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(54) **FILTERING AND CIRCULATION SYSTEM FOR POOL**

(57) A filtering and circulation system includes a skimmer (1) having an upper water inlet (38) and a lower water inlet (39) positioned opposite the upper water inlet. A water flow driving device (2) is fluidly coupled to the skimmer via a drainage pipe (5). The upper water inlet is

positioned adjacent a top surface of the pool, the lower water inlet is positioned adjacent a bottom surface of the pool, and the water flow driving device circulates water discharged from the skimmer into the pool.

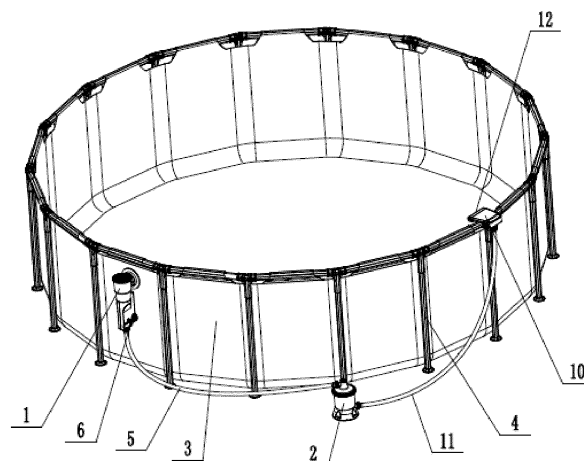


FIG. 1

Description

TECHNICAL FIELD

[0001] The present disclosure relates to a filtering and circulation system for a pool, and more particularly, to a filtering and circulation system having a skimmer connection structure and/or a water curtain structure.

BACKGROUND

[0002] Conventional pool filtration systems are primarily designed to filter water from the surface of the pool. These systems typically include a skimmer and a filter, with the skimmer collecting floating debris such as leaves and insects, and the filter removing impurities from the water. While effective at cleaning debris from a surface of the pool, traditional systems fail to address water quality issues at the bottom of the pool, where heavier debris and sediments often settle. This limitation is particularly problematic for frame pools and inflatable pools, which are popular due to their affordability and ease of setup but lack the sophisticated cleaning systems found in more permanent installations.

SUMMARY

[0003] In order to overcome the above shortcomings, the present disclosure provides a circulation and filtration systems that may effectively clean both a water surface and a bottom surface of a pool.

[0004] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure a filtering and circulation system for a pool is disclosed. The filtering and circulation system includes a skimmer comprising an upper water inlet, and a lower water inlet positioned opposite the upper water inlet. A water flow driving device is fluidly coupled to the skimmer via a drainage pipe. The upper water inlet is positioned adjacent a top surface of the pool, the lower water inlet is positioned adjacent a bottom surface of the pool, and the water flow driving device circulates water discharged from the skimmer into the pool.

[0005] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, the drainage pipe further includes a branch having an end portion that extends to the bottom surface of the pool to form the lower water inlet.

[0006] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, the branch further comprises an inner pipe, an outer pipe, a mounting head arranged between the inner pipe and the outer pipe, and a steering head arranged between the inner pipe and the outer pipe. The mounting head is received by a connecting hole formed in the pool and hermetically sealed to the outer pipe, and the steering head is connected between the mounting head and the inner pipe.

[0007] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, a directional valve is mounted on the drainage pipe at a location where the directional valve engages the drainage pipe, such that the drainage pipe and the branch are both connected to the directional valve.

[0008] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, a valve flap is rotatably mounted within the directional valve, such that rotation of the valve flap switches a flow path of the directional valve.

[0009] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, the valve flap is provided with a rotating shaft, and the rotating shaft extends out of an outer wall of the directional valve and is connected to a handle.

[0010] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, a water curtain discharge device is mounted on a frame of the pool, the water curtain discharge device including a water curtain outlet that forms a water curtain that falls into the pool.

[0011] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, a lamp is mounted on the water curtain discharge device.

[0012] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, a water supply connector is mounted on the pool and a water discharge pipe extends between the water supply connector and the water flow driving device.

[0013] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, the water supply connector comprises a connector body, an inner end cover, a threaded sleeve mounted between the connector body and the inner end cover, and a raised ring arranged on an outer wall of the threaded sleeve. The threaded sleeve is received by a mounting hole formed in the pool, the raised ring is sealed against an inner wall of the pool, the threaded sleeve is in threaded connection with a fastening sleeve hermetically sealed to an outer wall of the pool, the inner end cover is connected to an inner end of the threaded sleeve, and the connector body is connected to an outer end of the threaded sleeve.

[0014] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, a filtering and circulation system for a pool is disclosed. The filtering and circulation system comprises a skimmer comprising an upper water inlet and a lower water inlet positioned opposite the upper water inlet. A water flow driving device is fluidly coupled to the skimmer via a drainage pipe. A pool skimmer connection structure couples the skimmer to the pool, the pool skimmer connection structure comprising a skimmer body, a skimmer drainage tube extending between the skimmer body and the pool, a fastening sleeve con-

nected to a liner of the pool and a connector provided on the fastening sleeve. The connector extends through the liner of the pool and is connected to the skimmer drainage tube, the skimmer drainage tube is provided with an outer stressed surface, the fastening sleeve is provided with an inner stressed surface, and the outer stressed surface of the drainage tube and the inner stressed surface of the fastening sleeve are secured to an inner wall and an outer wall of the liner.

[0015] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, an outer sealing ring is mounted between the outer stressed surface and the outer wall of the liner.

[0016] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, an inner sealing ring is mounted between the inner stressed surface and the inner wall of the liner.

[0017] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, the fastening sleeve is pre-mounted to the liner, and the inner stressed surface is sealed to the inner wall of the liner.

[0018] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, a connecting disk is disposed about the skimmer drainage tube and a locking sleeve is disposed about the skimmer drainage tube. The locking sleeve abuts against the connecting disk, and the locking sleeve is connected to the connector to allow the skimmer drainage tube to be fastened to the connector.

[0019] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, a baffle is mounted in the skimmer drainage tube, and a lower portion of the baffle is rotatably mounted to the skimmer drainage tube.

[0020] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, a filtering and circulation system for a pool is disclosed. The filtering and circulation system comprises a skimmer including an upper water inlet and a lower water inlet positioned opposite the upper water inlet. A water flow driving device is fluidly coupled to the skimmer via a drainage pipe. A pool skimmer connection structure couples the skimmer to the pool. A water curtain discharge device is mounted to the pool, the water curtain discharge device comprising a water curtain inlet and a water curtain outlet. Water is delivered into the water curtain discharge device from the water curtain inlet and discharged from the water curtain outlet to form a water curtain that falls into the pool.

[0021] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, the water curtain discharge device further includes a water channel cavity positioned between and in fluid communication with the water curtain inlet and the water curtain outlet, the water channel cavity having a width that increases from the water curtain inlet to the water curtain outlet.

[0022] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, a plurality of side tubes is provided on an upper edge of the pool, wherein adjacent side tubes of the plurality of side tubes are connected via a side tube joint, and the water curtain discharge device is mounted to the side tube joint.

[0023] According to one aspect of the disclosure, and potentially in combination with other disclosed aspects of the disclosure, the water curtain discharge device is connected to a lamp holder on a side of the water curtain discharge device where the water curtain outlet is located, and a lamp is mounted to the lamp holder.

[0024] In view of the foregoing, it should be appreciated that the circulation and filtration systems described herein may effectively clean both a water surface and a bottom surface of the pool. For example, by incorporating dual water inlets (e.g., upper and lower inlets described herein), the system ensures comprehensive filtration and circulation. Furthermore, the inclusion of a directional valve enables users to switch between multiple filtration modes, providing flexibility and convenience. The circulation and filtration system described herein may also enhance the visual appeal of the pool with a water curtain discharge device and a mood lamp, creating a more enjoyable and functional pool environment.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] Other features and advantages of the present disclosure will be understood from the following embodiments described in detail herein and with reference to the accompanying drawings, in which like reference numerals represent the same or similar components.

FIG. 1 is a schematic view of a pool having a circulation and filtration system, according to one or more embodiments shown and described herein;

FIG. 2 is a schematic view of the circulation and filtration system of FIG. 1, according to one or more embodiments shown and described herein;

FIG. 3 is a cross-sectional view of the circulation and filtration system of FIG. 1, according to one or more embodiments shown and described herein;

FIG. 4 is a schematic view of another embodiment of a pool having a circulation and filtration system, according to one or more embodiments shown and described herein;

FIG. 5 is a schematic view of a water supply connector of the circulation and filtration system of FIG. 4, according to one or more embodiments shown and described herein;

FIG. 6 is an exploded view of the water supply con-

nector of FIG. 5, according to one or more embodiments shown and described herein;

FIG. 7 is a schematic view of a pool skimmer connection structure for coupling the circulation and filtration system of FIG. 1 to the pool, according to one or more embodiments shown and described herein;

FIG. 8 is a cross-sectional view of the pool skimmer connection structure of FIG. 7, according to one or more embodiments shown and described herein;

FIG. 9 is an exploded view of the pool skimmer connection structure of FIG. 7, according to one or more embodiments shown and described herein;

FIG. 10 is a schematic view of another embodiment of a pool skimmer connection structure for coupling the circulation and filtration system of FIG. 1 to the pool, according to one or more embodiments shown and described herein;

FIG. 11 is a cross-sectional view of the pool skimmer connection structure of FIG. 10, according to one or more embodiments shown and described herein;

FIG. 12 is an exploded view of the pool skimmer connection structure of FIG. 10, according to one or more embodiments shown and described herein;

FIG. 13 is an exploded view of another embodiment of a pool skimmer connection structure for coupling the circulation and filtration system of FIG. 1 to the pool, according to one or more embodiments shown and described herein;

FIG. 14 is an exploded view of another embodiment of a pool skimmer connection structure for coupling the circulation and filtration system of FIG. 1 to the pool, according to one or more embodiments shown and described herein;

FIG. 15 is a schematic view of a water curtain discharge device of the circulation and filtration system of FIG. 1, according to one or more embodiments shown and described herein;

FIG. 16 is a bottom-side view of the water curtain discharge device of FIG. 15, according to one or more embodiments shown and described herein;

FIG. 17 is a cross-sectional view of the water curtain discharge device of FIG. 15, according to one or more embodiments shown and described herein;

FIG. 18 is an exploded view of the water curtain discharge device of FIG. 15, according to one or

more embodiments shown and described herein;

FIG. 19 is a schematic view of a base of the water curtain discharge device of FIG. 15, according to one or more embodiments shown and described herein;

FIG. 20 is a schematic view of another water curtain discharge device of the circulation and filtration system of FIG. 1, according to one or more embodiments shown and described herein; and

FIG. 21 is a schematic view of another water curtain discharge device of the circulation and filtration system of FIG. 1, according to one or more embodiments shown and described herein; and

[0026] Elements in the figures are shown for simplicity and clarity and are not necessarily drawn to exact scale. It can be understood that these accompanying drawings are not only intended to explain and illustrate the present disclosure and description, but also contribute to the scope of the present disclosure.

DETAILED DESCRIPTION

[0027] The implementation and application of embodiments of a circulation and filtration system for a pool will be discussed in detail below. However, it should be understood that the embodiments discussed and illustrated herein illustratively described various embodiments, implementations, and applications of the present disclosure, and are not intended to limit the scope of the present disclosure.

[0028] Referring now to the drawings, FIG. 1 depicts a filtering and circulation system for a pool may include a skimming and drainage device, such as a skimmer 1, and a water flow driving device 2. In these embodiments, the pool may include a liner 3 and a frame 4, with the frame 4 being arranged outside the liner 3 and the liner 3 being connected to the frame 4, such that water may be contained in the frame 4 defined by the liner 3 to form the pool. In the embodiments described herein, the liner 3 may be formed of polyvinyl chloride (PVC), vinyl, reinforced polymer, thermoplastic polyurethane (TPU), rubber, or any other similar composite material capable of providing a desired durability for the pool.

[0029] Referring now to FIGS. 1-3, the skimmer 1 may be provided with an upper water inlet 38 and a lower water inlet 39. In these embodiments, the upper water inlet 38 may be positioned close to (e.g., proximate and/or adjacent to) a top surface of the pool, while the lower water inlet 39 may be positioned close to (e.g., proximate and/or adjacent to) a bottom surface of the pool. As depicted mostly clearly in FIG. 1, the water flow driving device 2 may deliver a water flow discharged from the skimmer 1 into the pool.

[0030] As further depicted in FIG. 1, a drainage pipe 5 may be coupled to the skimmer 1 and may be configured

to channel water from the skimmer 1 to the water flow driving device 2 (and vice versa). In these embodiments, the drainage pipe 5 may further include a branch 6 that fluidly couples the drainage pipe 5 to each of the lower water inlet 39 and the upper water inlet 38. For example, the branch 6 may have end portions which extend to the bottom and/or top of the pool to couple with the lower water inlet 39 and the upper water inlet 38, respectively. It should be appreciated that by fluidly coupling the drainage pipe to each of the upper water inlet 38 and the lower water inlet 39 (e.g., via branch 6), it may be possible to ensure that water from both levels of the pool (e.g., a top surface adjacent the upper water inlet 38 and a bottom surface adjacent the lower water inlet 39) is filtered and circulated. In these embodiments, transporting water from the pool and through the water flow driving device (e.g., via the drainage pipe 5) may also ensure that debris and impurities are removed from the water entering the pool, as will be described in additional detail herein.

[0031] Referring again to FIGS. 1-3, the skimmer 1 may be mounted on the liner 3 close to (e.g., proximate and/or adjacent to) the water surface. In these embodiments, the liner 3 may be provided with a drain outlet corresponding to the skimmer 1, with the upper water inlet 38 being hermetically connected to the drain outlet formed in the liner 3. As illustrated most clearly in FIG. 2, an outlet end of the skimmer 1 may be connected to the drainage pipe 5, such that water is able to flow between the skimmer and the water flow driving device 2, as described hereinabove.

[0032] As further depicted in FIGS. 1-3 the skimmer 1 may further include a directional valve 7 mounted on the drainage pipe 5 at the location where the branch 6 is coupled to the drainage pipe 5. In these embodiments, the drainage pipe 5 and the branch 6 may both be connected to the directional valve 7, such that actuation of the directional valve alters the flow of water through the drainage pipe 5 and the branch 6, as will be described in additional detail herein.

[0033] As most clearly depicted in FIG. 3, the directional valve 7 may further include a valve flap 8, which may be configured to rotate to switch flow paths of the directional valve 7. For example, in these embodiments, the valve flap 8 is provided with a rotating shaft, which extends out of an outer wall of the directional valve 7 and is connected to a handle 9. Accordingly, the valve flap 8, and in turn, the directional valve 7, may be adjusted by rotating the handle 9 illustrated in FIG. 3.

[0034] Referring now to FIGS. 2 and 3, the directional valve 7 may be provided with three openings, with a first opening, such as an upper opening, and a second opening, such as a lower opening, being connected to the drainage pipe 5 and a third opening, such as a central opening, being connected to the branch 6. In these embodiments, when the handle 9 is in a first position (e.g., in parallel with the central opening and branch 6, as depicted in FIG. 3), water may flow between the upper

surface of the pool (e.g., at upper water inlet 38) and the drainage pipe 5, such that the water traverses the upper opening and the lower opening of the directional valve 7. When then handle 9 is moved to a second position (e.g., such that the handle 9 is parallel with the upper opening and lower opening of the directional valve 7), water may flow between the lower surface of the pool (e.g., at lower water inlet 39) and the drainage pipe 5, such that the water traverses the central opening and the bottom opening of the directional valve.

[0035] In the embodiments described herein, the valve flap 8 may further include a sealing surface, which may have an arc-shaped structure. Accordingly, the arc-shaped structure of the valve flap 8 may allow the valve flap 8 to rotate in order to close any one of the openings or to open and communicate all of the three openings of the directional valve 7, as described hereinabove.

[0036] Referring again to FIGS. 1-3, the skimmer 1 may further include a plurality of protective covers mounted at a lower portion of the skimmer 1, which may be connected together to form a mounting cavity. In these embodiments, the directional valve 7 may be arranged in the mounting cavity, while the handle 9 is exposed outside the mounting cavity, such that a user is able to access the handle 9 to adjust operation of the directional valve 7, as has been described herein.

[0037] Referring again to FIG. 3, the branch 6 of the directional valve 7 is depicted in additional detail. As depicted, the branch 6 may include an inner pipe 13 and an outer pipe 14, with a mounting head 15 and a steering head 16 being arranged between the inner pipe 13 and the outer pipe 14. In these embodiments, the liner 3 of the pool may be provided with a connecting hole 17, which may correspond with and be configured to receive the branch 6. In particular, as illustrated in FIG. 3, the mounting head 15 may be adapted to be received by the connecting hole 17 formed in the liner 3.

[0038] Referring still to FIG. 3, the steering head 16 of the branch 6 may be connected between the mounting head 15 and the inner pipe 13, with the mounting head 15 being connected (e.g., hermetically sealed) to the outer pipe 14. In these embodiments, the mounting head 15 may be provided with an outwardly protruding annular disk 18, and a sealing ring 19 may be mounted between the annular disk 18 and an inner wall of the liner 3. As shown in FIG. 3, the mounting head 15 may be in threaded connection with a locking ring 20, with the locking ring 20 being configured to abut against an outer wall of the liner 3.

[0039] As further illustrated in FIG. 3, the outer pipe 14 may further include a fastening ring 21 sleeved about (e.g., disposed about) the outer pipe 14. In these embodiments, the fastening ring 21 may be formed by assembling two semicircular connecting members, with the two semicircular connecting members being connected to each other by means of a T-shaped engagement structure. As further depicted in FIG. 3, an end portion of the outer pipe 14 may be provided with a flange 22, while the

fastening ring 21 may be provided with a positioning projection 23, which may be configured to abut the flange 22. As depicted in FIG. 3, an end face of the outer pipe 14 may be coupled (e.g., hermetically sealed) to an end face of the mounting head 15. In these embodiments, the inner pipe 13 may be vertically arranged close to (e.g., proximate and/or adjacent to) the inner wall of the liner 3, and a lower end of the inner pipe 13 may be connected to a filter cover 24.

[0040] Referring again to FIGS. 1-3, it should be appreciated that the directional valve 7 is mounted below (e.g., beneath) the skimmer 1. Furthermore, in these embodiments, at least a portion of the drainage pipe 5 that extends between the directional valve 7 and the skimmer 1 may be formed of a corrugated pipe, which may facilitate adjusting a length of the drainage pipe 5 during mounting of the skimmer 1. To further aid in ease of installation, the outer pipe 14 and the inner pipe 13 may be conveniently connected to the liner 3 by means of the mounting head 15 and the steering head 16.

[0041] Referring now to FIG. 1, it should be appreciated that, in some embodiments, the pool may further include a water curtain discharge device 10 mounted to the pool. In these embodiments, the pool may further include a water discharge pipe 11 mounted between the water curtain discharge device 10 and the water flow driving device 2, such that water is able to flow between the water curtain discharge device 10 and the water flow driving device 2.

[0042] As further depicted in FIG. 1, the water curtain discharge device 10 may be provided with a strip-shaped water outlet, such that the water delivered to the water curtain discharge device 10 from the water flow driving device 2 is discharged from the water outlet to form a water curtain that falls into the pool. In these embodiments, a mood lamp 12 may be mounted on the water curtain discharge device 10, which may be mounted on top of a frame of the pool. Embodiments of the water curtain discharge device 10 will be described in additional detail herein with reference to FIGS. 15 - 21. Referring again to FIGS. 1-3, operation of the skimmer 1 and the water flow driving device 2 will now be described in additional detail. For example, when the water flow driving device 2 is activated, floating objects on the water surface of the pool and/or on the bottom surface of the pool may enter the water flow driving device 2 after flowing into the skimmer 1. In these embodiments, water at the bottom of the pool may be pumped into the water flow driving device 2 through the branch 6, and the water may be delivered into the pool after being filtered by the water flow driving device 2, so as to generate filtering and circulation of the water. Furthermore, by rotating the handle 9, as described in detail hereinabove, the flow paths of the directional valve 7 may be changed, thereby alternating the directional valve 7 between a plurality of filtering modes. For example, in various filtering modes of the plurality of filtering modes, the directional valve may be configured to allow for the filtering of only the floating

objects at the water surface of the pool, filtering only of water at the bottom of the pool, or filtering of water at both the water surface and the bottom of the pool. It should be further appreciated that, in the embodiments described herein, the water flow discharged from the water flow driving device 2 may be delivered to the water curtain discharge device 10, at which point the water may be discharged outwardly through the strip-shaped water outlet on the water curtain discharge device 10 to form a water curtain. The mood lamp 12 may then be turned on while the water curtain is formed, so as to increase the ornamental value of the pool.

[0043] Turning now to FIGS. 4-6, another embodiment of a pool having a skimmer 1 and a water flow driving device 2 is depicted. It should be appreciated that the skimmer 1 and the water flow driving device 2 depicted in FIGS. 4-6 are similar to those described with reference to FIGS. 1-3. Accordingly, like structure is indicated with like reference numerals where possible.

[0044] In the embodiments depicted in FIGS. 4-6, the pool may further include a water supply connector 25 mounted on the liner 3 of the pool and a water discharge pipe 11 mounted between the water supply connector 25 and the water flow driving device 2. In these embodiments, the water supply connector 25 may include a connector body 26 and an inner end cover 27. A threaded sleeve 28 may be mounted between the connector body 26 and the inner end cover 27. A raised ring 29 may be arranged on an outer wall of the threaded sleeve 28.

[0045] As depicted most clearly in FIG. 4, the liner 3 of the pool may be provided with a mounting hole 30, which may correspond to and be configured to receive the water supply connector 25. In particular, the threaded sleeve 28 of the water supply connector 25 may be adapted to be received by the mounting hole 30. In these embodiments, when the water supply connector engages the mounting hole 30, the raised ring 29 is sealed against the inner wall of the liner 3 of the pool. Accordingly, the seal formed between the raised ring 29 and the liner 3 of the pool may ensure that water is not able to flow between the water supply connector 25 and the water flow driving device 2 without leaking.

[0046] Furthermore, when the water supply connector 25 is engaged with the pool liner 3, the threaded sleeve 28 may engage in threaded connection with a fastening sleeve 31. In these embodiments, the fastening sleeve 31 may be attached (e.g., hermetically sealed) to an outer wall of the liner 3 of the pool. As further depicted in FIGS. 4-6, in these embodiments, the inner end cover 27 of the water supply connector 25 may be connected to an inner end of the threaded sleeve 28, while the connector body 26 may be connected to an outer end of the threaded sleeve 28.

[0047] As further illustrated most clearly in FIG. 6, the connector body 26 may be provided with a connecting pipe 32, and an end portion of the connecting pipe 32 may be provided with a ledge 33. A threaded fixing sleeve 34 is disposed about (e.g., sleeved about) the connecting pipe

32, and the end portion of the connecting pipe 32 is coupled (e.g., hermetically sealed) to the outer end of the threaded sleeve 28. As depicted in FIG. 6, the threaded fixing sleeve 34 is in threaded connection with the threaded sleeve 28 and is further provided with an abutment projection 35 that abuts against the ledge 33. A sealing gasket 36 is mounted between the raised ring 29 and the inner wall of the liner 3. The inner end cover 27 is provided with an outwardly-extending insertion sleeve 37, the insertion sleeve 37 is adaptively inserted into the threaded sleeve 28, the inner end cover 27 is provided with a mesh, and the inner end cover 27 and the threaded sleeve 28 are in threaded connection with each other.

[0048] In some embodiments, it should be further understood that the connecting pipe 32 and the connector body 26 may be connected together to form a T-shaped structure, and the fastening sleeve 31 and the raised ring 29 may be placed on each side (e.g., an inner side and an outer side) of the liner 3, thereby forming tight connection between the threaded sleeve 28 and the liner 3. In these embodiments, an outer edge of the raised ring 29 may be provided with an inwardly-protruding connecting ring, an outer wall of the connecting ring may be provided with threads, and the inner end cover 27 may be fastened to the connecting ring by means of threaded connection.

[0049] Referring again to FIGS. 4-6, it should be appreciated that, in these embodiments, the skimmer 1 may be mounted at an upper portion of the liner 3 of the pool, and the branch 6 may be connected to the middle of the liner 3. A lower end of the skimmer 1 may be connected to the water flow driving device 2 via the drainage pipe 5. The water supply connector 25 may be mounted at an upper middle position of the liner 3 (e.g., as illustrated in FIG. 4), and the water discharge pipe 11 may be connected between the water flow driving device 2 and the water supply connector 25. It should be appreciated that, in these embodiments, the water supply connector 25 facilitates the connection between the water discharge pipe 11 and the liner 3, and thus facilitates circular flow of the water into the pool.

[0050] Referring still to FIGS. 4-6, operation of the water flow driving device 2 and the water supply connector 25 will be described in additional detail. For example, and as described hereinabove with reference to FIGS. 1-3, once the water flow driving device 2 is activated, floating objects on the water surface of the pool and/or on the bottom surface of the pool may enter the water flow driving device 2 after flowing into the skimmer 1. In these embodiments, water at the bottom of the pool may be pumped into the water flow driving device 2 through the branch 6, and the water may be delivered into the pool after being filtered by the water flow driving device 2, so as to generate filtering and circulation of the water. Furthermore, by rotating the handle 9, as described in detail hereinabove, the flow paths of the directional valve 7 may be changed, thereby alternating the directional valve 7 between a plurality of filtering modes. For example, in various filtering modes of the plurality of

filtering modes, the directional valve may be configured to allow for the filtering of only the floating objects at the water surface of the pool, filtering only of water at the bottom of the pool, or filtering of water at both the water surface and the bottom of the pool. The water flow discharged from the water flow driving device 2 may then be discharged into the pool by means of the water supply connector 25 to complete filtering and circulation.

[0051] Turning now to FIGS. 7-14, embodiments of a pool skimmer connection structure for coupling the skimmer 1 to the pool (e.g., the liner 3 of the pool) are depicted. It should be appreciated that each of the embodiments of the pool skimmer connection structure described herein may be used in connection with the skimmer 1, pool, and circulation and filtration systems described with reference to FIGS. 1-6. Accordingly, like structure will be indicated with like reference numerals when possible.

[0052] Referring now to FIGS. 7-9, in some embodiments, the skimmer 1 may include a pool skimmer connection structure configured to couple the skimmer 1 to the liner 3 of the pool, as has been described hereinabove. In these embodiments, the pool skimmer connection structure may include a skimmer body 100, a skimmer drainage tube 102 provided on and/or coupled to the skimmer body 100, and a baffle 103 mounted within the skimmer drainage tube 102 proximate and/or adjacent to an opening. In these embodiments, a lower portion of the baffle 103 may be rotatably mounted to an inner wall of the skimmer drainage tube 102, such that the baffle 103 may be rotated within the skimmer drainage tube 102 to adjust water flow through and/or within the skimmer. For example, when the skimmer 1 is in operation, the baffle 103 may be rotated to an open position, such that water is able to flow through the skimmer drainage tube 102. In contrast, when the skimmer is deactivated, the baffle 103 may be rotated to a closed position, such that water is unable to flow through the skimmer drainage tube 102. In these embodiments, it should be appreciated that water may remain in the skimmer drainage tube 102 when the skimmer initially ceases operation. At this time, the baffle 103 may become vertically positioned on a water surface under the action of buoyancy to block floating objects from traversing the skimmer drainage tube 102.

[0053] Referring still to FIGS. 7-9, the pool skimmer connection structure may further include a fastening sleeve 110 connected to the liner 3, and a connector 111 may be provided on the fastening sleeve 110. In these embodiments, the connector 111 may extend outwardly through the liner 3 to the outside of a pool (e.g., extending through the liner 3). In order to accommodate the connector 111, a mounting hole 113 may be formed through the liner 3, with the mounting hole 113 being sized and/or shaped to correspond to an outer diameter of the connector 111. Accordingly, as described herein, the connector 111 of the pool skimmer connection structure may extend through the mounting hole 113 formed in the liner 3 to couple the skimmer 1 to the pool.

[0054] As further depicted in FIGS. 7-9, with the skim-

mer 1 being mounted to the liner 3 of the pool (e.g., via the connector 111), the skimmer drainage tube 102 may be arranged outside the outer wall of the liner 3. In these embodiments, the connector 111 may be secured directly to the skimmer drainage tube 102, such that engagement between the connector 111 and the skimmer drainage tube 102 forms an outer stressed surface 114 on the skimmer drainage tube 102. Furthermore, the engagement of the connector 111 and the skimmer drainage tube 102 may similarly form an inner stressed surface 115 on the skimmer drainage tube 102, with the outer stressed surface 114 and the inner stressed surface 115 of the skimmer drainage tube 102 being clamped to the outer wall and the inner wall, respectively, of the liner 3.

[0055] Referring still to FIGS. 7-9, the skimmer drainage tube 102 may further include a connecting disk 116 and a reinforcing plate provided on an outer wall of the skimmer drainage tube 102 between the connecting disk 116 and the skimmer body 100. In these embodiments, a locking sleeve 118 may be disposed about (e.g., sleeved on) the skimmer drainage tube 102, such that the locking sleeve 118 abuts the connecting disk 116 and is tightly connected to the connector 111 to secure the skimmer drainage tube 102 to the connector 111. As illustrated most clearly in FIGS. 8 and 9, an inner wall of the locking sleeve 118 may be provided with an internal thread, and an outer wall of the connector 111 may be provided with an external thread, such that the locking sleeve 118 may be in threaded connection with the connector 111.

[0056] In the embodiments described herein, the locking sleeve 118 may include a plurality of locking bodies 119, such as two semicircular locking bodies. As illustrated in FIGS. 8 and 9, ends of the plurality of locking bodies 119 may be adapted and connected to each other via a joint 120, such as a T-joint, and a slot 121, such as a T-slot, to achieve circumferential locking. Furthermore, in these embodiments, an outer wall of the locking sleeve 118 may be provided with a plurality of protrusions 122, such as anti-slip protrusions, arranged at intervals across a length of the locking sleeve 118. As depicted most clearly in FIGS. 8 and 9, the plurality of protrusions 122 may be generally V-shaped. However, it should be appreciated that the plurality of protrusions 122 may take any shape without departing from the scope of the present disclosure.

[0057] As further illustrated in FIGS. 8 and 9, the pool skimmer connection structure may also include a positioning flange ring 123 provided on the locking sleeve 118, with an inner diameter of the positioning flange ring 123 being smaller than an outer diameter of the connecting disk 116, such that the locking sleeve 118 abuts against the connecting disk 116 via the positioning flange ring 123.

[0058] An outer sealing ring 125 may also be mounted between the outer stressed surface 114 of the skimmer drainage tube 102 and the outer side of the liner 3. It should be appreciated that, as most clearly depicted in FIG. 8, an end surface of the locking sleeve 118 serves as

the outer stressed surface 114 of the skimmer drainage tube 102, and the outer sealing ring 125 is mounted between the end surface of the locking sleeve 118 and the outer wall of the liner 3.

[0059] In these embodiments, an inner sealing ring 128 may also be mounted between the inner stressed surface 115 of the skimmer drainage tube 102 and the inner wall of the liner 3. For example, to aid in forming a seal with the liner 3, an extension ring 126 extending outwardly may be provided on the fastening sleeve 110, such that an outer end surface of the extension ring 126 serves as the inner stressed surface 115 of the skimmer drainage tube 102. In these embodiments, the inner sealing ring 128 may be further mounted between the extension ring 126 and the inner wall of the liner 3. As further illustrated in FIGS. 8 and 9, the connector 111 may also include an inner ring sleeve 129 and an outer ring sleeve 130, and several connecting rib plates 131 provided between the inner ring sleeve 129 and the outer ring sleeve 130, such that the external thread of the connector 111 may disposed about (e.g., arranged on) an outer wall of the outer ring sleeve.

[0060] With reference again to FIGS. 7-9, and in view of the foregoing, it should be appreciated that, when the skimmer 1 is mounted to the pool (e.g., via the liner 3), the locking sleeve 118 may be to allow the locking sleeve 118 to engage in threaded connection with the connector 111, thereby fastening or otherwise securing the locking sleeve 118 to the connector 111. As described hereinabove, once the locking sleeve 118 and the connector 111 are coupled, an end surface of the connecting disk 116 abuts against an end surface of the connector 111, and the end surface of the locking sleeve 118 (e.g., acting as the outer stressed surface 114) is tightly connected to the outer side of the liner 3 for sealing. In these embodiments, as the locking sleeve 118 is rotated, the plurality of protrusions 122 on the outer wall of the locking sleeve 118 engage in an anti-slip function to facilitate tightening and loosening of the locking sleeve 118.

[0061] Referring still to FIGS. 7-9, an illustrative process of mounting the skimmer 1 onto the pool will now be described. In these embodiments, the mounting hole 113 may be adapted to the outer diameter of the connector 111 and formed through the liner 3, and the inner sealing ring 128 may be disposed about (e.g., sleeved on) the connector 111, at which point the connector 111 may be positioned through the mounting hole 113 such that the connector 111 extends outwardly through the mounting hole 113. In these embodiments, with the connector 111 positioned within the mounting hole 113, the inner sealing ring 128 may be arranged between the extension ring 126 and the inner wall of the liner 3.

[0062] With the connector 111 in position, the outer sealing ring 125 may be sleeved on the connector 111, the locking sleeve 118 may be sleeved on the outer wall of the drainage tube 102 via the plurality of locking bodies 119, and the locking sleeve 118 may be engaged in threaded connection with the connector 111, such that the connecting disk 116 is clamped between the position-

ing flange ring 123 and the connector 111 to achieve axial positioning of the drainage tube 102, while the end surface of the locking sleeve 118 (e.g., acting as the outer stressed surface 114) is clamped on the outer wall of the liner 3 to allow the outer sealing ring 125 to be tightly mounted between the locking sleeve 118 and the outer side of the pool sidewall 112. As has been described in detail herein, the outer stressed surface 114 and the inner stressed surface 115 are respectively clamped on the outer side and the inner side of the liner 3, achieving a sealed connection between the skimmer and the liner 3, so that the skimmer has a good sealing performance of connection and is less prone to water leakage.

[0063] Referring still to FIGS. 7-9, it should be further appreciated that, in order to facilitate mounting of the skimmer 1 on the pool, the fastening sleeve 110 may, in some embodiments, be pre-mounted to the liner 3, and the inner stressed surface 115 may be fixedly connected and integrally sealed to the inner wall of the liner 3. In these embodiments, the extension ring 126 may be pre-mounted to the inner side of the pool sidewall 112, and an end surface of the extension ring 126 may be fixedly and integrally connected to the inner side of the pool sidewall 112. The extension ring 126 may be integrally bonded to the inner wall of the liner 3 by means of glue, or the end surface of the extension ring 126 may be melted and integrally connected to the inner wall of the liner 3 by means of welding.

[0064] Specifically, as shown in FIG. 7, the skimmer is mounted to the liner 3, the fastening sleeve 110 is integrally connected to the inner side of the pool sidewall 112 via the extension ring 126, and the skimmer body 100 is rotated to allow the drainage tube 102 to be in threaded connection with and fastened to the connector 111, while the end surface of the abutting disk 133 as the outer stressed surface 114 is connected to the outer side of the pool in a sealing manner.

[0065] With reference now to FIGS. 8 and 9, a process of mounting the skimmer to the pool using the pre-mounted fastening sleeve 110 will now be described. In these embodiments, the mounting hole 113 is adapted to the outer diameter of the connector 111 is formed in the liner 3, the connector 111 on the fastening sleeve 110 passes through the mounting hole 113, and the end surface of the extension ring 126 on the fastening sleeve 110 is integrally connected to the inner side of the pool sidewall 112. The connection may be achieved by bonding with glue, or by ultrasonic welding for melting and integral connection. Then, an end of the drainage tube 102 is aligned with the connector 111, and the skimmer body 100 is rotated to allow the drainage tube 102 to be screwed into and fastened to the connector 111, with the outer stressed surface 114 and the inner stressed surface 115 being respectively clamped on the outer side and the inner side of the liner 3, achieving a sealed connection between the skimmer and the liner 3, so that the skimmer has a good sealing performance of connection and is less prone to water leakage.

[0066] Turning now to FIGS. 10-12, another embodiment of a pool skimmer connection structure is depicted. It should be appreciated the pool skimmer connection structure described herein may be similar to the pool skimmer connection structure of FIGS. 7-9. Accordingly, like structure will be indicated with like reference numerals where possible.

[0067] As depicted in FIGS. 10-12, in some embodiments, the connector 111 of the pool skimmer connection structure may be provided with a connecting hole 132, such that the skimmer drainage tube 102 is tightly connected to the connecting hole 132 in the connector 111. In these embodiments, the connecting hole 132 may be a threaded hole, an outer wall of the skimmer drainage tube 102 may be provided with an external thread, and the skimmer drainage tube 102 may be adapted and connected to the connecting hole 132 via the external thread.

[0068] As further illustrated in FIGS. 10-12, an outer sealing ring 125 may also be mounted between the outer stressed surface 114 and the outer wall of the liner 3. In these embodiments, an abutting disk 133 may be provided on the skimmer drainage tube 102, an end surface of the abutting disk 133 may serve as the outer stressed surface 114, and an outer sealing ring 125 may be mounted between the end surface of the abutting disk 133 and the outer side of the liner 3. Furthermore, a bushing 137 may be provided between the skimmer drainage tube 102 and the abutting disk 133, such that an annular cavity 135 is formed between an inner wall of the bushing 137 and the outer wall of the skimmer drainage tube 102, and the connector 111 is arranged in the annular cavity 135. A reinforcing plate 117 may also be provided on the outer wall of the drainage tube 102 between an end of the bushing 137 and the skimmer body 100.

[0069] Referring now to FIG. 13, in some embodiments, the fastening sleeve 110 may be pre-mounted to the pool sidewall 112, and the inner stressed surface 115 may be fixedly connected and integrally sealed to the inner side of the pool sidewall 112. In these embodiments, it should be appreciated that the extension ring 126 is pre-mounted to the inner wall of the liner 3, and an end surface of the extension ring 126 is fixedly and integrally connected to the inner wall of the liner 3. As described in detail herein, the extension ring 126 may be integrally bonded to the inner side of the liner 3 by means of glue, or the end surface of the extension ring 126 is melted and integrally connected to the inner wall of the liner 3 by means of welding.

[0070] Turning now to FIG. 14, in some embodiments, the inner sealing ring 128 may be mounted between the inner stressed surface 115 and the inner wall of the liner 3. In these embodiments, the extension ring 126 extending outward is provided on the fastening sleeve 212, an outer end surface of the extension ring 126 serves as the inner stressed surface 115, and the inner sealing ring 128 is mounted between the extension ring 126 and the inner wall of the liner 3.

[0071] Referring now to FIGS. 15-21, the water curtain discharge device 10 is depicted in additional detail. It should be appreciated that the water curtain discharge device 10 described herein may be used in connection with the skimmer 1, pool, pool connection structure, and circulation and filtration systems described with reference to FIGS. 1-14. Accordingly, like structure will be indicated with like reference numerals when possible.

[0072] Referring now to FIGS. 15-19, the water curtain discharge device 10 may be provided with a water curtain inlet 203 and a water curtain outlet 204, and water flow is delivered into the water curtain discharge device 10 from the water curtain inlet 203 and discharged from the water curtain outlet 204 to form a water curtain that falls into the pool, as has been described hereinabove. In these embodiments, the water curtain outlet 204 may include a strip-shaped structure, such that the water discharged into the pool via the water curtain outlet 204 has a generally "strip-shaped," or rectangular profile. However, it should be appreciated that the water curtain outlet 204 may take any shape without departing from the scope of the present disclosure. Furthermore, the water curtain inlet 203 may be connected to a water filter outlet end of the water flow driving device 2 by means of a pipe 205, and a water filter inlet end of the water flow driving device 2 may be connected to the liner 3 of the pool (e.g., via the frame 4) by means of the pipe 205.

[0073] Referring still to FIGS. 15-19, the water curtain discharge device 10 may also be provided with a water channel cavity 207 positioned between and being in fluid communication with the water curtain inlet 203 and the water curtain outlet 204. In these embodiments, the water channel cavity 207 may include a width that gradually increases in a direction from the water curtain inlet 203 to the water curtain outlet 204, and water flow may be delivered from the water curtain inlet 203 to the water channel cavity 207 and discharged from the water curtain outlet 204 to form a water curtain that falls into the pool defined by the liner 3. As further depicted in FIGS. 15-19, a plurality of water blocking strips 208 are arranged at intervals in the water channel cavity 207, and a distance between adjacent strips of the plurality of water blocking strips 208 may gradually increase in a direction towards the water curtain outlet 204.

[0074] As further depicted in FIGS. 15-19, a plurality of side tubes 216 may be provided on an upper edge of the frame 4 of the pool, with adjacent tubes of the plurality of side tubes 216 being connected by means of a side tube joint 217, and the water curtain discharge device 10 being mounted to the side tube joint 217. In these embodiments, each of the plurality of side tubes 216 may be connected to form a circle by means of the side tube joints 217, each side tube joint 217 may be provided with an insertion hole 218 for a leg tube 219, and each leg tube 219 may be adapted to and inserted into the insertion hole 218 for the leg tube 219, such that each leg tube 219 is supported on the ground. As further illustrated in FIGS. 15-19, an extension tube 209 is provided on the water

curtain discharge device 10 at a position where the water curtain inlet 203 is located. In these embodiments, the extension tube 209 may extend downwardly and may be coupled to a connecting seat 210 provided on the side tube joint 217.

[0075] As illustrated most clearly in FIGS. 16-18, the connecting seat 210 may be provided with a fastening hole 211, the extension tube 209 may be fitted over and connected to the fastening hole 211, and a threaded fastening sleeve 212 may be mounted to the extension tube 209, such that the threaded fastening sleeve 212 abuts a lower surface of the connecting seat 210. In these embodiments, an outer wall of the extension tube 209 may also be provided with a plurality of sections of thread, such as two threaded sections. For example, the plurality of sections of thread may include an upper section of thread and a lower section of thread, with the threaded fastening sleeve 212 being connected to the upper section of thread, the lower section of thread being configured to connect to the pipe 205, and the pipe 205 being connected to the water outlet end of the water flow driving device 2.

[0076] As further illustrated in FIGS. 16-18, in these embodiments, a fastening ring 213 may be arranged at an end of the pipe 205 connected to the extension tube 209. To accommodate the fastening ring 213, the end of the pipe 205 may be provided with a flange 214, the fastening ring 213 may be provided with a positioning protrusion 215, the fastening ring 213 may be connected to the lower section of thread of the extension tube 209 such that the positioning protrusion 215 abuts against the flange 214 to form a seal between the pipe 205 and the extension tube 209.

[0077] Referring still to FIGS. 16-18, the connecting seat 210 may be arranged on one side of at least one of the side tube joints 217, and a support 220 may be arranged on the other (e.g., opposite) side of the side tube joint 217, with the support 220 and the water curtain discharge device 10 being connected by means of a fastening screw 221. In these embodiments, the water curtain discharge device 10 is supported by the side tube joint 217, and is fixed on at least two sides by means of the connection between the extension tube 209 and the connecting seat 210 and the connection between the fastening screw 221 and the water curtain discharge device 10, respectively.

[0078] Referring now to FIGS. 16-19, it should be further appreciated that the water curtain discharge device 10 may also include a base 222 and an upper cover 223, with the upper cover 223 being fitted over the base 222 and the water channel cavity 207 being formed between the base 222 and the upper cover 223. In these embodiments, a water retaining rib 224 is provided on an upper surface of the base 222 along an edge in a circumferential direction from one end to the other end of the water curtain outlet 204, a connecting rib 225 corresponding to the water retaining rib 224 is provided on a lower surface of the upper cover 223, and the water

retaining rib 224 is adapted and connected to the connecting rib 225 to form the water channel cavity 207.

[0079] As most clearly depicted in FIG. 17, the water curtain discharge device 10 may also be connected to a lamp holder 226 on a side of the water curtain discharge device 10 where the water curtain outlet 204 is located, and a decorative lamp 227 may be mounted to the lamp holder 226. A battery mounting recess 228 is provided in the lamp holder 226, and a battery for powering the decorative lamp 227 is mounted in the battery mounting recess 228.

[0080] Turning now to FIGS. 17 and 18, it should be appreciated that, in some embodiments, an inner end of the upper cover 223 and an inner end of the base 222 may each be connected to the lamp holder 226 by means of screws. In these embodiments, after the lamp holder 226 is mounted, the connection between the upper cover 223 and the base 222 may be more reliable.

[0081] Furthermore, as depicted in FIGS. 17 and 18, a connecting column 229 may be provided on a lower surface of the base 222. In these embodiments, the connecting column 229 may be provided with a threaded hole, the fastening screw 221 may be engage the threaded hole, and the base 222 may be mounted to the side tube joint 217 by means of mounting the fastening screw 221 and the threaded fastening sleeve 212. Several reinforcing ribs 230 are also provided between the outer wall of the extension tube 209 and the lower surface of the base 222, as is depicted most clearly in FIG. 18.

[0082] Referring now to FIGS. 18 and 19 it should be understood that, in some embodiments, the water curtain inlet 203 is arranged at the end of the base 222 where the width of the water channel cavity 207 is smaller. In these embodiments, several reinforcing columns 231 are provided on the base 222, with the reinforcing columns serving as connection points between the base 222 and the lamp holder 226. As illustrated most clearly in FIG. 19, the water blocking strips 208 may be integrally formed on the base 222, and several protruding plates 232 may be provided on the lower surface of the upper cover 223. Furthermore, top blocks 233 may be provided on the base 222 corresponding to the protruding plates 232, with the top blocks 233 being arranged on the water blocking strips 208, such that the protruding plates 232 abut against the top blocks 233 to prevent the upper cover 223 from deforming and reduce the height of the water channel cavity 207.

[0083] Referring now to FIGS. 17-19, it should be further appreciated that, in some embodiments, the fastening hole 211 is provided with a locking slot 234 on a side wall, and the reinforcing rib 230 can be inserted into the locking slot 234 to circumferentially lock of the extension tube 209 to the fastening hole 211. In these embodiments, the lamp holder 226 may include a fixed holder body 235 and a movable holder body 236, and a flanging 237 is formed on an edge of the fixed holder body 235, such that the flanging 237 fits on the lower surface of

the base 222 and is connected to the base 222 by means of screws. Furthermore, in the embodiments described herein, the movable holder body 236 may be detachably mounted to the fixed holder body 235, and the decorative lamp 227 and the battery may be both mounted to the movable holder body 236. Several reinforcing plates 238 may also be provided on the lower surface of the upper cover 223 between an outer wall of the connecting rib 225 and an edge of the upper cover 223.

[0084] In view of the foregoing, it should be understood that the water curtain discharge device 10 described herein may be mounted to the upper edge of the frame 4 of the pool, the connecting seat 210 and the support 220 may both be arranged on the side tube joint 217, such that both the connection between the side tubes 216 and the mounting of the water curtain discharge device 10 are achieved by means of the side tube joint 217, and the inner and outer sides of the side tube joint 217 may be connected and fixed to the water curtain discharge device 10 by means of the connecting seat 210 and the support 220, respectively. Accordingly, the configuration described herein allows for a stable force distribution across the water curtain discharge device 10, which ensures the stability and reliability of the connection. The fastening screw 221 is used for connection and fastening, achieving a convenient and reliable connection.

[0085] Referring now to FIGS. 15-19, a mounting process and operation of the water curtain discharge device 10 will now be described in detail herein. For example, in the embodiments described herein, the water curtain discharge device 10 is mounted to a side tube joint 217 on the upper edge of the frame 4 of the pool, the base 222 of the water curtain discharge device 10 is supported on the side tube joint 217, the water curtain outlet 204 of the water curtain discharge device 10 faces the inside of the liner 3 of the pool, the water curtain inlet 203 of the water curtain discharge device 10 is arranged outside the liner 3 of the pool, and the pipe 205 is connected to the extension tube 209 by means of the fastening ring 213. The pipe 205 is connected to the water outlet end of the water flow driving device 2, water flow discharged by the water flow driving device 2 is delivered into the water channel cavity 207 through the pipe 205 and discharged from the water curtain outlet 204 to form a water curtain that falls into the pool. The width of the water channel cavity 207 gradually increases in the direction from the water curtain inlet 203 to the water curtain outlet 204, which is conducive to the diffusion of water flow to form a water curtain. The water blocking strips 208 divide the water channel cavity 207 into several water flow channels, which is conducive to the diffusion of water flow, and the distance between two adjacent water blocking strips 208 gradually increases in the direction towards the water curtain outlet 204, which improves the diffusion effect of water flow and is conducive to the forming effect of the water curtain. The water curtain formed by the water flow is discharged downwards and has a large

contact area with air, which is conducive to increasing the oxygen content of the water and increases enjoyment. As the water is discharged from the water curtain outlet 204, at the same time, the decorative lamp 227 is turned on, creating an atmosphere and increasing enjoyment.

[0086] Referring now to FIGS. 20-21, another embodiment of a water curtain discharge device 10 is depicted. In these embodiments, the water curtain discharge device 10 may be mounted to a side tube 216, an engagement socket 239 is provided on the water curtain discharge device 10, and the engagement socket 239 is engaged with and connected to the side tube 216.

[0087] As further depicted in FIGS. 20 and 21, the engagement socket 239 is arranged on the lower surface of the base 222, a fastening block 40 is mounted to a side wall of the engagement socket 239, the fastening block 240 and the side wall of the engagement socket 239 are connected to each other by means of a locking screw 241, and the other side wall of the engagement socket 239 may be a C-shaped structure. For example, a C-shaped clamping socket 242 may be provided on the fastening block 40, and the locking screw 241 may be connected to the base 222. In these embodiments, the locking screw 241 may also be provided with an engagement head on an end portion, the fastening block 240 may be provided with an engagement hole, the engagement head may be engaged in the engagement hole, the fastening block 240, may be pushed and pulled to move during rotation of the locking screw 241, and the fastening block 240 may move towards the side tube 216 to clamp the clamping socket 242 onto the side tube 216.

[0088] The terminology used herein is for the purpose of describing particular aspects only and is not intended to be limiting. As used herein, the singular forms "a," "an," and "the" are intended to include the plural forms, including "at least one," unless the content clearly indicates otherwise. "Or" means "and/or." As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items. It will be further understood that the terms "comprises" and/or "comprising," or "includes" and/or "including" when used in this specification, specify the presence of stated features, regions, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, regions, integers, steps, operations, elements, components, and/or groups thereof. The term "or a combination thereof" means a combination including at least one of the foregoing elements.

[0089] It is noted that the terms "substantially " and "about" may be utilized herein to represent the inherent degree of uncertainty that may be attributed to any quantitative comparison, value, measurement, or other representation. These terms are also utilized herein to represent the degree by which a quantitative representation may vary from a stated reference without resulting in a change in the basic function of the subject matter at issue.

[0090] While particular embodiments have been illu-

strated and described herein, it should be understood that various other changes and modifications may be made without departing from the spirit and scope of the claimed subject matter. Moreover, although various aspects of the claimed subject matter have been described herein, such aspects need not be utilized in combination. It is therefore intended that the appended claims cover all such changes and modifications that are within the scope of the claimed subject matter.

Claims

1. A filtering and circulation system for a pool, the filtering and circulation system comprising:

a skimmer (1) comprising:

an upper water inlet (38) positioned adjacent a top surface of the pool; and
a lower water inlet (39) positioned opposite the upper water inlet (38) and positioned adjacent a bottom surface of the pool; and

a water flow driving device (2) fluidly coupled to the skimmer (1) via a drainage pipe (5);
wherein the water flow driving device (2) circulates water discharged from the skimmer (1) into the pool.

2. The filtering and circulation system of claim 1, wherein the drainage pipe (5) further includes a branch (6) having an end portion that extends to the bottom surface of the pool to form the lower water inlet (39).

3. The filtering and circulation system of claim 2, wherein the branch (6) further comprises:

an inner pipe (13);
an outer pipe (14);
a mounting head (15) arranged between the inner pipe (13) and the outer pipe (14); and
a steering head (16) arranged between the inner pipe (13) and the outer pipe (14);
wherein the mounting head (15) is received by a connecting hole (17) formed in the pool and hermetically sealed to the outer pipe (14), and the steering head (16) is connected between the mounting head (15) and the inner pipe (13).

4. The filtering and circulation system of claim 2, further comprising a directional valve (7) mounted on the drainage pipe (5) at a location where the directional valve (7) engages the drainage pipe (5), such that the drainage pipe (5) and the branch (6) are both connected to the directional valve (7).

5. The filtering and circulation system of claim 4, further

comprising a valve flap (8) rotatably mounted within the directional valve (7), such that rotation of the valve flap (8) switches a flow path of the directional valve (7).

6. The filtering and circulation system of claim 5, wherein the valve flap (8) comprises a rotating shaft extending out of an outer wall of the directional valve (7) and connected to a handle (9).

7. The filtering and circulation system of claim 1, further comprising a water curtain discharge device (10) mounted on a frame of the pool, the water curtain discharge device (10) including a water curtain outlet (204) that forms a water curtain that falls into the pool.

8. The filtering and circulation system of claim 1, further comprising:

a water supply connector (25) mounted on the pool; and
a water discharge pipe (11) extending between the water supply connector (25) and the water flow driving device (2).

9. The filtering and circulation system of claim 8, wherein the water supply connector (25) comprises:

a connector body (26);
an inner end cover (27);
a threaded sleeve (28) mounted between the connector body (26) and the inner end cover (27); and
a raised ring (29) arranged on an outer wall of the threaded sleeve (28);
wherein the threaded sleeve (28) is received by a mounting hole (30) formed in the pool, the raised ring (29) is sealed against an inner wall of the pool, the threaded sleeve (28) is in threaded connection with a fastening sleeve (110) hermetically sealed to an outer wall of the pool, the inner end cover (27) is connected to an inner end of the threaded sleeve (28), and the connector body (26) is connected to an outer end of the threaded sleeve (28).

10. The filtering and circulation system of claim 1, further comprising

a pool skimmer connection structure that couples the skimmer (1) to the pool, the pool skimmer connection structure comprising:

a skimmer body (100);
a skimmer drainage tube (102) extending between the skimmer body (100) and the pool and comprising an outer stressed sur-

face (114);
a fastening sleeve (110) connected to a liner (3) of the pool and comprising an inner stressed surface (115); and
a connector (111) disposed on the fastening sleeve (110);

wherein the connector (111) extends through the liner (3) of the pool and is connected to the skimmer drainage tube (102), the outer stressed surface (114) of the skimmer drainage tube (102) and the inner stressed surface (115) of the fastening sleeve (110) are respectively secured to an inner wall and an outer wall of the liner (3).

11. The filtering and circulation system of claim 10, further comprising an outer sealing ring (125) mounted between the outer stressed surface (114) and the outer wall of the liner (3) and an inner sealing ring (128) mounted between the inner stressed surface (115) and the inner wall of the liner (3).

12. The filtering and circulation system of claim 10, wherein the fastening sleeve (110) is pre-mounted to the liner (3), and the inner stressed surface (115) is sealed to the inner wall of the liner (3).

13. The filtering and circulation system of claim 10, further comprising:

a connecting disk (116) disposed about the skimmer drainage tube (102); and
a locking sleeve (118) disposed about the skimmer drainage tube (102);
wherein the locking sleeve (118) abuts against the connecting disk (116), and the locking sleeve (118) is connected to the connector (111) to allow the skimmer drainage tube (102) to be fastened to the connector (111).

14. The filtering and circulation system of claim 1, wherein a baffle (103) is mounted in the skimmer drainage tube (102), and a lower portion of the baffle (103) is rotatably mounted to the skimmer drainage tube (102).

15. The filtering and circulation system of claim 1, further comprising a pool skimmer connection structure that couples the skimmer (1) to the pool; and
a water curtain discharge device (10) mounted to the pool, the water curtain discharge device (10) comprising:

a water curtain inlet (203); and
a water curtain outlet (204);

wherein water is delivered into the water curtain

discharge device (10) from the water curtain inlet (203) and discharged from the water curtain outlet (204) to form a water curtain that falls into the pool.

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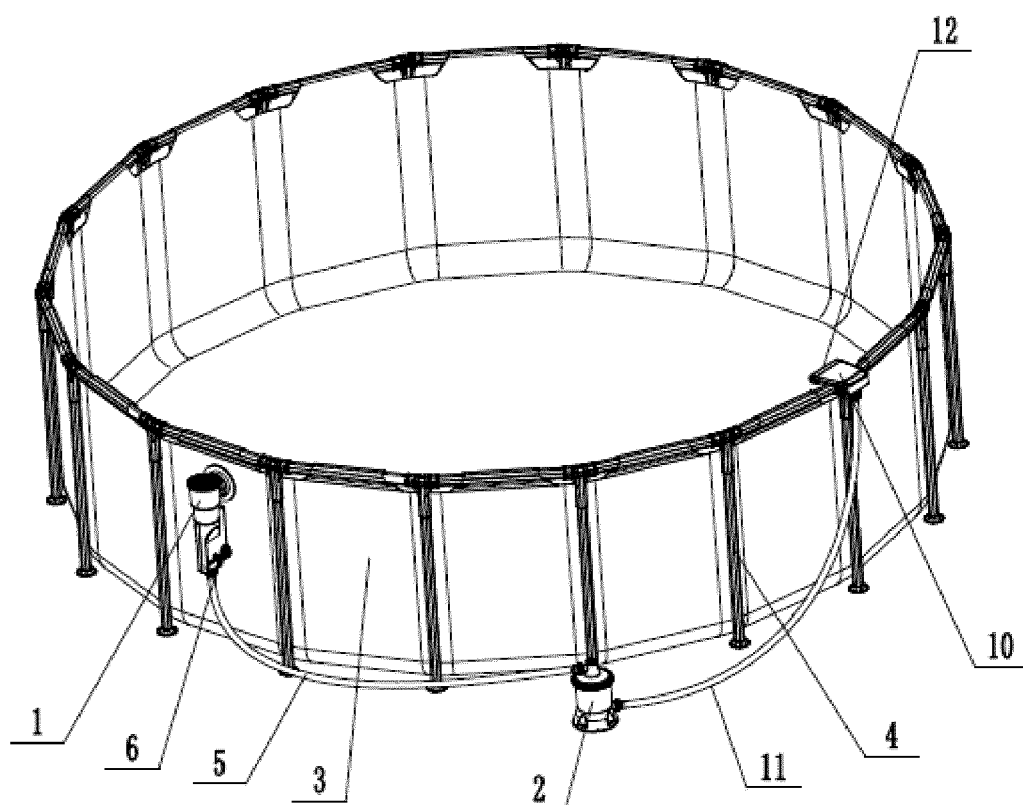


FIG. 1

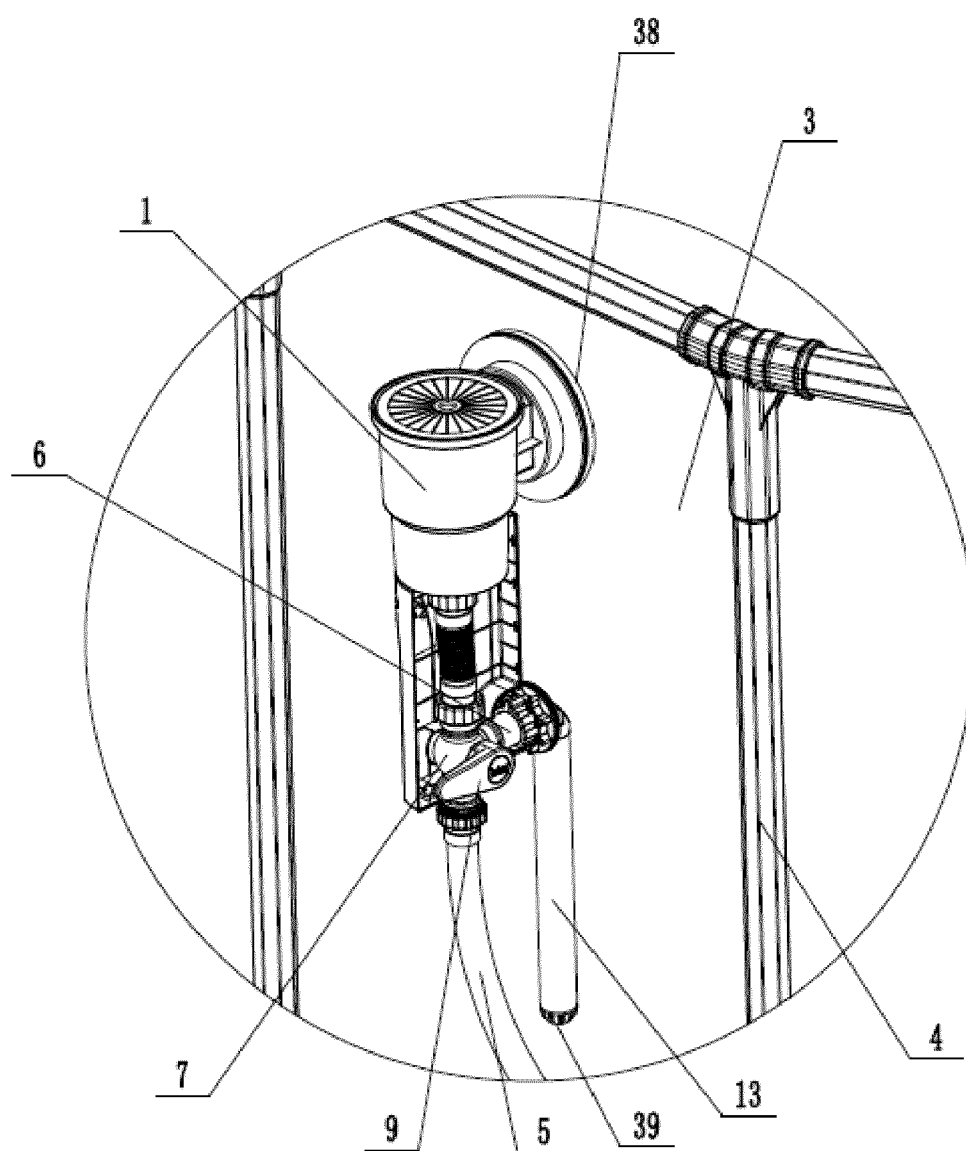


FIG. 2

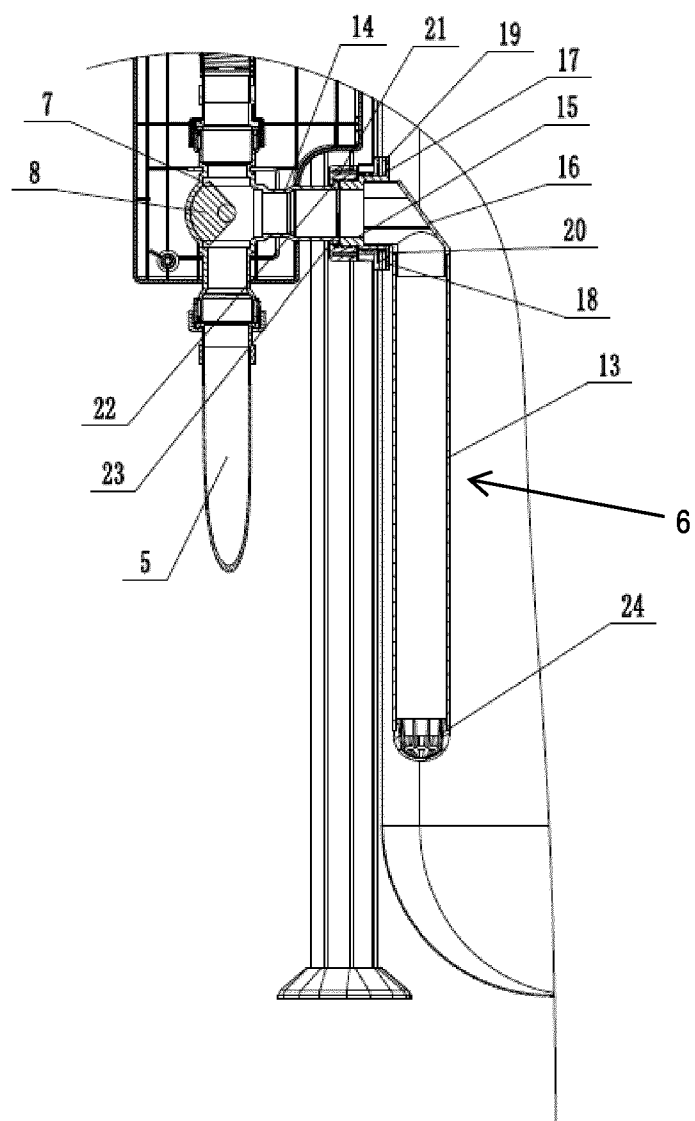


FIG. 3

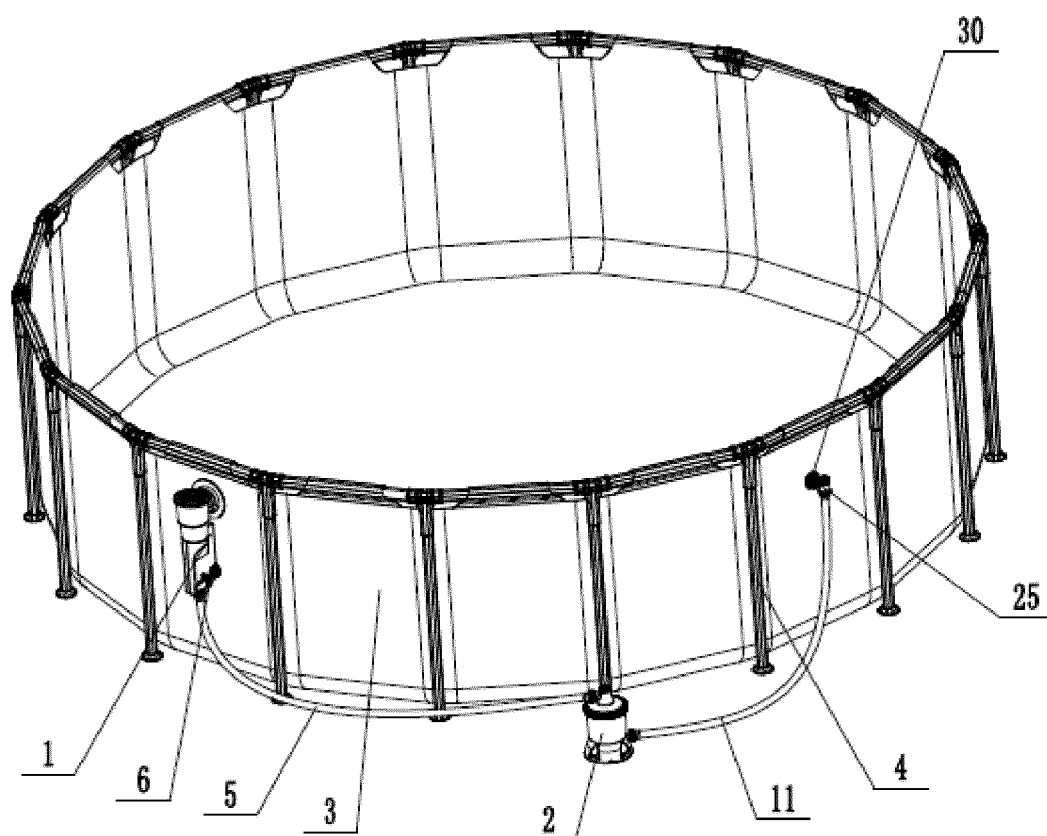


FIG. 4

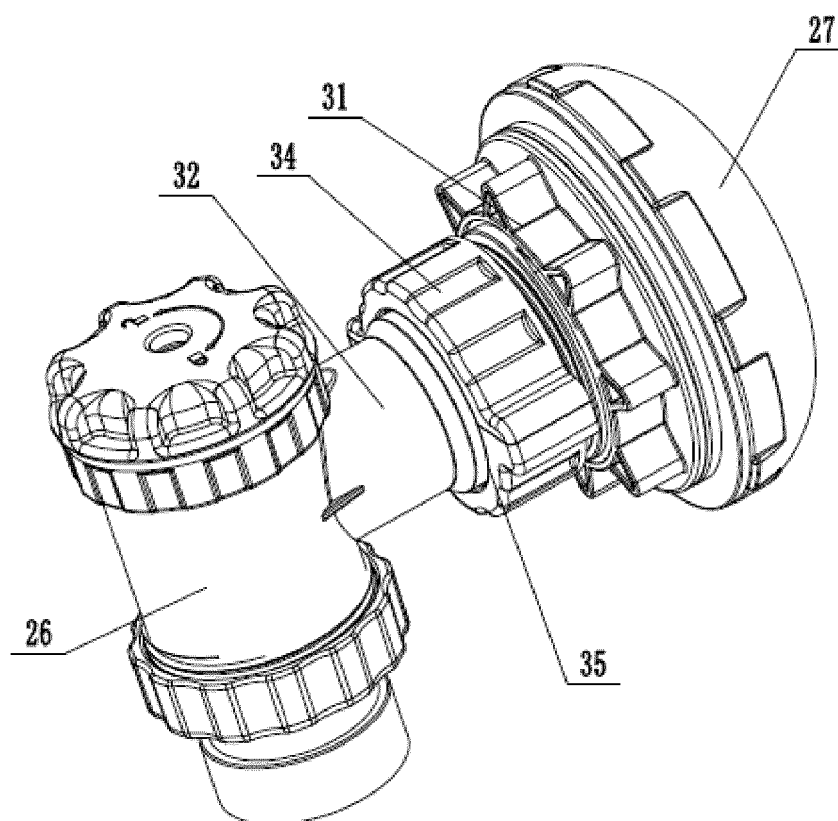


FIG. 5

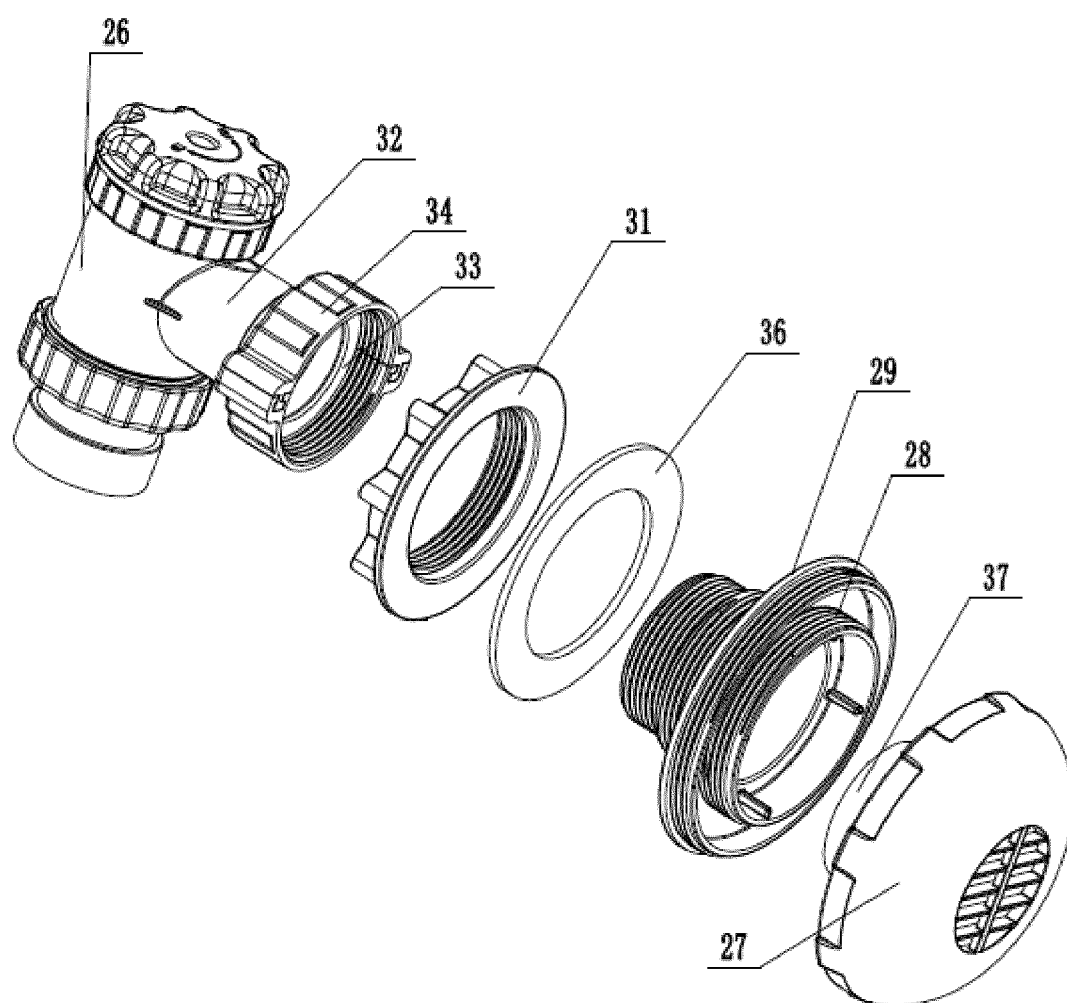


FIG. 6

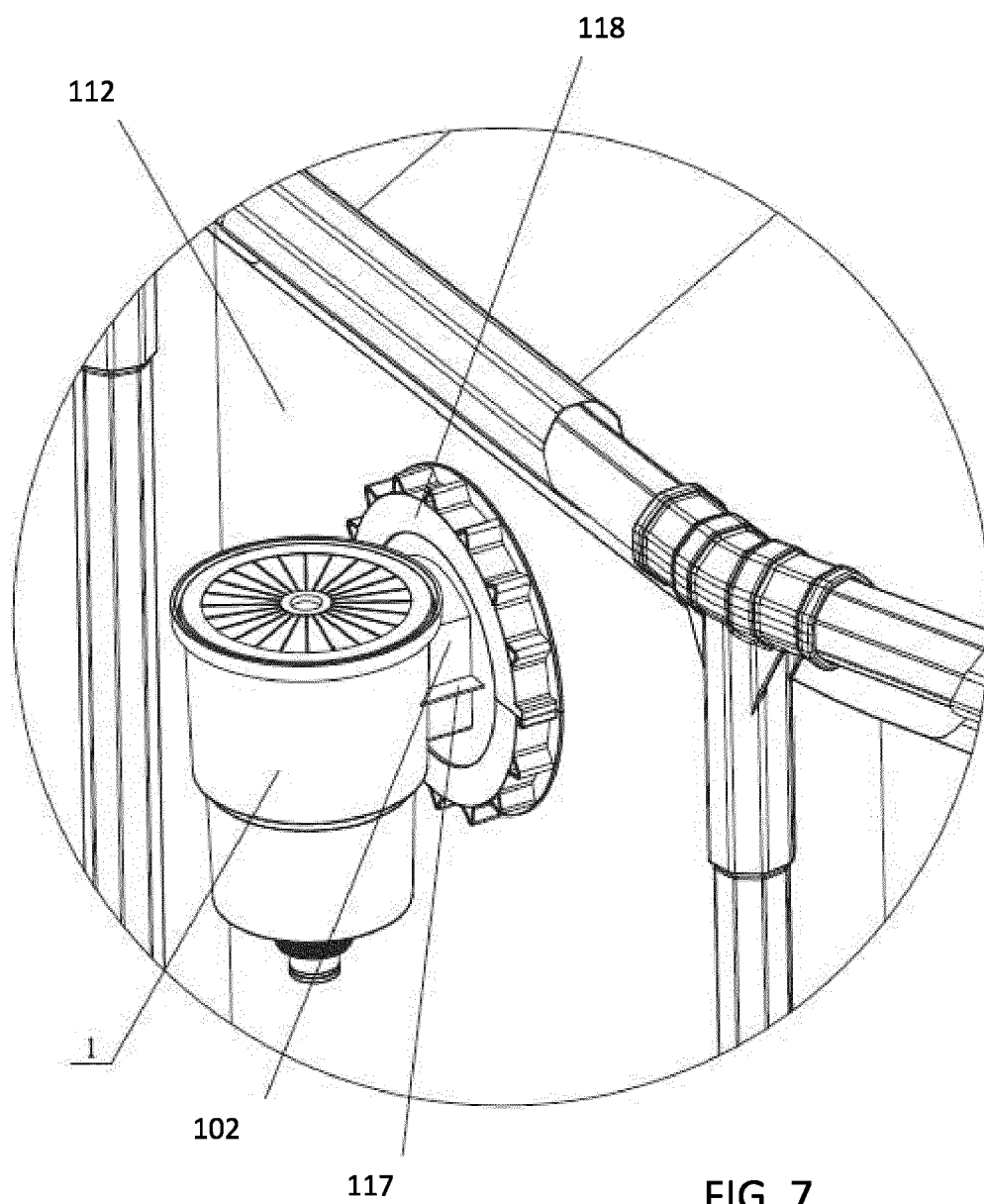


FIG. 7

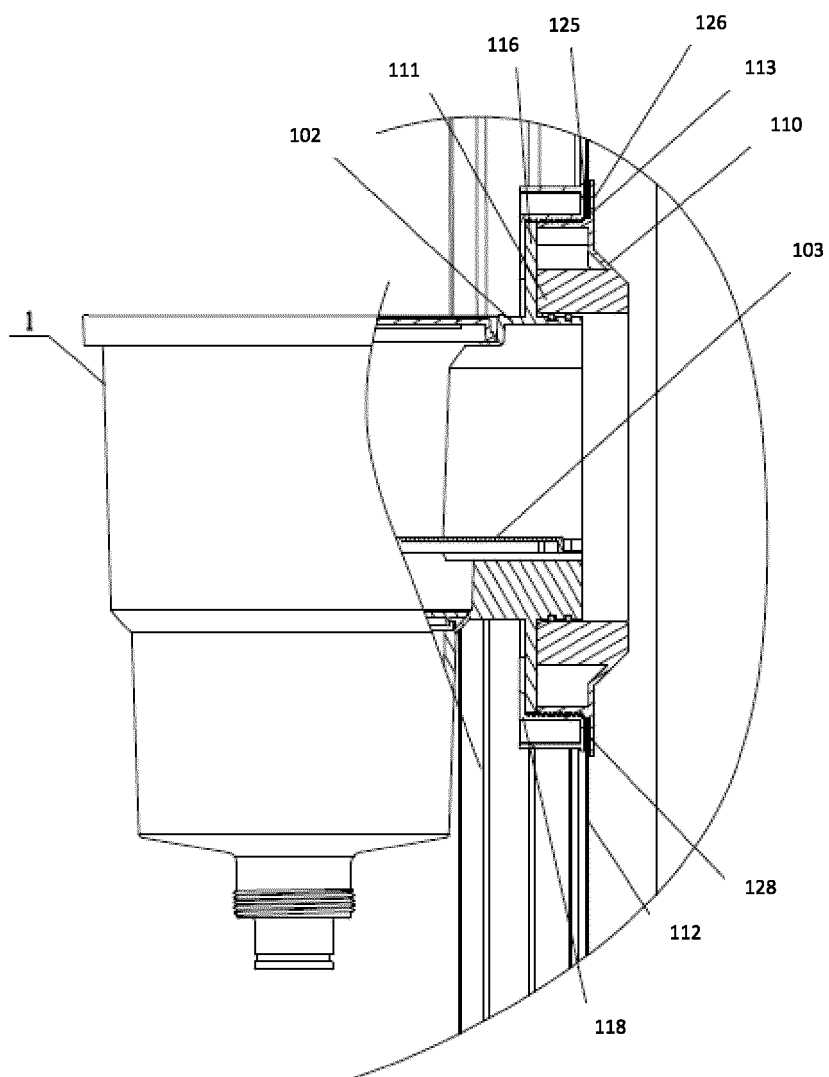


FIG. 8

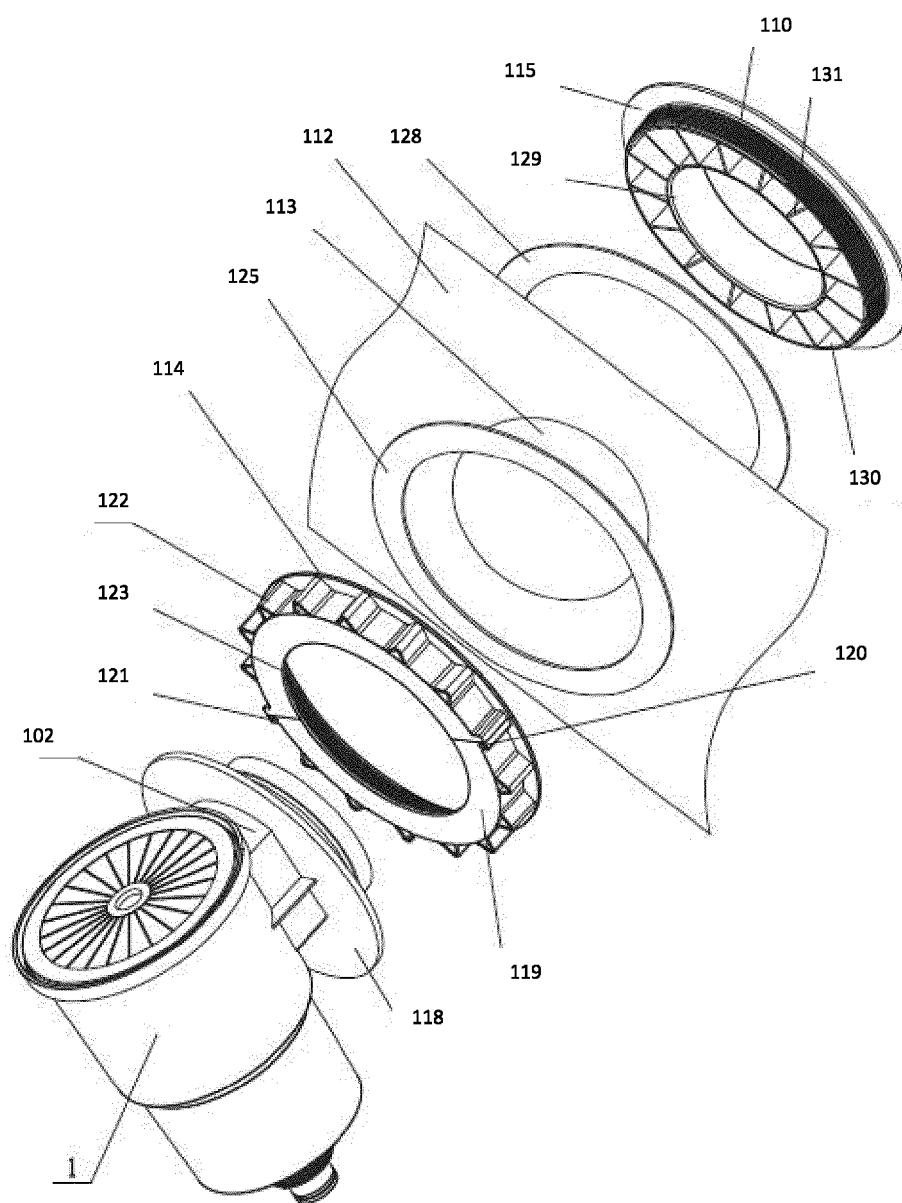


FIG. 9

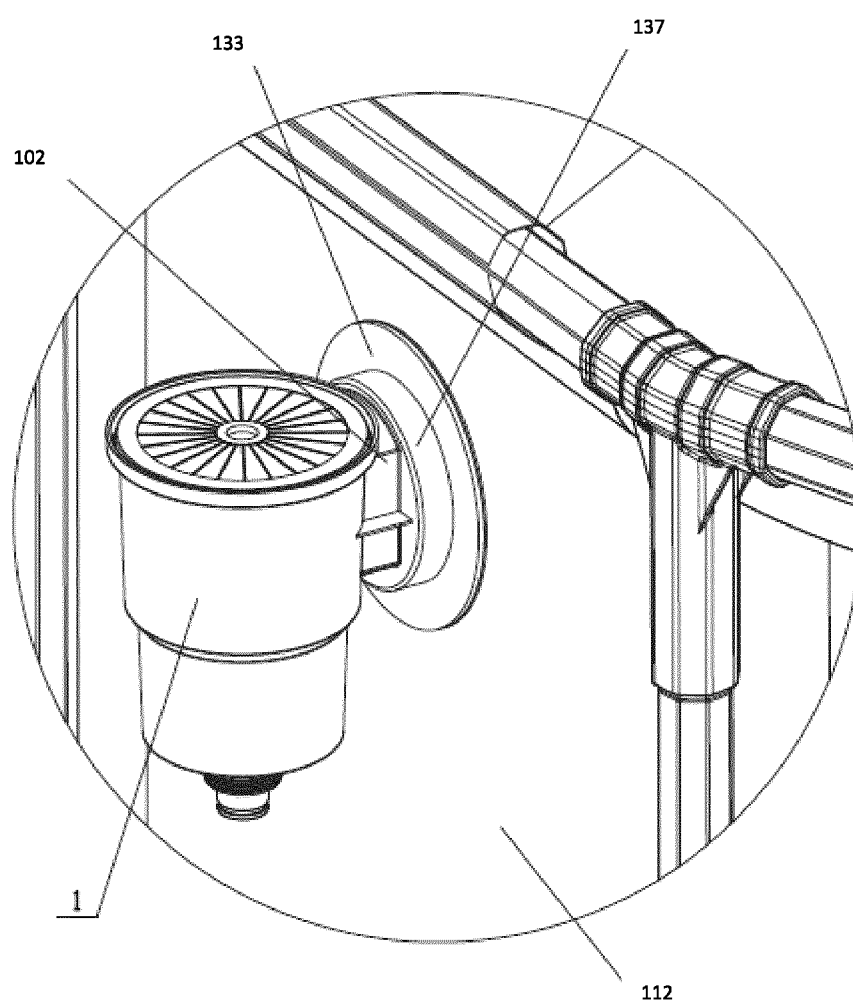


FIG. 10

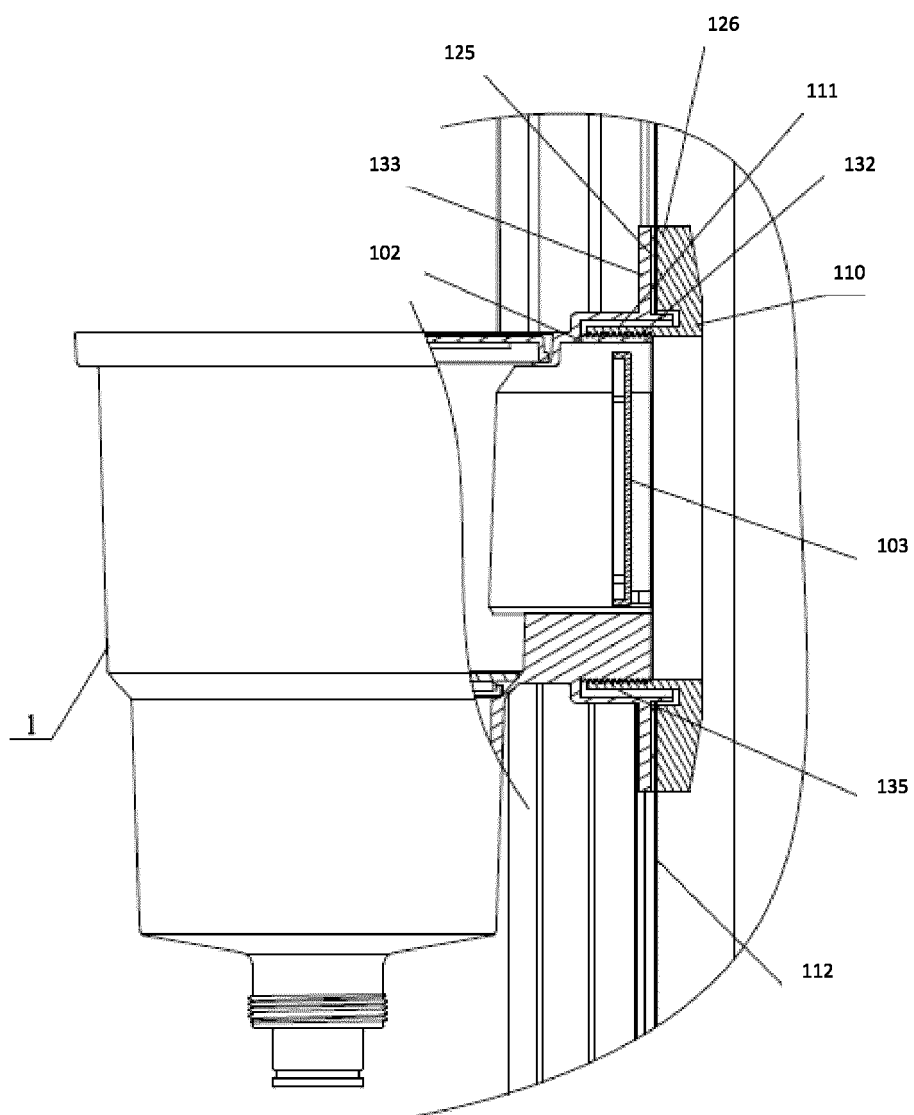


FIG. 11

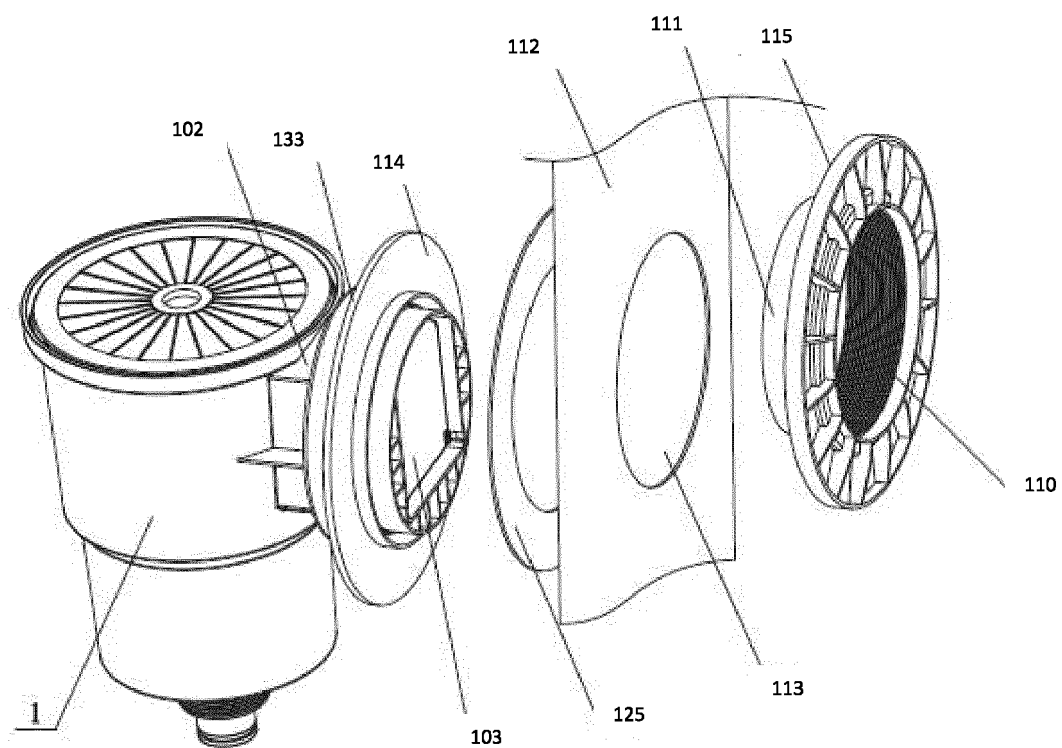


FIG. 12

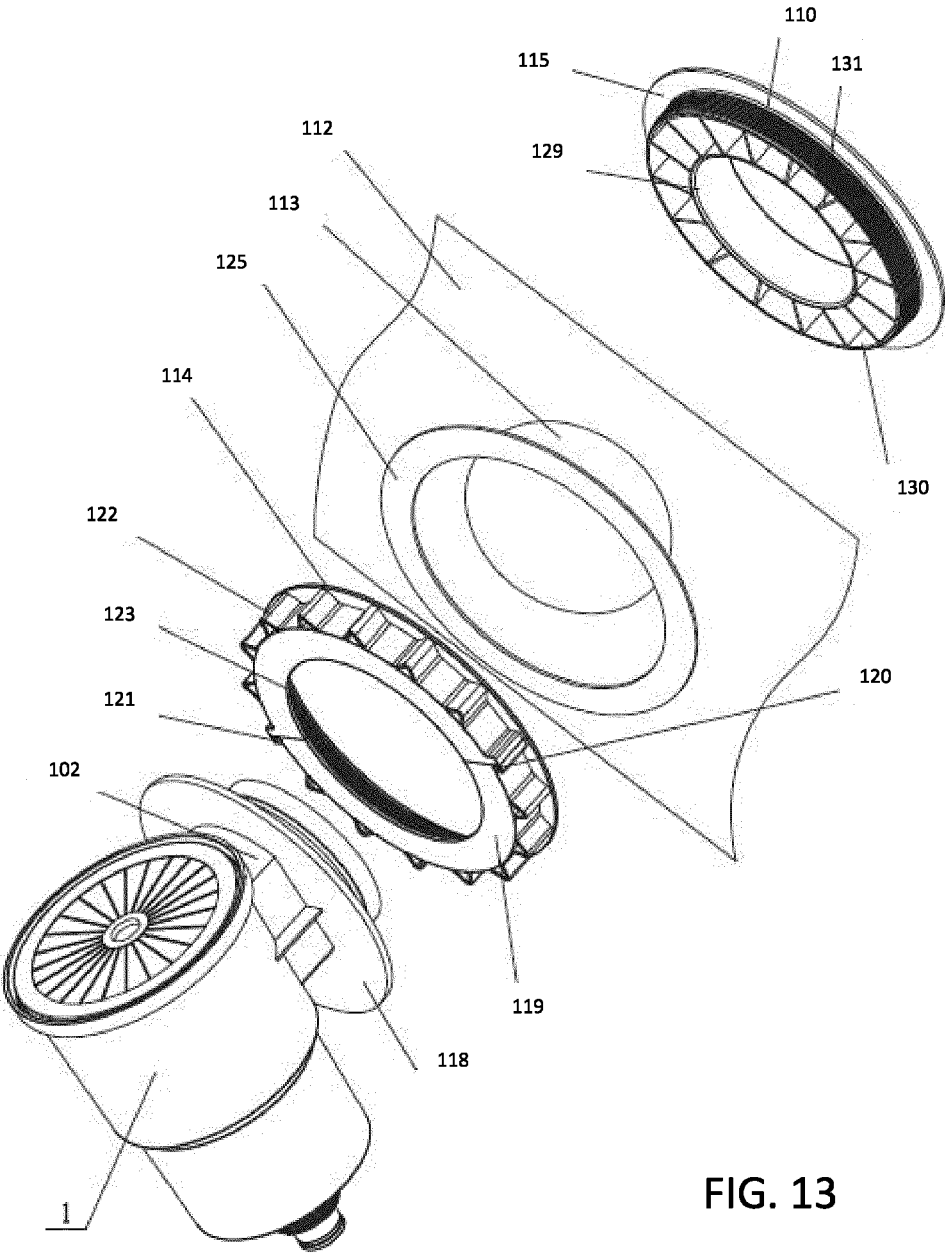


FIG. 13

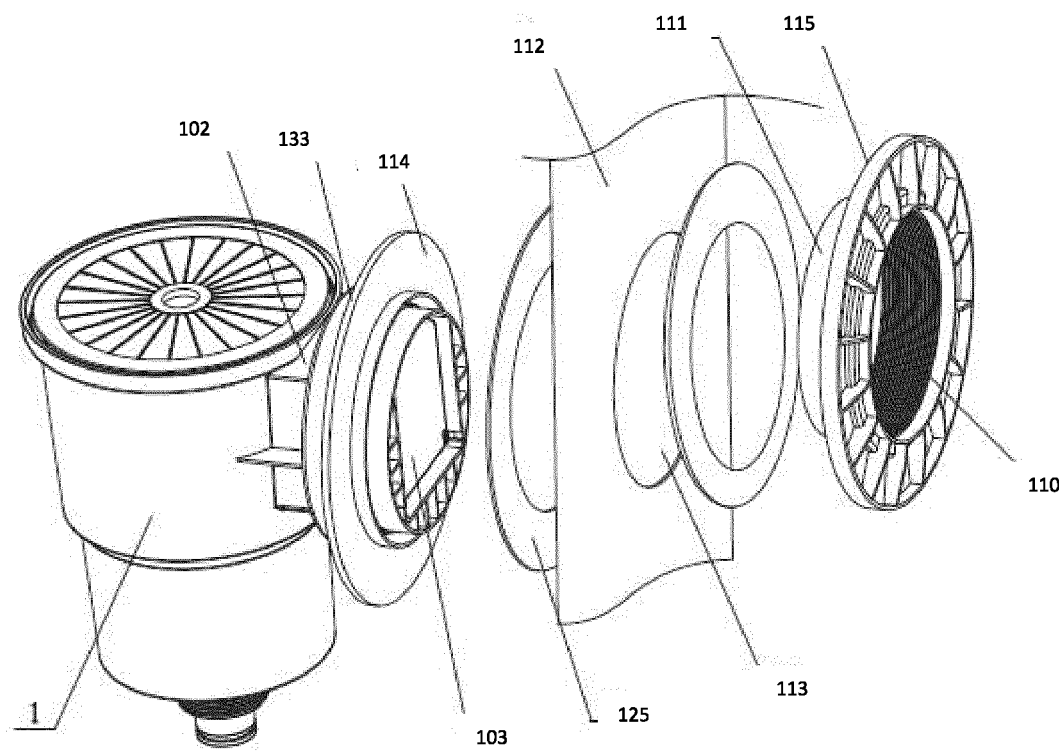


FIG. 14

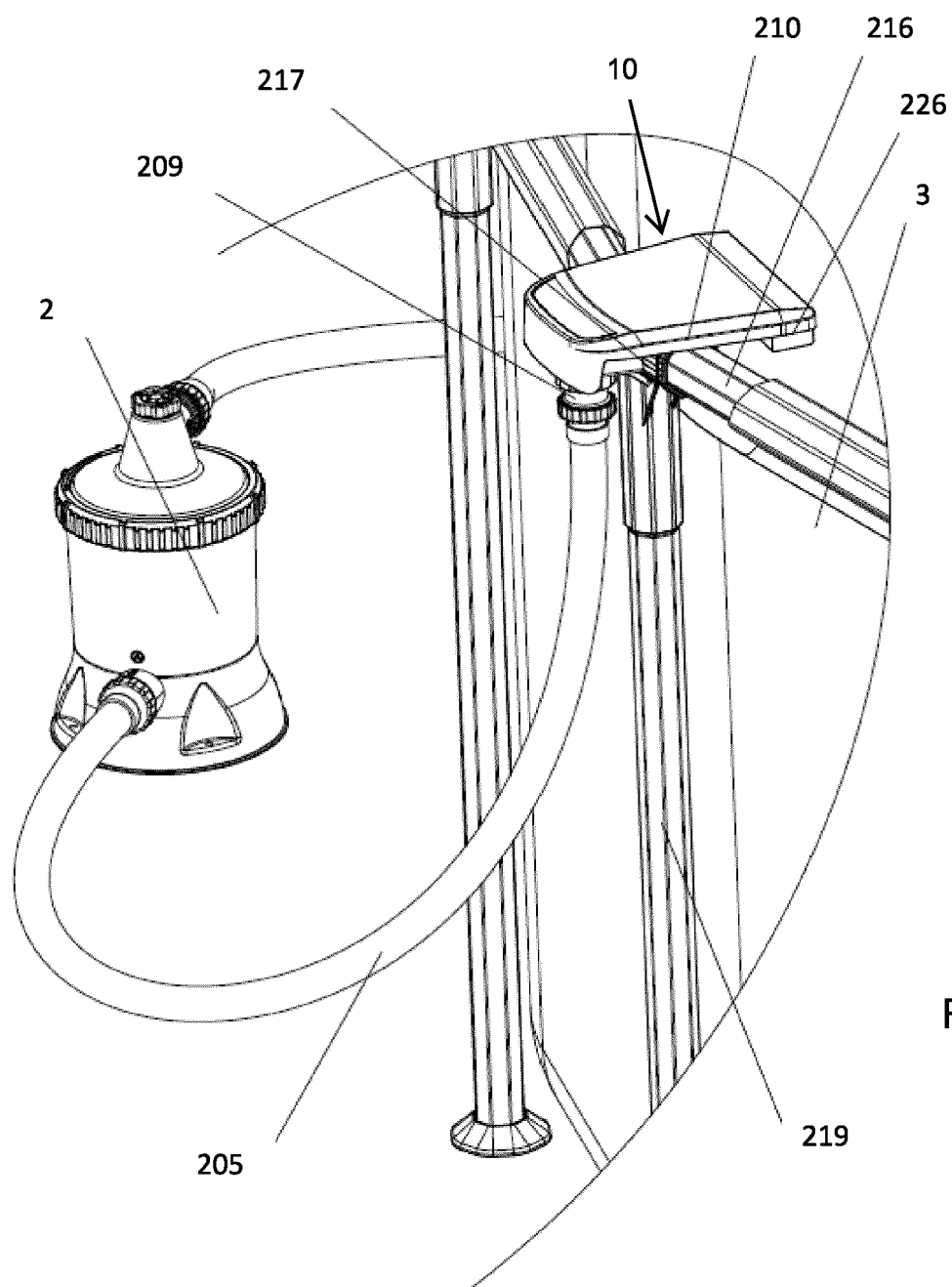


FIG. 15

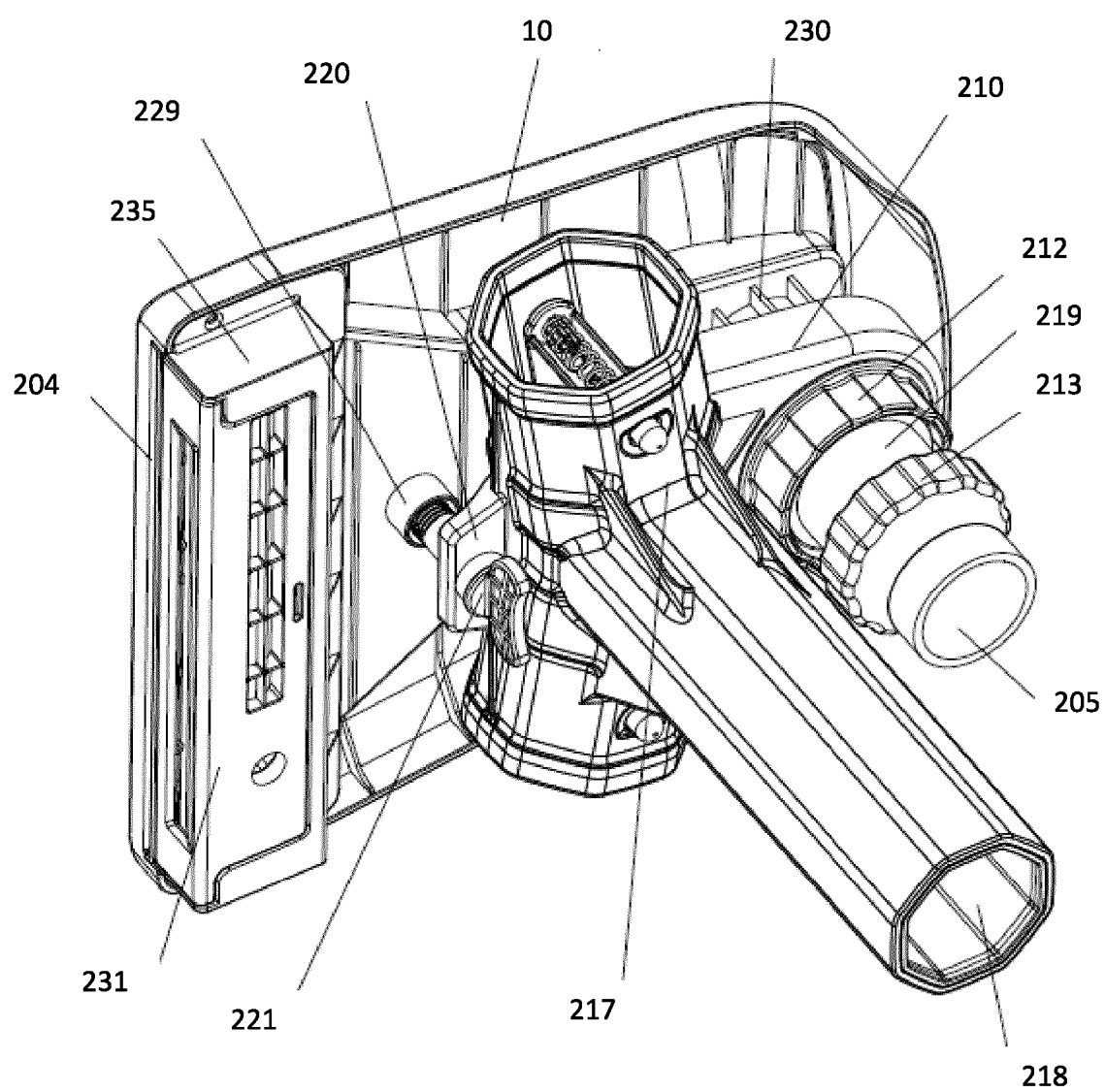


FIG. 16

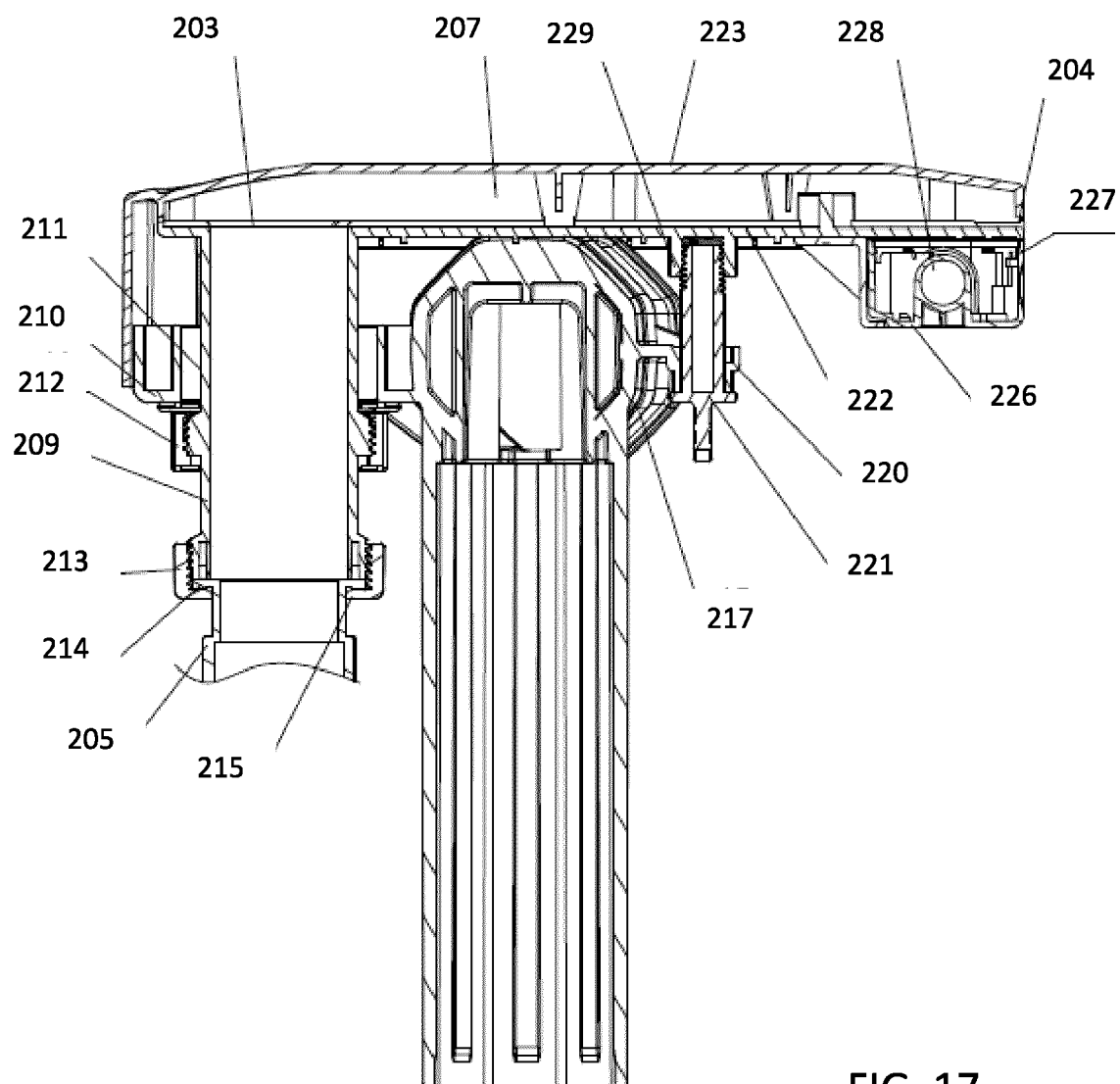


FIG. 17

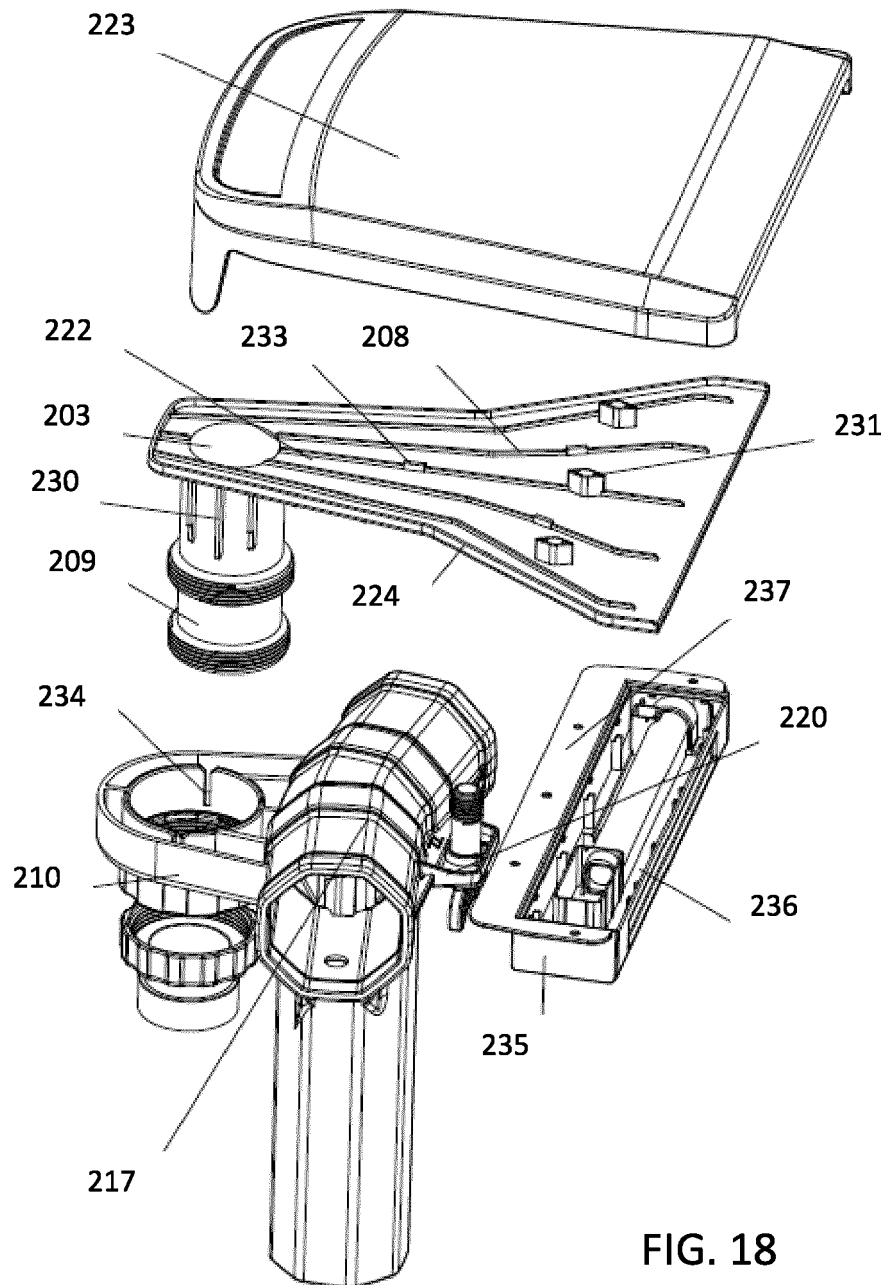


FIG. 18

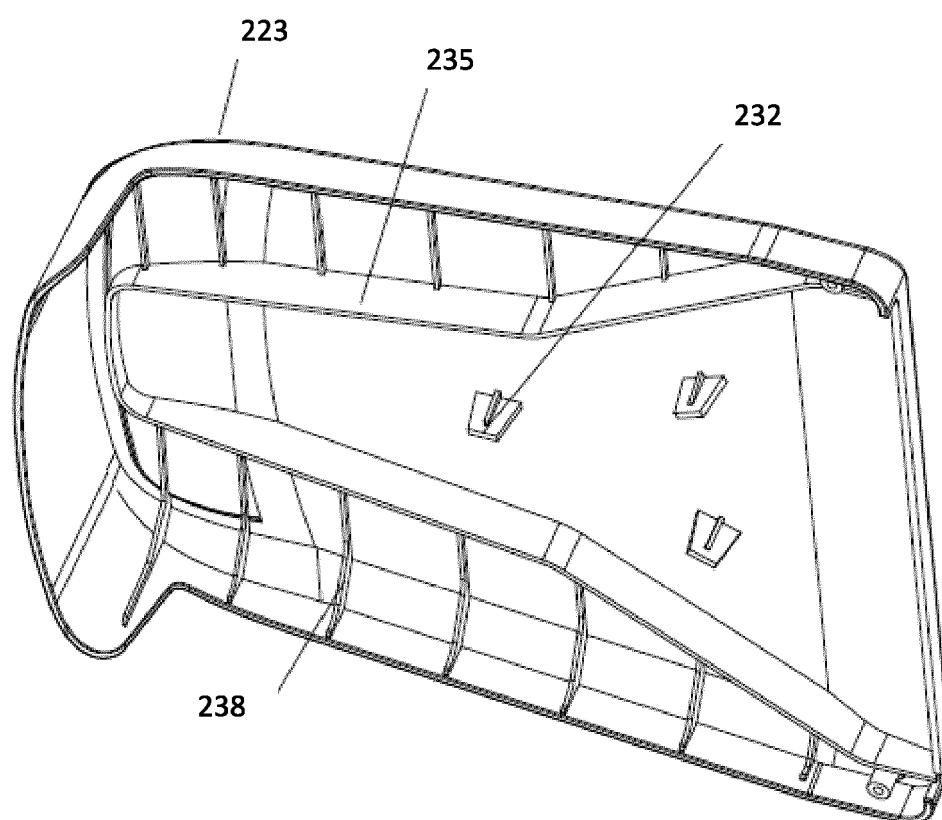


FIG. 19

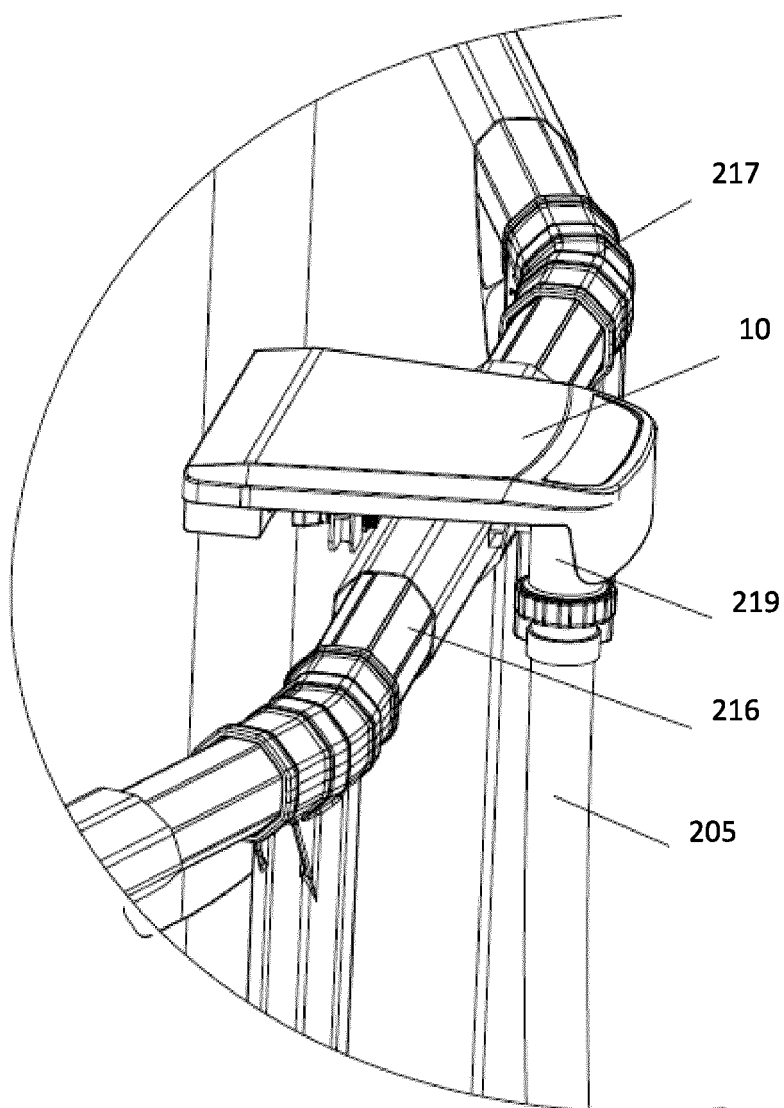


FIG. 20

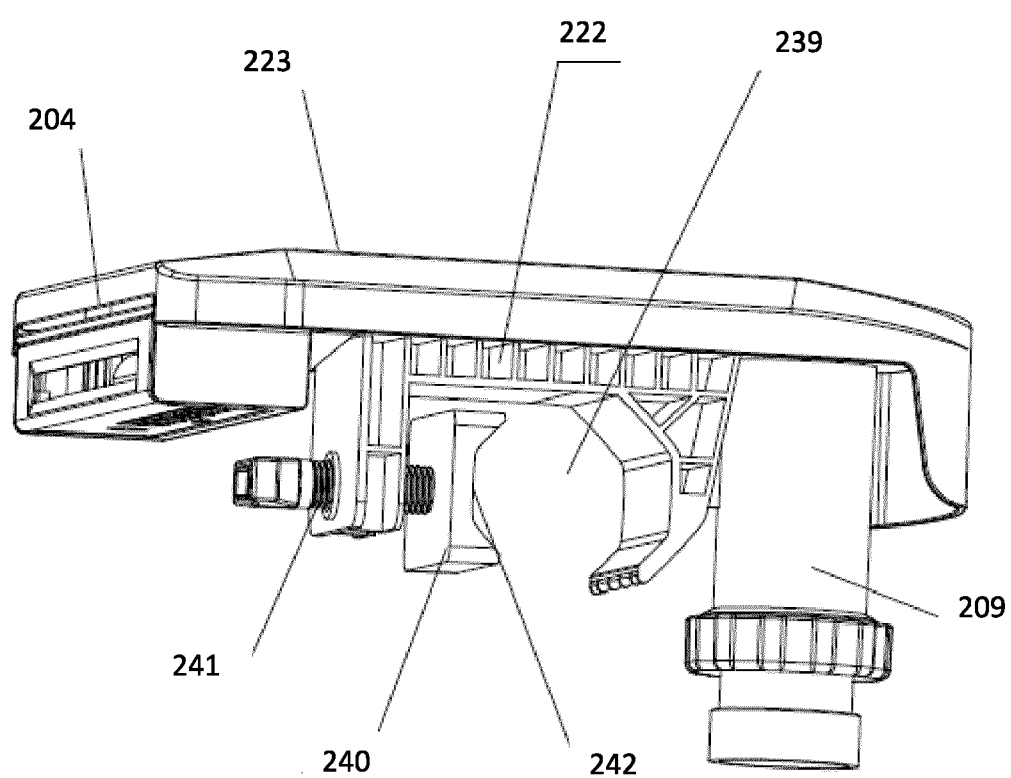


FIG. 21



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Application Number

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