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Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

[Continued on next page]

(54) Title: METHOD AND DEVICE FOR TRANSFERRING ULTRASONIC ENERGY FOR TREATING A FLUID AND/OR AN OBJECT

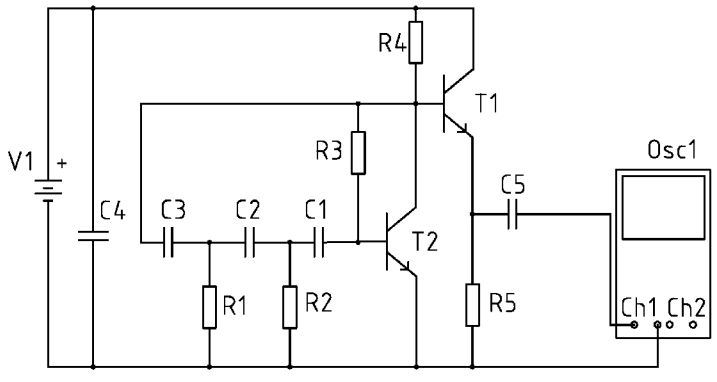

FIG. 1

(57) Abstract: The present invention relates to a method and device for transferring ultrasonic energy to a fluid and/or an object or a plurality of objects. The device comprises: - an ultrasonic transducer; - an amplifier operatively connected to the transducer; and - a function generator operatively connected at least to the amplifier, wherein the transducer is placed in a packed bed of particles.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
INV. B06B1/02 B01J19/10 B01F11/02

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)
B06B B01J B01F B08B B02C 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)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 216 338 A (WILSON ROBERT F [CA]) 1 June 1993 (1993-06-01) column 4, line 59 - column 5, line 5; figure 1	1,4,6,26
X	US 2008/159063 A1 (JANSSEN ROBERT ALLEN [US] ET AL) 3 July 2008 (2008-07-03) paragraphs [0031] - [0051]; figures 1,3	1-3,26
X	US 2004/173541 A1 (KURIHARA MASAHIRO [JP] ET AL) 9 September 2004 (2004-09-09)	1,26
Y	paragraph [0006]; figure 1	2
Y	FR 2 793 811 A (R V X [FR]) 24 November 2000 (2000-11-24) page 5, line 27 - page 6, line 23; figure	2

☐ Further documents are listed in the continuation of Box C.

☒ See patent family 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	Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/NL2009/050615

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 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 No. III Observations where unity of invention is lacking (Continuation of item 3 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 fees, this Authority did not invite payment of additional fees.

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.:

see annex

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

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

1. claims: 1-4, 6, 26 (when referring to claims 1-4, 6)

   Device for transferring ultrasonic energy for treating a fluid wherein the transducer is placed in a packed bed of particles.

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2. claims: 5, 11-14, 26 (when referring to claims 5, 11-14)

   Device for transferring ultrasonic energy for treating a fluid wherein the amplifier is an end stage of a transmitter.

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3. claims: 7, 8, 18-25, 26 (when referring to claims 7, 8, 18-25)

   Device for transferring ultrasonic energy for treating a fluid wherein the device is suitable for transmitting ultrasonic energy to a quartz tube in a UV disinfection reactor.

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4. claims: 9, 10, 15-17, 26 (when referring to claims 9, 10, 15-17)

   Device for transferring ultrasonic energy for treating a fluid wherein the function generator produces a distorted sine function.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5216338 A	01-06-1993	US 5113116 A	12-05-1992
US 2008159063 A1	03-07-2008	EP 2073919 A1	01-07-2009
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