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(54) **SYSTEM TO PROTECT OBJECTS FROM GROWTH ON SURFACES SUBMERGED INTO WATER**

SYSTEM ZUM SCHUTZ VON OBJEKTEN VOR WACHSTUM AN IN WASSER GETAUCHTEN
FLÄCHEN

SYSTÈME POUR PROTÉGER DES OBJETS CONTRE LE DÉVELOPPEMENT D'ALGUES SUR DES
SURFACES IMMERGÉS DANS L'EAU

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(73) Proprietor: **Cleanboatprotector Sweden AB**

274 91 Skurup (SE)

(72) Inventors:

- **Eriksson, Bror-Erik**
06500 Menton (FR)
- **Jeppsson, Jan**
274 91 Skurup (SE)

(74) Representative: **Ström & Gulliksson AB**

P.O. Box 4188
203 13 Malmö (SE)

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Description

[0001] The invention concerns a device for protecting objects, such as boats and tools, from organisms that grow and reproduce on object surfaces submerged into water.

Background

[0002] It is known from literature that ships and tools which are submerged in water will have growth of organisms on their submerged surfaces and this causes great problems. Sea acorns, algae and mussels reduce speed and possibility to manoeuvre the ship and they also increase the consumption of fuel (Ref. 1 and 2). Also functions of tools can be drastically altered by growth of sea acorns, algae and mussels or other water organisms. In order to avoid these problems various solutions have been presented. A system consisting of a belt which rubs off algae and other deposits from the surface of a boat is presented in the patent US 4,395,966. The purpose is to purely mechanically rub away the deposits. Another system is presented in the US patent 6,443,085 which utilizes a cover with holes of a predetermined size which is said to protect from growth of organisms on subjects submerged in water such as a boat. The size of the holes is completely vital for the function, according to the patent.

[0003] The use of a cover which has a lower density than water or which has air cushions is described in SE 527601. This device utilizes the movements between the boat and the cover, and the cover must have friction enough to remove the deposits. Another application WO 01/81167 A1 describes a cover for inhibiting the fouling for a vessel. The principle of this system is a cover resting in a vertical position. In order to achieve this, the covers have a density higher than water in the lower parts. To attach the cover to the boat it is necessary to use ropes and/or special tools to keep it in place.

[0004] Further background art is described in the references 3, 4 and 5. In the reference 3 "Settlingsval hos havstulpaner" the first step in the settling cycle of the sea acorn is described. The first step is the formation of the nauplius larv. The next step in the development is the forming of a cyprid larv which search for a suitable surface for settling. Signals from the environment can affect the choice of attaching or not attaching on the surface. Such factors are for example water flow close to the settling surface, light conditions, and the structure of the settling surface. When the larva finds a suitable surface it will produce protein glue that cures in water. The glue is very strong and it is very difficult to scrub off the surface. The final step is that the larva evolves into a fully developed sea acorn. Sea acorns can normally grow down to 6 m of water depth, deeper down the light conditions are not acceptable.

[0005] Even other water organisms like algae need light to develop and reproduce. Today different kinds of

colours for painting the outer bottom of the boat are used to protect the surface from growth of water organisms. However these colours release large portions of poisonous substances which have very serious consequences on the water environment.

[0006] The invention described below are intended to effectively hinder the growth of water organisms on object surfaces submerged into water without any material containing poisonous substances that can leak out into the water.

Description

[0007] The claimed device is intended to protect the bottom surfaces of boats or other object surfaces submerged into water from growth of algae or sea acorns. The boat or the object should be driven or moved up upon a cover which has a lower density than water and that is attached to a bridge. The density lower than water can be achieved by selecting a proper material or by attaching air pockets in the cover. According to the invention, the material suited for the cover is PVC, polyethylene, or polypropylene that are armed with polyester fibres. A preferred solution is to utilize a PVC cover with a thickness of 0.2 to 0.8 mm armed with polyester fibers for example the trademarks SCANPLAN 5140PF (Scantarp, Kuopio, Finland) or NAIZIL PS ADR PHTALATE FREE (NAIZIL INC., Canada). Both these two materials are phthalate free. This cover is combined for example by welding with foam of PVC (Expanancel®). The foam contains microspheres, in which gas is encapsulated and this result in a lifting force to the cover. The gas filled spheres are completely closed and therefore they cannot be filled with water. The PVC foam has a thickness of about 4 mm (interval 2 to 8 mm). An example of material is also polyethylene foam of trademark Alveolit TA4000 (DAFAA/S, Denmark),

[0008] Another feature of the cover is to significantly reduce the amount of light that is transmitted through the cover into the water. This can be achieved by adding additives to PVC. A preferred colour is the trademark F4050-R90B, which is relatively dark blue and suitable for the environment and results in a pleasant blue colour. This is important since the cover is attached to a bridge. Other colours can also be used. Since the cover has a density lower than water it is floating, and when the boat is driven onto it the cover will closely attach to the surface of the boat. This will reduce the amount of surface water around the boat and reduce the possibility for the cyprid larva to settle at the surface. Furthermore the light will be significantly reduced which decreases the possibilities for algae and sea acorns, to develop and to reproduce. In this example the cover is supposed to be attached to the bridge but it could of course also be attached to the boat by preset attachment points. Furthermore it has been proposed that the boat is moved or driven to the cover, but of course it is also possible for the cover to be drawn under the boat or the tool and then be attached

by ropes on either the bridge or the object.

[0009] Since the cover has a lower density or the cover contains air cushions, the object will push down the cover and the cover will attach closely to the surface of the object. In another preferred example, the cover can have a slit in order to allow for a deep keel that will not be enclosed by the cover in difference to the rest of the submerged boat.

[0010] The choice of material for the cover is made in such a way that it does not release any poisonous substances into the water, see examples above. It is also possible to use various types of natural textiles such as cotton, linen, hemp, cellulose fibres or different types of synthetic substances.

[0011] In another preferred design the outer borders of the cover could contain perforated channels so that air could be pumped through these holes in wintertime to keep the sides of the boat or tool ice free.

[0012] References:

1. Samhällets inverkan på Östersjön. J. Bohm. Luleå tekniska universitet. Institutet for Tillämpad kemi och geovetenskap. 2006.

2. Marin påväxt - ett svårlost problem. L.Mårtensson. Zoofysiologi. Göteborgs universitet. 2005.

3. Settlingssval hos havstulpaner. Projektarbete. J.Winell. D.Hammenstig. Gullmarsgymnasiet. 2005-04-05.

4. Cypridlarvers. Balanus improvisus. Beteende och settlingssintensitet i strömmande vatten. C. Lagerholm. Inst. for Marin Ekologi. Tjärnö. Marin Biologiska Laboratorie. 2000.

5. "Nu är det dags att tvätta båtens botten". Länssstyrelsen i Stockholm. Havstulpanprojektet 2007-11-29.

Claims

1. A device for protecting objects from organisms that grow and reproduce on object surfaces submerged into water, said device comprising a cover which has a density lower than water or which is provided with encapsulated air cushions, **characterized in that** the cover is arranged to cover the surfaces submerged into water and comprises a textile which is not permeable by light and which is made of one of: PVC, polyethylene or polypropylene, and which is armed with polyester fibres and joined with a foam containing closed microspheres, said microspheres being so designed that the cover will, in use, physically attach closely to the surfaces submerged into water, thereby hindering formation of a bio-film on said surfaces, which film could be the base for other

organisms like algae, mussels and water acorns to settle on said surfaces of the objects.

2. The device according to claim 1, **wherein** the cover consists of a textile joined with a foam of polyvinylchloride or polyethylene.
3. The device according to claim 1 or 2, **wherein** the cover consists of a dark coloured textile to prevent transmission of light.
4. The device according to any of claims 1-3, **wherein** the cover is designed with a slit for boats with a deep keel.
5. The device according to any of claims 1-4, **wherein** perforated air channels are enclosed on each side of the cover.

Patentansprüche

1. Vorrichtung zum Schützen von Objekten vor Organismen, die auf Objektoberflächen, die in Wasser eingetaucht sind, wachsen und sich reproduzieren, wobei die Vorrichtung eine Abdeckung umfasst, die eine niedrigere Dichte als Wasser aufweist oder die mit eingekapselten Luftpolstern versehen ist, **dadurch gekennzeichnet, dass** die Abdeckung angeordnet ist, um die in Wasser eingetauchten Oberflächen zu bedecken, und ein Textil umfasst, das für Licht nicht durchlässig ist und das aus einem von: PVC, Polyethylen oder Polypropylen besteht, und das mit Polyesterfasern ausgestattet ist und mit einem Schaum verbunden ist, der geschlossene Mikrokugeln enthält, wobei die Mikrokugeln so gestaltet sind, dass sich die Abdeckung bei der Verwendung eng an die in Wasser eingetauchten Oberflächen physikalisch anlagert, wodurch die Bildung eines Biofilms auf den Oberflächen verhindert wird, wobei der Film die Basis sein könnte, dass sich andere Organismen wie Algen, Muscheln und Seepocken auf den Oberflächen der Objekte ansiedeln.
2. Vorrichtung nach Anspruch 1, wobei die Abdeckung aus einem Textil besteht, das mit einem Schaum aus Polyvinylchlorid oder Polyethylen verbunden ist.
3. Vorrichtung nach Anspruch 1 oder 2, wobei die Abdeckung aus einem dunkelfarbigem Textil besteht, um den Durchlass von Licht zu verhindern.
4. Vorrichtung nach einem der Ansprüche 1-3, wobei die Abdeckung mit einem Schlitz für Boote mit einem tiefen Kiel gestaltet ist.
5. Vorrichtung nach einem der Ansprüche 1-4, wobei perforierte Luftkanäle auf jeder Seite der Abdeckung

eingeschlossen sind.

Revendications

1. Système pour protéger des objets contre des organismes qui se développent et se reproduisent sur des surfaces d'objet immergées dans l'eau, ledit système comprenant un couvercle ayant une densité inférieure à celle de l'eau ou qui est doté de coussins d'air encapsulés, **caractérisé en ce que** le couvercle est agencé pour recouvrir les surfaces immergées dans l'eau et comprend un textile qui n'est pas perméable à la lumière et qui est constitué d'un de : PVC, polyéthylène ou polypropylène, et qui est renforcé de fibres en polyester et lié à une mousse contenant des microsphères fermées, lesdites microsphères étant conçues de telle sorte que, lors de l'utilisation, le couvercle est physiquement fixé solidement aux surfaces immergées dans l'eau, empêchant ainsi la formation d'un biofilm sur lesdites surfaces, ledit film pouvant servir de base à d'autres organismes comme des algues, des coquillages et des glands de mer, pour s'établir sur lesdites surfaces des objets.
2. Système selon la revendication 1, dans lequel le couvercle est constitué d'un textile lié à une mousse de chlorure de polyvinyle ou de polyéthylène.
3. Système selon la revendication 1 ou 2, dans lequel le couvercle est constitué d'un textile de couleur sombre pour empêcher la transmission de la lumière.
4. Système selon l'une quelconque des revendications 1 à 3, dans lequel le couvercle est doté d'une fente pour bateaux à quille profonde.
5. Système selon l'une quelconque des revendications 1 à 4, dans lequel des conduites d'air perforées sont jointes de chaque côté du couvercle.

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REFERENCES CITED IN THE DESCRIPTION

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- US 4395966 A [0002]
- US 6443085 B [0002]
- WO 0181167 A1 [0003]

Non-patent literature cited in the description

- **J. BOHM.** Samhällets inverkan på Östersjön. Luleå tekniska universitet. Institutet for Tillämpad kemi och geovetenskap, 2006 [0012]
- Marin påväxt - ett svårlöst problem. **L.MÅRTENS-SON.** Zoofysiologi. Göteborgs universitet, 2005 [0012]
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- Nu är det dags att tvätta båtens botten. Länsstyrelsen i Stockholm. Havstulpanprojektet, 29 November 2007 [0012]