

(51) International Patent Classification:
F03B 13/18 (2006.01)(21) International Application Number:
PCT/GB2010/051501(22) International Filing Date:
8 September 2010 (08.09.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0915779.3 9 September 2009 (09.09.2009) GB
0918956.4 29 October 2009 (29.10.2009) GB(71) Applicant (for all designated States except US): **DARTMOUTH WAVE ENERGY LIMITED** [GB/GB]; Derwent Lodge, South Town, Dartmouth Devon TQ6 9BU (GB).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **SMITH, Alvin** [GB/GB]; Creek Cottage, Castle Road, Dartmouth Devon TQ6 9DA (GB).(74) Agents: **KENT, Peter** et al.; Keltie, Fleet Place House, 2 Fleet Place, London EC4M 7ET (GB).

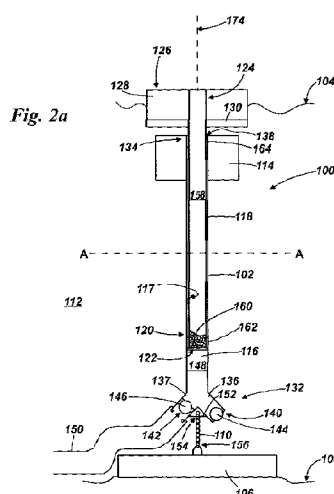
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished upon receipt of that report (Rule 48.2(g))

(54) Title: PUMPING DEVICE



(57) **Abstract:** A wave-powered pumping device for location in a body of water is described. The pumping device includes a submersible cylinder to be anchored to the bed of the body of water, the cylinder defining a bore. An underwater float acts on the cylinder and is arranged to urge the cylinder into an upright orientation in the water. A surface float is arranged to float at, or close enough to, the surface of the body of water in use to move up and down in the body of water in accordance with wave movement and tidal movement. An elongate member depends from the surface float. The elongate member extends telescopically into the bore of the submersible cylinder to define a pumping chamber within the cylinder. The volume of the pumping chamber varies with wave movement in a pumping cycle to draw fluid into the pumping chamber on an upstroke of the elongate member and to pump fluid out of the pumping chamber on a downstroke of the elongate member. The length of the pumping chamber varies with tidal movement to adjust to changing tidal depth by extending or retracting the elongate member relative to the cylinder while effective pumping cycles continue across a tidal range without needing to move the cylinder with respect to the bed of the body of water. To the extent that the elongate member is retracted into the bore of the cylinder, the elongate member occupies a majority of the cross-sectional area of the bore.