



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
11.04.2018 Bulletin 2018/15

(21) Application number: **16732008.4**

(22) Date of filing: **27.05.2016**

(51) Int Cl.:
B65B 5/10 (2006.01) **B65B 35/40** (2006.01)
B65B 35/38 (2006.01) **B65B 25/02** (2006.01)
B65B 35/54 (2006.01) **B27J 5/00** (2006.01)
B65B 35/52 (2006.01)

(86) International application number:
PCT/PT2016/050011

(87) International publication number:
WO 2016/195521 (08.12.2016 Gazette 2016/49)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **29.05.2015 PT 2015108517**

(71) Applicant: **Amorim Cork Research, Lda.**
4535-186 Mozelos VFR Santa Narua da Feira (PT)

(72) Inventors:
• **ALMEIDA E SOUSA, António Gil Da Costa**
4450-237 Matosinhos (PT)
• **LEITÃO, Luís Filipe Campos**
4760-611 Lousado (PT)
• **DA SILVA, Luis Filipe Peixoto Machado**
4535-193 Mozelos Vfr (PT)
• **DUARTE, Pedro Nuno Esteves**
4535-186 Mozelos Vfr (PT)
• **RIBEIRO, Reinaldo Lemos**
4740-255 Esposende (PT)

(74) Representative: **Alves Moreira, Pedro**
Rua do Patrocinio, 94
1399-019 Lisbon (PT)

(54) **ASSEMBLY AND PROCESS FOR ORGANISING STACKS OF CORK STOPPERS AND MACHINE COMPRISING SAID ASSEMBLY**

(57) The present invention relates to an assembly (1) for organising stacks of cork stoppers and a process for organising stacks of cork stoppers carried out by said assembly (1). The invention further relates to a machine comprising said assembly (1) for organising stacks of

cork stoppers. The stacks of cork stoppers are disposed in an organised way to facilitate and optimize their packaging, reducing the packaging volume and facilitating their transport. The present invention applies to field of cork industry and cork stopper production.

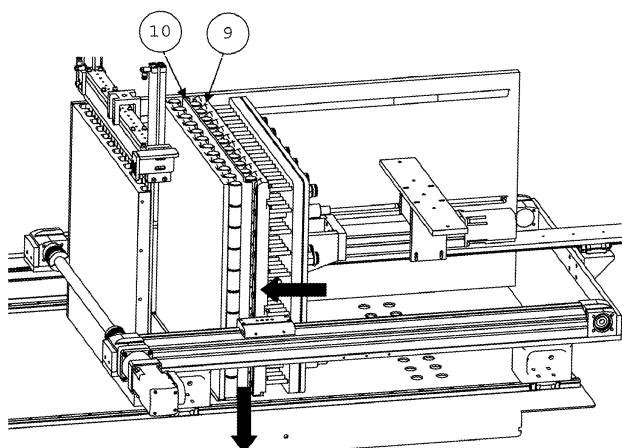


Fig. 4

Description

FIELD OF THE INVENTION

[0001] The present invention relates to an assembly and process for organising stacks of cork stoppers and a machine comprising said assembly for organising stacks of cork stoppers. The stacks of cork stoppers are organised in order facilitate and optimize their packaging, reducing the packaging volume and facilitating their transport. The present invention has application in the field of cork industry and cork stopper production.

BACKGROUND OF THE INVENTION

[0002] When the process of production of cork stoppers is finished, the cork stoppers are counted and packed in suitable conditions taking in consideration their transport to the bottler, so as to ensure that the cork stoppers reach the customer in predicted quantities and in adequate preservation conditions.

[0003] The manual processes of counting and packaging have been substituted by semi-automated or fully automated devices that avoid manual intervention during counting and packaging operations.

[0004] The devices and processes generally used in the art allow the packaging of cork stopper batches in polyethylene bags, usually inserting sulphurous anhydride, a microbiological development inhibitor gas of general use in the wine industry and said bags are thereafter sealed to guarantee the preservation of the cork stoppers. Optionally, the sealed bags having said cork stoppers are placed in cardboard boxes or the like.

[0005] On average, each package of cork stoppers comprises about 1000 to 1500 standard units, but this value depends on the cork stopper dimensions themselves and on the total amount ordered, as well as on the means used to transport the packages having such cork stoppers.

[0006] There are several types of counting and packaging devices for cork stoppers in the art. For example, the "Automatic Equipment for Packaging Cork Stoppers EMB-100" sold by Azevedos Indústria which is intended for automatic packaging of cork stoppers in bags is well known.

[0007] The packaging of cork stoppers in bags is made in bulk, i.e., the cork stoppers are kept in a disorganised manner in said bags, which raises problems in the amount of cork stoppers per bag due to the volume that these stoppers occupy. Consequently, the necessary space for warehouse storage of cork stoppers and also their transport will give rise to costs that increase the production costs.

[0008] In fact, one problem that is currently faced by cork stopper producers is the volume occupied by said cork stoppers inside the packaging, i.e., the lack of packaging means that allows a orderly grouping of the cork stoppers in their packaging in view of the subsequent

storage and dispatch to the customer.

[0009] Therefore, considering the current needs of the industry, the devices and processes for packaging of cork stoppers in bulk used in the art proved to be ineffective.

[0010] Accordingly, there is a need in the art for a device that allows to increase, in a cost effective way, the productivity of the packaging process of cork stoppers, providing a reduction of volume occupied per batch of packaged cork stoppers.

[0011] It is an object of the present invention to provide an assembly for organising stacks of cork stoppers, that allows storing the cork stoppers in an organised way to reduce the packaging volume per batch, overcoming the disadvantages shown by the prior art packaging devices and processes.

SUMMARY OF THE INVENTION

[0012] The present invention relates to an assembly for organising stacks of cork stoppers, characterized by comprising:

- a platform for organising stacks of cork stoppers comprising a base that defines a plane (P), the platform comprising a receiving zone for receiving stacks of cork stoppers, a transporting zone for transporting stacks of cork stoppers and a packing zone for packing stacks of cork stoppers;
- a mechanism for receiving and positioning of stacks of cork stoppers, the mechanism comprising:

an organ for receiving and transporting stacks of cork stoppers, the organ comprising

a first receiving plate for receiving stacks of cork stoppers, the first plate being movable relative to the plane (P),

a second receiving plate for receiving stacks of cork stoppers, the second plate being movable relative to the plane (P),

a retaining organ for retaining stacks of cork stoppers, the organ comprising a retention element and a presser that are both movable perpendicularly to the plane (P) and are arranged to operate in the packing zone;

- an edging comprising a wall for alignment of stacks of cork stoppers, the edging being movable parallel to the plane (P) and being arranged on the platform and around the receiving and positioning mechanism;

wherein

said first and second receiving plates have guides for receiving and housing stacks of cork stoppers; and

the first plate for receiving stacks of cork stoppers is parallel to the wall for alignment of stacks of cork stoppers of said edging.

[0013] In one embodiment, the first receiving plate is movable, within the edging, parallel to the plane (P), between said receiving zone and packing zone.

[0014] In other embodiment, the first receiving plate is movable perpendicular to the plane (P).

[0015] Still in other embodiment, the second receiving plate is movable perpendicular to the plane (P), being furthermore movable parallel to the plane (P), between said receiving zone and packing zone.

[0016] In other embodiment of the invention, the assembly for organising stacks of cork stoppers additionally comprises a plate for separating stacks of cork stoppers, the separating plate being movable relatively to the plane (P) and being arranged between the first receiving plate and the second receiving plate. Preferably, the separating plate is movable perpendicular to the plane (P) and is arranged to act in the receiving zone.

[0017] In one embodiment of the invention, the guides of the first receiving plate are misaligned relative to the guides of the second receiving plate.

[0018] In other embodiment, said wall for alignment has guides aligned with the guides of the second receiving plate.

[0019] Preferably, the guides of the first receiving plate, second receiving plate and wall for alignment, are spaced apart and parallel to each other and are perpendicular to the plane (P).

[0020] In a preferred embodiment, the retention element is a comb-like element.

[0021] In other embodiment, the first receiving plate for receiving cork stoppers have through-holes arranged spaced along the guides of said first plate and the spaces between said guides.

[0022] In one aspect of the invention, the assembly for organising stacks of cork stoppers further comprises a suction organ, movable between the receiving zone and the packing zone, parallel to the plane (P), the suction organ being arranged upstream of the receiving plate and prepared to cooperate with this.

[0023] In other aspect, the suction organ comprises a set of suction rods, wherein each rod comprises a suction tip.

[0024] Preferably, said rod tips of said set define at least one suction plane (Q). Most preferably, said suction rods tips of said set define at least two suction planes (Q', Q''), the suction planes (Q', Q'') being strictly parallel.

[0025] In preferred aspect, the suction rods are aligned with the through-holes of the first receiving plate, and said suction rods are prepared for, in use, crossing said through-holes.

[0026] The present invention also relates to a machine for packing cork stoppers, the machine comprising an assembly for organising stacks of cork stoppers of the invention arranged between an assembly for feeding cork stoppers and an assembly for packing stacks of cork

stoppers.

[0027] The invention further relates to a process for organising stacks of cork stoppers using an assembly for organising stacks of cork stoppers as previously described, the process being characterized by comprising the steps of:

a) feeding, in a receiving zone (4), with a predefined number of stacks of cork stoppers, the organ (8) for receiving and transporting stacks of cork stoppers comprising the first and second receiving plates (9, 11);

b) removing the second receiving plate from the platform for organising stacks of cork stoppers;

c) advancing the first receiving plate to the packing zone;

d) advancing the edging of a predefined distance;

e) operating the retaining organ in the packing zone, so as to retain the cork stoppers transported by the first receiving plate;

f) returning the first receiving plate to the receiving zone;

g) repositioning the second receiving plate in the receiving zone and

h) repeating steps a) to g) until forming a desired block of cork stoppers.

[0028] In one embodiment of the invention, the process further comprises an additional step between the steps a) and b), of removing a plate for separating stacks of cork stoppers from the receiving zone and, in step g) repositioning the second plate and the separating plate, wherein

before removal of the separating plate, a suction organ operates by suction for fixing the stacks of cork stoppers arranged in the first receiving plate;

after removal of the separating plate, the same suction organ operates by suction for fixing the stacks of cork stoppers arranged in the second receiving plate;

in step c) the first receiving plate moves forward together with the suction organ that keeps gripping the stacks of cork stoppers;

between step e) and step f) the suction organ releases the stacks of cork stoppers; and

in step f) returning the first plate and the suction organ to the receiving zone.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The invention is next described with reference to the attached drawings, wherein:

Fig. 1.1 shows a perspective view of an exemplary block of cork stoppers of the present invention, wherein said block has 46 matrices of cork stoppers, each matrix having 12 stacks of cork stoppers and wherein each stack has 10 stacked cork stoppers in a total of 5520 cork stoppers. The arrows indicate the direction of packing of the stacks of cork stoppers.

Fig. 1.2 shows a top view of the block of cork stoppers of Fig. 1.1, wherein the arrows indicate the direction of packing of the stacks of cork stoppers.

Fig. 1.3 shows a side view of the block of cork stoppers of Fig. 1.1, showing 24 stacks of cork stoppers, each stack having 10 stacked cork stoppers.

Fig. 2.1 shows a schematic embodiment of the assembly for organising cork stoppers of the present invention, in a starting position, before being loaded with stacks of cork stoppers.

Figs. 2.2 to 2.4 are schematic views, in perspective, front view and side view, respectively, of a set formed by the first plate for receiving stacks of cork stoppers and by the suction organ, according to other embodiment of the invention.

Figs. 2.5 to 2.7 are schematic views of the suction organ in perspective, front view and top view, respectively, according to an embodiment of the present invention.

Fig. 3.1 shows the organ for retaining stacks of cork stoppers operating in the assembly for organising cork stoppers of the present invention.

Fig. 3.2 shows a comb-like retaining element.

Figs. 4 to 12 show one operating cycle of a preferred embodiment of the invention, wherein:

Fig. 4 shows the beginning of the operating cycle of the assembly for organising stacks of cork stoppers of the invention, wherein the plate for separating stacks of cork stoppers is shown being removed from the platform, and the advancing synchronized movement of the first receiving plate, according to the direction of the arrows.

Fig. 5 shows the continuity of the cycle of Fig. 4, showing the organ for receiving and transporting stacks of cork stoppers already without the separating plate.

Fig. 6 shows the second plate for receiving stacks of cork stoppers being removed from the platform of the assembly for organising stacks

of cork stoppers, and the advancing synchronized movement of the first receiving plate, according to the direction of the arrows.

Fig. 7.1 shows the working platform without the second receiving plate.

Figs. 7.2 to 7.4 show schematically in perspective, front view and side view, respectively, the suction organ in cooperation with the first plate for receiving stacks of cork stoppers.

Fig. 8 shows the movement of the first receiving plate, moving the matrices of cork stoppers to the packing zone, the retaining organ being in a high position.

Fig. 9 shows the synchronized movement of the retaining organ that moves down before the first receiving plate moves back for its starting position, according to the direction of the arrows.

Fig. 10 shows the retaining element in a stop position of the stacks of cork stoppers in the packing zone, and the backing of the first receiving plate and associated organ for suction.

Fig. 11 shows the back movement of the first receiving plate, in the direction indicated by the arrow, in the receiving zone, the separating plate and the second receiving plate having retaken its position in the receiving zone to begin of a new cycle.

Fig. 12 shows the assembly for organising stacks of cork stoppers of the present invention in the starting position, prepared to initiate a new operating cycle.

Fig. 13 is a schematic perspective view of an assembly for organising stacks of cork stoppers of the present invention associated with a feeder of stacks of cork stoppers.

Fig. 14 is a schematic view of an embodiment of a packaging machine comprising the assembly for organising stacks of cork stoppers of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0030] The present invention relates to an assembly and process for organising stacks of cork stoppers and a machine comprising said assembly for organising stacks of cork stoppers, for packing said stacks of cork stoppers in a block with predefined dimensions, facilitating the packaging of a predetermined amount of cork stoppers and reducing the volume occupied by such

stoppers, as well as the storage and transport costs. The invention guarantees that the cork stoppers are adequately preserved as predicted by the International Code of Cork Stopper Manufacturing Practices (ICCSMP).

[0031] The packing of cork stoppers achieved by the assembly and process of the present invention allows packing a considerable higher number of cork stoppers per volume assembly, that is to say, per pack, when compared with the packing of cork stoppers in bulk carried out by the devices and processes of the prior art.

[0032] In the context of the present invention, the term "cork stopper" or "cork stoppers" relates to natural cork stoppers, colmated natural cork stoppers, agglomerated cork stoppers, micro-agglomerated cork stoppers, technical cork stoppers or the like, and combinations thereof.

[0033] The term "cylindrical body" relates to the body of a cork stopper having a substantially cylindrical shape and two flat ends. By substantially cylindrical means in the context of the present description the shape of a body that has equal diameters in both ends or which allows a dimensional variation between the diameters of said ends, usually associated with the production method, *i.e.*, having a substantially conic shape. Either end of the cylindrical body can be bevelled or rounded and is intended to be partially or totally inserted in the mouth or neck of a container.

[0034] The term "stack of cork stoppers" relates to a column of cork stoppers disposed on each other, the cork stoppers being laid on their flat ends. In other words, the ends of the cylindrical body of said cork stoppers abut on top of each other in order to get said stack. An example of a stack of the present invention comprises a stack of 10 overlapping cork stoppers. Of course, any another number of cork stoppers can be used to form a stack of cork stoppers.

[0035] In the context of the present invention, the term "matrix of cork stoppers" relates to a group of cork stopper stacks, the stacks being arranged side by side. For example, a matrix of 120 cork stoppers means an arrangement of 12 stacks, each stack having 10 stacked cork stoppers, as shown in Fig. 1.2. As an example, Fig. 1.1 shows an organisation (or block) of 46 matrices of cork stoppers. Of course, any another number of stacks of cork stoppers can be used to form a matrix.

[0036] In the context of the present invention, the term "block" means a ordered set of matrices of cork stoppers. An exemplary block of cork stoppers is shown in Fig. 1.1, having 46 matrices in a total of 5520 cork stoppers.

[0037] The term "strictly parallel planes" means that at least two planes are parallel to each other and they have no point in common with each other, *i.e.*, they are not coincident.

[0038] The term "manual" or variations thereof refers to any tasks performed by a human operator without the use of any automated, mechanical, electrical or electronic devices, or the like.

[0039] The term "semi-automated" refers to any task performed by automated, mechanical, electrical or elec-

tronic devices, or the like, but it requires human intervention for its implementation.

[0040] The term "automated" refers to any task performed only by automated, mechanical, electrical or electronic devices, or the like, without any human intervention.

[0041] In the context of the present description, the term "comprising" should be interpreted as "including, among others". As such, said term should not be interpreted as "consisting only of".

[0042] The invention will be explained hereinbelow with non-limiting reference to the attached Figures.

[0043] Figs. 1.1 to 1.3 show an exemplary block obtained by assembly (1) for organising stacks of cork stoppers of the present invention. The block shown in said figures corresponds to a standard size of commercially available cardboard boxes. Naturally, the dimensions of the block to form the assembly (1) can be adjusted to any desired packing size.

[0044] Surprisingly, with the packaging mentioned above, the inventors have found that it was possible to gain about 30% of the available packaging volume for the block generated by assembly (1) for organization of cork stoppers of the invention, relative to the volume of bulk stoppers that was used in an identical package.

[0045] As it will be understood, this gain in volume is expressed in significant benefits in terms of transport and storage costs.

[0046] Referring to Figs. 2.1 and 3.1, the assembly (1) for organising stacks of cork stoppers of the invention comprises:

- a platform (2) for organising stacks of cork stoppers comprising a base (3) that defines a plane (P), the platform (2) comprising a zone (4) for receiving stacks of cork stoppers, a transporting zone (5) for transporting stacks of cork stoppers and a packing zone (6) for packing stacks of cork stoppers;
- a mechanism (7) for receiving and positioning of stacks of cork stoppers, the mechanism (7) comprising:

an organ (8) for receiving and transporting stacks of cork stoppers, the organ (8) comprising

a first receiving plate (9) for receiving stacks of cork stoppers, the plate (9) being movable relative to the plane (P),

a second receiving plate (11) for receiving stacks of cork stoppers, the plate (11) being movable relative to the plane (P),

a retaining organ (12) for retaining stacks of cork stoppers, the organ (12) comprising a retention element (13) and a presser (14) that are both movable perpendicular to the plane (P) and are arranged to

operate in the packing zone (6);

- an edging (15) comprising a wall (16) for alignment of stacks of cork stoppers, the edging (15) being movable parallel to the plane (P) and being arranged on the platform (2) and around the receiving and positioning mechanism (7);

wherein

the plates (9, 11) have, respectively, guides (1709, 1711) for receiving and housing stacks of cork stoppers; and the first plate (9) for receiving stacks of cork stoppers is parallel to the wall (16) for alignment of stacks of cork stoppers of said edging (15).

[0047] The platform (2) for organising stacks of cork stoppers is a working plane for the mechanism (7) for receiving and positioning of stacks of cork stoppers, which has a displacement movement between two zones (4, 6) defined in the platform.

[0048] In zone (4) for receiving the platform (2), said receiving and positioning mechanism (7) receives stacks of cork stoppers that are supplied by a cork stopper feeding assembly, as shown in Fig. 14. This feeding assembly can be any prior art feeder, suitably adapted to interact with assembly (1) of the invention.

[0049] In a possible embodiment, this feeder provides cork stoppers, assisted by gravity and by feed canals, to the mechanism (7), as shown in Fig. 13. The advantage is that the supply allows the immediate formation of stacks of cork stoppers to feed to the mechanism (7).

[0050] The mechanism (7) for receiving and positioning of stacks of cork stoppers comprises a receiving and transporting organ (8) that includes two plates (9, 11). It should be noted that it is advisable, at all times of assembly (1) operation, that there is a permanent containment of stacks of cork stoppers, otherwise they can collapse and consequently make impractical the formation of the block of cork stoppers.

[0051] In one embodiment, the first plate (9) is movable within edging (15) parallel to the plane (P), between said zone (4) and zone (6).

[0052] In other embodiment, the first plate (9) is movable perpendicular to the plane (P). This feature is useful when used in one of the embodiments that include a suction organ (19), which will be better described below.

[0053] The second plate (11) is movable perpendicular to the plane (P), being additionally movable parallel to the plane (P) between the said zone (4) and zone (6).

[0054] In a preferred embodiment, the assembly (1) for organising stacks of cork stoppers further comprises a plate (10) for separating stacks of cork stoppers, the plate (10) being movable relatively to the plane (P) and being arranged between the first receiving plate (9) and the second receiving plate (11). Plate (10) is movable perpendicular to the plane (P) and is arranged to operate in receiving zone (4), allowing the separation of cork stopper matrices and preventing contact between them.

[0055] Preferably, the receiving plates (9, 11) comprise

guides (1709) e (1711), respectively, to assist in the ordered and stable formation of matrices of cork stoppers. Preferably, the guides (1709) of the first plate (9) are arranged in a misaligned manner in relation to the guides (1711) of the second plate (11).

[0056] The term "guides arranged in a misaligned manner" means that the guides (1709) of the first plate (9) of organ (8) for receiving and transporting stacks of cork stoppers of the present invention, does not coexist in the same reference line parallel to the plane (P), with the guides (1711) of the second plate (11). Similarly, in the context of the invention, the guides of the first plate (9) are aligned in the same reference line parallel to the plane (P), with the spaces between the guides (1711) of the second plate. These aspects are shown in Fig. 6.

[0057] Said misalignment between the matrices of cork stoppers formed in plates (9) and (11) is useful in volume saving of the formed final block, since it allows the utilization of the spaces between adjacent cork stoppers in the same matrix. Thus, the cork stoppers of the matrix formed in the first plate (9) fit into said existing free spaces between the stacks of cork stoppers of the matrix formed in the second plate (11). This aspect is visible in Fig. 1.2. e also in the cork stopper block shown in Fig. 1.1.

[0058] In order to organise the stacks of cork stoppers to obtain the final block, the wall (16) of the edging (15) preferably also has guides (1716). These guides (1716) are aligned with the guides (1711) of the second plate (11). By the term "aligned" is meant that the guides (1716) of the wall (16) of the edging (15), coexist in the same reference line parallel to the plane (P) with the guides (1711) of the second plate (11), as can be seen in Fig. 11, as better explained below.

[0059] In order to keep the formation, organisation and balance between the stacks of cork stoppers, the guides (1709, 1711, 1716) are spaced apart and parallel to each other and are perpendicular to the plane (P). This arrangement prevents, for example, that the stacks of cork stoppers contact each other in the formation stage of the cork stopper matrices in the plates.

[0060] In an exemplary embodiment of the invention, the operating cycle is initiated with the feeding stage, in which the plates (9, 10, 11) are located in the zone (4) for receiving stacks of cork stoppers. The plate (10) for separating stacks of cork stoppers is arranged between plates (9) e (11), serving to separate the cork stopper matrices that are formed in the latter, therefore preventing the contact between cork stoppers of said matrices and thus assuring balance which is essential to the subsequent construction of the final block of cork stoppers.

[0061] After feeding and formation of the cork stopper matrices, the plate (10) is removed by perpendicular movement, preferably downward, to the plane (P), which allows the connection and contact of the two cork stopper matrices already formed. Fig. 5 shows these aspects.

[0062] Next, plate (11) is removed by perpendicular movement, preferably downward, to the plane (P), as shown in Fig. 7.1. At this point, the plate (9) and the two

cork stoppers matrices are still in the receiving zone (4).

[0063] Subsequently, as shown in Fig. 7.1, 8 and 9, plate (9) initiates a transporting movement of the cork stopper stacks (and correspondent matrices) from zone (4) until packing zone (6), in which the set formed by both cork stopper matrices is lean against the wall (16) for alignment of stacks of cork stoppers of the edging (15), leaving the matrix formed in plate (11) in direct contact with the wall (16).

[0064] In a preferred embodiment, the wall (16) comprises guides (1716) that, as noted above, are aligned with guides (1711) of the second plate (11), whereby the guides (1716) receive the cork stopper stacks from the matrix formed in plate (11), thus guaranteeing stability and balance of the cork stopper stacks.

[0065] After this step, the edging (15) moves forward downstream of zone (4) parallel to the plane (P) a distance significantly identical to the thickness of the cork stopper matrices carried out by the plate (9) in each operating cycle. This solution allows the subsequent packing of another set of cork stopper matrices and then again until formation of the final desired block.

[0066] Before moving the plate (9) back to the receiving zone (4), in order to start a new cycle, this set of cork stopper matrices just packed will have to be immobilized to prevent collapses of cork stoppers that would compromise the formation of the final block. For this purpose, the organ (12) for retaining stacks of cork stoppers operates as shown in Fig. 9 and 10.

[0067] Finally, with the immobilized set of cork stopper matrices, the plate (9) backs to receiving zone (4), after which plates (10, 11) return to their starting position, thus finishing one operating cycle of the assembly (1) for organising stacks of cork stoppers of the invention. From here, the assembly (1) is ready to initiate a new feeding and transporting cycle of cork stoppers.

[0068] These cycles can be repeated as often as necessary to build a block of cork stoppers with the required dimensions. For example, to build a block identical to that shown in Fig. 1.1, it would be necessary 23 cycles of organization of cork stopper stacks as previously described.

[0069] Note that the organisation of stacks according to the present invention is carried out on platform (2) which defines a plane (P), that corresponds in practical terms to the working plane of assembly (1) for organising. Although the natural orientation of the plane (P) is substantially horizontal, the present invention contemplates angular variations of said horizontal orientation.

[0070] In other embodiment, the platform (2) may have an upward slope relative to the horizontal and thus zone (4) is at a level below zone (6). With this arrangement, it is possible to use gravity also in the transport stage of cork stopper stacks between zone (4) and zone (6) to keep the cork stopper matrices together, promoting balance and stability of the set formed by said cork stopper matrices.

[0071] Preferably, said retention element (13) is a

comb-like element.

[0072] In the context of the present description and making reference to Fig. 3.2, the term "comb-like element" means an element (13) formed by a plurality of teeth, parallel to one another, which are fixed in one of its ends to a bar-like element. Such teeth configuration allows that said comb-like element (13) to move perpendicular to the plane (P), wherein the spaces between the teeth allows them to move between the suction rods (20) of the suction organ (19) in Fig. 2.5.

[0073] In other embodiment of the invention and making reference to Figs. 2.2 and 2.3, the first receiving plate (9) has through-holes (18), the holes (18) being spacedly arranged along the guides (1709) and along the spaces between the guides (1709).

[0074] The term "through-holes" in the context of the present invention is associated with the plates (9, 11) described above. Said term means that any of said plates (9, 11) can have a through-hole arranged in its guides or spaces between its guides; or it can have several through-holes arranged along its guides or along the spaces between its plate guides; or alternatively can have through-cuts arranged in place of its guides, assuming in this last case a similar configuration to the comb-like element shown in Fig. 3.2.

[0075] The term "through-holes" when associated to the plate (10) for separation described above, relates to parallel cuts arranged in the plate body (10) that gives them a configuration similar to the comb-like element shown in Fig. 3.2.

[0076] The term "through-holes spacedly arranged along the guides and along the spaces between the guides" relates to through-holes, which distance between two through-holes, arranged in the same guide (1709) or in the same space between guides, should be as such that allows to hit each hole with the body of a respective stopper from the cork stopper stack located in that guide (1709) or space between guides (1709).

[0077] Note that 2 or more through-holes (18) may exist for each cork stopper body.

[0078] In other exemplary embodiment shown in Figs. 2.5 and 2.7, the assembly (1) for organising stacks of cork stoppers additionally comprises a suction organ (19), prepared to move between said zone (4) and zone (6), parallel to plane (P), the organ (19) being arranged upstream of receiving plate (9) and prepared to cooperate with it (as shown in Figs. 7.2 and 7.4).

[0079] Yet another embodiment using the suction organ (19), after feeding of the receiving organ (8) and after the suction organ (19) has been operated to hold the cork stoppers, the plates (9, 10, 11) can be removed, allowing the suction organ (19) to move the stacks of cork stoppers from zone (4) to zone (6) without needing the cooperation of plate (9) in that movement to the packing zone.

[0080] Preferably, the suction organ (19) comprises a set of suction rods (20), wherein each rod (20) comprises a suction tip (21). The suction tips (21) of the set of rods (20) define at least one suction plane (Q) as shown in

Fig. 7.4, preferably define at least two suction planes (Q', Q''), the suction planes (Q', Q'') being strictly parallel, as shown in Fig. 2.7.

[0081] Preferably, the suction rods (20) are aligned with the through-holes (18) of the first plate (9) and prepared, in use, to pass through said through-holes (18).

[0082] In case the receiving plate (9) takes the shape of a comb-like element, the suction rods (20) can pass through the teeth of the comb-like element to reach the cork stoppers and then hold them by suction. After that, the suction organ (19) can move to packing zone (6), together with said plate (9) in comb shape or without it, depending on the type of movement allowed to the plate (9), respectively, parallel or perpendicular movement to the plane (P). In other words, if plate (9) in comb shape has a parallel movement to the plane (P), the plate (9) will move with the suction organ (19) to the packing zone, to assist in the immobilization of the stacks of cork stoppers during the movement. In case the plate (9) in comb shape has perpendicular movement to the plane (P), plate (9) will be removed (by upward or downward movement, according to its mechanical design) from receiving zone (4), after the suction organ (19) have assured holding of the cork stoppers, this last one being released from the plate (9) during the movement to the packing zone (6).

[0083] In one special embodiment, it is predicted that the suction organ (19) as described can act separately or in combination with a plate (9) or still in combination with a receiving organ (8), in order to fix the cork stoppers to be organised and, in association with a mechanical arm (not shown), to release them directly in a package or box, which would allow to spare the remaining parts and devices herein described.

[0084] The present invention further relates to a machine for packing cork stoppers. This machine comprises an assembly for feeding cork stoppers and an assembly for packing stacks of cork stoppers, as well as an assembly (1) of the invention for organising stacks of cork stoppers, the assembly (1) arranged between said assemblies for feeding and packaging stacks of cork stoppers.

[0085] In one particular embodiment of the assembly (1) for organising cork stoppers of the present invention, the first receiving plate (9) having through-holes (18), the second receiving plate (11) and the separating plate (10), are located parallel of each other and perpendicular to the plane (P), in the zone (4) for receiving stacks of cork stoppers. Plate (10) for separating stacks of cork stoppers is arranged between plates (9) e (11). Plates (9, 11) have guides (1709, 1711) misaligned with each other. Upstream of plate (9), a suction organ (19) having rods (20) that comprise suction tips (21) defining two planes (Q', Q'') is arranged. In this design, after feeding and respective formation of cork stopper matrices, the organ (19) is moved forward, so that all its rods (20) cross the through-holes (18) of plate (9) and, as a result, the suction tips (21) in plane (Q') hold by suction the cork stoppers of the formed matrix in the plate (9) in which stacks are aligned in guides (1709). After that, plate (10) is removed

by downward movement, perpendicular to plane (P), allowing the organ (19) to move forward and the suction tips (21) of plane (Q'') hold by suction the cork stoppers of the formed matrix in plate (11), which is afterwards removed by downward movement, perpendicular to the plane (P). At this point, plate (9) is still in receiving zone (4), as well as the suction organ (19). Then, the plate (9) and the organ (19) in cooperation, initiate the transport of the cork stopper stacks (and correspondently matrices) from zone (4) to packing zone (6), in which the set formed by both cork stopper matrices are lean against a wall (16) for alignment of stacks of cork stoppers of an edging (15), the matrix of cork stoppers that is formed in the plate (11) being arranged in the guides (1716) of the wall (16). Note that, in this embodiment, the guides (1711) are aligned with the guides (1716) of the wall (16). After this step, a retaining organ (12) for retaining stacks of cork stoppers, the organ (12) comprising a presser (14) and a comb (13) that synchronically cooperate, operates. At this point, the comb (13) moves by a downward movement perpendicular to the plane (P), such as shown in Fig. 9 and 10, in order to immobilize the cork stoppers matrices transported, and the comb (13) teeth pass through the spaces between the rods (20) of the organ (19). Only then, the organ (19) releases the cork stoppers, and the plate (9) and organ (19) move back to receiving zone (4), therefore returning to its starting position. After that, the plates (10, 11) return to their positions in zone (4) initiating a new operating cycle of the assembly (1). In the following cycles, the above described is repeated until the operation of the retaining organ (12). At this stage, when the plate (9) and the suction organ (19) reach the packing zone (6), near the comb (13), the presser (14) moves by a downward movement perpendicular to the plane (P), until it reaches the top of the cork stopper stacks packed in the previous cycle, in order to hold them in the position where they are, and the comb (13) moves upwardly and perpendicularly to the plane (P), allowing that the new cork stopper matrices join the previous matrices. When the plate (9) together with the organ (19) move forward and lean the new cork stopper matrices against the previous matrices, the presser (14) moves upwardly, releasing the cork stopper matrices of the previous cycle and allows the movement of the edging (15) downstream of zone (4), so as to allow a space gain necessary for new cork stopper matrices in the following cycle. After said movement of the edging (15), the comb (13) moves downwardly and perpendicularly to the plane (P), now retaining the set of cork stoppers of the two cycles and allowing the backing of plate (9) and suction organ (19). The following cycles repeat the above described procedure until a block of 5520 cork stoppers is obtained, which corresponds to a block of 48 cork stopper matrices, wherein the matrix formed in the plate (9) has 11 cork stopper stacks and the matrix formed in the plate (11) has 12 cork stopper stacks, wherein each cork stopper stack has 10 stacked stoppers. This configuration is obtained by means of an organ (8) for receiving and trans-

porting cork stopper stacks, in which the first and second plates (9, 11) have, respectively, 11 guides (1709) and 12 guides (1711). In this embodiment, 24 operating cycles are carried out, as described above, to obtain a block of 5520 cork stoppers. Note that the configuration of the obtained block in this embodiment is different from that shown in Figs. 1.1 to 1.3.

[0086] To obtain a block of identical dimensions to the block obtained in the previous embodiment, the previous embodiment may be slightly change so that the matrix formed in plate (9) has 12 stacks of cork stoppers and the matrix formed in plate (11) has 11 stacks of cork stoppers, each stack having 10 stacked cork stoppers. A block equally formed by 48 matrices of cork stoppers is thus obtained, wherein the first and second plates (9, 11) have, respectively, 12 guides (1709) and 11 guides (1711). In this variant, 24 operating cycles are also carried out, as described for the previous embodiment, to obtain a block of 5520 cork stoppers.

[0087] These embodiments show how the final configuration of cork stopper blocks to be produced by an assembly for organising stacks of cork stoppers of the present invention can be design. In this way, different configurations of cork stopper blocks are possible, in order to adapt the last one to the package shapes and to the required amount of cork stoppers per package.

[0088] In a preferred embodiment of the process for organising stacks of cork stoppers using assembly (1) for organising stacks of cork stoppers of the present invention, the process comprises the steps of:

a) feeding, in a receiving zone (4), with a predefined number of stacks of cork stoppers, the organ (8) for receiving and transporting stacks of cork stoppers comprising the first and second receiving plates (9, 11);

b) removing the second receiving plate (11) from the platform (2) for organising stacks of cork stoppers;

c) advancing the first plate (9) to the packing zone (6);

d) advancing the edging (15) of a predefined distance;

e) operating the retaining organ (12) in the packing zone (6), so as to retain the cork stoppers transported by the first receiving plate (9);

f) returning the first plate (9) to the receiving zone (4);

g) repositioning the second plate (11) in the receiving zone (4); and

h) repeating steps a) to g) until forming a desired block of cork stoppers.

[0089] In an optional embodiment of the invention, the

previously defined process further comprises an additional step, between steps a) and b), to remove a plate (10) for separating stacks of cork stoppers of receiving zone (4) and, in step g), to reposition the second plate (11) and the separating plate (10), wherein
before removal of the separating plate (10), a suction organ (19) operates by suction fixing the stacks of cork stoppers arranged in the first plate (9);
after removal of the separating plate (10), the same suction organ (19) operates by suction fixing the stacks of cork stoppers arranged in the second plate (11);
in step c) the first plate (9) moves forward together with the suction organ (19) that keeps gripping the stacks of cork stoppers;
between step e) and step f) the suction organ (19) releases the stacks of cork stoppers; and
in step f) returning the first plate (9) and the suction organ (19) to the receiving zone (4).

[0090] As previously mentioned, the number of cork stopper stacks to feed the assembly (1) for organising of the invention depends on the dimensions of the final block of cork stopper stacks needed and, as such, can be predefined to confirm packaging or normative requisites existing in this industry.

[0091] The foregoing description should be understood as exemplary and non-limiting of the scope of the present invention, which is defined by the attached claims.

Claims

1. An assembly (1) for organising stacks of cork stoppers, comprising:

- a platform (2) for organising stacks of cork stoppers comprising a base (3) that defines a plane (P), the platform (2) comprising a receiving zone (4) for receiving stacks of cork stoppers, a transporting zone (5) for transporting stacks of cork stoppers and a packing zone (6) for packing stacks of cork stoppers;
- a mechanism (7) for receiving and positioning of stacks of cork stoppers, the mechanism (7) comprising:

an organ (8) for receiving and transporting stacks of cork stoppers, the organ (8) comprising

a first receiving plate (9) for receiving stacks of cork stoppers, the first plate (9) being movable relative to the plane (P),
a second receiving plate (11) for receiving stacks of cork stoppers, the second plate (11) being movable relative to the plane (P),

a retaining organ (12) for retaining stacks of cork stoppers, the organ (12) comprising a retention element (13) and a presser (14) that are both movable perpendicular to the plane (P) and are arranged to operate in the packing zone (6);

- an edging (15) comprising a wall (16) for alignment of stacks of cork stoppers, the edging (15) being movable parallel to the plane (P) and being arranged on the platform (2) and around the receiving and positioning mechanism (7);

wherein

the plates (9, 11) have, respectively, guides (1709, 1711) for receiving and housing stacks of cork stoppers; and
the first plate (9) for receiving stacks of cork stoppers is parallel to the wall (16) for alignment of stacks of cork stoppers of said edging (15).

- The assembly (1) for organising stacks of cork stoppers according to claim 1, wherein the first plate (9) is movable, within the edging (15), parallel to the plane (P), between said zone (4) and zone (6).
- The assembly (1) for organising stacks of cork stoppers according to claim 1, wherein the first plate (9) is movable perpendicular to the plane (P).
- The assembly (1) for organising stacks of cork stoppers according to any one of claims 1 to 3, wherein the second plate (11) is movable perpendicular to the plane (P).
- The assembly (1) for organising stacks of cork stoppers according to claim 4, wherein the second plate (11) is additionally movable parallel to the plane (P), between said zone (4) and zone (6).
- The assembly (1) for organising stacks of cork stoppers according to any one of claims 1 to 5, further comprising a plate (10) for separating stacks of cork stoppers, the plate (10) being movable relative to the plane (P), and being arranged between the first receiving plate (9) and the second receiving plate (11).
- The assembly (1) for organising stacks of cork stoppers according to claim 6, wherein plate (10) is movable perpendicular to the plane (P) and is arranged to operate in the receiving zone (4).
- The assembly (1) for organising stacks of cork stoppers according to any one of the previous claims, wherein the guides (1709) of the first plate (9) are arranged in a misaligned manner in relation to the guides (1711) of the second plate (11).

- The assembly (1) for organising stacks of cork stoppers according to any one of claims 1 to 8, wherein the wall (16) has guides (1716) aligned with the guides (1711) of the second plate (11).
- The assembly (1) for organising stacks of cork stoppers according to claim 8 or 9, wherein the guides (1709, 1711, 1716) are spaced apart and parallel to each other and are perpendicular to the plane (P).
- The assembly (1) for organising stacks of cork stoppers according to any one of claims 1 to 7, wherein the retaining organ (13) is a comb-like element.
- The assembly (1) for organising stacks of cork stoppers according to any one of the previous claims, wherein the first plate (9) has through-holes (18) spacedly arranged along the guides (1709) and along the spaces between the guides.
- The assembly (1) for organising stacks of cork stoppers according to claim 12, further comprising a suction organ (19) movable, between said zone (4) and zone (6), parallel to the plane (P), the organ (19) being arranged upstream of the first plate (9) and prepared to cooperate with it.
- The assembly (1) for organising stacks of cork stoppers according to claim 13, wherein the suction organ (19) comprises a set of suction rods (20), wherein each rod (20) comprises a suction tip (21).
- The assembly (1) for organising stacks of cork stoppers according to claim 13 or 14, wherein said tips (21) of the rods (20) of said set define at least one suction plane (Q).
- The assembly (1) for organising stacks of cork stoppers according to claim 15, wherein said tips (21) of the rods (20) of said set define at least two suction planes (Q', Q''), the suction planes (Q', Q'') being strictly parallel.
- The assembly (1) for organising stacks of cork stoppers according to any one of claims 14 to 16, wherein the suction rods (20) are aligned with the through-holes (18) of the first plate (9) and prepared for, in use, to pass through said through-holes (18).
- A machine for packaging of cork stoppers, comprising an assembly for feeding cork stoppers and an assembly for packing stacks of cork stoppers, further comprising an assembly (1) for organising stacks of cork stoppers according to any one of the previous claims, arranged between the assembly for feeding cork stoppers and the assembly for packing stacks of cork stoppers.

19. A process for organising stacks of cork stoppers using an assembly (1) for organising stacks of cork stoppers according to claim 1, the process comprising the steps of:

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a) feeding, in a receiving zone (4), with a predefined number of stacks of cork stoppers, the organ (8) for receiving and transporting stacks of cork stoppers;

b) removing the second receiving plate (11) from the platform (2) for organising stacks of cork stoppers; 10

c) advancing the first plate (9) to the packing zone (6);

d) advancing the edging (15) of a predefined distance; 15

e) operating the retaining organ (12) in the packing zone (6), so as to retain the cork stoppers transported by the first receiving plate (9);

f) returning the first plate (9) to the receiving zone (4); 20

g) repositioning the second plate (11) in the receiving zone (4); and

h) repeating steps a) to g) until forming a desired block of cork stoppers. 25

20. The process according to claim 19, wherein between steps a) and b), removing a plate (10) for separating stacks of cork stoppers from the receiving zone (4), and in step g), repositioning the second plate (11) and the separating plate (10). 30

21. The process according to claim 20, wherein:

before removal of the separating plate (10), a suction organ (19) operates by suction for fixing the stacks of cork stoppers arranged in the first plate (9); 35

after removal of the separating plate (10), the same suction organ (19) operates by suction for fixing the stacks of cork stoppers arranged in the second plate (11); 40

in step c) the first plate (9) moves forward together with the suction organ (19) that keeps gripping the stacks of cork stoppers; 45

between step e) and step f) the suction organ (19) releases the stacks of cork stoppers; and

in step f) returning the first plate (9) and the suction organ (19) to the receiving zone (4). 50

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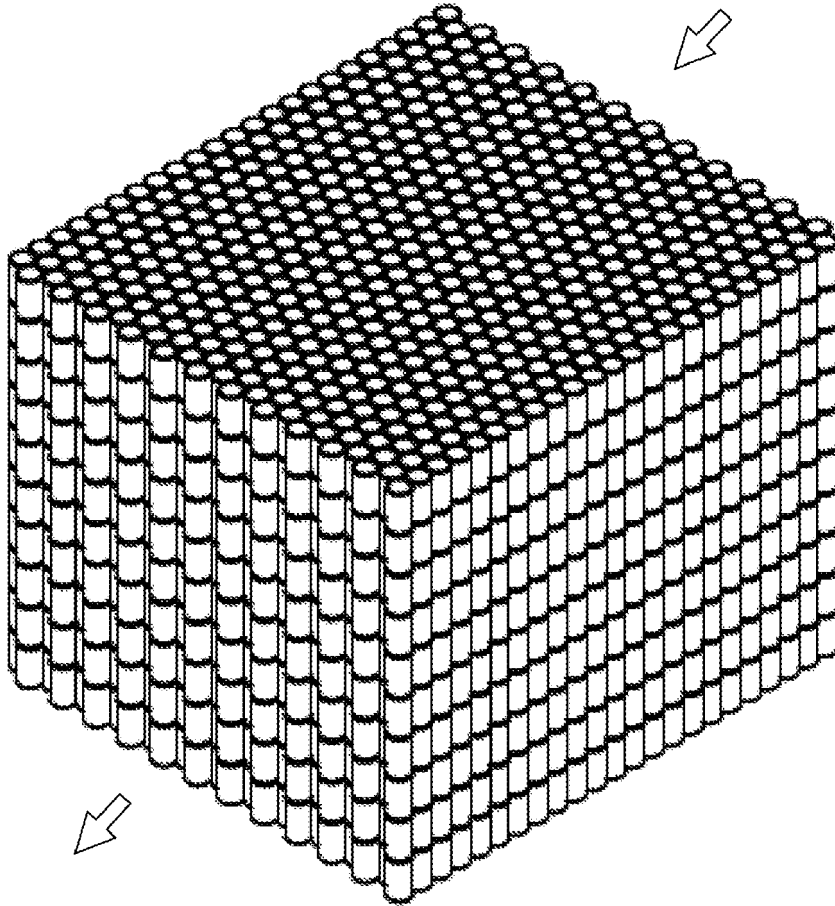


Fig. 1.1

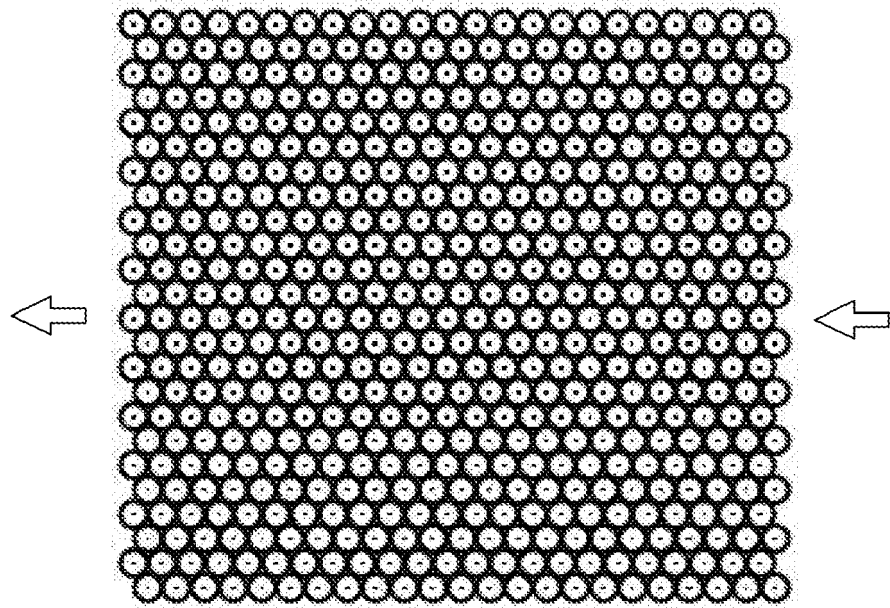


Fig. 1.2

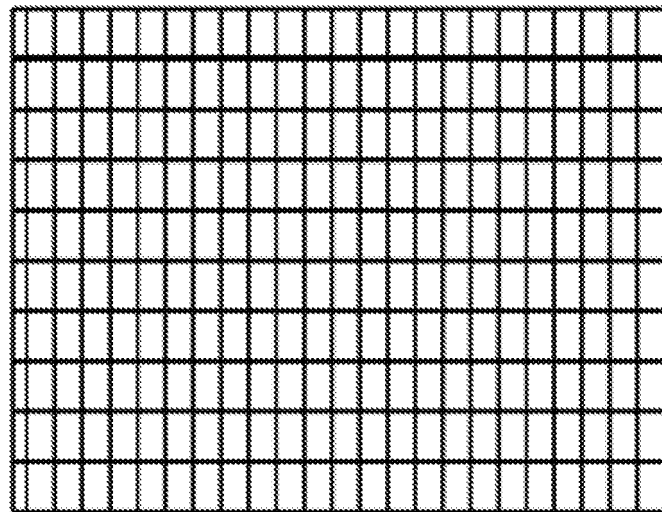


Fig. 1.3

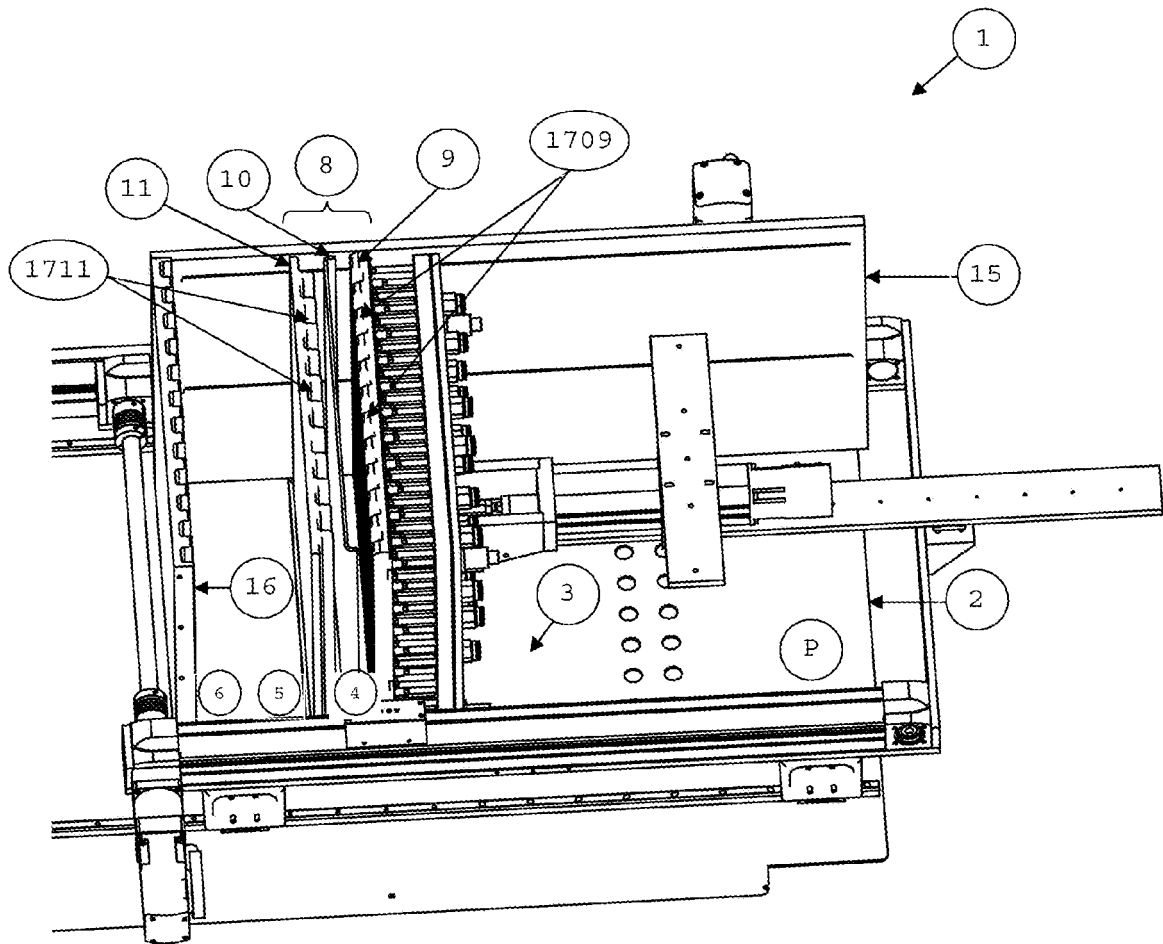


Fig. 2.1

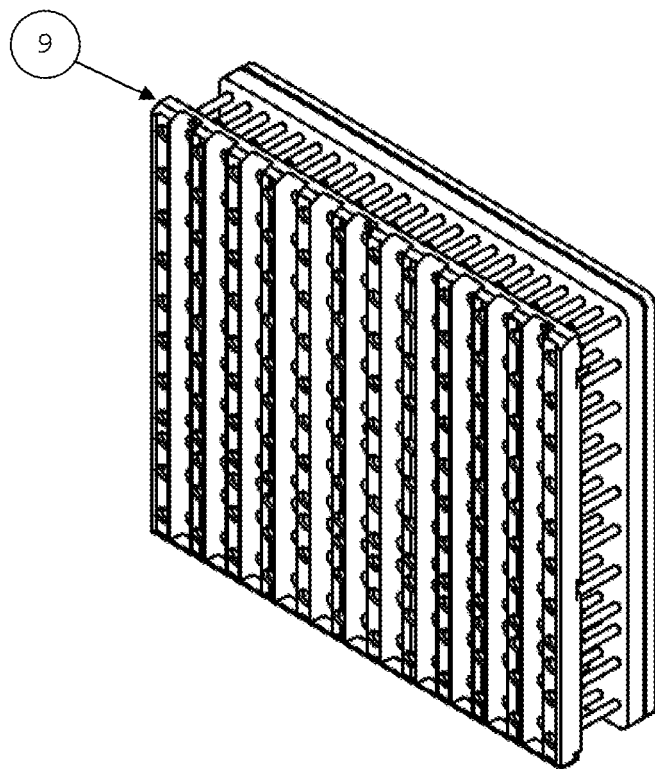


Fig. 2.2

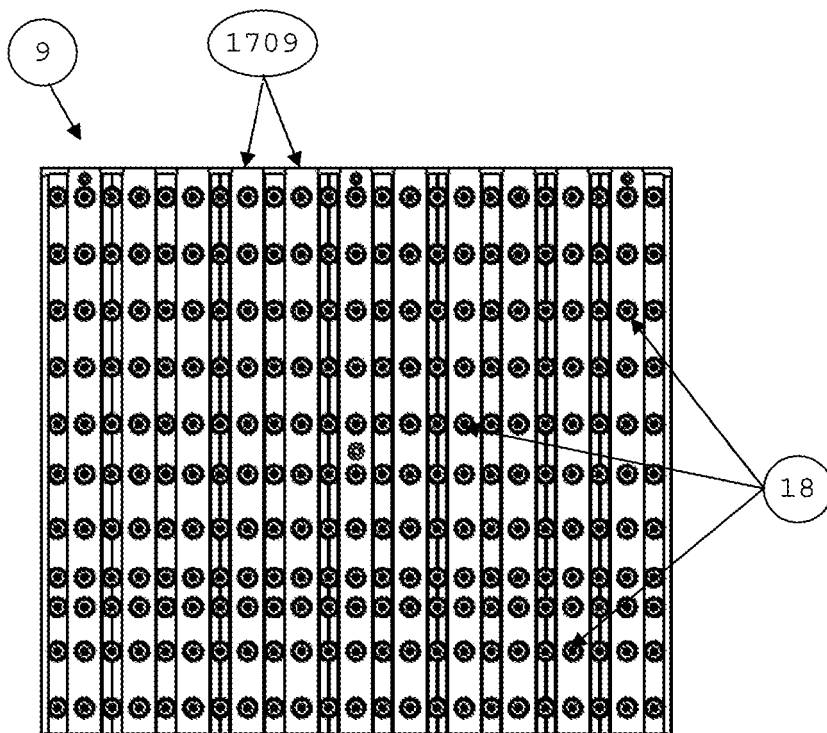


Fig. 2.3

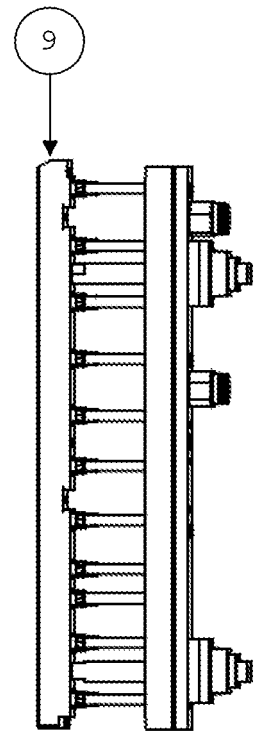


Fig. 2.4

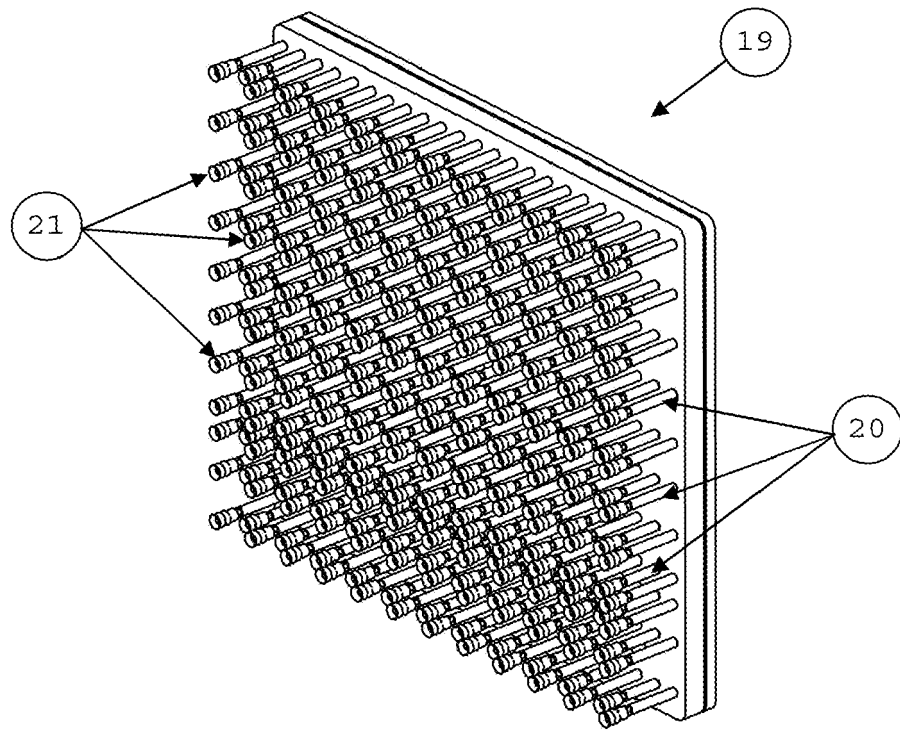


Fig. 2.5

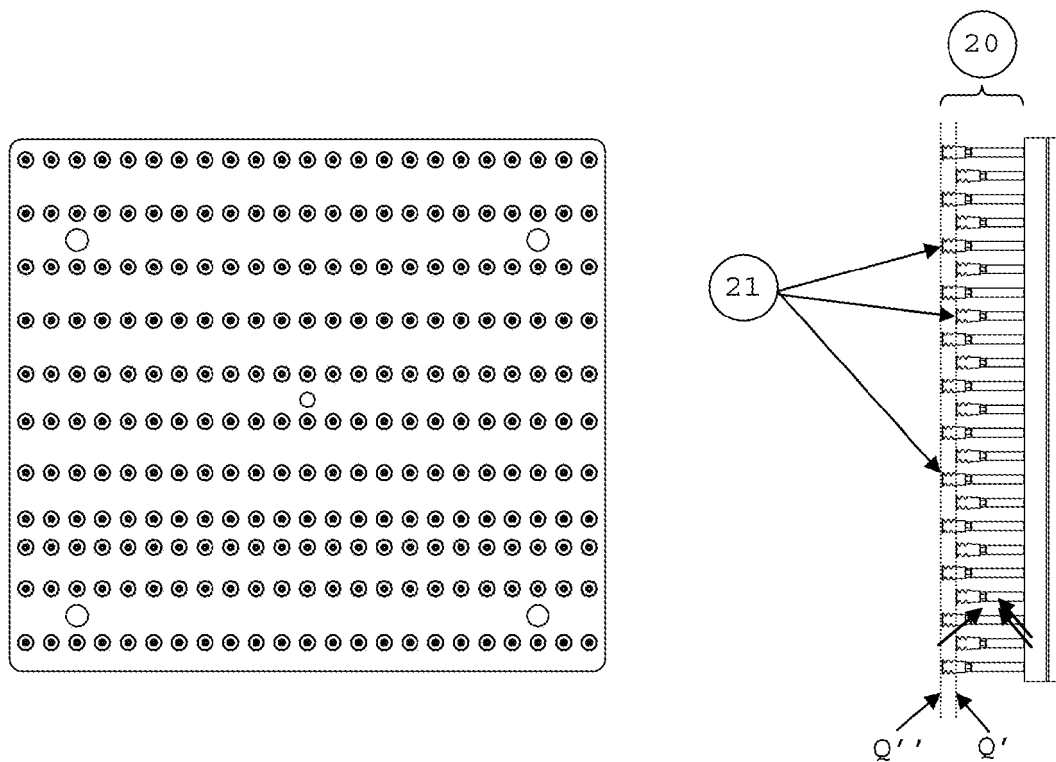


Fig. 2.6 Fig. 2.7

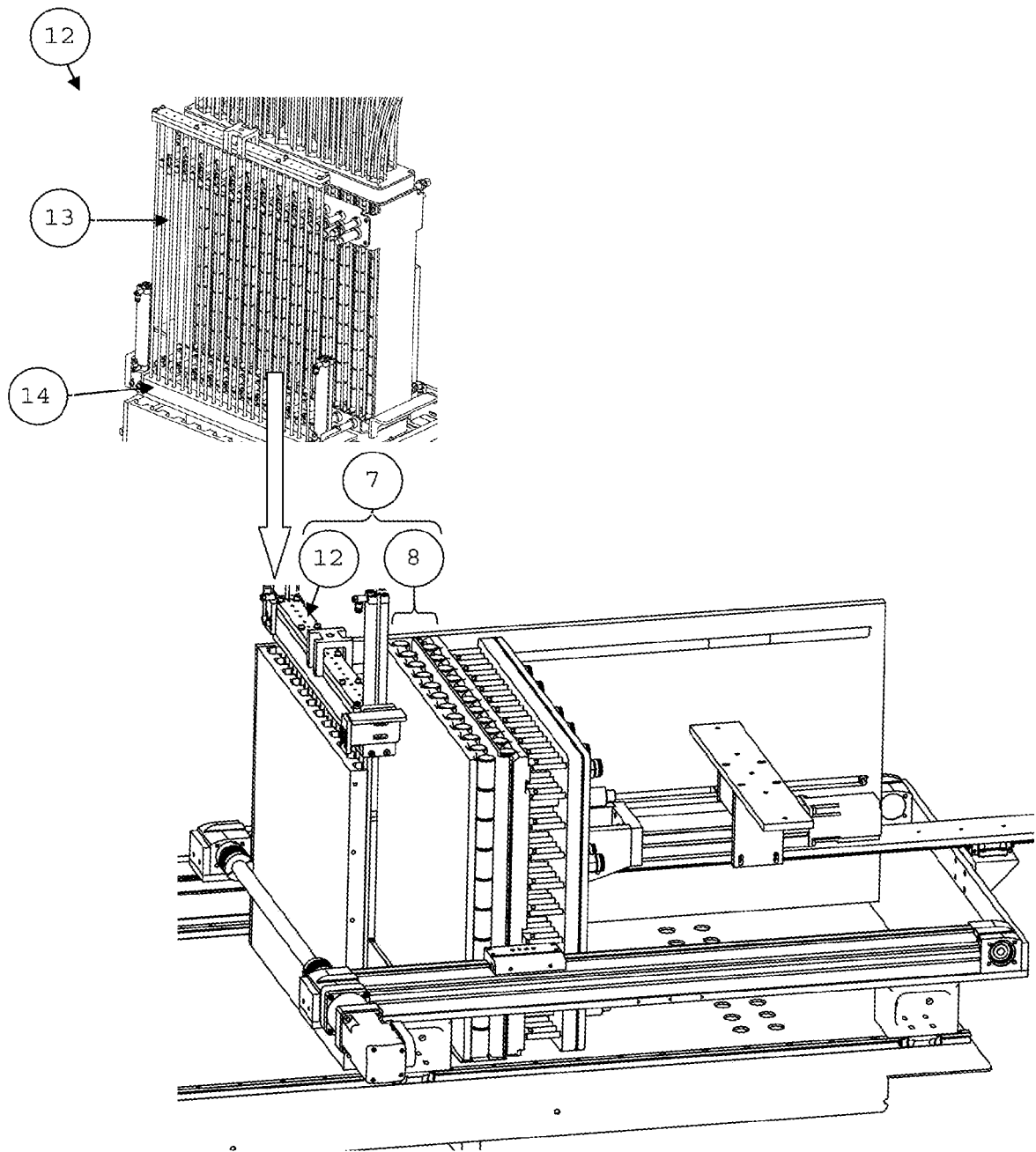


Fig. 3.1

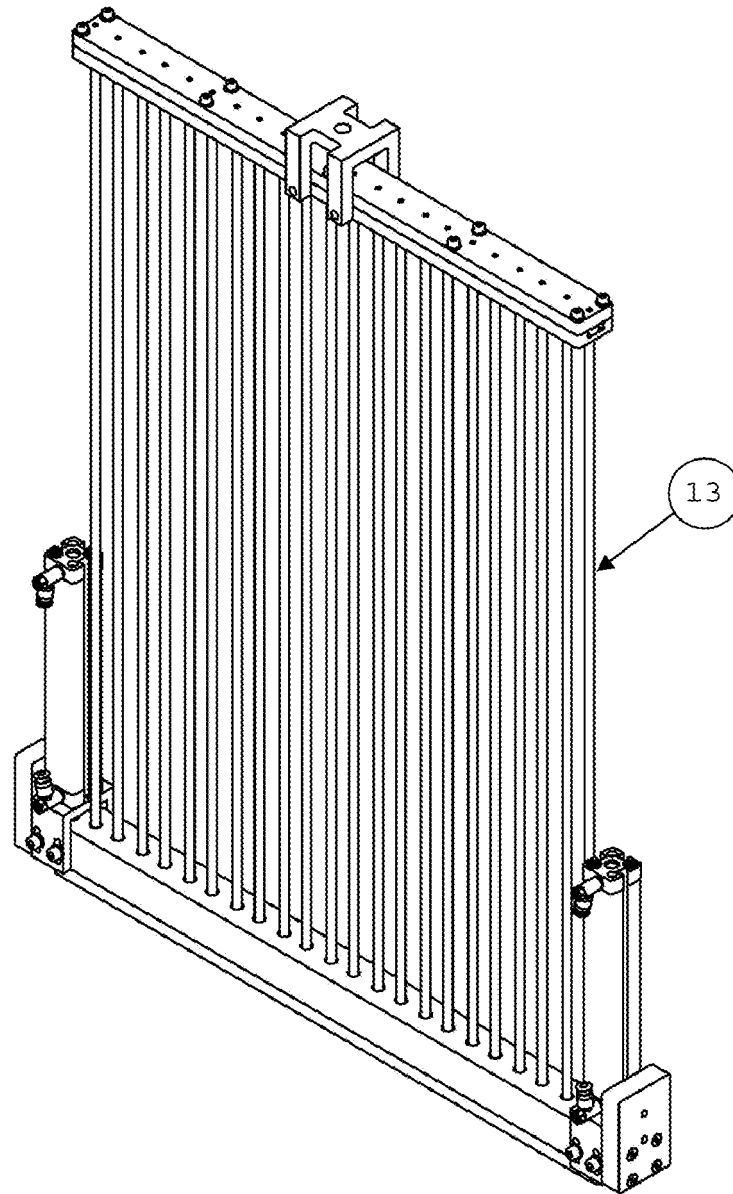


Fig. 3.2

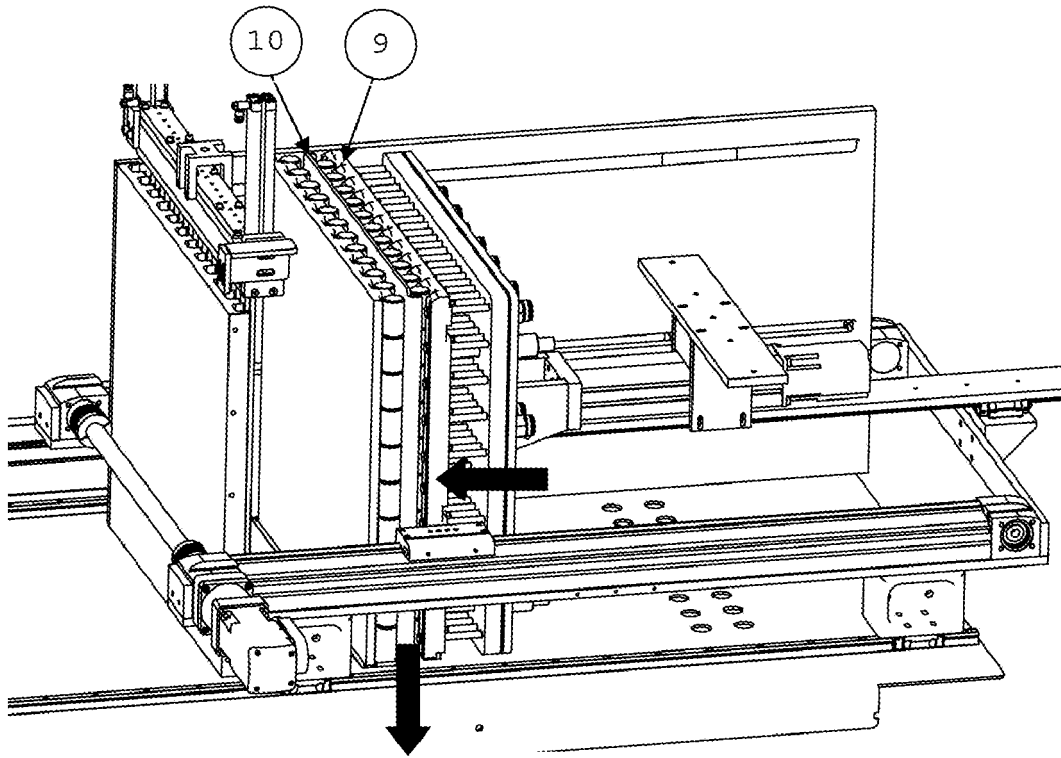


Fig. 4

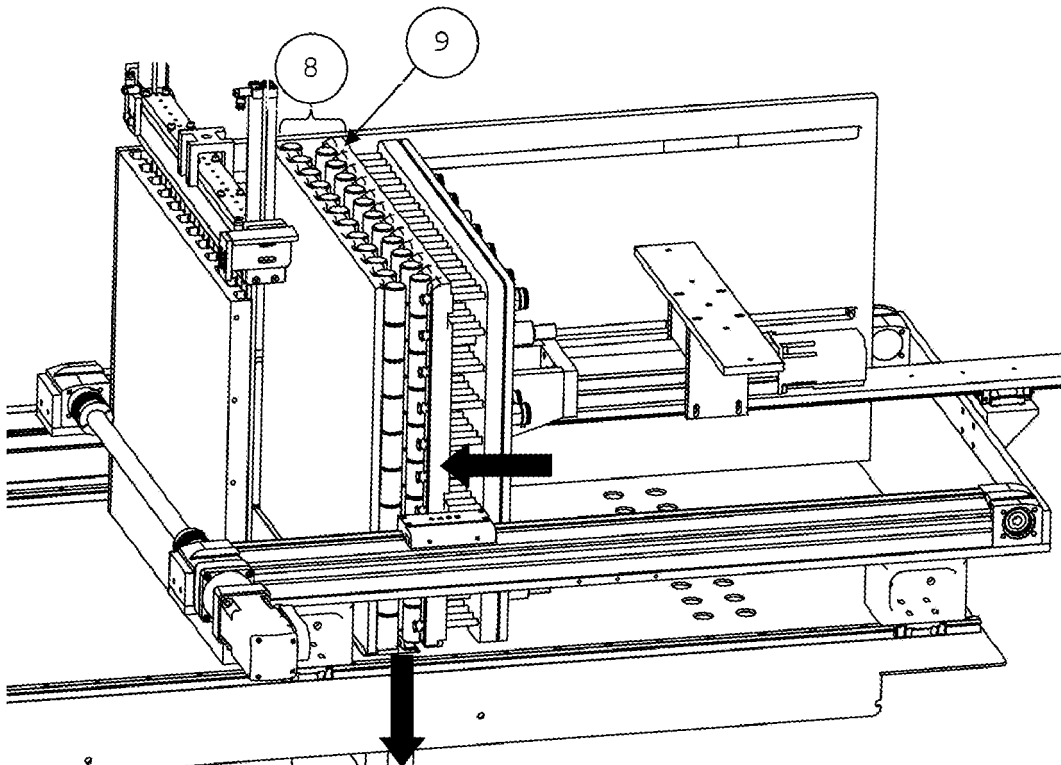


Fig. 5

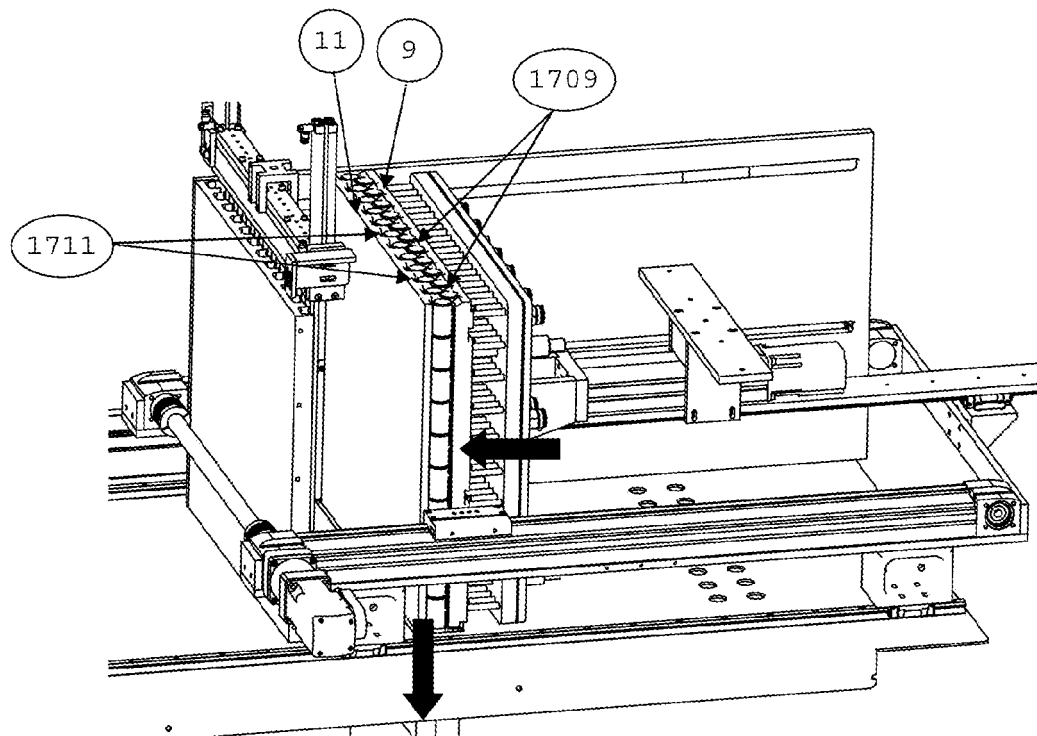


Fig. 6

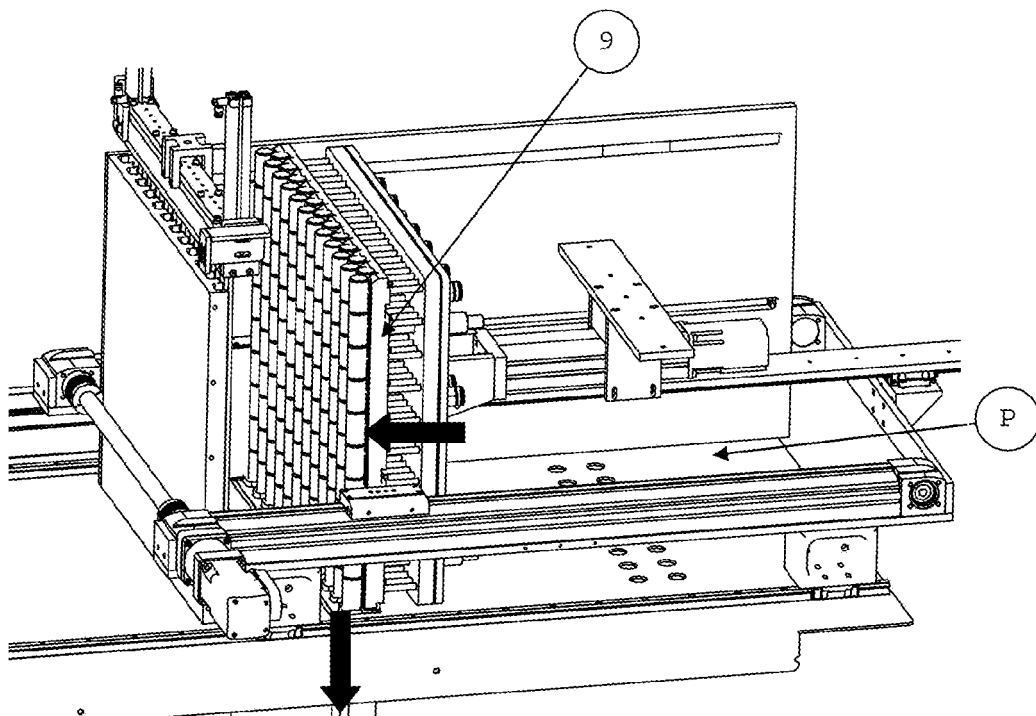


Fig. 7.1

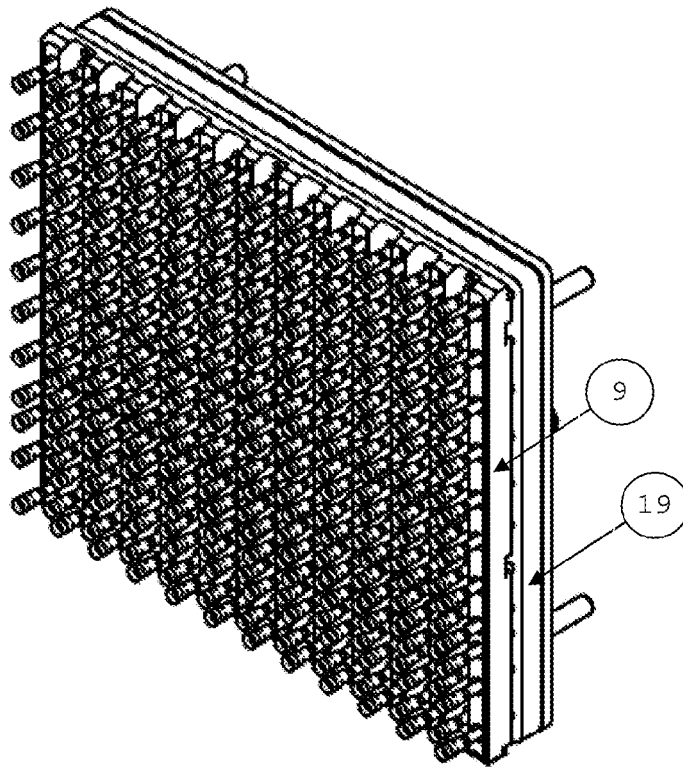


Fig. 7.2

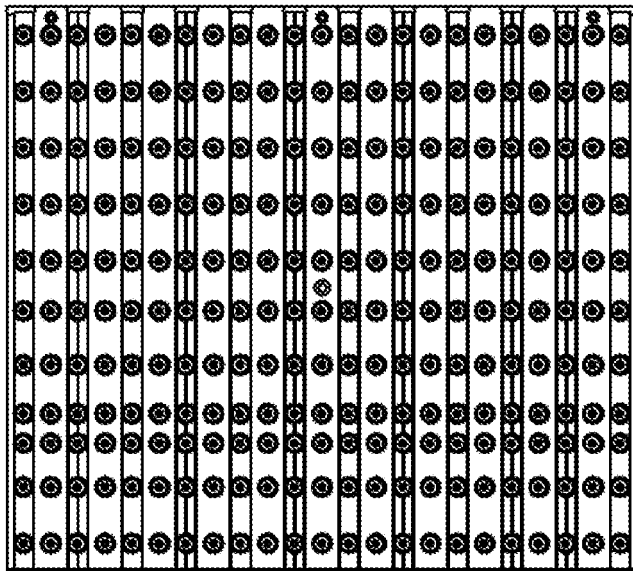


Fig. 7.3

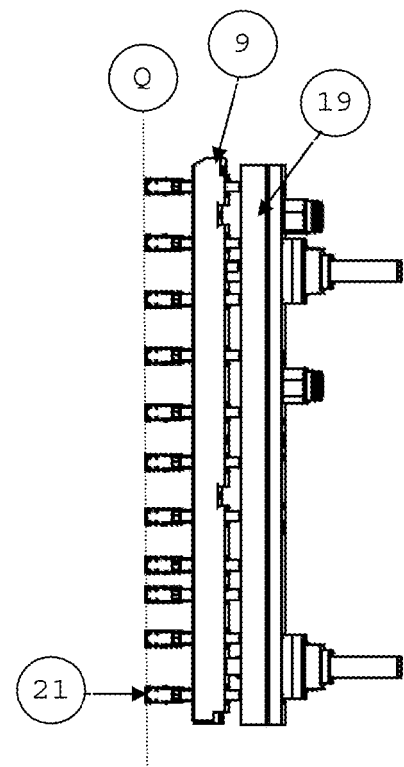


Fig. 7.4

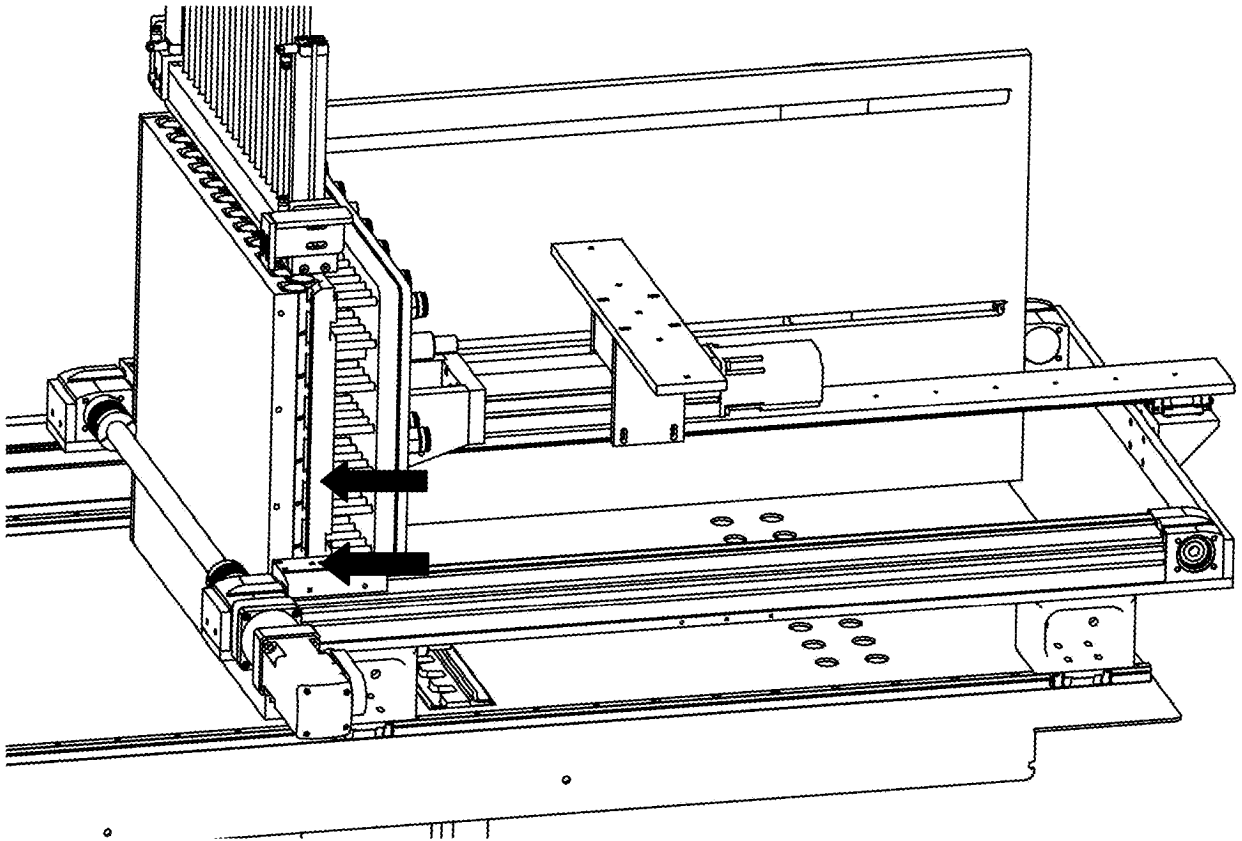


Fig. 8

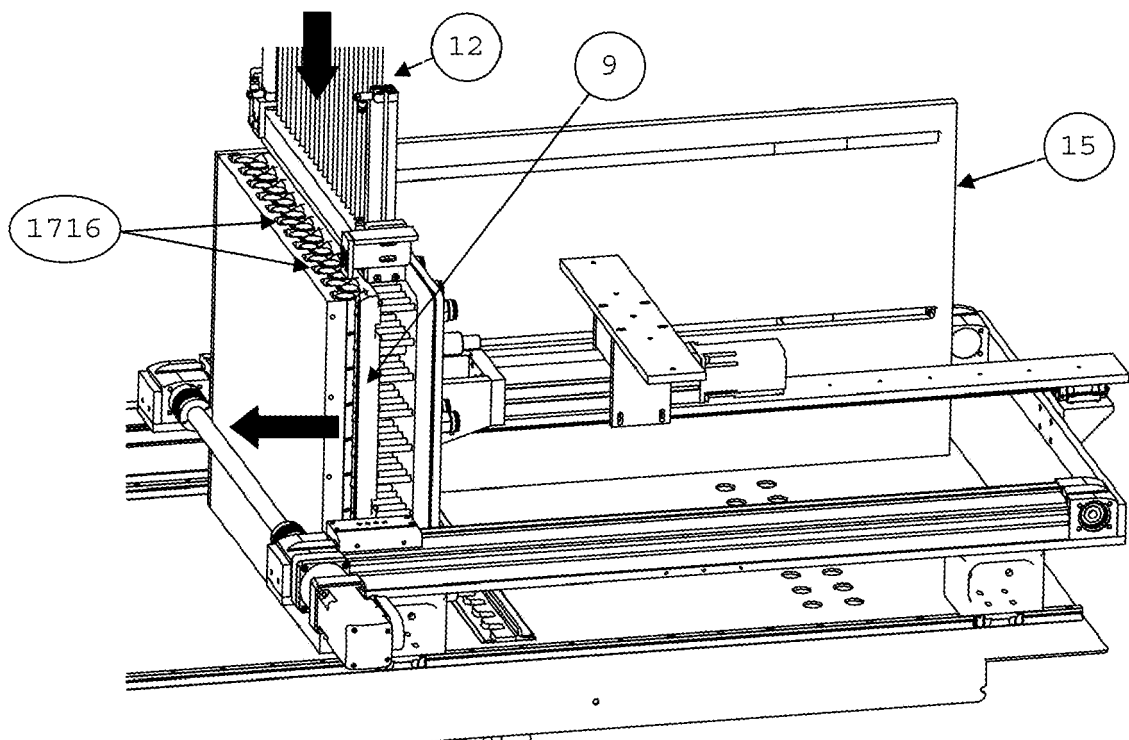


Fig. 9

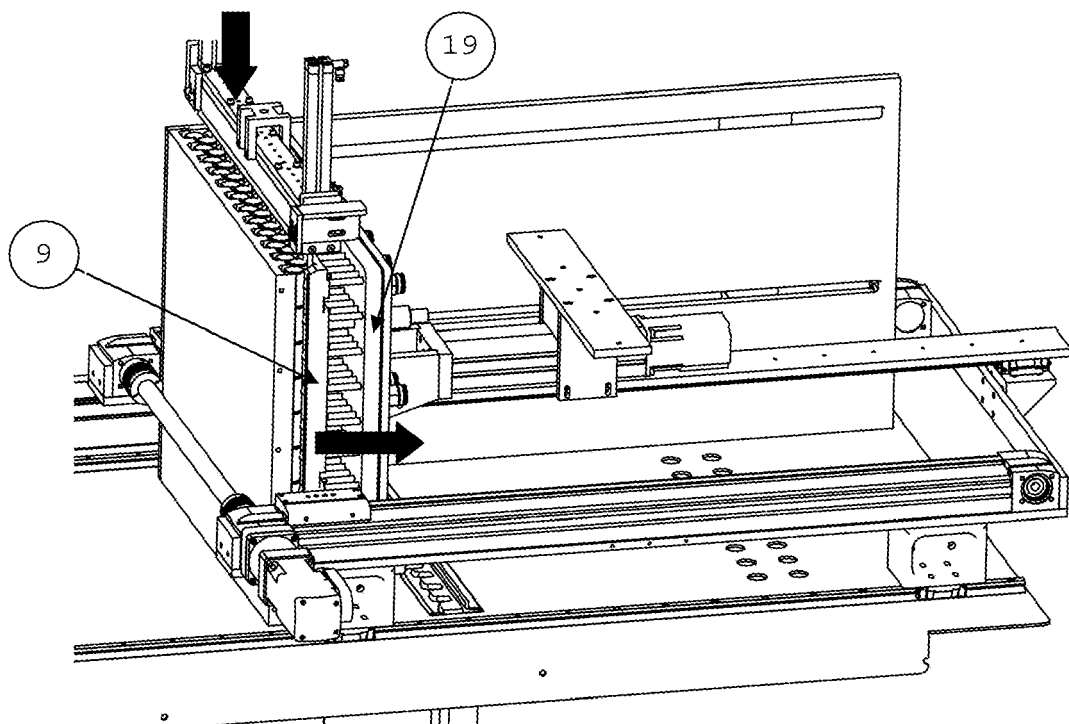


Fig. 10

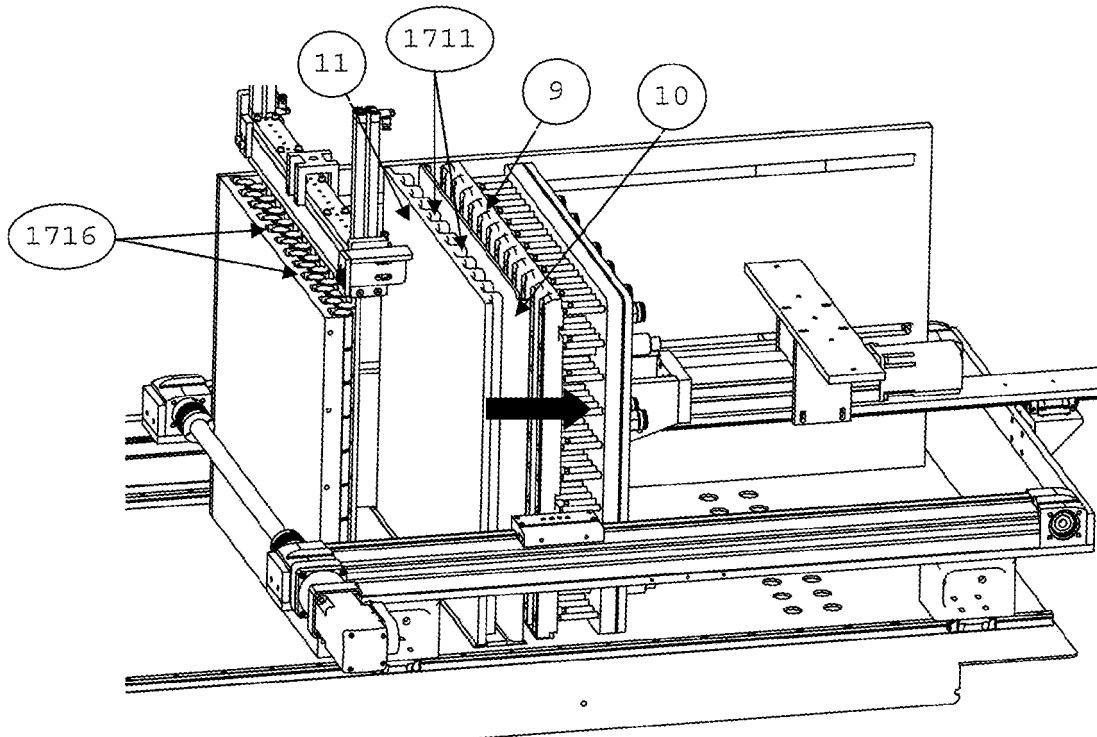


Fig. 11

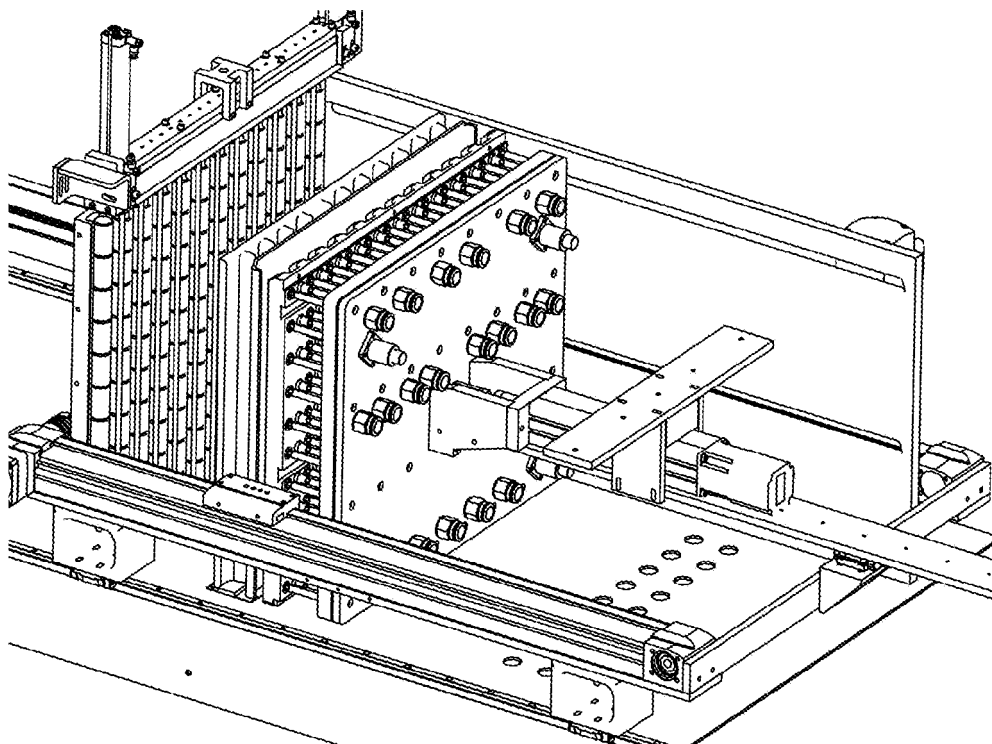


Fig. 12

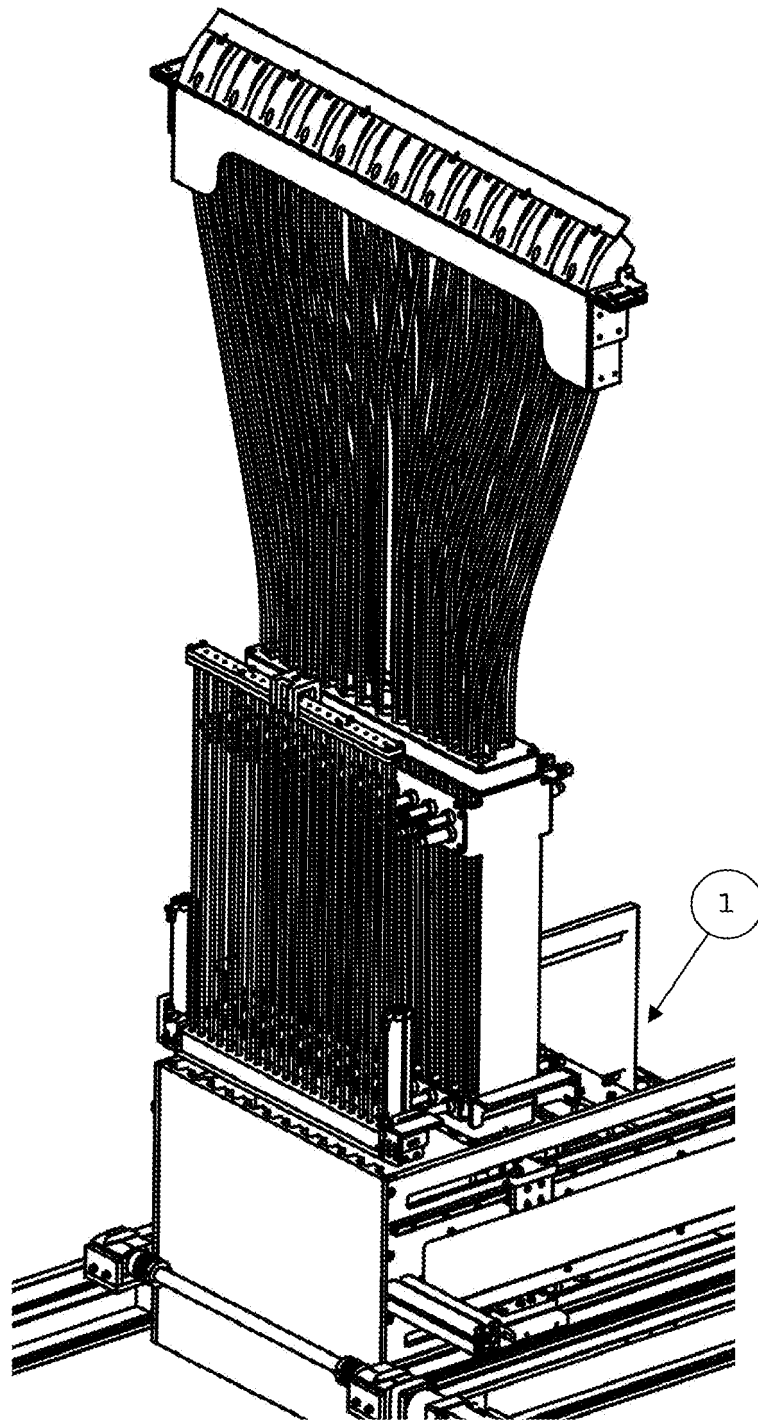


Fig. 13

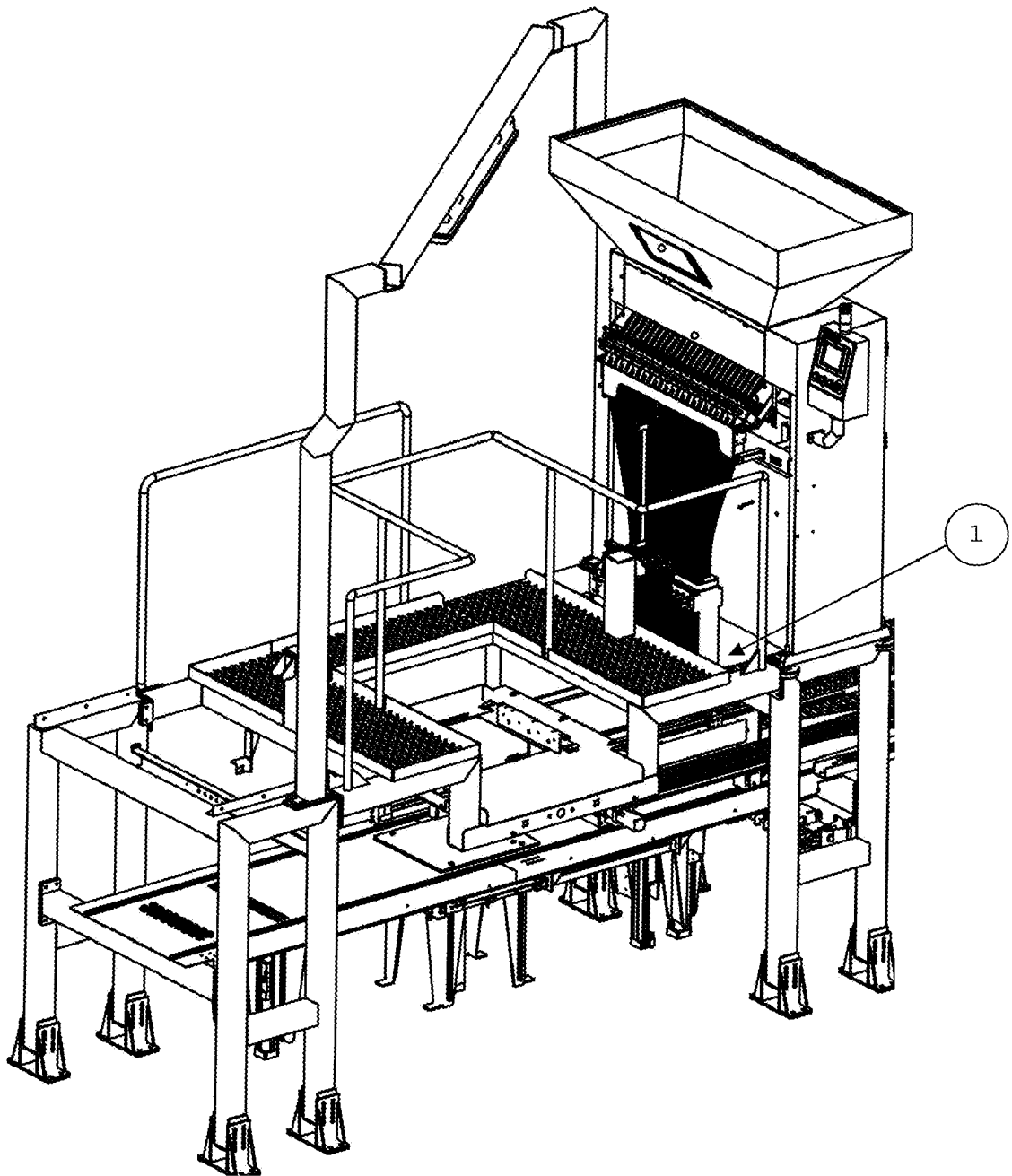


Fig. 14

INTERNATIONAL SEARCH REPORT

International application No
PCT/PT2016/050011

A. CLASSIFICATION OF SUBJECT MATTER INV. B65B5/10 B65B35/40 B65B35/38 B65B25/02 B65B35/54 ADD. B27J5/00 B65B35/52																		
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) B65B B27J																		
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																		
<table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>EP 2 733 086 A1 (MENABREAZ IVALDI S R L [IT]) 21 May 2014 (2014-05-21) paragraph [0031]; figures 8-9 -----</td> <td>1-21</td> </tr> <tr> <td>A</td> <td>US 2 589 038 A (LEON BOOTH) 11 March 1952 (1952-03-11) figures 1-3,7-9 -----</td> <td>1,21</td> </tr> <tr> <td>A</td> <td>US 2 190 859 A (BINDER JOHN M) 20 February 1940 (1940-02-20) figures 1,4,7-10 -----</td> <td>1,21</td> </tr> <tr> <td>A</td> <td>EP 1 166 982 A2 (C M A DI PIAZZESE DOMENICO S R [IT]) 2 January 2002 (2002-01-02) figure 2 -----</td> <td>1,21</td> </tr> <tr> <td></td> <td style="text-align: center;">-/-</td> <td></td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	A	EP 2 733 086 A1 (MENABREAZ IVALDI S R L [IT]) 21 May 2014 (2014-05-21) paragraph [0031]; figures 8-9 -----	1-21	A	US 2 589 038 A (LEON BOOTH) 11 March 1952 (1952-03-11) figures 1-3,7-9 -----	1,21	A	US 2 190 859 A (BINDER JOHN M) 20 February 1940 (1940-02-20) figures 1,4,7-10 -----	1,21	A	EP 1 166 982 A2 (C M A DI PIAZZESE DOMENICO S R [IT]) 2 January 2002 (2002-01-02) figure 2 -----	1,21		-/-	
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																
A	EP 2 733 086 A1 (MENABREAZ IVALDI S R L [IT]) 21 May 2014 (2014-05-21) paragraph [0031]; figures 8-9 -----	1-21																
A	US 2 589 038 A (LEON BOOTH) 11 March 1952 (1952-03-11) figures 1-3,7-9 -----	1,21																
A	US 2 190 859 A (BINDER JOHN M) 20 February 1940 (1940-02-20) figures 1,4,7-10 -----	1,21																
A	EP 1 166 982 A2 (C M A DI PIAZZESE DOMENICO S R [IT]) 2 January 2002 (2002-01-02) figure 2 -----	1,21																
	-/-																	
☒ 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 12 August 2016	Date of mailing of the international search report 25/08/2016																	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Cardoso, Victor																	

INTERNATIONAL SEARCH REPORT

International application No

PCT/PT2016/050011

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2007/059152 A1 (COTTONE NORBERT [DE]) 15 March 2007 (2007-03-15) abstract; figure 9	1,21
A	JP 2009 249113 A (TOKYO AUTOMATIC MACH WORKS) 29 October 2009 (2009-10-29) figures 1,6-11	1,21
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