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(54) **A biodegradable substrate for growth accommodation of oysters and/or oyster larvae**

(57) The invention relates to a biodegradable substrate for growth accommodation of oysters and/or oyster larvae, comprising an extruded block, comprising a clay material; at least one hollow, at least partially surrounded by the extruded block, extending in the extrusion direction of the block; wherein at least one surface of the extrude block comprises a wavy or undulating pattern; wherein the block comprises a porous structure.

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Dit octrooi is verleend ongeacht het bijgevoegde resultaat van het onderzoek naar de stand van de techniek en schriftelijke opinie. Het octrooischrift komt overeen met de oorspronkelijk ingediende stukken.

A biodegradable substrate for growth accommodation of oysters and/or oyster larvae

The present invention relates to a biodegradable substrate for growth accommodation of oysters and/or oyster larvae and to a method for manufacturing a biodegradable substrate.

Over the years, the vast majority of oysters from the oceans have been consumed, almost to extinction. The numbers of oysters gone are 95% in the North Sea and 85% worldwide. Oysters used to have an incredible impact on the marine environment and perform critical ecosystem functions, therefore the loss of our oyster reefs represents an enormous loss to society since a healthy ocean is a key to climate change. They improve biodiversity, reduce algal blooms and eutrophication, store carbon, stabilise our shores and prevent tidal surges. A single oyster can filter up to 200 litres of water a day; removing pollutants including sewage waste, nitrogen, phosphate, and even microplastics.

Ways to farm oysters on artificial substrates have also been known for a long period of time. These substrates are typically formed of concrete or granite or limestone or plastic, and they have a long-lasting negative effect on the marine environment and the climate. These known substrates available in the art are furthermore not cost-effective, more difficult to manufacture, and some require specialised production and/or deployment projects, which are not necessarily scalable. Currently available substrates are also relatively unattractive to oyster larvae, consequently leading to slower regeneration of oysters.

The goal of the present invention is to overcome these disadvantages and provide a biodegradable, sustainable, more cost-effective, and scalable alternative to accommodate the faster regeneration and growth of oysters by using all-natural and easily accessible materials. Furthermore, it is also aimed to increase biodiversity as the invention may also host other surrounding marine creatures once it is deployed into the water. Water may refer to a body of liquid that may include, but is not limited to, at least a portion of brackish water or seawater or water with any degree of salinity.

To that end, the invention proposed a substrate, in particular a decomposable and/or biodegradable substrate according to claim 1, in particular, "Mother Reef", a biodegradable and climate-positive substrate for growth accommodation of oysters and/or oyster larvae, comprising at least one block, preferably an extruded block, comprising a ceramic material, such as clay; at least one hollow, at least partially surrounded by the extruded block, extending in the extrusion direction of the block; wherein at least part of the surface of the extruded block comprises a wavy and/or undulating pattern; wherein at least part of the block comprises a porous structure.

The substrate according to the invention is decomposable and/or (bio)degradable and thus may degrade over time. This invention introduces the utilization of a ceramic material, such as clay, as a decomposable and/or biodegradable core material of the block. Advantageously, clay material is low-cost, (bio)degradable, uncomplicated to manufacture especially on a large scale for example by extrusion, and adaptable to the local area as clay is ubiquitous all around the world. It is also possible for the marine organisms to drill on the clay, unlike granite or concrete, thus other marine creatures and microorganisms may penetrate and use the block as a shelter, which then over time will increase biodiversity and better thriving marine ecosystems. The block may comprise a shape of, but is not limited to, trapezoidal-prism clay with a porous structure. The substrate according to the invention further benefits of the fact that after its use and decomposition, there will be no remains in the sea found that would not already be found there (i.e. the mud and sand) which is positive from environmental point of view.

When it is referred to a hollow, also a cavity, receiving space, void and/or channel could be meant or referred to. The hollow in the block increases the available surface area for oysters to attach to, where the undulating surface mimics the shape of natural oyster shells. Despite the substrate being configured for the growth accommodation of oysters and/or oyster larvae, the substrates according to the invention could be used for any sessile marine organism that requires a hard surface to settle on, such as but not limited to mussels, clams, seaweed, etc. In a preferred embodiment, a block may comprise at least two, preferably three quadrilateral-shaped, such as trapezium-shaped hollows with a wavy-patterned surface, wherein the whole block body may be realised by means of extrusion. The base width may be wider than the top width, and the top width may shape slightly

concavely. In another preferred embodiment, the extruded block may comprise a more protruding area on one shorter edge and one opposite of the said shorter edge of the top side of the block, while the top side is substantially planar. Such shapes may be aimed to easily facilitate the transportation or pick up of the blocks and an increased surface area for the growth of the oysters, and other possible marine life. Such shapes may also be aimed to be easily producible by any generic brick factory or manufacturer, and able to be clamped in different situations, preferably in four different configurations. The clamp may comprise at least a straight wall substantial enough for the clamp to hold the blocks. The extrusion method is preferably chosen as means of production because it may lead to a more scalable production; be easier than other methods, such as casting; and be suitable for the materials used for producing the blocks. It is likewise relatively more efficient and economical for the generic brick manufacturers to produce a mass scale of these blocks. The geometry of the substrates according to the present invention benefits from the fact that, when placed closely together or stacked in oyster tanks, openings are created between the surfaces that allow larvae to settle on the surface of the substrate.

The wavy or undulating pattern may comprise a plurality of parallel grooves, extending in the same direction as the extrusion direction of the block. These grooves may vary along the outer circumference of the block and mimics the shape of natural oyster shells. These grooves, formed during the extrusion of the block, may provide a natural habitat for the oysters to attach to, as the oysters have a rather similar wavy pattern on the top surface of the shell. A hard and attractive surface to grow on is all oysters need to start providing their multiple benefits, because one of the problems with oyster regeneration is that there is not enough hard surface to settle, for example, in the North Sea, there is mainly sand. The hard, wavy pattern therefore also increases the surface area, which may induce more oysters and/or oyster larvae to settle. Said unique pattern of the block may be aimed to be relevant for the flow pattern of water surrounding the block, preferably low flow areas and the like, in order to create a comfortable environment for the oysters and/or oyster larvae to settle and/or grow. Typically, the wavy pattern diminishes in size as they reach the centre of the block, which also matches what occurs on oyster shells naturally.

The substrate according to the present invention may comprise at least one biofilm comprising natural compounds. The wavy-patterned surface may also be treated with a biofilm comprising natural compounds which preferably produce chemical signals for oysters that want to settle before being deployed into the water, preferably in locations of expansion of the artificial and/or natural reefs. Other healthy oyster reefs and/or oyster larvae can smell the biochemical signals produced by certain symbiotic microorganisms from the applied biofilm. The application of biofilm may increase the effectiveness of oyster and/or oyster larvae attachments, and increase the time window of regeneration projects. The biofilm on the "Mother Reef" block may be applied onshore, preferably by a spraying method, and the production of said natural biofilm is specialised in a specific culture tank. In another preferred embodiment, the block may be pre-charged with oyster larvae, wherein the larvae may settle onto the block in settlement tanks onshore before being deployed into the water, preferably in locations where oysters are extinct and there were historic reefs but no healthy populations remaining. The invention thereto proposes a "Mother Reef" block with a wavy surface mimicking the structure of the oyster shells which may increase attractiveness and quantity for the oysters and/or oyster larvae.

The "Mother Reef" block comprises a porous structure, for instance, by adding a combustible material, like paper, being burnt completely during the production method. Combustible material, such as paper, may be incorporated into the clay mixture in appropriate proportions and will be burnt during the combustion process to form a porous structure. The porous structure, additionally together with the sharp notches shape on its surface, may facilitate the collapse of the block when internal pressure is built up as a result of oyster growth. The porous structure increases the brittleness of the block and such block may accommodate the settlement of oysters and/or oyster larvae before eroding in the water and disintegrating naturally into small clay particles. In case multiple blocks are dropped in the water, a certain amount of purposeful fracturing is expected of these blocks due to their shape and porosity. These fractures lead to further complexity of the piles of these blocks and fractions thereof, which closely mimics random undulations of marine life rather than artificial and simple geometry alternatives. Depending on the factors, such as the environmental influence and the materials applies, the substrates could last for between 2 to 30 years from its deployment into

the water. Typically, the substrate lasts at least 1.5 years, preferably after 2 years from its deployment into the water. The block fractures easier, when it comprises the porous structure, by means of natural pressure from the attached oysters, thereafter making it (bio)degradable and sustainable as the clay itself is a natural material. On top of being naturally friendly, the cost of producing each block is considered low and deployment is easily performed cost-efficiently. Preferably the complete outer and inner surface of the block has a porous structure.

Correspondingly, the preferred weight of "Mother Reef" block may be less than 20 kilograms, preferably less than 16 kilograms, more preferably less than 14 kilograms. It is also conceivable that the decomposable and/or biodegradable substrate, and in particular the block, weighs between 8 and 10 kilograms. This results in the blocks being relatively easy to handle. It is also conceivable that the substrate according to the present invention has a weight above 5 kilograms, preferably above 7 kilograms. The density of the block may be between 1 and 4 kg/m^3, preferably between 1.5 and 2.5 kg/m^3, more preferably around 2 kg/m^3.The height of the block may be between 10-20 cm, more preferably about 15 cm. However, it is also imaginable that the width of the block may be between 25-35 cm, more preferably about 30 cm. This configuration may lead to easy access and deployment by communities in smart locations, including by fishermen. Some preferred embodiments of the block may be applicable to around 20 x 30 x 15 cm in size and around 8 – 8.5 kg in weight. Thus, deployment of each block into the water is easily attainable from a boat, for example, a fishing boat.

Nowadays, the placement and deployment practices are problematic as working in the high seas is dangerous, expensive, and very prescriptive, meaning that projects are smaller and less resilient. These projects also provide low added value to society as fishermen are excluded and benefits are focused far from populated areas. The inventors also propose critical mass projects in smart locations, with a minimum of 5 ha projects placed in coastal and estuarine areas. Critical mass is a concept that defines the theoretical number and density of oysters required to generate population survival. A lower line of critical mass equals a lower cost to achieve ecosystem take-off. High seas around wind farms almost always have a higher critical mass than coastal estuarine areas. This concept may be supported by a mapping protocol looking at marine conditions including temperature, pH,

nutrient concentrations, salinity, and water currents to help spot the best locations for placing the "Mother Reef" blocks. Therefore, coastal communities, such as fishermen, will also have a new critical stewardship role by using their knowledge and love of water, slack time from quota-restricted days, and pre-existing hardware such as their vessels, sonar, and radar, by involving them in the deployment of the "Mother Reef" project.

The invention additionally relates to a method of manufacturing a decomposable and/or biodegradable substrate, in particular according to the invention, comprising the steps of:

a) mixing a paste comprising a ceramic material, such as clay, and at least one combustible material in a malleable core material;

b) extruding the core material into a block and forming at least one hollow in the block in the extrusion direction;

c) optionally at least partially drying and/or solidifying the block; and

d) baking the block and burning the combustible material of the block.

The hollow, or cavity, could be formed during the extrusion step. Preferably, the nozzle of the extruder is configured to create the specific configuration. The method according to the invention could be applied to manufacture any of the embodiments as described for the present invention.

Step d) could also be described as, subjecting the block to a firing step such that at least part of the combustible material is burned and possibly such that the ceramic material of the block is at least partially cured. The baking step of the method is preferably done at a relatively low firing temperature and/or for a relatively short baking time. This results in the desired material properties of the substrate and this is also beneficial from environmental point. The baking process is preferably done such that substantially all combustible material is burned. It is conceivable that the baking process is done such that the ceramic material is only partially hardened or cured. In one preferred embodiment of the method according to the invention, a preferred action may be performed, further comprising step e) cutting the block in a plurality of bricks or substrates. In another preferred embodiment, another preferred action may be performed, further comprising step f) applying a biofilm to the block.

Step c) of the method could for example include that the block is cooled down by sun-drying, firing and/or oven-drying.

The invention is further elucidated on the basis of the non-limitative exemplary embodiment shown in the following figures. Herein:

- Figures 1a and 1b schematically show possible embodiments of substrates according to the invention;
- Figures 2a and 2b show a cross-sectional view of the substrates as shown in figures 1a and 1b;
- Figure 3 schematically shows an example of four different possible configurations of the plurality of the blocks being clamped together according to the present invention;
- Figure 4 schematically shows an example of the deployment project from a boat according to the present invention; and
- Figure 5 shows a plurality of substrates as shown in figures 1a and 2a in a stacked configuration.

Within these figures, similar references refer to similar or equivalent features or elements.

Figure 1a, 1b, 2a, and 2b schematically shows a substrate (1) according to the invention. Figures 1a and 1b show a perspective view of respectively a first and a second embodiment of the substrate (1) according to the present invention, while figures 2a and 2b show a side view of said first and second embodiment. The substrate (1) comprises an extruded block (2), comprising a clay material and at least one hollow (3), at least partially surrounded by the extruded substrate (1), extending in the extrusion direction (E) of the block (2). The surface (4) of the extrude block (2), including the surface of the at least one hollow (3), comprises a wavy or undulating pattern (5). The wavy and/or undulating pattern (5) preferably mimics physical substrates of oyster shells which have different sizes of wavy patterns, as the wavy patterns may comprise smaller waves and bigger waves. Typically, the wavelength of the waves on the surface of the substrates (1) is diminishing gradually similarly to the oyster shells themselves. The combination of different sizes preferably may accommodate oysters having different heights and widths to settle or attach in block (2). Block (2) has a porous structure created by burning the combustible material, such as, but not limited to, paper, during the

production process. The porous structure of said substrate (1) may accommodate the block to fracture with the help of natural pressure from the attached oysters and eventually may disintegrate into at least a portion of mud and/or sand, preferably being up to 100% decomposable and/or biodegradable and leaving no waste in the sea.

Figure 3 schematically shows an example of four different possible configurations (6a, 6b, 6c, and 6d) of the plurality of the substrates (2) or blocks (2) according to the present invention being clamped together. It is conceivable that the unique and practical shape of the block (2) may be handled in large volumes, therefore increasing producibility and scalability.

Figure 4 schematically shows an example of the deployment project from a boat (7) according to the present invention. It is conceivable that the deployment project is easily attainable by at least one person from a boat. It is shown that blocks (2) are released into the water.

Figure 5 shows a plurality of substrates (2) or blocks (2) as shown in figures 1a and 2a in a stacked configuration. It is for example conceivable that such stacking in applied in an oyster tank (not shown). It can be seen that the geometry of the blocks (2) creates openings O between the surfaces that allow larvae to settle on the surface of the substrates.

It will be clear that the invention is not limited to the exemplary embodiments which are illustrated and described here, but that countless variants are possible within the framework of the attached claims, which will be obvious to the person skilled in the art. In this case, it is conceivable for different inventive concepts and/or technical measures of the above-described variant embodiments to be completely or partly combined without departing from the inventive idea described in the attached claims.

The verb 'comprise' and its conjugations as used in this patent document are understood to mean not only 'comprise', but to also include the expressions 'contain', 'substantially contain', 'formed by' and conjugations thereof.

Conclusies

1. Een biodegradeerbaar substraat voor groeihuisvesting van oesters en/of oesterlarven, omvattende:

- een geëxtrudeerd blok, omvattende een keramisch materiaal, zoals klei;
- ten minste één holte, ten minste gedeeltelijk omgeven door het geëxtrudeerde blok, die zich uitstrekt in de extrusierichting van het geëxtrudeerde blok;
- waarbij ten minste één oppervlak van het geëxtrudeerde blok een golvend en/of geonduleerd patroon omvat; en
- waarbij ten minste een deel van het blok een poreuze structuur omvat.

2. Substraat volgens conclusie 1, waarbij het golvende patroon een veelvoud van parallelle groeven omvat, die zich in dezelfde richting als de extrusierichting van het blok uitstrekken.

3. Substraat volgens één der voorgaande conclusies, waarbij het blok in hoofdzaak trapezium-prismavormig is, waarbij bij voorkeur een basisbreedte van het blok breder is ten opzichte van een boven breedte.

4. Substraat volgens één der voorgaande conclusies, waarbij de holte vierhoekvormig is, zoals trapeziumvormig.

5. Substraat volgens één der voorgaande conclusies, omvattende ten minste twee holtes, bij voorkeur ten minste drie holtes, die op een afstand van elkaar zijn gelegen in een richting loodrecht op de extrusierichting van het blok.

6. Substraat volgens één der voorgaande conclusies, waarbij ten minste een binnenoppervlak en een buitenoppervlak van het blok het golvende patroon omvat, waarbij bij voorkeur alle oppervlakken van het blok het golvende patroon omvatten.

7. Substraat volgens één der voorgaande conclusies, waarbij het substraat minder dan 20 kilogram weegt, bij voorkeur tussen 8-10 kilogram weegt.

8. Substraat volgens één der voorgaande conclusies, waarbij de dichtheid van het blok tussen 1 en 4 kg/m3 is, bij voorkeur tussen 1,5 en 2,5 kg/m3.

9. Substraat volgens één der voorgaande conclusies, waarbij de hoogte van het substraat tussen 10-20 cm is, meer bij voorkeur circa 15 cm, en/of waarbij de breedte van het substraat tussen 25-35 cm is, meer bij voorkeur circa 30 cm.

10. Substraat volgens één der voorgaande conclusies, omvattende ten minste één biofilm omvattende natuurlijke samenstellingen.

11. Substraat volgens één der voorgaande conclusies, waarbij het golvende of geonduleerde patroon langs de buitenste omtrek van het blok varieert.

12. Een werkwijze voor het vervaardigen van een biodegradeerbaar substraat, in het bijzonder volgens één der voorgaande conclusies, omvattende de stappen van:

a) het mengen van een pasta omvattende klei en een ontvlambaar materiaal in een kneedbaar kernmateriaal;

b) het extruderen van het kernmateriaal in een blok en het vormen van ten minste één holte in het blok in de extrusierichting;

c) het drogen of het stollen van het blok;

d) het bakken van het blok en het verbranden van het ontvlambare materiaal van het blok;

13. Werkwijze volgens conclusie 12, verder omvattende de stap van:

e) het snijden van het blok in meerdere substraten.

14. Werkwijze volgens conclusie 12 en 13, verder omvattende de stap van:

f) het aanbrengen van een biofilm op het blok.

15. Werkwijze volgens één van de conclusies 12 tot 14, waarbij in stap c) het blok wordt afgekoeld door zondrogen of ovendrogen.

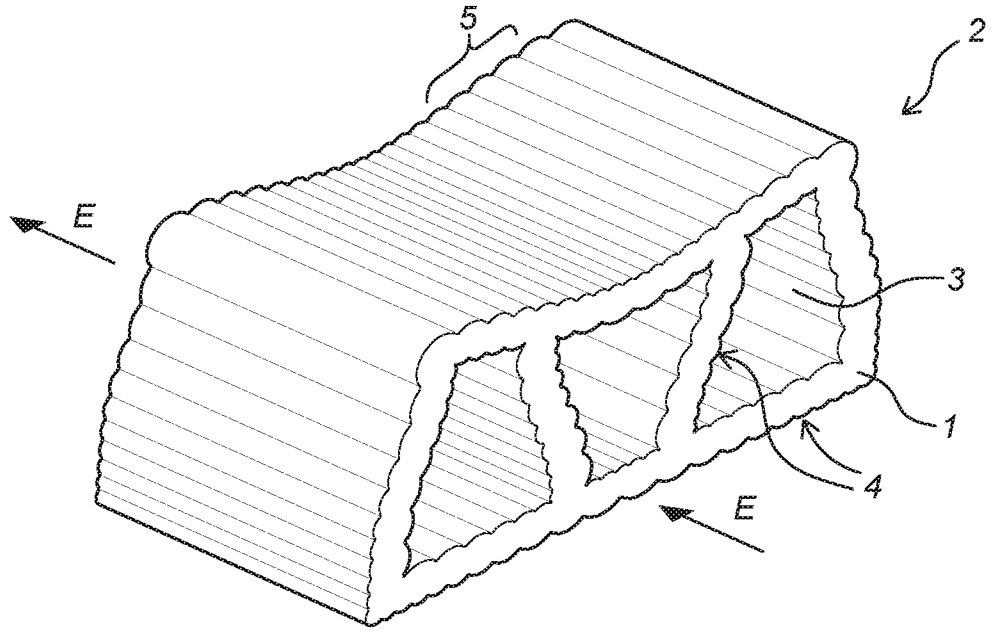

Fig. 1a

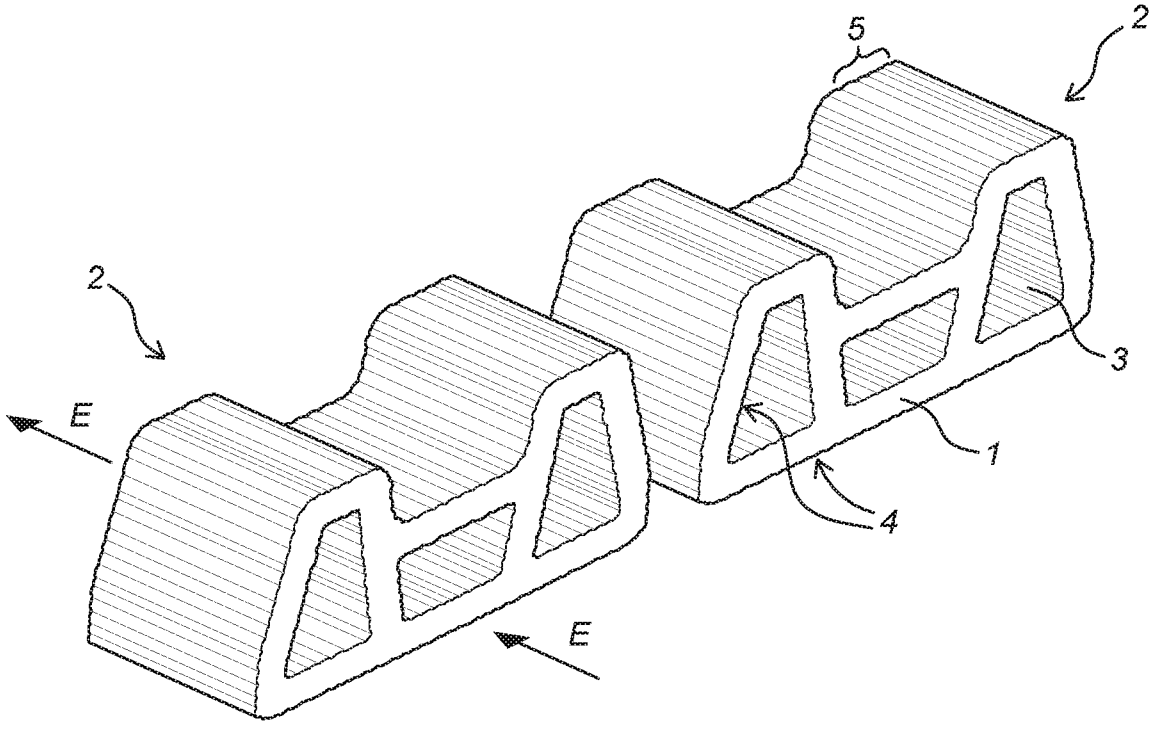

Fig. 1b

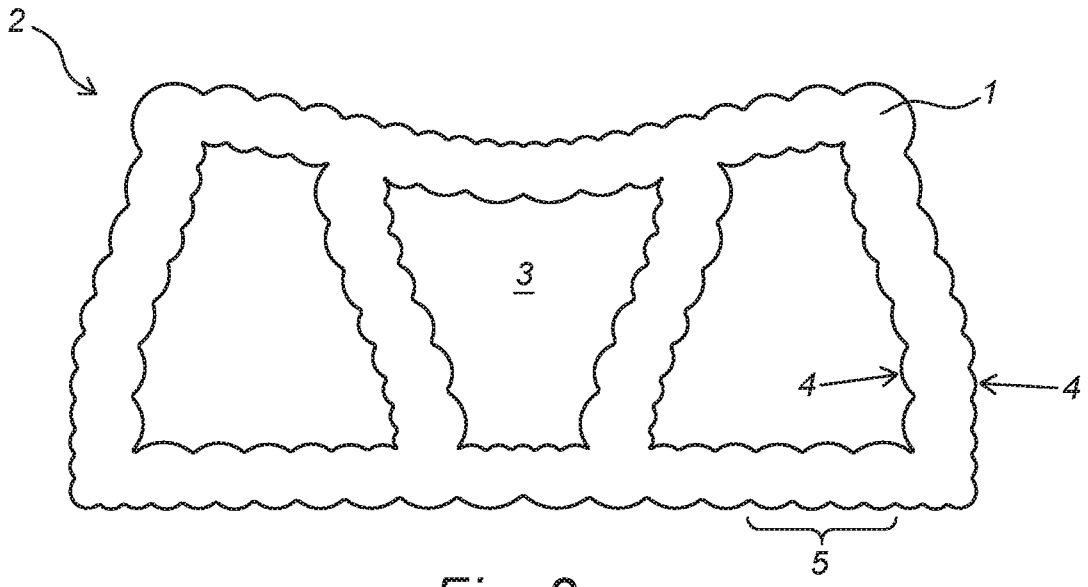

Fig. 2a

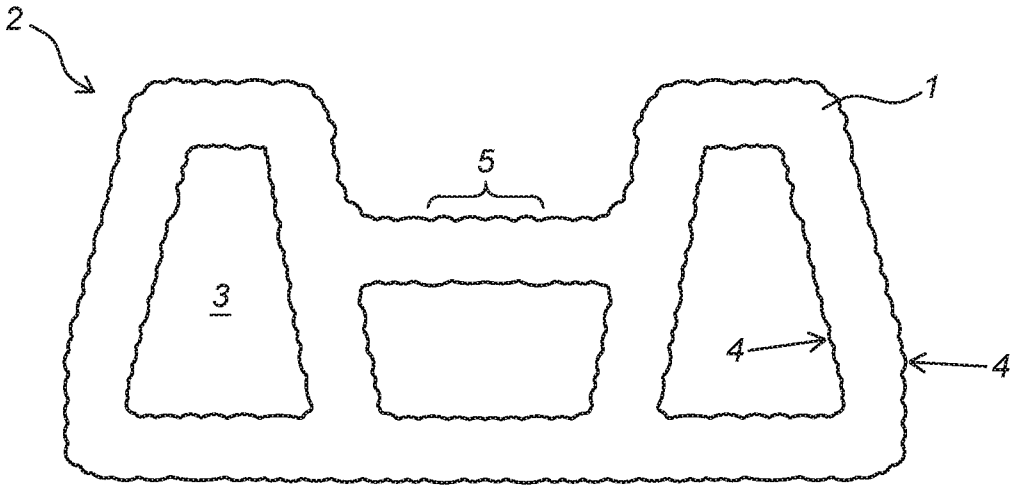

Fig. 2b

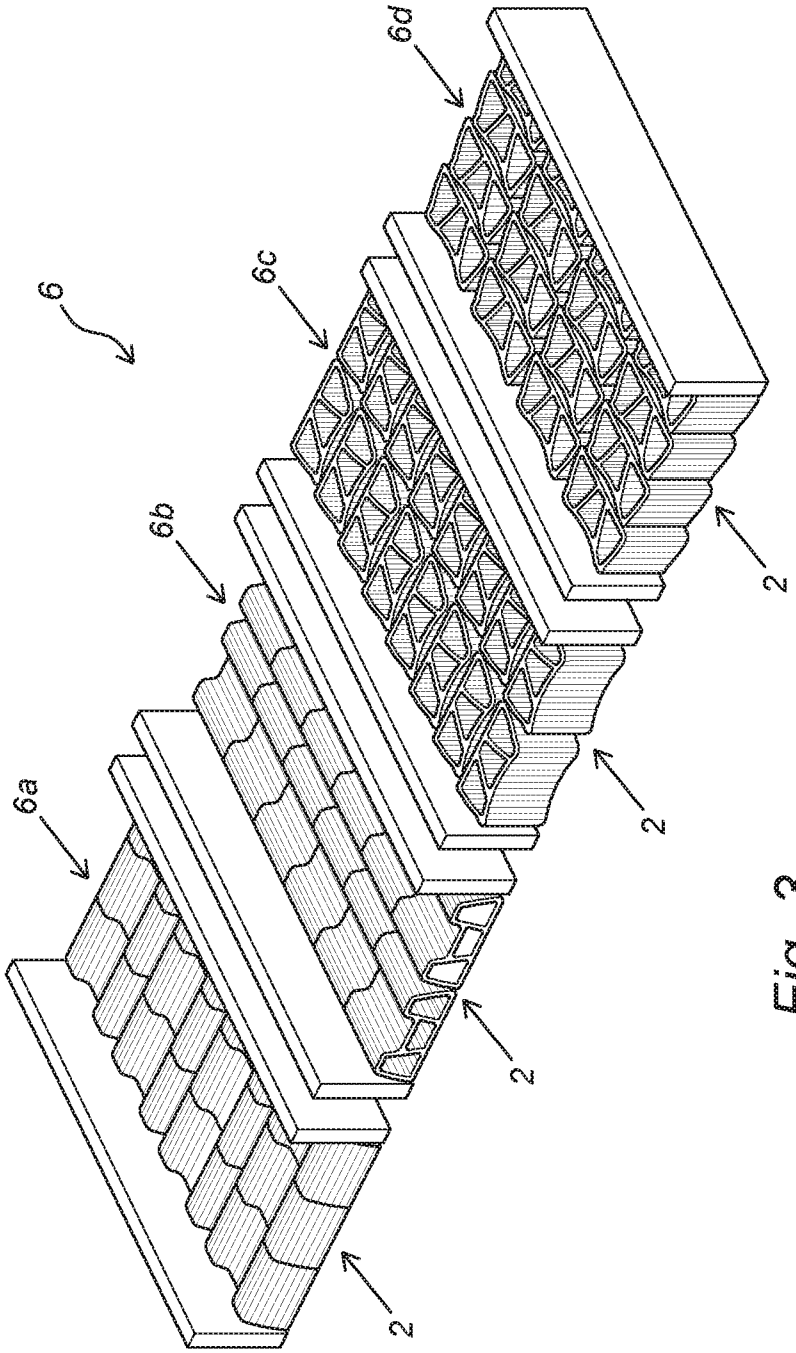

Fig. 3

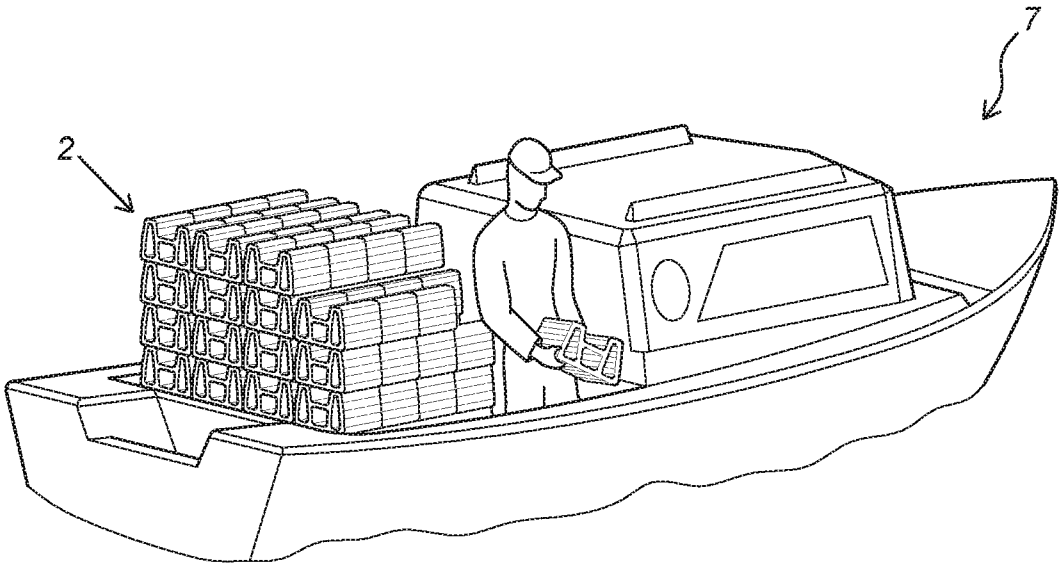

Fig. 4

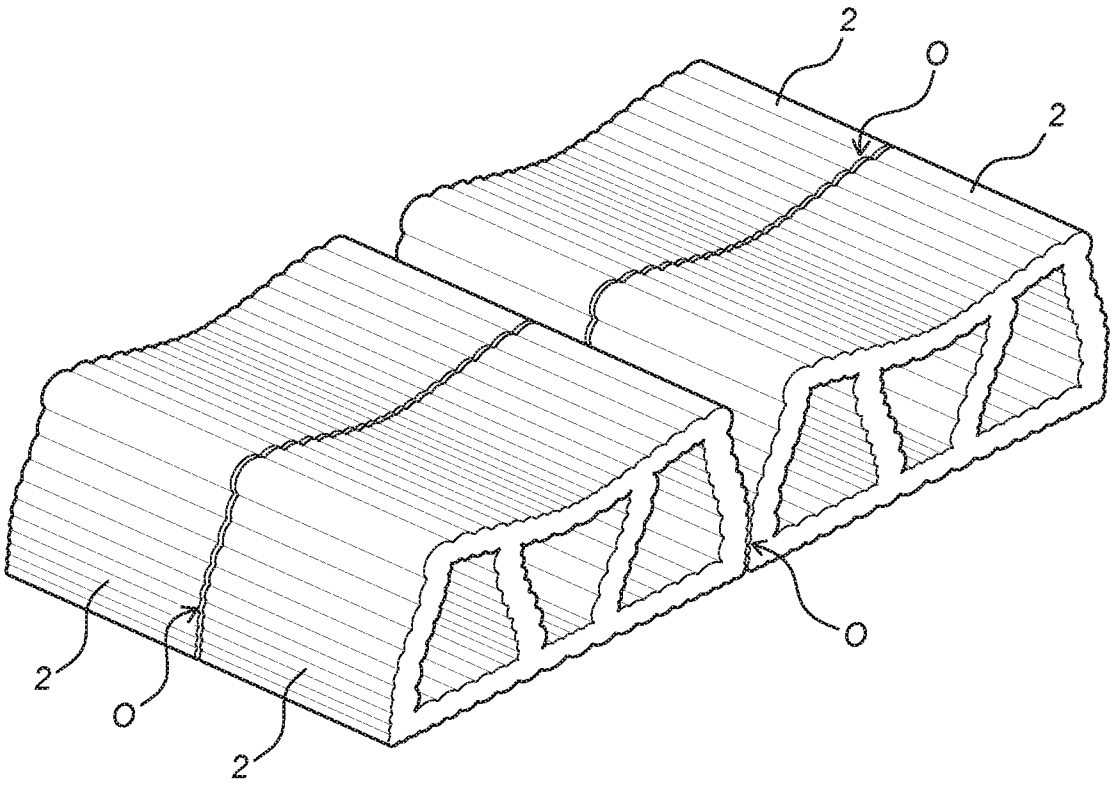

Fig. 5

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE
Nederlands aanvraag nr. **2032634**	Indieningsdatum **29-07-2022**
	Ingeroepen voorrangsdatum
Aanvrager (Naam) **Oyster Heaven IP B.V.**	
Datum van het verzoek voor een onderzoek van internationaal type **01-10-2022**	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. **SN82291**

I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)

Volgens de internationale classificatie (IPC)

Zie onderzoeksrapport

II. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimumdocumentatie

Classificatiesysteem	Classificatiesymbolen
IPC	**Zie onderzoeksrapport**

Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

III.	☐	**GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES**	(opmerkingen op aanvullingsblad)
IV.	☐	**GEBREK AAN EENHEID VAN UITVINDING**	(opmerkingen op aanvullingsblad)

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2032634

A. CLASSIFICATIE VAN HET ONDERWERP
INV. A01K61/54 A01K61/77
ADD.

Volgens de internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.

B. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte miminum documentatie (classificatie gevolgd door classificatiesymbolen)
A01K

Onderzochte andere documentatie dan de mimimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden)
EPO-Internal, WPI Data

C. VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	KR 101 738 836 B1 (CHUNG HWA POTTERY [KR]) 23 mei 2017 (2017-05-23) * alineas [0001], [0018] - [0020], [0027] - [0030], [0052] - [0061] * * samenvatting * * figuren 1-8 *	1,2,5, 10,12-15
X Y	KR 2020 0136221 A (SANCHEONGTOGIWA [KR]) 7 december 2020 (2020-12-07) * alineas [0005], [0008], [0013] - [0015], [0019], [0032] - [0065], [0068] - [0070] * * samenvatting * * figuren 1a-4c *	1,2,4, 6-9,11 3,5,10

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[x] Verdere documenten worden vermeld in het vervolg van vak C.

[x] Leden van dezelfde octrooifamilie zijn vermeld in een bijlage

° Speciale categorieën van aangehaalde documenten

"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft

"D" in de octrooiaanvrage vermeld

"E" eerdere octrooi(aanvrage), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven

"L" om andere redenen vermelde literatuur

"O" niet-schriftelijke stand van de techniek

"P" tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur

"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvrage, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding

"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur

"Y" de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht

"&" lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid	Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type
15 maart 2023	

Naam en adres van de instantie	De bevoegde ambtenaar
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Been, Mathieu

1

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2032634

C.(Vervolg). VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
Y	ES 2 141 685 B1 (MARCO MOLINUEVO JOSE MARIA [ES]) 16 november 2000 (2000-11-16) * kolom 2, regels 10-38, 54-67 * * figuren 1-3 *	3,5,10
A	FR 1 405 338 A (PNEUMATIQUES, CAOUTCHOUC MANUFACTURE ET PLASTIQUES KLEBER-COLOMBES) 9 juli 1965 (1965-07-09) * bladzijde 1, linker kolom, alinea 6 - bladzijde 2, linker kolom, alinea 8 * * figuren 1-3 *	1-15
A	FR 2 127 380 A5 (PRIMAPLAST PROFILES) 13 oktober 1972 (1972-10-13) * bladzijde 1, regels 30-37 * * bladzijde 2, regels 13-18 * * figuren 1-6 *	1-15

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar de stand van de techniek

NL 2032634

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
KR 101738836	B1 23-05-2017	GEEN	
KR 20200136221	A 07-12-2020	GEEN	
ES 2141685	B1 16-11-2000	GEEN	
FR 1405338	A 09-07-1965	BE 664366 A	16-09-1965
		FR 1405338 A	09-07-1965
		NL 6506742 A	29-11-1965
FR 2127380	A5 13-10-1972	GEEN	

WRITTEN OPINION

File No.	Filing date *(day/month/year)*	Priority date *(day/month/year)*	Application No.
SN82291	29.07.2022		NL2032634

International Patent Classification (IPC)
INV. A01K61/54 A01K61/77

Applicant
Oyster Heaven IP B.V.

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 with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the application
- ☐ Box No. VIII Certain observations on the application

	Examiner
	Been, Mathieu

Application number

WRITTEN OPINION

NL2032634

Box No. I Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application, this opinion has been established on the basis of a sequence listing:

   a. ☐ forming part of the application as filed.

   b. ☐ furnished subsequent to the filing date for the purposes of search,

      ☐ accompanied by a statement to the effect that the sequence listing does not go beyond the disclosure in the application as filed.

3. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the application, this opinion has been established to the extent that a meaningful opinion could be formed without a WIPO Standard ST.26 compliant sequence listing.

4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes:	Claims	3, 7-10, 14, 15
	No:	Claims	1, 2, 4-6, 11-13
Inventive step	Yes:	Claims	
	No:	Claims	1-15
Industrial applicability	Yes:	Claims	1-15
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the application

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1 KR 101 738 836 B1 (CHUNG HWA POTTERY [KR]) 23 mei 2017 (2017-05-23)

D2 KR 2020 0136221 A (SANCHEONGTOGIWA [KR]) 7 december 2020 (2020-12-07)

D3 ES 2 141 685 B1 (MARCO MOLINUEVO JOSE MARIA [ES]) 16 november 2000 (2000-11-16)

D4 FR 1 405 338 A (PNEUMATIQUES, CAOUTCHOUC MANUFACTURE ET PLASTIQUES KLEBER-COLOMBES) 9 juli 1965 (1965-07-09)

D5 FR 2 127 380 A5 (PRIMAPLAST PROFILES) 13 oktober 1972 (1972-10-13)

1 The present application does not meet the criteria of patentability, because the subject-matter of claims 1 and 12 is not new.

1.1 Document D1 discloses (see paragraphs [0001], [0018] - [0020], [0027] - [0030], [0052] - [0061]; abstract; figures 1-8) all the technical features of independent claim 1, i.e. a "biodegradeerbaar substraat (bioceramics bricks 20 as represented in figures 7 and 8) voor groeihuisvesting van oesters en/of oesterlarven (the bioceramic bricks 20 are used for settling marine organisms and are suitable for setlling of oyster spat), omvattende:
- een geëxtrudeerd blok 20, omvattende een keramisch materiaal (see e.g. paragraph [0018] of the automated translation), zoals klei;
- ten minste één holte 21, ten minste gedeeltelijk omgeven door het geëxtrudeerde blok, die zich uitstrekt in de extrusierichting van het geëxtrudeerde blok 20 (see figures 7 and 8);
- waarbij ten minste één oppervlak van het geëxtrudeerde blok een golvend en/of geonduleerd patroon omvat (in the form of grooves 23 on the outer surface of the brick 20 in figure 8); en
- waarbij ten minste een deel van het blok een poreuze structuur omvat (pores 25; see paragraphs [0001], [0020], [0056])".

D1 also discloses all the technical features of independent claim 12, i.e. a "werkwijze voor het vervaardigen van een biodegradeerbaar substraat 20, omvattende de stappen van:
a) het mengen van een pasta omvattende klei en een ontvlambaar materiaal (wood chips) in een kneedbaar kernmateriaal (see paragraph [0053]);
b) het extruderen van het kernmateriaal in een blok en het vormen van ten minste één holte in het blok in de extrusierichting (see paragraph [0061]);
c) het drogen of het stollen van het blok (inevitable before baking);
d) het bakken van het blok en het verbranden van het ontvlambare materiaal van het blok (see paragraphs [0018], [0055], [0058]; wherein the burning of the wood chips during the baking process forms the pores 25 of the brick 20 to induce early establishment of marine organisms)".

All the technical features of independent claims 1 and 12 are thus known from this document D1, and the subject-matter of these claims can therefore not be regarded as new in view of D1.

1.2 Moreover, document D2 also discloses (see paragraphs [0005], [0008], [0013] - [0015], [0019], [0032] - [0065], [0068] - [0070]; abstract; figures 1a-4c) all the technical features of independent claim 1, i.e. a "biodegradeerbaar substraat 10 voor groeihuisvesting van oesters en/of oesterlarven (the blocks 10 are used for settling marine organisms underwater and are suitable for setlling of oyster spat), omvattende:
- een geëxtrudeerd blok 10, omvattende een keramisch materiaal (see e.g. paragraph [0066] of the automated translation), zoals klei,
- ten minste één holte (see figures 1a-1c, 2a-2b, 3, 4a-4c), ten minste gedeeltelijk omgeven door het geëxtrudeerde blok, die zich uitstrekt in de extrusierichting van het geëxtrudeerde blok 10;
- waarbij ten minste één oppervlak van het geëxtrudeerde blok een golvend en/of geonduleerd patroon omvat (in the form of shaped or irregular grooves 92; see paragraphs [0068]-[0069]); en
- waarbij ten minste een deel van het blok een poreuze structuur omvat (see paragraphs [0061]-[0062])".

All the technical features of independent claim 1 are thus also known from D2, and the subject-matter of claim 1 can therefore not be regarded as new in view of D2.

2 Dependent claims 2, 4-6, 11 and 13 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, are new with respect to the prior art cited in the present communication. The

reasons therefor are that:
- the additional features of claims 2, 5 and 13 are directly known from D1 (see the grooves 23 concerning the features of claim 2; see the multiple cavities 21 in figure 8 concerning the features of claim 5; see the similar dimensions of the bricks in the figures which result from cutting an extruded block into these bricks 20 concerning the features of claim 13),
- the additional features of claims 2, 4, 6 and 11 are directly known from D2 (see paragraph [0069] concerning the features of claim 2; see figure 4c concerning the features of claim 4; see the grooves 15 and the corresponding grooves in the inner surface of the bricks 10 of figure 3 concerning the features of claim 6; see paragraphs [0068] and [0069] concerning the features of claim 11).

3 Furthermore, dependent claims 3, 5, 7-10, 14 and 15 do not appear to contain any additional features which involve an inventive step when combined with the subject-matter of any claim to which they refer. The reasons therefor are that:
- the additional features of claims 3, 5 and 10 are a combination of features obvious to the person skilled in the art in consideration of D2 in combination with document D3 (see column 2, lines 10-38, 54-67; figures 1-3) concerning the provision of a trapezoidal prismatic block for settling marine organisms underwater (see figure 1 of D3), the provision of several trapezoidal cavities 1 in this block, and the provision of a biofilm 4,
- the additional features of claims 7-9 are a combination of features which can be regarded as a normal design option for the person skilled in the art in consideration of D2 in combination with their common general knowledge concerning the selection of specific dimensions and weight for the substrates 10 of D2,
- the additional features of claims 14 and 15 are a combination of features which can be regarded as a normal design option for the person skilled in the art in consideration of D1 in combination with their common general knowledge concerning the provision of a biofilm to improve the adhesion of marine organisms on the substrate (see e.g. D3) or the provision of a cooling step of each brick 10 after burning the wood chips to form the pores 25.

Re Item VII

Certain defects in the application

4 The relevant background art disclosed in D1 and D2 is not mentioned in the description, nor are these documents identified therein.

5 Independent claim 1 is not in the two-part form, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble and the remaining features being included in the characterising part.