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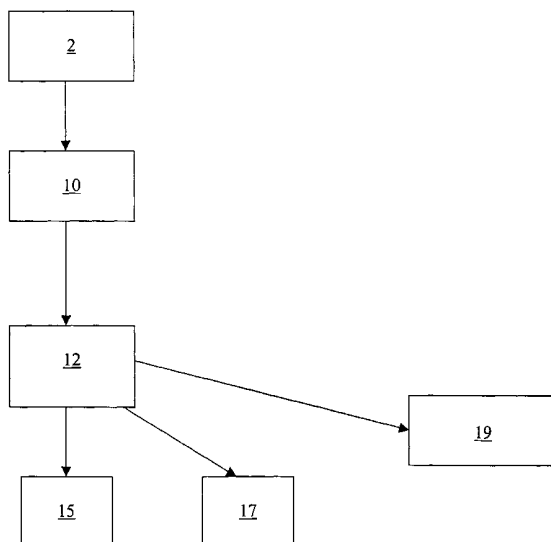
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- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

[Continued on next page]

(54) Title: TREATMENT OF WASTE WATER AND APPARATUS THEREFOR



(57) Abstract: A water treatment apparatus for the treatment of waste water (2), including sewage material, is provided on a marine vessel for example a cruise ship. The apparatus comprises a filter (10) in the form of an submerged flat panel membrane bio-reactor unit or MBR (11) having an average effective pore size of less than 0.1 micron (100 nanometres) and an ionisation unit (12) including electrodes (48, 50), the unit (12) acting as a source of metal ions. The electrodes (48, 50) are formed from an alloy of silver, copper and zinc. In use, waste water (2) flows through the filter (10) and then the ionisation unit (12), so that the waste water is filtered and then infused with metal ions. The concentration of ions in the effluent water is at a concentration effective to disinfect the waste water (2) and provide a residual disinfecting action, the metal ions providing biocidal and/or fungicidal effects. The apparatus may be retro-fitted to a ship by means of a conversion kit.



WO 02/036499 A3



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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

INTERNATIONAL SEARCH REPORT

International Application No

PC 01/04809

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C02F1/46 C02F1/44 C02F3/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

PAJ, WPI Data, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99 18790 A (NVID INTERNATIONAL INC) 22 April 1999 (1999-04-22)	1,2, 6-11,35, 36
Y	abstract; figure 2 page 12, line 8 - line 17 page 12, line 28 -page 13, line 12 page 13, line 22 - line 25 ---	17
Y	US 4 752 401 A (BODENSTEIN WILLEM J) 21 June 1988 (1988-06-21)	17
A	figures 1,3,6,10,14  column 5, line 59 -column 7, line 5 column 8, line 65 -column 10, line 31 column 11, line 25 -column 12, line 12 --- -/--	1-16,35, 36

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

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## INTERNATIONAL SEARCH REPORT

International Application No

PCT B 01/04809

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	FR 2 067 724 A (ETU DIFF PROCEDES BREVET) 20 August 1971 (1971-08-20)	17
A	figure 1  page 1, line 24 - line 30 page 2, line 4 - line 33 ---	1-16,35, 36
A	GB 2 298 858 A (UNILEVER PLC) 18 September 1996 (1996-09-18)  the whole document -----	17, 20-22, 25,31,32

INTERNATIONAL SEARCH REPORT

International application No.  
PCT/GB 01/04809

**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-36

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

## 1. Claims: 1-36

## 1.Group:

Claims 1-16, 35 and 36.

The inventions defined in claim 1 (and its dependent claims 2-16), claim 35 and claim 36 relates to a device comprising the following features:

- 1) a filter having an average pore size of less than 1 micron(micrometer),
- 2) a source of metal ions,
- 3) arranged in such a way that a liquid, e.g. water, may flow through the filter and may be infused with the metal ions.

## Claims 17-34.

The inventions defined in claim 17 (and its dependent claims 18-34) relates to a method of disinfecting waste water comprising:

- 1) a filter having an average pore size of less than 1 micron(micrometer),
- 2) a source of metal ions,
- 3) arranged in such a way that a liquid, e.g. water, may flow through the filter and may be infused with the metal ions.

## 2. Claims: 37-40

## 2.Group: claims 37-39, 40.

The inventions defined in claim 37 (and its dependent claims 38-39) relates to a method of improving an existing water treatment installation comprising:

- 1) connecting an ionisation unit (as a source of metals) in series with an existing filter,
- 2) connecting a control unit.

The invention defined in claim 40 relates to a conversion kit comprising a ionisation unit and a control unit to carry out the invention of claims 37-39.

## 3. Claim : 41

## 3.Group: claim 41.

The inventions defined in claim 41 comprise a marine structure or a marine vessel including the following features:

- 1) a filter having an average pore size of less than 1 micron(micrometer),
- 2) a source of metal ions,
- 3) arranged in such a way that a liquid, e.g. water, may flow through the filter and may be infused with the metal ions.

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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