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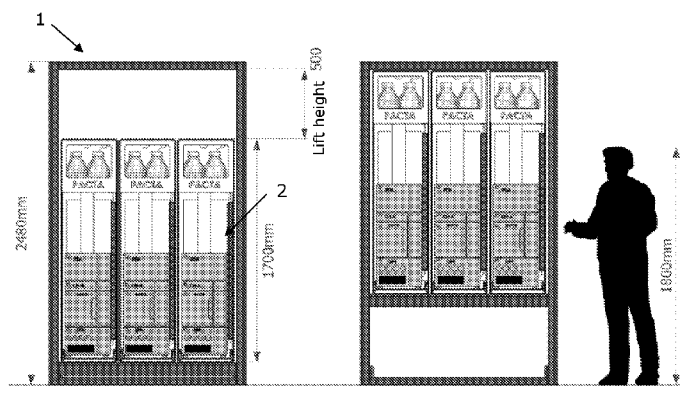


Fig. 4

(57) Abstract: A measuring unit comprising a unit frame (3) comprising two vertical side parts (3.2), a horizontal top (3.1) and bottom parts (3.3), in which unit frame measuring equipment of the measuring unit is arranged. A rack according to the invention comprising a rack frame (1) having two vertical side parts (1.1), preferably a horizontal top part (1.2) and preferably a bottom part (1.3) defining an enclosure in which the at least one measuring unit is arranged with its vertical side parts parallel or substantially parallel with the vertical side parts of the rack frame, wherein the vertical height of the enclosure of the rack frame is larger than the vertical outer height of the unit frame. Preferably, the rack comprises a mechanically activated position system to which the unit frame of each of the at least one measuring unit is connected, the mechanically activated position system is configured to position each of the least one measuring unit at different vertical positions in the rack frame.



MEASURING UNIT AND A SYSTEM FOR POSITION SUCH MEASURING UNIT

FIELD OF THE INVENTION

The present invention relates to a measuring unit and a system for position such
5 measuring unit.

A measuring unit comprising a unit frame comprising two vertical side parts, a
horizontal top and bottom parts, in which unit frame measuring equipment of the
measuring unit is arranged. A rack according to the invention comprising a rack
frame having two vertical side parts, preferably a horizontal top part and
10 preferably a bottom part defining an enclosure in which the at least one
measuring unit is arranged with its vertical side parts parallel or substantially
parallel with the vertical side parts of the rack frame, wherein the vertical height
of the enclosure of the rack frame is larger than the vertical outer height of the
unit frame. Preferably, the rack comprises a mechanically activated position
15 system to which the unit frame of each of the at least one measuring unit is
connected, the mechanically activated position system is configured to position
each of the least one measuring unit at different vertical positions in the rack
frame.

20 BACKGROUND OF THE INVENTION

When performing analysis of e.g. liquids, such as by routine analysis of liquids
during production of one or more substances, the analysis equipment are often
arranged in analysis units having a large footprints as well as having operation
points for personnel operating the units at different heights.

25

Such large footprints and operating points at different heights result in a less
efficient use of the space available and of the personnel operating the measuring
units.

30 Hence, an improved system for such measuring units would be advantageous, and
in particular a more efficient and/or reliable exploitation of physical space
available would be advantageous.

OBJECT OF THE INVENTION

An object of the present invention is to provide an alternative to the prior art.

In particular, it may be seen as a further object of the present invention to
5 provide an analysis equipment that solves the above mentioned problems of the prior art of a less efficient use of the space available and of the personnel operating the measuring units.

SUMMARY OF THE INVENTION

10 Thus, the above described object and several other objects are intended to be obtained in a first aspect of the invention by providing a rack holding at least one measuring unit.

Each measuring unit may preferably comprise a unit frame comprising two vertical
15 side parts, a horizontal top part and a horizontal bottom part, in which unit frame measuring equipment of the measuring unit is arranged.

The rack preferably comprises a rack frame having two vertical side parts,
preferably a horizontal top part and preferably a horizontal bottom part defining
20 an enclosure in which the at least one measuring unit is arranged with its vertical side parts parallel or substantially parallel with the vertical side parts of the rack frame. In the embodiments, where no top and/or bottom part is(are) provided, the enclosure is defined by the region in-between the two vertical side parts.

25 The vertical height of the enclosure of the rack frame is preferably larger than the vertical outer height of the unit frame.

The vertical height of the enclosure of the rack frame is selected in accordance with a desired span in different vertical position.

30

Typically examples of span in different vertical position includes for use of a longitudinal elongatable pillar (such as a lifting column) a travel of 2.1 times the height of the pillar in collapsed position, which may translate into a span around
45 cm.

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In other situations, where the measuring units travel from the floor (or close to the floor), a travel of e.g. 80 cm is achieved.

The rack may further comprise a mechanically activated position system to which the unit frame of each of the at least one measuring unit is connected, the mechanically activated position system is configured to position each of the least one measuring unit at different vertical positions in the rack frame.

In a second aspect, the invention relates to a measuring unit comprising a unit frame preferably comprising two vertical side parts, a horizontal top and bottom parts, in which unit frame measuring equipment of the measuring unit is arranged. The measuring unit preferably further comprises a mechanically activated position system to which the unit frame of the measuring unit is connected, the mechanically activated position system is configured to position each of the least one, at least one or said measuring unit at different vertical positions.

It is noted that the measuring unit is preferably considered to comprise the mechanically activated position system configured to arrange the measuring unit at different vertical position (and in some embodiments also at different horizontal position). Within this is considered that a lower end of the mechanically activated position system typically maintains its vertical position as the measuring unit is typically arranged on a floor.

Preferably, the mechanically activated position system may comprise a longitudinal elongatable pillar, such as an elongateable actuator, such as hydraulic cylinders, connected at one end to the bottom part of the unit frame and wherein the longitudinal direction of the pillar preferably is parallel to the longitudinal direction of the vertical side parts.

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The longitudinal elongatable pillar comprising preferably, at the end being distal to the one being connected to the bottom of the unit frame, a horizontal position system configured to position the measuring unit with pillar at different horizontal positions on a floor.

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Preferably, the mechanically activated position system or the horizontal position system may comprise a plurality of wheels, such as four, in contact with the floor, said wheels being preferably configured to allow horizontal movement a forward-backward movement and/or a sideways movement. Advantageously, the

5 horizontal position system is electrically driven. The wheelbase and the track defined by the wheels are preferably both larger than a length and a width of the horizontal bottom part.

Preferably, the mechanically activated positioning system may according to

10 preferred embodiments of the invention may further configured for moving the unit frame in a horizontal direction, preferably being limited to a forward and backward movement.

Preferably, a measuring unit according to preferred embodiments of the invention

15 may comprise a void for storing e.g. bottle or other containers for consumables or discharge used or produced during use of the measuring equipment, said void being preferably in the form of a drawer arranged in the unit frame, said drawer is extractedly arranged either partly or fully from the unit frame to allow access to the content stored in the void.

20

Preferably, a measuring unit according to preferred embodiments of the invention may comprise a drawer containing or configured to contain a tool-kit for tools to be used e.g. during use of the measuring unit, the drawer is typically configured with a cover which covers the tools and may be used as table.

25

In some preferred embodiments, the measuring unit may comprise at least two such as at least three measuring unit sections, wherein preferably two of said sections are structural identical to each other by being configured to contain the same number and type of measuring equipment and preferably at least one of the

30 measuring unit sections (preferably another section than the two sections being structural identical) comprising a void for storing e.g. container(s).

Preferably, the at least three measuring unit sections may be assembled into a measuring unit with a positioning system arranged to positioning all three sections

35 simultaneous at different vertical positions. Alternatively, the at least three

measuring unit sections may be individual sections each comprising a positioning system to arrange each of the sections at different vertical positions individually.

Preferably, one of the measuring unit sections may contain one or more voids for
5 storing containers, such as bottles, in which liquids used by and/or produced by the measuring equipment are stored, and two measuring unit sections comprising measuring equipment may be adjacently, such as neighbouring, arranged to the measuring unit section comprising one or more voids. Further, the measuring unit may preferably comprise flexible lines for the measuring equipment to extract
10 and/or deliver liquid to the bottles stored in the void(s).

The measuring unit or one or more of the measuring unit sections may preferably comprise a supporting plate arranged on rails for carrying the supporting plate for supporting a measuring equipment while at same time allow the supporting plate
15 to move horizontally and thereby also provide a horizontal movement of the measuring equipment.

Preferably, the measuring unit or one or more of the measuring unit sections may comprise a rotatable receptacle adapted to support a measuring equipment and
20 allow rotation of the rotatable receptacle along a vertical axis.

Advantageously, a measuring unit, a measuring unit section and/or a rack according to preferred embodiments of the present invention may further comprise a ventilation system for ventilating the measuring unit(s), measuring
25 unit section(s) and/or rack.

Preferably, the ventilation system may comprise one or more pumps arranged to suck out gasses produced e.g. by the measuring equipment and which pumps preferably is connected at the outlet to lines arranged to lead the gasses sucked
30 out to a predefined position, such as to the atmosphere outside a building or to a treatment facility for removing hazardous substances from the gasses.

The ventilation system may preferably comprise one or more channels arranged to lead fluid out from the interior of the measuring unit, the channel(s) preferably
35 being provided with one or more valves for controlling the fluid flow through the

channel(s) and thereby at least partly controlling the ventilation of the measuring unit, wherein said valve(s) preferably are adapted to constrain the flow between closed channel and unrestricted channel.

- 5 A measuring unit or a rack according to preferred embodiments of the invention may further comprise a pump provided to provide a suction of fluid out from the measuring unit.

Preferably, in a measuring unit or rack according to preferred embodiments of the invention, the ventilation system further comprising a heat exchanger unit.

In a measuring unit or rack according to preferred embodiments of the invention, one channel of the ventilation system may be connected to void(s) of the measuring unit containing e.g. containers storing liquid and may comprise a valve for each void connected to the channel for controlling the amount of air sucked from each void.

In a measuring unit or rack according to preferred embodiments of the invention, one channel of the ventilation system may be connected, preferably at a lower end or upper end, to a section of the measuring unit containing the measuring equipment.

Preferably, a measuring unit or rack according to preferred embodiments of the invention, the channels may at their upper ends connected to a heat exchanger unit being configured to regulate the heat exchange and mass flow so that a volume fraction (preferably being between 5 and 95%) of the air sucked out from the measuring unit goes to the outside of the building in which the measuring unit is placed in and the remaining amount goes to the inside of the building in which the measuring unit is placed.

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Preferably, the heat exchanger unit regulates, optionally assisted by use of a heat source such as a heat pump, the temperature of the two airstreams out from the heat exchanger to have specified temperatures, such as the stream going to the inside having a temperature of 20°C and the stream going to the outside having a temperature of 70°C.

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In a third aspect the invention relates to an equipment farm installed or installable in a room having a front wall in which an access opening to the room is provided, two side walls extending from the front wall and an end wall opposite to the front wall. The equipment farm preferably comprises a plurality of racks according to the first and/or plurality of measuring units according to the second aspect of the invention arranged inside said room.

The present invention provides the possibility of position each of the measuring units at different positions and as the measuring units may be considered as stand-alone units they may be positioned during use. Thus, there is normally no need for shutting down or putting the units in a special mode (such as stand-by mode) prior to movement of the units.

As outlined herein, an aim of the present invention is to provide a possibility of moving the measuring units while measurements are carried out. In order to avoid the need for a re-calibration necessitated by shakings, vibrations or the like of the measuring units, the position system provided according to the present invention is most often computer controlled to avoid strong accelerations and decelerations. Furthermore, the position system is most often produced with small clearances to avoid wobbling during movements.

Local ventilation is preferably integrated to limit exposure of hazardous or toxic fumes, vapours and exhaust air, to improve EHS (Environmental, Health and Safety) and to keep measuring units tempered. Ducts and wires and pipes are preferably flexible and capable to fit any measuring unit position when operated.

In the present context a number of terms are used in a manner being ordinary to a skilled person. Some of these terms are explained in the following.

Rack is used in an ordinary manner and preferably to mean a construction in which one or more measuring units are arranged.

Mechanically activated is used in a broad sense and preferably to include pneumatic, hydraulic, electronic and/or mechanical actuators.

Measuring unit is used in a broad sense and refers preferably to a stand alone unit which produces a measuring or analysis result without input from other measuring units. It is noted, that a production of e.g. a chemical product may be carried out
5 in the measuring unit.

Measuring equipment is used in broad sense and refers preferably to a device configured to perform one or more measurements and/or analysis.

10 *Equipment farm* is used in broad sense and refers to room inside which a number of racks, and/or measuring units, according to the present invention are arranged.

Frame is used on a broad sense and refers preferably to a mechanical construction proving sufficient strength to contain the elements arranged in
15 frame. A frame may preferably comprise a lattice and/or plate construction with an open front.

Line is used in broad manner and included inter alia, electrical power lines, data connections, fluid connections (such as tube) etc.
20

Different positions is used in a broad manner to include that the positions at which the measuring units and/or rack are selectable within the span provided by the position systems.

25 *Rail* is used in a broad sense to denote a mechanical construction for guiding a carrier. Rails as used herein is also intended to include and not limit to elongatable actuators such as lifting columns, toothed racks, threaded rods and the like.

30 *Carrier* is also used in a broad sense to denote an element being moved along or with the rails. Non-limiting examples are sledges guided along a rail and an elements arranged on a elongatable actuator which follows the movement of the elongation. It is noted that the measuring units may be directly connected to a carrier or through one or more structural elements bridging the distance
35 between the measuring unit and the carrier.

Further aspects and embodiments are presented in the following as well as in the accompanying claims.

- 5 The first, second and third aspect of the present invention may each be combined with any of the other aspects. These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments described hereinafter.

10 BRIEF DESCRIPTION OF THE FIGURES

The present invention and particular preferred embodiments thereof will now be described in more detail with regard to the accompanying figures. The figures show ways of implementing the present invention and is not to be construed as being limiting to other possible embodiments falling within the scope of the

- 15 attached claim set.

Figure 1 is a schematically front view of a rack according to an embodiment of the invention; fig. 1a shows the rack with measuring units in a upper position, and fig. 1b, shows the rack with the measuring units in a lower position,

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Figure 2 is a schematically 3 dimensional front view of a measuring unit according to a preferred embodiment of the invention; fig. 2a shows the measuring unit with all sub-units positioned within the measuring unit, and fig. 2b shows the unit of fig. 2a with one sub-unit extracted from the measuring unit,

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Figure 3 is a schematically front view of a rack according to a preferred embodiment of the invention in which the measuring units may be located at varies positions in the rack without being removed from the rack;

- 30 Figure 4 is a schematically front view of a rack according to a preferred embodiment of the invention in which all measuring units are moved upwardly and downwardly commonly,

Figure 5 is a schematically 3-dimensional view of a rack according to a preferred
35 embodiments in which the measuring units are drawn out from the rack,

Figure 6 is a schematically 3-dimensional view (from above) of an equipment farm according to a preferred embodiment of the present invention;

5 Figure 7 is schematically 3-dimensional view (from above) of an equipment farm according to a preferred embodiment of the present invention; fig. 7a shows the equipment farm in a first configurative position, and fig. 7b shows the equipment farm and another configurative position,

10 Figure 8 is a schematically front view of a further embodiment of a measuring unit according to a further embodiment of the invention; in the figure two measuring units are shown but at different altitude,

Figure 9 is a schematically 3-dimensional view of a measuring unit according to
15 yet a further embodiment of the invention, in the figure two measuring units are shown but at different altitude,

Figure 10 is a schematically 3-dimensional view of a measuring unit according to
yet another embodiment of the invention,
20

Figure 11 illustrates schematically and in a 3-dimensional view, the measuring unit of fig. 10 with two measuring equipment drawn out from the unit and one of the measuring equipment further rotated along a vertical axis,

25 Figure 12 illustrates schematically and in a 3-dimensional view, the measuring unit of fig. 10 with the two measuring equipment drawn out in fig. 11 removed,

Figure 13 illustrates schematically a cross sectional view of a measuring unit according to the present invention, the measuring unit being equipped with a
30 ventilation system,

Figure 14 illustrates schematically a measuring unit according to a preferred embodiment of the present invention,

35 and

Figure 15 illustrates schematically a measuring unit according a preferred embodiment of the invention.

5 DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

In the figures, identical numerals are applied for referencing identical or similar elements in the different figures. When figures shows measuring units in different positions, reference numerals are often only applied to the figure showing one of the positions. Further, when more the one measuring unit e.g. is shown in one
10 figure, only one of those are referenced with a numeral. Dimensions indicated in the figures are only for illustrative purposes and are not to be considered as limiting the scope of the invention. Throughout the following description, identical reference numerals are used in different figures for referencing identical or similar features among the various embodiments.

15

Reference is made to fig. 1, which shows a preferred embodiment of the present invention. As disclosed in fig. 1, the invention comprises a rack 1 holding at least one measuring unit 2.

20 In the embodiment shown in fig. 1, the rack comprising three measuring units 2. Each of the measuring units 2 comprising a unit frame 3 comprising (see fig. 2) two vertical side parts 3.1 horizontally distanced from each other, a horizontal top part 3.2 and a horizontal bottom part 3.3, thereby defining an enclosure – it is noted that the front of the unit frame 3 is left open. The unit frame 3 is typically
25 made from panels but may be a lattice construction as well (or a combination of a lattice construction with plates applied on the lattice).

In the enclosure of each unit frame 3, measuring equipment of the measuring unit 2 is arranged.

30

The rack comprising a rack frame 1 having two vertical side parts 1.1 horizontally distanced from each other, a horizontal top part 1.2 and bottom part 1.3 thereby defining an enclosure in which the at least one measuring unit 2 is arranged. Each of the measuring units 2 is arranged in the rack frame 1 with their vertical side
35 parts parallel or substantially parallel with the vertical side parts of the rack frame

1. As one of the important features of the invention is to provide a movement of the measuring units 2 vertically (up and down with reference to the figure), the vertical height of the enclosure of the rack frame 1 is larger than the vertical outer height of the unit frame 3 in order to allow for the measuring units to move
5 vertically (up and down) inside the rack frame 1.

In fig. 1A some preferred dimensions are indicated and the contour of an adult is also indicated. In fig. 1A all the measuring units 2 are positioned at their upper most position and it can be seen in fig. 1A that in this position, the lower parts of
10 each measuring units 2 are easy accessible as they are positioned in navel position of the operator. In fig. 1B, all the measuring units 2 are positioned at their lower most position and in can be seen from fig. 1B that in this position, the upper parts of each measuring units 2 are easy accessible as they are positioned in the navel position of the operator. It is noted that the measuring units can be
15 positioned at any of such upper most or lower most positions.

To provide the positioning of the measuring units 2, the rack further comprising a mechanically activated position system to which the unit frame 3 of each of the at least one measuring unit 2 is connected. Thereby, as the measuring devices are connected to the unit frame 3, a movement of the unit frame 3 will effectuate a
20 movement of measuring unit 2.

As disclosed above, the mechanically activated position system is configured to position each of the least one measuring unit 2 at different vertical positions in the rack frame 1.

25 Ventilation is preferably integrated locally in the rack frame and/or in the unit frames in order to limit exposure of hazardous or toxic fumes, vapours and exhaust air, to improve EHS (Environmental, Health and Safety) and to keep measuring units tempered. Ducts and wires and pipes are preferably flexible and capable to fit any measuring unit position when operated.

30

Preferably, the mechanically activated position system to which the unit frame 3 of each of the at least one measuring unit 2 is connected comprising a first rail system extending vertically in the rack frame 1. The first rail system may be provided in or on the back of the rack frame 2 and/or in or on the vertical side
35 parts 1.1. In the embodiment shown in fig. 1A, this first rail system comprising

rails 10 (not visible in fig. 1) on which carriers 16 are arranged. The carriers 16 may be connected to the unit frames 3 to the unit frames 3. In the embodiment shown in fig. 1A the carriers 16 are connected to the unit frames 3 through a beam construction 14 (the carrier may be made an integral part of the beam construction 14) on which the measuring units 3 are located. With reference to fig. 1A, the one or more rails 10 may be applied at each vertical side parts 1.1, which is particular useful in situations where all the measuring units 3 are to be positioned commonly (as shown in fig. 1). If heavy measuring units are use, it may be preferred to apply e.g. two (or more) rails 10 on each vertical side part 1.1, each of the two (or more) rails extend vertically with a horizontal distance in between.

The carriers 15 are made in such a manner that they engage with the rails allowing the carriers to move only along rails and, preferably, take up bending moments resulting from the gravity acting on the measuring units 2. The rails with carriers may be in the form of longitudinal elongatable pillars, toothed racks or the like.

Alternatively, the mechanically activated position system as disclosed in fig. 8 and 9 may be used to position the measuring units 2 at different vertical positions in the rack frame 1.

Fig. 3 show an example rails 10 arranged at the back of the rack frame – however, the rails in fig. 3 comprises (in relation to the vertical movement) further a second rail system (not shown) for a horizontal movement.

While the rails with carriers allows the measuring units 2 to move up and down, the activation of the movement is produced by a linear actuator connected to the carriers moving the carriers along the rails upwardly and downwardly. Alternatively, the linear actuator may be a connected to the unit frames 3. The linear actuator may be in the form of a hydraulic operated piston, a chain drive, a spindle or similar.

As shown in fig. 1, the number of measuring units 2 is three. However any number of measuring units 2 are considered within the scope of the present

invention. When more than two measuring units 2 it may be preferred that the mechanically activated position system being configured to position each of the at least one measuring unit 2 individually at different vertical positions in the rack frame 1. This may preferably be provided by the mechanically activated position
5 system for each measuring unit 2 is a separate position system that can be operated independently of the other position system.

In other embodiments, where the number of measuring units is at least two the mechanically activated position system may be configured to position all
10 measuring units 2 commonly at same vertical position in the rack frame. This may be provided by having a single position system and connecting each measuring unit 2 to each other, whereby upon movement of one of the measuring unit 2 will provide a movement of the other connected measuring units 2. Fig. 4 which is a schematically front view of a rack according to a preferred embodiment of the
15 invention is an example where all measuring units are moved upwardly and downwardly commonly.

As seen most evident from e.g. fig. 2A, the measuring unit 2 may each comprising sub-units 4, 5, 6, 7, 8 and one of more one or more of the sub-units are
20 extractable from the unit frame 3. As shown in fig. 2A the upper sub-unit 4 is a drawer in which a number of containers (bottles) are located. These container may comprise one or more fluids, chemicals or the like which either is analysed or used during measuring and/or analysing. The containers comprising lines (not shown) allowing the content of the containers to be extracted by e.g. the
25 equipment located below in each measuring unit 2 and such lines are made from a flexible material allowing the drawer with containers to be drawn out from the measuring unit 2 while still being connected in an operating state to other sub-units of the measuring unit 2. The lines may also be electrical lines to conduct an electrical signal from a analyser arranged in one or more of the containers to one
30 of the sub-units of the measuring unit or to a position outside the rack.

The other elements of the measuring unit may also be drawn out from the unit frame 3. In some embodiments, it is preferred that the measuring units as such can be drawn out from the rack, e.g. in order to service the measuring unit 2. The measuring unit 2 may in this connection be provided with guides cooperating with

guides in the rack frame 1 so as to allow for the measuring unit 2 only a horizontal movement out of the rack.

Fig. 1 and 2 also disclose lines 9 from the measuring units to a position outside the rack. Such lines may be for exchanging data with e.g. a central server and each measuring unit 2, for supplying power to the measuring units 2. Also these lines are made flexible so as not to hinder the movement of the measuring units 2 in the rack frame 1.

10 In a particular preferred embodiments, all the all the measuring units 2 in one rack are identical to each other.

Reference is made to fig. 3 disclosing a further embodiment of the invention. As disclosed above, the first rail system 10 provides a vertical movement of the measuring units 2. In the embodiment disclosed in the fig. 3, the mechanically activated position system, to which the unit frame 3 of each of the at least one measuring unit 2 is connected, is further configured to position each of the least one measuring unit 2 at different horizontal positions in the rack frame 1.

20 In the embodiment disclose in fig. 3 no horizontal top part and bottom part is shown. Although such parts may be applied, the top and bottom parts may be dispensed and the vertical sides may be attached directly to the floor. Further, mechanical stiffness to the rack frame may be provided by e.g. the position system(s) and/or e.g. a lattice structure applied to the back of the frame.

25

It is noted that in fig. 3, the elements 25 is vertical support elements provided for stability purposes at the front of the rack in such a manner that the measuring units 2.1, 2.2, 2.3. 2.4 and 2.5 may moved vertically and horizontally behind the support elements 25.

30

By this, the measuring units 2 of the rack shown in fig. 3 may change places. For instance, the measuring unit 2.1 (please note that the measuring units e.g. 2.1 actually comprises two measuring units 2 which a structurally connected to form a single unit) may be positioned at the upper right corner of the rack frame 1, where after the measuring units 2.2 and 2.3 may be moved horizontally to the

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right making space for measuring unit 2.4 to move down and into the lower left corner of the rack frame 1. Thereafter, measuring unit 2.5 may be moved to the upper left corner of the rack frame 1. This may be viewed as carousel movement with an anti-clockwise movement. It is clear that movement may be clockwise.

- 5 Further, although the movements have been disclosed as rotation, the invention is not considered limited to a rotation.

In a preferred embodiment, the horizontal position of the measuring units is provided by the mechanically activated position system comprising a second rail system extending horizontally (not shown). The second rail system comprising as
10 the first rail system, rails on which carriers are arranged, said carrier are connected to the unit frames 3, the second rail system further comprising a linear actuator connected to the carriers moving the carriers along the rails sidewardly. The carriers are as disclosed in connection with fig. 1 and 2, although the rails and
15 carriers are adapted to allow disengagement and subsequent engagement with the rails when the movement is changed from horizontal to vertical or vice versa. Alternatively, or in combination thereto, the carriers are adapted to disengage and engage with unit frames 3 when movement is changed. It is noted that the horizontal position option may be used with the vertical position option.

20

All the positioning is controlled by a computer adapted to control inter alia the actuators in response to a control signal received.

As disclosed in fig. 3, it may be preferred that the number of measuring units 2 is
25 uneven and greater than three (in fig. 3, five measuring units are used). In such embodiments the internal width and the internal height of the enclosure of the rack frame 1 each are selected as an integer division of the external width and external height of the unit frame 3 respectively. It is noted that although this is a "mathematical correct formulae" clearance is often needed to allow the measuring
30 units 2 to move relatively to each other without friction. Such clearance is often in the range 1% of the width of the measuring units' outer dimension and in the formulae above this means that 1% of the width is added to the external width and external height of the unit frame 3.

Typically and preferably, a rack according to the present invention is supported on a floor and may further comprising, optionally, a third position system. Such third position system being configured to position the rack frame at different horizontal positions on the floor. Such third position system may be provided to

5 embodiments with vertical position, horizontal position or a combination thereof of the measuring units 2.

Such third position system may also comprise rails provided in the floor and the rack comprising carrier arranged on the rails. While the carriers used in the

10 measuring units 2 needed to engage with the rails of the first and second position system to keep the units 2 suspended, this may not be needed for the carriers used in the third position system as gravity will have at least a tendency to maintain carriers on the rails. However, it may be preferred to have carriers engaging with the rails to prevent the rack from tilting. As for the first and second
15 position system, the third position system typically comprises an actuator, as disclosed above the first and second position system) for position the rack along the rails. Alternatively, or in combination, the third position system may comprising wheels abutting the surface of the floor, which wheels may be rotatable by means of an electrical motor.

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The carriers used herein may be in the form of slides. As disclosed in fig. 1 and 2 connections, such a data, power, fluid connections, from and to each of the measuring unit(s) is(are) led upwardly from the top of the unit frame and beyond the top the rack frame. The connections, such a data, power, fluid connections,
25 from and to each of the measuring unit(s) is(are) preferably made from flexible materials such as plastic and reinforced plastic, rubber, reinforced rubber or the like. In addition, some or all of the connections may preferably be provided with coupling allowing them to be detached from the measuring equipment and/or at the end distal from the measuring equipment.

30

Often the use of the measuring equipment requires out-sucking of gasses, such as hazardous gasses from the room inside which the measuring equipment is located. In addition, the atmosphere surrounding the measuring units may need control in order e.g. to maintain the temperature of the measuring units 2. Thus,

a rack according to the present invention may further comprising ventilation means for ventilating the measuring units 2.

Reference is made to fig. 6 showing an equipment farm according to the present invention. As disclosed in fig. 6, such an equipment farm may be installed in a room having a front wall 20 in which an access opening 21 to the room is provided, two side walls 22 extending from the front wall 20 and an end wall 23 opposite to the front wall 20. Inside the room a plurality of racks as disclosed above arranged. Please note that in fig. 6, a roof and a part of one of the side walls 22 are not shown in order to reveal the elements inside the room. Further, the room is shown with an access opening in the end wall 23 as well.

In the embodiment of fig. 6, the racks are arranged side by side in a row along one or both side walls, thereby providing a passage extending from the opening and along the front of the racks.

Fig. 7 shows another configuration of an equipment farm according to the present invention. In the embodiment, the racks comprising the third position system and rails are located in the floor (not shown) along the longitudinal extension of the room. As shown in fig. 7A, the racks are arranged back facing back in a row along one of the side walls (if the dimension allows, such a row may also be arranged on the opposite side wall). The two racks at the end of the row is arranged with the back facing towards one of front 20 or end wall 23. Further, a distance of at least the width of the side part of one rack is provided between at least two of the racks.

As noted with reference to fig. 6, please note that in fig. 7, a roof and a part of one of the side walls 22 are not shown in order to reveal the elements inside the room. Further, the room is shown with an access opening in the end wall 23 as well. In addition, a row of cabinets 24 is shown extending along one of the side walls 22.

It is noted that the two racks at the end of the row may not necessarily comprise the position system, as there may be no need for moving the rack horizontally.

Each of the racks may be moved independently from each other by third positioning systems in a horizontal direction parallel to the longitudinal direction of the room. This provides the possibility to re-arrange the distance between the rack, e.g. into a configuration as disclosed in fig. 7B. Thereby easy access to each individual measuring unit 2 may be provided by position the rack and/or position a particular measuring unit 2 relatively to the rack in which it is located to position a particular measuring unit in desired position relatively to e.g. an operator. As indicated in fig. 7, as the racks are arranged back facing back, two racks may be connected to each other so as to form a single rack and moved accordingly as a single rack. It is further noted, that the arrangement back facing back may be departed from and the rack may be arranged back facing front.

Reference is made to fig. 8 and 9 showing two further embodiments of a measuring unit according to the present invention; in the figure two measuring units are shown but at different altitude,

As seen from fig. 8, the measuring unit comprising a unit frame 3 comprising two vertical side parts, a horizontal top and bottom parts, in which unit frame 3 measuring equipment of the measuring unit 2 is arranged as disclosed above.

20

In the embodiments of fig. 8 and 9, the unit frame 3 of the measuring unit 2 is connected to a mechanically activated position system 11. The mechanically activated position system is configured to position each of the least one measuring unit 2 at different vertical positions. This is shown in fig. 8 (and 9) by the two measuring units being located at different vertical positions (altitude). It is noted that the measuring units 2 may be positioned according to choice.

In the embodiments of fig. 8 and 9, the mechanically activated position system comprising a longitudinal elongatable pillar 11, such as an elongateable actuator (also know as a lifting column), preferably in the form of an hydraulic cylinder.

The elongatable pillar 11 is connected at one end to the bottom part of the unit frame 3 and wherein the longitudinal direction of the pillar is parallel to the longitudinal direction of the vertical side parts. This means with reference to fig. 8

and 9 that the pillar 11 extending parallel to gravity and is elongatable to raise the measuring unit 2 from a ground position upwardly to an upper most position.

In a further embodiment, the mechanically activated positioning system may
5 further be configured for moving the unit frame 3 in a horizontal direction, preferably being limited to a forward and backward movement (where forward refers to the direction out of plane in fig. 8). Such a configuration may be provided by arranging the horizontal bottom part on horizontal rails (not shown) in a vertically locked mode so that the unit frame 3 can be moved horizontally
10 along the rails, while the vertical movement is not hindered.

Such horizontal movement may requires that the lower end of the mechanically activated positioning system is secured to the floor in order to avoid tilting of the measuring unit.

15

In a further embodiment, see fig. 9, the longitudinal elongatable pillar 11 comprising, at the end being distal to the one being connected to the bottom of the unit frame 3, a horizontal position system 12 configured to position the measuring unit 2 with pillar at different horizontal positions on a floor. In the
20 embodiment shown in fig. 9, the horizontal position system 12 comprising four wheels providing a possibility for the measuring unit with pillar to be rolled along the floor on which it is located. The wheelbase (the distance between centre of the front wheel and the centre of the rear wheel) and the track (the distance between the centre of two front wheel or the two rear wheel) are both preferably larger
25 than size of the bottom part 3.3 in order to increase the stability of the measuring unit during horizontal movement. It is noted that the rail with carriers disclosed herein may substitute the wheels. Although the embodiment of fig. 9 indicates that the horizontal movement is limited to a forward-backward movement, this may not be the case as suitable wheels may be applied if further movements are
30 desired. Further, the wheels may be driven by electrical motors allowing for a smooth moving of the measuring unit.

It is noted, that in the embodiment using elongatable pillar, a carrier is typically consider present as the part pillar moving and carrying the measuring unit.

35

As also shown in fig. 8 and 9, a measuring unit according to the present invention may comprise a void 17 for storing e.g. bottle or other containers for consumables or discharge used or produced during use of the measuring equipment. Typically, such a void 17 may be in the form of a drawer arranged in the unit frame and
5 which can be extracted partly or fully from the unit frame to allow access to the content stored in the void 17. The void 17 is preferably ventilated by sucking air (or in general gas) from the void and e.g. to the exterior (as disclosed below in connection with e.g. fig. 13). In some preferred embodiments, the void 17 at the upper end of the measuring unit stores consumables, whereas the void 17' at the
10 lower end of the measuring unit stores discharge fluid.

Further, a measuring unit according to the present invention may comprise a further drawer (not shown) containing a tool-kit for tools to be used e.g. during use of the measuring unit. This drawer is typically configured with a cover which
15 covers the tools and may be used as table during use of the measuring unit e.g. for temporarily storing a laptop.

In equipment according to the present invention, some or all of the racks (e.g. as disclosed in connection with fig. 6 and 7), may be interchanged with the
20 measuring units 2 as disclosed schematically in fig. 8 and 9.

Reference is made to fig. 10 which shows schematically a 3 dimensional view of a measuring unit 2 according to yet another embodiment of the invention. The measuring unit 2 comprising three measuring unit sections 13.1, 13.2 and 13.3. It
25 is noted that the two sections 13.1 and 13.3 are structural identical to each other – preferably by being configured to contain the same number and type of measuring equipment (15) - except from connections to e.g. power and the bottles contained in section 13.2 may be different to. Further, in fig. 10, the measuring equipment 15 shown in the section 13.1 left hand side are removed in
30 the section 13.1 right hand side. Still further, one of the sections 13.1 or 13.3 may be omitted and/or the sections may be arranged in a different order than what is disclosed in fig. 10 (e.g. in the order from left to right: 13.1;13.3;13.2).

The three sections 13.1 13.2 and 13.3 are preferably assembled (preferably by
35 mutually attaching the three section to each other) into a measuring unit 2 and a

positioning system 11 e.g. as disclosed in connection with fig. 8 is preferably arranged to positioning all three sections simultaneous at different vertical positions. However, each of the sections 13.1, 13.2 and 13.3 may be individual sections (e.g. by not being mutually attached to each other) and may be provided
5 with a positioning system 11 as disclosed in connection with fig. 8 whereby each of the sections 13.1, 13.2 and 13.3 may be arranged at different vertical positions individually. Alternatively or in combination thereto, the sections 13.1, 13.2 and 13.3 may be arranged in a rack frame 1 as disclosed e.g. in connection with fig. 1. Finally, the positioning system may comprise means such that one or more of the
10 sections, such as all of the sections 13.1, 13.2 and 13.3 may be displaced in horizontal direction normal to the front of a section (by front is preferably meant the side of a section facing towards the user during operation of the equipment). Such positioning system(s) is(are) omitted from the fig.s 10-12 for clarity reason only.

15

As indicated in fig. 10, the section 13.2 contains two voids 17 storing containers, such as bottles, in which liquids used by and/or produced by the measuring equipment are stored. The sections 13.1 and 13.3 are arranged neighbouring the section 13.2 and contain flexible lines (not shown) allowing the measuring
20 equipment to extract and/or deliver liquid to the bottles stored in the voids 17. Reference is made to fig. 11. As shown in fig. 11, some of the measuring equipment 15 in sections 13.1 and 13.3 are arranged in manner allowing them to be drawn out from the measuring unit. In fig. 11, the measuring equipment of the section 13.3 are omitted for clarity reason only. As shown in fig. 11, two
25 measuring equipment 15.1 and 15.2 are drawn out from the measuring unit and one of the measuring equipment 15.2 are further turned along a vertical axis. Thereby, easy access to both the measuring equipment 15.1 and 15.2 is provided in a manner allowing also access to the side of a measuring equipment which when arranged in the measuring unit in a non-drawn out manner are arranged
30 closely side-by-side (as shown in fig. 10, e.g.).

As disclosed herein, a measuring unit preferably refers to a stand-alone unit. Thus, each of the measuring unit sections 13.1, 13.2 and 13.3 may each be considered a measuring unit e.g. if configured to operate as a stand-alone unit
35 providing a measuring or analysis result without input from other measuring units.

Reference is made to fig. 12 and left hand side measuring unit section 13.1, which shows the configuration of fig. 11 with the measuring equipment 15.1 and 15.2 omitted. In fig. 11, the measuring equipment 15.1 and 15.2 are shown in an
5 extracted position. As shown in fig. 12, the measuring unit comprises a supporting plate 18 arranged on rails 10 for carrying the supporting plate 18 supporting the measuring equipment while at same time allow the supporting plate 18 to move horizontally and thereby also provide a horizontal movement of the measuring equipment. The measuring unit further comprising a rotatable receptacle 19
10 adapted to support a measuring equipment and allow rotation of the rotatable receptacle 19 along a vertical axis. As shown in fig. 11 and 12, the two neighbouring measuring unit sections 13.1 and 13.3 are structurally identical to each other while the middle measuring unit section 13.2 is more narrow and contains to voids 17 for storing bottles (see also fig. 10). As shown in fig.s 11 and
15 12 the rotatable receptacle 19 is extractable from the measuring unit so as to allow the receptacle 19 (and thereby the equipment contained in the receptacle) can be extracted from the measuring unit and rotated to a position e.g. in front of the measuring unit section 13.2. This may be provided by arranging the receptacle 19 on the support plate 18 or on a separate set of rails.

20

It is further noted, that the rack frame may be constituted fully or partly by the mechanically activated position system(s). For instance, the rails or position systems in general used for providing vertical and horizontal movement may be used to provide the structural stiffness of the rack and which rails or position
25 systems is/are arranged at the back of the measuring units, whereby one of or all of the two vertical side parts, the top part and the bottom part may be omitted.

As indicated herein, each of the measuring unit may advantageously be equipped with a ventilation system for ventilating the measuring units. Such
30 ventilation system may be in the form of one of more pumps which sucks out gasses produced by the measuring equipment and may advantageously be connected at the outlet to lines arranged to lead the gasses sucked out to a predefined position, such as to the atmosphere outside a building or to a treatment facility for removing hazardous substances from the gasses.

35

Fig. 13 illustrates schematically a cross sectional view of a measuring unit 2 according to the present invention. The measuring unit 2 being equipped with a ventilation system 26, comprising two channels 27 being provided with two valves 29 for controlling the fluid flow through the channel and thereby at least partly the ventilation of the measuring unit 2. The valves 29 may be adapted to constrain the flow through the channel between closed channel and unrestricted channel. A pump is provided to provide a force suction of fluid out from the measuring unit, which pump may be arranged in the heat exchanger unit 30 (the pump is not shown in the figure for clarity reasons only).

10

The channel 29 is connected to upper void 17 containing e.g. containers storing liquid (the connections from the containers are left out for clarity only) and is intended to ventilate the upper void 17. As shown in fig. 13, the channel 29 is also connected to the lower void 17 and is thereby also intended to ventilate the lower void 17. By controlling the valves 29, the amount of air sucked from respectively upper or lower void 17 may be regulated.

The section of the measuring unit 2 containing the measuring equipment 15 is connected at a lower end to the channel 27, as the substances intended to be sucked out is heavier than atmospheric air. If the substances is lighter the atmospheric air, the connection to the channel 27 may be provided at an upper end of the section. Similarly, the connections to the upper and lower voids 17 may be made in accordance with these considerations.

Both the channels 27 and 28 are at their upper ends connected to a heat exchanger unit 30 which regulates the heat exchange and mass flow so that a volume fraction x (being between 5 and 95%) of the air sucked out from the measuring unit 2 goes to the outside of the building in which the measuring unit is placed in and the remaining amount goes to the inside of the building in which the measuring unit is placed. The heat exchanger unit 30 regulates the temperature of the two airstreams out from the heat exchanger to have specified temperatures, e.g. the stream going to the inside having a temperature of e.g. 20°C and the stream going to the outside having a temperature of e.g. 70°C. If needed, the heat exchanger may comprise a heat pump. Further, is desired, the

high temperature stream may be used for heating purposes prior to be sent to the outside.

While it may be preferred to provide two channels 26 and 27, a measuring unit
5 according to the present invention may comprise a single channel extending along the back-side of the measuring unit. Further, in embodiment where the mechanically activated positioning system is configured for both a vertical positioning and a horizontal positioning, the channel may be arranged in a fixed horizontal position (while allowing it to move vertically along with the positioning
10 system for vertically movement) whereby the channels are disconnected from the unit frame when the unit frame is moved horizontally.

Reference is made to figure 14 illustrating schematically a measuring unit 2 according to a preferred embodiment of the present invention in which the
15 mechanically activated position system is configured to provide a vertical and horizontal movement of the measuring unit 2. Figure 14 shows three identical measuring units 2 being arranged in different positions: the measuring unit 2 in the left hand of fig. 14 is moved horizontally forward, the measuring unit 2 in the middle figure of fig. 14 is in its most backward position (which typically is position
20 in which the measuring unit is used to measuring) and the measuring unit 2 in the right hand side of fig. 14 is in its operation mode.

As illustrated in fig. 14, the mechanically activated position system comprising the part 11 (preferably in the form of an elongatable pillar) which moves the
25 measuring up and down when activated and the part 12 moving the measuring unit 2 horizontally when activated. The part 12 is preferably made by rails on which the unit frame is slidingly arranged or an horizontal arranged elongatable pillar.

30 The embodiment shown in fig. 14 further comprising a ventilation system 26. The ventilation system 26 comprise a vertical extending channel 26.1 (extending behind measuring unit 2). The ventilation system further comprising one or more horizontally extending channel 26.2 in fluid communication with vertical extending channel 26.1. The horizontally extending channel extends into e.g. the void 17
35 when the measuring unit 2 is in its most backward position. Gas is sucked by use

of a pump (not illustrated) sucking gas from e.g. the void 17 through the horizontally channel 26.2 towards and through the vertically channel 26.1

The void 17 in fig. 14 is embodied as a drawer which is shown in its extracted
5 position in the middle part of fig. 14.

Reference is made to figure 15 illustrating schematically a measuring unit according a preferred embodiment of the invention. Figure 15 illustrates a single
10 measuring unit 2 in three different positions: left hand side with the void 17 in the form of a drawer extracted; the middle of fig. 15 where the measuring unit 2 is moved forward, and the right hand side where measuring equipment 15.1 and 15.2 are extracted from the measuring unit as disclosed in relation to e.g. fig. 11 herein.

15 The measuring unit comprising a ventilation system 26 having a vertically extending channel 26.1 (extending along the back of the unit 2). The vertically extending channel 26.1 is connected to a horizontally extending channel 26.2 arranged in fluid communication with the void 17 (storing e.g. bottles with liquid). A pump (not illustrated) is arranged to suck gas out from the void measuring via
20 the vertically and horizontally arranged channels 26.1 and 26.2. As also indicated in the figure, a ventilation 26.3 channel is arranged separate from the channels 26.1 and 26.2 and is configured for ventilating the elements of the measuring unit 2 not producing gasses but requires e.g. ventilation to conduct heat away from the measuring unit 2. By such a separation, warm air can be sucked out from the
25 measuring unit 2 and e.g. distributed to the room in which the measuring unit 2 is arranged.

Although the present invention has been described in connection with the specified embodiments, it should not be construed as being in any way limited to
30 the presented examples. The scope of the present invention is set out by the accompanying claim set. In the context of the claims, the terms "comprising" or "comprises" do not exclude other possible elements or steps. Also, the mentioning of references such as "a" or "an" etc. should not be construed as excluding a plurality. The use of reference signs in the claims with respect to elements
35 indicated in the figures shall also not be construed as limiting the scope of the

invention. Furthermore, individual features mentioned in different claims, may possibly be advantageously combined, and the mentioning of these features in different claims does not exclude that a combination of features is not possible and advantageous.

List of references used:

- | | |
|-------|---|
| 1 | rack frame |
| 2 | measuring unit |
| 3 | unit frame |
| 5 4 | sub-unit |
| 5 | sub-unit |
| 6 | sub-unit |
| 7 | sub-unit |
| 8 | sub-unit |
| 10 9 | line |
| 10 | rails |
| 11 | Positioning system / elongatable pillar |
| 12 | horizontal position system |
| 13 | measuring unit section |
| 15 14 | beam construction |
| 15 | measuring equipment |
| 16 | carriers |
| 17 | void |
| 18 | support structure |
| 20 19 | rotatable receptacle |
| 20 | front wall |
| 21 | opening |
| 22 | side wall |
| 23 | end wall |
| 25 24 | cabinet |
| 25 | support element |
| 26 | ventilation system |
| 27 | channel |
| 28 | channel |
| 30 29 | valve |
| 30 | heat exchanger unit |

CLAIMS

1. A rack holding at least one measuring unit,
- each measuring unit (2) comprising a unit frame (3) comprising two vertical side parts (3.1), preferably a horizontal top part (3.2) and preferably a horizontal bottom part (3.3), in which unit frame (3) measuring equipment of the measuring unit (2) is arranged,
 - the rack comprising a rack frame (1) having two vertical side parts (1.1), a horizontal top part (1.2) and a horizontal bottom part (1.3) defining an enclosure in which the at least one measuring unit is arranged with its vertical side parts parallel or substantially parallel with the vertical side parts of the rack frame (1), wherein the vertical height of the enclosure of the rack frame (1) is larger than the vertical outer height of the unit frame (3),
- the rack further comprising
- a mechanically activated position system to which the unit frame (3) of each of the at least one measuring unit (2) is connected, the mechanically activated position system is configured to position each of the at least one measuring unit (2) at different vertical positions in the rack frame (1).
2. A rack according to claim 1, wherein the mechanically activated position system to which the unit frame (3) of each of the at least one measuring unit (2) is connected comprising a first rail system extending vertically; the first rail system comprising rails on which carriers are arranged, said carriers are connected to the unit frame(s) (3), the rail system preferably further comprising a linear actuator connected to the carriers moving the carriers along the rails upwardly and downwardly.
3. A rack according to claim 1 or 2, wherein the number of measuring units is at least two, and wherein the mechanically activated position system being configured to position each of the at least one measuring unit (2) individually at different vertical positions in the rack frame.
4. A rack according to claim 1 or 3, wherein the number of measuring units is at least two, and wherein the mechanically activated position system being

configured to position all measuring units (2) commonly at same vertical position in the rack frame.

5. A rack according to any of the preceding claims, wherein one or more of the
5 measuring unit each comprising sub-unit, wherein one or more of the sub-units are extractable from the unit frame.

6. A rack according to any of the preceding claims, wherein all the measuring units in a rack are identical to each other.

10

7. A rack according to any of the preceding claims, wherein the mechanically activated position system, to which the unit frame (3) of each of the at least one measuring unit (2) is connected, further is configured to position each of the least one measuring unit (2) at different horizontal positions in the rack frame (1).

15

8. A rack according to claim 7, wherein the mechanically activated position system comprising a second rail system extending horizontally; the second rail system comprising rails on which carriers are arranged, said carrier are connected to the unit frame(s) (3), the second rail system preferably further comprising a linear
20 actuator connected to the carriers moving the carriers along the rails sideward.

9. A rack according to any of the preceding claims, wherein the mechanically activated position system(s) is(are) computer controlled to maintain accelerations and decelerations of the measuring units numerically below 5 m/s^2 such as below
25 4 m/s^2 , preferably below 3 m/s^2 , and even below 2 m/s^2 , preferably below 1 m/s^2 .

10. A rack according to claims 7-9, wherein the number of measuring units is uneven and greater than three and wherein
- the internal width and the internal height of the enclosure of the rack frame
30 each are selected as an integer division of the external width and external height of the unit frame respectively.

11. A rack according to any of the preceding claims, wherein the rack is supported on a floor and further comprising a third position system, the third position

system being configured to position the rack frame at different horizontal positions on the floor.

12. A rack according to claim 11, wherein the third position system comprising
5 rails in the floor and the rack comprising carrier arranged on the rails, and wherein the third position system further comprising an actuator for position the rack along the rails.

13. A rack according to any of the preceding claims, wherein connections, such a
10 data, power, fluid connections, from and to each of the measuring unit(s) is(are) led upwardly from the top of the unit frame and beyond the top the rack frame.

14. A rack according to any of the preceding claims, wherein the connections,
such a data, power, fluid connections, from and to each of the measuring unit(s)
15 is(are) made from flexible materials such as plastic and reinforced plastic, rubber, reinforced rubber or the like.

15. A rack according to any of the preceding claims, further comprising ventilation
system (26) for ventilating the measuring units (2).

20

16. A measuring unit comprising
- a unit frame (3) comprising two vertical side parts (3.2), a horizontal top
part (3.1) and a horizontal bottom part (3.3), in which unit frame (3)
measuring equipment of the measuring unit (2) is arranged,
25 - a mechanically activated position system to which the unit frame (3) of the
measuring unit (2) is connected, the mechanically activated position
system is configured to position at least one or said measuring unit (2) at
different vertical positions.

30 17. A measuring unit according to claim 16, wherein the mechanically activated
position system comprising a longitudinal elongatable pillar, such as an
elongateable actuator, such as hydraulic cylinders, connected at one end to the
bottom part of the unit frame (3) and wherein the longitudinal direction of the
pillar is parallel to the longitudinal direction of the vertical side parts.

35

18. A measuring unit according to claim 17, wherein the longitudinal elongatable pillar comprising, at the end being distal to the one being connected to the bottom of the unit frame (3), a horizontal position system configured to position the measuring unit (2) with pillar at different horizontal positions on a floor.

5

19. A measuring unit according to any of the claims 16-18, wherein the mechanically activated position system or when dependant on claims 18 the horizontal position system comprising a plurality of wheels, such as four, in contact with the floor, said wheels being preferably configured to allow horizontal
10 movement a forward-backward movement and/or a sideways movement.

20. A measuring unit according to claim 18 or 19, wherein horizontal position system is electrically driven.

15 21. A measuring unit according to claims 19 or 20 wherein the wheelbase and the track defined by the wheels are both larger than a length and a width of the horizontal bottom part (3.3).

22. a measuring unit according to any of the preceding claims, 16-21, wherein the
20 mechanically activated positioning system is further configured for moving the unit frame (3) in a horizontal direction, preferably being limited to a forward and backward movement.

23. A measuring unit according to any of the preceding claims 16-22, comprising
25 a void (17) for storing e.g. bottle or other containers for consumables or discharge used or produced during use of the measuring equipment, said void (17) being preferably in the form of a drawer arranged in the unit frame, said drawer is extractedly arranged either partly or fully from the unit frame to allow access to the content stored in the void (17).

30

24. A measuring unit according to any of the preceding claims 16-23, comprising drawer containing or configured to contain a tool-kit for tools to be used e.g. during use of the measuring unit, the drawer is typically configured with a cover which covers the tools and may be used as table.

35

25. A measuring unit according to any of the preceding claims, 16-24, wherein the measuring unit (2) comprising at least three measuring unit sections (13.1, 13.2, 13.3), wherein preferably two of said sections are structural identical to each other by being configured to contain the same number and type of measuring
5 equipment (15) and preferably at least one of the measuring unit sections comprising a void (17) for storing e.g. container(s).

26. A measuring unit according to claim 25, wherein the at least three measuring unit sections (13.1, 13.2, 13.3) are assembled into a measuring unit with a
10 positioning system (11) arranged to positioning all three sections simultaneous at different vertical positions.

27. A measuring unit according to claim 25, wherein the at least three measuring unit sections (13.1, 13.2, 13.3) are individual sections each comprising a
15 positioning system (11) to arrange each of the sections (13.1, 13.2, 13.3) at different vertical positions individually.

28. A measuring unit according to any of the preceding claims 25-27, wherein one of the measuring unit sections (13.2) contains one or more voids (17) for storing
20 containers, such as bottles, in which liquids used by and/or produced by the measuring equipment are stored, and wherein two measuring unit sections (13.1, 13.3) comprising measuring equipment are adjacently, such as neighbouring, arranged to the measuring unit section comprising one or more voids (17), and wherein the measuring unit comprises flexible lines for the measuring
25 equipment(s) to extract and/or deliver liquid to the bottles stored in the void(s) (17).

29. A measuring unit according to any of the preceding claims 16-228 wherein the measuring unit or when depending on claims 25-28 wherein one or more of the
30 measuring unit sections comprising a supporting plate (18) arranged on rails (10) for carrying the supporting plate (18) for supporting a measuring equipment while at same time allow the supporting plate (18) to move horizontally and thereby also provide a horizontal movement of the measuring equipment.

30. A measuring unit according to any of the preceding claims 16-24 wherein the measuring unit or when depending on claims 25-28 wherein one or more of the measuring unit sections comprising a rotatable receptacle (19) adapted to support a measuring equipment and allow rotation of the rotatable receptacle (19) along a
5 vertical axis.

31. A measuring unit or measuring unit section according to any of the preceding claims 16-30 or a rack according to any of the preceding claims 1-15 further comprising a ventilation system (26) for ventilating the measuring unit(s),
10 measuring unit section(s) and/or rack.

32. A measuring unit or a rack according to claim 31, wherein the ventilation system (26) comprising one of more pumps arranged to suck out gasses produced e.g. by the measuring equipment and which pumps preferably is connected at the
15 outlet to lines arranged to lead the gasses sucked out to a predefined position, such as to the atmosphere outside a building or to a treatment facility for removing hazardous substances from the gasses.

33. A measuring unit or a rack according to claim 31 or 32 wherein the
20 ventilation system (26), comprising one or more channels (27) arranged to lead fluid out from the interior of the measuring unit, the channel(s) (27) being provided with one or more valves (29) for controlling the fluid flow through the channel(s) and thereby at least partly controlling the ventilation of the measuring unit (2), wherein said valve(s) (29) preferably are adapted to constrain the flow
25 between closed channel and unrestricted channel.

34. A measuring unit or a rack according to claim 33, further comprising a pump provided to provide a suction of fluid out from the measuring unit.

30 35. A measuring unit or rack according to claims 31- 33, wherein the ventilation system further comprising a heat exchanger unit (30).

36. A measuring unit or rack according to claim 33, wherein one channel (28) of the ventilation system is connected to void(s) (17) of the measuring unit

containing e.g. containers storing liquid and comprising a valve for each void (17) connected to the channel for controlling the amount of air sucked from each void.

37. A measuring unit or rack according to claim 33 or 36, wherein one channel
5 (27) of the ventilation system is connected, preferably at a lower end or upper end, to a section of the measuring unit (2) containing the measuring equipment (15).

38. A measuring unit or rack according to claim 36 in combination with claim 37,
10 wherein the channels are at their upper ends connected to a heat exchanger unit (30) being configured to regulate the heat exchange and mass flow so that a volume fraction (preferably being between 5 and 95%) of the air sucked out from the measuring unit (2) goes to the outside of the building in which the measuring unit is placed in and the remaining amount goes to the inside of the building in
15 which the measuring unit is placed.

39. A measuring unit or rack according to claim 38, wherein the heat exchanger unit (30) regulates, optionally assisted by use of a heat source such as a heat pump, the temperature of the two airstreams out from the heat exchanger to
20 have specified temperatures, such as the stream going to the inside having a temperature of 20°C and the stream going to the outside having a temperature of 70°C.

40. An equipment farm installed or installable in
25 - a room having a front wall in which an access opening to the room is provided, two side walls extending from the front wall and an end wall opposite to the front wall, and the equipment farm comprising
- a plurality of racks according to any of the preceding claims 1-15 and/or a plurality of measuring units according to claims 16-39 are arranged inside
30 said room.

41. An equipment farm according to claim 40, wherein the racks are arranged side by side in a row along one or both side walls.

42. An equipment farm according to claim 41 and when dependant on claim 11 or 12, wherein the racks are arranged back facing back or back facing front in a row along one or both side walls with back of the racks at the end of the row facing towards one of front or end wall, and wherein a distance of at least the width of
5 the side part of one rack is provided between at least two of the racks.

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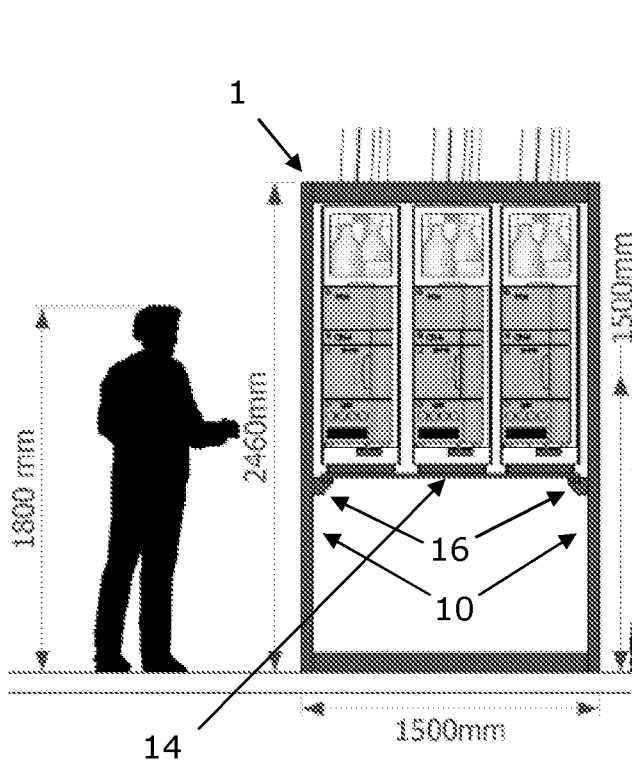


Fig. 1A

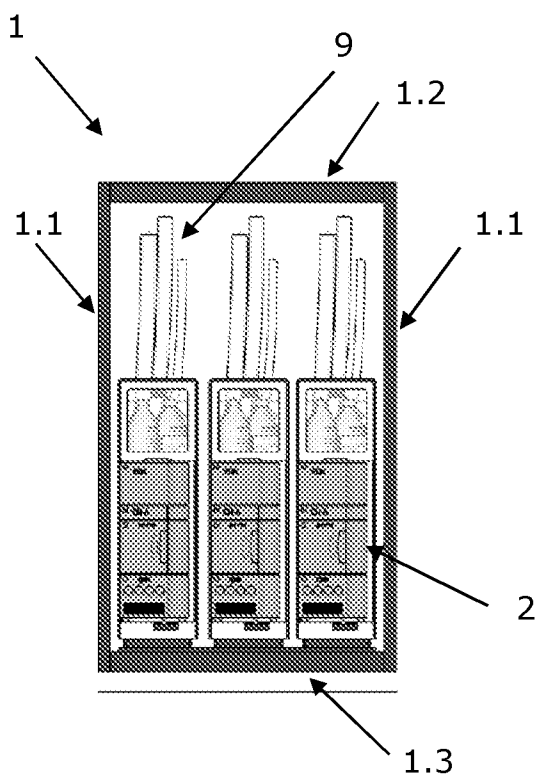


Fig. 1B

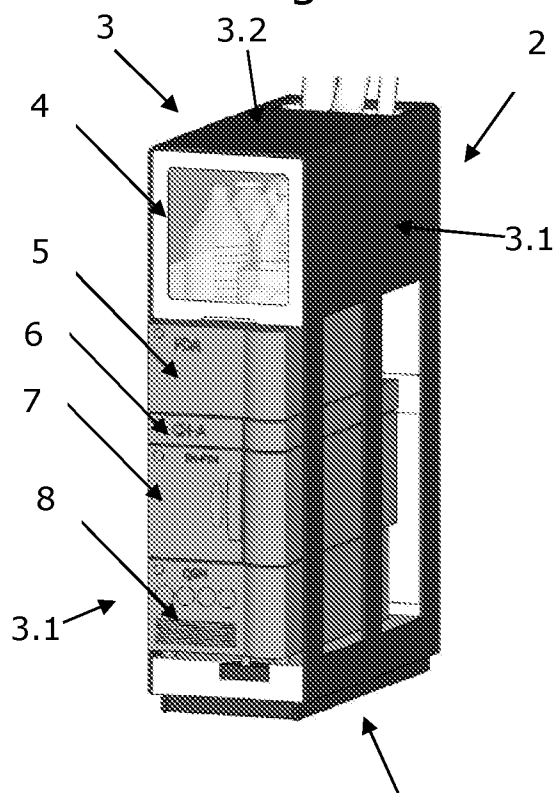


Fig. 2A

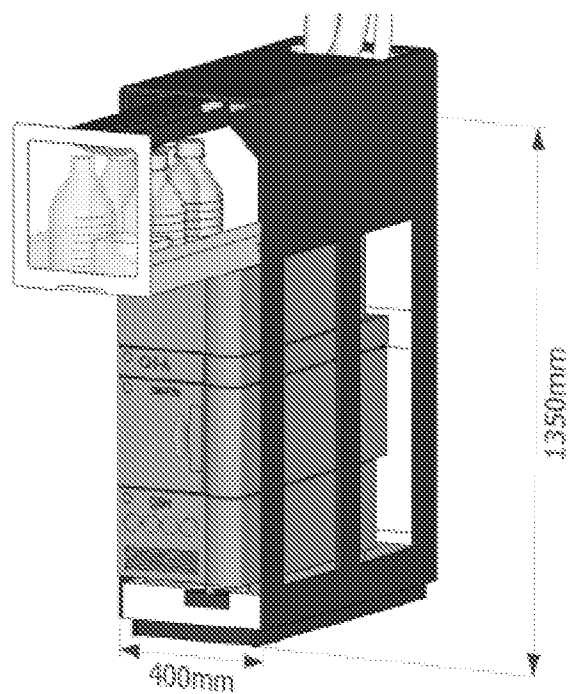


Fig. 2B

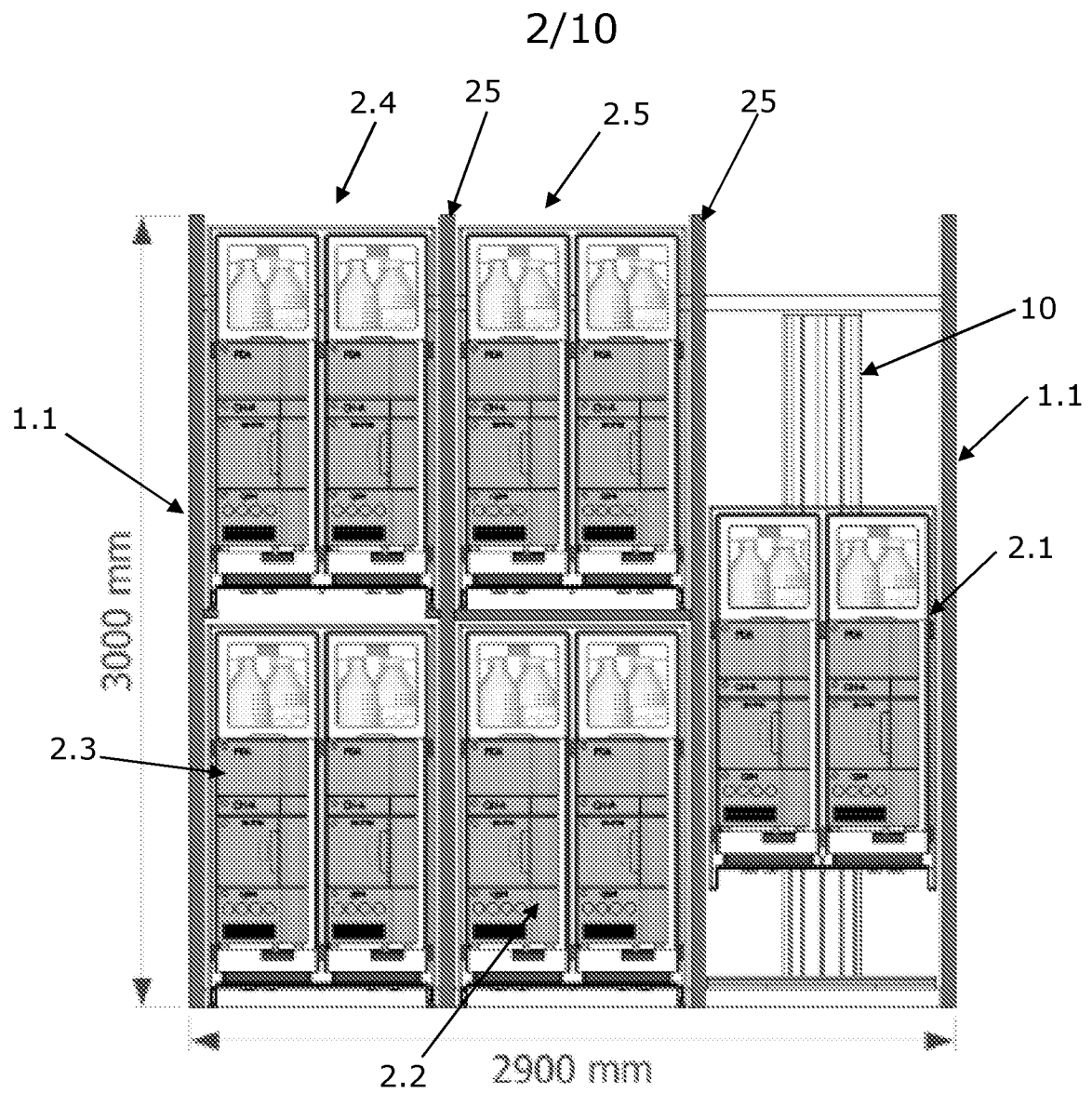


Fig. 3

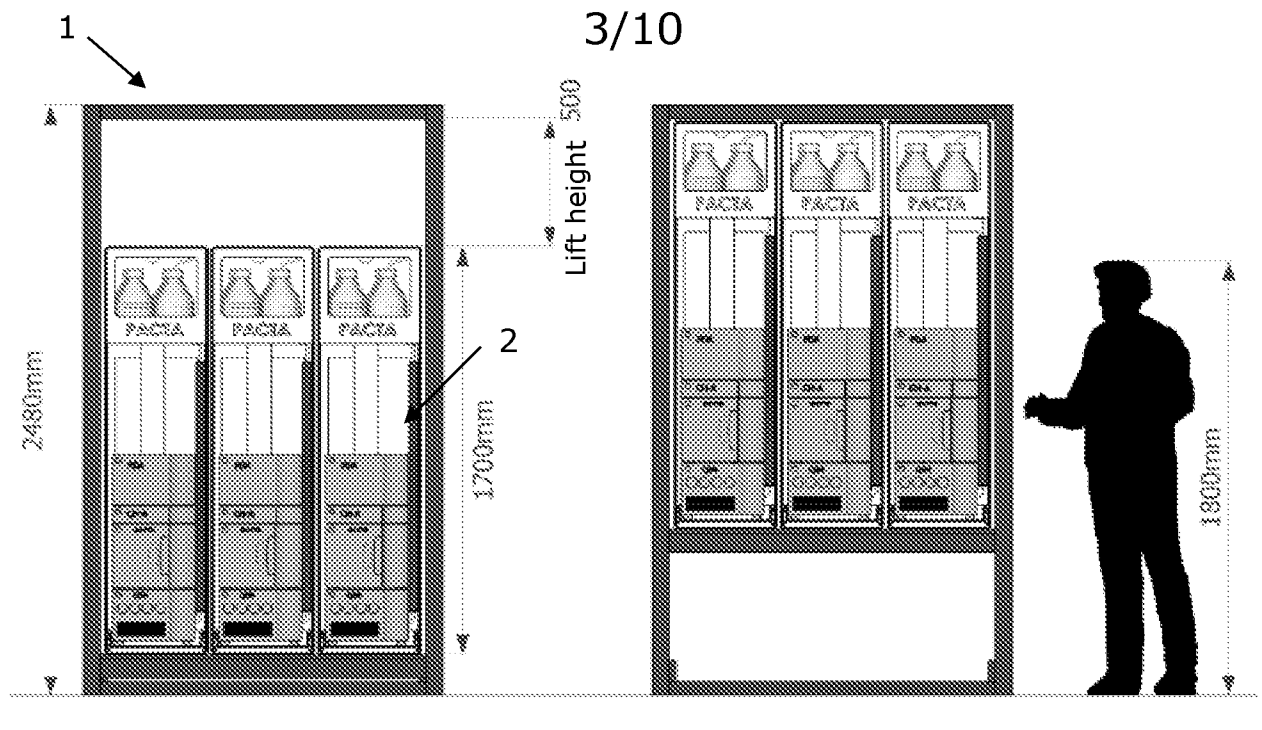


Fig. 4

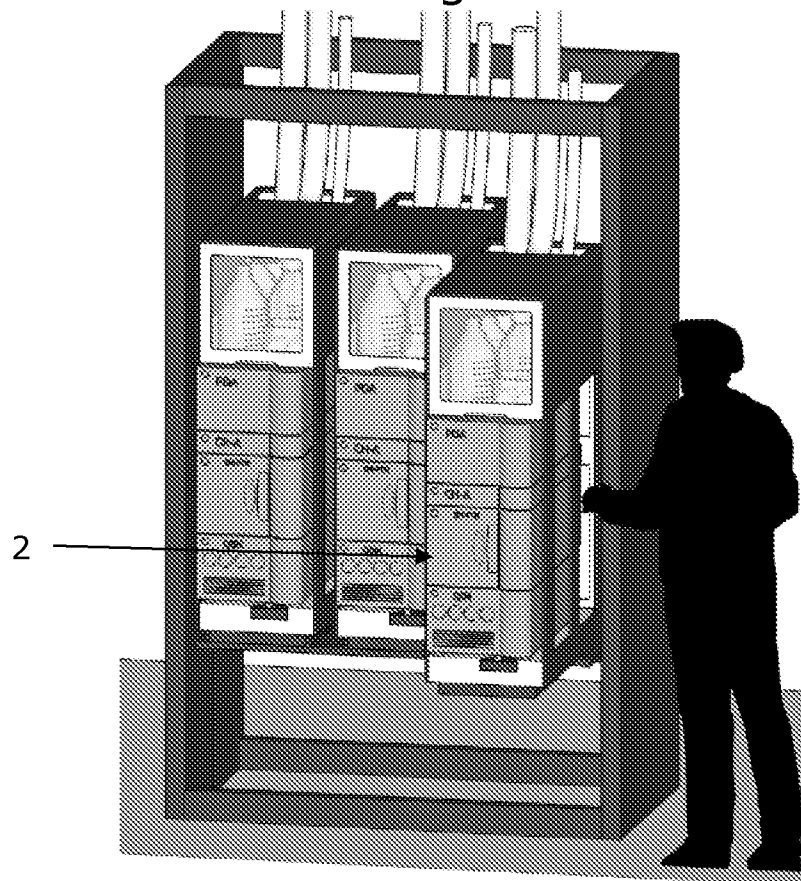


Fig. 5

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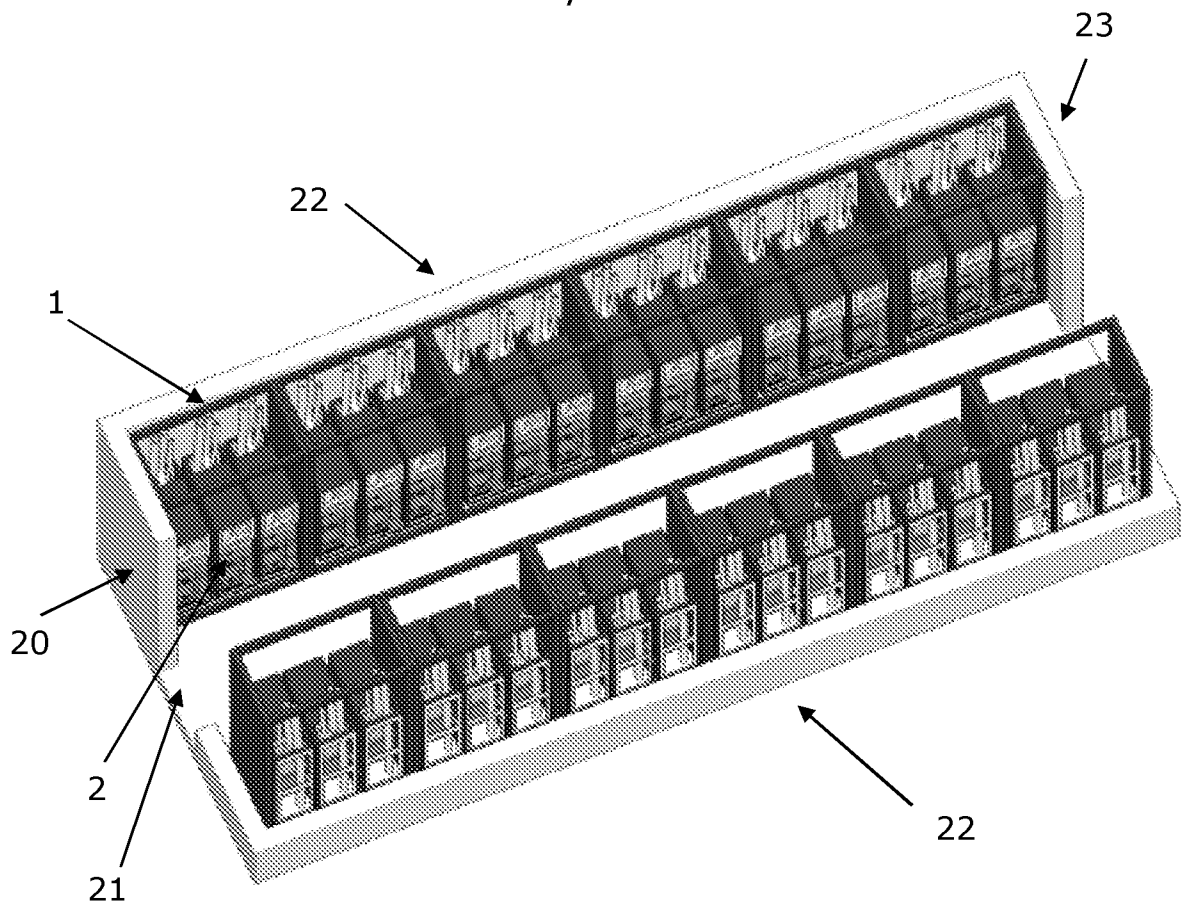
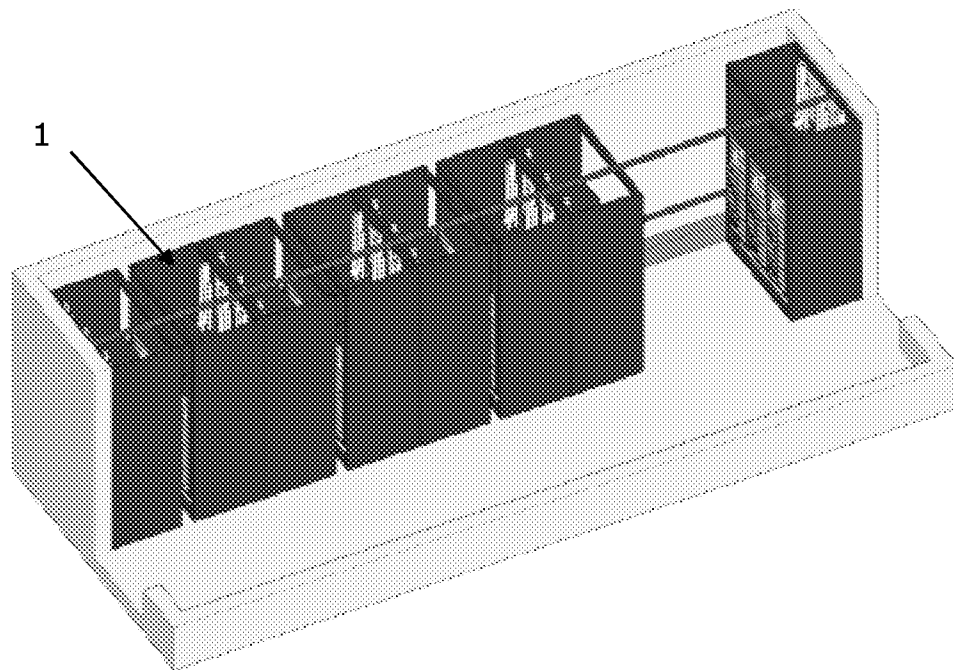
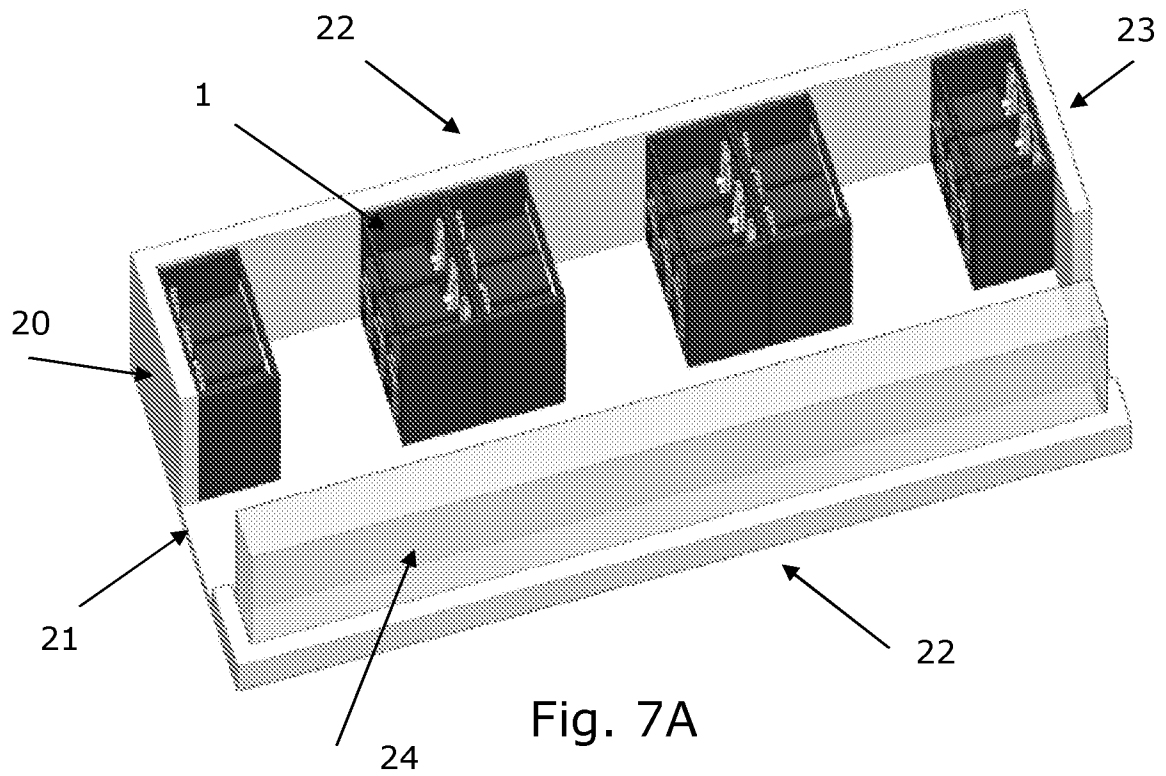


Fig. 6

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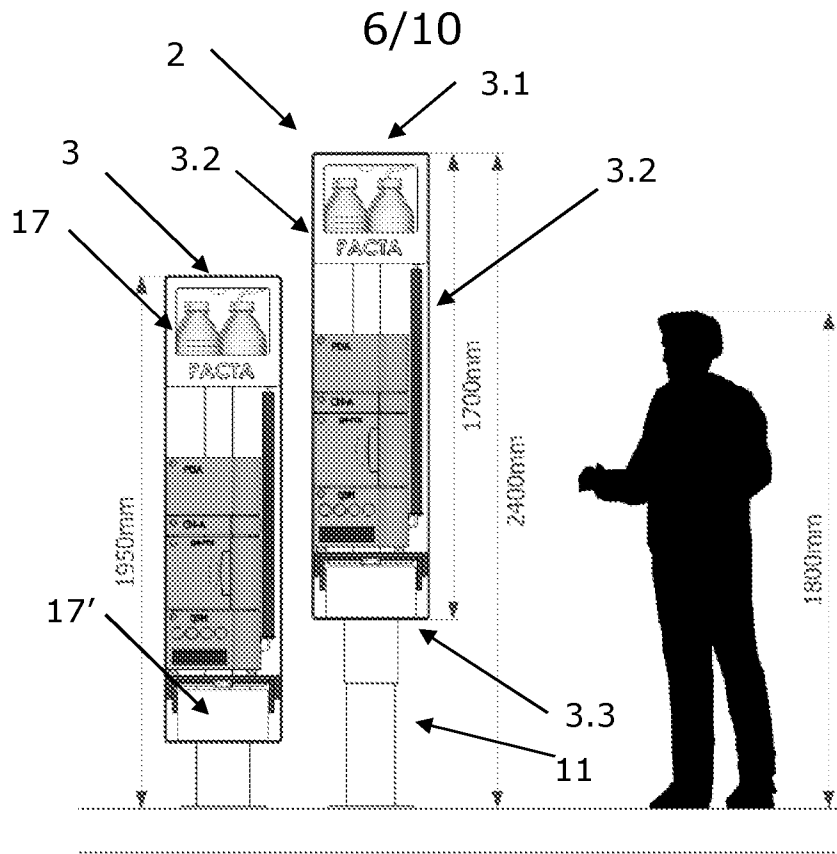


Fig. 8

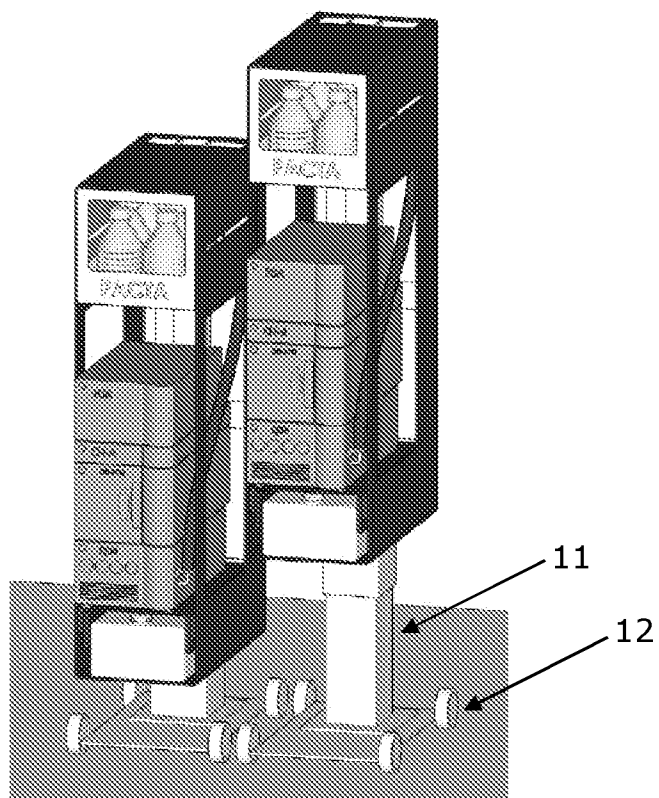


Fig. 9

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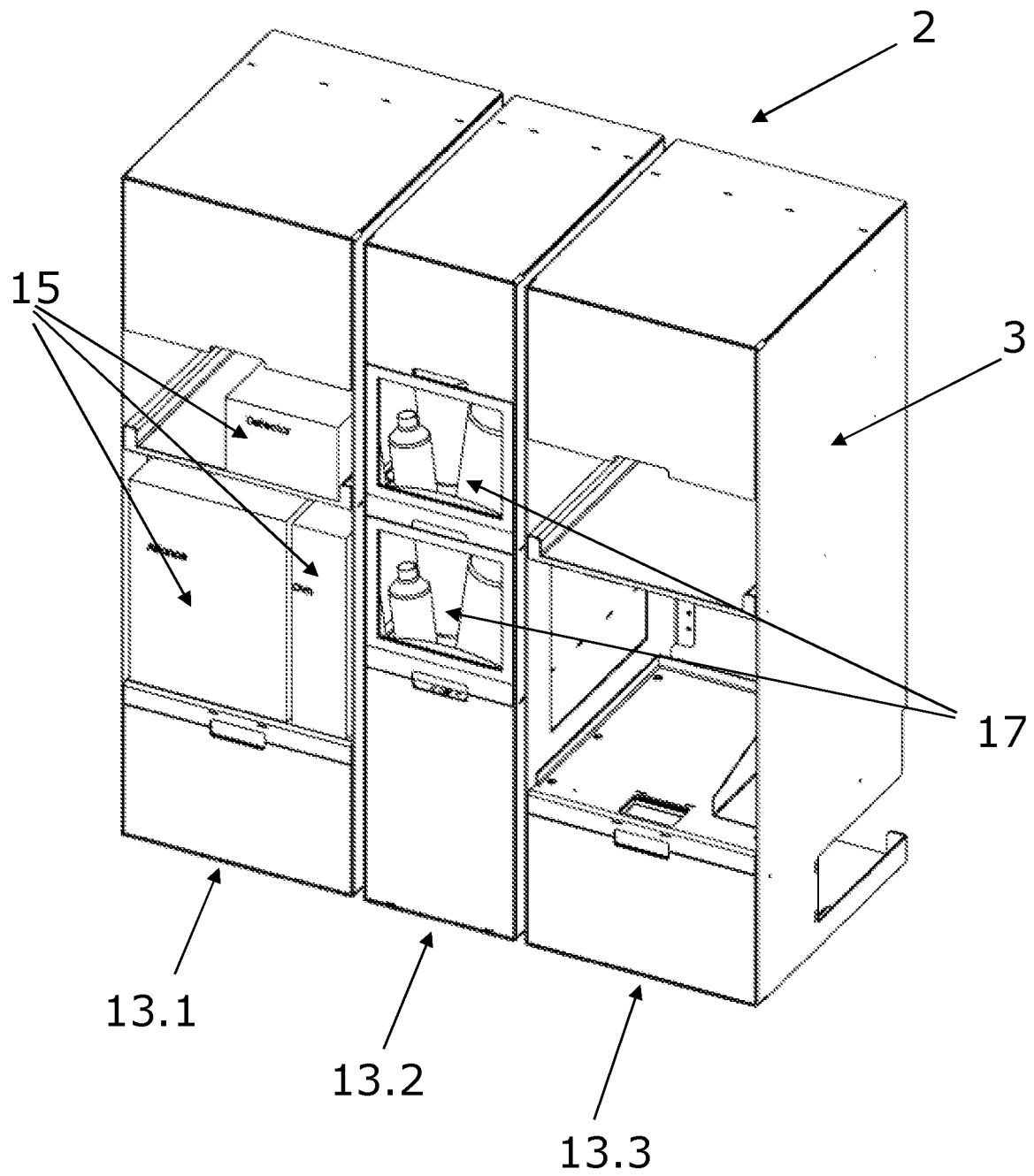


Fig. 10

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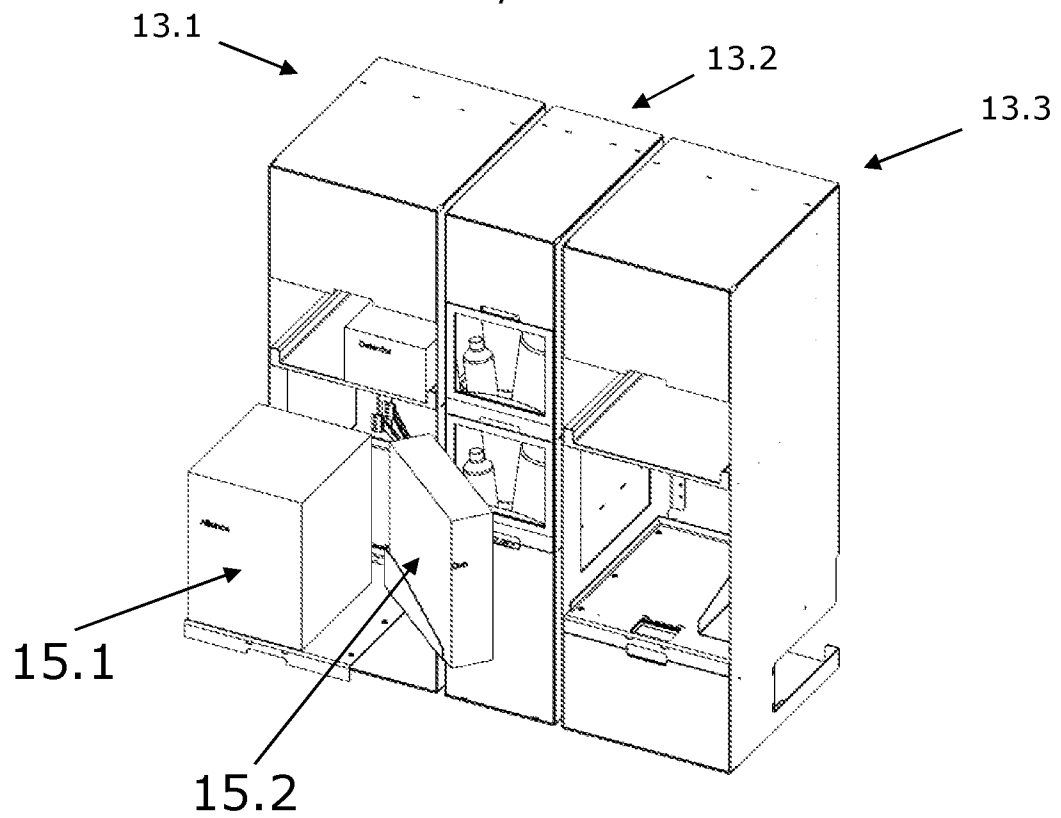


Fig. 11

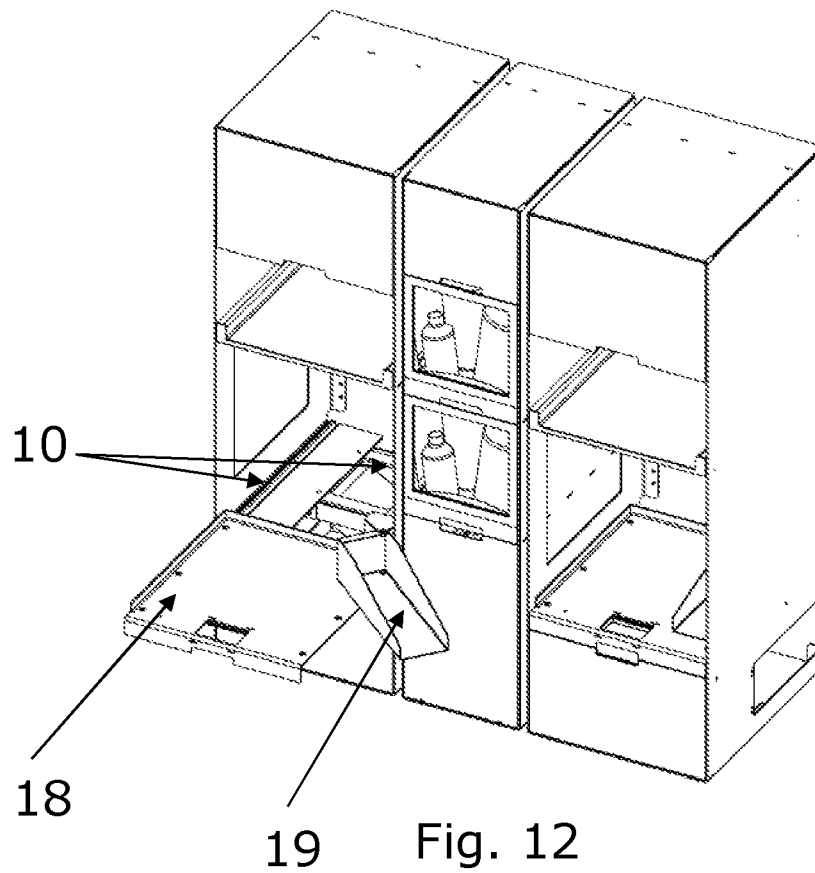


Fig. 12

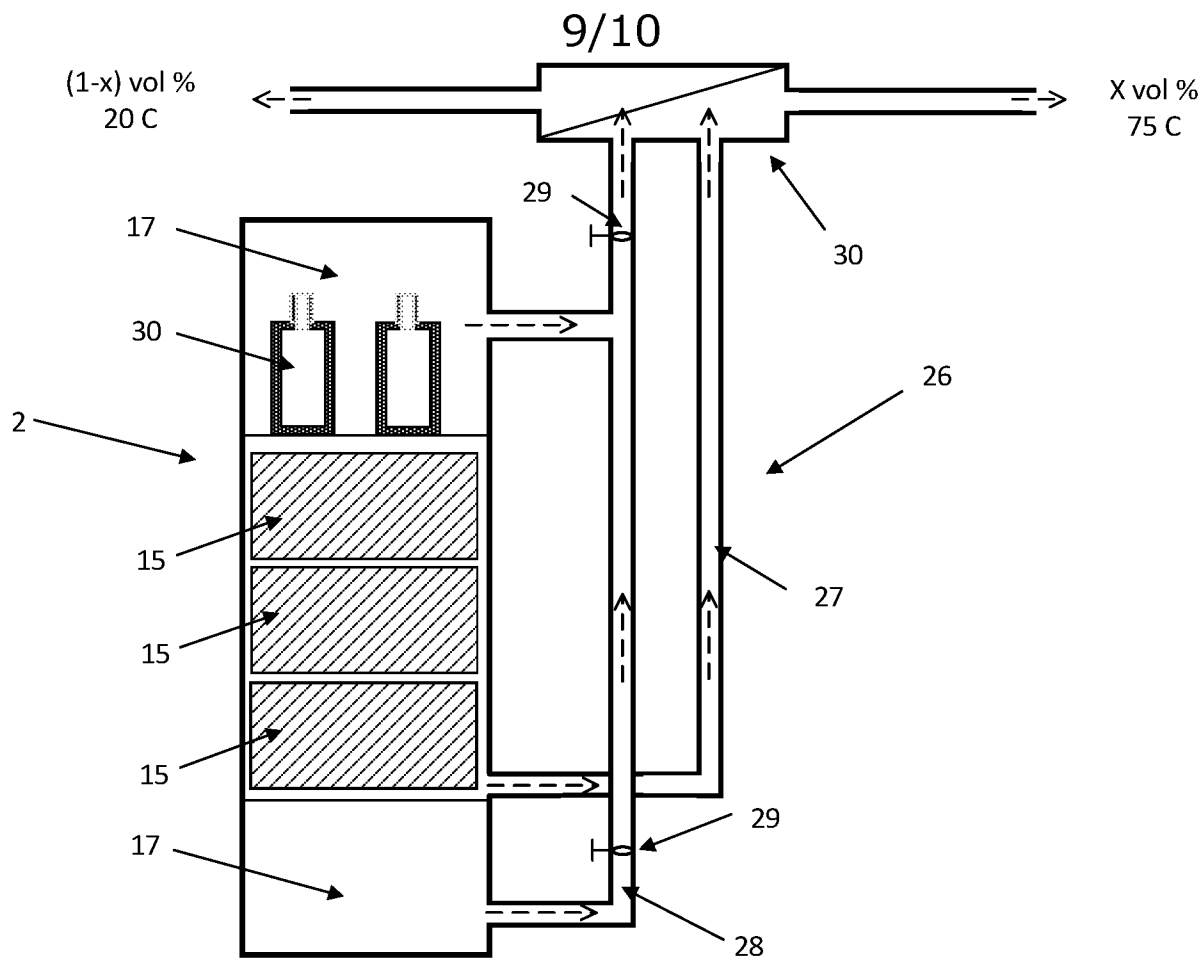


Figure 13

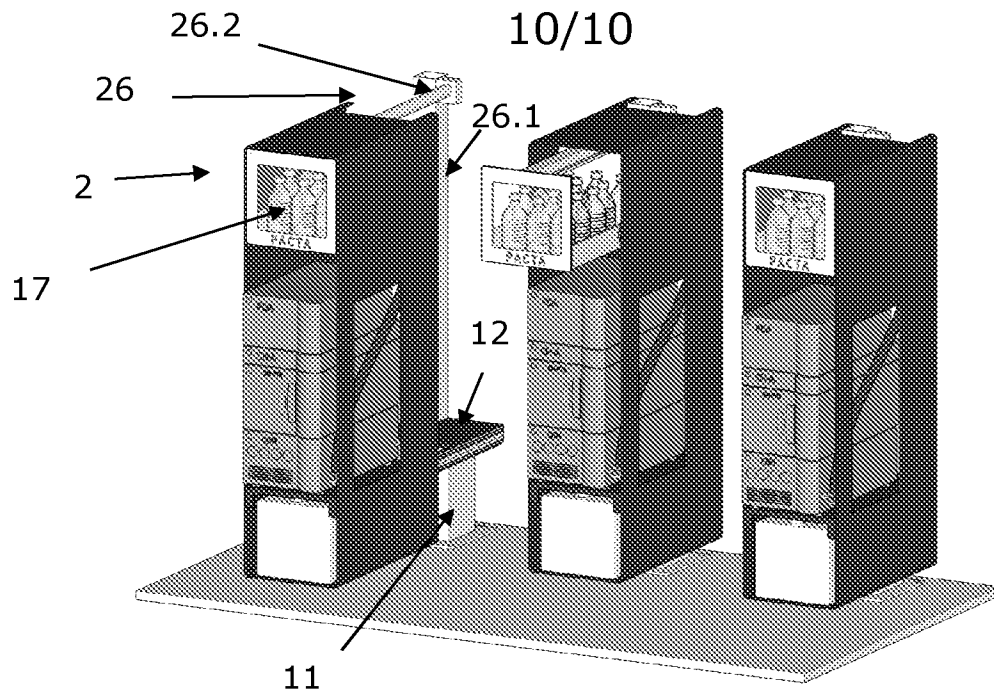


Fig. 14

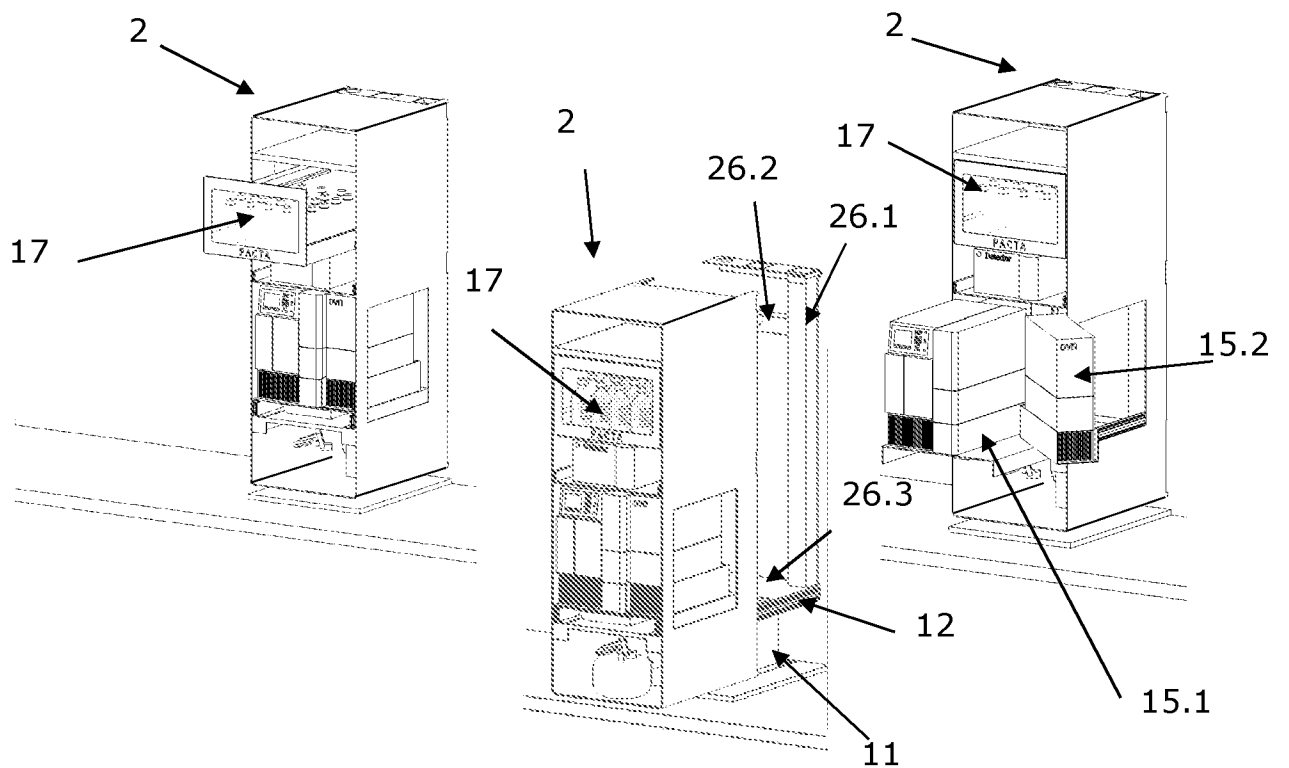


Fig. 15

INTERNATIONAL SEARCH REPORT

International application No
PCT/DK2015/050333

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47B51/00 B65G1/127 G01N35/00
ADD.

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)
A47B B65G G01N A01J

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)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 20 2012 011138 U1 (KAPPLER MED & ORG GMBH [DE]) 16 January 2013 (2013-01-16) paragraph [0001] - paragraph [0002] paragraph [0033] - paragraph [0040]; figures 1,2	13-42
X	----- US 2011/101837 A1 (SOLOMON STANLEY B [US]) 5 May 2011 (2011-05-05) page 1; figures 1,3-50	1-42
X	----- EP 1 970 327 A1 (JGP INGENIERIE [FR]) 17 September 2008 (2008-09-17) column 5 - column 6; figures 1-12 -----	1-42



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

28 January 2016

Date of mailing of the international search report

05/02/2016

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Authorized officer

Moeremans, Benoit

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/DK2015/050333

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 202012011138 U1	16-01-2013	NONE	
US 2011101837 A1	05-05-2011	NONE	
EP 1970327 A1	17-09-2008	EP 1970327 A1	17-09-2008
		FR 2913574 A1	19-09-2008