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(54) **Automatic cleaner soleplate**

(57) The invention shows a kind of automatic cleaner soleplate (1), which includes a plate (2) positioned and connected in the inner chamber of cleaning head (11). Inlets (4,6) with the same cross-sectional area are on two sides of the plate (2). The cross-sectional area of the inlets (4,6) is smaller than that of suction pipe (9) of cleaning head (11). There is a clearance between the plate (2) and sway plane of trip valve (12) which forms differential pressure during the direction changing of pumping. The differential pressure makes trip valve (12) be pushed from one area to the other and swing up and down to drive the cleaner to move. Therefore, whether the flux is big or small, wall and surface of swimming pool can be cleaned with excellent stability during startup.

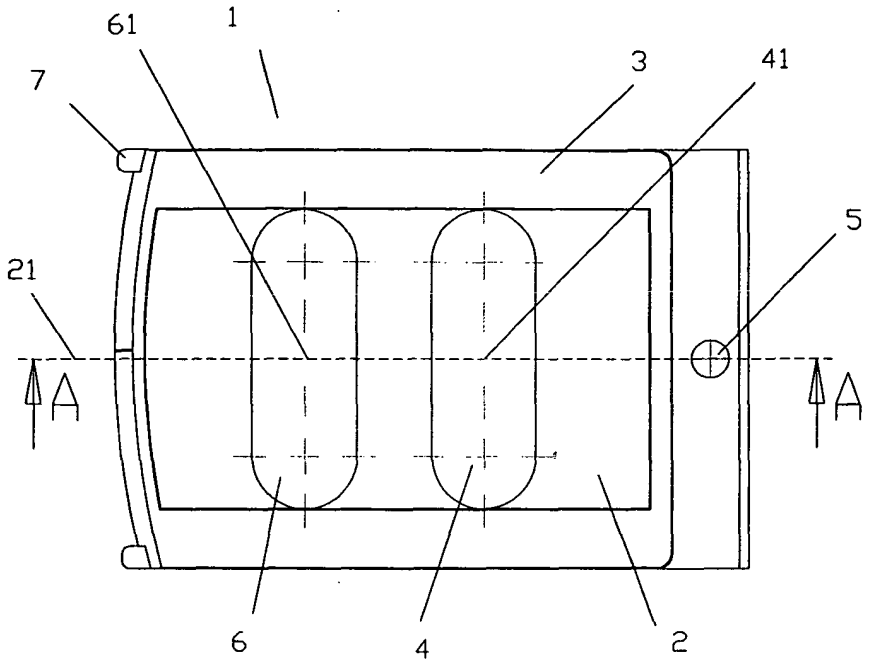

Fig. 1

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Description

Technical Field

[0001] The invention refers to a kind of automatic cleaner soleplate that can clean dirt dipped below the liquid surface. The soleplate can change direction of pumping with the trip valve of the cleaner.

Background art

[0002] The automatic deaner is an apparatus which cleans dirt dipped below the liquid surface such as surface and wall of swimming pool. It has a cleaning head which can pump water. There is an inner chamber at the lower part of the cleaning head. The trip valve and soleplate are in the chamber. There is an inlet groove on the soft part of the bottom which is fixed at the bottom of the cleaning head by chassis, forming a gradient of 45°with the level. The cleaning head connects two suction pipes with the same cross-sectional area. There is a buoyancy adjuster and buffer zone outside the suction pipes. After combined at the upper part, the two suction pipes connect to corrugated pipe. The trip valve and soleplate change the direction of pumping so as to let the cleaner sway continuously. During the operation, dirty water containing with dirt is sucked by cleaning head and flows to the pump through corrugated pipe and pumped to filter for disposal. Clean water after filtering is drained into the swimming pool for use by tubes. Dirt and impurity are drained to appointed place by a six-way valve. The combination of soleplate and trip valve in the automatic cleaner plays a vital role in chancing the direction of pumping. For current technology, soleplates take the shape of "⌣" and the inlet is at the center. Practice has proved that when the flux is low, the startup is not steady. To solve the problem of unsteady startup in low flux, now someone also suggests fixing reed on both sides of the trip valve and utilizing the elasticity to make up differential pressure. The method is effective in the beginning. But when the reed is rusted, or there are sundries in the swimming pool such as leaves, cloth cords and lines, they will be brought to the cleaning head with waves and wrap the reed, preventing the trip valve from swaying neatly. So this method still cannot solve the problem of unsteady startup and even cannot start up the sway.

Summary of the Invention

[0003] The object of this invention is to provide a kind of automatic cleaner soleplate to solve the current technical problems, which has steady startup of trip valve whether the flux is high or low.

[0004] The technology problem of the invention can be solved by the following technical solution:

[0005] A kind of automatic cleaner soleplate includes a plate, which is positioned and connected in the inner chamber of cleaning head and changes the direction of pumping with trip valve. There are inlets in the plate, characterizing in that said plate takes the shape of a rectangle of board shape and there is a clearance between sway planes of trip valve. There are inlets with the same cross-sectional area on two sides of the plate and the area is smaller than the cross-sectional area of suction pipes of the cleaning head with the same cross-sectional area.

[0006] The mentioned clearance is 1 to 3 mm.

[0007] To further adapt to new working environment with low flux, a vertical is made through the sway center of trip valve to the plate, the angle between vertical and the line connecting the sway center of trip valve and the center of the first inlet is 6-10 degrees.

[0008] The angle between the vertical and the line connecting the sway center of trip valve and the center of the second inlet is 9-11 degrees.

[0009] More preferably, the angle between the vertical and the line connecting the sway center of trip valve and the center of the first inlet is 7.5 degrees. And the angle between the vertical and the line connecting the sway center of trip valve and the center of the second inlet is 10 degrees.

[0010] There is a bulge and mounting hole connected with the cleaning head on both sides of the plate.

[0011] The said inlet may be a long circle, rectangle, square, round or oval.

[0012] There are strengthened chimbs on four sides of the plate of mentioned soleplate.

[0013] Compared with current technologies, the invention improves the structure of the soleplate. There is a short clearance between the trip valve and the soleplate. The shorter the clearance is, the more rapidly the stream runs, and the bigger the pressure difference between the two areas is. The trip valve is pushed from one area to the other by the differential pressure so that it will sway up and down continuously. Whether the flux is big or small, wall and surface of the swimming pool can be cleaned with excellent stability during startup.

Description of Figures

[0014]

Figure 1 shows the structure of the invention.

Figure 2 is a sectional view taken along a line A-A in FIG. 1.

Figure 3 is a sectional view of the structure of an automatic cleaner (show the positions of the trip valve and soleplate in the cleaning head).

Figure 4 is an enlarged drawing that shows the positions of the trip valve and soleplate in the cleaning head.

Detailed Description

[0015] Here is a preferred embodiment for implementation of the invention according to Figures 1 to 4. Detailed description will be given for better understanding

of function and features of the invention.

[0016] Figure 1 and 2 show the automatic cleaner soleplate. There is a rectangular plate 2 with board shape on soleplate 1. Two bulges 7 of one side of soleplate 2 is positioned and connected in the inner chamber of the cleaning head 11 (ref. Fig 3). And they are connected and fixed to cleaning head 11 by bolts at mounting hole 5. On both sides of the plate 2 of soleplate 1 are inlet 4 and 6 that are long circles with the same cross-sectional area. There are strengthened chimbs 3 around them.

[0017] Figure 3 and 4 show the automatic cleaner. The inner chamber of cleaning head 11 is connected with suction pipe 9 and 10 that have the same cross-sectional area. There is a buoyancy adjuster 8 and buffer zone 16 outside the suction pipes. At the bottom is a soft part 13 with many inlet grooves fixed by chassis 14. There is soleplate 1 and trip valve 12 in the inner chamber of cleaning head 11. The cross section of trip valve 12 is a sector structure with the shape of "⊥". It can sway freely in the inner chamber of the cleaning head and change the direction of pumping by the push of pumping. To achieve the object, the cross-sectional area of inlet 4 and 6 of the soleplate must be smaller than that of suction pipe 9 and 10. Meanwhile, there is a clearance D between soleplate 1 and the sway plane 15 of the trip valve. Different lengths of clearance form different differential pressures. The shorter the clearance is, the bigger the differential pressure and the force to push the trip valve are. In the invention, the clearance D is 1 to 3 mm.

[0018] The center 41 and 61 of inlet 4 and 6 are located on the central line 21 of plate 2. The position of the center 41 of inlet 4 is fixed by the following method: make a vertical to plate 2 from the sway center 19 of trip valve 12, make the angle between the vertical and the line connecting the sway center 19 of trip valve 12 and the center 41 of inlet be 6-10 degrees (7.5 degrees preferred). Likewise, the angle between the mentioned vertical and the line connecting the sway center 19 of trip valve 12 and the center 61 of inlet is 9-11 degrees and 10 degrees is better. Thus working environment of low flux can be further adapted.

[0019] As seen in Figure 4, when the pumping system is in operation, trip valve 12 first stops at area 18 when the suction pipe 10 is blocked. Since the cross-sectional areas of two inlets are smaller than that of each suction pipe, when water flows into the inner chamber of the cleaning head from the two inlets at the same time, water from inlet 4 directly flows to suction pipe 9 through area 17 and water from inlet 6 enters suction 9 through area 17 by the clearance between trip valve and soleplate. The shorter the clearance is, the more rapidly the stream runs and the bigger the differential pressure is. The trip valve is pushed from area 18 to area 17 by the differential pressure, blocking suction pipe 9, thus the direction of flow is changed and this process is repeated circularly. The position of trip valve is changed continuously, swaying up and down to drive the cleaner to move.

Claims

1. A kind of automatic cleaner soleplate (1), including the plate (2) with inlets which is positioned and connected between the inner chamber of cleaning head (11) and trip valve (12) so that the direction of pumping can be changed, **characterizing in that** the plate takes the shape of a rectangle of board shape and there is a clearance between the plate and sway plane (15) of trip valve (12), and that on two sides of the plate are inlet (4) and inlet (6) with the same cross-sectional area which is smaller than that of suction pipes(9) and (10) of the cleaning head with the same cross-sectional area.

2. The automatic cleaner soleplate as claimed in claim 1, **characterizing in that** there is a bulge (7) and mounting hole (5) connected with the cleaning head (11) on both sides of the said plate (2) of the soleplate.

3. The automatic cleaner soleplate as claimed in claim 1, **characterizing in that** said inlet (4) and (6) may be long circle, rectangle, square, round or oval.

4. The automatic cleaner soleplate as claimed in claim 1, 2 or 3, **characterizing in that** there are strengthened chimbs (3) on four sides of the plate (2) of the described soleplate.

5. The automatic cleaner soleplate as claimed in claim 1, **characterizing in that** said clearance is 1 to 3 mm.

6. The automatic cleaner soleplate as claimed in claim 1, **characterizing in that** the centers (41) and (61) of inlet (4) and (6) are on the central line (21) of the plate (2).

7. The automatic cleaner soleplate as claimed in claim 6, **characterizing in that** the position of center (41) of inlet (4) is: a vertical is made through the sway center (19) of trip valve (12) to the plate (2), the angle between vertical and the line connecting the sway center (19) of trip valve (12) and the center (41) of the inlet is 6-10 degrees.

8. The automatic cleaner soleplate as claimed in claim 7, **characterizing in that** said angle is 7.5 degrees.

9. The automatic cleaner soleplate as claimed in claim 7 and 8, **characterizing in that** the angle between the vertical and the line connecting the sway center (19) of trip valve (12) and the center (61) of the inlet is 9-11 degrees.

10. The automatic cleaner soleplate as claimed in claim 9, **characterizing in that** the angle between the ver-

tical and the line connecting the sway center (19) of trip valve (12) and the center (61) of the inlet is 10 degrees.

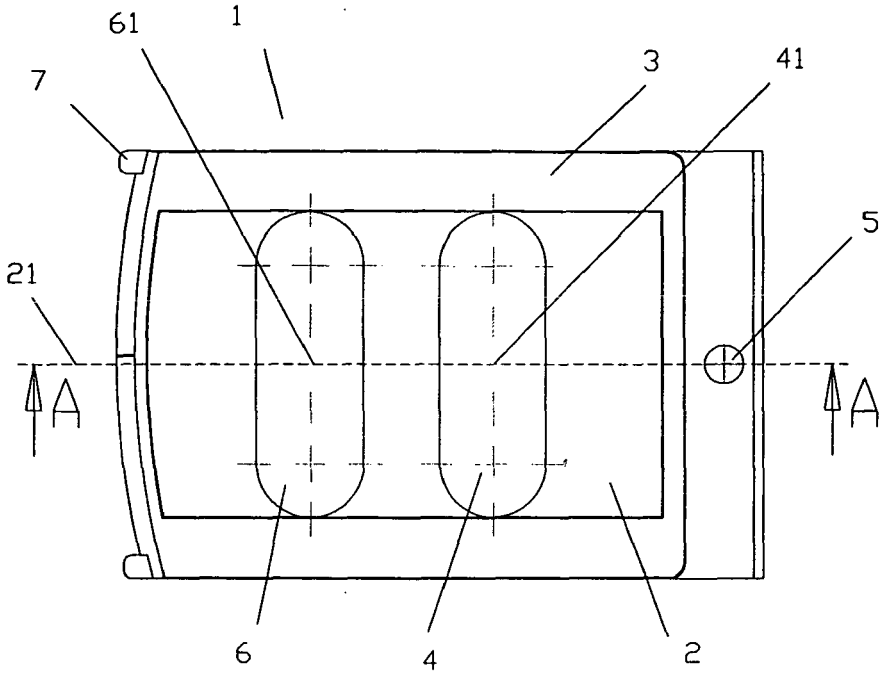

Fig. 1

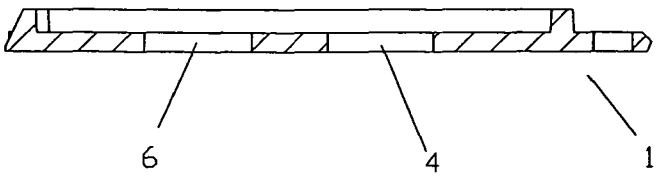

Fig. 2

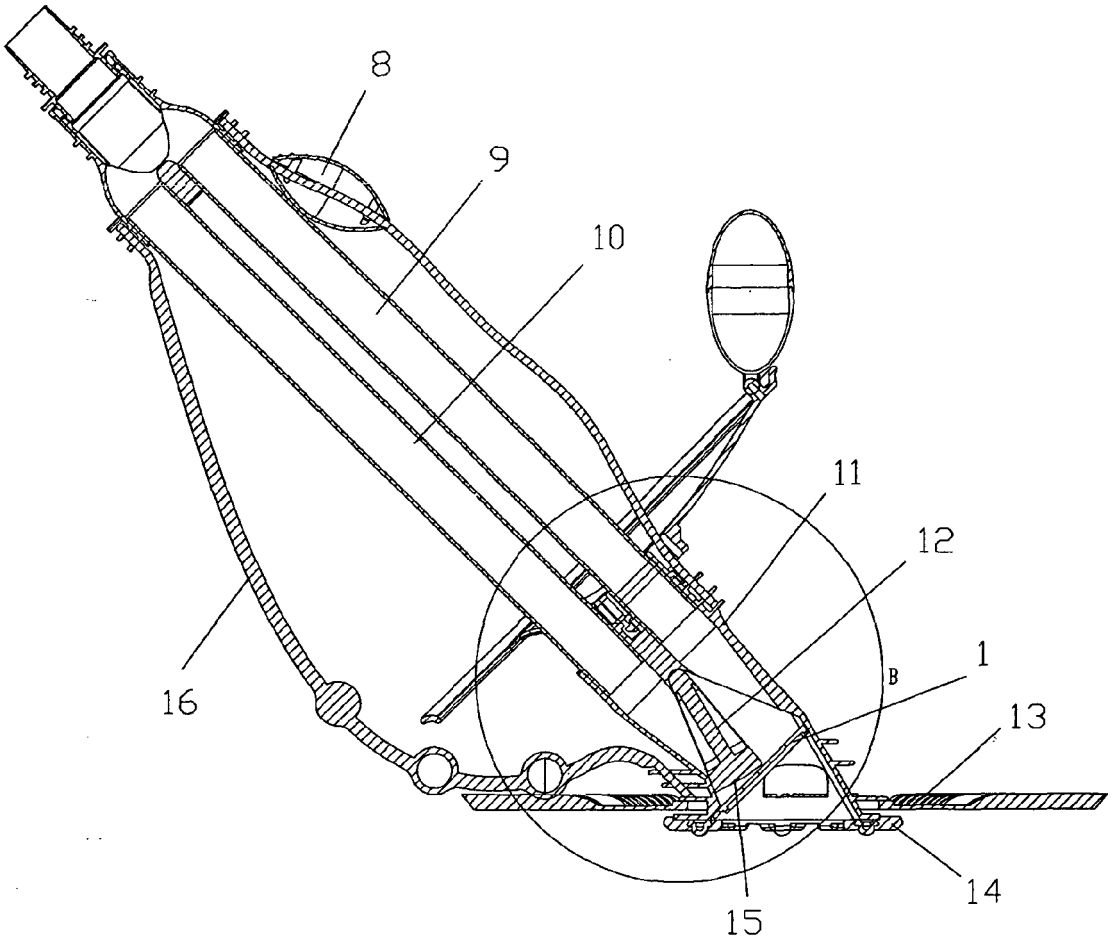

Fig. 3

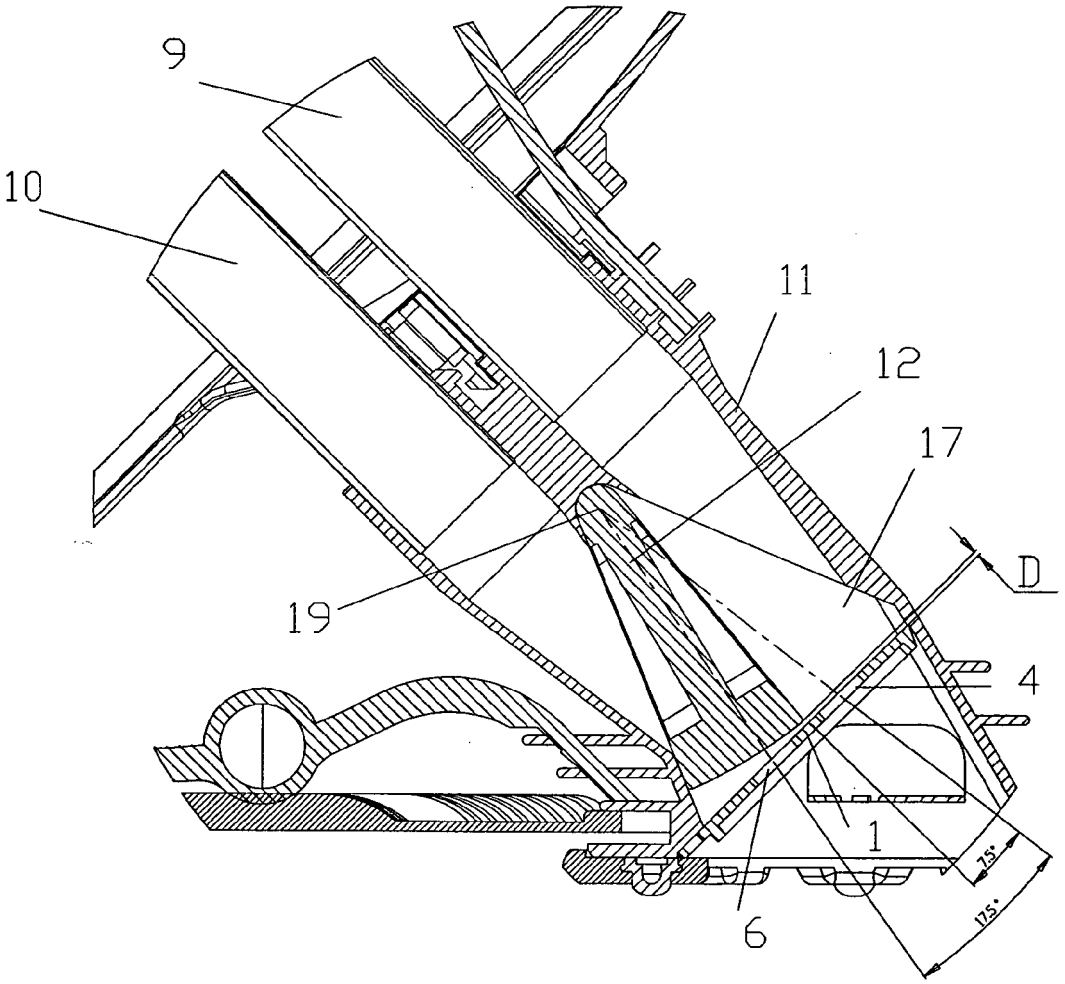

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 06 01 6551

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 0 543 387 A2 (KREEPY KRAULY PTY LTD [ZA]) 26 May 1993 (1993-05-26) * page 3, line 26 - page 4, line 37; figures 1-3 *	1,3,5	INV. E04H4/16
A	DE 26 20 119 A1 (CHAUVIER FERNAND L O J) 24 November 1977 (1977-11-24) * page 10, line 1 - page 12, line 24; figures 1,2,5 *	1,3,5	
A	US 5 794 293 A (HOFFINGER MARTIN I [US]) 18 August 1998 (1998-08-18) * column 4, line 46 - column 6, line 14; figures 3-5 *	1,3,5	
A	US 4 133 068 A (HOFMANN HELMUT J) 9 January 1979 (1979-01-09) * column 2, line 32 - column 4, line 18; figures 1-3 *	1,3,5	
A	WO 02/08548 A (ZODIAC POOL CARE EUROP SAS [FR]; ZODIAC POOL CARE INC [US]; WADMAN ALE) 31 January 2002 (2002-01-31) * abstract; claims 6-8,15; figures 1-4 *	2,3	TECHNICAL FIELDS SEARCHED (IPC) E04H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 November 2006	Stefanescu, Radu

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82