapted to contain packages of shredded material between its coils and to move the same packages along said channel (17) by rotating the thrust element about its own longitudinal axis (X); in particular, the spiral (19) is moved in rotation about its own axis (X) by means of a motor (13) which drives a connecting member (14) which can be constituted by a movement disk on which the

- spiral (19) is fixed;
- at least one door (6) for access inside said distributor (1), provided with closing means (3);
- at least one outlet or withdrawal compartment (5) for the release of the product dispensed by the vending machine (1).

[0017] Advantageously, in a vending machine (1) according to the present invention the longitudinal axis (X) of the thrust element of the shredded tobacco dispensing device is arranged horizontally.

[0018] Furthermore, the motor (13) is placed in correspondence of the same containment and transport channel (17) so as not to increase the encumbrance of the device (10) in the axis development direction (X). In other words, the motor (13) is arranged in correspondence of the channel (17) in the area of the same channel, not protruding from the latter (17) in the direction of development of the axis (X).

[0019] In the examples shown in the drawings, the motor (13) is located above the channel (17) and is kinematically connected to the spiral (19) by a kinematic chain not described in detail and which can comprise, for example, gear trains and/or belts and/or joints and/or other convenient means for transmitting the motion.

[0020] Advantageously, as better described below, the closing means (3) of the door (6) can comprise an electrically controlled lock.

[0021] Moreover, the said outlet mouth (5) is provided with a camera (50) adapted to produce an image of a dispensed product, an archive (51) of reference images being provided to which the image thus obtained is compared.

[0022] In particular, in the case in which the distributor (1) comprises a plurality of cigarette pack dispenser devices fixed to corresponding vertical uprights (22), the shredded tobacco dispenser device (10) is provided with fastening means (12) to the structure of the vending machine (1) shaped and sized so as to allow fixing to the vertical uprights (22) provided for cigarette pack dispenser devices. In practice, the device (10) is provided with brackets which allow it to be stably fastened to the structure of the distributor using the uprights (22) already provided for the cigarette columns.

[0023] The shredded tobacco delivery device (10) is provided with a passage sensor (11) arranged and acting in correspondence with said containment and transport channel (17). The passage sensor will be connected to the central unit (UC) of the distributor so as to make it possible to monitor the operation of the device (10).

[0024] In practice, the distributor (1) in its embodiment schematically shown in the drawings considerably increases the possibilities for controlling the delivery, in particular for the spiral devices (10) which, with respect to many known solutions, are able to guarantee a high security. In fact, each device (10), which is arranged horizontally thanks to the small size due to the advantageous positioning of the motor (13), is provided with the passage

sensor (11) which detects that a product has been released by the spiral device (10); the released product passes into the camera shooting area (50) which scans and sends the acquired image to the processing unit (UC) which, thanks to the comparison with the images contained in the archive (51), is able to "recognize" the product supplied by the vending machine.

[0025] The containment and transport channel (17) of the shredded tobacco delivery device (10) consists of an open box-shaped structure, that is U-shaped in cross section. The devices can be coupled two by two or joined in groups of four, as shown in the examples. In the case in which the vending machine (1) comprises two shredded tobacco dispenser devices (10) arranged superimposed, the relative box-like structures (17) can be overlapped and supported by a single vertical support plate (16).

[0026] The advantages of the present invention are clear from the point of view of the possibility of being provided with shredded tobacco dispensing devices without excessively limiting the possibility of being equipped with dispensing devices of another type such as, for example, cigarette packet distributors.

[0027] In the example of Fig. 6 it is visible that instead of two columns for packets of cigarettes it is possible to house two shredded tobacco dispensing devices (10); with a known vending machine the positioning of the two devices (10) would have determined the "loss" of four columns.

[0028] In the example of Fig. 10 it is visible how instead of three columns for packets of cigarettes it is possible to house four shredded tobacco dispensing devices (10); with a vending machine of a known type the positioning of the four devices (10) would have determined the "loss" of eight columns.

[0029] Advantageously, moreover, the distributor (1) can be provided with a cover-lock (3) with magnetic coding, so as to eliminate the conventional padlocks that are cumbersome and which, protruding from the profile of the machine, can constitute an obstacle for possible impacts; moreover, the elimination of the padlocks makes the distributor more appreciable from the aesthetic point of view.

[0030] An electrically controlled lock can be provided, connected via an intelligent electronic card, for example in serial or via can-bus, and controlled by a software application via a fingerprint reader (30) present on the vending machine. It is in fact sufficient that the manager of the vending machine registers himself in order to be identified by the same vending machine (1), for example by showing his own footprint in a specific sequence to open the distributor door without a key.

[0031] The electrically operated lock is connected to a reader (30) of a recognition code that can be configured differently.

[0032] For example, a system for recognizing a code (32) sent via a software application can be provided. In other words, through a software application, which can

also be resident on a mobile phone, an opening or closing command can be sent to the lock (3). Obviously, the lock will be connected to a communication network.

[0033] The electrically operated lock can also be connected to a reader (30) for biometric recognition capable of identifying a person based on one or more biological and/or behavioral characteristics by comparing them with data previously acquired and stored in a database (31). Among the biological characteristics one or more of those of the whole can be used, including: fingerprints, the color and size of the iris, the retina, the shape of the hand, the palm of the hand, the vascularization, the shape of the ear, the physiognomy of the face. Among the behavioral characteristics one or more of those of the whole can be used, including: the vocal impression, the graphic writing, the signature. Obviously, for the recognition of each specific characteristic a corresponding reader will be provided.

[0034] Advantageously, the vending machine can comprise a conveyor belt (100), adapted to transport the dispensing products towards the outlet mouth (5), arranged according to the depth direction (P) of the vending machine (1), i.e. in an orthogonal direction compared to the front (L) of the vending machine (1).

[0035] The details of execution can however vary in an equivalent manner in the shape, dimensions, arrangement of the elements, nature of the materials used, without however departing from the scope of the idea of solution adopted or of the inventive concept and therefore remaining within the limits of the protection afforded by the present patent as defined by the claims.

Claims

1. Automatic vending machine (1) of the type provided with:

- means (2) for selecting a product;
- means (2) to make a payment;
- means (4) for displaying the products;
- means for dispensing the selected product, including a container for the products to be dispensed and means for the controlled release of the selected products; said means for dispensing the product including at least a spiral dispensing device (10), i.e. a device comprising a container consisting of a containment and transport channel (17) in which a spiral thrust element (19) suitable for containing the products between its coils and moving the same products along said channel (17) driven by a motor (13) by rotating the thrust element (19) around its own longitudinal axis (X);
- at least one outlet or withdrawal compartment (5) for the release of the product dispensed by the vending machine (1);

vending machine (1) **characterized in that:**

- said motor (13) is arranged in correspondence of said containment and transport channel (17) in the area of the same channel, not protruding from the latter (17) in the direction of development of the axis (X);
- said outlet (5) is provided with a camera (50) adapted to produce an image of a dispensed product, an archive (51) of reference images being provided to which the image thus obtained is compared.

2. Automatic vending machine according to claim 1, **characterized in that** the longitudinal axis (X) of said thrust member (19) of the device (10) is arranged horizontally.
3. Automatic vending machine according to claim 1 and / or 2, wherein the vending machine (1) is provided with at least one door (6) for access to the inside of said vending machine, provided with closing means, **characterized in that** said closing means (3) of the door (6) comprise an electrically controlled lock.
4. Automatic vending machine according to claim 3, **characterized in that** said electrically operated lock is connected to a reader (30) of a recognition code.
5. Automatic vending machine according to claim 3, **characterized in that** said electrically operated lock is connected to a system for recognizing a code (32) sent through a software application.
6. Automatic vending machine according to claim 3, **characterized in that** said electrically operated lock is connected to a reader (30) for biometric recognition capable of identifying a person on the basis of one or more biological and/or behavioral characteristics by comparing them with the data previously acquired and stored in a database (31).
7. Automatic vending machine according to claim 3, **characterized in that** said biological and/or behavioral characteristics are one or more of those of the set comprising: fingerprints, the color and size of the iris, the retina, the shape of the hand, the palm of the hand, the vascularization, the shape of the ear, the physiognomy of the face, the vocal imprint, the graphic writing, the signature.
8. Automatic vending machine according to claim 1, wherein the vending machine comprises a plurality of cigarette pack dispenser devices fixed to corresponding vertical uprights (22), **characterized in that** said at least one shredded tobacco delivery device (10) is provided with means (12) for fastening to the structure of the vending machine (1) shaped

and sized so as to allow fixing to the vertical uprights (22) provided for cigarette pack dispensing devices.

9. Automatic vending machine according to one or more of the preceding claims, **characterized in that** said at least one spiral dispensing device (10) is provided with a passage sensor (11) arranged and acting in correspondence of said containment and transport channel (17). 5 10
10. Automatic vending machine according to one or more of the preceding claims, **characterized in that** said containment and transport channel (17) of said at least one dispensing device (10) consists of an open box-shaped structure, U-shaped in cross section. 15
11. Automatic vending machine according to claim 10, **characterized in that** it comprises at least two dispensing devices (10) arranged superimposed, with their box-like structures supported by a single vertical support plate (16). 20
12. Automatic vending machine according to one or more of the preceding claims, **characterized in that** said spiral dispensing device (10) is a dispensing device of shredded tobacco packages. 25
13. Automatic vending machine according to one or more of the preceding claims, **characterized in that** the automatic vending machine comprises a conveyor belt (100), adapted to transport the products to be dispensed towards the outlet (5), arranged in the direction of the depth (P) of the vending machine (1), i.e. in an orthogonal direction with respect to the front part (L) of the vending machine (1). 30 35

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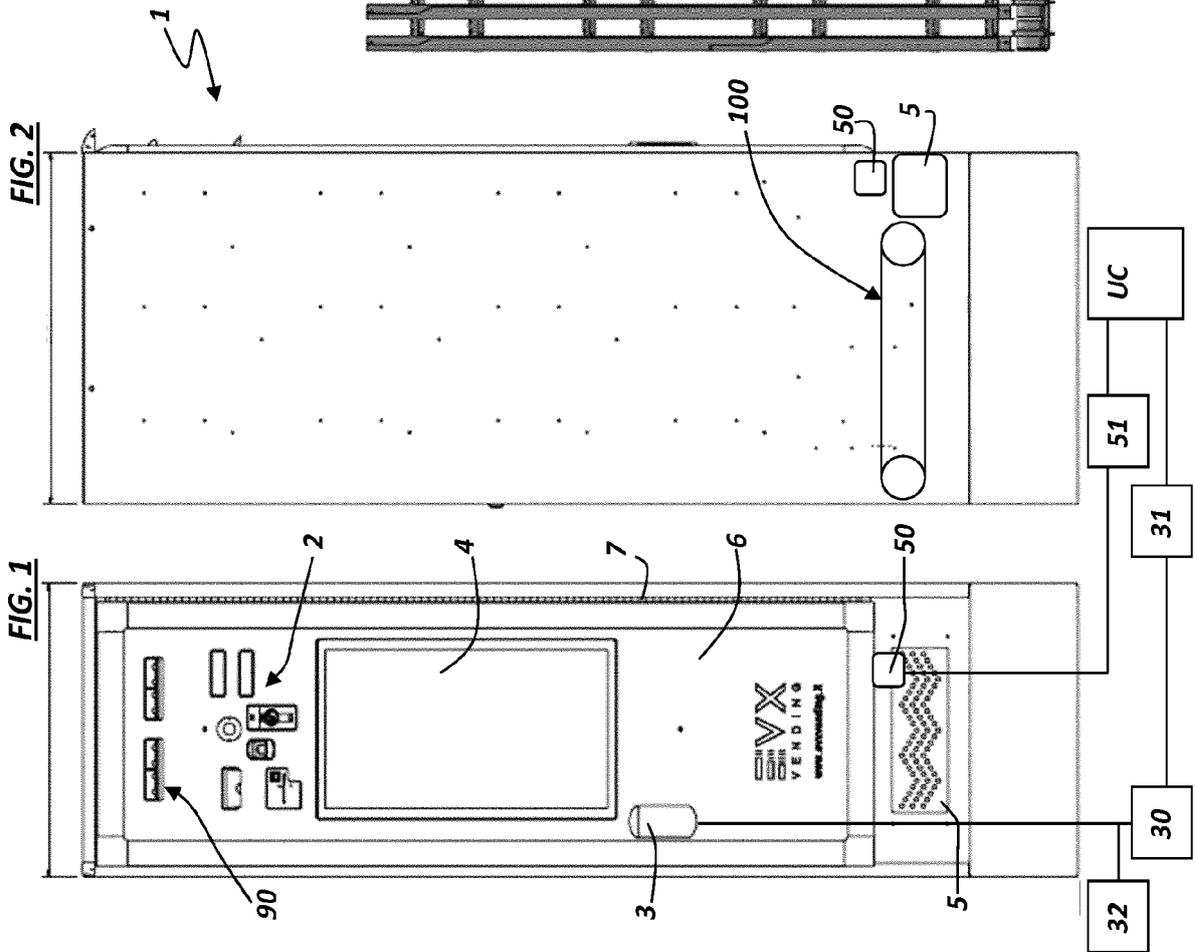


FIG. 2

FIG. 1

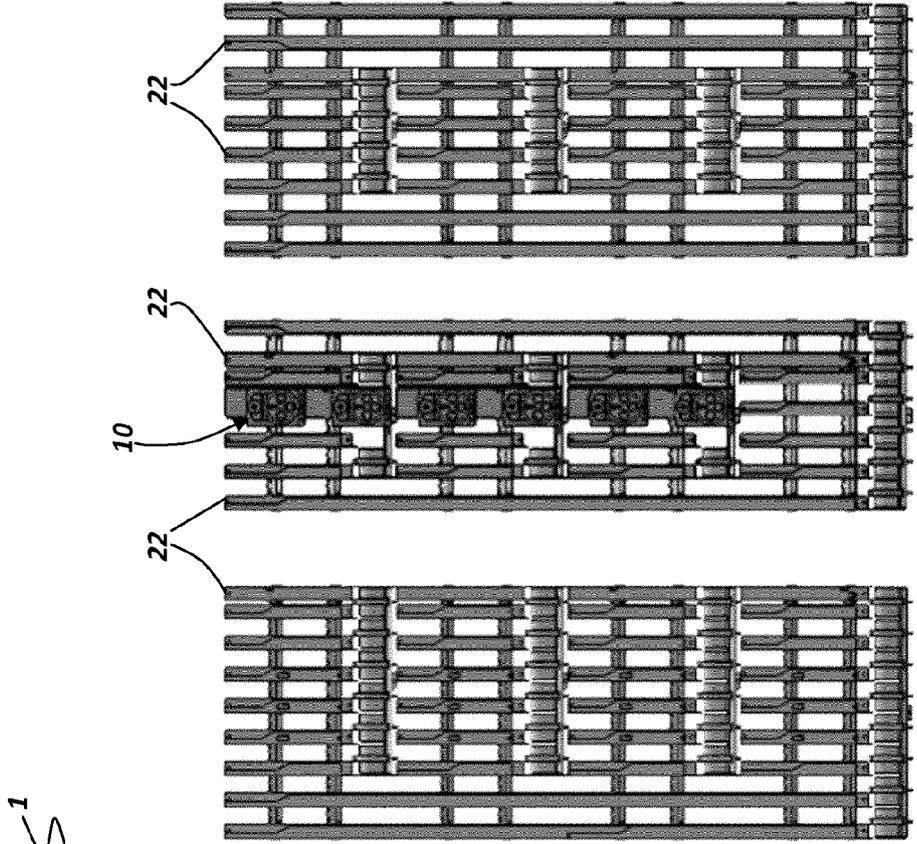


FIG. 3

FIG. 4

FIG. 5

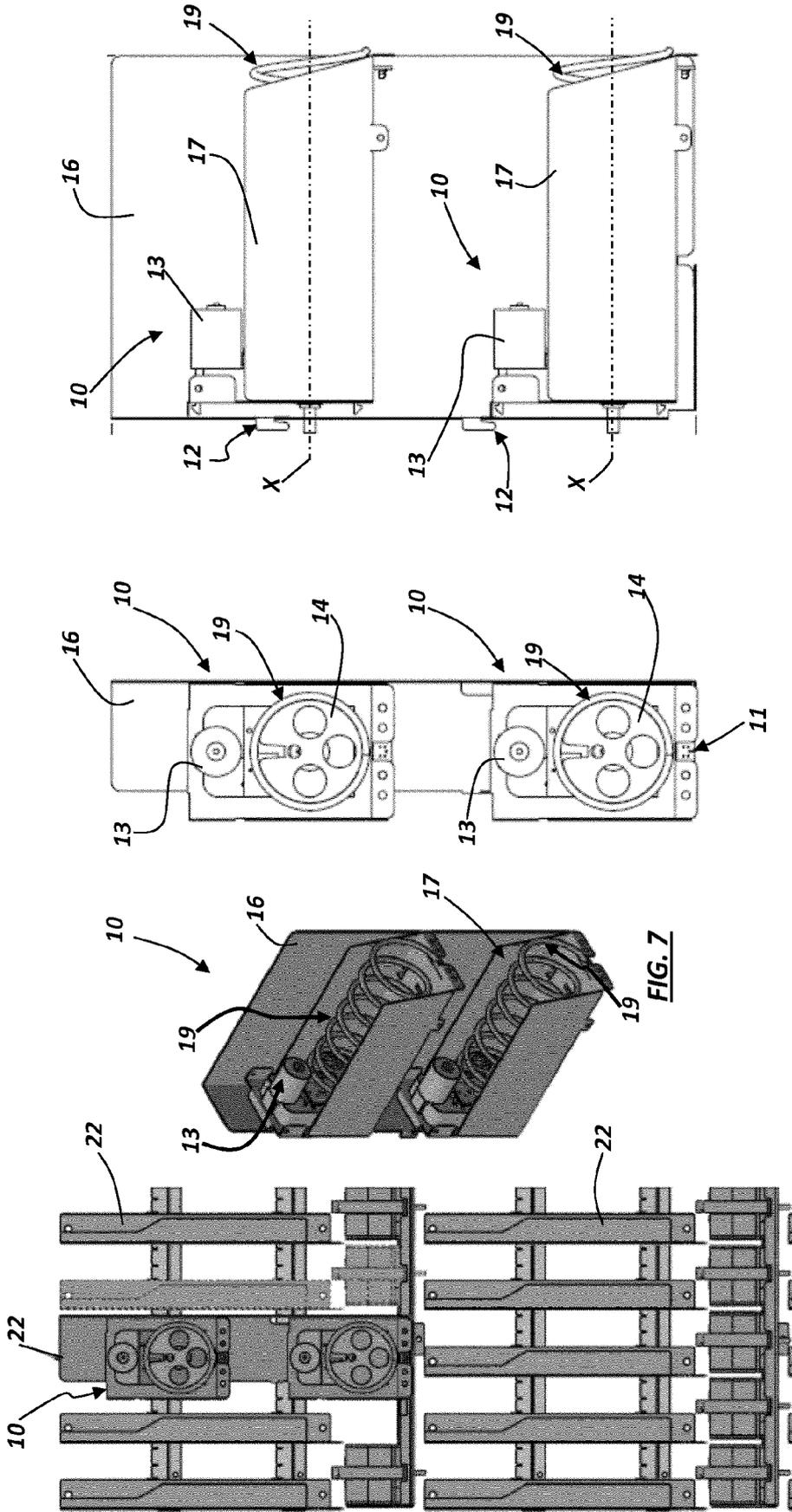


FIG. 9

FIG. 8

FIG. 6

FIG. 7

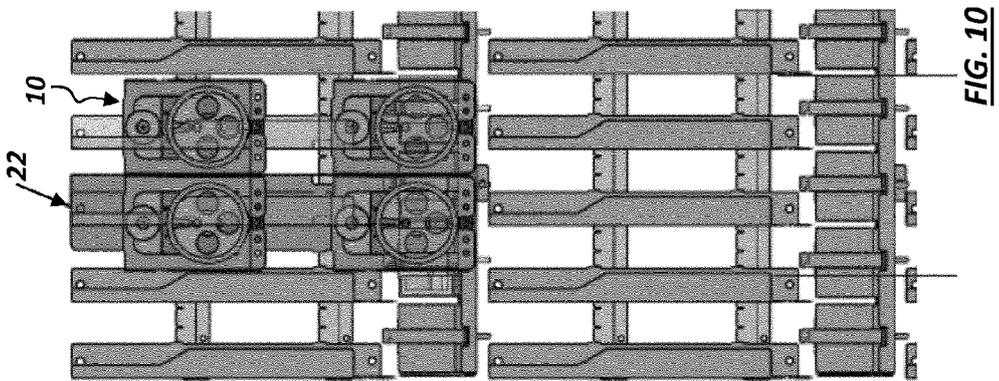


FIG. 10

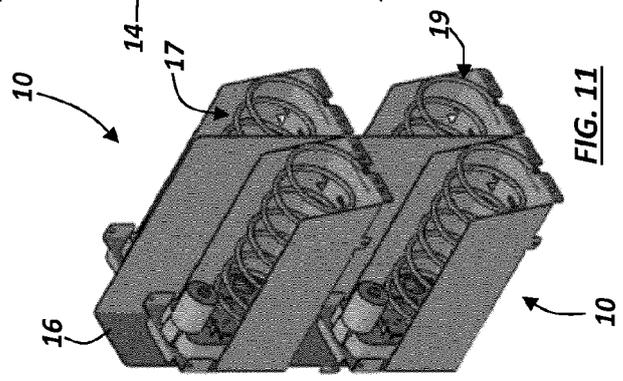


FIG. 11

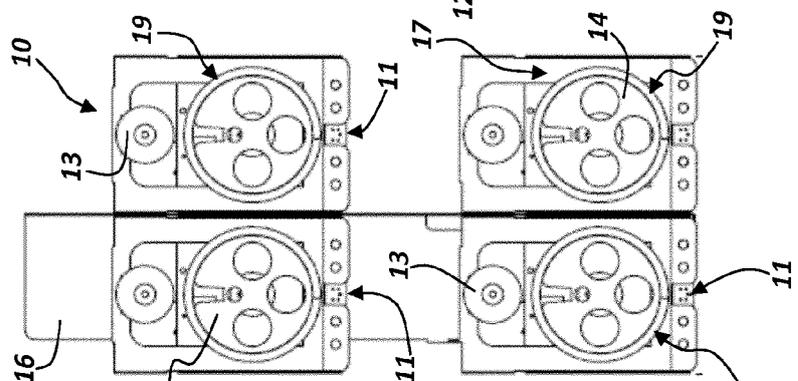


FIG. 12

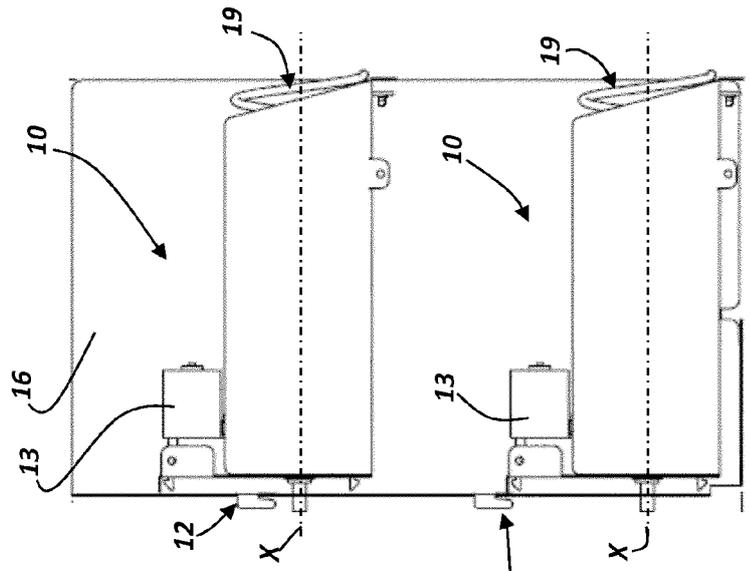


FIG. 13

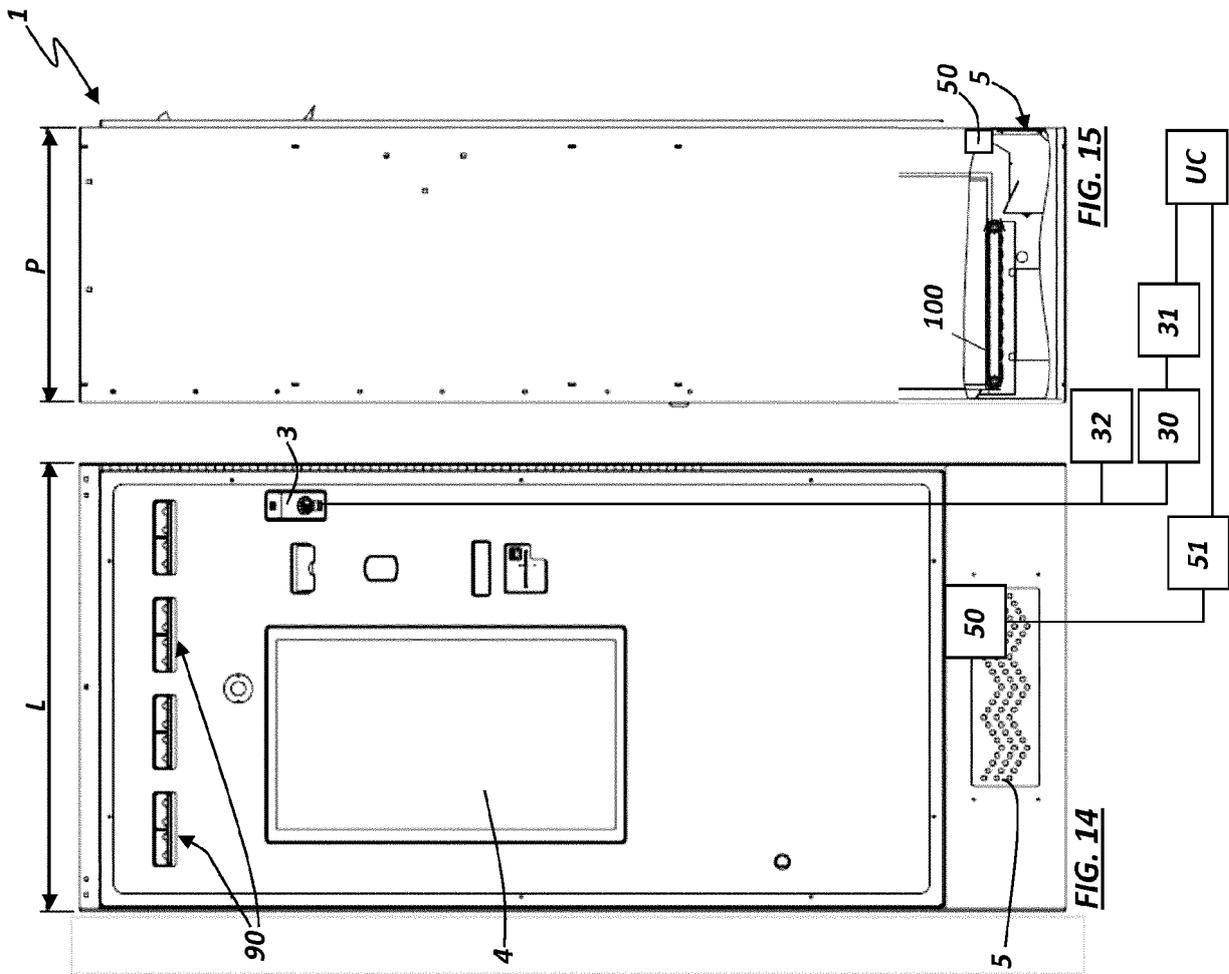


FIG. 15

FIG. 14

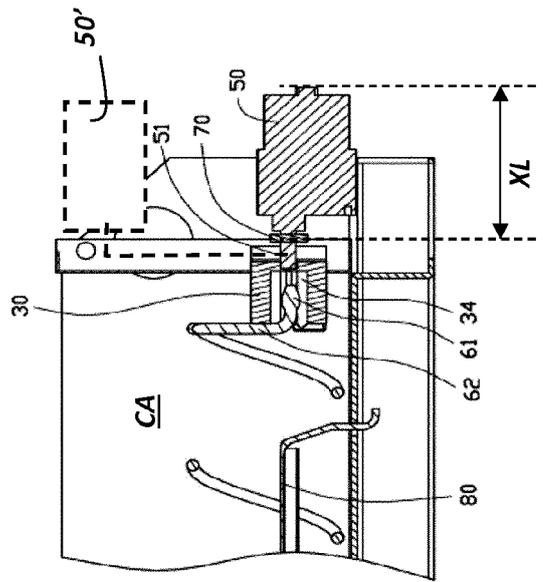


FIG. 16



EUROPEAN SEARCH REPORT

Application Number
EP 19 02 0129

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Place of search The Hague		Date of completion of the search 27 May 2019	Examiner Moynihan, Maurice
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