

PATENT COOPERATION TREATY

From the:
INTERNATIONAL SEARCHING AUTHORITY

To:

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PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing (*day/month/year*)
31 May 2017

Applicant's or agent's file reference
195732WO

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/NZ2017/050008

International filing date (*day/month/year*)
27 January 2017

Priority date (*day/month/year*)
29 January 2016

International Patent Classification (IPC) or both national classification and IPC
E02B 3/04 (2006.01)

Applicant
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1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA

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Date of completion of this opinion
31 May 2017

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Box No. I **Basis of this opinion**

1. With regard to the **language**, this opinion has been established on the basis of:
 - The international application in the language in which it was filed
 - A translation of the international application into, , which is the language of a translation furnished for the purposes of international search (under Rules 12.3(a) and 23.1(b)).
2. This opinion has been established taking into account **the rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:
 - a. (means)
 - on paper
 - in electronic form
 - b. (time)
 - in the international application as filed
 - together with the international application in electronic form
 - subsequently to this Authority for the purposes of search
4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 2-22	YES
	Claims 1	NO
Inventive step (IS)	Claims NONE	YES
	Claims 1-22	NO
Industrial applicability (IA)	Claims 1-22	YES
	Claims NONE	NO

2. CITATIONS AND EXPLANATIONS:

CITATIONS

D1: WO 2006/094552 A1 (DMS V.O.F.) 14 September 2006
 D2: US 5040919 A (HENRIX) 20 August 1991
 D3: AU 2012258446 A1 (KAYE RATCLIFFE) 20 June 2013
 D4: US 2003/0077122 A1 (CARNAHAN et al.) 24 April 2003
 D5: US 2007/0154264 A1 (BARUH) 05 July 2007
 D6: US 2015/0110558 A1 (MCKENZIE) 23 April 2015

NOVELTY (N)

The invention defined in claim 1 is not novel in light of prior art documents D1-D3 cited above.

D1 discloses a liquid fillable barrier which can be used as an artificial reef (figures 1-13, abstract) comprising a base layer (item 3) and a surface layer (items 4a and 4b) wherein the base layer is joined and sealed to the surface layer forming at least sealed compartment (item 2) there between for receipt of air or pourable material there between to form a volumetric shaped artificial reef (page 1 lines 1-7), the artificial reef also includes at least one inlet (item 12) and outlet valve (item 13) to allow air or any pourable material to be filled or discharged therefrom the sealed compartment wherein artificial reef is constructed to allow it to be built on a dry surface and be floated out to a precise position (page 7 lines 1-25) whereby when in position on the seabed or lake bed whereby the artificial reef comprises a broad base with horizontal planar dimensions being at least 8 meter (page 4 lines 21-28) to prevent toppling over by waves and sinkage into a sandy seabed or lakebed under wave and current action. Similarly D2 (figures 1-5, abstract, column 2 line 60 – column 3 line 21, column 3 lines 55-63) and D3 (figures 1-6, abstract, page 4 line 1 – page 5 line 38) disclose the invention.

Therefore the subject matter of claim 1 is not new and does not meet the requirements of Article 33(2) of the PCT with regard to novelty.

Claims 2-22 meets the criteria set forth in PCT Article 33(2) for novelty. The prior art cited above do not disclose an artificial reef having base surface area exceeding 100 m², rippled top surface, designing artificial reef using a computer software, resilient elongate member having two circular plates connected to the base and surface layer, a tripod framed support member and an inlet and an outlet comprised of two plate structure attached to the surface layer of the artificial reef.

Therefore the subject matter of claims 2-22 is new and meets the requirements of Article 33(2) of the PCT with regard to novelty.

INVENTIVE STEP (IS)

Claim 1 lack an inventive step under Article 33(3) of the PCT because the subject matter claimed is obvious in light of documents D1-D3 cited above.

Claim 1 lacks inventive step in light of documents D4-D6 cited above.

D4 discloses an artificial reef (figures 1-7, abstract) comprising a base layer (item 16) and a surface layer (items 17 and 13a-13x) wherein the base layer is joined and sealed to the surface layer forming at least sealed compartment (item 15) there between for receipt of air or pourable material there between to form a volumetric shaped artificial reef (paragraph [0087]), the artificial reef

also includes at least one inlet (item 18) and outlet valve (item 19) to allow air or any pourable material to be filled or discharged therefrom the sealed compartment wherein artificial reef is constructed to allow it to be built on a dry surface and be floated out to a precise position (paragraph [0024]) whereby when in position on the seabed or lake bed whereby the artificial reef comprises a broad base with horizontal planar dimensions to prevent toppling over by waves and sinkage into a sandy seabed or lakebed under wave and current action. Similarly D5 (figures 1-9, abstract) and D6 (figures 1-33, abstract) disclose a water barrier which can be used as artificial reef. Each of D4-D6 do not disclose artificial reef base having dimension of at least 8 meter to prevent toppling over by waves. However each of D4-D6 disclose artificial reef base having some dimension to prevent toppling over by waves. D4 discloses varied dimension base (paragraph [0125]), D5 discloses 10 feet base (paragraph [0030]) and D6 discloses base of the reef having certain dimension (paragraphs [0129]-[0130]). Hence it would have been obvious to the person skilled in the art at the time of the invention was made to build artificial reef base of certain length and width based on the nature of the material used, nature of the water wave currents, design of the artificial reef and material used to fill the artificial reef. Therefore using of the artificial reef base dimension of at least 8 meter is merely a matter of design choice. It would have been obvious to the person skilled in the art to pick base horizontal planar dimension of artificial reef disclosed by D4-D6 having at least 8 meter to provide stability to avoid toppling of the artificial reef by waves.

Claims 2-22 lack inventive step in light of documents D1-D3 and D6 cited above. Claims 2-5 lack inventive steps in light of D4-D5 documents cited above.

With regard to claim 2, D1-D6 do not disclose artificial reef having at least one horizontal planar dimension in excess of 15 meter, base surface area exceeding 100 m^2 , volume to base surface area ratio not exceeding 3 or 4. However each of D1-D6 disclose features of artificial reef as discussed above and also disclose varying or specific horizontal planar dimension of artificial reef. Selection of specific horizontal planar dimension, surface area of the base and ratio of volume to base surface area is merely a matter of design choice which depends on factors such as nature of the material used to build artificial reef, nature of the water wave currents, design of the artificial reef and material used to fill the artificial reef. All these are considered to avoid toppling of artificial reef by waves and sinkage into the water. Hence, it would have been obvious to the person skilled in the art to pick base horizontal planar dimension of artificial reef, base surface area and volume to base surface area ratio defined in claim 2 for artificial reef disclosed by D1-D6 to provide stability and avoid toppling of the artificial reef by waves.

With regard to claims 3-4, D1 disclose artificial reef made of resilient flexible waterproof material such as plastic or rubber, and fluid such as water is poured into the reef (page 4 lines 29-35). Similarly D2 (column 4 lines 10-17), D3 (page 3 lines 28-33), D4 (paragraph [0007], [0018]), D5 (paragraph [0050]) and D6 (paragraph [0073]) disclose the invention.

With regard to claim 5, D1-D6 do not disclose portion of top surface of the artificial reef is rippled or corrugated. However all of D1-D6 discloses an artificial reef or water barrier having base and top surface. It would have been obvious to the person skilled in the art at the time of the invention was made to make the surface of the reef of D1-D6 corrugated or irregular in order to induce friction to the water waves to reduce force of waves hitting the shores.

With regard to claim 6, D1 disclose a support member made of a stiff or rigid material connected between the base layer and a support layer inside the sealed compartment to support shape of the artificial reef (figure 2, item 18, page 6 lines 1-10, page 8 lines 27-29). Similarly D2 (figures 1-3, item 14, column 2 line 66 – column 3 line 12), D3 (figures 1-2, item 20, page 4 lines 28-32) and D6 (figures 1-30, abstract, items 102 and 112) disclose the invention.

With regard to claims 7, D1-D3 and D6 do not disclose resilient elongate member connected between the base layer and the surface layer to keep artificial reef in shape during upward forces from sand and water inside the chamber. However all of these documents disclose support members to keep the artificial reef in shape during forces from sand and water filled into the cavity. Using of resilient elongate member in addition to the support layer is merely a matter of design choice. It would have been obvious to the person skilled in the art to add resilient elongate member into the artificial reef or barriers of D1-D3 and D6 to provide additional support for keeping the artificial reef in shape.

With regard to claim 8, D1-D3 and D6 do not disclose using of computer software to obtain shape of the artificial reef to provide quality surfing and length of posts, straps to provide designated shape to the artificial reef. Using of computer software to model the structure taking into account of all the variables that affect the intended outcome is well known in the art of product designing. Hence it would have been obvious to the person skilled in the art the time of the invention was made to use computer software to design artificial reef of D1-D3 and D6 for intended purpose and build all the parts of artificial reef to support the intended shape and design.

With regard to claims 9-10, D1-D3 and D6 do not disclose resilient elongate member connected to the base layer and surface layer of the artificial reef with two circular plates and bolts as defined in these claims. As discussed above with regard to claim 7, D1-D3 and D6 disclose a support member to maintain the shape of the artificial reef. Adding additional resilient elongate member and connection means including two circular plates and bolts to the base and surface layer is merely a matter of design choice which a person skilled in the art can do to the artificial reef disclosed by D1-D3 and D6 by routine non-inventive steps.

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With regard to claims 11-12, D1-D3 and D6 do not disclose a support member formed as a tripod frame connected to the base layer and surface layer of the artificial reef with two plate members and bolts as defined in these claims. However D1-D3 and D6 disclose a support member made of a stiff or rigid material connected between the base layer and a support layer inside the sealed compartment to support shape of the artificial reef as discussed with regard to claim 6 above. Using of tripod frame structure and connecting means having plate and bolts is merely a matter of design choice which a person skilled in the art can do to the artificial reef disclosed by D1-D3 and D6 by routine non-inventive steps.

With regard to claims 13-18, D1-D3 and D6 do not disclose sealing of base layer and surface layer made of HDPE with elongate strip member and bolting, a series of valves to control sinking of the artificial reef to a precise location, the inlet and outlet comprising two plate members with seal cap and bolts, a split pipe and dredge pump arrangement to fill the artificial reef and opening on the base layer for deployment and retrieval of the artificial reef. As discussed above in previous claims 1, 3-4, D1-D3 and D6 do disclose water barrier which can be used as artificial reef made from water impermeable material having a sealed chamber comprising inlet valve and outlet valve to feed fluid into the chamber, a series of valves to adjust sinking of the artificial reef and that the artificial reef can be deployed or retrieved for storage by removing fluid inside the chamber. The features added by these claims are merely matter of design choice which a person skilled in the art would modify artificial reef disclosed by D1-D3 and D6 by routine non-inventive step to include these additional design features by routine non-inventive steps to improve the usability.

With regard to claims 19-21, D1-D3 and D6 do not disclose data collection at the proposed artificial reef to determine wave heights, currents in order to design a steel artificial reef having internal beams and steel plates of specific strength using computer software. D1-D3 and D6 disclose using of flexible material to build a water tight chamber. Document D6 discloses using of metal as a base layer of the barrier wall. Using of steel instead of flexible material is merely a matter of design choice which a person skilled in the art can do by routine non-inventive step. Further it is well known in the art to use computer software to obtain shape of the artificial reef, strength of internal beams, steel plates for the base and surface layer to provide designated shape to the artificial reef based on the variables such as wave height, current that affect the intended outcome is well known in the art of product designing. Hence it would have been obvious to the person skilled in the art the time of the invention was made to collect data of variables at the proposed reef site and use computer software to design artificial reef of D1-D3 and D6 for intended purpose and build all the parts of artificial reef to support the intended shape and design.

With regard to claim 22, D1-D3 and D6 do not explicitly disclose every method steps defined in claim 22, base surface area of artificial reef exceeding 200 m^2 , volume to base surface area not exceeding 2. D2-D3 and D6 do not disclose horizontal planar dimension in excess of 25m. However each of D1-D3 and D6 disclose (as discussed above with regard to claim 1 under Novelty heading and claim 6 under Inventive step heading) a water barrier which can be used as a reef having a base layer and a surface layer wherein the base layer is joined and sealed to the surface layer forming at least sealed compartment there between for receipt of air or pourable material there between to form a volumetric shaped artificial reef, a support member connected between the base layer and a surface layer, the artificial reef also includes at least one inlet and outlet valve to allow air or any pourable material to be filled or discharged therefrom the sealed compartment wherein artificial reef is constructed to allow it to be built on a dry surface and be floated out to a precise position whereby when in position on the seabed or lake bed whereby the artificial reef comprises a broad base with horizontal planar dimension to prevent toppling over by waves and sinkage into a sandy seabed or lakebed under wave and current action. Selection of specific horizontal planar dimension, surface area of the base and ratio of volume to base surface area is merely a matter of design choice which depends on factors such as nature of the material used to build artificial reef, nature of the water wave currents, design of the artificial reef and material used to fill the artificial reef. All these are considered to avoid toppling of artificial reef by waves and sinkage into the water. Hence, it would have been obvious to the person skilled in the art to pick base horizontal planar dimension of artificial reef, base surface area and volume to base surface area ratio for artificial reef disclosed by D1-D3, D6 to provide stability and avoid toppling of the artificial reef by waves. Further with regard to method steps, D1-D3 and D6 disclose artificial reef which can be deployed and retrieved for storage. It would have been obvious to the person skilled in the art to follow the similar method steps defined in claim 22 to deploy artificial reefs disclosed by D1-D3 and D6 at the location of sea or lake bed by routine steps for the intended purpose.

Therefore the subject matter of claims 1-22 is obvious and does not meet the requirements of Article 33(3) of the PCT with regard to inventive step.

INDUSTRIAL APPLICABILITY (IA)

The invention defined in the claims 1-22 is considered to meet the requirements of Article 33(4) of the PCT because it can be made by, or used in, industry.

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Box No. VIII Certain observations in the international application

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The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 6 line 2 defines support member is located between the base layer and support layer. It appears that applicant intended surface layer instead of support layer.

Claim 8 is not clear because I cannot find an antecedent to the term "the post" when claim is appended to claim 7 or previous claims.

Claim 13 is not clear because I cannot find an antecedent to the term "the HDPE" when claim is appended to claim 12 or previous claims.

Claim 14 is not clear because I cannot find an antecedent to "the object" when claim is appended to claim 13 or previous claims. It appears that applicant intended that be the artificial reef instead of "the object".

Claim 18 is not clear because it is referring to "deployment and retrieval of artificial reef by adopting the methods and valve system described already". There is no claim defined previously for deploying and retrieving artificial reef. Claim 14 refers to a series of valve system to control the sinking of object to a precise location on the sea bed. It appears that applicant intended to append the claim to valve system defined in claim 14. For the purpose of examination I have considered it to be appended to claim 14. Clarification on this is required.