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(54) **Improvements in automatic pool cleaners.**

(57) Apparatus for cleaning a surface submerged in a liquid is disclosed and claimed. The apparatus comprises a body (12) defining a flow passage (28, 32, 16, 18 and 20) therethrough. The flow passage extends between a main inlet (26) to the body defined in a peripheral region (22) of the body and an outlet (41) from the body. The peripheral region (22), in use, being releasably engageable with a surface to be cleaned and the outlet (41) being connectable to a suction source. A pivotal valve (34) is located in the body for intermittently varying the flow of liquid through the body (12). The cleaner is characterised in that it comprises formations (46) for imparting whirling motion to liquid flowing through at least part of the body (12).

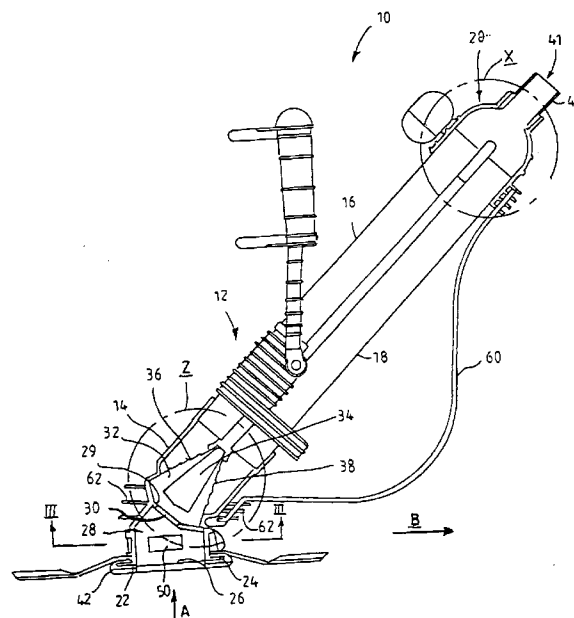


FIGURE 1



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EUROPEAN SEARCH REPORT

Application Number

EP 92 11 9752

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,Y A	US-A-4 023 227 (CHAUVIER) * column 3, line 15 - column 4, line 27; figures 1,2 *	1-4 8,15	E04H4/16
Y A	DE-A-1 684 604 (CONRAD) * page 3, line 20 - page 5, line 4 * * page 6, line 6 - page 7, line 5 * * page 7, line 21 - page 8, line 4; figures 1,3,5-7 *	1-4 12	
A	FR-A-2 635 282 (BPH PATENT HOLDING A.G.) * page 6, line 7 - line 11; figure 1 *	9	
A	EP-A-0 088 381 (CHAUVIER) * page 3, line 13 - line 25; figure 4 *	10	
Y A	US-A-4 193 156 (CHAUVIER) * column 4, line 5 - column 4, line 55; figures 1,2 *	12 3,4	
Y A	US-A-3 753 496 (BOYD) * column 2, line 37 - column 3, line 7 * * column 3, line 32 - column 3, line 35; figures 1-4 *	12 3,4	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	US-A-3 046 583 (DRENNAN) * column 1, line 46 - column 2, line 28; figures 2,3 *	12	E04H A47L E02B
X A	US-A-1 889 603 (JOHNSTON) * page 1, line 60 - line 76; figures 1,2 *	14 11	
A	FR-A-2 604 351 (DENTRAYGUES) * page 1, line 14 - line 31; figure 1 *	15	
D,A	US-A-4 642 833 (STOLTZ & AL.) -----		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 MAY 1993	Examiner PORWOLL H.P.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03.82 (P0401)



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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claims:
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

See sheet -B-

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



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Sheet B

EP 92119752

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

Non-unity a priori

1. Claims 1-11, 16-19 (partially)

Underwater cleaning apparatus with whirling water flow.

2. Claims 12,13, 16-19 (partially)

Disk-like footpad with curvilinear channels

3. Claims 14, 16-19 (partially)

Drive tube with internal stroke

4. Claims 15, 16-19 (partially)

Underwater cleaning apparatus with asymmetrical pivotal valve.