US009410538B2

(12) **United States Patent**
Barsacq et al.

(10) **Patent No.: US 9,410,538 B2**
(45) **Date of Patent: Aug. 9, 2016**

(54) **ENERGY RECOVERING DEVICE**

(71) Applicant: **GEPS INNOV**, Saint-Nazaire (FR)

(72) Inventors: **Mathieu Barsacq**, Saint-nazaire (FR); **Jean-Luc Longeroche**, Saint-nazaire (FR); **Philippe Magaldi**, Saint-nazaire (FR)

(73) Assignee: **GEPS INNOV**, Saint-Nazaire (FR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 130 days.

(21) Appl. No.: **14/396,517**

(22) PCT Filed: **Apr. 24, 2013**

(86) PCT No.: **PCT/FR2013/050915**

§ 371 (c)(1),
(2) Date: **Feb. 4, 2015**

(87) PCT Pub. No.: **WO2013/160617**

PCT Pub. Date: **Oct. 31, 2013**

(65) **Prior Publication Data**

US 2015/0167649 A1 Jun. 18, 2015

(30) **Foreign Application Priority Data**

Apr. 25, 2012 (FR) 12 53803

(51) **Int. Cl.**

F01D 15/10	(2006.01)
F02C 6/00	(2006.01)
H02K 7/18	(2006.01)
H02P 9/04	(2006.01)
F03G 7/08	(2006.01)

(Continued)

(52) **U.S. Cl.**

CPC . ***F03G 7/08*** (2013.01); ***F03B 13/00*** (2013.01); ***F03B 13/14*** (2013.01); ***F03B 13/16*** (2013.01); ***F03B 13/22*** (2013.01); *F05B 2250/131* (2013.01); *Y02E 10/38* (2013.01)

(58) **Field of Classification Search**

USPC 290/42, 52, 53

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,064,137 A * 11/1962 Corbett, Jr. F03B 13/142 290/42
3,231,749 A * 1/1966 Hinck, III F03B 13/20 290/53

(Continued)

FOREIGN PATENT DOCUMENTS

EP 0 059 652 9/1982
EP 0 565 805 10/1993

(Continued)

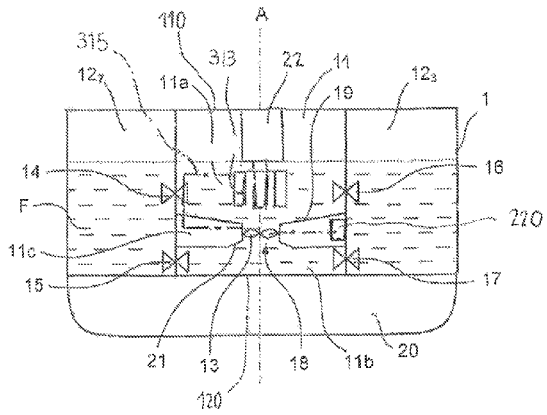
OTHER PUBLICATIONS

PCT/FR2013/050915 International Search Report dated Nov. 21, 2013 (6 pages including English translation).

Primary Examiner — Pedro J Cuevas

(74) *Attorney, Agent, or Firm* — Brinks Gilson & Lione; G. Peter Nichols

(57) **ABSTRACT**

An energy recovery device including a central compartment in which a turbine is arranged and which is positioned between at least first and second compartments is described. Liquid flows between the compartments via side valve systems and a central throttling channel. One specific feature is that an adjustable stopper is arranged substantially at the throttling channel. The device may include a second turbine that controls head losses and makes it possible to feed the main turbine located above, in the vortex.

11 Claims, 10 Drawing Sheets