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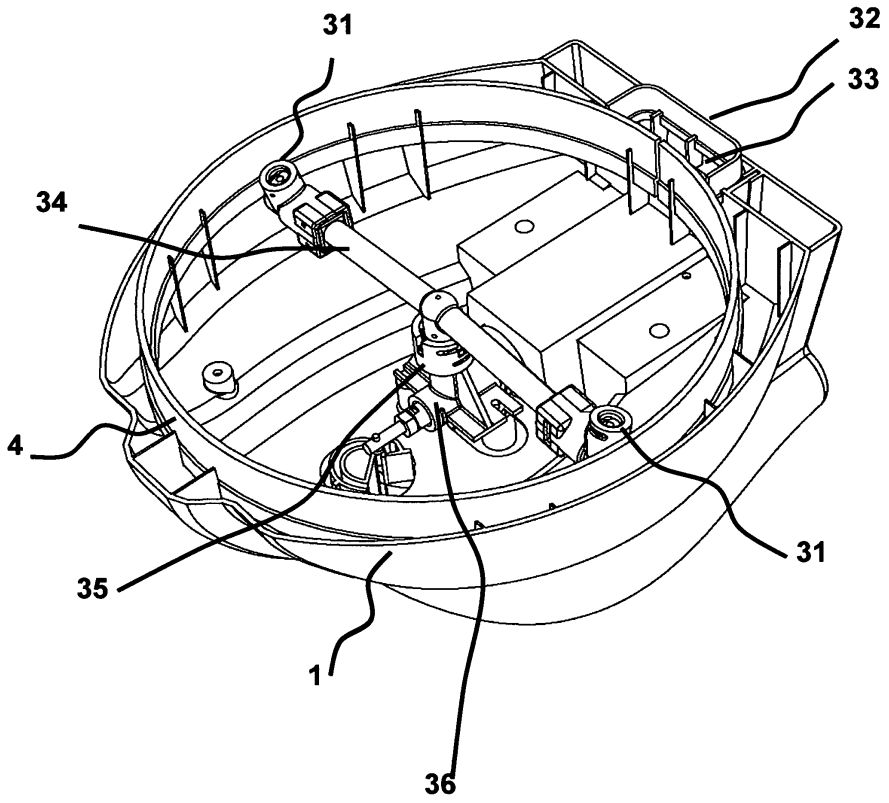
(54) **Cleaning apparatus**

(57) A cleaning apparatus for cleaning of large and relatively even surfaces is disclosed. The cleaning apparatus is to be used together with a pressure source e.g. a high pressure cleaner. The cleaning apparatus comprises a housing (1) and a rotary arm (34). One or more nozzles (31) are connected to the rotary arm. A suction manifold (32) is located, which will enable the user to suck up the dirty cleaning liquid that during cleaning may be formed in various pools on the surface to be cleaned. The suction manifold is formed by a suction lib (32) and a brush ring (4). The vacuum is generated by a secondary nozzle inside the cleaning apparatus.

FIG. 3



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Description

Field of the Invention

[0001] The present invention generally relates to an apparatus and method for cleaning planar surfaces, using a high pressure cleaner. The apparatus comprises rotary high pressure nozzles capable of cleaning the surface and an integrated suction system capable of picking up the cleaning liquid. The suction system is also driven by the cleaning liquid.

Background of the Invention

[0002] Patios and driveways around domestic houses get over time dirty and need to be cleaned. Cleaning is typically done once every year to remove dirt and algae. High pressure cleaners are typically a preferred choice for this task. During the last decade application dedicated patio cleaners e.g. (EP 1 027 854 and WO 2005/039787) for consumer high pressure cleaners have become increasing popular as they not only decrease the cleaning time (being much more effective), but also offer splash protection. This means that, i.e. the cleaning liquid after having hit the surface to be cleaned, is not directed to the surrounding surfaces (house walls, windows, etc) and thereby making them dirty.

[0003] One of the problems many consumers experience, when cleaning with these patio / surface cleaners, is that the orientation of the surface to be cleaned is not 100% even and/or having the right angle compared to horizontal enabling the cleaning liquid to run smoothly to a drain. As a considerably amount of water is used for cleaning, pools of dirty cleaning liquid will form on the cleaning surface, making the cleaning task much more time consuming and less effective. Consumers thus have to wait, until the pool of dirty cleaning liquid has been drained before the cleaning can be resumed.

[0004] Some attempts and solutions have been made to solve this problem. The most favourable solution as in US 4 895 179 involves a surface cleaner, having a peripheral liquid collection region integrated into the housing. The nozzle is oriented towards the collection region. The cleaning liquid is sucked up by venture device, which provides the pumping/suction of the cleaning liquid. This solution suffers from several weaknesses, when being used together with a consumer high pressure cleaner with limited pressure and flow (typically limited by the electrical supply available i.e. 230V and 10-16A in Europe). As a comparison the surface cleaner in US 4 895 179 is to be used with a pressure of 207 to 345 bar and flow of 23 to 38 1/min, where consumer high pressure cleaners are typically in the range of 80 to 120 bar and 5 to 81/min. The limited hydraulic power for a consumer high pressure cleaner will not make it possible to have an effective suction together with an effective cleaning with the surface cleaner in US 4 895 179. Also directing the nozzles towards the outer housing and collection region, as claimed in the patent, will decrease the cleaning effect as the nozzles will be moved away from the surface to be cleaned.

[0005] US 4 191 589 discloses a cleaning apparatus, which is also configured to pick up the cleaning liquid. The cleaning liquid pick up is, however, done by means of an external vacuum/filter system, which is also used for filtering the cleaning liquid and re-using it. For a consumer this system is much too expensive and complicated to use.

[0006] DE 102 06 014 and EP 1 027 857 shows standard consumer surface cleaners without any liquid pick up.

Object of the Invention

[0007] It is an object for the present invention to specify a cleaning apparatus to be used together with a consumer high pressure cleaner that is dedicated for cleaning large and relatively even surfaces, which has the possibility for sucking up the cleaning liquid during and/or after the cleaning. The cleaning apparatus can thus 100% clean, 100% suck or a combination of the two.

Description of the Invention

[0008] The object of the present invention can be accomplished by a system as described in the introductory part of claim 1, consisting of a standard surface cleaner consisting of housing with handle and a connection to a pressure source e.g. high pressure cleaner. The cleaning liquid from the pressure source is via a swivel connected to an arm that rotates inside the housing. To the arm (typically at the ends) one of more primary nozzles can be connected. The primary nozzles are tipped compared to the swivel (centre of rotation) and thereby creating a self-propelling rotary movement around the swivel. The high velocity jet from the primary nozzles, when rotating above the cleaning surfaces, makes the cleaning effect. To the pressure source is also connected one or more secondary nozzles used to create a vacuum in a suction manifold. Cleaning liquid not being drained during cleaning can then be sucked up by the cleaning apparatus and led to a proper drain via a connection hose connected to the suction outlet of the cleaning apparatus.

[0009] In one preferred embodiment according to the invention, a primary valve is integrated which is used to direct the cleaning liquid to the primary nozzle(s) and/or secondary nozzle(s). If 100% power to cleaning is needed, the cleaning liquid is via the primary valve only led to the primary nozzle(s). If 100% power to sucking of cleaning liquid is needed the cleaning liquid is via the primary valve directed only to the secondary nozzle(s). Any combination of suction and cleaning is possible by adjusting the primary valve.

[0010] In another embodiment according to the invention a secondary valve is integrated which is used to close the suction outlet connection on the cleaning apparatus. When water from the pressure source is led to the sec-

ondary nozzle(s) less water is directed to the primary nozzles, when the pressure source is a fixed displacement which is normally the case for high pressure cleaners. The lower cleaning liquid flow to the primary nozzles will reduce the velocity of the jet, which again will decrease the cleaning power/effect. This feature is valuable, when cleaning soft surfaces as wood compared to hard surfaces such as concrete.

[0011] In one preferred embodiment according to the invention the spool inside the primary valve has the same diameter at both ends, where it is sealed. This will make the spool pressure compensated.

[0012] The invention is not limited to the described embodiments which can be modified in many ways.

Description of the Drawing

[0013] Preferred embodiments of the present invention will now be more particularly described, by way of example, with reference to the accompanying drawing, wherein:

Fig. 1 shows the cleaning apparatus - side view
Fig. 2 shows the cleaning apparatus - top view
Fig. 3 shows the cleaning apparatus - bottom view
Fig. 4 shows a cross sectional view of the cleaning apparatus - side view
Fig. 5 shows a cross sectional view of the primary and secondary valve - side view
Fig. 6 shows a cross sectional view of the primary and secondary valve - top view

Detailed Description of the Invention

[0014]

Fig. 1 illustrates the complete cleaning apparatus consisting of a housing (1), handle (2), connection nipple (3) and brush ring (4) and The connection nipple (3) is connected to a pressure source (5) e.g. a high pressure cleaner. The handle (2) is used, when the cleaning apparatus is used on vertical surfaces e.g. walls.

Fig. 2 illustrates the cleaning apparatus seen from the top with a rear suction outlet (23) and two rotary buttons (21 and 22) for control of the functions in the cleaning apparatus.

Fig. 3 shows the bottom view of the cleaning apparatus. The arm (34) is connected to two primary nozzles (31) and to the swivel (35). The arm (34) will due to the orientation of the primary nozzles (31) rotate around the swivel (35) when being pressurized. Rear on the machine is located a suction lib (32) that together with the brush ring (4) creates a suction manifold (33). The suction manifold is used to suck up the cleaning liquid.

Fig. 4 and 5 illustrates a cross sectional side view of the cleaning apparatus. The cleaning liquid from the pressure source (5) enters the cleaning apparatus in this view at (41). The water is then via the spool (44) directed to the primary nozzles via (45) or the secondary nozzle (43). In the spool (44) position on the drawing the water is directed solely to the secondary nozzle (43) as indicated by the arrow (48). A cleaning liquid jet (49) is created by the nozzle (43). The jet (49) will create a vacuum behind the jet, which will suck up the cleaning liquid in the suction manifold (33) as shown by the arrow (47). The spool (44) is moved to the left and right on the drawing by rotating the button (21).

Fig. 6 illustrates a top cross sectional view of the valves in the cleaning apparatus. A valve (52) is arranged before the suction outlet (23). The valve (52) can be rotated as shown with the arrow (61), thereby disabling cleaning liquid from the secondary nozzle (43) from reaching the suction outlet (23). The water is than forced to leave the cleaning apparatus via the suction manifold (32). The spool (51) has the same diameter at both ends (62 and 63), where it is sealed. The spool (51) will thus be pressure compensated and independent of the position of the spool (51) there will be no, or limited, forces on the spool from the cleaning liquid surrounding it.

Claims

1. A cleaning apparatus compromising:

   A connection nipple (3) for a pressure source (5), a housing (1) configured to be located on a cleaning surface (42) wherein a rotary arm (34) is located, a rotary arm (34) connected to the pressure source (5), one or more primary nozzles (31) for cleaning connected to the rotary arm (34) and the pressure source (5) **characterised in that** minimum one secondary nozzle (43), connected to the same pressure source (5) as one or more primary nozzles (31), for creating a suction/pumping effect in a suction manifold (33) only partial covering the complete housing (1).

2. A cleaning apparatus according to claim 1 **characterised in that** a primary valve (36) with spool (44) is integrated that controls how much of the cleaning liquid from the pressure source (5) that is directed to the primary nozzle(s) (31) and secondary nozzle (s) (43)

3. A cleaning system according to claim 1 or claim 2 **characterised in that** a secondary valve (52) is integrated that can open and close for the suction out-

let (23).

4. A cleaning system according to one of the preceding claims **characterised in that** the spool (44) has the same diameter (62 and 63) at both ends where it is sealed.

FIG. 1

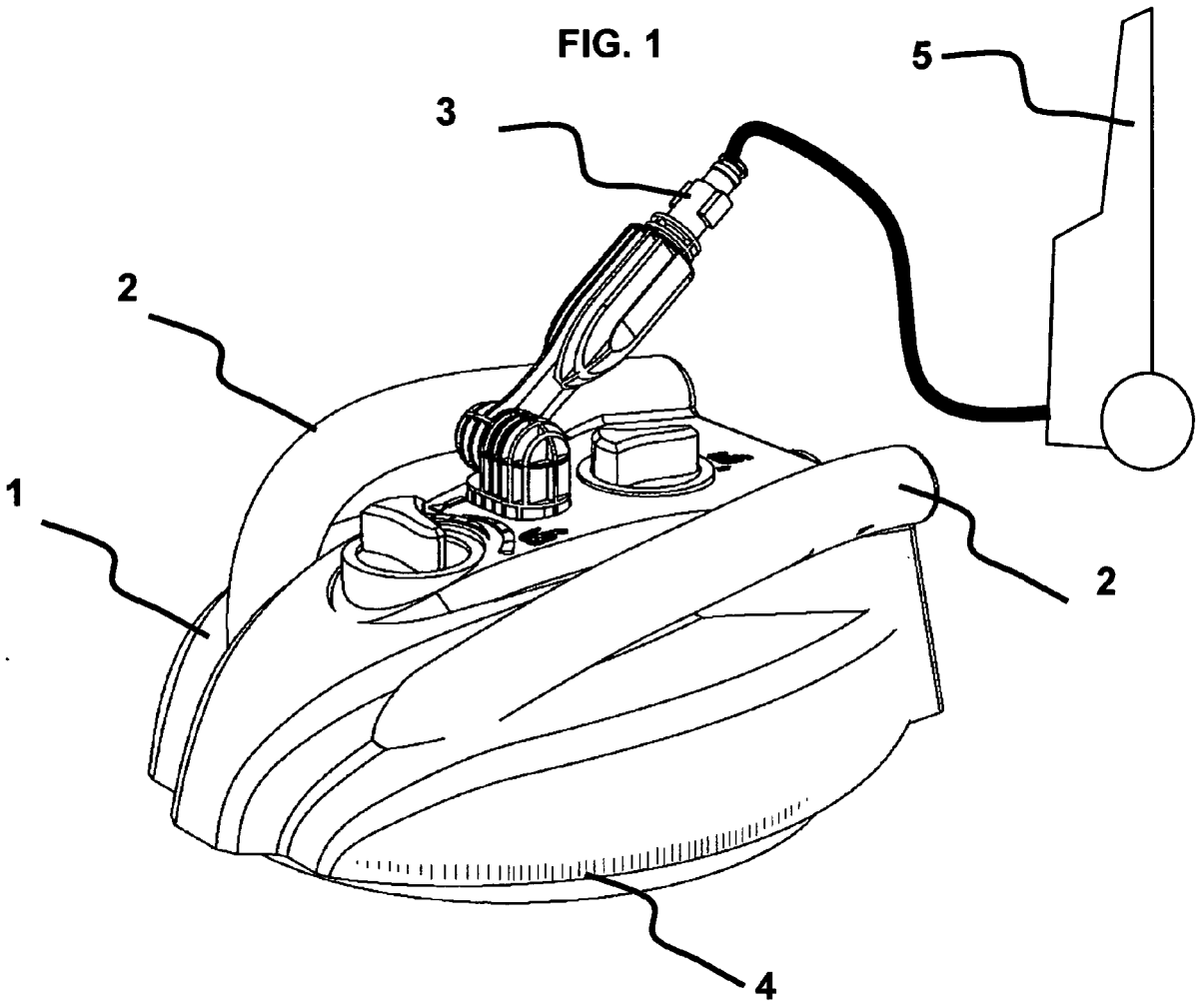


FIG. 2

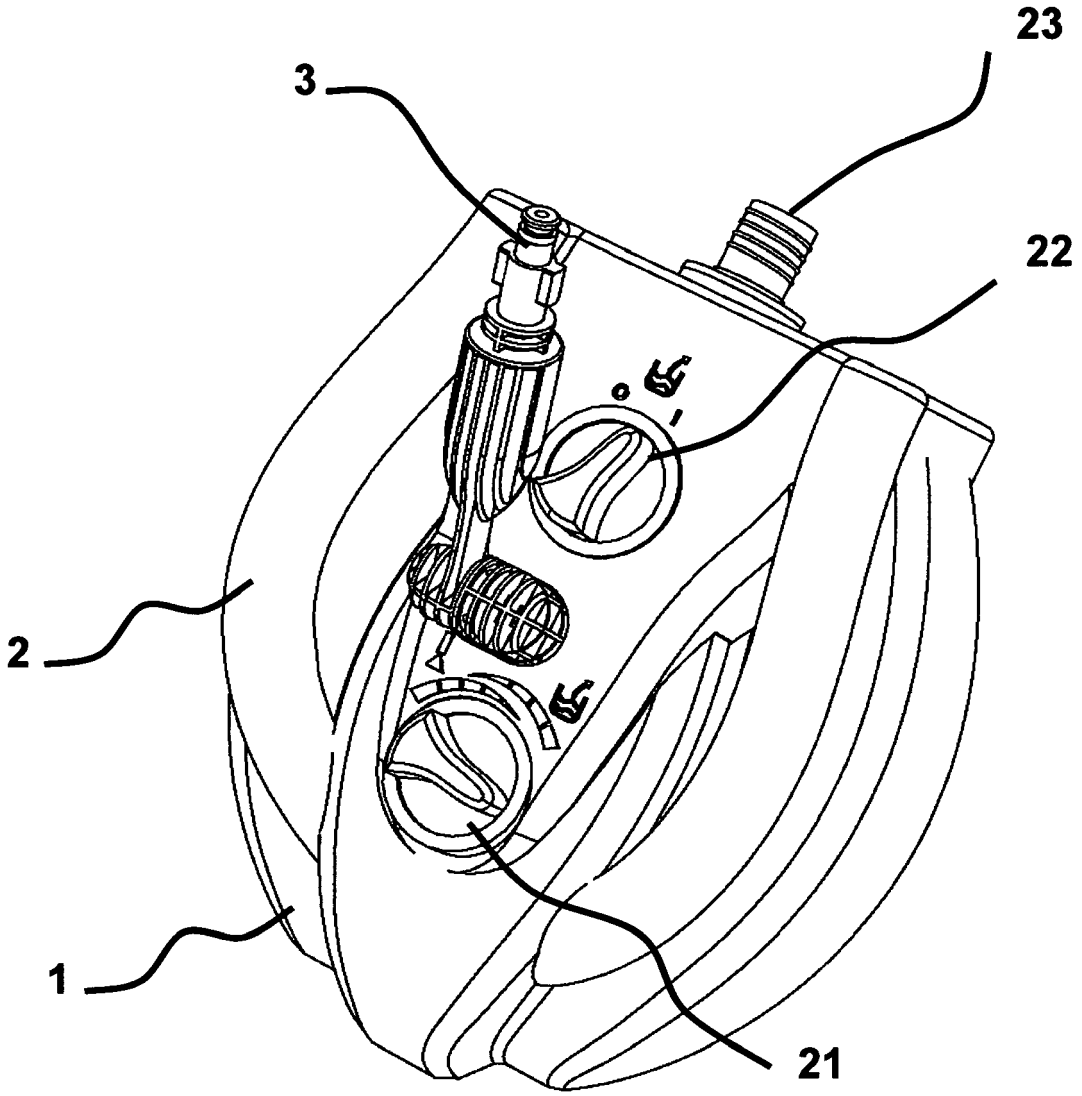


FIG. 3

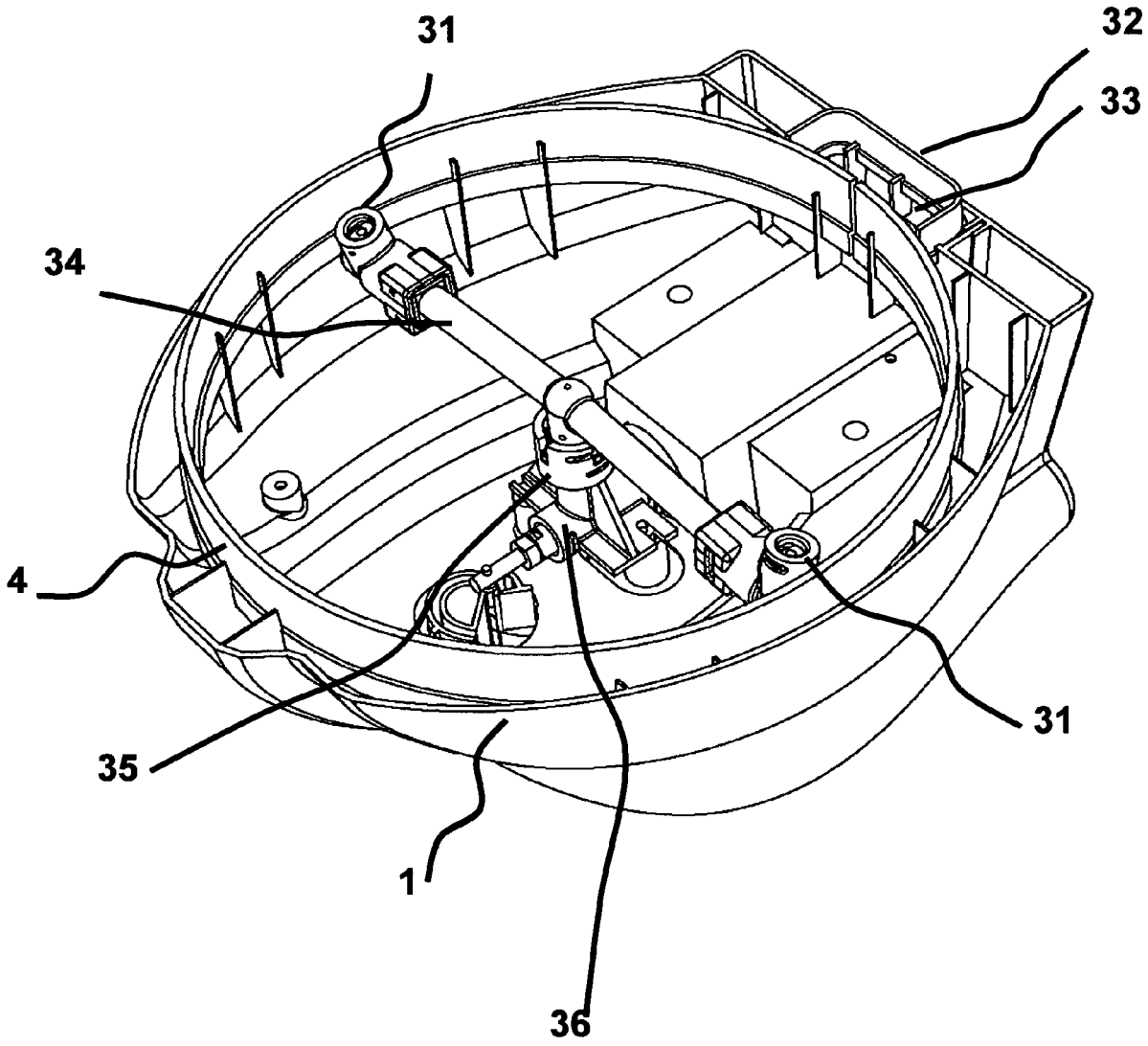


FIG. 4

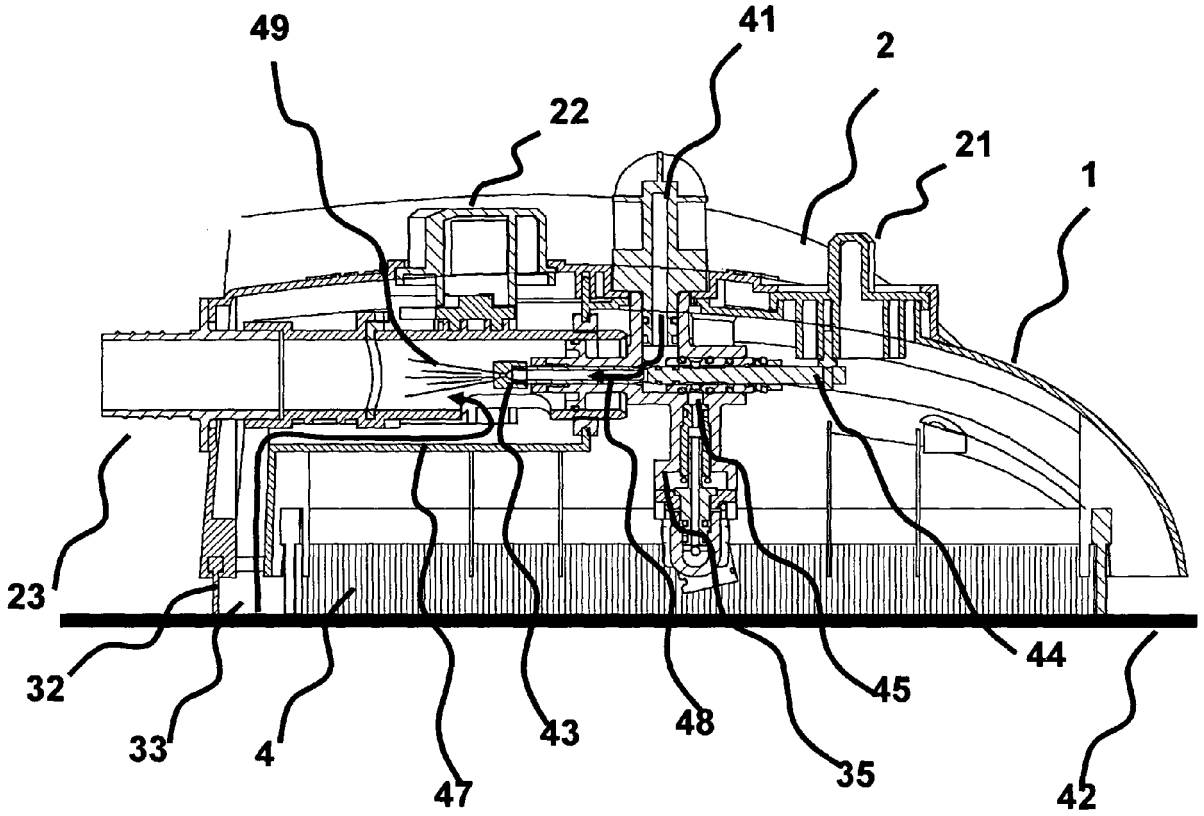


FIG. 5

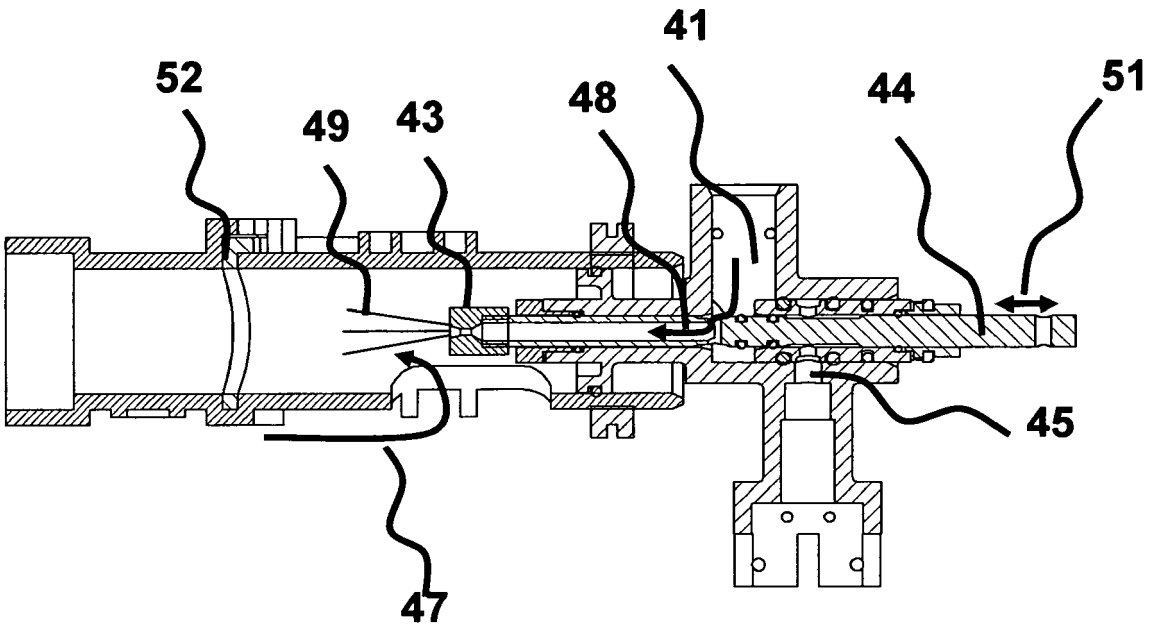
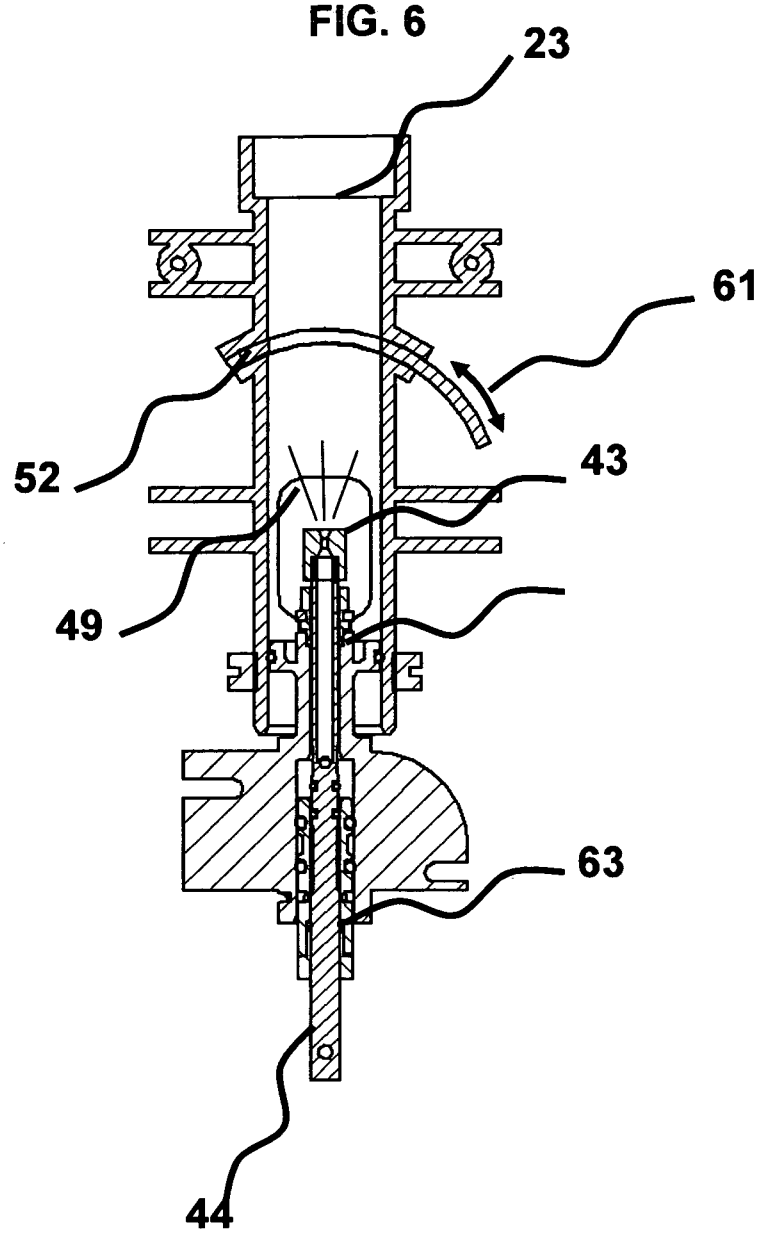


FIG. 6



REFERENCES CITED IN THE DESCRIPTION

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