(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 524 348 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
19.03.2025 Bulletin 2025/12

(21) Application number: **24200537.9**

(22) Date of filing: **16.09.2024**

(51) International Patent Classification (IPC):
E04H 4/16 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
E04H 4/1654

(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
Designated Extension States:
BA
Designated Validation States:
GE KH MA MD TN

(30) Priority: **14.09.2023 US 202363582822 P**
17.01.2024 US 202463621819 P

(71) Applicant: **Maytronics Ltd.**
1935000 Kibbutz Yizrael (IL)

(72) Inventors:
- **Ben-Dov, Boaz**
1935000 Kibutz Yizrael (IL)
- **Yosimov, Leonid**
1935000 Kibutz Yizrael (IL)

(74) Representative: **Maidment, Marc et al**
Albright IP Limited
County House
Bayshill Road
Cheltenham, Glos. GL50 3BA (GB)

(54) **SUBMERGED POOL RELATED PLATFORM WITH A CONTROLLABLE JET FLUID UNIT**

(57) A pool related platform that includes a housing; and a fluid jet system that includes a first fluid jet portion that is configured to selectively output a first fluid jet from a first outlet located at rear part of the pool related platform at a first angle thereby lifting a front part of the housing; a second fluid jet portion that is configured to selectively output a second fluid jet from a second outlet located at the rear part of the pool related platform at a second angle thereby lifting a rear part of the housing; and a selection unit that is configured to receive an inner flow of fluid and to direct the inner flow to one of the first fluid jet portion or the second fluid jet portion.

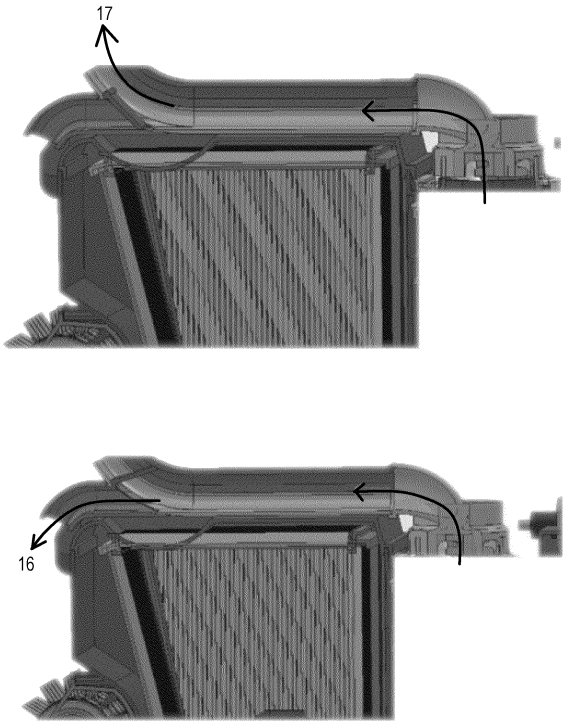


FIG. 1

EP 4 524 348 A1

Description

CROSS REFERENCE

[0001] This application claims priority from US provisional patent serial number 63/582,822 filing date 14 September 2023 which is incorporated herein by reference.

[0002] This application claims priority from US provisional patent serial number 63/621,819 filing date 17 January 2024 which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0003] Pool cleaning robots are expected to clean various pool surfaces such as submerged planes, sidewall, sun ledge and stairs.

[0004] There is a growing need to provide an efficient method for propagating along these various pool surfaces.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] In order to understand the invention and to see how it may be carried out in practice, a preferred embodiment will now be described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

FIGs. 1-27 illustrate examples of pool related platforms and parts of pool related platforms; and
FIG. 28 illustrates an example of a method.

[0006] It will be appreciated that for simplicity and clarity of illustration, elements shown in the figures have not necessarily been drawn to scale. For example, the dimensions of some of the elements may be exaggerated relative to other elements for clarity. Further, where considered appropriate, reference numerals may be repeated among the figures to indicate corresponding or analogous elements.

DETAILED DESCRIPTION OF THE DRAWINGS

[0007] According to an embodiment there is provided a pool related platform (PRP) that uses one of more water jets for movement and for assisting in changing the tilt angle of the PRP- for example assisting to lift the front part of the PRP or to lift the rear part of the PRP.

[0008] The PRP may be any platform that may perform an operation related to a fluid of a pool - cleaning, changing chemical composition, monitoring, and the like. Examples of a PRP include a pool cleaning robot (PCR), a pool robot that differs from a PCR, a PCR, and the like. Any example related to a PCR may be applied mutatis mutandis, to any other PRP.

[0009] According to an embodiment, the PCR is configured to output a rear upper jet 17 or a rear lower jet 14, it is also configured to output an upward jet 23.

[0010] The upward jet 23 is formed when a second impeller 21 rotates at a first rotational direction and directs filtered fluid towards a third conduit 22 that has an upward facing opening.

[0011] Either one of the rear upper jet and the rear lower jet are formed when a first impeller 11 rotates at a first rotational direction and directs filtered fluid towards a rear fluid path that includes a first conduit 12, a second conduit 13 and a rear selection unit (RCU) 30 that determines whether the fluid (a) is directed through a rear lower conduit 14 having a rear lower outlet 18, or (b) is directed through a rear upper conduit 15 having a rear upper outlet 19.

[0012] The RCU 30 includes a fluid control element (FCU) 31 that is located within the rear fluid path - and it rotated to block one of the rear lower conduit and the rear upper conduit - while directing the fluid to the other one of the rear lower conduit and the rear upper conduit.

[0013] RCU 30 also includes an FCU setting subunit 39 located outside the rear fluid path - that sets the position of the FCU.

[0014] Figures 3-11 illustrate three examples of the RCU.

[0015] According to a first example (see figure 3-6) the FCU setting sub-system 39 include a positioning element (PU) 32 and a PU interface 33 that rotates between positions thereby rotating the FCU to different positions.

a. When the FCU is moved to an upper position (blocking the rear upper conduit) it triggers a future movement of the PU interface 33 to an opposite direction.
b. When the first impeller stops rotating then the PU interface 33 (and accordingly the FCU) is moved to a first intermediate position that is slightly tilted towards the lower position.
c. When the first impeller is rotated again, the PU interface 33 (and accordingly the FCU) is moved to the lower position - and this triggers a future movement of the PU to another opposite position.
d. When the first impeller stops rotating then the PU interface 33 (and accordingly the FCU) is moved to a second intermediate position that is slightly tilted towards the upper position.
e. When the first impeller is rotated again, the PU interface 33 (and accordingly the FCU) is moved to the upper position.

[0016] Figure 5 illustrates various components of the FCU setting subunit - including axis 34, PU interface 33 that rotates about the axis and is in communication with the PU 32, spring 36, pole 38 that is supports the spring 36, RCU base element 37 movable by the spring, and RCU housing 35.

[0017] RCU base element 37 includes left recess 37-1, a left sloped facet 37-2 which is positively sloped, a center, a right sloped facet 37-3 that is negatively sloped,

and a right recess 37-4.

[0018] The PU 32 has a lower left facet 32-4 which is negatively sloped, a lower right facet 32-2 which is positively sloped, a right front pin 32-1, a left front pin 32-2, and a lower tip 32-5. The PU interface 33 is rotatably coupled to the PU 32 by axis 33-1 located at the upper portion of the PU interface 33.

a. Assuming that the FCU is moved to an upper position (blocking the rear upper conduit) in this case the lower tip 32-5 of the PU 32 is caught in the left recess 37-1, which prevents the PU from rotating clockwise.

b. When the first impeller stops rotating, the lower tip 32-5 exits the left recess 37-1 and the PU rotates clockwise till the lower right facet 32-2 (of PU 32) contacts the right sloped facet 37-3 (of the RCU base element 37), and the PU interface 33 contacts the right front pin 32-1 and maintain at the first intermediate position.

c. When the first impeller is rotated again, the fluid forces the FCU axis 34 to rotate and to position the lower tip-32-5 to be caught by the right recess 37-4.

d. When the first impeller stops rotating, the lower tip 32-5 exits the right recess 37-4 and the PU rotates counterclockwise till the lower left facet 32-4 (of PU 32) contacts the left sloped facet 37-2 (of the RCU base element 37), and the PU interface 33 contacts the right front pin 32-2 and maintain at a second intermediate position.

[0019] According to a second example (see figures 7-9) the FCU rotates about an axis and has a weight 40 near a distal end (the proximal end of the FCE is closer to the axis).

a. When the first impeller 11 rotates at a first rotational direction and directs filtered fluid towards a rear fluid path - the FCU (due to the weight) blocks the real lower conduit.

b. When the first impeller 11 rotates at a second rotational direction (opposite to the first rotational direction), fluid outside the PCR is sucked through the rear lower conduit and the rear upper conduit - and the FCU is elevated to an intermediate position - in which it does not block any of the rear conduits. The FCU is slightly elevated - for example dur to different suction of fluid through the different rear conduits.

c. Immediately following (b) - after the first impeller 11 returns to rotate at a first rotational direction, the fluid elevates the FCU to block the rear upper conduit.

[0020] According to a third example (see figures 10-11) the RCU includes a rotatable conduit extension (RCE) that rotates between an upper conduit position in which it extends the rear upper conduit 15, to a lower position in which is extends the rear lower conduit 14.

[0021] Figure 10-11 illustrates the RCE that is rotatable about an axis by a RCE setting subunit 51 that includes a RCE engine 54 and a transfer mechanism. The RCE engine and the RCE are located within a RCE housing 52. According to an embodiment the RCE is rotatable along multiple other angles not shown in figures 10-11.

[0022] The PRR may also include a drive motor and/or pump motor, electrical power means, an optional power cable, a hydraulic path may include water suction intake and outlet, filtering element in the hydraulic path, an electronic control box, sensors, a carry handle and the like.

[0023] The PCR of figure may hover over surfaces of the pool such as stairs, ledges without actually driving over said surfaces. During the hovering the pool cleaning robot may contact the surfaces by its cleaning elements and even only by its cleaning elements.

[0024] Figure 11A illustrates an example of a water jet used for movement of a PRP on a surface such as a bottom of pool. This can be used during "normal" movement of the PRP - for example over a plane of the pool that may be horizontal or have a small tilt angle (for example up to 10, 20, 30, 40, 50, 60 degrees). The water jet is outputted from the upper rear part of the PRP and is aimed downwards and backwards - for example at an angle of 235 degrees or between 190 to 260 degrees.

[0025] Figure 11B illustrates an example of a water jet used to lift the front part of the PRP - while applying pressure on the rear part of the PRP. The water jet is outputted from the upper rear part of the PRP at a first angle 91 and is aimed upwards and forwards - for example at a first angle of 45 degrees or between 20 to 80 degrees. This can be used to clean an upper facet of a stair.

[0026] Figure 11C illustrates an example of a water jet used to lift the rear part of the PRP - while applying pressure on the front part of the PRP. The water jet is outputted from the upper rear part of the PRP and is aimed at a second angle 92 - backwards and forwards - for example at a second angle of 135 degrees or between 110 to 170 degrees. This can be used to exit the pool or climb a stair.

[0027] The control of the direction of outputting the water jet can be done by a flow control unit - for example having a rotatable nozzle and one or more outlets through which the nozzle may output fluid. Other flow control units such as valve and/or switch based units may be provided.

[0028] According to an embodiment, there is provided a PRP, a fluid jet control unit of a PRP and a method for flow control.

[0029] There is provided a fluid jet control unit of a pool related platform (PRP), the fluid control unit includes a fluid control element (FCE) configured to move between a first position to a second position; a positioning unit that is configured to impact a positioning of the FCE; wherein the FCE is configured to: (a) direct fluid towards a first fluid jet output of the PRP when positioned in the first position; and (b) direct the fluid towards a second fluid jet

output of the PRP when positioned in the other position.

[0030] According to an embodiment the FCE is configured to be positioned at a default position when unlocked and not in contact with a reverse flow of fluid; and wherein the FCE is configured to move to a fluid induced position and maintain in the fluid induced position when unlocked and being contacted flow of fluid. The positioning unit is configured to lock the FCE when the FCE is positioned in the default position and is prevented from locking the FCE when the FCE is at the fluid induced position.

[0031] According to an embodiment, the FCE is a flap and is coupled to an interface element such as a cylinder that is patterned and rotates about an axis. The patterned cylinder has a cylinder axis is attached to a shaft of the flap, and is coupled to a spring that pushing the flat to bottom position in which fluid is directed to flow to an outlet that is higher than a bottom outlet.

[0032] The PRP also includes a frame and a guiding element that if connected to the frame and interacts with a pattern of the cylinder to position the flap in different positions.

[0033] Figure 13 illustrate the cylinder 70, a cylinder opening 76 that fits a rotation axis 82, the spring 81 pushing (illustrated by arrow 81") to a certain direction, and pattern 71 of the cylinder that includes cavity 72.

[0034] The pattern 71 of the cylinder and different positions of the cylinder are illustrated in figure 14.

[0035] Figure 14 illustrates the cylinder 70 having pattern that includes cavity 72 and an inner island 73, and four recesses located at four locations - first location P1 701, second location P2 702, third location P3 703 and fourth location P4 704. The first recess is a lowest recess of the four recesses, the second recess is located to the right of the first recess and above the first recess, the third recess located above the first recess, below the second recess and to the right of the second recess, and the fourth recess is formed above the second recess and to the right of the third recess.

[0036] According to an embodiment, a guiding element (dented 97 in figures 15-20) is moved between the recesses (using changes in a flow of fluid that reach the fluid control element) to alter the position of the flow control unit (such as flap 95 in figures 15-20).

[0037] Figure 14 also illustrates the exterior sidewalls 74 and the interior sidewalls 75 that defined cavity 72, wherein at least one recess of the four recesses are formed in the exterior sidewalls and at least one other recess of the four recesses is formed in the interior sidewall.

[0038] Figures 15 and 16 illustrate the flap 95, the rear upper fluid conduit 93, a rear lower fluid conduit 94, a guiding element 91, a shaft 82, the frame 96 and the cylinder (having pattern 71) when the flap is at a lower position (corresponds to position - associated with location P1 - the guiding element is pressed against location P1).

[0039] Figure 17 illustrates the flap 95, the rear upper fluid conduit 93, a rear lower fluid conduit 94, a guiding element 91, the frame 96, the cylinder, and the flow of fluid and the position of the flap and the guiding element (in location P2) - following a reversing of the impeller, using the water stream the flap is located between P1 and P2 - and then in further moved to position the guiding element at P2.

[0040] Figure 18 illustrates the flap 95, the rear upper fluid conduit 93, a rear lower fluid conduit 94, a guiding element 91, the frame 96, the cylinder, and the position of the flap and the guiding element (in location P3) - following a stopping of the impeller, the spring will rotate the cylinder and the flap back, and the guiding element will be guided to position P3, this will stop the flap slightly above the center line.

[0041] Figure 19 illustrates the flap 95, the rear upper fluid conduit 93, a rear lower fluid conduit 94, a guiding element 91, the frame 96, the cylinder, and flow of fluid and the position of the flap and the guiding element (in location P4) - when following the stop - the impeller is activated in the correct direction, the water will push the flap upwards, the flap will rotate the cylinder, and the cylinder will guide the guiding element to location P4, the water output direction will now be pointed to the bottom.

[0042] Figure 20 illustrates the flow of fluid and the position of the flap and the guiding element (in location P1) - following a stop the impeller the spring will rotate the cylinder back, the guiding element will be guided to position P1, and the flap will be at the bottom - guiding the water to the normal output direction.

[0043] According to an embodiment, the PCR is configured to have an improved maneuverability and is configured to be prominent, to climb slippery sidewalls and/or to clean steps in an improved manner.

[0044] Figures 21-23 illustrates an example in which the PCR has a first plurality (N1) of fluid conduits that are oriented at different angles, a fluid control element that is configured to rotate between a second plurality (N2) of positions, and a mechanism for rotating the flow control unit.

[0045] The PCR is configured to output fluid jets at different angles.

[0046] According to an embodiment, each angle (including a first angle and a second angle) is defined between the direction of propagation of the fluid jet and a longitudinal axis of the pool related platform. According to an embodiment, the longitudinal axis is parallel to the bottom of the housing of the pool related platform. According to an embodiment, the longitudinal axis virtually passes through an axis of rotation of the flow control element.

[0047] According to an embodiment, N1 equals N2 - and the fluid control element has a single angular position per each fluid conduit - to provide N1 angles of an outputted fluid jet. According to an embodiment, the different angles may span along one or more continuous angular ranges.

[0048] According to an embodiment, N2 exceeds N1

(by at least 1, 2, 3, 4, 5, 6, and more) - and the fluid control element has multiple angular positions (corresponding to multiple directions of the jet fluid) for at least one of the fluid conduits.

[0049] According to an embodiment, a single opening may pass fluid jest of different directions.

[0050] Figures 21, 22 and 23 illustrate the N1 fluid conduits as including:

a. A first fluid conduit 411 that is located at a front half of the PCR and having a first opening located at a top of the housing and of an upwards orientation.

b. A second fluid conduit 412 located at a rear half of the PCR and having a front upper orientation, the second fluid conduit includes a second opening located at the rear half of the top of the housing.

c. A third fluid conduit 413 located at the rear half of the PCR and having a third opening located at the rear of the PCR, the third fluid conduit has a rear upper orientation.

d. A fourth fluid conduit 414 located at the rear half of the PCR and having a fourth opening located below the third opening and at the rear of the PCR, the fourth fluid conduit has a rear lower orientation.

[0051] First fluid conduit 411 has first opening 401 for outputting fluid jet 421, second fluid conduit 412 has second opening 402 for outputting fluid jet 422, third fluid conduit 413 has third opening 403 for outputting fluid jet 423, and fourth fluid conduit 414 has fourth opening 404 for outputting second fluid jet 424.

[0052] Figure 21 also illustrate filtering unit 121, pump motor 122, impeller 123 and handle 124.

[0053] In figures 21-23 the first fluid jet 421 propagates at an angle that is normal to the impeller.

[0054] In figure 21 the second fluid jet 422 propagates at angle 131. In figure 22 the fourth fluid jet 424 propagates at angle 132. In figure 23 the third fluid jet 422 propagates at angle 133.

[0055] According to an embodiment, outputting a fluid jet 422 through the second fluid opening lifts the front of the pool related platform.

[0056] According to an embodiment, outputting fluid jet 424 through the fourth fluid opening lifts the rear of the pool related platform.

[0057] According to an embodiment, when submerged, the front part of the PCR is lighter than the read part of the PCR.

[0058] According to an embodiment, and during a cleaning of a surface such as the bottom of the pool - the outputting of a fluid jet through the first fluid conduit assists to attach the front part of the PCR to the cleaned surface.

[0059] According to an embodiment, while cleaning a stair, outputting the fluid jet through the first fluid conduit and an outputting of another fluid jet through the fourth fluid conduit lifts the PCR, while the outputting of the fluid jet through the first fluid conduit prevents the PCR from moving to the next stair.

[0060] According to an embodiment, and while entering an erect position to clean a slippery sidewall - the outputting of a fluid jet through the second fluid conduit assists the PCR to be prominent, to climb slippery sidewalls.

[0061] Figures 24-27 illustrates the PCR in which the mechanism for rotating the flow control element includes a fluid control element engine that rotates a fluid control element shaft to set the fluid control element to a desired angle.

[0062] Figure 24 illustrates PCR 400 that includes an input conduit 460 that is followed by a fluid control element 440 that is rotated within a multi-aperture unit 450 that includes:

a. A first aperture 451 that belongs to a first fluid conduit, which has a front upper orientation and is located at the rear half of the PCR.

b. A second aperture 452 that belongs to a second fluid conduit, which has a rear upper orientation, is located at the rear half of the PCR and is wider than the first aperture.

c. A third aperture 453 that belongs to a third fluid conduit, which has a rear lower orientation, is located at the rear half of the PCR and has at least a portion that is lower than an axis of rotation of the flow control element 440 - for allowing the flow of rear lower fluid jets.

[0063] The rotation of the flow control element 440 to more than three directions allows the outputting of fluid jets at much more than three direction - for example for more than 4, 6, 8, 10, 12, 20, 30 and more directions.

[0064] These different directions include one or more directions for lifting the rear of the PCR and one or more other direction for lifting the front of the PCR.

[0065] Figures 24-27 also illustrate a mechanism for rotating the fluid control element, the mechanism includes fluid control element engine 441 that is configured to rotate a fluid control element shaft 446 using one or more gears 442.

[0066] According to an embodiment, the fluid control element 440 that is rotated within a multi-aperture unit 450 are positioned below an apertured cover 470.

[0067] According to an embodiment, there is provided a pool related platform that includes a housing; and a fluid jet system that includes: a first fluid jet portion that is configured to selectively output a first fluid jet from a first outlet located at rear part of the pool related platform at a first angle thereby lifting a front part of the housing; a second fluid jet portion that is configured to selectively output a second fluid jet from a second outlet located at the rear part of the pool related platform at a second angle thereby lifting a rear part of the housing and a selection unit that is configured to receive an inner flow of fluid and to direct the inner flow to one of the first fluid jet portion or the second fluid jet portion.

[0068] According to an embodiment, the first angle ranges between twenty and eighty degrees.

[0069] According to an embodiment, the second angle ranges between one hundred and ten and one hundred and seventy degrees.

[0070] According to an embodiment, the first fluid jet portion and the second fluid jet portion share a rear upper conduit, and wherein the selection unit includes a rotatable conduit extension that is rotatable between (i) a second position in which the rotatable conduit extension is configured to receive a flow of fluid from the rear upper conduit and perform a fluid direction change to output the second fluid jet at the second angle, and (ii) a second position in which it extends the rear upper conduit and outputs the second fluid jet at the second angle.

[0071] According to an embodiment, the rotatable conduit extension is rotatable about an axis that passes through the rear upper conduit.

[0072] According to an embodiment, the rotatable conduit extension is rotatable by a rotatable conduit extension engine located on top of the housing.

[0073] According to an embodiment, there is provided a method for controlling an angle of a housing of a pool related platform, the method includes: receiving, by selection unit, an inner flow of fluid; directing, by the selection unit, the inner flow of fluid to a selected fluid jet portion out of a first fluid jet portion and the second fluid jet portion; outputting, by the first fluid jet portion and when selected, a first fluid jet from a first outlet located at rear part of the pool related platform at a first angle thereby lifting a front part of the housing; outputting, by the second fluid jet portion and when selected, a second fluid jet from a second outlet located at the rear part of the pool related platform at a second angle thereby lifting a rear part of the housing.

[0074] According to an embodiment, the first angle ranges between twenty and eighty degrees.

[0075] According to an embodiment, the second angle ranges between one hundred and ten and one hundred and seventy degrees.

[0076] According to an embodiment, the first fluid jet portion and the second fluid jet portion share a rear upper conduit, and wherein the directing of the fluid includes setting a position of a rotatable conduit extension, by rotation, to a selected position out of (i) a first position for outputting the first fluid flow following a fluid direction change, and (ii) a second position for outputting the second fluid flow.

[0077] According to an embodiment, the method includes rotating the rotatable conduit extension about an axis that passes through the rear upper conduit.

[0078] According to an embodiment, the method includes rotating the rotatable conduit extension by a rotatable conduit extension engine located on top of the housing.

[0079] According to an embodiment, there is provided a pool related platform that includes a housing; a controller; and a fluid jet system that includes: a rear lower conduit configured to output a rear lower fluid jet; a rear upper conduit configured to output a rear upper fluid jet; an upwards conduit configured to output an upwards fluid jet from a location position at a front half of the housing; and a rear selection unit configured to select whether to direct a rear inner flow of fluid to one of the rear upper conduit and the rear lower conduit.

[0080] According to an embodiment, the upwards conduit is configured to output the upward fluid jet independently from a selection made by the rear selection unit.

[0081] According to an embodiment, the pool related platform includes a fluid control element and a fluid control element setting subunit that is configured to move the fluid control element between (i) a rear upper position in which the fluid control element blocks the rear lower conduit while maintaining the rear upper conduit unblocked, and (ii) a rear lower position in which the fluid control element blocks the rear upper conduit while maintaining the rear lower conduit unblocked.

[0082] According to an embodiment, the fluid control element is configured to alternate between the rear upper position and the rear lower position without using electronic signals.

[0083] According to an embodiment, the fluid control element setting subunit includes a positioning element and a positioning element interface that rotates between positions thereby rotating the flow control unit between the rear upper position and the rear lower position.

[0084] According to an embodiment, a positioning of the fluid control unit at the rear upper position triggers a future movement of the positioning element interface at an opposite direction.

[0085] According to an embodiment, the positioning interface element is configured to move to a lower position following a stop of fluid provided to the fluid jet system, and after the positioning of the fluid control unit at the rear upper position.

[0086] According to an embodiment, the positioning interface element is configured to move to the lower rear position following a resuming of a supply of fluid to the fluid jet system.

[0087] According to an embodiment, a positioning of the fluid control unit at the rear lower position triggers a future movement of the positioning element interface at an opposite direction.

[0088] According to an embodiment, the positioning interface element is configured to move to an upper position following a stop of fluid provided to the fluid jet system, and after the positioning of the fluid control unit at the rear lower position.

[0089] According to an embodiment, the positioning interface element is configured to move to the upper rear position.

[0090] According to an embodiment, the pool cleaning robot includes a fluid control element that is configured to, using a mechanical mechanism and a control imposed on an inner flow of fluid to be received by the flow control element, alternate between (i) a rear upper position in

which the fluid control element blocks the rear lower conduit while maintaining the rear upper conduit unblocked, and (ii) a rear lower position in which the fluid control element blocks the rear upper conduit while maintaining the rear lower conduit unblocked.

[0091] According to an embodiment, there is provided a method for outputting one or more fluid jets, the method includes selectively outputting an upwards fluid jet, from an upwards conduit of a pool related platform located at a front half of a housing of a pool related platform; receiving by a rear selection unit a rear inner flow of fluid; determining, by the rear selection unit, whether to direct the rear inner flow of fluid to one of the rear upper conduit and the rear lower conduit; outputting, by the rear lower conduit when selected, a rear lower fluid jet; and outputting, by the rear upper conduit when selected, a rear upper fluid jet.

[0092] According to an embodiment, the method includes moving a fluid control element by a fluid control element setting subunit, between (i) a rear upper position in which the fluid control element blocks the rear lower conduit while maintaining the rear upper conduit unblocked, and (ii) a rear lower position in which the fluid control element blocks the rear upper conduit while maintaining the rear lower conduit unblocked.

[0093] According to an embodiment, the method includes alternating the fluid control element between the rear upper position and the rear lower position without using electronic signals.

[0094] According to an embodiment, the method includes rotating a positioning element interface between positions thereby rotating the flow control unit between the rear upper position and the rear lower position.

[0095] According to an embodiment, a positioning of the fluid control unit at the rear upper position triggers a future movement of the positioning element interface at an opposite direction.

[0096] According to an embodiment, the method includes moving the positioning interface element to a lower position following a stop of a provision of fluid to the fluid jet system, and after the positioning of the fluid control unit at the rear upper position.

[0097] According to an embodiment, the method includes moving the positioning interface element to the lower rear position following a resuming of a supply of fluid to the fluid jet system.

[0098] According to an embodiment, a positioning of the fluid control unit at the rear lower position triggers a future movement of the positioning element interface at an opposite direction.

[0099] According to an embodiment, there is provided a pool related platform that includes a housing; a controller; and a fluid jet system that includes: a rear lower conduit configured to output a rear lower fluid jet; a rear upper conduit configured to output a rear upper fluid jet; and a selection unit configured to select whether to direct a rear inner flow of fluid to one of the rear upper conduit and the rear lower conduit, wherein the selection unit includes a fluid control element and a patterned cylinder having a cylinder axis, wherein the cylinder axis is rotatably coupled to a shaft of the fluid control unit, wherein an angular position of the patterned cylinder is determined based on an interaction between a pattern of the patterned cylinder and a guiding element.

[0100] According to an embodiment, one side of the guiding element is in contact with the patterned cylinder and another side of the guiding element is in contact with a static frame.

[0101] According to an embodiment, the flow control element is configured to be positioned at a default position when unlocked and not in contact with a flow of fluid within the pool related platform.

[0102] According to an embodiment, the flow control element is configured to move to a fluid induced position and maintain in the fluid induced position when unlocked and being contacted by the flow of fluid.

[0103] According to an embodiment, the patterned cylinder is configured to lock the flow control element when the flow control element is positioned in the default position and is prevented from locking the flow control element when the flow control element is at the fluid induced position.

[0104] According to an embodiment, the pattern of the patterned cylinder defines four recesses that correspond to four states of the guiding element.

[0105] According to an embodiment, pattern of the patterned cylinder is a cavity that has exterior sidewalls and interior sidewalls, wherein at least one recess of the four recesses are formed in the exterior sidewalls and at least one other recess of the four recesses is formed in the interior sidewall.

[0106] The pool related platform according to claim , further includes a spring that is configured to rotate the patterned cylinder at a first angular direction.

[0107] According to an embodiment, the four recesses comprise: (i) a first recess that is a lowest recess of the four recesses, (ii) a second recess that is located to the right of the first recess and above the first recess, (ii) a third recess that located above the first recess, below the second recess and to the right of the second recess, and (iii) a fourth recess that is formed above the second recess and to the right of the third recess.

[0108] According to an embodiment, pattern of the patterned cylinder is a cavity that has exterior sidewalls and interior sidewalls, wherein the third recess is formed in the interior sidewalls and the first, second and third recesses are formed in the exterior sidewalls.

[0109] According to an embodiment, the guiding element is movable between multiple states using changes in a flow of fluid that reach the fluid control element and a movement of the guiding element between the recesses formed in the pattern.

[0110] According to an embodiment, there is provided a method that includes receiving by a selection unit a rear inner flow of fluid; determining, by the selection unit, whether to direct the rear inner flow of fluid to one of

the rear upper conduit and the rear lower conduit; wherein the selection unit includes a fluid control element and a patterned cylinder having a cylinder axis, wherein the cylinder axis is rotatably coupled to a shaft of the fluid control unit, wherein an angular position of the patterned cylinder is determined based on an interaction between a pattern of the patterned cylinder and a guiding element; outputting, by the rear lower conduit when selected, a rear lower fluid jet; and outputting, by the rear upper conduit when selected, a rear upper fluid jet.

[0111] According to an embodiment, one side of the guiding element is in contact with the patterned cylinder and another side of the guiding element is in contact with a static frame.

[0112] According to an embodiment, the method includes positioning the flow control element at a default position when unlocked and not in contact with a flow of fluid within the method.

[0113] According to an embodiment, the method includes moving the flow control element to a fluid induced position and maintaining in the fluid induced position when unlocked and being contacted by the flow of fluid.

[0114] According to an embodiment, the method includes locking, by the patterned cylinder, the flow control element when the flow control element is positioned in the default position and preventing from locking the flow control element when the flow control element is at the fluid induced position.

[0115] According to an embodiment, the pattern of the pattern cylinder defines four recesses that correspond to four states of the guiding element.

[0116] According to an embodiment, pattern of the patterned cylinder is a recess that has exterior sidewalls and interior sidewalls, wherein at least one recess of the four recesses are formed in the exterior sidewalls and at least one other recess of the four recesses is formed in the interior sidewall.

[0117] According to an embodiment, the four recesses comprise: (i) a first recess that is a lowest recess of the four recesses, (ii) a second recess that is located to the right of the first recess and above the first recess, (ii) a third recess that located above the first recess, below the second recess and to the right of the second recess, and (iii) a fourth recess that is formed above the second recess and to the right of the third recess.

[0118] According to an embodiment, the method includes moving the guiding element between multiple states using changes in a flow of fluid that reach the fluid control element and a movement of the guiding element between the recesses formed in the pattern.

[0119] Figure 28 illustrates method 300 for controlling an angle of a housing of a pool related platform.

[0120] According to an embodiment, method 300 includes step 310 of receiving, by selection unit, an inner flow of fluid.

[0121] According to an embodiment, step 310 is followed by step 320 of directing, by the selection unit, the inner flow of fluid to a selected fluid jet portion out of a first fluid jet portion and the second fluid jet portion.

[0122] According to an embodiment, step 320 is preceded by setting (step 305) the selection unit according to the selection.

[0123] According to an embodiment, step 320 is followed by steps 330 or step 340 - according to the selection made in step 320.

[0124] According to an embodiment, step 330 includes outputting, by the first fluid jet portion and when selected, a first fluid jet from a first outlet located at rear part of the pool related platform at a first angle thereby lifting a front part of the housing.

[0125] According to an embodiment, step 340 includes outputting, by the second fluid jet portion and when selected, a second fluid jet from a second outlet located at the rear part of the pool related platform at a second angle thereby lifting a rear part of the housing.

[0126] According to an embodiment, the first angle ranges between twenty and eighty degrees.

[0127] According to an embodiment, the second angle ranges between one hundred and ten and one hundred and seventy degrees.

[0128] According to an embodiment, the first fluid jet portion and the second fluid jet portion share a rear upper conduit, and step 320 is preceded by setting a position of a rotatable conduit extension, by rotation, to a selected position out of (i) a first position for outputting the first fluid flow following a fluid direction change, and (ii) a second position for outputting the second fluid flow.

[0129] According to an embodiment, the setting includes rotating the rotatable conduit extension about an axis that passes through the rear upper conduit.

[0130] According to an embodiment, the setting includes rotating the rotatable conduit extension by a rotatable conduit extension engine located on top of the housing.

[0131] Any reference to the term "comprising" or "having" should be applied, mutatis mutandis to "consisting of" or "essentially consisting of'. For example - a pool cleaning robot that comprises certain components can include additional components, can be limited to the certain components or may include additional components that do not materially affect the basic and novel characteristics of the pool cleaning robot - respectively.

[0132] In the foregoing specification, the invention has been described with reference to specific examples of embodiments of the invention. It will, however, be evident that various modifications and changes may be made therein without departing from the broader spirit and scope of the invention as set forth in the appended claims.

[0133] Moreover, the terms "front, " "back, " "top, " "bottom, " "over, " "under " and the like in the description and in the claims, if any, are used for descriptive purposes and not necessarily for describing permanent relative positions. It is understood that the terms so used are interchangeable under appropriate circumstances such that the embodiments of the invention described herein

are, for example, capable of operation in other orientations than those illustrated or otherwise described herein.

[0134] Any arrangement of components to achieve the same functionality is effectively "associated" such that the desired functionality is achieved. Hence, any two components herein combined to achieve a particular functionality can be seen as "associated with " each other such that the desired functionality is achieved, irrespective of architectures or intermedial components. Likewise, any two components so associated can also be viewed as being "operably connected, " or "operably coupled, " to each other to achieve the desired functionality.

[0135] Furthermore, those skilled in the art will recognize that boundaries between the above described operations are merely illustrative. The multiple operations may be combined into a single operation, a single operation may be distributed in additional operations and operations may be executed at least partially overlapping in time. Moreover, alternative embodiments may include multiple instances of a particular operation, and the order of operations may be altered in various other embodiments.

[0136] While certain features of the invention have been illustrated and described herein, many modifications, substitutions, changes, and equivalents will now occur to those of ordinary skill in the art. It is, therefore, to be understood that the appended claims are intended to cover all such modifications and changes as fall within the true spirit of the invention.

Claims

1. A pool related platform, comprising:

a housing; and
a fluid jet system that comprises:

a first fluid jet portion that is configured to selectively output a first fluid jet from a first outlet located at rear part of the pool related platform at a first angle thereby lifting a front part of the housing;
a second fluid jet portion that is configured to selectively output a second fluid jet from a second outlet located at the rear part of the pool related platform at a second angle thereby lifting a rear part of the housing and
a selection unit that is configured to receive an inner flow of fluid and to direct the inner flow to one of the first fluid jet portion or the second fluid jet portion.

2. The pool related platform according to claim 1, wherein the first angle ranges between twenty and eighty degrees.

3. The pool related platform according to claim 1, wherein the second angle ranges between one hundred and ten and one hundred and seventy degrees.

4. The pool related platform according to claim 1, wherein the first fluid jet portion and the second fluid jet portion share a rear upper conduit, and wherein the selection unit comprises a rotatable conduit extension that is rotatable between (i) a second position in which the rotatable conduit extension is configured to receive a flow of fluid from the rear upper conduit and perform a fluid direction change to output the second fluid jet at the second angle, and (ii) a second position in which it extends the rear upper conduit and outputs the second fluid jet at the second angle.

5. The pool related platform according to claim 4, wherein the rotatable conduit extension is rotatable about an axis that passes through the rear upper conduit.

6. The pool related platform according to claim 4, wherein the rotatable conduit extension is rotatable by a rotatable conduit extension engine located on top of the housing.

7. The pool related platform according to claim 1, wherein the selection unit comprises a fluid control element and a mechanism for rotating the fluid control element between a second plurality of positions that comprise a first position for outputting the first fluid jet at the first angle and a second position for outputting the second fluid jet at the second angle.

8. The pool related platform according to claim 7, wherein the mechanism comprises a fluid control element engine configured to rotate a fluid control element shaft that is mechanically coupled to the fluid control element.

9. The pool related platform according to claim 7, wherein the mechanism is configured to position the fluid control element at a second plurality of positions, wherein the second plurality of positions comprises the first position, the second position, and one or more additional positions.

10. The pool related platform according to claim 9, comprising a first plurality of openings that comprise an opening from which the first fluid jet is output, another opening from which the second fluid jet is output and one or more additional outputs.

11. A method for controlling an angle of a housing of a pool related platform, the method comprises:

receiving, by selection unit, an inner flow of fluid;

directing, by the selection unit, the inner flow of fluid to a selected fluid jet portion out of a first fluid jet portion and the second fluid jet portion; outputting, by the first fluid jet portion and when selected, a first fluid jet from a first outlet located at rear part of the pool related platform at a first angle thereby lifting a front part of the housing; outputting, by the second fluid jet portion and when selected, a second fluid jet from a second outlet located at the rear part of the pool related platform at a second angle thereby lifting a rear part of the housing.

12. The method according to claim 11, wherein the first angle ranges between twenty and eighty degrees.

13. The method according to claim 11, wherein the second angle ranges between one hundred and ten and one hundred and seventy degrees.

14. The method according to claim 11, wherein the first fluid jet portion and the second fluid jet portion share a rear upper conduit, and wherein the directing of the fluid comprises setting a position of a rotatable conduit extension, by rotation, to a selected position out of (i) a first position for outputting the first fluid flow following a fluid direction change, and (ii) a second position for outputting the second fluid flow.

15. The method according to claim 14, comprising rotating the rotatable conduit extension about an axis that passes through the rear upper conduit.

16. The method according to claim 1, comprising rotating the rotatable conduit extension by a rotatable conduit extension engine located on top of the housing.

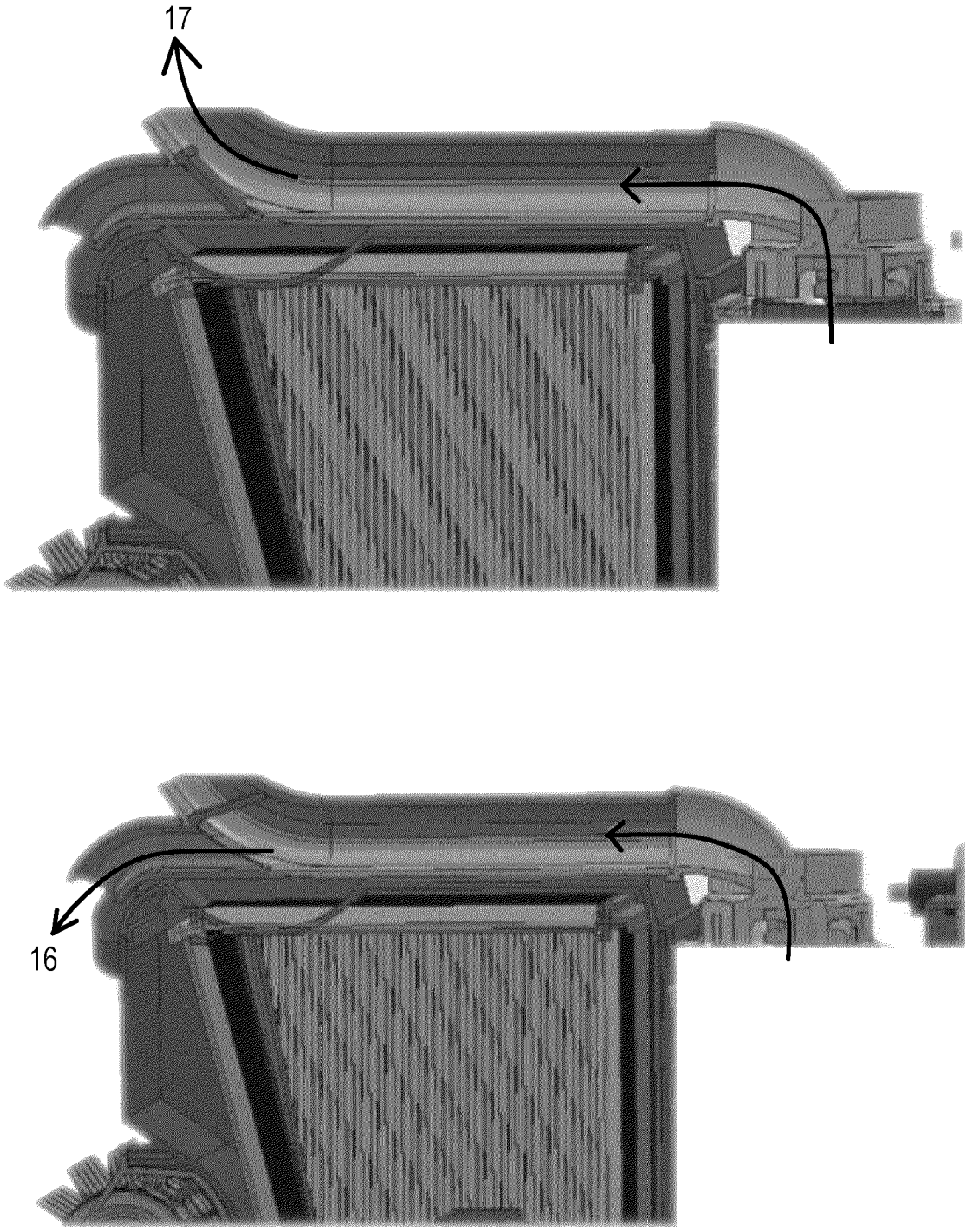


FIG. 1

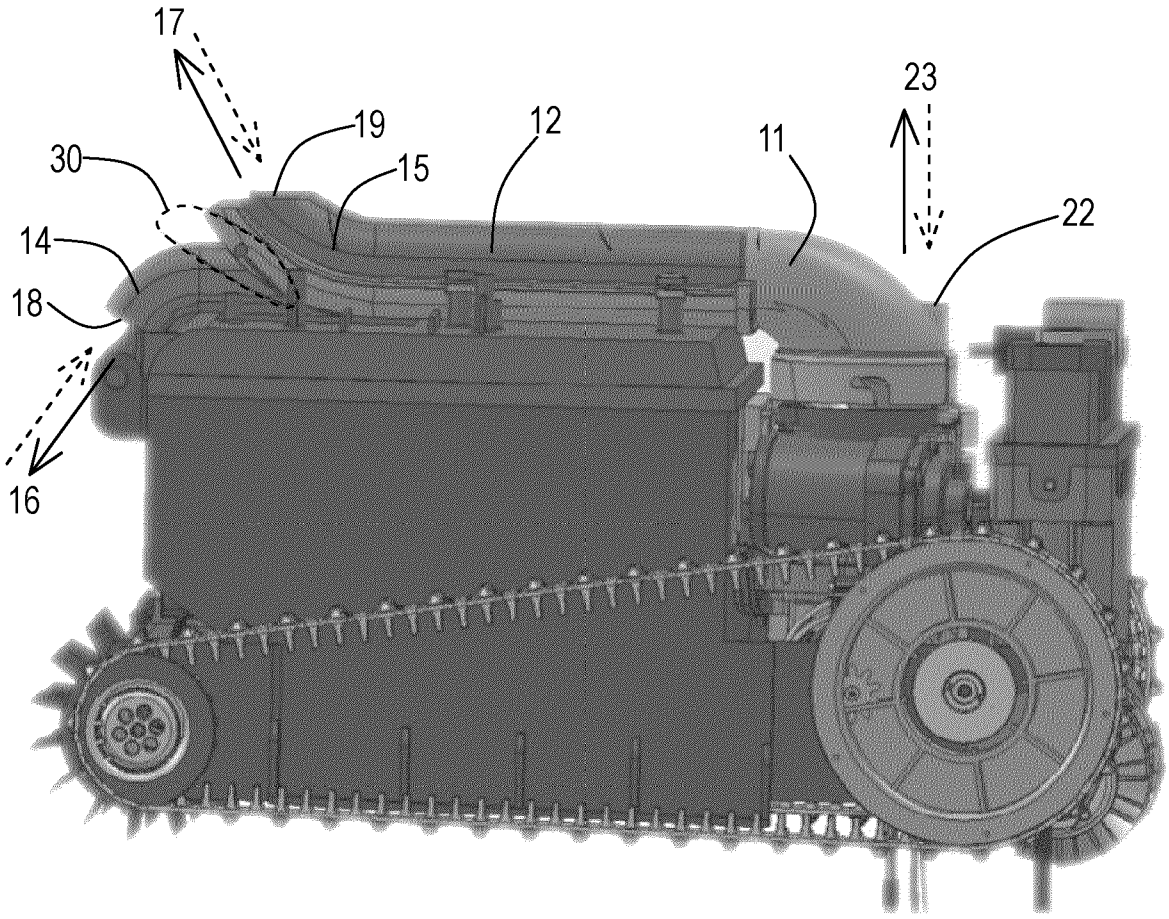


FIG. 2

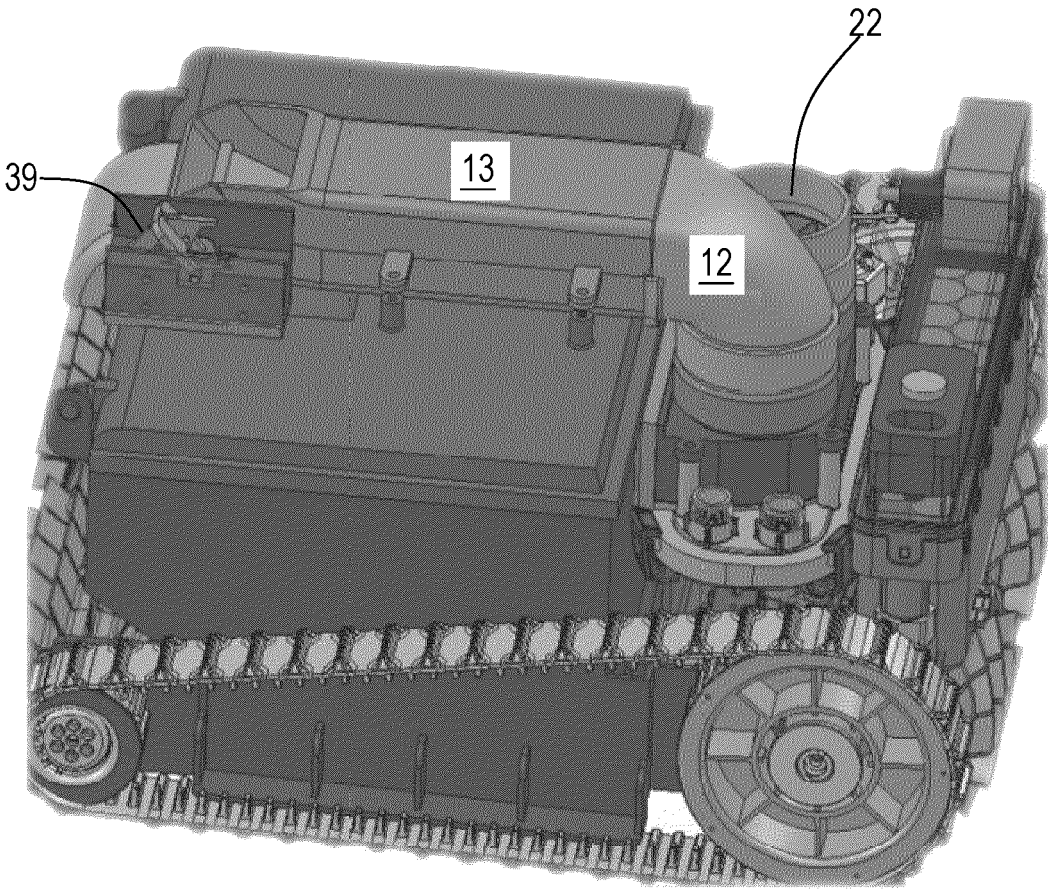


FIG. 3

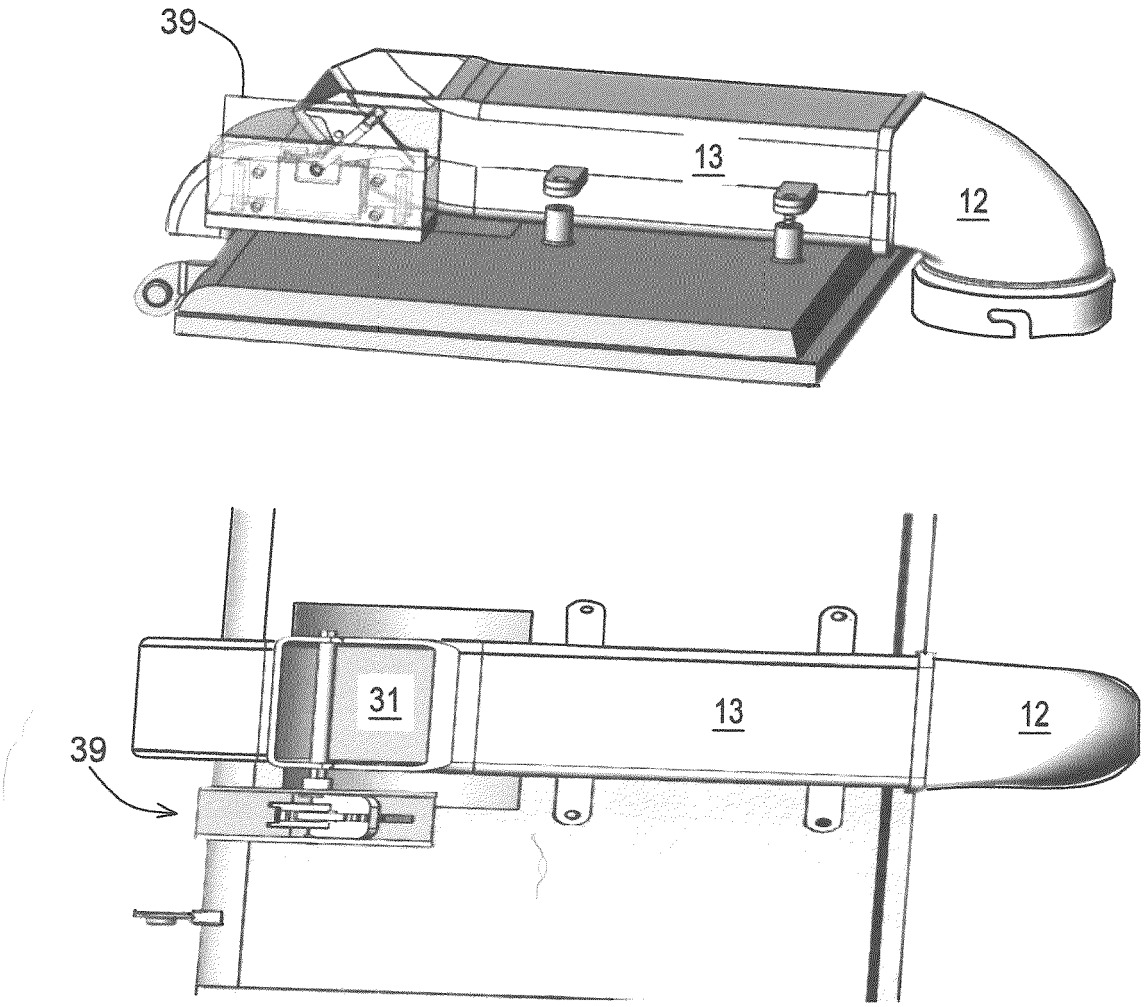
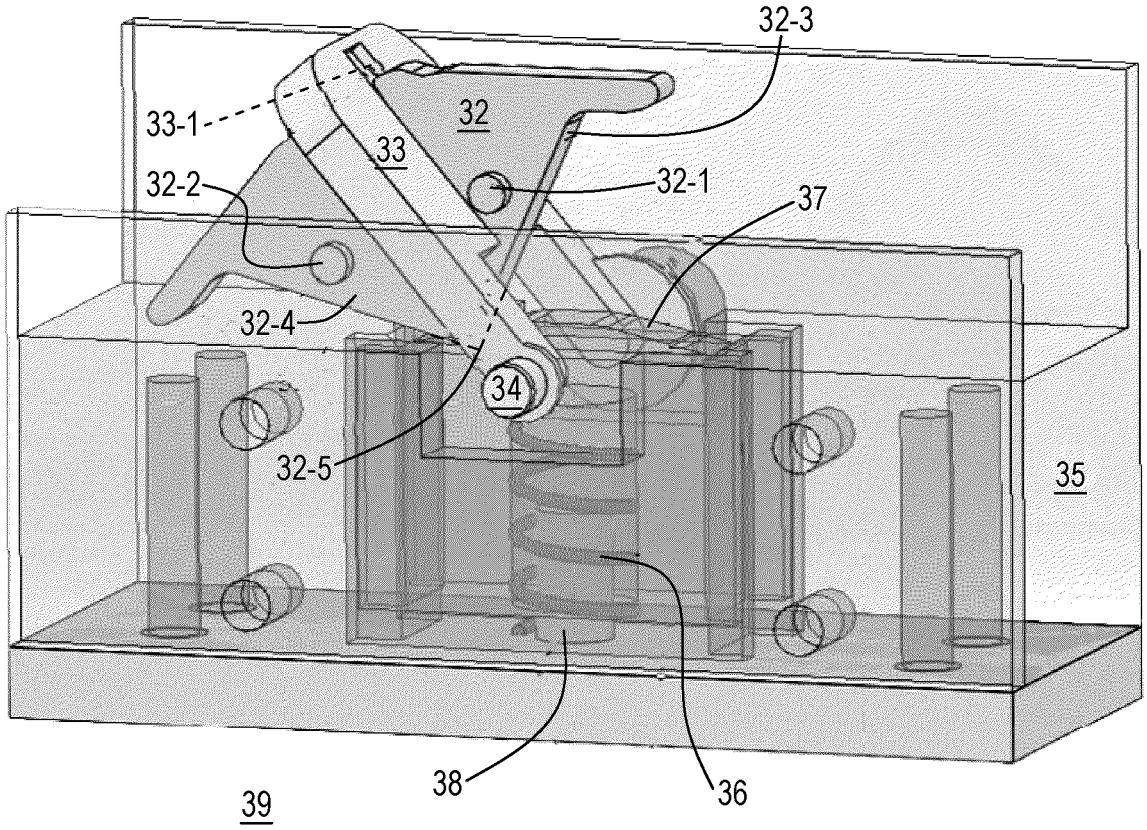


FIG. 4



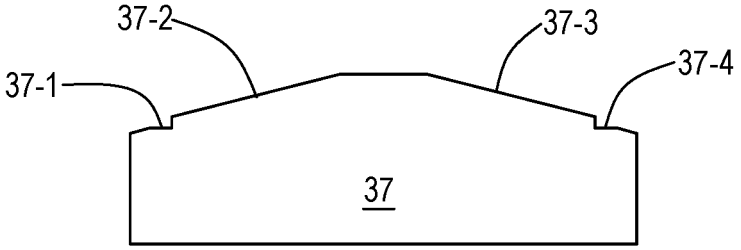
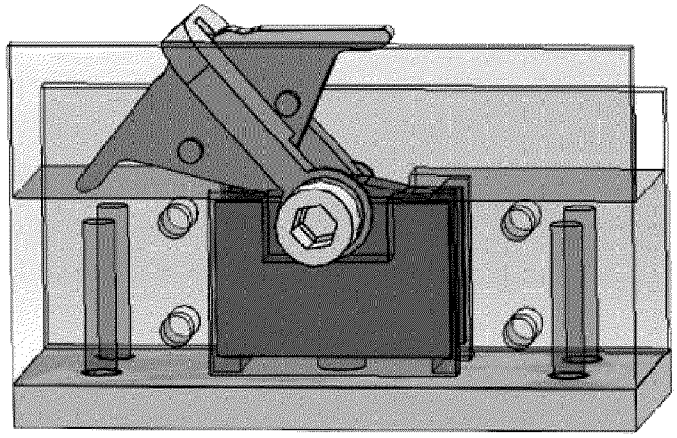
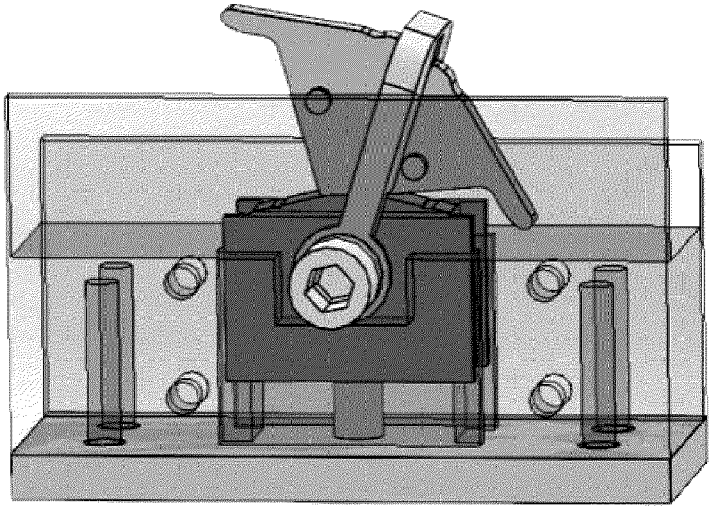


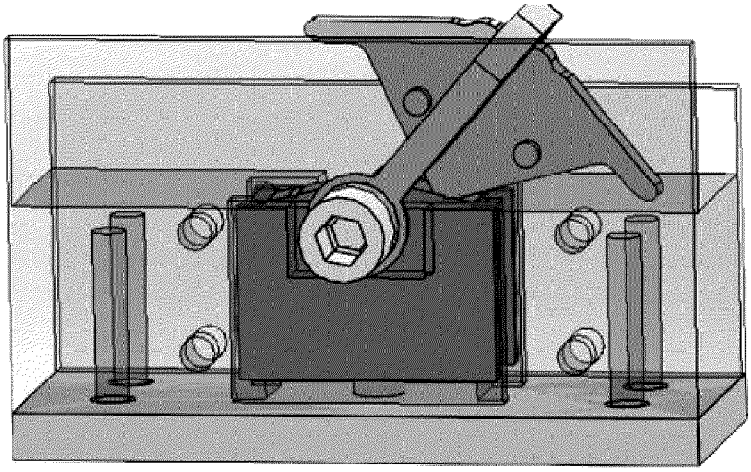
FIG. 5



39



39



39

FIG. 6

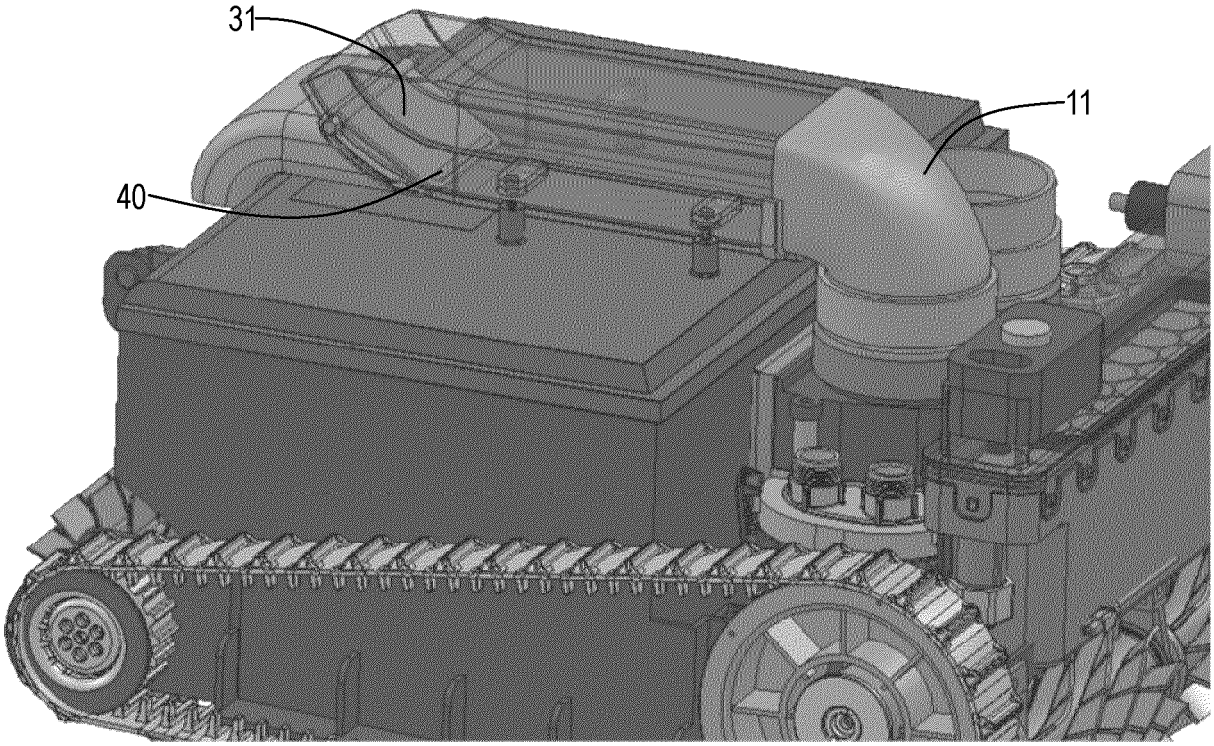
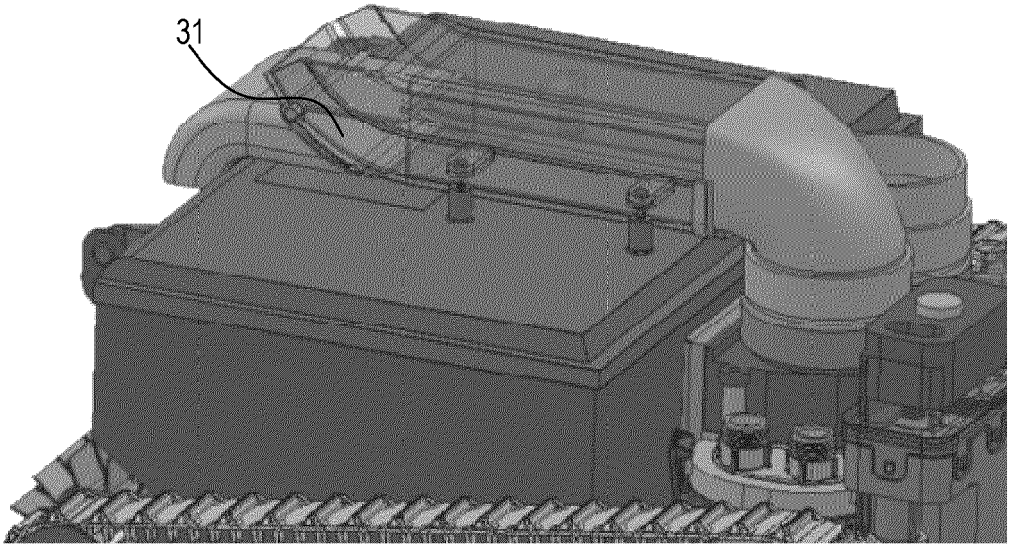


FIG. 7



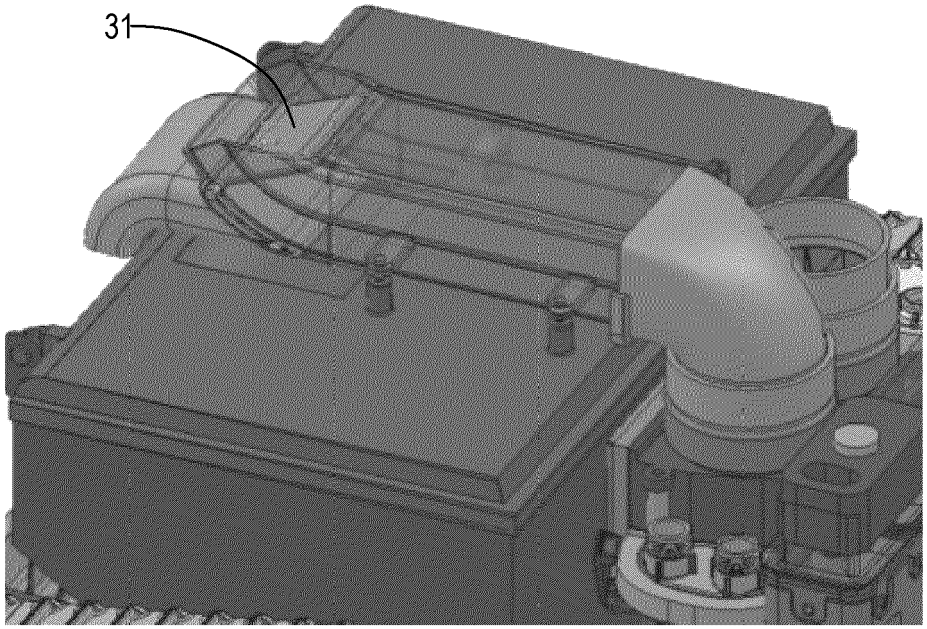


FIG. 8

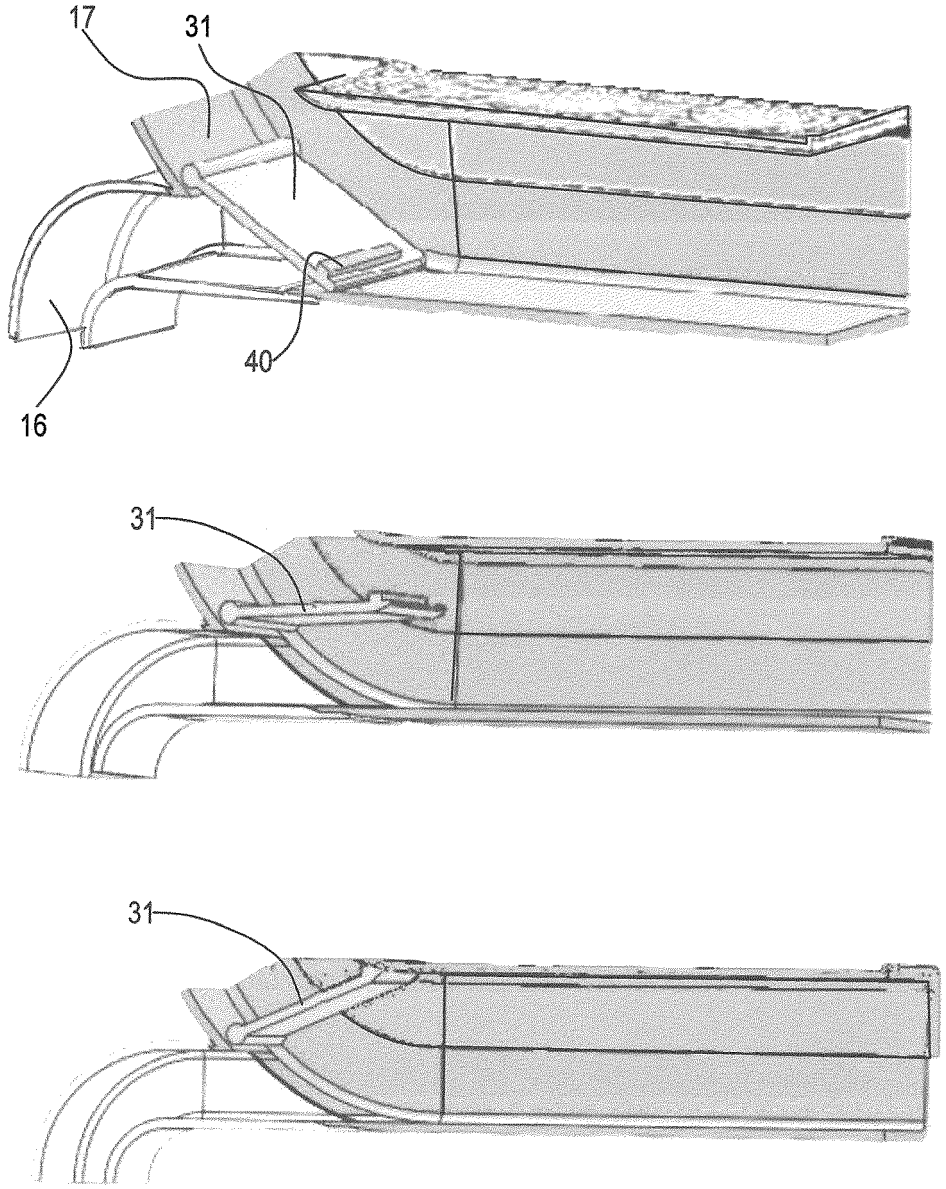


FIG. 9

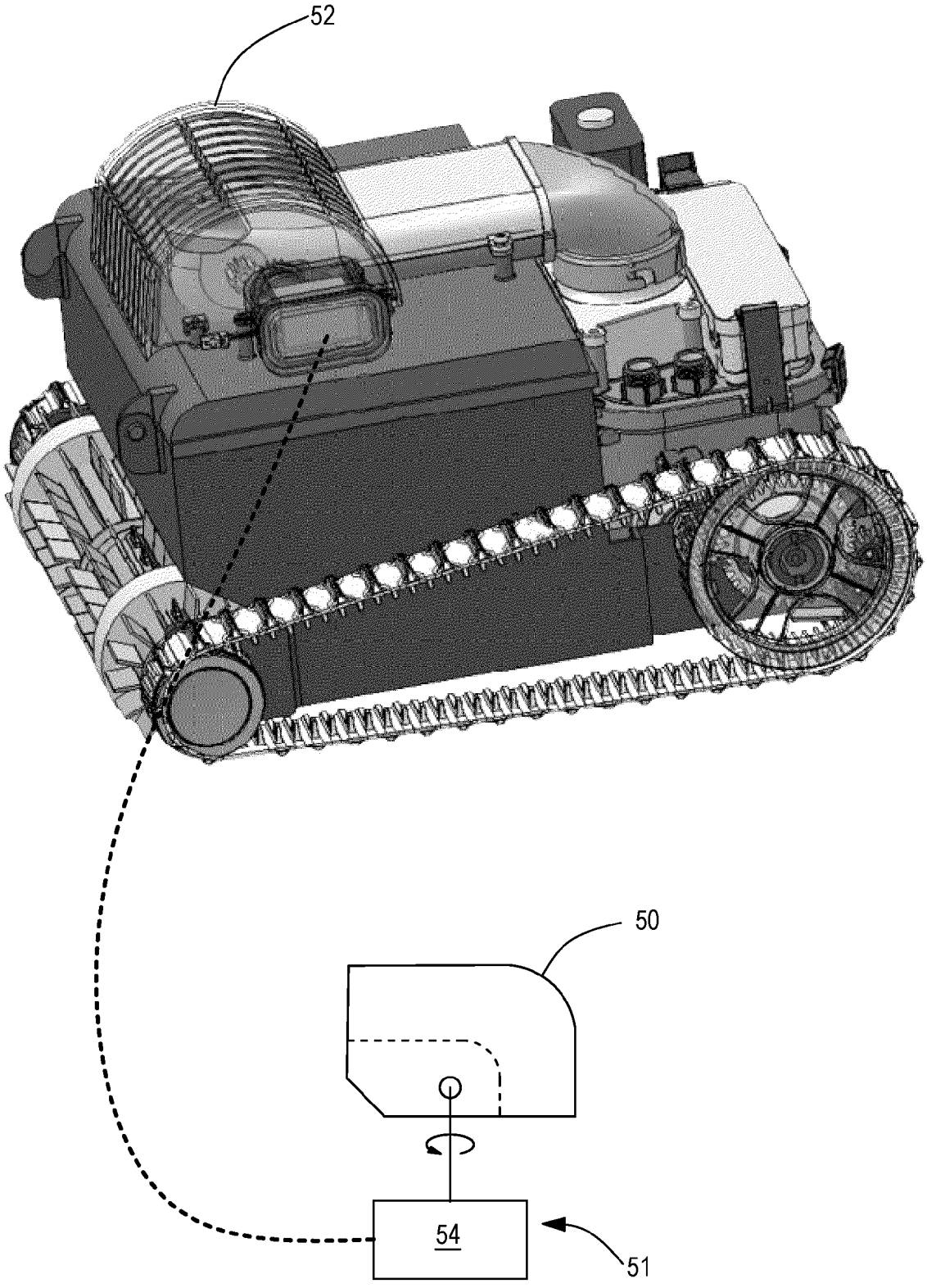


FIG. 10

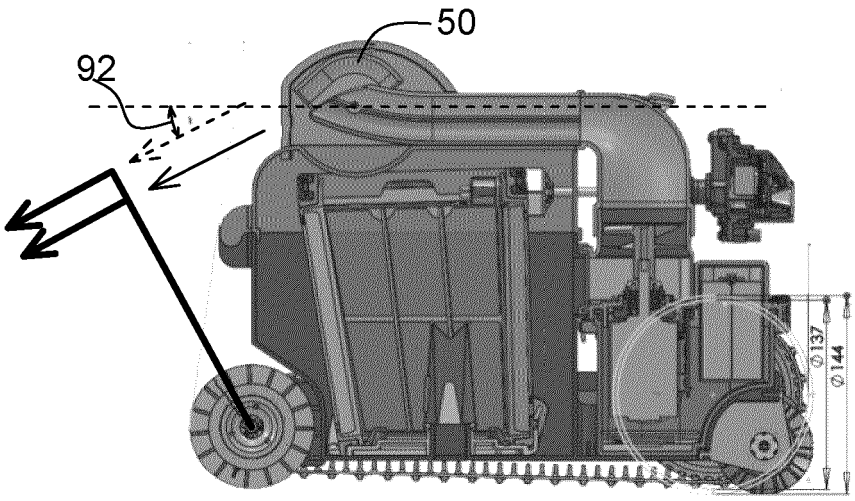


FIG. 11C

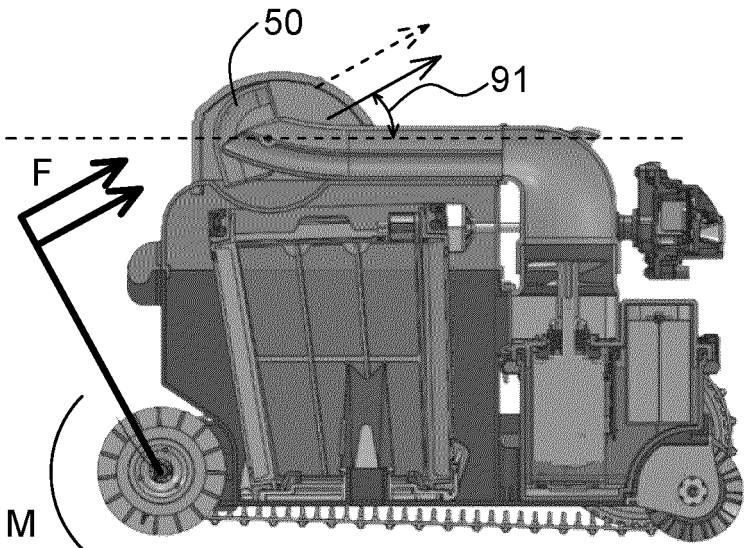


FIG. 11B

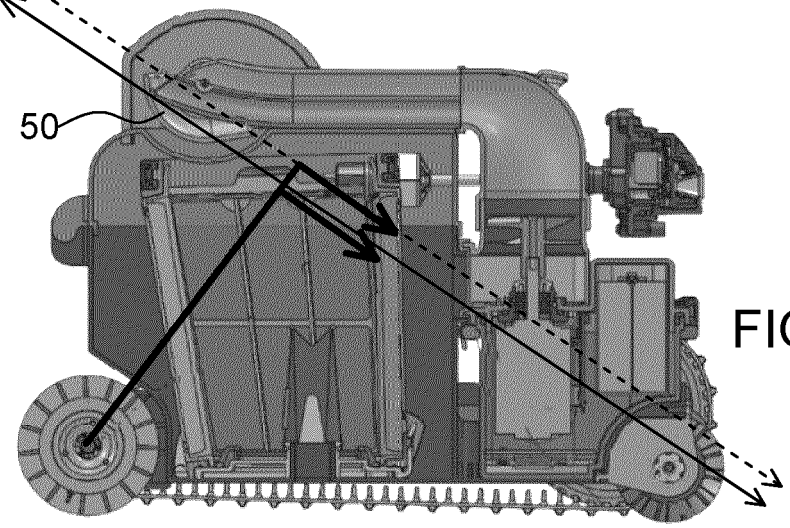


FIG. 11A

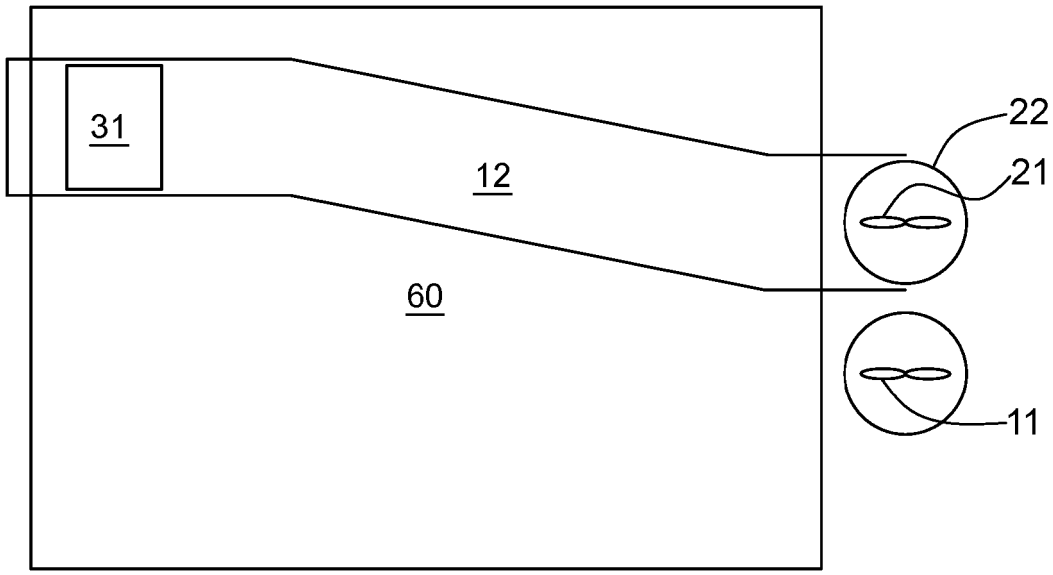
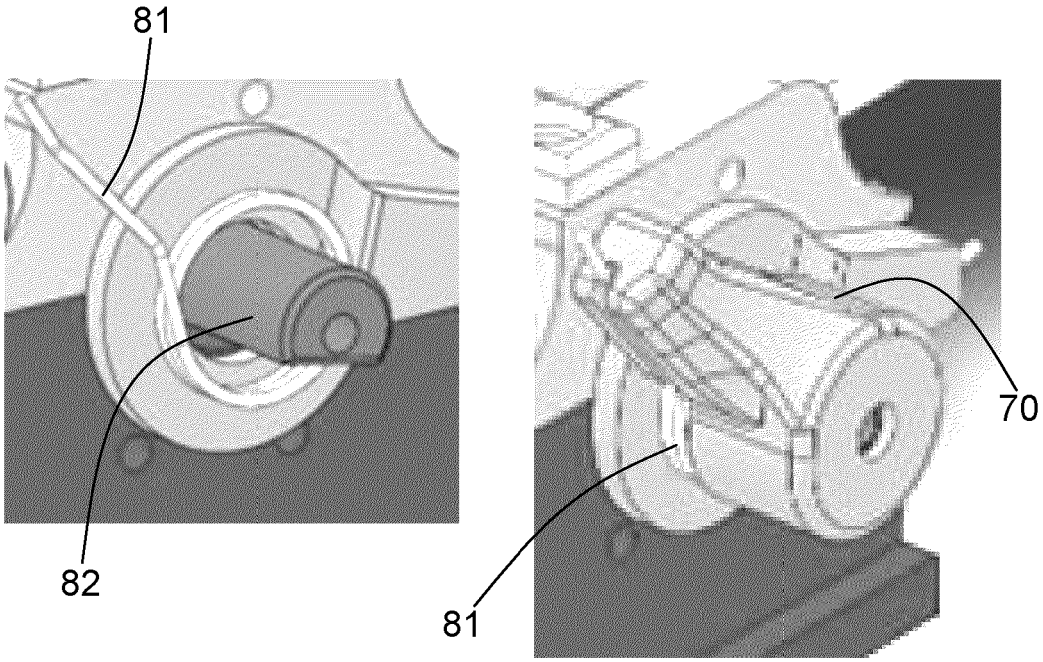


FIG. 12



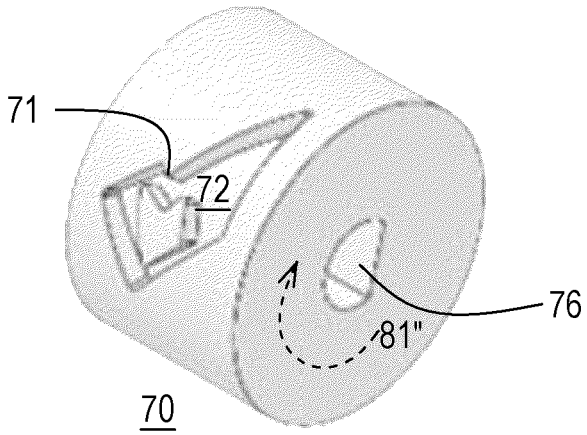


FIG. 13

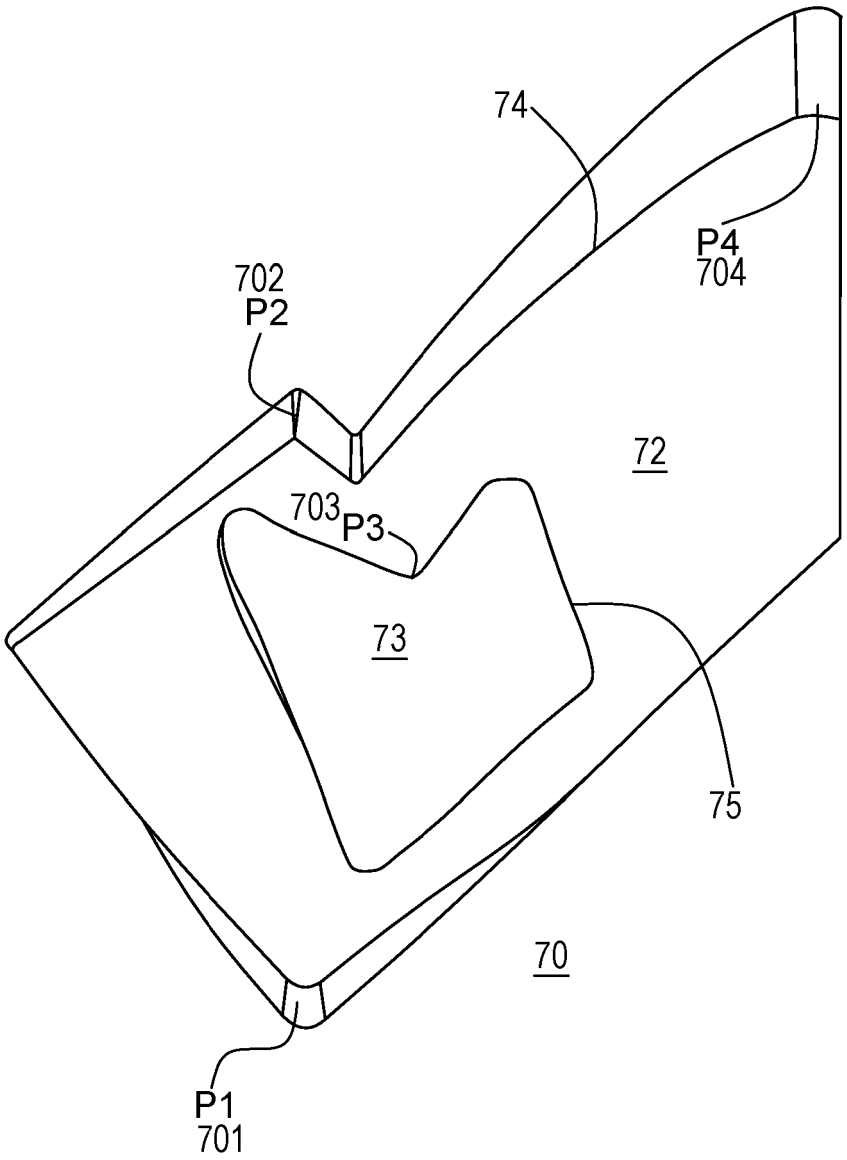


FIG. 14

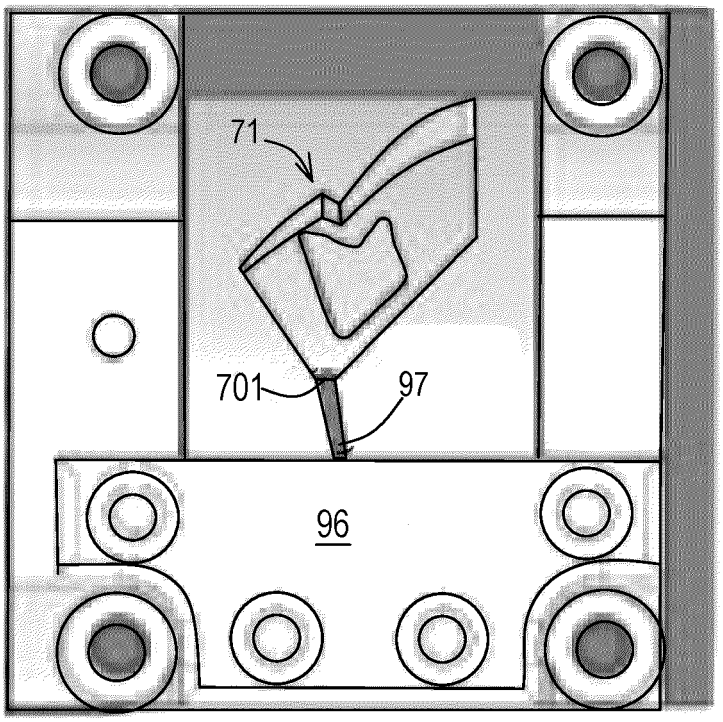


FIG. 15

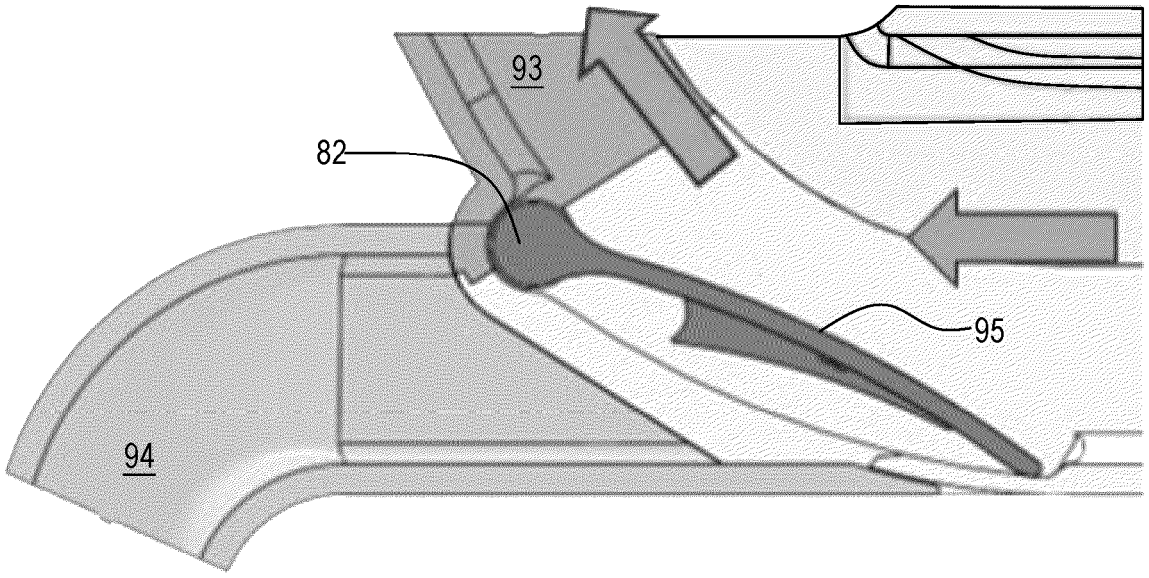
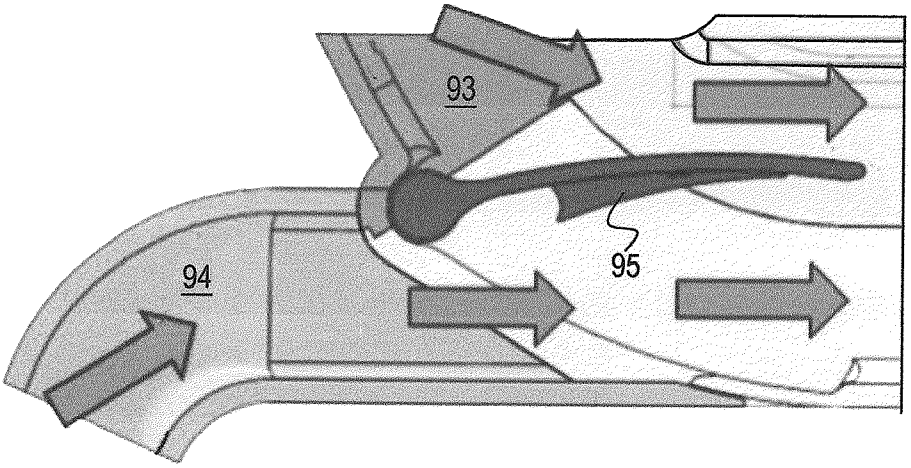


FIG. 16



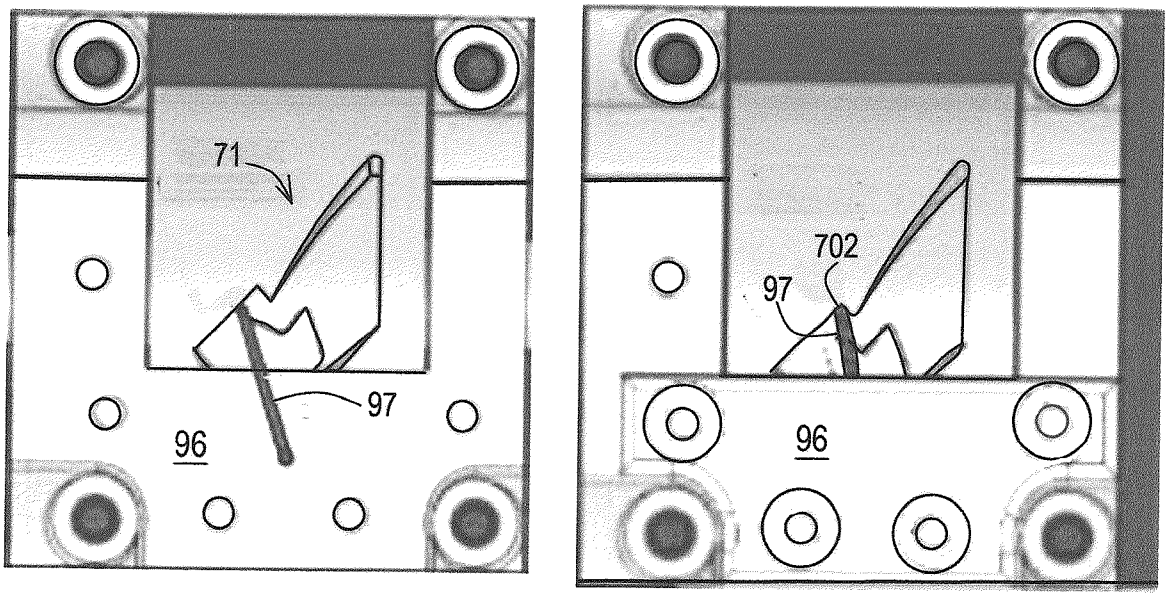
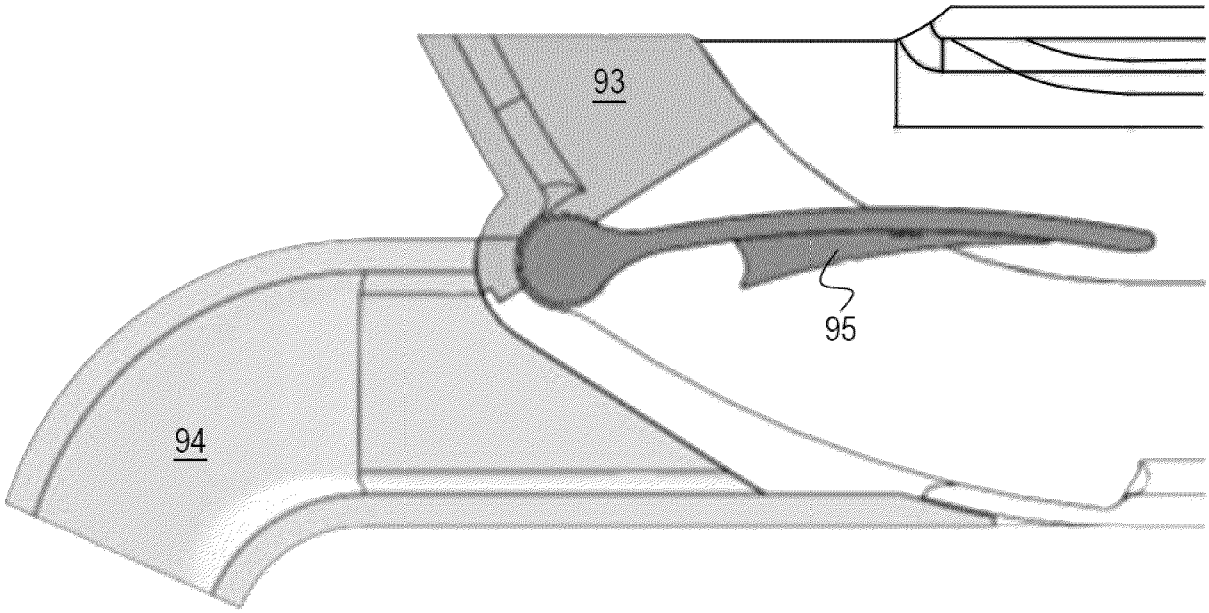


FIG. 17



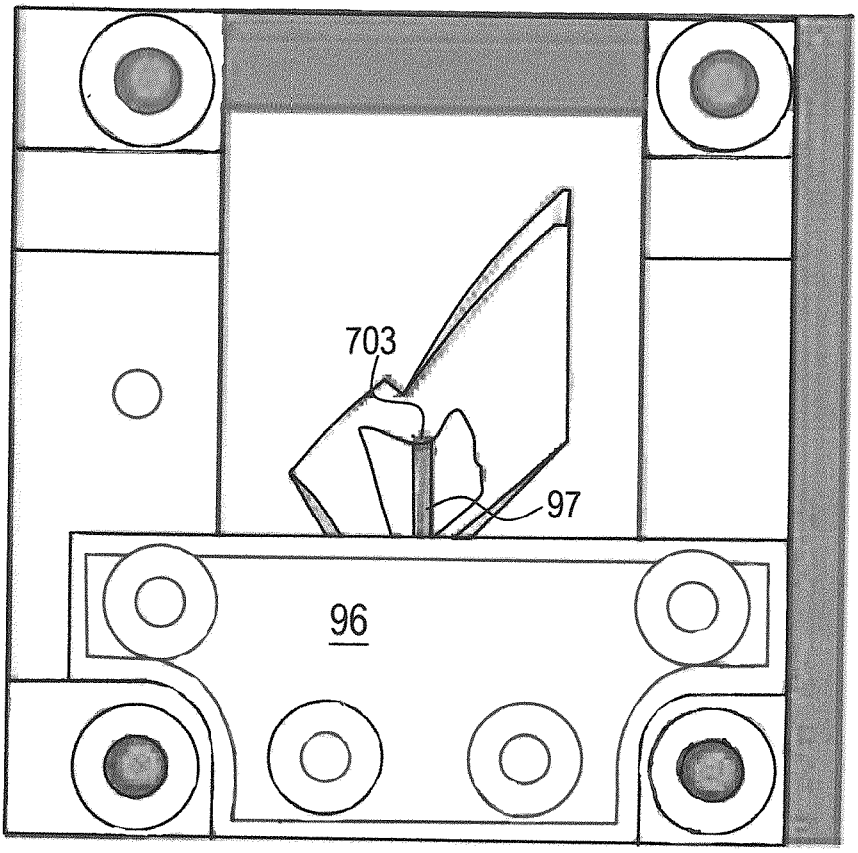
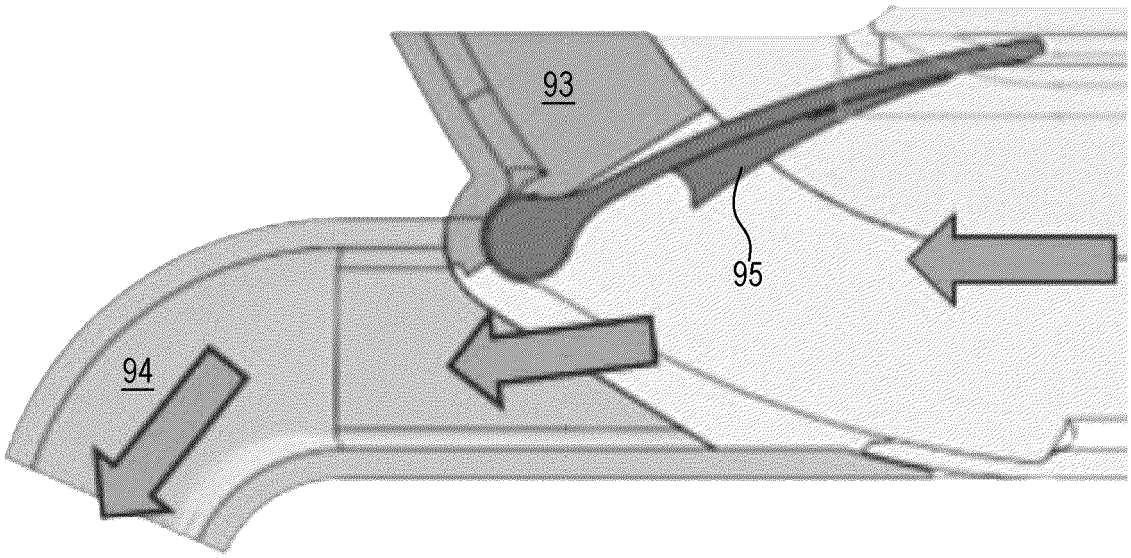


FIG. 18



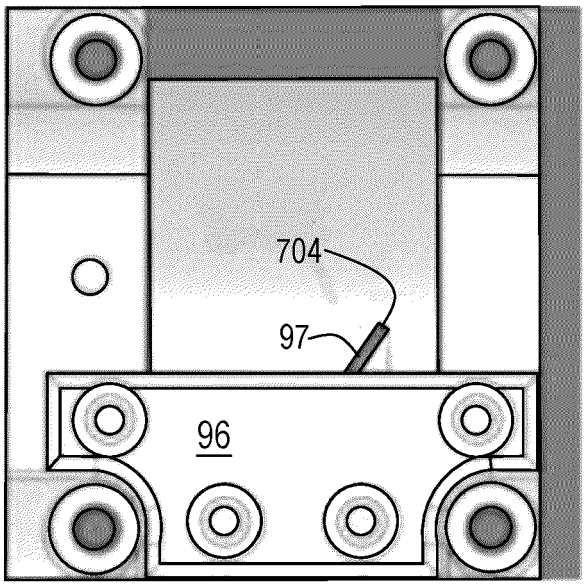
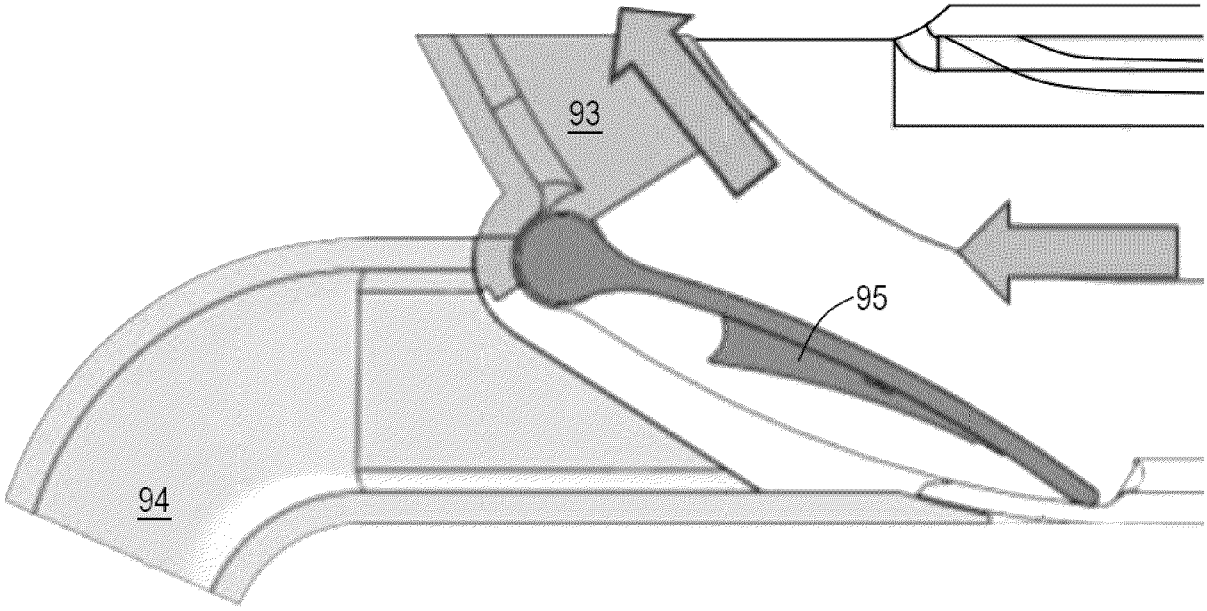


FIG. 19



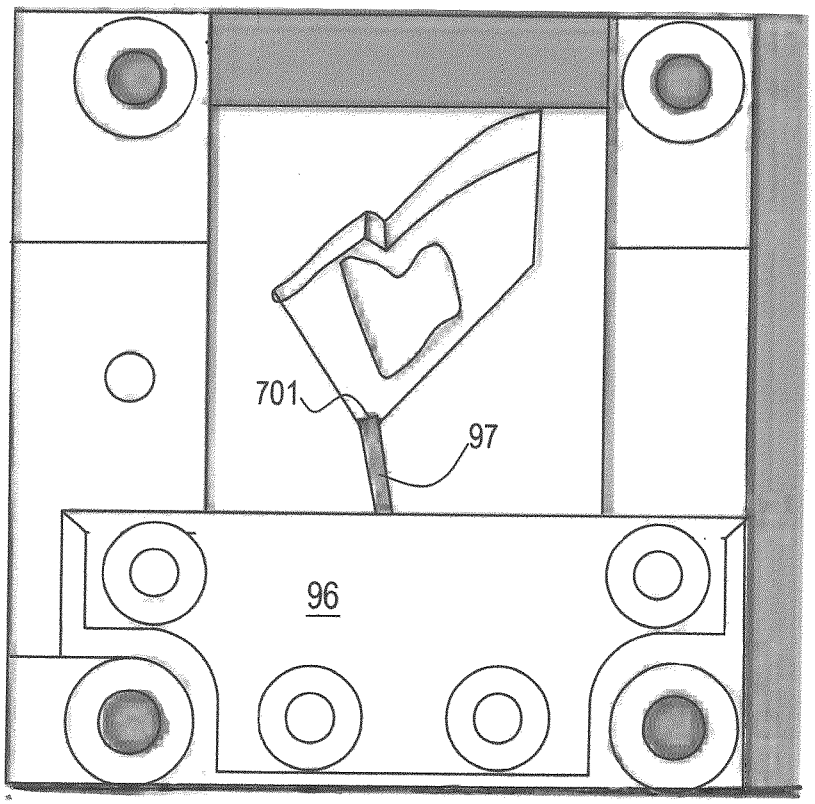


FIG. 20

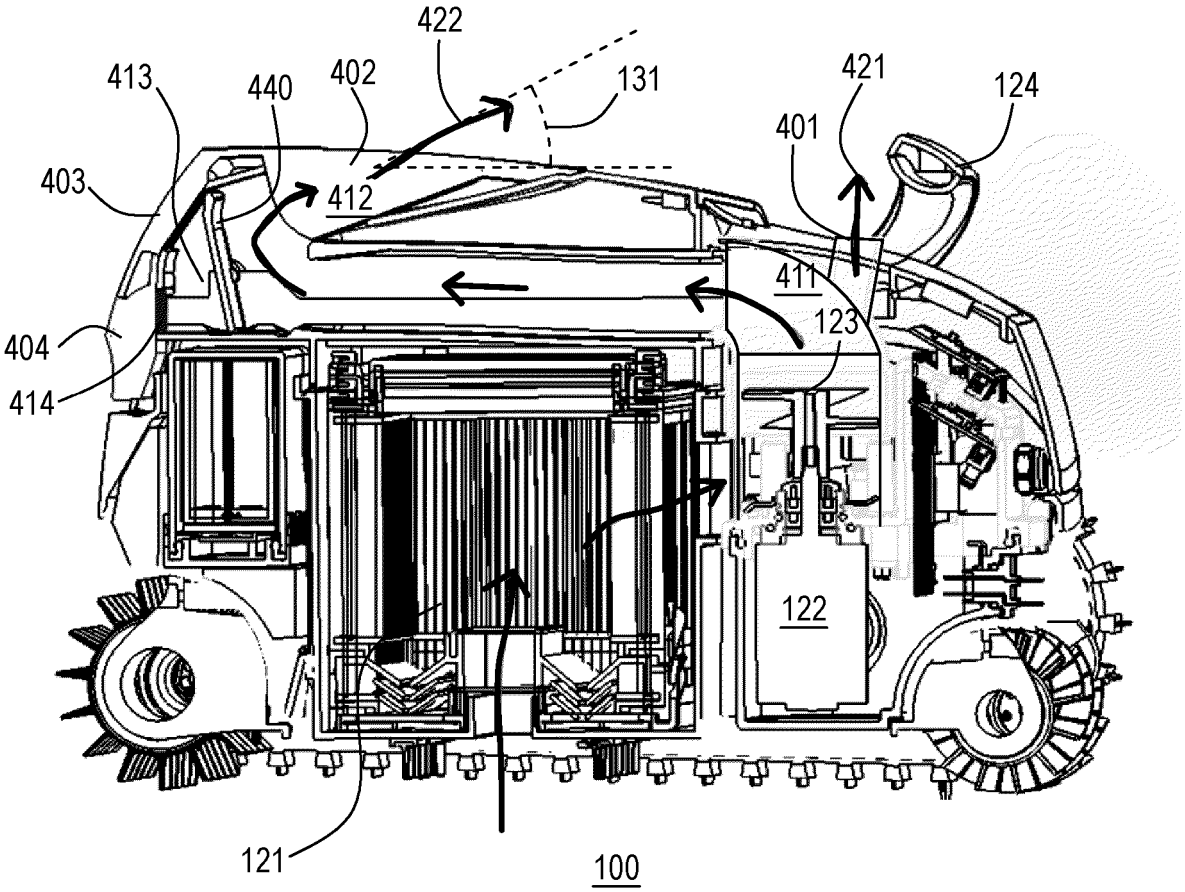

422
413
440
402
131
421
124
401
403
412
411
404
123
414
122
121
100

FIG. 21

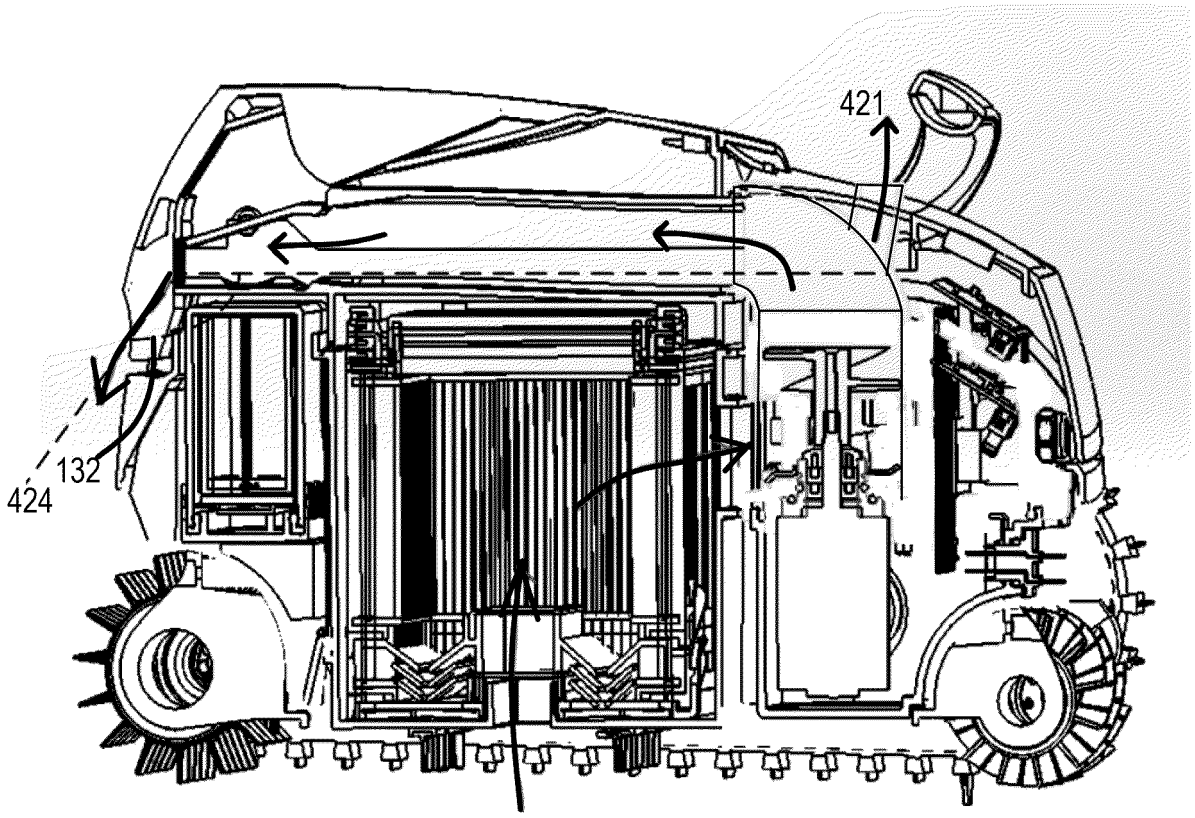


FIG. 22

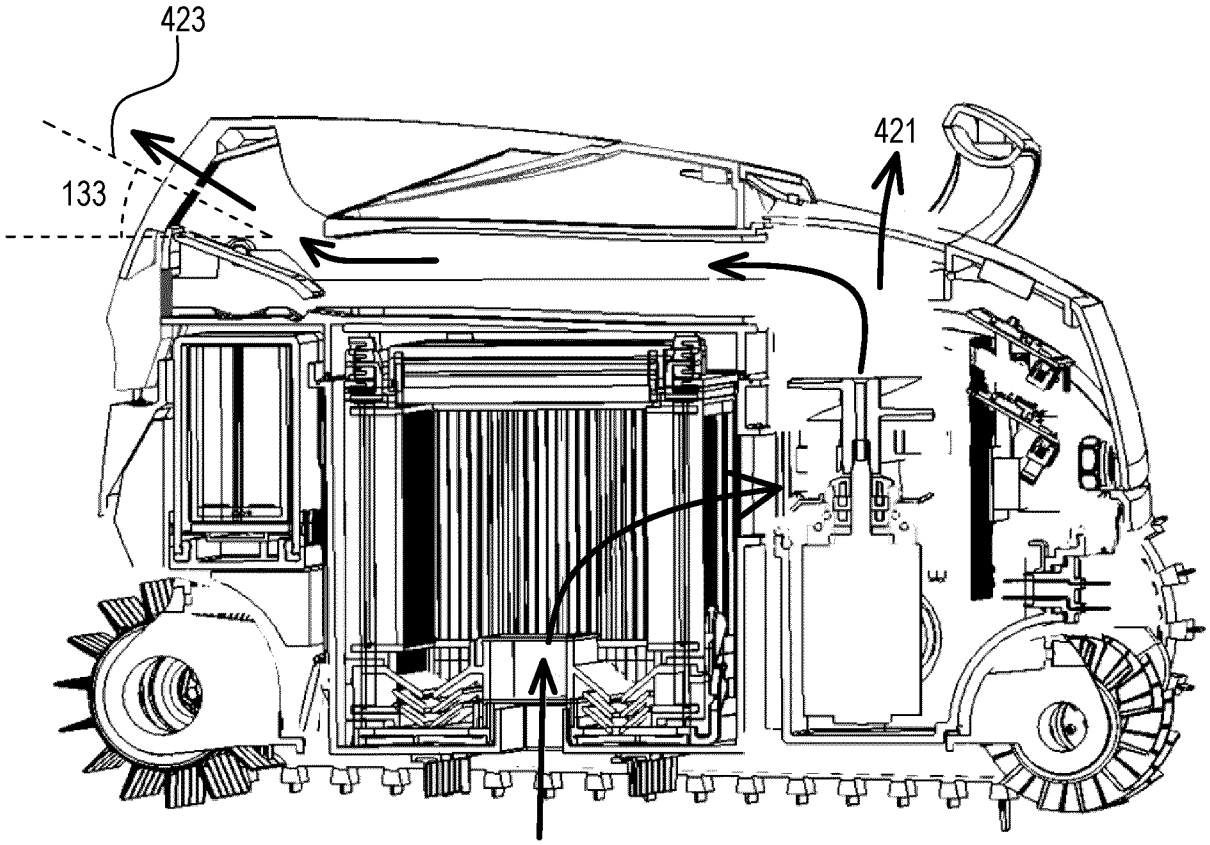


FIG. 23

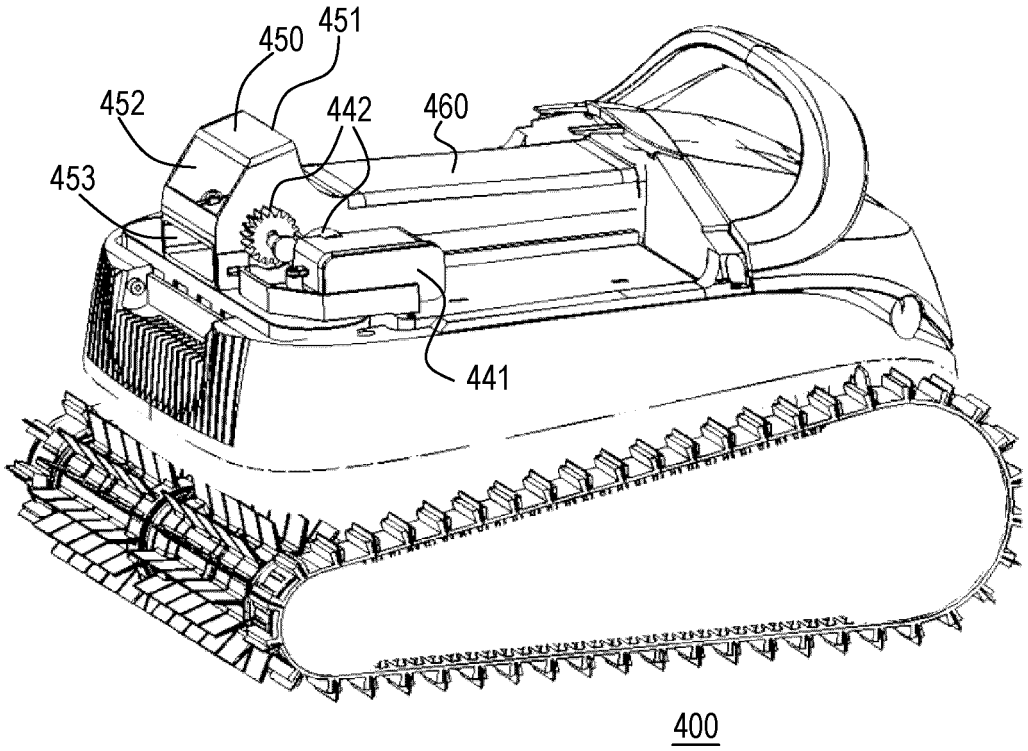


FIG. 24

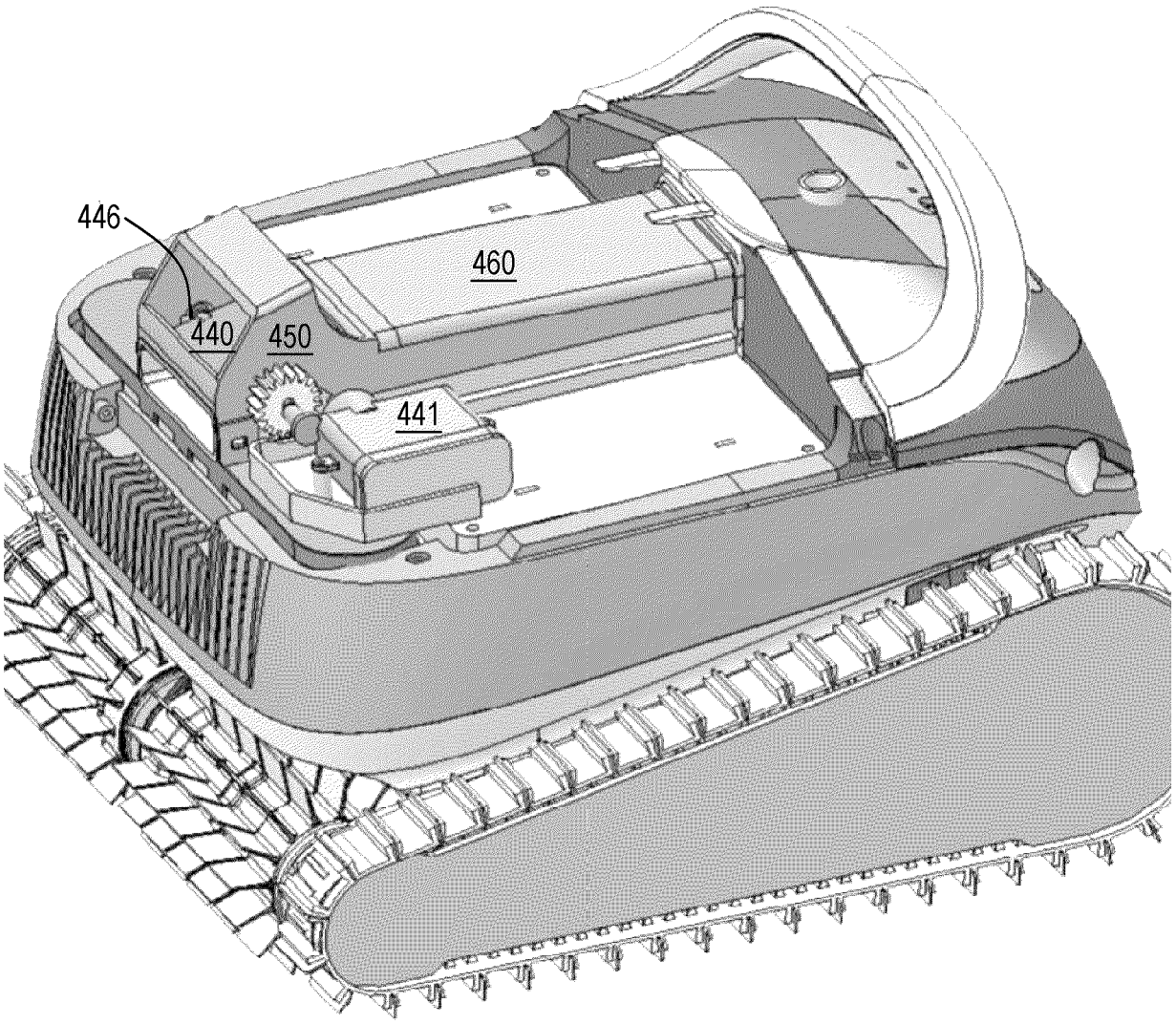


FIG. 25

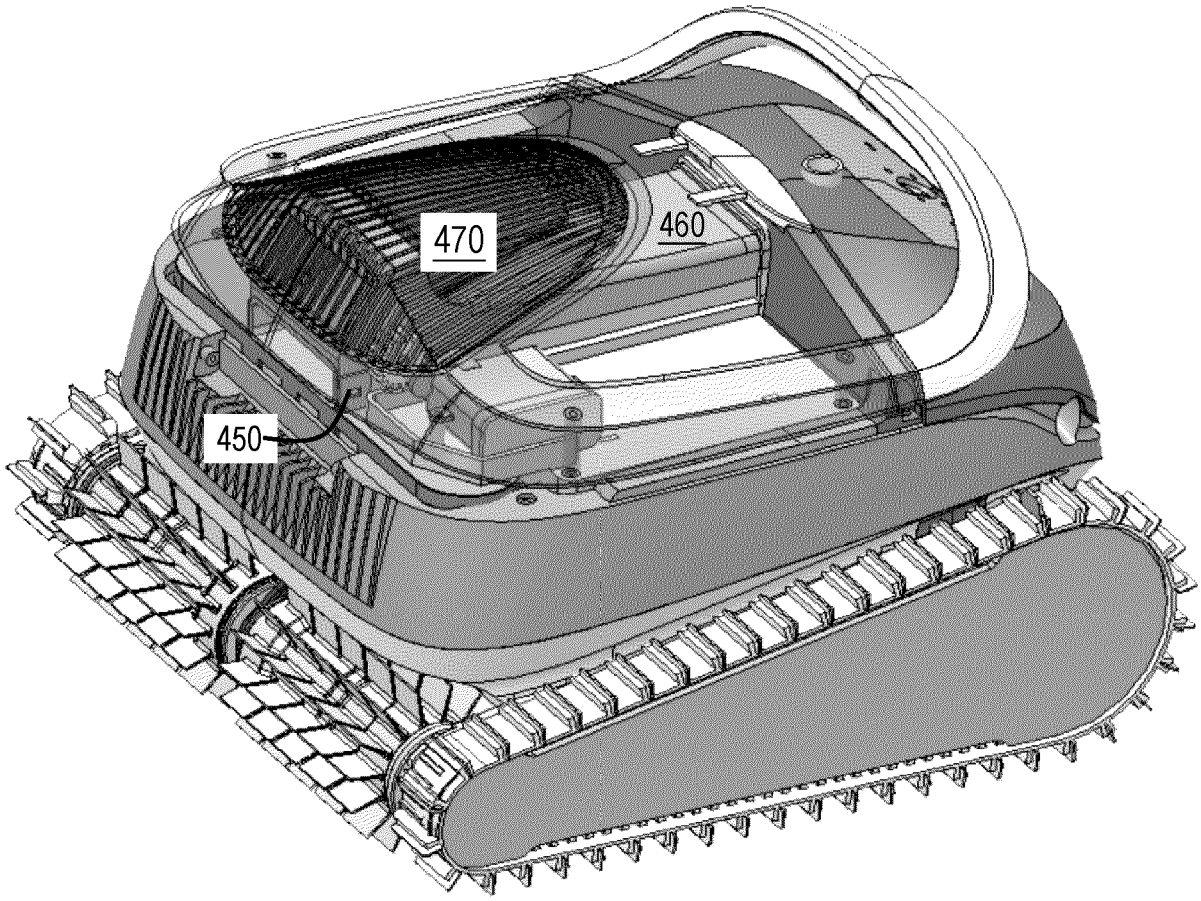


FIG. 26

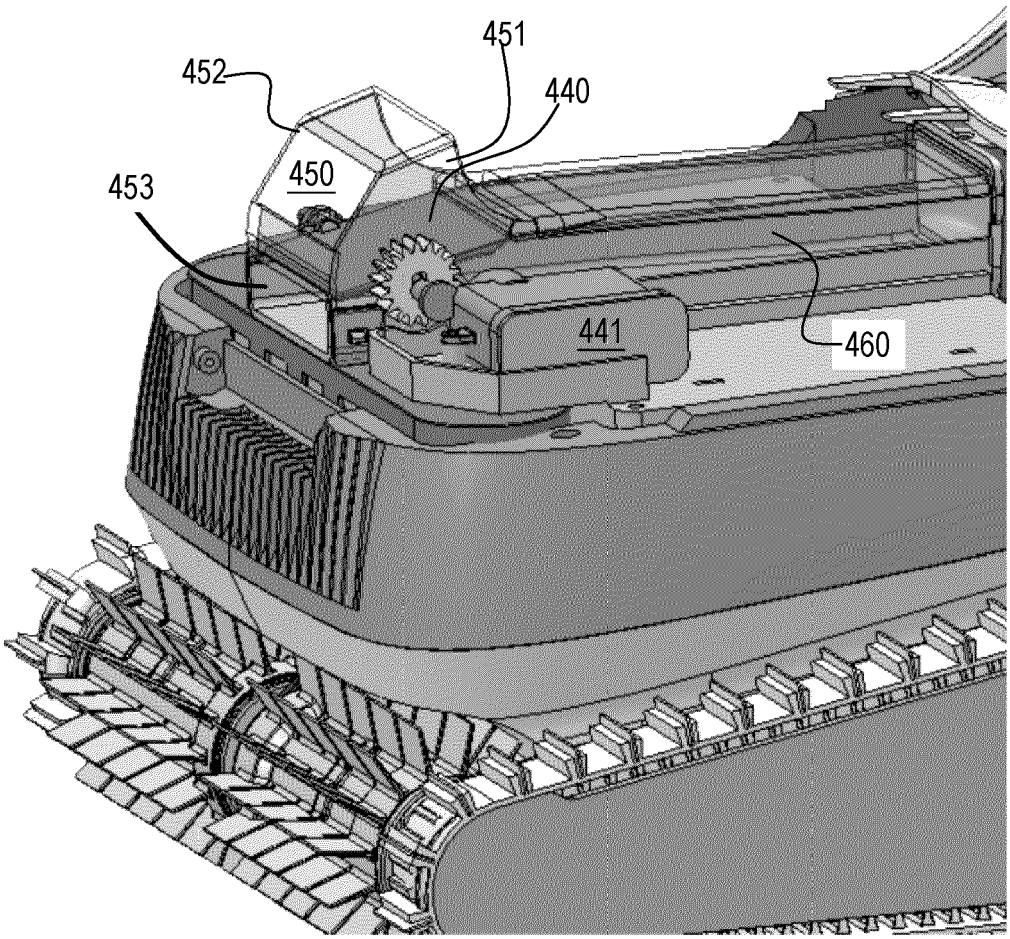


FIG. 27

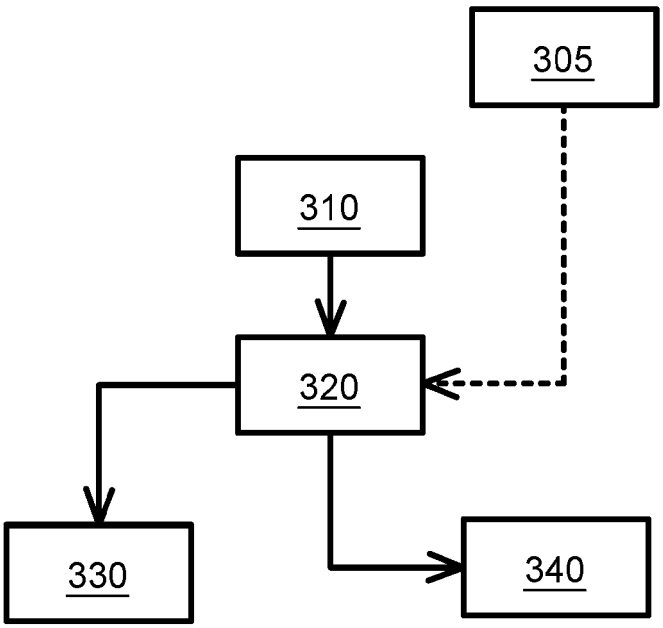


FIG. 28

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 24 20 0537

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2013/178935 A1 (CAVAGNOL MICHEL [FR]; CHEN LIANG [CN] ET AL.) 5 December 2013 (2013-12-05) * figure 4 *	1-16	INV. E04H4/16
A	EP 3 023 561 A1 (UPWARD SALES LTD [CN]) 25 May 2016 (2016-05-25) * figure 1a * * paragraph [0011] *	1-16	
A	US 2008/189885 A1 (ERLICH GIORA [US] ET AL) 14 August 2008 (2008-08-14) * figure 1 *	1-16	

TECHNICAL FIELDS SEARCHED (IPC)
E04H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	5 February 2025	Brucksch, Carola

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 24 20 0537

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

05-02-2025

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2013178935 A1	05-12-2013	EP 2855797 A1	08-04-2015
		FR 2990975 A1	29-11-2013
		US 2015143643 A1	28-05-2015
		WO 2013178935 A1	05-12-2013
EP 3023561 A1	25-05-2016	CN 105625761 A	01-06-2016
		EP 3023561 A1	25-05-2016
		ES 2712607 T3	14-05-2019
		US 2016145885 A1	26-05-2016
US 2008189885 A1	14-08-2008	EP 1022411 A2	26-07-2000
		ES 2239946 T3	16-10-2005
		US 6412133 B1	02-07-2002
		US 2002129839 A1	19-09-2002
		US 2004168838 A1	02-09-2004
		US 2007101521 A1	10-05-2007
		US 2008189885 A1	14-08-2008
		US 2011056031 A1	10-03-2011
		US 2011271983 A1	10-11-2011
		US 2012273004 A1	01-11-2012
		US 2015197951 A1	16-07-2015
		US 2015197952 A1	16-07-2015
		US 2017275906 A1	28-09-2017

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 63582822 **[0001]**
- US 63621819 **[0002]**