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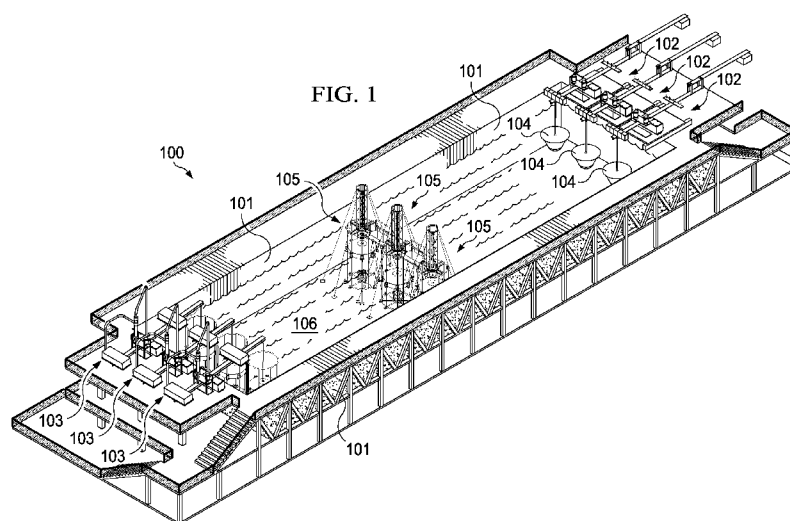
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Published:

- 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))

(88) Date of publication of the international search report:  
1 March 2012

(54) Title: WAVE ENERGY TRANSFER SYSTEM



(57) Abstract: A system and method of wave energy transfer including the generation and capture of waves in a tank filled with liquid is disclosed. The wave energy transfer system comprises wave generation apparatus including a displacement block for generating the waves in the tank, and wave capture apparatus including a buoyancy block for capturing the waves to convert the wave motion and provide fluid flow. The wave capture apparatus may also include an artificial pump head for stabilizing the fluid flow provided by the buoyancy block of the wave capture apparatus. Testing apparatus including a tank filled with liquid and wave generation devices is also disclosed.



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2011/038383

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - F03B 13/14 (2011.01)

USPC - 60/506

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(8) - F03B 13/12, 13/14, 13/16, 13/18; F04D 35/00; G01M 10/00 (2011.01)

USPC - 4/491; 60/325,398,495,497,498,500,506; 73/148; 290/53; 405/76,79; 417/330,331,332,333,337; 434/126

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 practicable, search terms used)

PatBase

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,705,428 A (ANDERSEN) 10 November 1987 (10.11.1987) entire document	1-18, 21, 22, 31-43, 51-63, 65
Y	US 3,142,908 A (ANNIS et al) 04 August 1964 (04.08.1964) entire document	1-43, 51, 53-63
Y	US 4,092,828 A (GARZA) 06 June 1978 (06.06.1978) entire document	19-30, 52-62, 65
Y	US 2008/0260548 A1 (AHDOOT) 23 October 2008 (23.10.2008) entire document	24, 31-43, 51
Y	US 2009/0158729 A1 (HATZILAKOS) 25 June 2009 (25.06.2009) entire document	23, 59
A	US 4,201,496 A (ANDERSEN) 06 May 1980 (06.05.1980) entire document	1-63, 65
A	US 4,507,018 A (ANDERSEN) 26 March 1985 (26.03.1985) entire document	1-63, 65
A	US 6,269,636 B1 (HATZILAKOS) 07 August 2001 (07.08.2001) entire document	1-63, 65
A	US 4,931,662 A (BURTON) 05 June 1990 (05.06.1990) entire document	1-63, 65

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

\* 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 application or patent 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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

01 November 2011

Date of mailing of the international search report

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2011/038383

## 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.: 66-68  
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:  
Claims 66-68 are held to be unsearchable, since these claims are omnibus and refer to drawing figures and applicant's specification.
  
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 extra 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 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.:  
1-63, 65

### 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.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2011/038383

Continuation from Box III.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claims 1-63 and 65, drawn to wave energy generation, transfer and capture systems.

Group II, claims 64 and 69-107, drawn to pumping systems with attached artificial head apparatuses.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical feature of the Group I invention is a transfer arm with attached load, said transfer arm being pivotally connected to a base rigidly connected to a tank to allow pivotal movement of the transfer arm between two positions thereby generating energy for capture and/or transfer, as claimed therein and is not present in the invention of Group II; and the special technical feature of the Group II invention is a pumping system in fluid communication with an artificial head system having a vessel to be filled with a pressurized fluid provided by said pumping system, as claimed therein and is not present in the invention of Group I.

Since none of the special technical features of the Group I and II inventions is found in more than one of the inventions, unity of invention is lacking.