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(71) Applicant: **Antonio Zamperla S.p.A.**
36077 Altavilla Vicentina (VI) (IT)

(72) Inventor: **ZAMPERLA, Alberto**
I-36077 Altavilla Vicentina VI (IT)

(74) Representative: **Mignini, Davide Giuseppe et al**
Marietti, Gislon e Trupiano S.r.l.
Via Larga, 16
20122 Milano (IT)

(54) **AMUSEMENT RIDE**

(57) It is disclosed an amusement ride (1) comprising a vehicle (2) for one or more passengers and lifting means to move said vehicle (2) between a lower position and a raised position, the lifting means comprising a nested tube arrangement (3), having a plurality of nested tubes (3a - 3f), a fluid reservoir (4) for housing an operating fluid (10) fluidically connected to said nested tubes (3a - 3f), and pressurizing means (7) to pressurize said operating fluid (10) for supplying pressurized operating fluid (10) within said nested tubes (3a - 3f) to extend said nested tube arrangement (3) in order to lift said vehicle (2) from said lower position to said raised position.

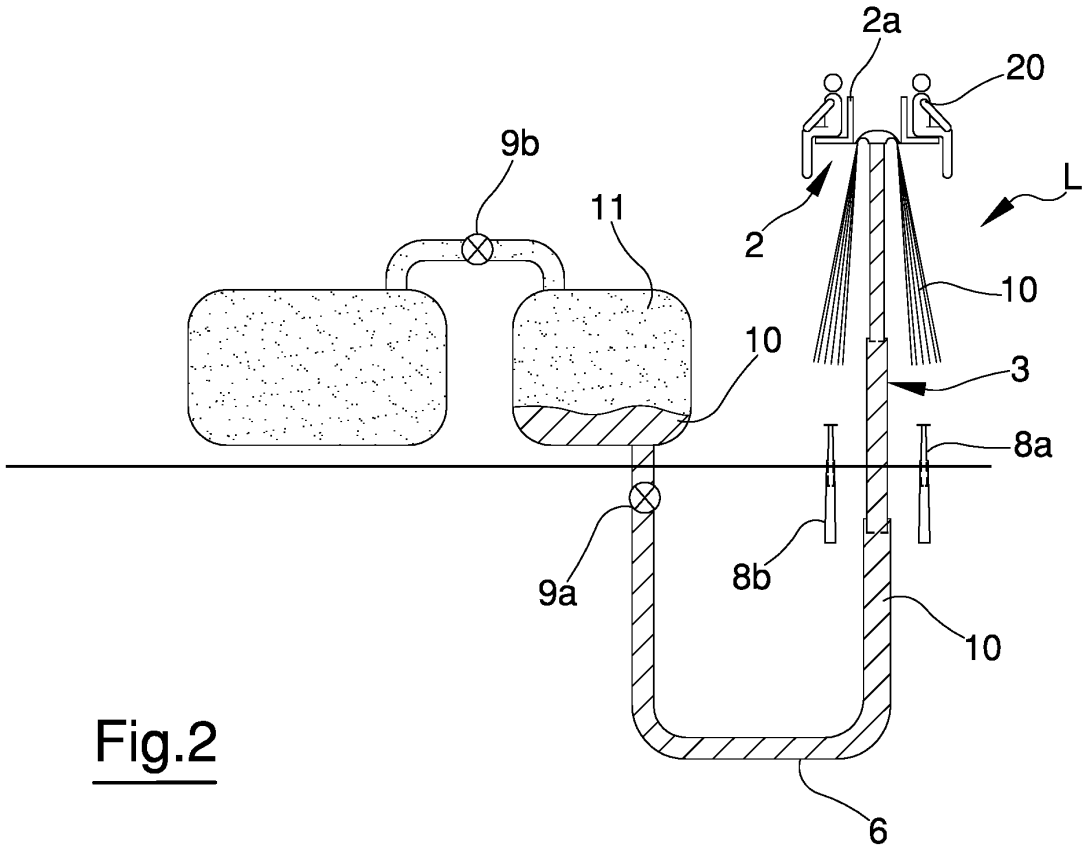


Fig.2

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Description

FIELD OF THE INVENTION

[0001] The present invention relates in general to amusement and theme parks rides, in particular to amusement rides moving a vehicle carrying one or more passengers alternately between a lower position and a raised position. Similar kinds of amusement rides are also known as towers, or drop rides.

BACKGROUND OF THE INVENTION

[0002] Park operators and ride producers are continuously seeking to increase the entertainment experience, fun and enjoyment for both the passengers of the amusement rides and the spectators.

[0003] There are also known in the art water rides provided with vehicles, intended to be occupied by passengers that are moved along a slide, partially arranged inside water so that a "splash" effect can be generated when the vehicle passes in the slide provided with water. Similar water rides are known in the art with the name of log flumes, wherein vehicles in the form of hollow logs are moved along a water flume by the water flow. A descent is usually provided in the water flume with a splash-down effect.

[0004] These rides allow interaction of passengers with water splashed in some portions of the slide along which the vehicles (hollow logs) are moved; these rides are mainly intended for kids and families and are not attractive to adult passengers because of the limited fun and thrill. Additionally, these rides necessitate a large area for their installation, in order to provide a sufficient length of the water path (water flume) along which the vehicles move.

[0005] Therefore, it is an aim of the present invention to provide an amusement ride able to increase the thrill and, in general, the entertainment experience provided to the passengers.

SUMMARY OF THE INVENTION

[0006] This and other aims are reached by an amusement ride according to the independent claim. Preferred aspects of the ride are recited in the dependent claims.

[0007] According to an embodiment an amusement ride comprises a vehicle for one or more passengers and lifting means to move said vehicle between a lower position and a raised position. The lifting means comprise a nested tube arrangement, having a plurality of nested tubes, a fluid reservoir for housing an operating fluid and fluidically connected to the nested tubes, and pressurizing means to pressurize the operating fluid for supplying pressurized operating fluid within said nested tubes. As a consequence, the nested tube arrangement is extended by the pressurized operating fluid, supplied within the nested tubes, in order to lift the vehicle from said lower position to said raised position.

[0008] The vehicle is moved alternately between the lower and the raised position, i.e. the amusement ride is not of the "roller coaster" kind where the vehicle is moved cyclically along a closed path. On the contrary, the present amusement ride is more similar to the "tower" kind, where a vehicle is moved up and down along a guide, typically along a substantially vertical and straight line.

[0009] The nested tube arrangement is a known arrangement for two or more tubes, wherein a smaller tube can axially move (typically slide) within a larger tube. This arrangement is also known as "nesting tube" arrangement or "telescopic tube" arrangement. As a result, when the tubes are all inserted one within the other, the nested tube arrangement is in its retracted condition. In such a condition, the length of the nested tube arrangement (measured along the axis of the nested tube arrangement) is minimum. On the contrary, when the smaller tubes are moved out of the larger tubes, the nested tube arrangement is in its extended condition. In such a condition, the length of the nested tube arrangement (measured along the axis of the nested tube arrangement) is maximum. The operating fluid, supplied under pressure within the nested tubes, is thus used to extend the nested tubes and moving one or more tubes out of at least another tube. For example, a smaller tube is moved out from larger tube.

[0010] The definitions "raised position" and "lowered position" are evident in this field. In particular, the "raised position" is the one where the vehicle, during its run (i.e. movement) provided by the extension of the nested tubes arrangement due to the pressurized operating fluid, is at the maximum distance from the ground, and the lowered position is the one where the vehicle, during its run, is at the minimum distance from the ground.

[0011] Advantageously, the nested tube is a compact and simple solution to move the vehicle. Also, thanks to the pressurized operating fluid used to raise the nested tubes, a great upward acceleration can be imparted to the vehicle.

[0012] According to an embodiment, the operating fluid is water. Water is a fluid that is simple to handle.

[0013] The use of water allows increasing the thrill and, in general, the entertainment experience provided to the passengers.

[0014] According to an embodiment, the nested tube arrangement comprises operating fluid ejecting means, e.g. water ejecting means, arranged to eject water from said nested tube arrangement, preferably at the vehicle or close to the vehicle. In more detail, according to a preferred aspect, the water ejecting means are placed below the vehicle, in order to eject fluid at the vehicle, below it. In other words, the water ejecting means are provided with one or more outlets that are placed below and near the vehicle.

[0015] Thanks to this, water pressure within the nested tube arrangement can be easily and quickly dropped to

low values. Also, the passenger may experience the impression of being raised directly by water, as if he was sitting on a geyser.

[0016] According to an embodiment, the ejecting means are arranged to eject water at an angle equal to or lower than 90 degrees, preferably equal to or lower than 60 degrees, more preferably equal to or lower than 45 degrees, with respect to the axis of said nested tube arrangement. In other words, the operating fluid, e.g. the jets of water ejected from the device are directed substantially downwards. This feature, among others, allows easy collection of the ejected water, to be used again in following operating cycles of the amusement ride, and improves the "geyser" feeling for the passengers.

[0017] A water collector may be placed around the nested tube arrangement in order to collect the water ejected by the device, in order to allow its re-use in a following ride. As a result, waste of water is reduced.

[0018] According to an embodiment, the pressurizing means comprise an air compressor. This is a compact and simple solution.

[0019] According to an embodiment, the amusement ride comprises weighing means to weigh said vehicle at least when it is at the lower position. The weight and the number of the passengers loaded in the vehicle may vary between different operating cycles of the amusement ride. As a result, it is advantageous to adapt the pressure of the operating fluid (and thus the lifting force applied to the vehicle) according to the total weight of the vehicle, i.e. the weight of the vehicle plus the passenger(s).

[0020] According to an embodiment, the nested tubes are provided with at least one gas chamber defined between subsequent nested tubes (typically between the lateral surfaces of the nested tubes) of the nested tube arrangement. The gas chamber is arranged so that the dimension of said gas chamber (and in particular the volume of the chamber) varies according to the relative position between subsequent nested tubes of the nested tube arrangement. This allows to dampen the movement of the various nested tubes according to their relative position, allowing to select the desired pattern for the extension (i.e. the deployment) of the nested tube arrangement.

[0021] According to an embodiment, the gas chamber is provided with openings and the nested tube arrangement is provided with sealing means to seal at least part of the openings, according to the relative position of the nested tubes.

[0022] This allows further control over the extension pattern of the nested tube arrangement. As an example, fluidic connection between the gas chamber and the external environment may be provided by two openings, a bigger one and a smaller one.

[0023] At the beginning of the extension movement, both the openings are open, so that a great flow of air is allowed from the first gas chamber into the external environment (e.g. outside the chamber). Compression of air in the gas chamber is easy, and no braking force (i.e. no dampening) is exerted on the nested tubes.

[0024] The extension speed of the nested tube arrangement is high. Subsequently, at a certain point of the movement (i.e. the run) of the nested tubes, the bigger opening is closed by the sealing means. As a result, the flow of air towards the external environment (e.g. outside the chamber) is provided only by the smaller opening, so that air provides a greater resistance to compression, and thus extension speed of the nested tube arrangement is reduced.

[0025] According to an embodiment, the amusement ride comprises braking means to brake the vehicle for at least part of the return run from the raised position towards said lower position. This helps braking the movement of the vehicle, e.g. when the presence of the operating fluid within the nested tube arrangement during the descent movement is not enough to provide an appropriate damping (braking) of the vehicle speed.

[0026] According to an embodiment, the braking means and/or the weighing means comprise at least one pneumatic piston, placed laterally with respect to the nested tube arrangement.

[0027] According to an embodiment, the braking means and the weighing means coincide.

[0028] A further aspect of the present invention provides for a method of operating an amusement ride according to one or more of the previous embodiments, comprising the steps of:

(a) loading at least one passenger on the vehicle when the vehicle is at the lower position;
(b) operating the pressurizing means to pressurize the operating fluid;
(c) supplying the pressurized operating fluid to said nested tubes to extend the nested tube arrangement in order to lift the vehicle from the lower position to the raised position;
(d) operating the pressurizing means to reduce pressure of the operating fluid or to stop pressurizing of the operating fluid to retract the nested tube arrangement in order to lower the vehicle from said raised position to said lower position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] With reference to the enclosed drawings, exemplary and non-limiting embodiments will be now discussed, wherein:

- figure 1 is a schematic view of an amusement ride according to an embodiment of the present invention, wherein the vehicle is at the lower position;
- figure 2 is a schematic view of the embodiment of fig. 1, wherein the vehicle is at the raised position;
- figure 3 is a perspective view of a further embodiment of an amusement ride, wherein the vehicle is at the lower position;
- figure 4 is a perspective view of the embodiment of

fig.3, wherein the vehicle is at the raised position;

- figure 5 is a perspective view of the embodiment of fig.3, wherein the vehicle contacts the braking means during its run from the raised position towards the lower position;
- figure 6A, 6B are detailed view of the gas chamber during subsequent steps of the extension of the nested tube arrangement;
- figures 7A, 7B are detailed view of the gas chamber during subsequent steps of the retraction of the nested tube arrangement;
- figure 8 is a perspective view of the operating fluid ejecting means of an amusement ride according to an embodiment of the present invention;
- figure 9 is a schematic view of the fluid ejecting means of an amusement ride according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0030] An amusement ride 1 comprises a vehicle 2 for one or more passengers 20. The vehicle 2 may be of different types. Generally, the vehicle 2 comprises a plurality of seats 2a, arranged to house a number of seated passengers 20. In the shown embodiment, the vehicle comprises eight seats 2a, arranged on the sides of a quadrilateral (e.g. square) shape. Number, shape and arrangement of the seats 2a may vary between different embodiments. Known locking means (e.g. belts or similar elements) may be arranged on the vehicle 2 to secure the passenger 20 to the vehicle, i.e. to avoid disengagement between the passenger 20 and the vehicle 2 during operation of the amusement ride 1.

[0031] The amusement ride 1 also comprises lifting means L, to move the vehicle between a lower position (shown e.g. in figures 1 and 3) and a raised position (shown e.g. in figures 2 and 4). In other words, the lifting means are arranged so that, in operation, the vehicle 2 is moved up (i.e. towards the raised position) and down (towards the lower position). The lifting means L are typically arranged to move the vehicle along a substantially straight path. According to an aspect, the path is substantially arranged vertically, when the amusement ride 1 is in use. The lifting means L comprise a fluidic reservoir 4 to house an operating fluid 10. The fluidic reservoir 4 may be any kind of housing or container capable of containing an operating fluid 10. As better discussed later, the operating fluid 10 is used to move the vehicle 2 between the lower and the raised positions.

[0032] The lifting means L also includes a nested tube arrangement 3, comprising a plurality of nested tubes 3a, 3b, 3c, 3d, 3e, 3f. In the schematic embodiment of figures 1 and 2, the nested tube arrangement comprises three nested tubes 3a - 3c; in the embodiment of figures 3 - 6, six nested tubes 3a - 3f are shown. In general, the number of nested tubes may vary between different embodiments. Typically, there is a fixed nested tube and a plurality (i.e. at least two) movable nested tube. A preferred embodiment comprises three nested tubes, typically a fixed nested tube and two movable nested tubes.

[0033] The arrangement of tubes in a nested arrangement is known in mechanics. In particular, the nested tubes 3a - 3f have progressively decreasing section dimensions, and are arranged one within the other. Each nested tube (apart from the largest one) can slide with respect to the relevant larger nested tube, so that the length of the nested tube arrangement 3 may vary according to the relative position between the different nested tubes 3a - 3f. In the following, when the nested tubes 3a - 3f are moved out one from the other, increasing the length of the nested tube arrangement 3, reference will be made to an "extending" of the nested tube arrangement 3. On the contrary, when the nested tubes 3a - 3f are moved to be inserted one within the other, decreasing the length of the nested tube arrangement 3, reference will be made to a "retracting" of the nested tube arrangement.

[0034] According to an embodiment, the first nested tube 3a, i.e. the largest one, may be fixed, while the other nested tubes 3b - 3f are movable. The definition "fixed" and "movable" are to be considered during use, with respect to the ground where the amusement ride 1 is placed. As a result, a tube element is "fixed" when it does not move with respect to the ground.

[0035] In other words, according to an aspect of the invention, the first nested tube 3a is substantially fixed with respect to the ground, while the other nested tubes 3b - 3f are movable (typically up and down) with respect to the ground. As a result, the first nested tube 3a serves as a supporting (and guide) element for the other movable nested tubes 3b - 3f (in particular, for the second nested tube 3b).

[0036] Typically, as per the shown embodiments, the vehicle 2 is constrained to the nested tube of the nested tube arrangement 3 having smaller diameter (in cross section). Typically, considering the condition of the amusement ride 1 wherein the vehicle is at its raised position, the nested tube having the greatest diameter is the one placed at the lowermost position, while the nested tube with the smallest diameter is the one at the uppermost position.

[0037] At least part of the nested tubes 3a - 3f (typically all the movable ones) are fluidically connected between each other. The fluidic connection between two subsequent nested tubes 3d and 3f is for example shown with reference to figures 6A - 7B. This description however applies in general to the fluidic connection between two generic nested tubes of the nested tubes arrangement.

[0038] Nested tubes 3d and 3e are each provided with a fluid chamber 30d and 30e for receiving operating fluid 10 in pressure. Fluid chambers 30d and 30e are fluidically connected to allow flow of the operating fluid 10 between the nested tubes 3d and 3e. In the shown embodiment, the nested tubes are hollow, so that the internal cavities (i.e. the internal empty space) of the nested tubes form the fluid chambers 30d and 30e

[0039] According to an embodiment, the nested tubes 3d, 3e are further provided with gas chambers 31 d and 31 e, which are preferably fluidically separated from the fluid chambers 30d and 30e for the operating fluid 10. According to a possible embodiment, as for example shown in the figures, the gas chambers 31 d and 31 e are annular and they are arranged around the fluid chambers 30d and 30e.

[0040] The nested tubes 3d and 3e are preferably provided with sealing means 34, 35 to fluidically separate the fluid chambers 30d and 30e from the gas chambers 31d and 31e. In the shown embodiment, annular sealing means are arranged laterally with respect to the nested tubes 3d and 3e. As a result, the lateral space between the nested tubes 3d and 3e (i.e. between the lateral surface of the inner tube and the inner surface of the outer tube is fluidically separated from the fluid chamber 30d and 30e. Such a lateral space between the tubes 3d and 3e forms the gas chambers.

[0041] In the shown embodiment, the nested tubes (apart from the top one) are provided in two pieces, i.e. a main body B and an extension E, provided at the top portion of the main body B. The extension E is typically a hollow member that can be applied to an end of a nested tube. A gas chamber 31 d is provided between the external surface of the main body B of nested tube 3d (i.e. of an inner tube between two subsequent tubes) and the inner surface of the main body B of the nested tube 3e (i.e. of the outer tube between two subsequent tubes), while gas chamber 31 e is provided between the external surface of the main body B of the nested tube 3d (i.e. of an inner tube between two subsequent tubes) and the inner surface of the extension E. The lower portion of the extension E may also be provided with (or it may act itself as) the sealing means 35.

[0042] Relative movement between the nested tubes 3d, 3e may vary the dimension of the gas chambers 31 d and 31 e. In particular, when the dimensions of the gas chambers 31 d and 31 e are reduced, the gas contained in the gas chambers 31 d, 31 e is compressed, so that a braking force is exerted on the moving nested tubes so as cushioning the relative movement of the tubes 3d, 3e, for at least part of their relative movement, preferably in proximity of the extended position or the retracted position. By doing so, a contact of the end parts of two nested tubes in the retracted position and/or the extended position can be damped by means of the modification of the dimension (e.g. the volume) of the gas chamber.

[0043] Openings 31, 32 and 33 may provide fluidic connection between the gas chambers 31 d, 31e and the external environment. In the shown embodiment, gas chambers 31d is provided with different rows of lateral openings 31 and 32, distanced one from the other in the longitudinal direction of the nested tube arrangement 3, while the gas chambers 31 e is provided with an upper opening 33. In these embodiments the gas used in the gas chambers is typically environmental air.

[0044] According to an embodiment, the sealing means 34, 35 can be provided to totally, or at least partially, close at least part of the openings 31, 32, 33 that fluidically connect the gas chamber 31d with the external environment. The sealing means 34, 35 are typically arranged to seal (or partially seal) the openings 31, 32, 33 only when the nested tubes are disposed in pre-determined conditions. As an example, sealing means 34 are preferably arranged to seal (or partially seal, i.e. partially occlude) the openings 31 and/or 32 only when the nested tubes 3d and 3e approach the extended condition. Such an arrangement may be used to decrease the flow of air from the gas chamber 31 d towards the external environment, to reduce the relative speed of movement between the nested tubes 3d and 3e. In fact, when the two nested tubes 3d, 3e move one relative to the other, the sealing means 34 are moved as well, thus varying the dimension of the gas chamber 31. As a result, when the nested tubes are extended, the dimension of the gas chamber 31 is decreased, and air is compressed and expelled from the gas chamber 31d via the openings 31 and 32.

[0045] In particular, opening 32 is bigger than opening 31, i.e. opening 32 allows a greater flow of air towards the external environment. As mentioned, the sealing means 34 are arranged to seal, i.e. to occlude, opening 32 when the tube 3e approaches the extended condition from nested tube 3d. Flow of air towards the environment is thus reduced, so that it is more difficult to compress air within the gas chamber, and thus the extension speed of nested tube 3e from nested tube 3d is reduced as well, providing a cushioning effect.

[0046] Similarly, the gas chamber 31 e is open at the top, so that the sealing means 35 are generally external to the gas chamber 31 e. However, when nested tube 31 e approaches the end of its downward run within the outer nested tube 3d, the sealing means 35 enters and closes the gas chambers 31 e, so that a cushion of air is formed between the two nested tubes, increasing a braking force (due to the compression of gas within the air chamber 31 e) and causing relative motion between the nested tubes 3d and 3e to eventually cease.

[0047] The nested tube arrangement 3 also comprises fluid ejecting means 5, arranged to eject operating fluid 10 from the nested tubes 3a - 3f to the external environment. Typically the fluid ejecting means 5 comprise ejecting openings or ejecting nozzles 5a. In particular, ejecting openings or nozzles 5a are preferably used when the operating fluid 10 is water, so that the "fluid" ejecting means are "water" ejecting means. According to an aspect, the water ejecting means are disposed at the vehicle 2 or close to vehicle 2, so that the water ejected from the water ejecting means 5 resembles a geyser lifting the vehicle. In fact, the ejecting means 5 are preferably placed under the vehicle 2. In other words, the nozzles 5a are preferably placed under the vehicle 2 so that, in use, the sight of the nested tubes 3a - 3f is substantially concealed to the user, giving him the impression of being raised by a jet of water.

[0048] In particular, according to an embodiment, the

water ejecting means are arranged to eject water at an angle α equal to or lower than 90 degrees, preferably equal to or lower than 60 degrees, more preferably equal to or lower than 45 degrees, with respect to the axis A of said nested tube arrangement. In other words, the water ejecting means are arranged so that, in use, water is ejected at an angle lower than a radial direction with respect to the axis of the tubes. Preferably the water is ejected downwards with respect to the nested tube arrangement. The above mentioned "angle" α is measured from the axis A of the nested tube arrangement 3, as for example shown in figure 9.

[0049] Thus an angle α of 90 degrees means that the water is ejected radially with respect to the nested tube arrangement 3. Typically, the amusement ride 1 is arranged so that, in use, the axis of the nested tube arranged is vertical; an angle α lower than 90 degrees thus means that water is ejected downward directed towards the ground. Typically, water is ejected through an ejecting opening or nozzle 5a. The angle of the axis of the ejecting opening or nozzle 5a with respect to the axis of the nested tube arrangement 3 is thus corresponding to said angle α.

[0050] Typically, the ejecting opening or nozzle 5a is preceded by a bent or curved duct 5b. The definition "precede" is to be meant with reference to the flow of the operating fluid 10. In other words, the operating fluid 10 meets the bent duct before being ejected from the ejecting opening or nozzle 5a. Typically, the bent duct 5b is placed just before the ejecting opening or nozzle 5a, so that it is located at the vehicle 2. The bent duct 5b is arranged so that, in use, the operating fluid 10 reaches its highest (i.e. most distant from the ground) point in its run within the nested tube arrangement 3 when it reaches the bend of the tube 5b.

[0051] According to an embodiment, the curved duct is a substantially "U" shaped bent duct, as shown in the figures. This is particularly useful when water is ejected downwards with a reduced angle α with respect to the axis of the nested tube arrangement 3, thus providing a water ejection close (e.g. substantially parallel) to the axis of the nested tubes.

[0052] The fluidic reservoir 4 is fluidically connected, in a known manner, to the nested tube arrangement 3, so that operating fluid 10 may flow from the fluidic reservoir 4 to the nested tube arrangement 3. As an example, in the shown embodiment, a connecting duct 6 is placed between the fluidic reservoir 4 and the nested tube arrangement 3.

[0053] The amusement ride 1 also comprises means 7 to pressurize the operating fluid 10, namely water in the shown example. These means 7 may be of various kinds known in the art. As an example, in the shown embodiment, the pressurizing means 7 comprise an air compressor 7a. In more detail, compressed air 11 is used to pressurize the operating fluid 10 (e.g. water in the shown embodiment), so as to force it towards (and within) the nested tube arrangement 3.

[0054] According to an aspect, the pressurizing means comprise a high pressure air tank 7b, that is arranged downstream the air compressor 7a. The high pressure air tank 7b is fluidically connected to the air compressor 7b, so that it can receive compressed air 11 from the air compressor 7a. Thanks to this, in use, when there is the need of compressed air 11, it may be quickly provided by the high pressure tank 7b. The air to be compressed by the compressor 7 may be taken directly from the environment. Otherwise, a low pressure air tank 7c may be provided, e.g. interposed between the air compressor 7a and the high pressure tank 7c. In such an embodiment, when the air compressor is activated, it compresses the air of the low pressure air tank 7c, to feed compressed air 11 to the high pressure air tank 7b.

[0055] A number of valves 9a - 9d may be disposed between the various element fluidically connected between each other, to selectively allow/prevent the flow of operating fluid 10 between them. In the figures there are shown: a valve 9a at the outlet of the fluidic reservoir 4, a valve 9b at the inlet (figs 1 - 2) of the fluidic reservoir 4, a valve 9c between the low pressure air tank 7c and the high pressure air tank 7b (figs. 3 - 4), a valve 9d at the outlet of the high pressure air tank 7b.

[0056] According to an embodiment, the pressurizing means vary the pressurization of the operating fluid 10 during different cycles of the amusement ride 1. In particular, according to an aspect, the pressurization of the operating fluid 10 is chosen according to the weight of the loaded vehicle, i.e. the weight of the vehicle 2 plus the weight of the passengers 20. As a result, the amusement ride 1 may comprise weighing means 8, to evaluate the weight of the vehicle 2 when one or more passengers 20 are loaded to the vehicle itself.

[0057] In the shown embodiment, the weighing means 8 comprise two pneumatic pistons 8a, 8b. The number of pneumatic pistons may vary with respect to what shown, e.g. a single pneumatic piston may be used, as well as more than two pneumatic pistons 8a, 8b. In general, the weighing means 8 are arranged to weigh the vehicle 2 when the latter is at the lower position. In the shown embodiment, the pneumatic pistons 8a, 8b are arranged laterally, preferably in a parallel manner, with respect the nested tube arrangement 3. The weighing means 8 are preferably separate from the nested tube arrangement 3, as per the shown embodiment.

[0058] The pneumatic pistons 8a, 8b are connected to a source of air (not shown). In an embodiment, the pneumatic pistons 8a, 8b may be connected to pressurizing means 7. As better discussed later, when the vehicle 2, loaded with passengers 20, is at the lower position, the pneumatic pistons 8a, 8b are initially extended to lift the vehicle 2, typically for a short run. The amusement device 1 may thus evaluate the force needed to lift the vehicle 2, to infer the weight of the loaded vehicle itself. This value may be used to set the pressure at which the operating fluid 10 should be pressurized to extend the nested tube arrangement 3 in the desired manner (e.g. with the desired acceleration/speed).

[0059] According to an aspect, the weighing means 8 may also be used to brake the run of the vehicle 2, typically in the downward movement. In particular, the pneumatic pistons 8a, 8b may be extended to wait for the vehicle 2. When the vehicle 2 contacts the pneumatic pistons 8a, 8b, the vehicle begins to compress the pneumatic pistons 8a, 8b that, due the pressurized air contained therein, damp (and thus brake) the movement of the vehicle 2.

[0060] In an alternative embodiment, the weighing means and the braking means may be separate, i.e. independent, one from the other. As an example, the above discussed pneumatic pistons 8a, 8b may be used only as braking means, while different weighing means (or no weighing means at all) may be provided. In the above discussed embodiment, the weighing means and the braking means coincide. It is also possible that the braking means and the weighing means are only partially "overlapped". In other words, it may be the case that only part of the weighing means are used also as braking means or vice versa. As an example, both the pneumatic pistons 8a, 8b may be used as braking means, while only pneumatic piston 8b is used also as weighing means. As a further example, both the pneumatic pistons 8a, 8n may be used both to weigh and to brake the vehicle, but the braking means comprise also elements (not shown) that brake the movement of the vehicle e.g. by friction.

[0061] As mentioned, the weighing means and the braking means may be separate one from the other, but they can both comprise one or more pneumatic pistons. As an example, pneumatic piston 8a may be used to weigh the vehicle 2, while pneumatic piston 8b may be used to brake the vehicle 2.

[0062] During use, the nested tube arrangement 3 is initially retracted so that the vehicle 2 is at its lower position, to allow loading of passengers 20 on the vehicle 2. Preferably, after all the passengers 20 (not shown) are loaded onto the vehicle 2, the weighing means 8 evaluate the weight of the loaded vehicle 2.

[0063] As mentioned, in a preferred embodiment, as for example shown in the figures, one or more pneumatic pistons 8a, 8b are extended until they contact the vehicle 2. Subsequently they lift, typically for a short run, the vehicle 2. By evaluating the lifting force needed to lift the vehicle 2, the weight of the vehicle 2 loaded with passengers is measured.

[0064] Then, the pressurizing means 7 pressurize the operating fluid 10, and supply it to the nested tube arrangement 3, to extend it. As mentioned, according to an aspect, the pressurization of the operating fluid 10 may be set according to the measured weight of the loaded vehicle 2. As a result, the acceleration and/or speed of the vehicle may be substantially identical in subsequent cycles, even if the loaded vehicle 2 has each time a different weight.

[0065] According to an aspect, the air compressor 7a compresses and supplies air 11 to the operating fluid (e.g. water) 10, to push the operating fluid within the nested tubes 3a - 3f, to extend it. In more detail, with reference to the shown embodiment, valve 9a is opened and water 10 is sent by gravity to the connecting duct 6. Meanwhile, compressor 7a compresses the air 11 of the low pressure air tank 7c, valve 9c is opened, and air 11 at the desired compression degree (calculated as a function of the weighing means 8) is collected within the high pressure air tank 7b. Subsequently, valve 9d is opened, and the air 11 of the high pressure tank 7b pushes water 10 within the nested tube arrangement 3.

[0066] Meanwhile, valve 9a is closed, and the fluid reservoir 4 is filled again in a known manner with fluid coming from a fluid source (not shown).

[0067] As mentioned, there are different ways to supply pressurized operating fluid 10 (e.g. water) to the nested tube arrangement. In the schematic view of figures 1 and 2, as an example, compressed air 11 is sent directly within the fluidic reservoir 4, in order to pressurize water 10 and to supply it towards the nested tube arrangement 3.

[0068] The pressurized operating fluid 10 then reaches the nested tube arrangement 3 and extends it, in order to move the vehicle from the lower position towards the raised position. The fluidic communication between the nested tubes 3a - 3f may be arranged in different ways, according to the desired extension (i.e. deployment) pattern of the nested tube arrangement 3. The arrangement of air chambers 31 d, 31 e may also provide different deployment patterns.

[0069] With reference to the embodiment shown in figures 6A - 7B, the nested tubes 3d and 3e are provided with gas chambers 31 d and 31 e, that provide selective braking of the movement of the nested tubes 3d and 3f according to the relevant position between the nested tubes themselves. As mentioned, sealing means 33, 34 are integral with one of the nested tubes so as to vary the dimension of the gas chamber, so as to compress the gas housed therein, thus providing a braking force on the nested tubes 3d, 3e. A gas chamber 31d can be provided with openings 31 and 32, wherein opening 32 is bigger than opening 31.

[0070] Openings 31 and 32 are spaced ones from the others in the longitudinal direction (i.e. in the direction of the axis of the nested tube arrangement 3), and allow fluidic communication between the gas chamber 31d and the external environment. In the condition of figure 6A, the sealing means 34 are not engaged with any of the openings 31, 32. As a result, a great flow of air is allowed from gas chamber 31 d to the external environment. As a consequence, air is easily expelled from the gas chamber 31d, little or no compression of air occurs within the gas chamber 31 d so that little or no braking force is exerted on nested tube 3e, that is rapidly extracted from nested tube 3d.

[0071] Subsequently, the sealing means 34 engages the bigger opening 32, so as to (at least partially) occlude it, as shown in figure 6B. As a result, fluidic communication between the gas chamber 31 d and the external environment is provided only by the small opening 31. As

a consequence, a greater compression of air occurs so that a braking force is exerted on the nested tube 3e. The nested tube 3e thus can continue its upward movement, but the speed of movement of the nested tube 3e is decreased with respect to the previous condition.

[0072] According to an embodiment the operating fluid 10 (typically water) is ejected from the nested tube arrangement during the upward movement of the vehicle 2, i.e. during the movement of the vehicle 2 from the lower position towards the raised position. According to an aspect all, or substantially all, of the operating fluid 10 sent to the nested fluid arrangement is ejected from the latter before the vehicle reaches the raised position. In such an embodiment, when all of the operating fluid 10 is ejected from the nested tube arrangement, the vehicle 2 is no longer pushed upwards. As a consequence, the vehicle 2 begins to decelerate, typically under the action of gravity, until it stops its upward movement, i.e. when it reaches the raised position.

[0073] More in general, the vehicle 2 reaches the raised position and subsequently begins its downward movement, i.e. the movement from the raised position towards the lower position.

[0074] Preferably, at least part of the run between the raised position and the lower position is braked or damped. This may be achieved in different ways. As an example, according to an embodiment, braking means can be provided to act, directly or indirectly, on the vehicle 2. As mentioned, in a preferred embodiment, the braking means comprise pneumatic pistons 8a, 8b.

[0075] The pneumatic pistons 8a, 8b wait for the vehicle 2 in an extended or partially extended condition, see figure 4. At a certain point of the run of the vehicle 2 from the raised position towards the lower position, the vehicle 2 meets the pneumatic pistons 8a, 8b, as shown in figure 5. From now on, the vehicle 2 compresses the pneumatic pistons 8a, 8b. The pneumatic pistons 8a, 8b offer resistance to such a compression, so that the movement of the vehicle 2 is damped (braked).

[0076] According to a different embodiment, the operating fluid 10, or the pressurizing means 7 (acting directly or, as shown, indirectly on the operating fluid 10) may be used to brake the movement of the vehicle 2, until it reaches the lower position.

[0077] Also, when the nested tubes approach the end of their downward run, a braking force may be provided thanks to a gas chambers 31 e, with reference to the shown embodiment, see in particular figs 7A and 7B, when the nested tube approaches its end of run, the sealing means 35 enters the gas chambers 31 e, thus starting to compress the air housed therein. A braking force is thus exerted on the nested tube 3e.

[0078] At this point, the cycle may begin again, supplying again pressurized operating fluid 10 to the nested tube arrangement 3, to lift again the vehicle 2, or the passengers 20 may disembark from the vehicle 2.

Claims

1. An amusement ride (1) comprising a vehicle (2) for one or more passengers and lifting means to move said vehicle (2) between a lower position and a raised position, the lifting means comprising a nested tube arrangement (3), having a plurality of nested tubes (3a - 3f), a fluid reservoir (4) for housing an operating fluid (10) fluidically connected to said nested tubes (3a - 3f), and pressurizing means (7) to pressurize said operating fluid (10) for supplying pressurized operating fluid (10) within said nested tubes (3a - 3f) to extend said nested tube arrangement (3) in order to lift said vehicle (2) from said lower position to said raised position.

2. The amusement ride (1) according to claim 1, wherein said operating fluid (10) is water.

3. The amusement ride (1) according to claim 1 or 2, wherein said nested tube arrangement (3) comprises a fluid ejecting means (5), arranged to eject operating fluid (10) from said nested tube arrangement (3), preferably at the vehicle (2).

4. The amusement ride (1) according to claim 3, wherein said fluid ejecting means (5) are arranged to eject operating fluid (10) at an angle (α) equal to or lower than 90 degrees, preferably equal to or lower than 60 degrees, more preferably equal to or lower than 45 degrees, with respect to the axis of said nested tube arrangement (3).

5. The amusement ride (1) according to any of the preceding claims, wherein said pressurizing means (7) comprise an air compressor (7a).

6. The amusement ride (1) according to any of the preceding claims, comprising weighing means (8) to weigh said vehicle (2) at least when it is at the lower position.

7. The amusement ride (1) according to any of the preceding claims, wherein the nested tubes are provided with at least one gas chamber (30d, 30e) defined between subsequent nested tubes (30d, 30e) of the nested tube arrangement, arranged so that the dimension of said gas chamber varies according to the relative position between the subsequent nested tubes (3d - 3e) of the nested tube arrangement (3).

8. The amusement ride (1) according to claim 7, wherein said gas chamber (30d, 30e) is provided with openings (31, 32, 33), wherein the nested tube arrangement (3) is provided with sealing means (34, 35) to seal at least part of said openings (31,32,33), according to the relative position of said nested tubes (3d - 3e).

9. The amusement ride (1) according to any of the preceding claims, comprising braking means (8a, 8b) to brake said vehicle (2) for at least part of the run from said raised position towards said lower position.

10. The amusement ride (1) according to claim 9 or 6, wherein said braking means and/or said weighing means comprise at least one pneumatic piston (8a, 8b), preferably placed laterally with respect to the nested tube arrangement (3).

11. The amusement ride (1) according to claim 9 or 10, when depending from claim 6, wherein said braking means and said weighing means coincide.

12. A method of operating an amusement ride (1) according to any previous claim, comprising the steps of:

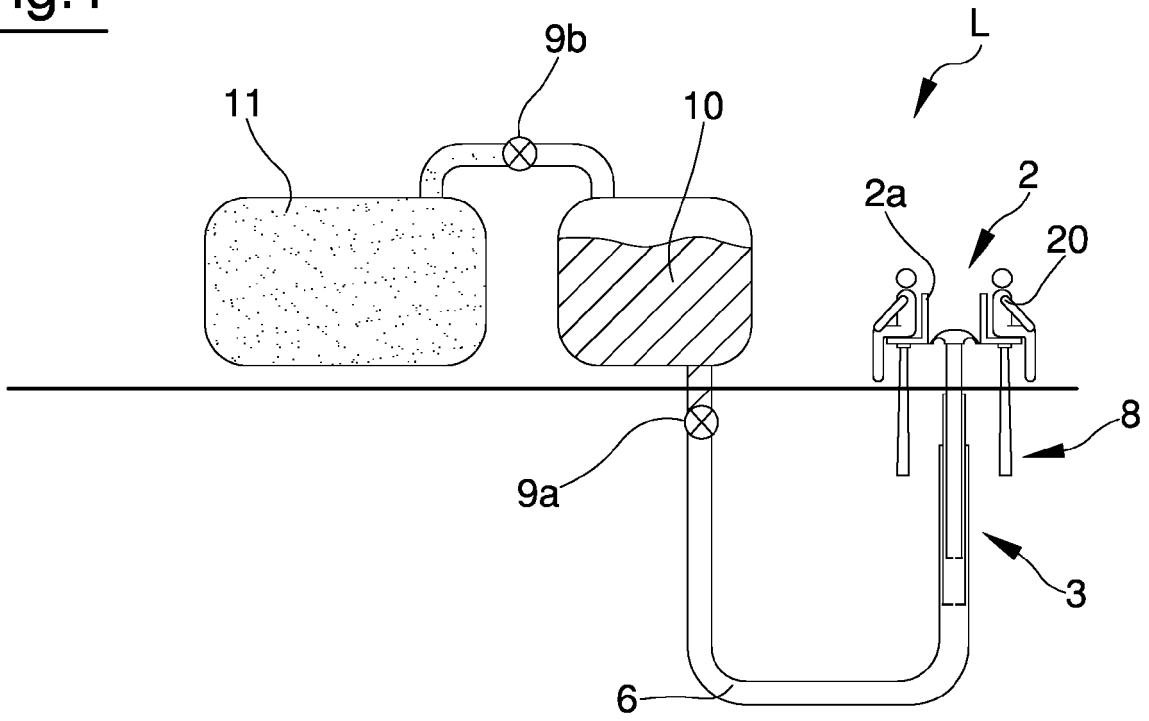
(a) loading at least one passenger on said vehicle (2) when said vehicle (2) is at the lower position;
(b) operating the pressurizing means (7) to pressurize the operating fluid (10);
(c) supplying said pressurized operating fluid (10) to said nested tubes (3a - 3f) to extend said nested tube arrangement (3) in order to lift said vehicle (2) from said lower position to said raised position;
(d) operating the pressurizing means (7) to reduce pressure of the operating fluid (10) or to stop pressurizing of the operating fluid (10) to retract said nested tube arrangement (3) in order to lower said vehicle (2) from said raised position to said lower position.

13. The method according to claim 12, wherein between said steps (a) and (b), the vehicle (2) is weighed, and the pressurizing means (7) are operated to pressurize the operating fluid (10) at a pressure calculated as a function of the weight of the vehicle.

14. The method according to claim 12 or 13, wherein the braking means are operated to brake the lowering of the vehicle (2) of step (d).

15. The method according to any claim 12 to 14, wherein during said step (c), the operating fluid (10) is ejected from the nested tube arrangement (3).

Fig.1



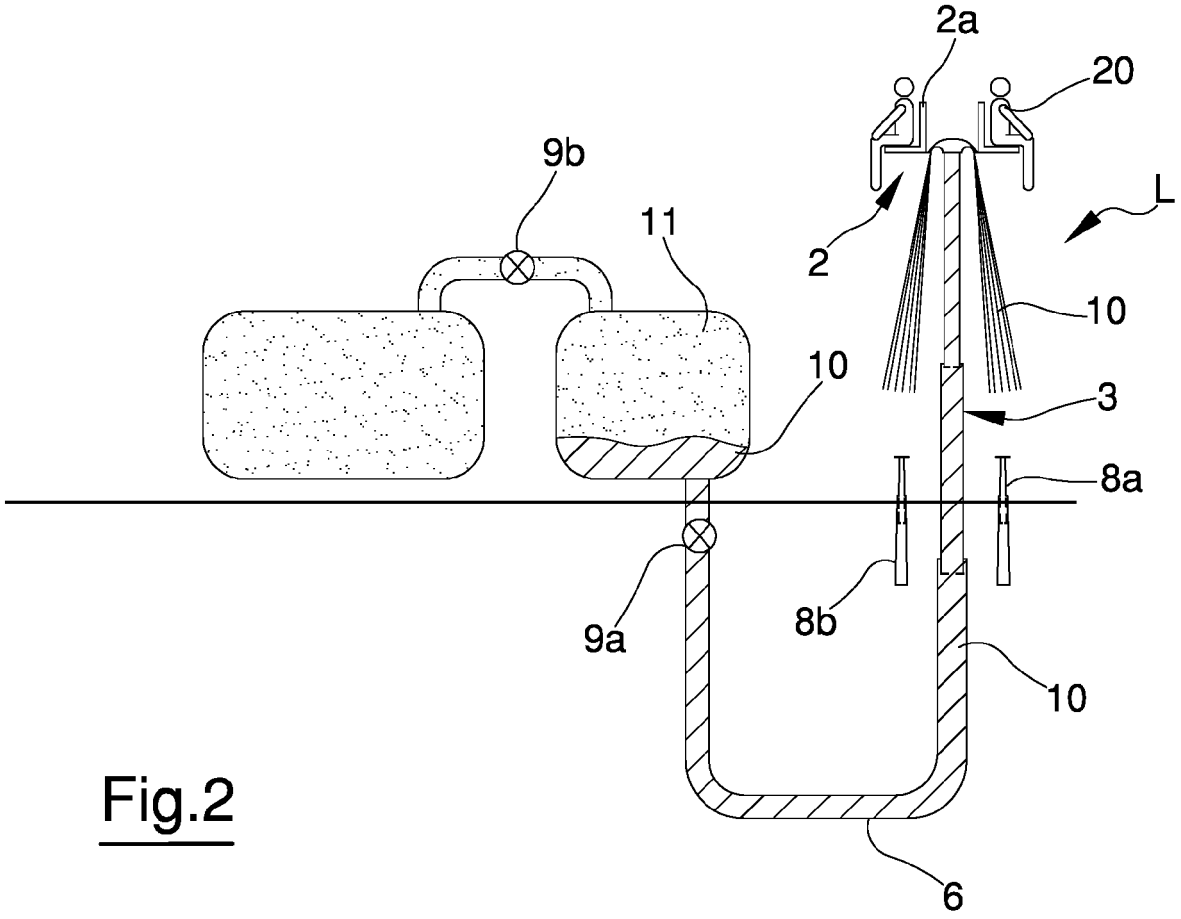


Fig.2

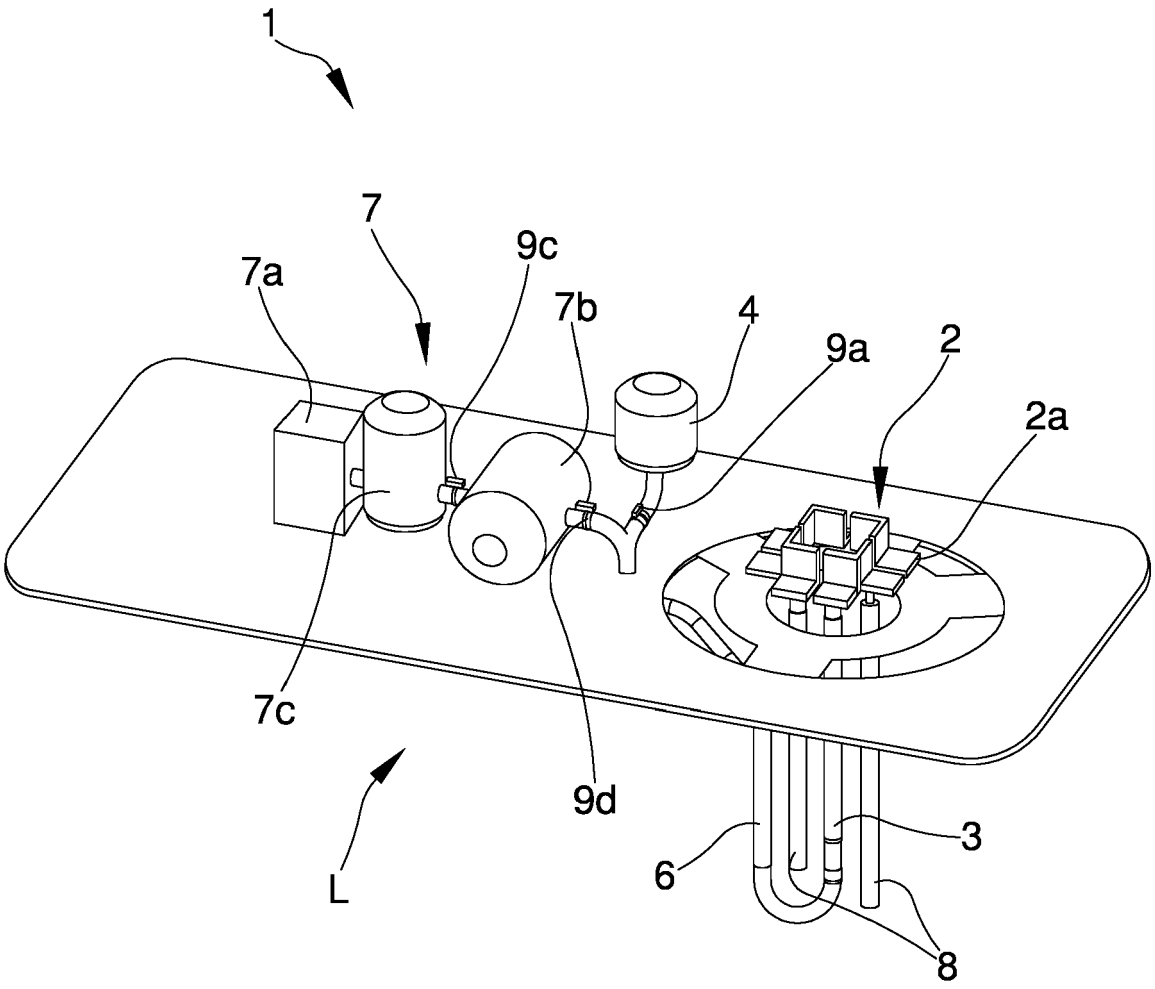


Fig.3

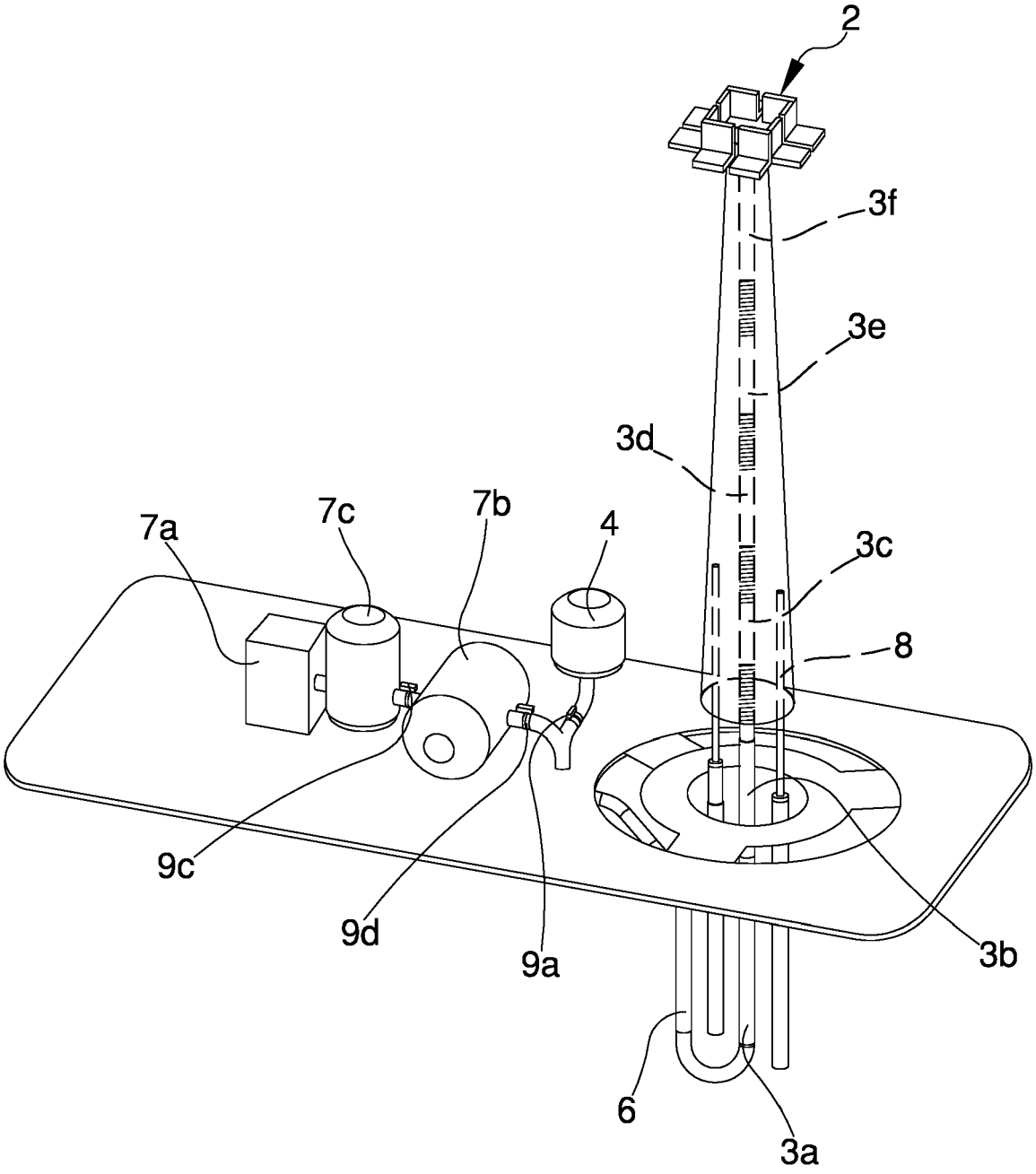


Fig.4

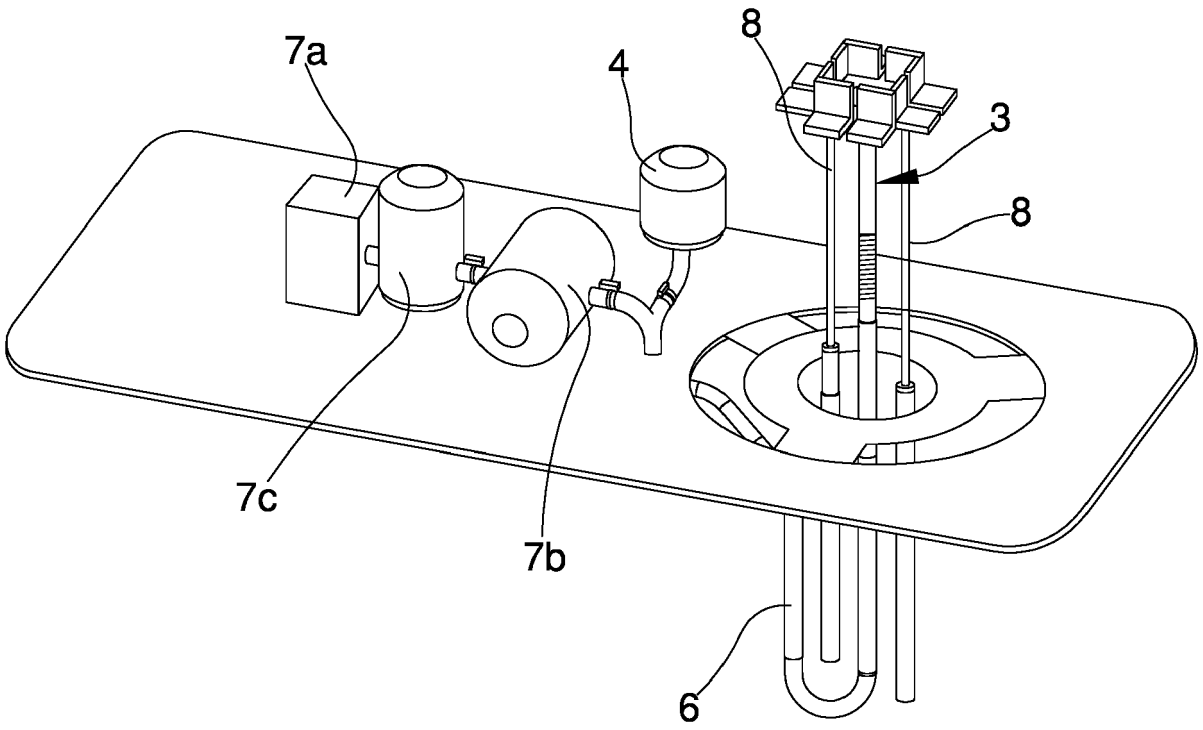
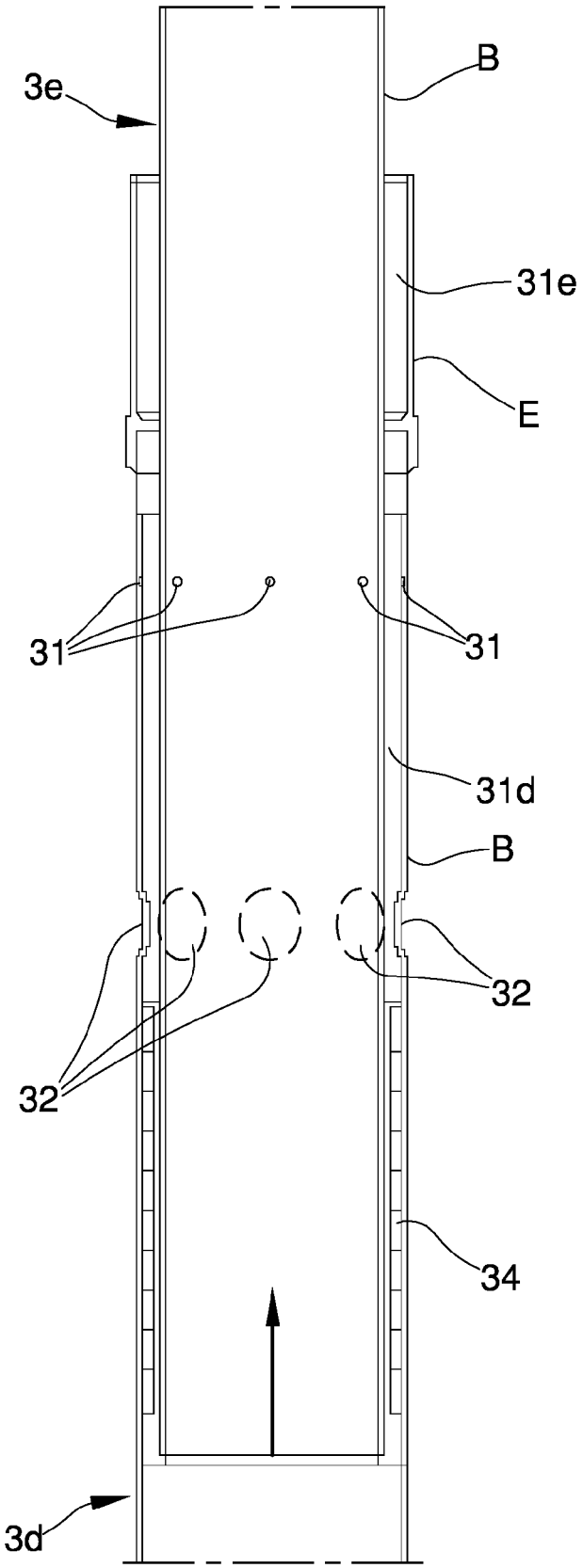


Fig.5

Fig.6A



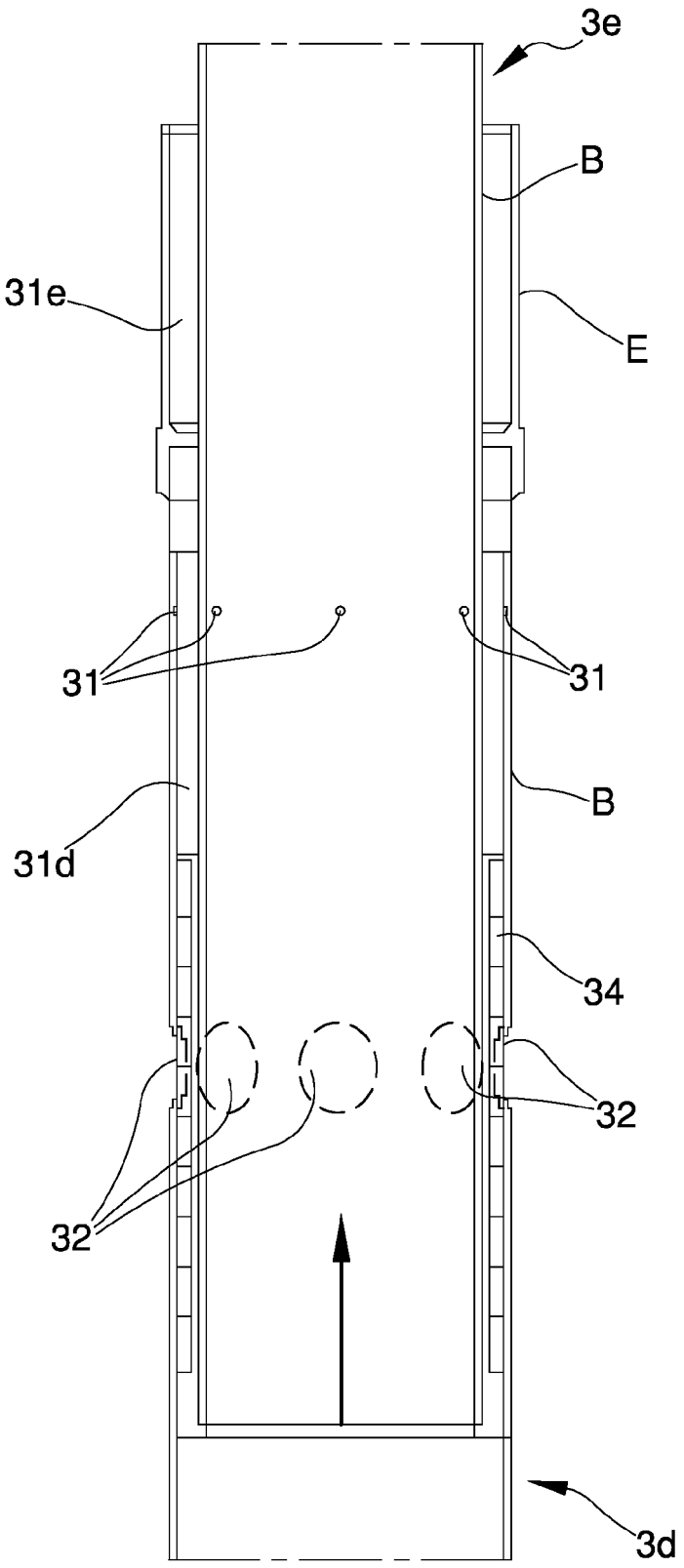


Fig.6B

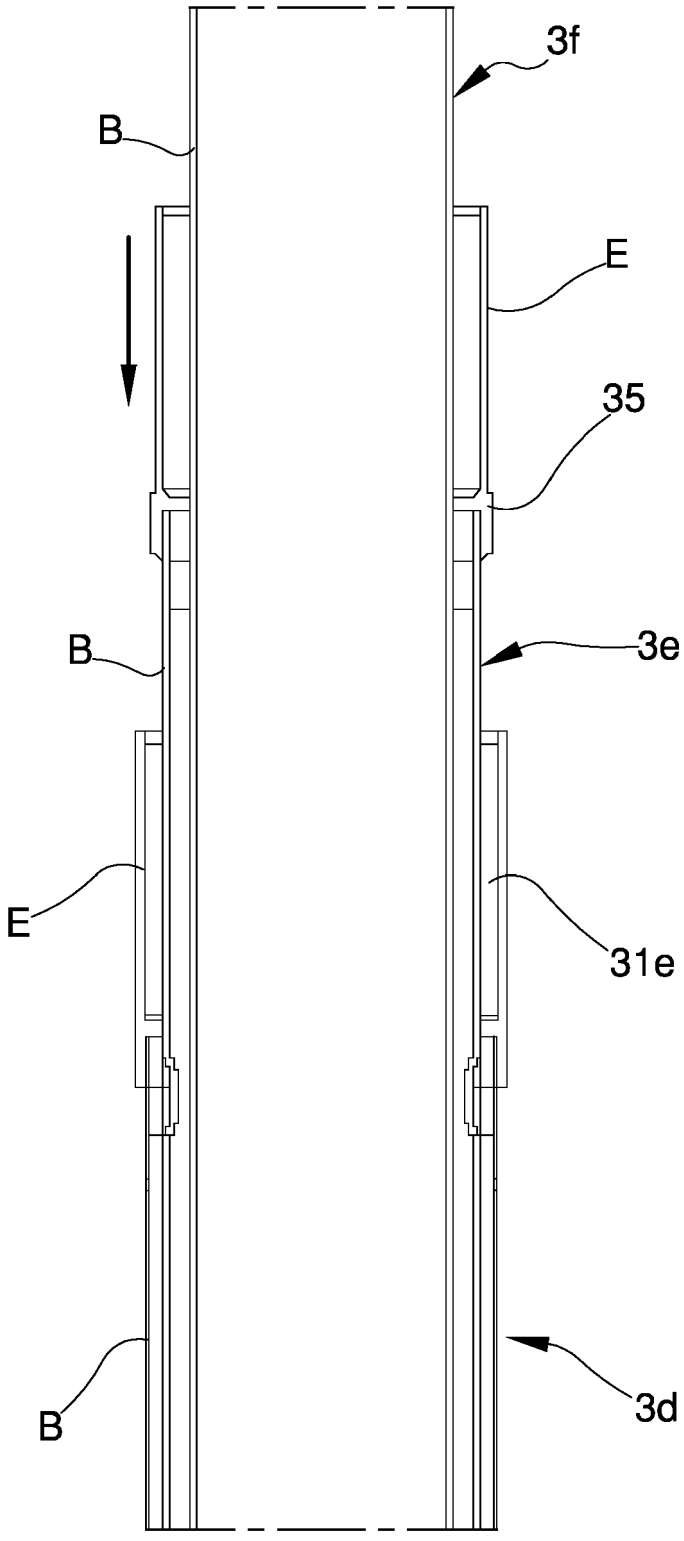


Fig.7A

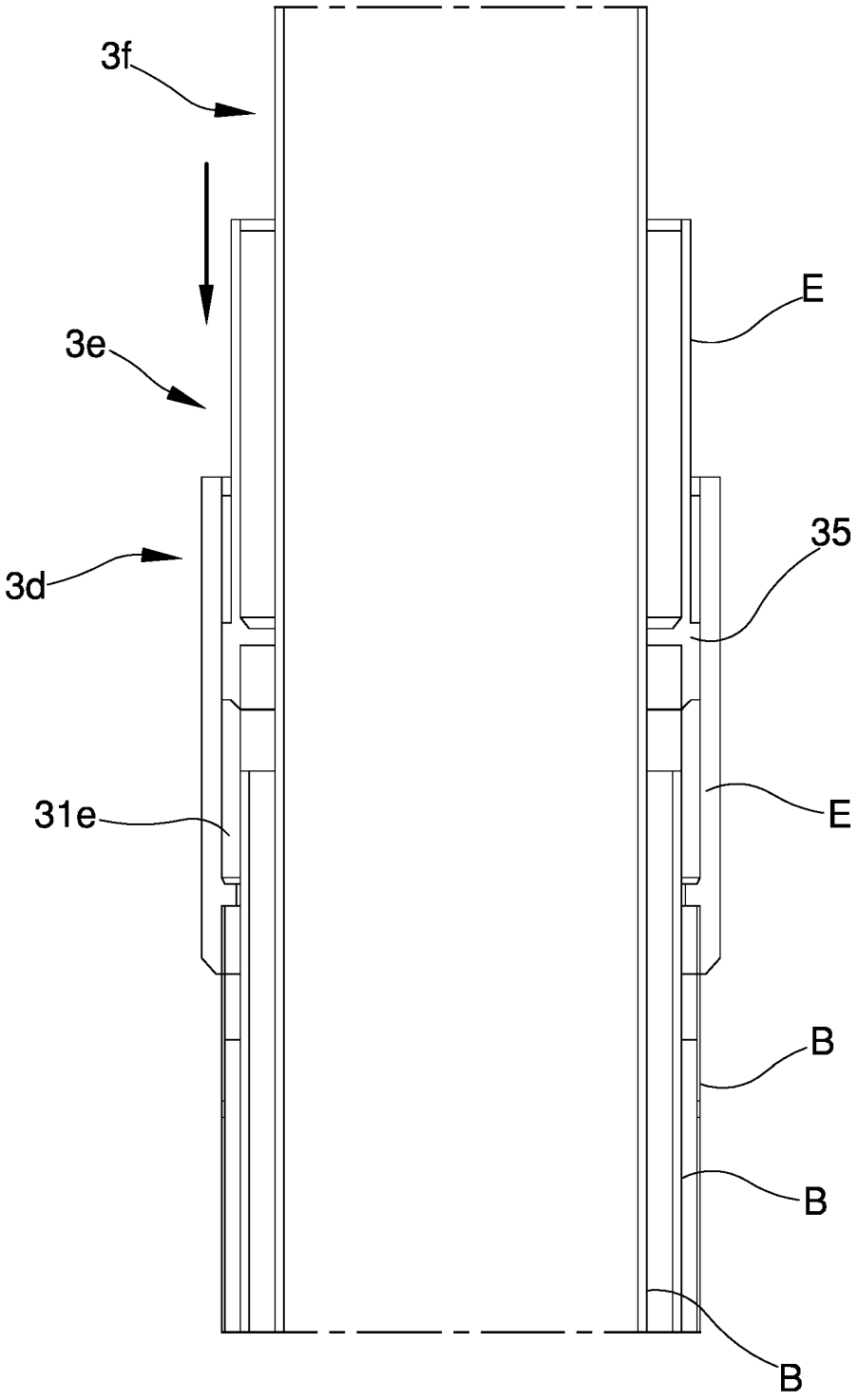


Fig.7B

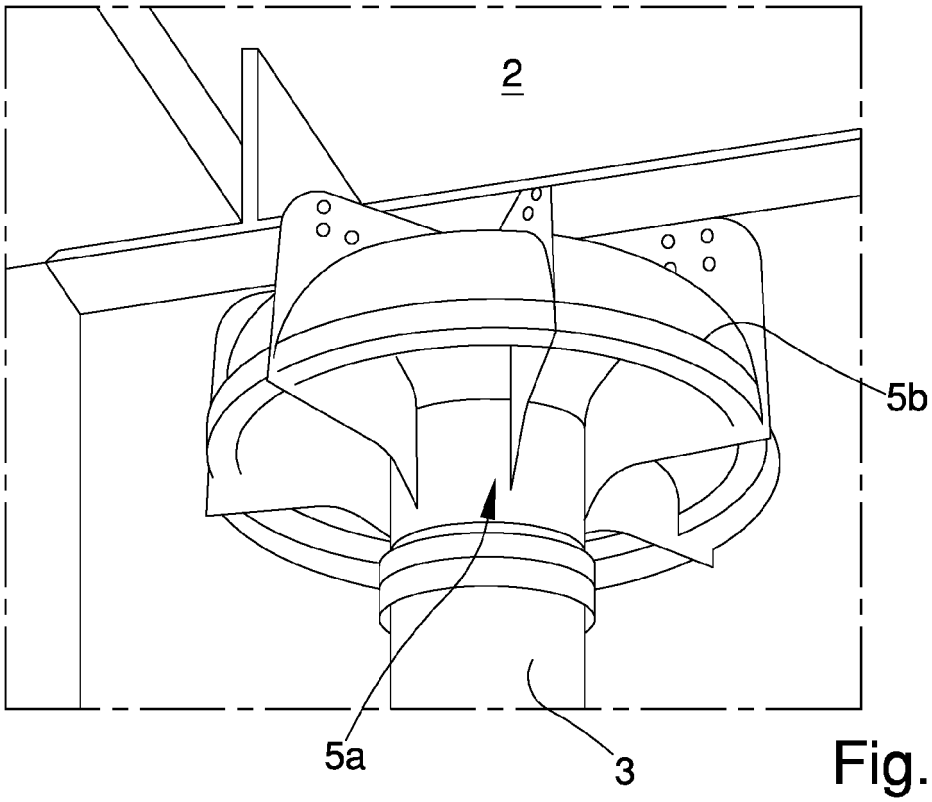


Fig.8

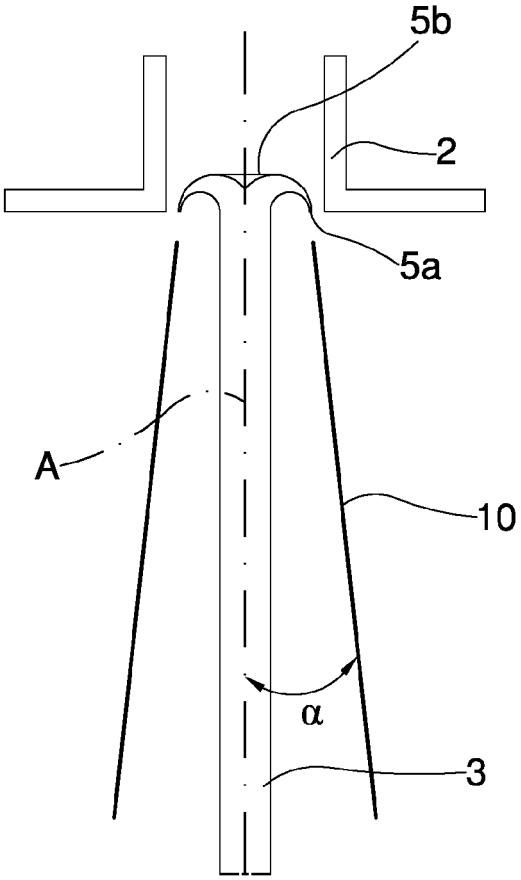


Fig.9

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EUROPEAN SEARCH REPORT

Application Number
EP 17 17 6232

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 October 2017	Bagarry, Damien

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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