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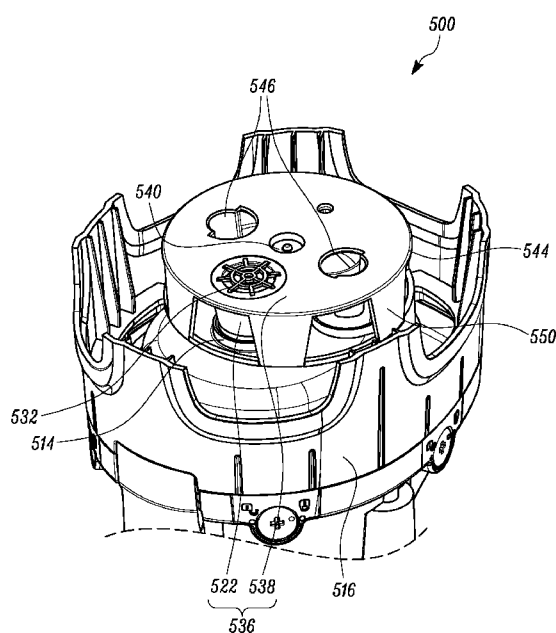


FIG. 7

(57) Abstract: The present disclosure relates to the pump 100, 500. The pump 100, 500 includes a housing member 108, 508 having a first end portion 110, 510 and a second end portion 112, 512 distal to the first end portion 110, 510. The pump 100, 500 further includes an impeller 102, 502 disposed proximal to the second end portion 112, 512 of the housing member 108, 508. The pump 100, 500 further includes a base member 116, 516 connected to the second end portion 112, 512 of the housing member 108, 508. The base member 116, 516 includes an inlet section 114, 514. The inlet section 114, 514 is adapted to removably attach with at least one nozzle 112, 322, 422, 522.

SUBMERSIBLE PUMP

TECHNICAL FIELD

The present invention relates to pumps, and more particularly relates to a submersible pump having an inlet section adapted to
5 removably attach with at least one nozzle.

BACKGROUND

Clean water pumps are generally installed for pumping water from a lower level to a higher level for domestic purposes or industrial
10 purposes, such as for draining out clean water or laden liquid from one place to another place. Submersible pumps are adapted to operate for pumping the clean water or laden water. However, with varying particle sizes in the dust water and varying applications, the pumps may often be unsuitable for pumping both the dust water and clean water. Further, as
15 nozzles of the submersible pumps often do not reach out to lower levels of the liquid, air from the environment tends to enter the nozzle of the pumps causing suction problems. In addition, the existing pumps leave out some portion of liquid on the surface since suction orifice of the nozzles does not contact the surface of the liquid after certain preset
20 heights.

EP1441127A1 provides a submersible pump. The submersible pump is for use in a settlement chamber, to move water through a drainage pipe. The pump includes a base suction region, and a pressure line that feeds into the pipe. The suction region has a suction pipe which
25 exhibits a valve at its end to act as a closure.

Therefore, in light of the foregoing, there is a need for an improved submersible pump.

SUMMARY

30 In view of the above, it is an objective of the present invention to solve or at least reduce the problems discussed above. The objective is at least partially achieved according to a pump. The pump includes a housing member having a first end portion and a second end portion distal to the

first end portion. The pump further includes an impeller disposed proximal to the second end portion of the housing member. The pump further includes a base member connected to the second end portion of the housing member. The base member includes an inlet section. The inlet section is adapted to removably attach with at least one nozzle.

According to an aspect of the present invention the inlet section is adapted to removably attach with multiple nozzles having different size parameters and/or structures.

According to an aspect of the present invention at least one nozzle includes type of a non-return valve. This non-return valve prevents the reverse or back flow of the liquid sucked.

According to an aspect of the present invention height of suction orifice of the nozzle is adjusted above a surface by attaching the nozzle of different size parameters and/or structures.

According to an aspect of the present invention the nozzle is adapted to suck liquid from the surface up to a height ranging from about 1 mm to about 3 mm.

According to an aspect of the present invention an exchange mechanism, having a rotating disc and at least two nozzles, is movably accommodated in the base member.

According to an aspect of the present invention at least one of the nozzles of the exchange mechanism includes a non-return valve.

According to an aspect of the present invention the exchange mechanism includes a central hole defined on the rotating disc for accommodating a spring member for lifting the rotating disc during rotation thereof.

According to an aspect of the present invention the rotation of the rotating disc aligns at least one nozzle with the inlet section of the base member.

According to an aspect of the present invention the rotating disc is lowered down after alignment of one of the nozzles with the inlet section for configuring the nozzle for suction operation.

According to an aspect of the present invention the exchange mechanism includes longitudinal legs extending from a side surface of the rotating disc for providing support and stability during the rotation and alignment of the nozzle with the inlet section.

5 According to an aspect of the present invention the pump is used for gardening application, household application and industrial application.

According to an aspect of the present invention, the pump having the rotating disc aligns either the at least one nozzle or the hole for providing multiple suction requirements, for example for pumping either clean liquid
10 or dirty liquid the pumping is optimized.

According to another aspect of the present invention, as the pump is configurable for pumping any sort of the liquid, like clean liquid or dirty liquid, an operator need not use multiple pumps for pumping different kinds of liquid. The operator can operate the pump with ease and may
15 reduce operator fatigue.

According to another aspect of the present invention, the pump is provided with one or more stabilizing rims and a plurality of ribs, which provides support and stabilize the nozzle as well as the exchange mechanism. Thus, the life of the nozzle and the exchange mechanism is
20 increased.

According to another aspect of the present invention, the inlet section is provided with a protection grid does not allow the entry of solid particles into the inlet section when the nozzle is not attached with the inlet section.

25 BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described in more detail with reference to the enclosed drawings, wherein:

FIG. 1 shows a sectional view of a pump, according to an embodiment of the present invention;

30 FIG. 2 shows a sectional view of a nozzle for the pump shown in FIG. 1, according to an embodiment of the present invention;

FIG. **3** shows a sectional view of a nozzle for the pump shown in FIG. **1**, according to another embodiment of the present invention;

FIG. **4** shows a sectional view of a nozzle for the pump shown in FIG. **1**, according to another embodiment of the present invention;

5 FIG. **5** shows a sectional view of a pump, according to another embodiment of the present invention;

FIG. **6** shows a bottom view of the pump shown in FIG. **5**, showing rotating plate, according to an embodiment of the present invention; and

10 FIGS. **7-10** shows bottom perspective views of portions of the pump shown in FIG. **5**, according to an embodiment of the present invention.

DESCRIPTION OF EMBODIMENTS

15 The present invention will be described more fully hereinafter with reference to the accompanying drawings, in which example embodiments of the invention incorporating one or more aspects of the present invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so
20 that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. For example, one or more aspects of the present invention can be utilized in other embodiments and even other types of structures and/or methods. In the drawings, like numbers refer to like elements.

25 FIG. **1** illustrates a sectional view of a pump **100**, according to an embodiment of the present invention. The pump **100** may embody a positive displacement pump including, but not limited to, a submersible pump. The submersible pump may be a single stage pump or a multi stage pump that may be used for gardening application, household
30 application, drainage pumping application, sewage pumping application, industrial pumping and slurry pumping applications. The terms “pump” and “submersible pump” are interchangeably used in this disclosure. It is to be understood that the terms “pump” and “submersible pump” are one

and the same and is not meant to be limiting the scope of the present disclosure. The pump **100** uses an impeller **102** driven by a motor centrifugally. In an example, the submersible pump **100** may be configured to be a “bottom suction” pump. It is to be understood that the
5 submersible pump may be configured to be a “side suction” pump or any other configuration that may be designed to configure a workable submersible pump. The example of the “bottom suction” pump as used herein is not meant to be limiting the scope of the present invention.

In the bottom suction pump, the impeller **102** is coupled to a drive
10 shaft **104** of an electric motor **106** for rotation about an axis **X- X'** of the drive shaft **104**. The pump **100** includes a housing member **108** for accommodating various components of the submersible pump **100**. The housing member **108** includes a first end portion **110** and a second end portion **112**. The second end portion **112** is distal to the first end portion
15 **110**. The terms “first end portion” and “second end portion” used in the present disclosure corresponds to terms a “top end portion” and a “bottom end portion” respectively. The housing member **108** includes a base member **116** forming part of the second end portion **112** of the housing member **108**. The base member **116** includes an inlet section **114** for
20 allowing liquid to be sucked from a surface **126**. The surface **126** may include, but not limited to, a ground surface in a garden area, a floor in a house or industry, or an underground sump. The housing member **108** is adapted to accommodate the impeller **102** adjacent to the electric motor **106** and proximal to the second end portion **112** of the housing member
25 **108**. The electric motor **106** of the impeller **102** is disposed in the housing member **108** such that rotation of the impeller **102** causes liquid to be sucked into a volute chamber (not shown) along the axis **X- X'** from the inlet section **114** of the base member **116**. The sucked liquid may be expelled tangentially and horizontally within the volute chamber in the
30 pump **100**. The expelled liquid is adapted to be directed by the volute chamber to an outlet **118** to which a pipe **120** may be attached, such that the liquid is pumped upwardly through the pipe **120**.

The inlet section **114** of the base member **116** is adapted to removably attach with at least one nozzle **122**. In one embodiment, the inlet section **114** is adapted to removably attach with multiple nozzles having different size parameters and/or structures. Further, as the inlet
5 section **114** is configured to be removably attached with multiple nozzles of different size parameters and/or structures, a height “H” between the surface **126** and a suction orifice **124** located at bottom of the nozzle **122** can be adjusted. In an example, the multiple nozzles as described in the present disclosure are adapted to suck the liquid up from the surface **126**
10 having a liquid level “L.” In an example, the liquid level “L” ranges from about 1 mm to about 3 mm from the surface **126**. The dimensions, such as external diameter, of nozzle **122**, may correspond to the dimensions such as internal diameter of the inlet section **114**.

FIG. **2** illustrates a sectional view of the nozzle **122** for the pump
15 **100** shown in FIG. **1**, according to one embodiment of the present invention. In the illustrated embodiment, the nozzle **122** includes a first portion **128** and a second portion **130** extending from the first portion **128**. The first portion **128** of the nozzle **122** is adapted to be removably connected with the inlet section **114** of the base member **116**. The
20 connection between the first portion **128** of the nozzle **122** and the inlet section **114** (shown in FIG. **1**) may be made using a fastening member (not shown) including, but not limited to, threading or snap locking member, which may facilitate the removable connection between the nozzle **122** and the base member **116**. In an example, as illustrated in the
25 FIG. **2**, the first portion **128** is configured in a conical shape and disposed towards the inlet section **114**. It is to be understood that the shape of the first portion **128** is exemplary only and is not meant to be limiting. The second portion **130** is adapted to protrude downwards and towards the surface **126**. The second portion **130** of the nozzle **122** is in cylindrical
30 shape having a constant diameter. In an exemplary embodiment, the second portion **130** of the nozzle **122** may be configured to have varying diameters for the nozzle **122** to adapt for providing multiple suction

requirements of the pump **100**. The multiple suction requirements may arise due to varying sizes of particles laden in the liquid to be pumped.

In the illustrated example of the FIG. **2**, the second portion **130** of the nozzle **122** further includes a non-return valve **132** at the suction orifice **124** at a bottom end **134** of the second portion **130**. The non-return valve **132** is adapted to prevent back or reverse flow of the liquid through the inlet section **114** and out of the nozzle **122**. In an example, the first portion **128** and the second portion **130** of the nozzle **122** has a height “**H1**” of about 30 mm and the nozzle **122** is adapted to suck and pump the liquid from the surface **126** up to a height “**H2**” ranging from about 3 mm. In an embodiment, the nozzle **122** and the inlet section **114** may have a cross section including, but not limited to, circular, and rectangular cross section.

FIG. **3** illustrates a sectional view of a nozzle **322** for the pump **100** shown in FIG. **1**, according to another embodiment of the present invention. In the illustrated embodiment, the nozzle **322** includes a first portion **328** and a second portion **330** extending downwards from the first portion **328**. The first portion **328** is adapted to removably connect with the inlet section **114** of the base member **116**. The connection between the first portion **328** of the nozzle **322** and the inlet section **114** (shown in FIG. **1**) may be made using a fastening member (not shown) including, but not limited to, threading or snap locking member, which facilitates the removable connection between the nozzle **322** and the base member **116**. In an example, as illustrated in the FIG. **3**, the first portion **328** is configured in a conical shape converging towards the inlet section **114**. It is to be understood that the shape of the first portion **328** is exemplary only and is not meant to be limiting. The first portion **328** may be made in any shape which serves the purpose of allowing the sucked liquid to pass through the nozzle **322** in a streamlined manner.

The second portion **330** is adapted to protrude downwards and towards the surface **126** and thus contacting the liquid for pumping. The second portion **330** of the nozzle **322** is in a cylindrical shape having a

constant diameter. In an example, the first portion **328** and the second portion **330** of the nozzle **322** has a height “**H3**” of about 5 mm and the nozzle **322** is adapted to suck and pump the liquid from the surface **126** up to a height “**H4**” ranging from about 1 mm.

5 FIG. **4** illustrates a sectional view of a nozzle **422** for the pump **100** shown in FIG. **1**, according to another embodiment of the present invention. In the illustrated embodiment, the nozzle **422** includes a first portion **428**, a second portion **430** and a third portion **436** between the first portion **428** and the second portion **430**. The first portion **428** is adapted
10 to removably connect with the inlet section **114** of the base member **116**. The connection between the first portion **428** of the nozzle **422** and the inlet section **114** (shown in FIG. **1**) may be made using a fastening member (not shown), including but not limited to, threading or snap lock member, which facilitates the removable connection between the nozzle
15 **422** and the base member **116**. In an example, as illustrated in the FIG. **4**, the first portion **428** is configured in a conical shape converging towards the inlet section **114**. It is to be understood that the shape of the first portion **428** is exemplary only and is not meant to be limiting. The shape of the first portion **428** may be made in any shape which serves the
20 purpose of allowing the sucked liquid to pass through in a streamline manner. The second portion **430** is adapted to protrude downwards and towards the surface **126** and thus contacting the liquid for pumping. The second portion **430** of the nozzle **422** is in conical shape having a varying diameter.

25 Further, the second portion **430** of the nozzle **422** includes an auxiliary suction orifice **444** provided at a side surface **446**. The auxiliary suction orifice **444** is adapted to allow suction of liquid having particles of varying sizes. In an exemplary embodiment, the auxiliary suction orifice **444** is at a height “**H5**” of about 29 mm from a suction orifice **424** at a
30 bottom end **434** of the nozzle **422**. In another exemplary embodiment, the suction orifice **424** at the bottom end **434** of the nozzle **422** includes multiple smaller orifices **448** for allowing passage of the liquid. Thus, the

nozzle **422** is adapted to provide multiple suction requirements. The multiple suction requirement may include, pumping of clear liquid from the suction orifice **424** and liquid having particles of varying sizes through the auxiliary suction orifice **444** of the nozzle **422**. In an example, the first
5 portion **428** and the second portion **430** of the nozzle **422** has a height “**H6**” of about 35 mm and the nozzle **422** is adapted to suck and pump the liquid from the surface **126** up to a height “**H7**” of about 2 mm.

In an embodiment, the inlet section **114** is adapted to connect with multiple nozzles, such as the nozzles **122**, **322**, or **422** of varying size
10 parameters, and the pump **100** can be used for sucking and pumping both clean liquid and laden liquid (also referred to as dirty liquid or liquid containing particles). In an embodiment, when the clean liquid is required to be pumped out from the surface **126**, the nozzle **122** is required to be connected at the inlet section **114** as shown in FIGS. **1** and **2**. As the
15 nozzle **122** is provided with the non-return valve **132**, the nozzle **122** allows flow of clean liquid through the inlet section **114** and into the pump **100**. The non-return valve **132** provided in the nozzle **522** prevents the back flow or the reverse flow of the liquid.

In an embodiment, when liquid containing particles is to be pumped
20 from the surface **126**, any one of the nozzles **322**, **422** (shown in FIGS. **3** and **4**) may be connected with the inlet section **114**. As the nozzles **322**, **422** are provided with larger sized suction orifices, the liquid having the particles can be easily pumped out from the surface **126**.

In an embodiment, as the nozzle **422** shown in FIG. **4** includes the
25 multiple smaller orifices **448** and the auxiliary suction orifice **444**, the nozzle **422** can be used for suction of both the clean liquid and the liquid having the particles.

Further, as each of the nozzles **122**, **322**, **422** are designed to have varying heights, the surface **126** having the liquid can be pumped out with
30 lowest possible height/depth. Also, as each of the nozzles **122**, **322**, **422** are designed to have varying diameters at the suction orifices **124**, **324**,

424 facing the surface **126**, the nozzles **122**, **322**, **422** can be adapted to suck both the clean liquid and the liquid containing the particles.

In an example, the nozzles **122**, **322**, **422** having the first portions **128**, **328**, **428** respectively are having same conical configuration and thus, the inlet section **114** can be retrofitted with any of the nozzles **122**, **322**, **422** without any change or modification in the inlet section **114** of the pump **100**.

FIG. **5** illustrates a sectional view of a pump **500**, according to another embodiment of the present invention. The pump **500** may embody a positive displacement pump including, but not limited to, a submersible pump. The submersible pump may be a single stage pump or a multi stage pump that may be used for drainage pumping, sewage pumping, general industrial pumping and slurry pumping. The terms “pump” and “submersible pump” used in this disclosure are interchangeably used. It is to be understood that the terms “pump” and “submersible pump” are one and the same and is not meant to be limiting the scope of the present disclosure. The submersible pump **500** uses an impeller **502** driven by a motor centrifugally. In an example, the submersible pump may be configured to a “bottom suction” pump. It is to be understood that the submersible pump **500** may be configured to be a “side suction” pump or any other configuration that may be designed to configure a workable submersible pump. The example of the “bottom suction” configured as used herein in the present invention is not meant to be limiting the scope of the present invention.

In the bottom suction pump, the impeller **502** is coupled to a drive shaft **504** of an electric motor **506** for rotation about an axis X_1 - X_1' of the drive shaft **504**. The pump **500** includes a housing member **508** for accommodating various components of the pump **500**. The housing member **508** includes a first end portion **510** and a second end portion **512**. The second end portion **512** is distal to the first end portion **510**. The terms “first end portion” and “second end portion” used in the present disclosure corresponds to terms a “top end portion” and a “bottom end

portion” respectively. The housing member **508** is adapted to accommodate the impeller **502** below the electric motor **506** and proximal to the second end portion **512** of the housing member **508**. The electric motor **506** of the impeller **502** is disposed in the housing member **508**

5 such that rotation of the impeller **502** causes liquid to be sucked into the impeller **502** axially from an inlet section **514** of a base member **516**. The base member **516** is connected to the second end portion **512** of the housing member **508**. The sucked liquid may be expelled tangentially and horizontally within a volute chamber (not shown) in the pump **500**.

10 The expelled liquid is adapted to be directed by the volute chamber to an outlet **518** to which a pipe **520** is attached, such that the liquid is pumped upwardly through the pipe **520**. The base member **516** includes the inlet section **514**. The inlet section **514** is adapted to removably attach with an exchange mechanism **536** (shown in FIG. **6**) for suction and pumping out

15 the liquid from the surface **126**. The surface **126** may include, but not limited to, a ground surface in a garden area, a floor in a house or industries, and underground sump.

FIG. **6** illustrates a bottom view of the pump **500** shown in FIG. **5** according to an embodiment of the present invention. The illustrated

20 figure shows the exchange mechanism **536**, according to one embodiment of the present invention. The exchange mechanism **536** includes at least one rotating disc **538** and at least one nozzle **522**. In an alternative embodiment, the rotating disc **538** may be configured to be sliding or folding disc. The exchange mechanism **536** is movably

25 accommodated in the base member **516**. In an example, the at least one nozzle **522** of the exchange mechanism **536** includes a non-return valve **532**. In an example, the nozzle **522** having the non-return valve **532** may be used for suction of clean liquid.

In another embodiment, the exchange mechanism **536** includes at

30 least one rotating disc **538** exhibiting at least two nozzles **522**. The at least two nozzles **522** are configured to be in different size parameters and/or structures. For example, the nozzle **522** having the non-return

valve **532** may be used for suction of the clean liquid and another nozzle **522** without the non-return valve **532** may be used for suction of dirty liquid.

5 The exchange mechanism **536** includes a central hole **540** defined on the rotating disc **538** for accommodating a spring member **542** (shown in FIG. **5**) for lifting the rotating disc **538** for rotation. In one example, the central hole **540** is present at a central position on the rotating disc **538**. In alternative examples, the central hole **540** may be present at any position offset from the central position on the rotating disc **538**. The
10 rotation of the rotating disc **538** aligns at least one nozzle **522** with the inlet section **514** of the base member **516**. The rotating disc **538** may be moved or lowered down after alignment of one of the nozzles **522** with the inlet section **514** for configuring the nozzle **522** for suction operation. The exchange mechanism **536** further includes longitudinal legs **550** (shown in
15 FIG. **7**) extending from a side surface **544** (shown in FIG. **7**) of the rotating disc **538** for providing support and stability during the rotation and alignment of the nozzle **522** with the inlet section **514**. In an embodiment, the longitudinal legs **550** may engage with the base member **516** and act as a guide during rotation of the rotating disc **538**. As the exchange
20 mechanism **536** is configured with the multiple nozzles **522** and holes **546**, the pump **500** may be configured to pump either clean liquid or dirty liquid from the surface **126**. In an example, the pump **500** is used for gardening application and household applications.

FIGS. **7** illustrates a bottom perspective view of a portion of the
25 pump **500** as shown in the FIGS. **5** and **6**, according to an embodiment of the present invention. The rotating disc **538** of the exchange mechanism **536** in the illustrated figure is positioned in a working position, wherein the nozzle **522** of the rotating disc **538** is aligned with the inlet section **514** of the pump **500**. In the illustrated example, the nozzle **522** provided in the
30 rotating disc **538** includes the non-return valve **532**. The nozzle **522** is detachably connected with the inlet section **514** for pumping clear liquid from the surface **126** as the nozzle **522** includes the non-return valve **532**.

FIG. 8 illustrates a bottom perspective view of a portion of the pump **500** as shown in the FIG. 7, according to an embodiment of the present invention. In the illustrated figure, the rotating disc **538** of the exchange mechanism **536** is lifted to a pre-set height from the base member **516**. The rotating disc **538** is lifted using the spring member **542** disposed inside the central hole **540**. The exchange mechanism **536** lifted is free for rotation about the central hole **540** and the axis “C-C” as the nozzle **522** is detached from the inlet section **514**. The central hole **540** may include a stopper member (not shown) above the rotating disc **538** for restraining the longitudinal movement of the exchange mechanism **536** after moving to a pre-set height from the base member **516**. The exchange mechanism **536** may be rotated using rotating mechanism including but not limited to, automatic mechanism including, motor mechanism, gear mechanism and manual rotation.

In an example, the automatic mechanism using the motor mechanism may include a stepper motor (not shown). The stepper motor may be disposed below the spring member **542** and coupled to bottom of the rotating disc **538**. The stepper motor may be connected with a power source (not shown) and may be activated using a switch (not shown) disposed at the housing member **508** by a user/operator. In an example, the stepper motor may be configured to rotate the exchange mechanism **536** only when the exchange mechanism **536** is lifted by the spring member **542** and thus preventing unintentional rotation during operation of the pump **500**. In another example, the automatic mechanism using the gear mechanism (not shown) may include one or more gears connected to a driving motor (not shown). The one or more gears may be coupled to the exchange mechanism **536** for rotation by operating a switch (not shown) disposed in the housing member **508**.

As illustrated in the FIG. 8, the inlet section **514** includes a protection grid **552** for restraining entry of solid larger particles inside the inlet section **514**. The protection grid **552** is adapted to selectively open when the nozzle **522** is removably attached surrounding the inlet section

514. In an example, when the nozzle **522** is lifted up from the inlet section **514**, the protection grid **552** in the inlet section **514** closes the opening of the inlet section **514** for restraining the entry of the solid particles. In an embodiment, the protection grid **552** may include a spring or a flap (not shown) for closing the inlet section **514** when the nozzle **522** is lifted up from the inlet section **514**.

Further, the base member **516** includes one or more stabilizing rims **554**, **556**, on the base member **516**, facing the exchange mechanism **536**. A first stabilizing rim **554** is provided at the inlet section **514**. The first stabilizing rim **554** is adapted to provide support to the nozzle **522** when the nozzle **522** is attached at the inlet section **514**. A second stabilizing rim **556** is provided on the base member **516**, at a location different from the inlet section **514**. A portion of the base member **516** covered by the second stabilizing rim **556** does not form the inlet section **514** of the pump **500**. The first and second stabilizing rims **554**, **556** may be configured in a shape which supports the nozzle **522** both in a working position and a non-working or a parking position. The term "working position" is defined as a position of the nozzle **522** on the base member **516**, when the nozzle **522** is detachably connected to the inlet section **514**. The term "non-working or parking position" is defined as a position of the nozzle **522** on the base member **516**, when the nozzle **522** is positioned away from the inlet section **514**. In an embodiment, a shape of the stabilizing rims **554**, **556** may be including, but not limited, to a shape conforming to the shape of the inlet section **514**. The shape of the inlet section **514** may include, circular, oval, square, rectangular or any other non-geometric shapes.

Further, the base member **516** includes a plurality of ribs **558** disposed on a surface **560** of the base member **516**. Each ribs of the plurality of ribs **558** are spaced apart from each such that the longitudinal legs **550** can be supported and stabilized, when the exchange mechanism **536** makes contact with the base member **516** during the working position of the nozzle **522** (as shown in FIG. 7) and also, when the exchange mechanism **536** is lowered down after rotation about the axis "C-C'" (as

shown in FIG. 10). Preferably the plurality of ribs 558 are disposed in a circular manner, conforming to periphery of the rotating disc 538 of the exchange mechanism 536.

FIG. 9 illustrates a bottom perspective view of a portion of the pump 500 as shown in the FIG. 7 according to an embodiment of the present invention. In the illustrated figure, the rotating disc 538 of the exchange mechanism 536 is rotated to a pre-set angle "A" about the central hole 540 and the axis "C-C'". The rotation of the exchange mechanism 536 rotates the rotating disc 538 and aligns any one of the holes 546 of the rotating disc 538 with the inlet section 514.

FIG. 10 illustrates a bottom perspective view of a portion of the pump 500 as shown in the FIG. 7, according to an embodiment of the present invention. In the illustrated figure, after the rotation about the axis "C-C'" of the central hole 540, the rotating disc 538 of the exchange mechanism 536 is lowered down. The exchange mechanism 536 lowered down aligns the at least one of the hole 546 with the inlet section 514 of the base member 516. The alignment of the hole 546 with the inlet section 514 forms a passage 548 for the liquid by aligning with any one of the holes 546 of the rotating disc 538 with the inlet section 514. The alignment of the any one of the holes 546 with the inlet section 514 may allow the pumping of liquid having dust particles as well.

In an embodiment, the exchange mechanism 536 in the pump 500 allows the pumping of either the clean liquid or the liquid containing particles. In an example, when the clean liquid is required to be pumped from the surface 126, the nozzle 522 of the exchange mechanism 536 is required to be aligned with the inlet section 514, as shown in FIG. 7. As the nozzle 522 is provided with the non-return valve 532, the nozzle 522 allows flow of liquid through the inlet section 514 and into the pump 500. The non-return valve 532 provided in the nozzle 522 prevents the back flow or the reverse flow of the liquid.

In another example, when liquid containing particles is to be pumped out from the surface 126, any one of the holes 546 are required

to be aligned with the inlet section **514** as shown in FIG. **10**. As the holes **546** are provided with larger sized orifices, the liquid having the particles is pumped out from the surface **126**.

5 In the drawings and specification, there have been disclosed preferred embodiments and examples of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for the purpose of limitation of the scope of the invention being set forth in the following claims.

LIST OF ELEMENTS

	100	Pump
	102	Impeller
	104	Drive shaft
5	106	Electric motor
	108	Housing member
	110	First end portion
	112	Second end portion
	114	Inlet section
10	116	Base member
	118	Outlet
	120	Pipe
	122	Nozzle
	124	Suction orifice
15	126	Surface
	128	First portion
	130	Second portion
	132	Non-return valve
	134	Bottom end
20	322	Nozzle
	324	Suction orifice
	328	First portion
	330	Second portion
	422	Nozzle
25	424	Suction orifice
	428	First portion

	430	Second portion
	434	Bottom end
	436	Third portion
	444	Auxiliary suction orifice
5	446	Side surface
	448	Multiple smaller orifices
	500	Pump
	502	Impeller
	504	Drive shaft
10	506	Electric motor
	508	Housing member
	510	First end portion
	512	Second end portion
	514	Inlet section
15	516	Base member
	518	Outlet
	520	Pipe
	522	Nozzle
	532	Non-return valve
20	536	Exchange mechanism
	538	Rotating disc
	540	Central hole
	542	Spring member
	544	Side surface
25	546	Hole
	548	Passage

	550	Longitudinal Legs
	552	Protection grid
	554	First stabilizing rim
	556	Second stabilizing rim
5	558	Plurality of ribs
	560	Surface
	H	Height
	H1	Height
	H2	Height
10	H3	Height
	H4	Height
	H5	Height
	H6	Height
	H7	Height
15	L	Level
	A	Pre-set angle
	X-X ^I	Axis
	X ₁ -X ₁ ^I	Axis
	C-C ^I	Axis

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CLAIMS

1. A pump (**100, 500**) comprising:
 - a housing member (**108, 508**) having a first end portion (**110, 510**) and a second end portion (**112, 512**) distal to the first end portion (**110, 510**);
 - an impeller (**102, 502**) disposed proximal to the second end portion (**112, 512**) of the housing member (**108, 508**); and
 - a base member (**116, 516**) connected to the second end portion (**112, 512**) of the housing member (**108, 508**), the base member (**116, 516**) includes an inlet section (**114, 514**);

characterized in that,

 - the inlet section (**114, 514**) is adapted to removably attach with at least one nozzle (**112, 322, 422, 522**).
2. The pump (**100**) of claim 1, wherein the inlet section (**114**) is adapted to removably attach with multiple nozzles (**112, 322, 422**) having different size parameters and/or structures.
3. The pump (**100**) of claim 1 or 2, wherein at least one nozzle (**112**) includes a non-return valve (**132**).
4. The pump (**100**) of any of the preceding claims, wherein height of a suction orifice of the nozzle (**112**) is adjusted above a surface (**126**) by attaching the nozzle (**112**) of different size parameters and/or structures.
5. The pump (**100**) of any of the preceding claims, wherein the nozzle (**112**) is adapted to suck liquid from the surface (**126**) up to a height ranging from about 1 mm to about 3 mm.
6. The pump (**500**) of claim 1 or 2 further includes an exchange mechanism (**536**) having a rotating disc (**538**) and at least two nozzles (**522**), wherein the exchange mechanism (**536**) is movably accommodated in the base member (**516**).

7. The pump (500) of claim 6, wherein at least one of the nozzles (522) of the exchange mechanism (536) includes a non-return valve (532).
- 5 8. The pump (500) of claim 6, wherein the exchange mechanism (536) includes a central hole (540) defined on the rotating disc (538) for accommodating a spring member (542) for lifting the rotating disc (538) during rotation thereof.
- 10 9. The pump (500) of claim 8, wherein the rotation of the rotating disc (538) aligns at least one nozzle (522) with an inlet section (514) of a base member (516).
- 15 10. The pump (500) of claim 8, wherein the rotating disc (538) is lowered down after alignment of one of the nozzles (522) with the inlet section (514) for configuring the nozzle (522) for suction operation.
- 20 11. The pump (500) of any of claims 6 to 10, wherein the exchange mechanism (536) includes longitudinal legs (550) extending from a side surface (544) of the rotating disc (538) for providing support and stability during the rotation and alignment of the nozzle (522) with the inlet section (514).
- 25 12. The pump (100, 500) of any of the preceding claims, wherein the pump (100, 500) is used for gardening application, household application and industrial application.

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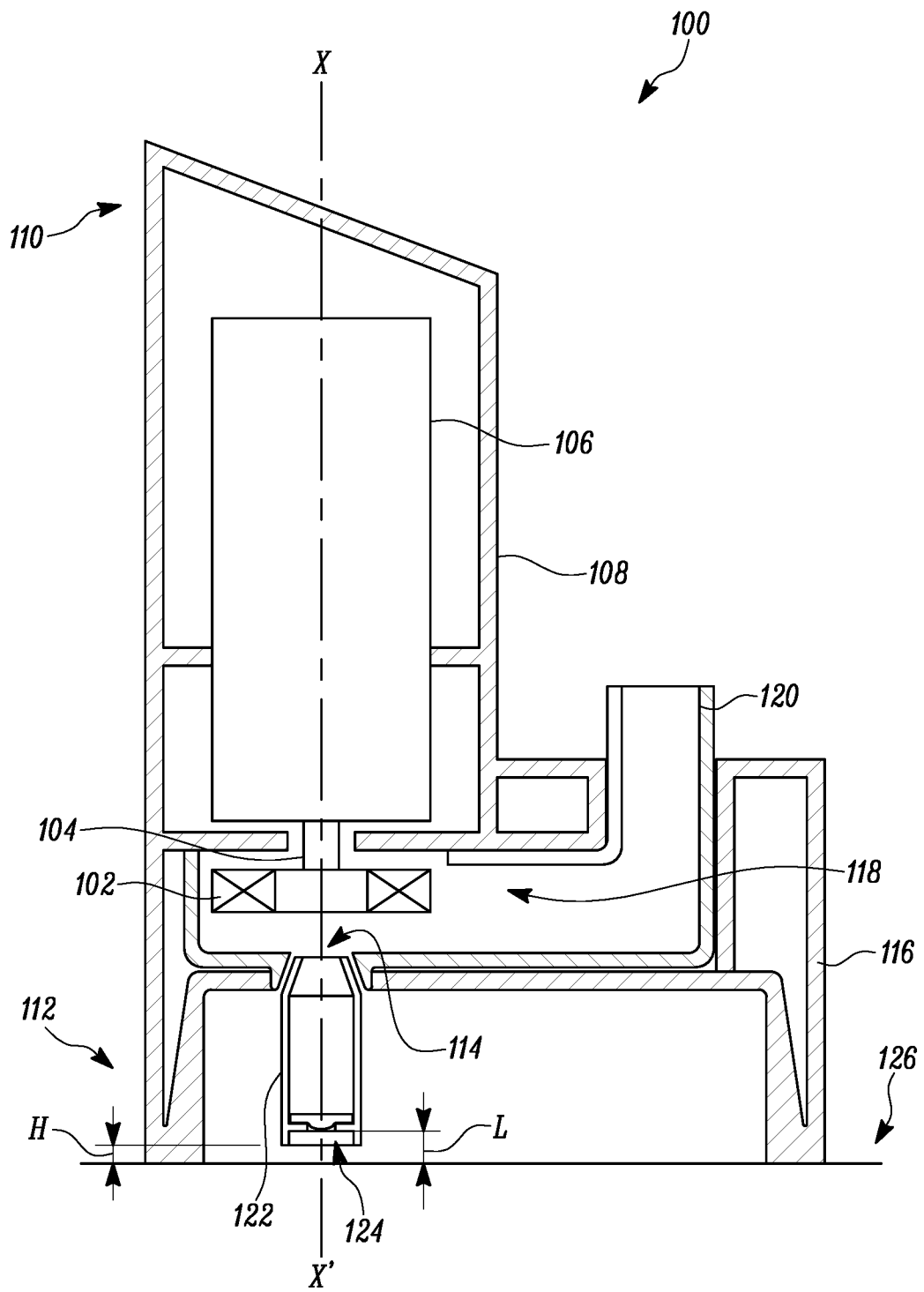


FIG. 1

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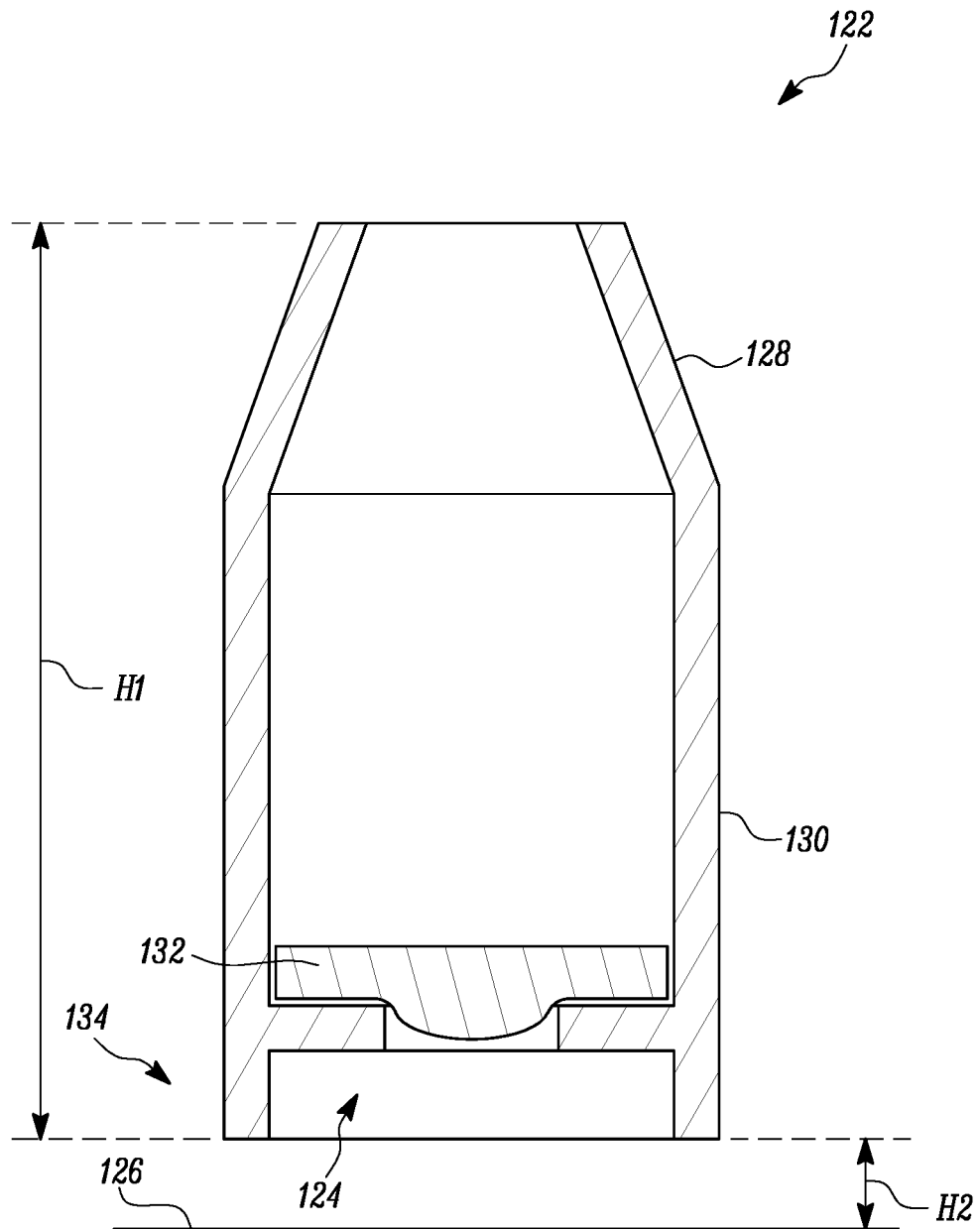


FIG. 2

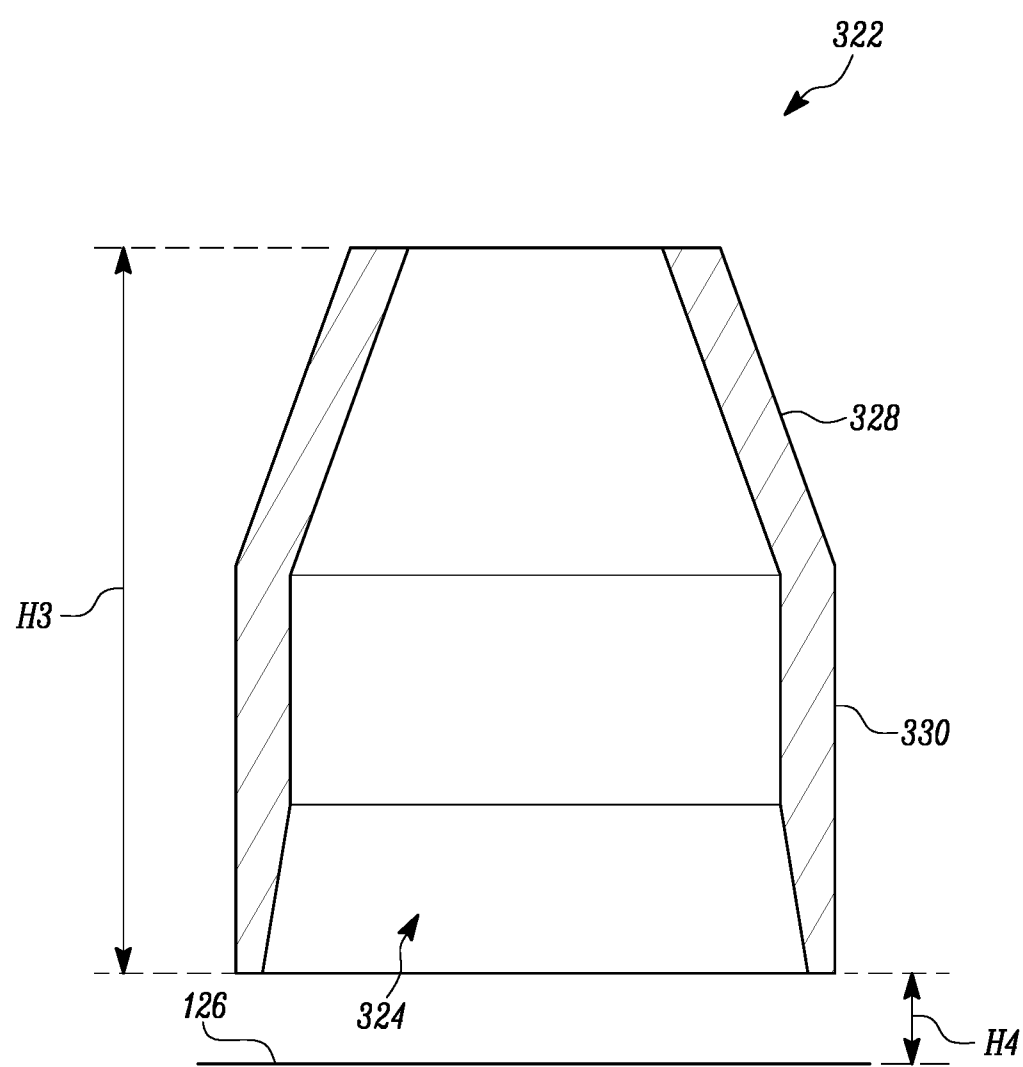


FIG. 3

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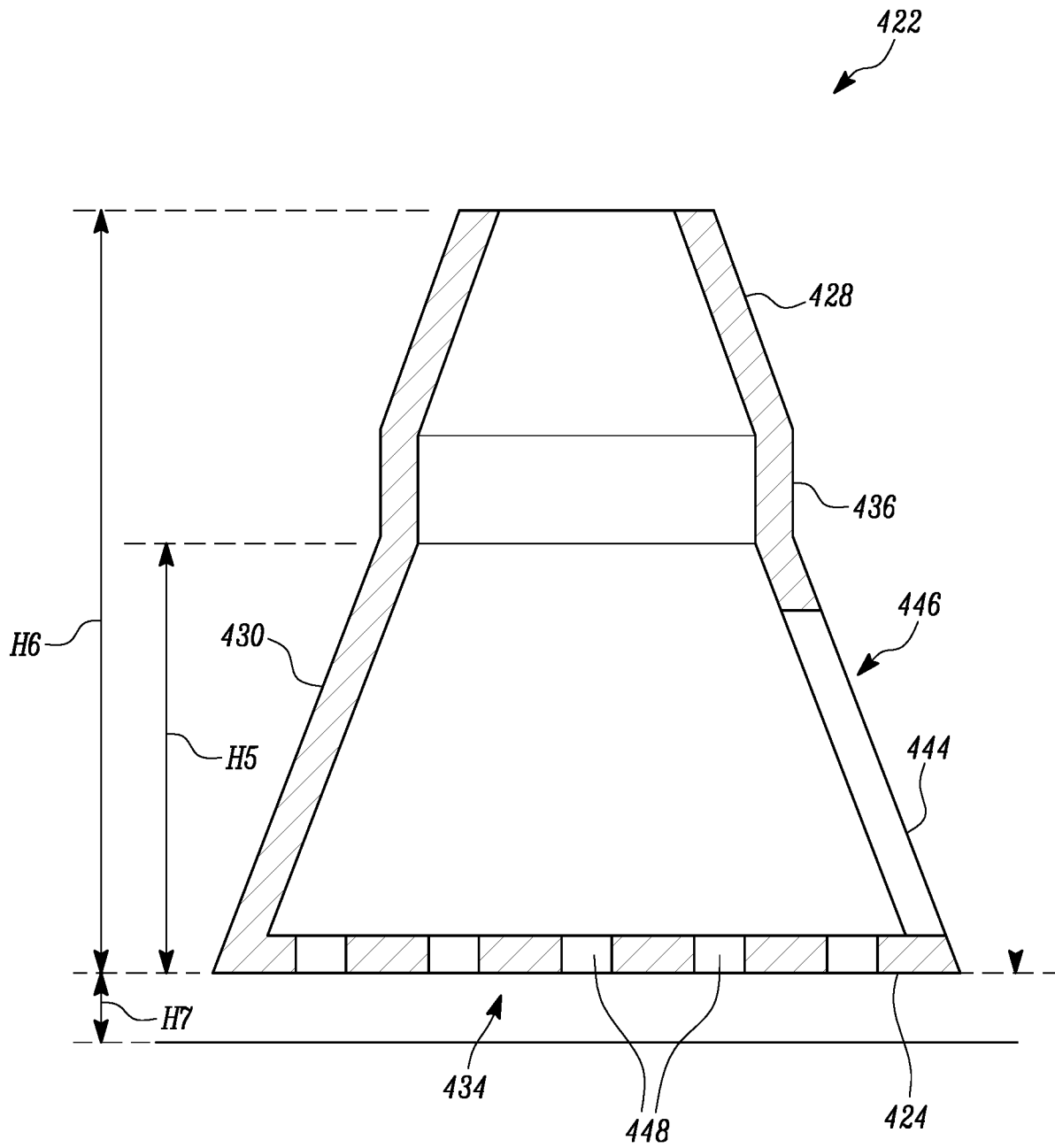


FIG. 4

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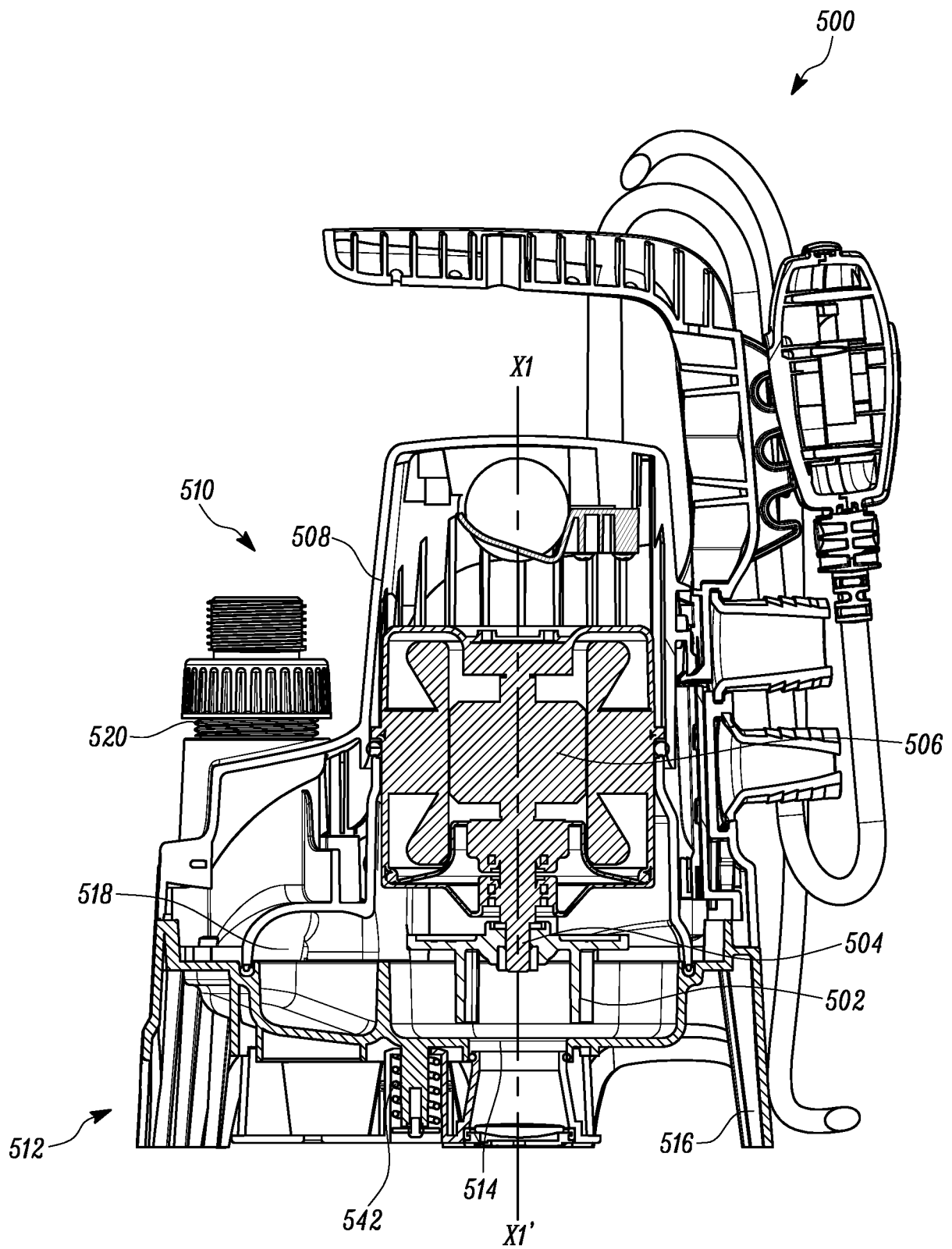


FIG. 5

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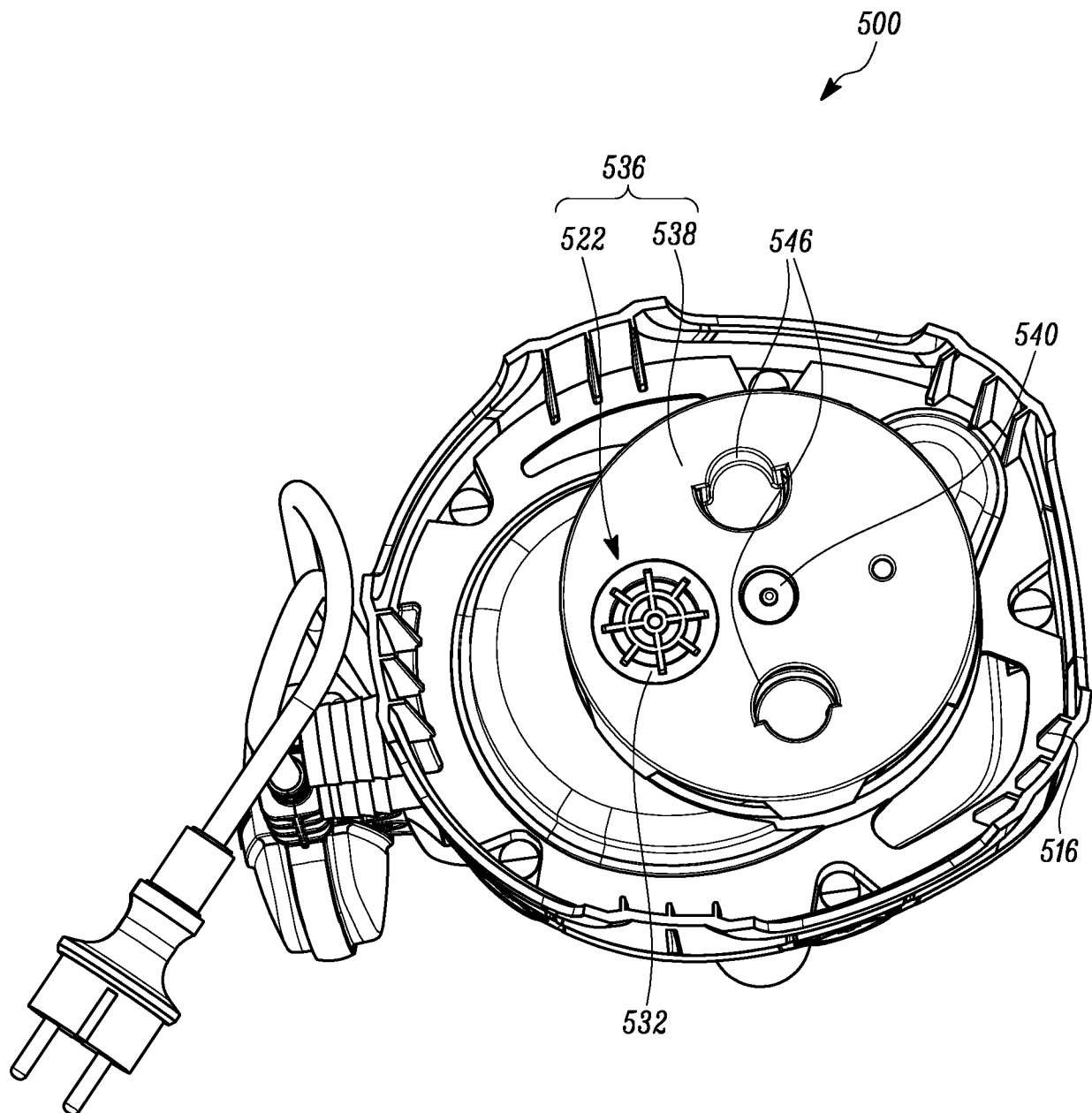


FIG. 6

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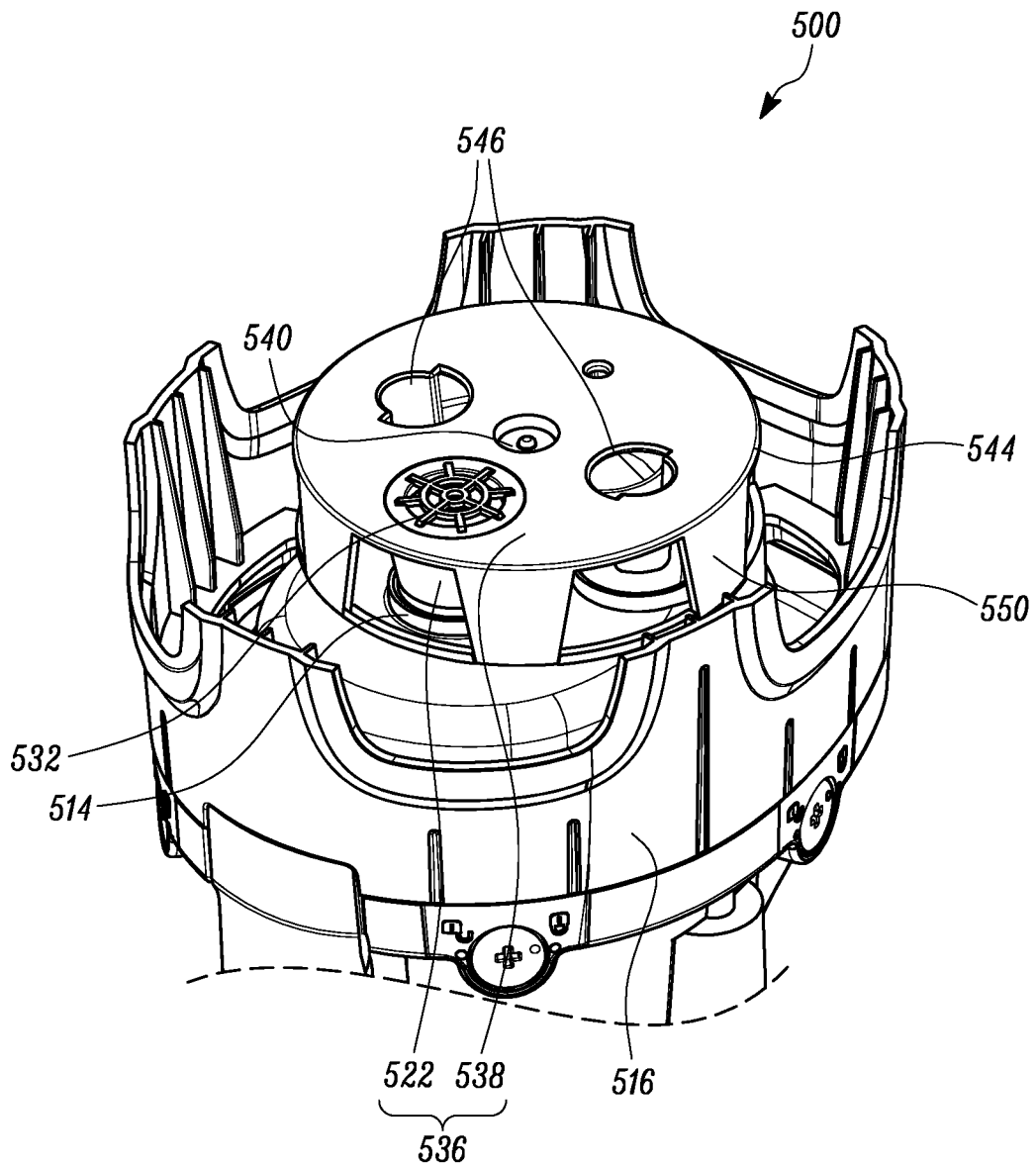


FIG. 7

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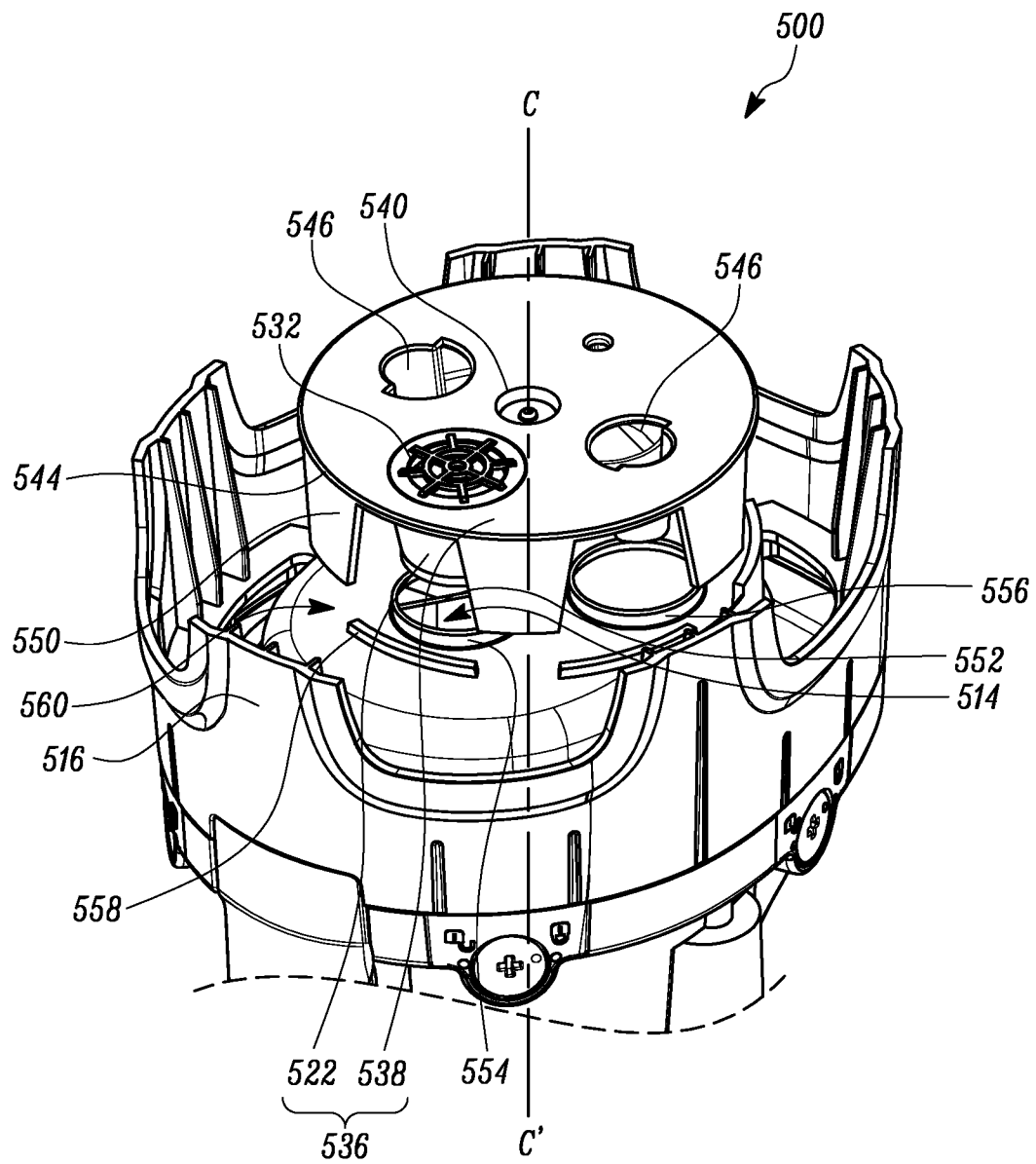


FIG. 8

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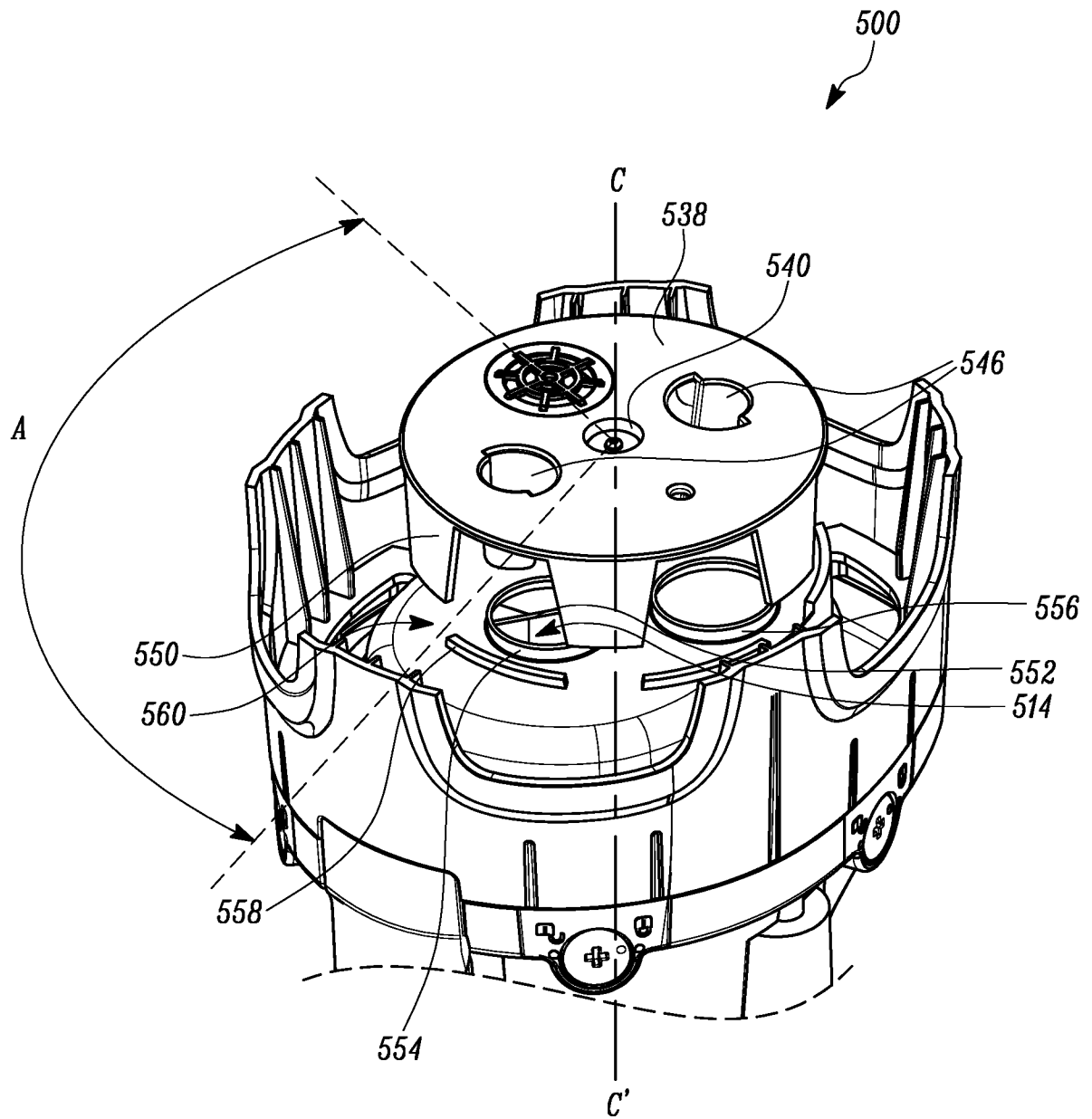


FIG. 9

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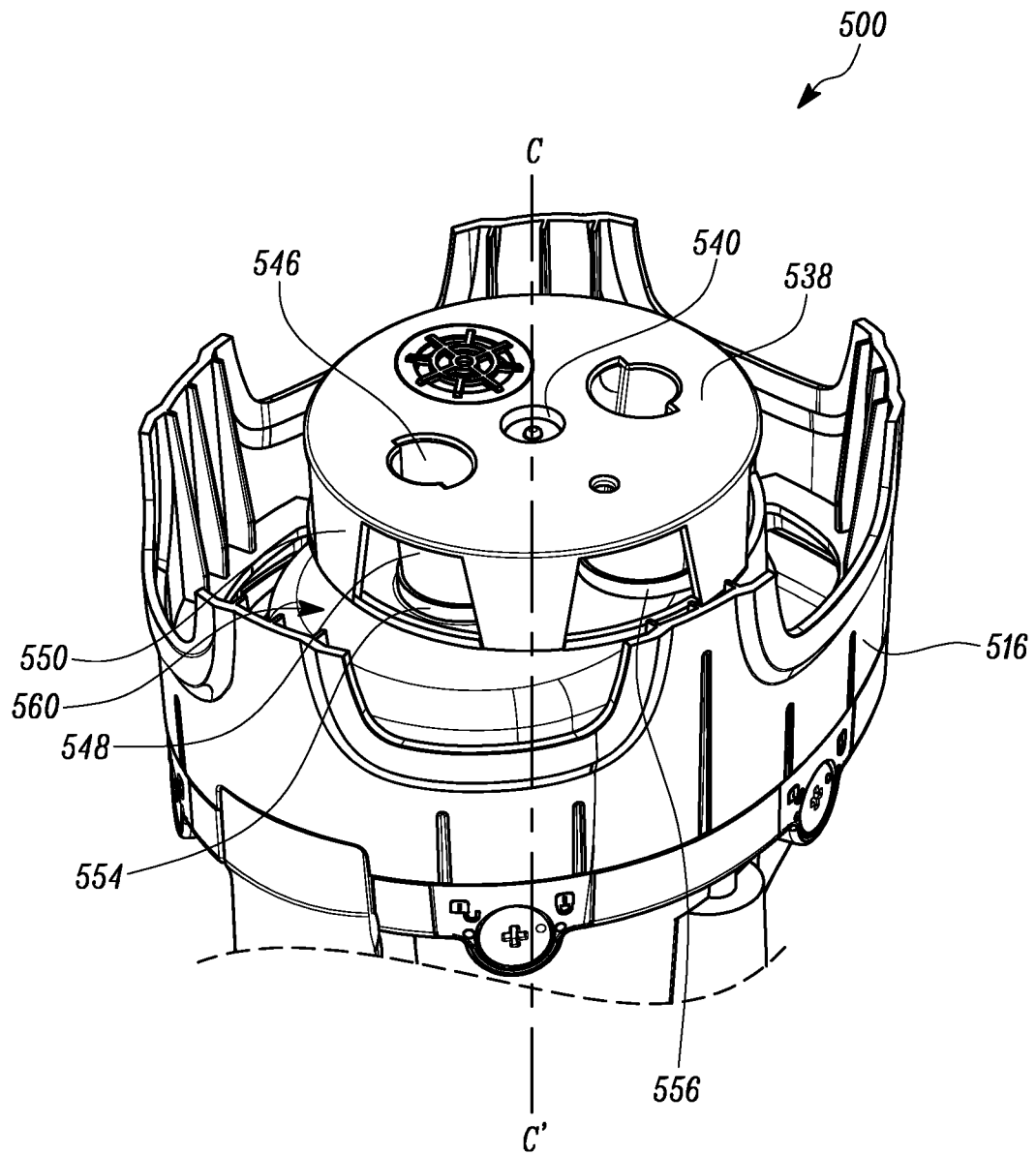


FIG. 10

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/055343

A. CLASSIFICATION OF SUBJECT MATTER INV. F04D29/42 F04D13/06 F04D13/08 F04D15/00 F04D15/02 ADD. F04D29/70		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) F04D		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 698 544 A1 (DIPRA [FR]) 19 February 2014 (2014-02-19) paragraph [0026] - paragraph [0029] figures 4-5	1-12
X	----- CN 202 756 301 U (ZHEJIANG LEO CO LTD) 27 February 2013 (2013-02-27) abstract figures 1-8	1-3,6,7, 11,12
A	----- DE 26 18 068 A1 (BLUM ALBERT) 10 November 1977 (1977-11-10) page 6, line 20 - line 21 page 7, line 1 - line 19 figures 3-5 -----	1-12
☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search	Date of mailing of the international search report	
8 November 2017	14/11/2017	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Lovergine, A	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2017/055343

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2698544	A1	19-02-2014	NONE
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DE 2618068	A1	10-11-1977	BR 7702597 A 28-02-1978 DE 2618068 A1 10-11-1977