

(19)



(11)

EP 4 520 409 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
12.03.2025 Bulletin 2025/11

(51) International Patent Classification (IPC):
A63B 69/12 ^(2006.01)

(21) Application number: **23195288.8**

(52) Cooperative Patent Classification (CPC):
A63B 69/125; A63B 2024/0025; A63B 2071/0675;
A63B 2220/13; A63B 2220/805; A63B 2225/02;
A63B 2225/093

(22) Date of filing: **05.09.2023**

(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 ME MK MT NL
NO PL PT RO RS SE SI SK SM TR**

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Remarks:
Amended claims in accordance with Rule 137(2)
EPC.

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(54) SWIMMING POOL WITH CURRENT SYSTEM

(57) A swimming pool provided with a reservoir is described, which is equipped for swimming on the spot in the reservoir by means of generated compensating counterflow which compensates for the propulsive movement of the swimmer. The swimming pool is configured in a way that the moving fluid mass is optimally adjusted to the position of the swimmer and the flow in the reservoir is

substantially in one direction. The circulation of the fluid further takes place via a liquid line outside the reservoir where in the ascending section of this liquid line a turbine is installed transversally to the longitudinal direction of the reservoir, where the upper edge of the turbine is lower than or equal to the lower edge of the inflow opening in the reservoir.

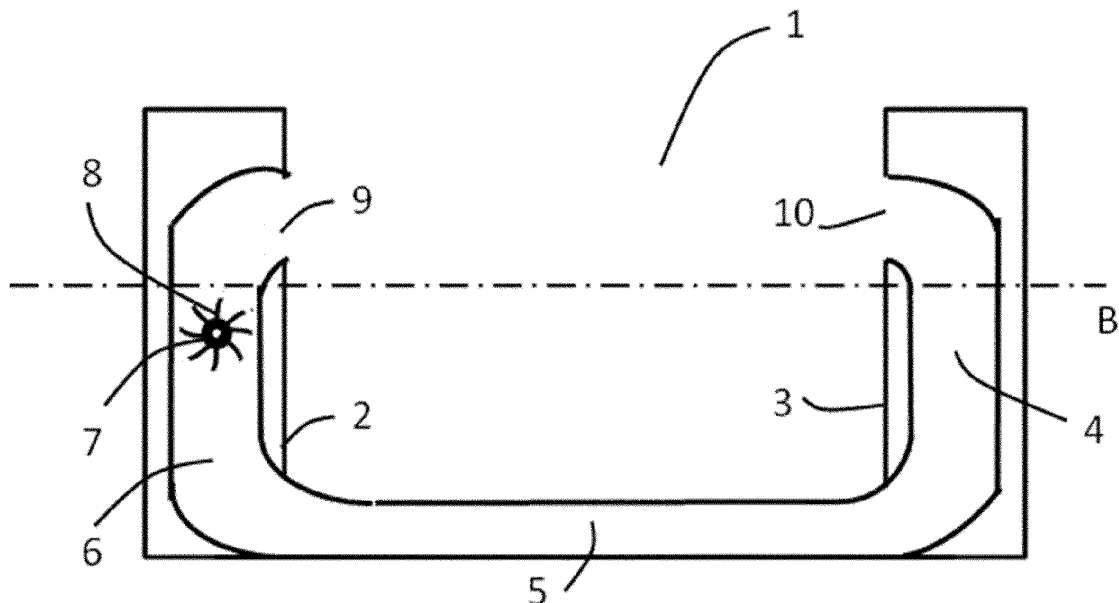


Fig.2

Description

Background of the invention

[0001] The invention refers to a swimming pool equipped for swimming on the spot by means of generated compensating counterflow, i.e. the propulsive swimming motion of the swimmer is counterbalanced by the generated counterflow such that the swimmer remains on the spot.

[0002] Such swimming pools are commonly known. Known advantages include limited dimensions and thus limited associated space requirements and amount of liquid for athletic swimming and/or bathing. This lowers the barrier to placing these pools in covered areas and/or private gardens and avoids the barriers people face to swimming in public pools, such as the trip, the reservation, and the lack of comfort and privacy.

[0003] US 1731554 showing a swimming pool having an inflow opening, an outflow opening, and a connection between outflow opening and inflow opening extending below the basin. The water flow circulates from inflow opening to outflow opening in the pool and then from outflow opening to inflow opening through the connection. The water flow is generated by driven propellers positioned in the part of the connection below the swimming pool where the drive shafts are parallel to the longitudinal direction of the swimming pool. However, the use of propellers generates a turbulent flow, making it difficult for the swimmer to maintain his position partly because the resulting lateral forces exerted on the swimmer push him to the side of the swimming pool and as such make swimming more difficult.

[0004] US2015/0074895A1 discloses a swimming pool where propellers are placed directly in front of the inflow opening. The propellers generate a turbulent flow. Between the propellers and the inflow opening is a structure intended to reduce turbulence of the generated flow and as such inject a more laminar flow into the swimming pool. The outflow opening is provided on the same side of the swimming pool as the inflow opening. The configuration results in two flows being present in the swimming pool in opposite directions, namely, on the one hand, the generated flow injected into the swimming pool and, on the other hand, a flow in the opposite direction due to the suction of the propellers through the outflow opening. This gives rise to increased turbulence.

[0005] The above state of the art are some examples of the generally known problem of turbulent flows which already manifests itself at the source and where one looks for solutions to reduce the turbulence of the generated flow afterwards. Apart from the problem of the turbulent flow, as discussed above, there are other known problems in the overall state of the art. Thus, energy consumption is very high. This is related to the high rotation speed of the propellers required to achieve the desired flow rate in the swimming pool. swimming This water loss increases as the flow becomes more

turbulent. Moreover, this water loss depends on the swimming style chosen, such as crawl, breaststroke, butterfly stroke or backstroke.

[0006] It is an objective of the invention to generate as laminar a flow as possible at the source and maintain it as well as possible in the swimming pool such that the swimmer can swim comfortably without constantly having to correct his position.

[0007] It is also an objective of the invention to reduce the energy consumption needed to achieve counterflow in the swimming pool.

[0008] It is a further objective of the invention to make the swimming pool more suitable for practising different swimming styles and minimise water loss as much as possible in each swimming style.

Summary of the invention

[0009] The above objectives are achieved by the present invention as described in the claims.

[0010] The invention comprises a swimming pool equipped for swimming on the spot by means of generated compensating counterflow. To this end, the swimming pool for swimming on the spot comprises:

a fluid reservoir longitudinally provided with an inflow opening in a first end and an outflow opening in a second opposite end,

a liquid line comprising a descending section located adjacent to the second end of the reservoir, a flow-through section located below the reservoir and an ascending section located adjacent to the first end of the reservoir,

a turbine in the ascending section of the liquid line transversal relative to the longitudinal direction, where the upper edge of the turbine is lower than or equal to the lower edge of the inflow opening, and

a drive unit to rotate the turbine with adjustable speed.

[0011] In operational state when the swimming pool is filled with liquid, usually water, and the drive unit rotates the turbine, this rotation propels a mass of water at a speed and flow rate depending on the set rotation speed in the form of a laminar flow towards the inflow opening, which then moves further down the reservoir in the longitudinal direction. As such, a swimmer in the pool experiences a compensatory counterflow allowing him to swim on the spot. The moving mass of water moves further towards the outflow opening and is discharged from the reservoir through the outflow opening into the liquid line. The rotation of the turbine also creates an underpressure below the turbine and thus a suction effect so that the liquid moves further in the liquid line towards the turbine. This maintains a circular flow.

[0012] The surface area of the outflow opening is greater than or equal to the surface area of the inflow opening. And in operational state, the inflow opening and outflow opening are located completely below the level of liquid present in the reservoir. First, it avoids or at least suppresses the creation of flows in directions deviating from the laminar main flow at the outflow end of the reservoir. Such flows would negatively affect the laminar main flow and may occur, for example, due to reflection. It also increases the efficiency of circulation and therefore reduces energy consumption.

[0013] In one embodiment, the turbine extends substantially over the entire length of the liquid line. Optionally, the turbine extends substantially over the entire width of the liquid line. Furthermore, the blades of the turbine may be curved. Preferably, the ratio of turbine diameter to length has a value in the range of 0.4 to 0.6 inclusive. The width of the ascending section of the liquid line has a value in the range of 0.9 m to 1.6 m inclusive.

[0014] The turbine may have a drive shaft protruding at at least one end through a sealed opening in the liquid line. This allows the drive unit to be provided outside the reservoir in the dry area of the swimming pool. In operational state, the drive unit rotates the turbine by driving the drive shaft at the protruding end.

[0015] Alternatively, the turbine can be provided with a drive shaft which is completely inside the liquid line and is driven at one end by the drive unit which, in its operational state, is immersed in the liquid. The drive unit may include a hydraulic motor. Instead of 1 turbine, 2 turbines can be used transversally placed behind each other with a hydraulic motor between them driving both turbines simultaneously. Preferably, both turbines have the same diameter. Preferably, the assembly with the drive unit and 1 or more turbines extends substantially across the entire width of the liquid line. The drive unit may be mounted in the core of the turbine or turbines so that the circumference of the turbine forms an almost continuous assembly.

[0016] In a further embodiment, a fluid guiding element is positioned in the flow-through section of the liquid line at the end of the flow-through section adjacent to the ascending section, where the fluid guiding element is configured in a way that a first and a second fluid passage are formed at the side edges of the liquid line to allow the fluid to flow from the flow-through section to the ascending section.

[0017] Optionally, the fluid guiding element is configured in a way that the cross section of the fluid guiding element increases with decreasing distance to the ascending section of the liquid line. In particular, this contributes to the suppression or prevention of any turbulence generation.

[0018] The inflow opening and outflow opening can be configured to each have a width greater than their height. This allows the cross section of the fluid mass moving in the reservoir to be optimally matched to the swimmer so that they only move in a laminar flow. The swimming pool can be further configured in a way that the position in the

reservoir of the inflow opening and the outflow opening, respectively, is adjustable in height. This allows the position of the moving mass of water to be adjusted to the swimming style of the swimmer. Indeed, the swimmer's position in the swimming pool depends on the swimming style. The position of the turbine can also be made adjustable in height. Furthermore, it can be opted for the turbine and the inflow opening to be made simultaneously adjustable in height.

[0019] In a further embodiment, the inflow opening and the outflow opening are each covered by a slatted grid configured in a way that the fluid can flow through the respective slatted grid from the ascending section of the liquid line to the reservoir and from the reservoir to the descending section of the liquid line.

[0020] The invention will be explained in more detail on the basis of the figures. The figures are made for illustrative purposes and the different components and constituents may not have the right proportions between them.

[0021] Figure 1 shows in top view a swimming pool according to the invention.

[0022] Figure 2 shows in side view a vertical longitudinal cross section of a swimming pool according to the invention in accordance with the dotted line A as shown in Figure 1.

[0023] Figure 3 shows in top view a horizontal longitudinal cross section of a swimming pool according to the invention in accordance with the dotted line B as shown in Figure 2.

Description of the invention

[0024] A swimming pool to swim on the spot ideally has dimensions that allow for the necessary swimming movements without getting too close to the edge or bottom. Taking into account the dimensions of an adult human being, this means already a minimum length of 3 m, a minimum width of 2m and a minimal depth of 90 cm. To make it somewhat more comfortable but also taking into account running costs, mainly determined by energy consumption and water consumption, transport, and space required for installation, typical practical dimensions of a swimming pool for swimming on the spot are 4 m to 4.5 m long by 2.2 m to 2.5 m wide and 1.5 m to 1.8 m deep. Of course, the invention is by no means limited to these typical practical dimensions and these swimming pools can also be made larger or smaller.

[0025] Figure 1 shows a top view of a swimming pool with these typical dimensions. In the central part of the swimming pool reservoir 1 is located, which, when the swimming pool is operational, i.e. ready for use, is filled with water. The reservoir has metal or plastic walls. The reservoir is longitudinally provided with an inflow opening in a first end 2 and an outflow opening in a second opposite end 3. In operational state, the inflow opening and outflow opening are located completely below the surface level of the water present in the reservoir. The

inflow opening and the outflow opening are preferably located centrally in the respective ends (sidewalls width-wise) of the reservoir. The upper edge of the inflow opening and outflow opening are located 5 cm to 25 cm below the water surface, preferably 10 cm to 15 cm.

[0026] To allow a swimmer to swim on the spot, a counterflow is generated that counteracts the forward motion of the swimmer. This involves introducing water under pressure into the reservoir through the inflow opening and then this flows longitudinally towards the outflow opening through which the water is drained. The drained water is fed back to the inflow opening through a liquid connection. For proper and efficient circulation, the surface area of the outflow opening is greater than or equal to the surface area of the inflow opening. Taking into account the average width of an adult human being of approximately 50 cm, the inflow opening is 60 cm to 90 cm high and 90 cm to 150 cm wide. The outflow opening is typically 10 cm to 20 cm wider and/or higher.

[0027] The liquid connection of outflow opening 10 back to inflow opening 9 consists of a liquid line as shown for example in Figure 2. The liquid line comprises a descending section 4 in connection with the reservoir via the outflow opening and located adjacent to the second end 3 of the reservoir 1, an ascending section 6 located at the first end 2 of the reservoir and in connection with the reservoir via the inflow opening, and a flow-through section 5 located under the reservoir between the ascending and descending section. In the ascending section of the liquid line transversal relative to the longitudinal direction is located a turbine 7. The upper edge of the turbine is lower than or equal to the lower edge of the inflow opening. With a drive, an upward laminar flow is created by rotation of the turbine in the direction of the inflow opening. The generated laminar flow is injected into the reservoir through the inflow opening and then moves to the opposite end of the reservoir where the outflow opening is located. The rotation of the turbine simultaneously creates an underpressure below the turbine which draws water from the reservoir via the outflow opening and the liquid line. As such, continuous fluid circulation is created in the pool and the counterflow in the reservoir is maintained.

[0028] The use, the orientation associated therewith, and the installation of a turbine 7 to generate counterflow offers significant advantages. The rotation axis of the turbine is perpendicular to the direction of propulsion which, unlike a screw or propeller, for example, generates a laminar flow in the direction of propulsion. The rotation axis of the turbine is also perpendicular to the longitudinal direction of the reservoir which ensures that the cross section of the mass of water can be better matched to the position, more specifically the swimming zone, of the swimmer in the pool for optimal comfort of the swimmer. The swimming zone is the space occupied in the swimming pool by the swimmer during swimming. The propelled mass of water can, after all, be routed through a rectangular or oval inflow opening. Preferably,

the inflow opening has a width greater than the height so that the swimmer throughout his swimming zone is in a laminar flow in which the water moves at substantially the same speed and in the same direction. This keeps the swimmer on the spot and he does not have to correct his position all the time. If the swimmer wishes to adjust his swimming speed, he can do so, for example, by adjusting the setting of the turbine rotation speed on a control panel, possibly using a remote control. Alternatively, proximity sensors (e.g. optical sensors) can be provided, for example at the end 2 of the reservoir that detect the longitudinal position of the swimmer and, depending on it, dynamically adjust the speed and flow rate of the counterflow by changing the rotation speed of the turbine.

[0029] The turbine 7 is installed in the ascending section 6 of the liquid line so that the upper edge of the turbine does not protrude above the lower edge of the inflow opening 9. This ensures that the turbine is fully submerged in the operational state and by rotation propels a mass in an upward direction. Moreover, the turbine extends completely over the entire width and length of the liquid line in the ascending section. This ensures an optimal efficiency and avoids the generation of turbulence in the space between the turbine and the wall of the liquid line. The shortest distance between the turbine and the wall of the liquid line is 10 cm or smaller in length and width, preferably 5 cm or smaller.

[0030] An additional advantage of a turbine is that due to the relatively large contact area between blades and water compared to, for example, propellers, the same flow rate can be realised with a lower rotational speed. This will benefit energy consumption. The blades are equidistantly and with equal angles attached to a cylindrically shaped central part. The efficiency can further be improved by using curved blades 8 and as such increase the contact surface with the water, and where the blades are also positioned so that the concave side of the blades supports the propulsive movement of the water.

[0031] The turbine 7, as shown in Fig. 3, is provided with a drive shaft 11 protruding at the ends through openings in the wall in the ascending section 6 of the liquid line. In the sealed openings, waterproof bearings are provided in which the drive shaft is installed. Next to the ascending section 6 of the liquid line, a space 13 is provided in which a drive unit 12 is installed to rotate the turbine with adjustable speed so that, in operational state, a laminar flow is generated in ascending direction. This space 13 is hidden from view but still easily accessible from above or via the side and is located in the dry area of the swimming pool. The latter not only makes it cheaper and easier to maintain, but in addition it reduces the cost of acquisition of the motor as it is not submerged in the liquid. The drive unit 12 comprises an electric motor connected via a belt, chain and/or gears to one end of the turbine drive shaft. The electric motor can typically deliver maximum power between 1 kW and 5 kW. The electric motor can be fitted with a frequency converter that allows stepless control of the rotation speed of the turbine from a

speed that is virtually zero to the maximum set range corresponding to a predetermined maximum achievable swimming speed. This also allows the rotation speed of the turbine to be dynamically controlled depending on the detected position of the swimmer if he speeds up or slows down. The maximum rotation speed of the turbine is typically between 1000 and 2000 rpm.

[0032] For proper circulation the liquid line extends in the descending section 4 and largely in the flow-through section 5 across substantially the entire width of the reservoir. In the flow-through section, the height of the liquid line is typically 10 cm to 20 cm, such as 15 cm, for example. The width of the ascending section 6 of the liquid line is typically 90 cm to 160 cm, such as 120 cm, for example. The length of the ascending section of the liquid line is typically 40 cm to 90 cm, such as 65 cm, for example. Because the cross section of the ascending section is different from the cross section of the flow-through section, the width of the flow-through section decreases progressively and the height of the flow-through section increases progressively towards the ascending section to achieve a smooth and appropriate connection between the flow-through section and the ascending section.

[0033] To further increase the efficiency of the water circulation and, in particular, to ensure a good and efficient supply to the turbine, a fluid guiding element is provided in the flow-through section 5 of the liquid line, which, in particular, focuses the fluid supply to the turbine on the sides of the turbine after which it can distribute optimally along the length of the turbine. The fluid guiding element is made of metal or plastic and is centrally positioned at the end of the flow-through section adjacent to the ascending section. The fluid element is configured in a way that a first and a second fluid passage are formed at the side edges of the liquid line. The fluid can only flow from the flow-through section to the ascending section via these passages. Preferably, the fluid guiding element is configured in a way that the cross section of the fluid guiding element increases with decreasing distance to the ascending section of the liquid line.

[0034] Grids can be installed in the inflow opening and in the outflow opening. This provides shielding and, in particular, prevents objects from entering the liquid line or hurting people, for example due to entrapment in the fluid line or accidental contact with the rotating turbine. Preferably, these grids are slatted grids.

Claims

1. A swimming pool for swimming on the spot comprising

a fluid reservoir (1) longitudinally provided with an inflow opening (9) in a first end (2) and an outflow opening (10) in a second opposite end (3), wherein the surface area of the outflow

opening is greater than or equal to the surface area of the inflow opening, and wherein, in operational state, the inflow opening and outflow opening are located completely below the level of liquid present in the reservoir,

a liquid line forming a liquid connection from the outflow opening to the inflow opening, the liquid line comprising a descending section (4) located adjacent to the second end of the reservoir, a flow-through section (5) located below the reservoir and an ascending section (6) located adjacent to the first end of the reservoir, a turbine (7) in the ascending section of the liquid line transversal relative to the longitudinal direction, wherein the upper edge of the turbine is lower than or equal to the lower edge of the inflow opening, and

a drive unit (12) to rotate the turbine with adjustable speed so that in operational state a laminar flow is generated in the direction of the inflow opening which moves further into the reservoir longitudinally.

2. The swimming pool according to claim 1, wherein the turbine (7) extends substantially over the entire length of the liquid line.
3. The swimming pool according to any of the preceding claims, wherein the turbine (7) extends substantially the entire width of the liquid line.
4. The swimming pool according to any of the preceding claims, wherein the blades (8) of the turbine (7) are curved.
5. The swimming pool according to any of the preceding claims, wherein the flow-through section (5) of the liquid line comprises a fluid guiding element, positioned at the end of the flow-through section adjacent to the ascending section (6), and wherein the fluid guiding element is configured in a way that a first and a second fluid passage are formed at the side edges of the liquid line to allow the fluid to flow from the flow-through section to the ascending section.
6. The swimming pool according to claim 5, wherein the cross section of the fluid guiding element increases with decreasing distance to the ascending section of the liquid line.
7. The swimming pool according to any of the preceding claims, wherein the inflow opening (9) and outflow opening (10) each have a width greater than their height.
8. The swimming pool according to any of the preceding claims, wherein the position in the reservoir (1) of

the inflow opening (9) and the outflow opening (10), respectively, is adjustable in height.

9. The swimming pool according to any of the preceding claims, wherein the position of the turbine (7) is adjustable in height. 5
10. The swimming pool according to claim 9, wherein the turbine (7) and the inflow opening (9) are simultaneously adjustable in height. 10
11. The swimming pool according to any of the preceding claims, wherein the ratio of turbine (7) diameter to length has a value in the range of 0.4 to 0.6 inclusive. 15
12. The swimming pool according to any of the preceding claims, wherein in the reservoir (1) the inflow opening (9) and the outflow opening (10) are each covered by a slatted grid configured in a way that the fluid can flow through the respective slatted grid from the ascending section (6) of the liquid line to the reservoir and from the reservoir to the descending section (4) of the liquid line. 20
13. The swimming pool according to any of the preceding claims, wherein the width of the ascending section (6) of the liquid line has a value in the range of 0.9 m inches to 1.6 m inclusive. 25
14. The swimming pool according to any of the preceding claims, wherein the turbine (7) has a drive shaft (11) protruding at least one end through a sealed opening in the liquid line. 30
15. The swimming pool according to claim 14, wherein the drive unit (12) is located in the dry area of the pool outside the liquid line and the reservoir (1) and, in operational state, rotates the turbine (7) by driving the drive shaft (11) at the protruding end. 35

Amended claims in accordance with Rule 137(2) EPC.

1. A swimming pool for swimming on the spot comprising 45
a fluid reservoir (1) longitudinally provided with an inflow opening (9) in a first end (2) and an outflow opening (10) in a second opposite end (3), wherein the surface area of the outflow opening (10) is greater than or equal to the surface area of the inflow opening (9), and wherein, in operational state, the inflow opening (9) and outflow opening (10) are located completely below the level of liquid present in the reservoir (1),
a liquid line forming a liquid connection from the outflow opening (10) to the inflow opening (9), 50

the liquid line comprising a descending section (4) located adjacent to the second end of the reservoir (1), a flow-through section (5) located below the reservoir (1) and an ascending section (6) located adjacent to the first end of the reservoir, a paddle wheel (7) in the ascending section (6) of the liquid line transversal relative to the longitudinal direction, wherein the upper edge of the paddle wheel (7) is lower than the lower edge of the inflow opening (9), and a drive unit (12) to rotate the paddle wheel (7) with adjustable speed so that in operational state, an upward laminar flow is generated by rotation of the paddle wheel (7) in the direction of the inflow opening (9), which upward laminar flow is injected into the reservoir through the inflow opening and then moves to the opposite end of the reservoir where the outflow opening is located.

2. The swimming pool according to claim 1, wherein the paddle wheel (7) extends substantially over the entire length of the liquid line, and/or wherein the paddle wheel (7) extends substantially the entire width of the liquid line.
3. The swimming pool according to claim 1 or 2 wherein the inflow opening (9) is located in a first vertical wall at the first end (2) and the outflow opening (10) is located in a second vertical wall at the second opposite end (3).
4. The swimming pool according to any of the preceding claims, wherein the blades (8) of the paddle wheel (7) are curved.
5. The swimming pool according to any of the preceding claims, wherein the flow-through section (5) of the liquid line comprises a fluid guiding element, positioned at the end of the flow-through section adjacent to the ascending section (6), and wherein the fluid guiding element is configured in a way that a first and a second fluid passage are formed at the side edges of the liquid line to allow the fluid to flow from the flow-through section to the ascending section (6).
6. The swimming pool according to claim 5, wherein the cross section of the fluid guiding element increases with decreasing distance to the ascending section (6) of the liquid line.
7. The swimming pool according to any of the preceding claims, wherein the inflow opening (9) and outflow opening (10) each have a width greater than their height.

8. The swimming pool according to any of the preceding claims, wherein the position in the reservoir (1) of the inflow opening (9) and the outflow opening (10), respectively, is adjustable in height.

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9. The swimming pool according to any of the preceding claims, wherein the position of the paddle wheel (7) is adjustable in height.

10. The swimming pool according to claim 9, wherein the position of the paddle wheel (7) and the inflow opening (9) are simultaneously adjustable in height.

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11. The swimming pool according to any of the preceding claims, wherein the ratio of paddle wheel (7) diameter to length has a value in the range of 0.4 to 0.6 inclusive.

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12. The swimming pool according to any of the preceding claims, wherein in the reservoir (1) the inflow opening (9) and the outflow opening (10) are each covered by a slatted grid configured in a way that the fluid can flow through the respective slatted grid from the ascending section (6) of the liquid line to the reservoir (1) and from the reservoir (1) to the descending section (4) of the liquid line.

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13. The swimming pool according to any of the preceding claims, wherein the width of the ascending section (6) of the liquid line has a value in the range of 0.9 m inches to 1.6 m inclusive.

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14. The swimming pool according to any of the preceding claims, wherein the turbine (7) has a drive shaft (11) protruding at least one end through a sealed opening in the liquid line.

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15. The swimming pool according to claim 14, wherein the drive unit (12) is located in the dry area of the pool outside the liquid line and the reservoir (1) and, in operational state, rotates the turbine (7) by driving the drive shaft (11) at the protruding end.

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1. A swimming pool for swimming on the spot comprising

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a fluid reservoir (1) longitudinally provided with an inflow opening (9) in a first vertical wall at a first end (2) and an outflow opening (10) in a second vertical wall at a second opposite end (3), wherein the surface area of the outflow opening (10) is greater than or equal to the surface area of the inflow opening (9), and wherein, in operational state, the inflow opening (9) and outflow opening (10) are located completely below the level of liquid present in the reservoir (1), and wherein the position in the reservoir (1) of the inflow opening (9) and the outflow opening

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(10), respectively, is adjustable in height, a liquid line forming a liquid connection from the outflow opening (10) to the inflow opening (9), the liquid line comprising a descending section (4) located adjacent to the second end of the reservoir (1), a flow-through section (5) located below the reservoir (1) and an ascending section (6) located adjacent to the first end of the reservoir (1), a paddle wheel (7) in the ascending section (6) of the liquid line transversal relative to the longitudinal direction, wherein the upper edge of the paddle wheel (7) is lower than the lower edge of the inflow opening (9), and a drive unit (12) to rotate the paddle wheel with adjustable speed so that in operational state, an upward laminar flow is generated by rotation of the paddle wheel (7) in the direction of the inflow opening (9), which laminar flow is injected into the reservoir through the inflow opening and then moves to the opposite end of the reservoir where the outflow opening is located.

2. The swimming pool according to claim 1, wherein the paddle wheel (7) extends substantially over the entire length of the liquid line.

3. The swimming pool according to any of the preceding claims, wherein the paddle wheel (7) extends substantially the entire width of the liquid line.

4. The swimming pool according to any of the preceding claims, wherein the blades (8) of the paddle wheel (7) are curved.

5. The swimming pool according to any of the preceding claims, wherein the flow-through section (5) of the liquid line comprises a fluid guiding element, positioned at the end of the flow-through section adjacent to the ascending section (6), and wherein the fluid guiding element is configured in a way that a first and a second fluid passage are formed at the side edges of the liquid line to allow the fluid to flow from the flow-through section to the ascending section (6).

6. The swimming pool according to claim 5, wherein the cross section of the fluid guiding element increases with decreasing distance to the ascending section (6) of the liquid line.

7. The swimming pool according to any of the preceding claims, wherein the inflow opening (9) and outflow opening (10) each have a width greater than their height.

8. The swimming pool according to any of the preceding claims, wherein the position of the paddle

wheel (7) is adjustable in height.

9. The swimming pool according to claim 8, wherein the position of the paddle wheel (7) and the inflow opening (9) are simultaneously adjustable in height. 5

10. The swimming pool according to any of the preceding claims, wherein the ratio of paddle wheel (7) diameter to length has a value in the range of 0.4 to 0.6 inclusive. 10

11. The swimming pool according to any of the preceding claims, wherein in the reservoir (1) the inflow opening (9) and the outflow opening (10) are each covered by a slatted grid configured in a way that the fluid can flow through the respective slatted grid from the ascending section (6) of the liquid line to the reservoir (1) and from the reservoir (1) to the descending section (4) of the liquid line. 15

12. The swimming pool according to any of the preceding claims, wherein the width of the ascending section (6) of the liquid line has a value in the range of 0.9 m inches to 1.6 m inclusive. 20

13. The swimming pool according to any of the preceding claims, wherein the turbine (7) has a drive shaft (11) protruding at least one end through a sealed opening in the liquid line. 25

14. The swimming pool according to claim 13, wherein the drive unit (12) is located in the dry area of the pool outside the liquid line and the reservoir (1) and, in operational state, rotates the turbine (7) by driving the drive shaft (11) at the protruding end. 30

1. A swimming pool for swimming on the spot comprising

a fluid reservoir (1) longitudinally provided with an inflow opening (9) in a first end (2) and an outflow opening (10) in a second opposite end (3), wherein the surface area of the outflow opening (10) is greater than or equal to the surface area of the inflow opening (9), and wherein, in operational state, the inflow opening (9) and outflow opening (10) are located completely below the level of liquid present in the reservoir (1), 40

a liquid line forming a liquid connection from the outflow opening (10) to the inflow opening (9), the liquid line comprising a descending section (4) located adjacent to the second end of the reservoir (1), a flow-through section (5) located below the reservoir (1) and an ascending section (6) located adjacent to the first end of the reservoir, 45

a paddle wheel (7) in the ascending section (6) of

the liquid line transversal relative to the longitudinal direction, wherein the upper edge of the paddle wheel (7) is lower than the lower edge of the inflow opening (9), and

a drive unit (12) to rotate the paddle wheel (7) with adjustable speed so that in operational state, an upward laminar flow is generated by rotation of the paddle wheel (7) in the direction of the inflow opening (9), which laminar flow is injected into the reservoir through the inflow opening and then moves to the opposite end of the reservoir where the outflow opening is located, and wherein the flow-through section (5) of the liquid line comprises a fluid guiding element, positioned at the end of the flow-through section adjacent to the ascending section (6), and wherein the fluid guiding element is configured in a way that a first and a second fluid passage are formed at the side edges of the liquid line to allow the fluid to flow from the flow-through section to the ascending section (6), and wherein the cross section of the fluid guiding element increases with decreasing distance to the ascending section (6) of the liquid line. 50

2. The swimming pool according to claim 1, wherein the paddle wheel (7) extends substantially over the entire length of the liquid line.

3. The swimming pool according to any of the preceding claims, wherein the paddle wheel (7) extends substantially the entire width of the liquid line.

4. The swimming pool according to any of the preceding claims, wherein the blades (8) of the paddle wheel (7) are curved.

5. The swimming pool according to any of the preceding claims, wherein the inflow opening (9) and outflow opening (10) each have a width greater than their height.

6. The swimming pool according to any of the preceding claims, wherein the position in the reservoir (1) of the inflow opening (9) and the outflow opening (10), respectively, is adjustable in height.

7. The swimming pool according to any of the preceding claims, wherein the position of the paddle wheel (7) is adjustable in height.

8. The swimming pool according to claim 7, wherein the position of the paddle wheel (7) and the inflow opening (9) are simultaneously adjustable in height.

9. The swimming pool according to any of the preceding claims, wherein the ratio of paddle wheel (7) diameter to length has a value in the range of 0.4 to

0.6 inclusive.

10. The swimming pool according to any of the preceding claims, wherein in the reservoir (1) the inflow opening (9) and the outflow opening (10) are each covered by a slatted grid configured in a way that the fluid can flow through the respective slatted grid from the ascending section (6) of the liquid line to the reservoir (1) and from the reservoir (1) to the descending section (4) of the liquid line.

11. The swimming pool according to any of the preceding claims, wherein the width of the ascending section (6) of the liquid line has a value in the range of 0.9 m inches to 1.6 m inclusive.

12. The swimming pool according to any of the preceding claims, wherein the turbine (7) has a drive shaft (11) protruding at least one end through a sealed opening in the liquid line.

13. The swimming pool according to claim 12, wherein the drive unit (12) is located in the dry area of the pool outside the liquid line and the reservoir (1) and, in operational state, rotates the turbine (7) by driving the drive shaft (11) at the protruding end.

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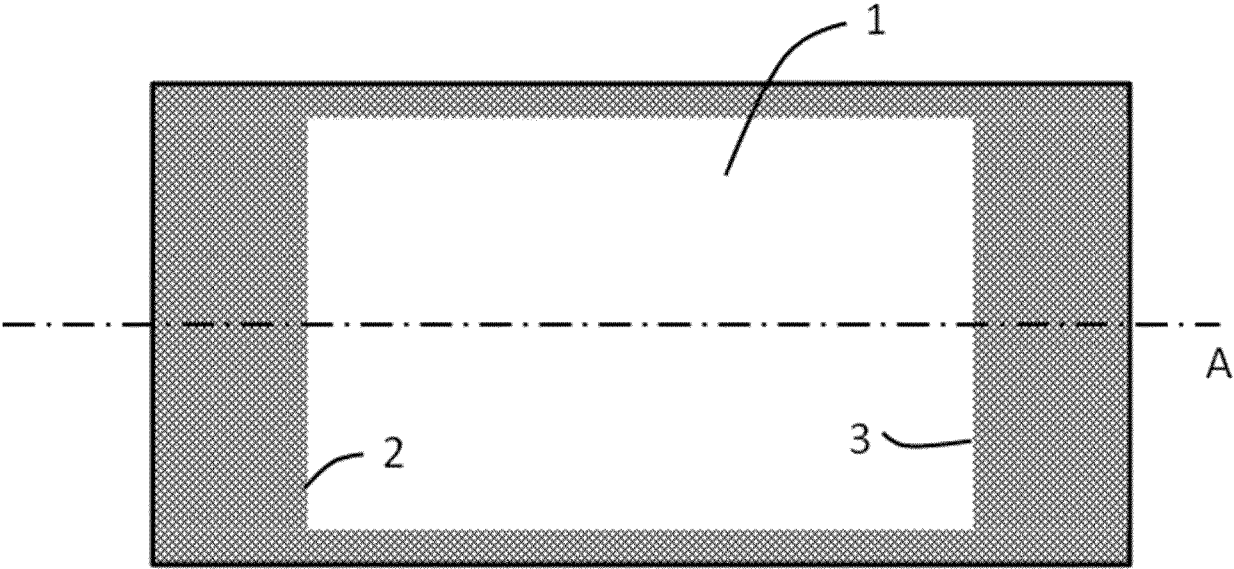


Fig.1

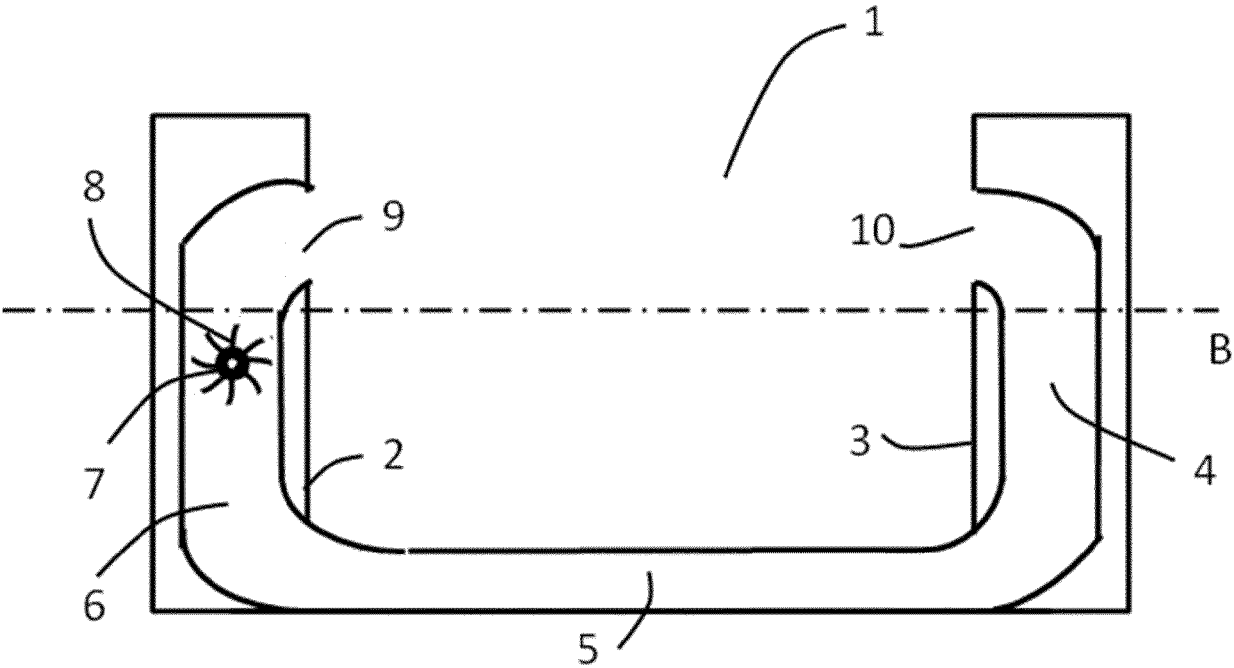


Fig.2

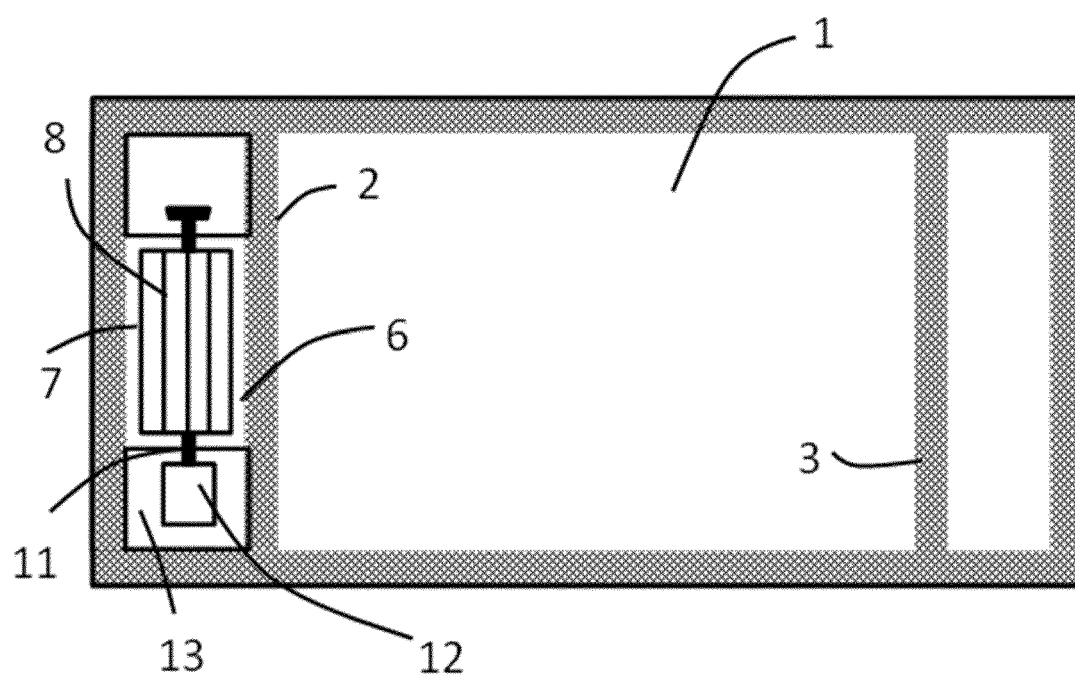


Fig.3



EUROPEAN SEARCH REPORT

Application Number

EP 23 19 5288

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
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Munich		7 February 2024	Schindler-Bauer, P
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07-02-2024

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