



US 20080282956A1

(19) **United States**

(12) **Patent Application Publication**
Morace

(10) **Pub. No.: US 2008/0282956 A1**

(43) **Pub. Date: Nov. 20, 2008**

(54) **MARINE PLANT FOR THE AUTOMATIC WASHING OF BOATS, IN PARTICULAR FOR CLEANING THE HULL**

(30) **Foreign Application Priority Data**

Nov. 29, 2005 (IT) MI2005A002279

(76) **Inventor: Alberto Morace, Catanzaro (IT)**

Publication Classification

Correspondence Address:
IP STRATEGIES
12 1/2 WALL STREET, SUITE E
ASHEVILLE, NC 28801 (US)

(51) **Int. Cl.**
B63B 59/06 (2006.01)

(52) **U.S. Cl.** 114/222

(57) **ABSTRACT**

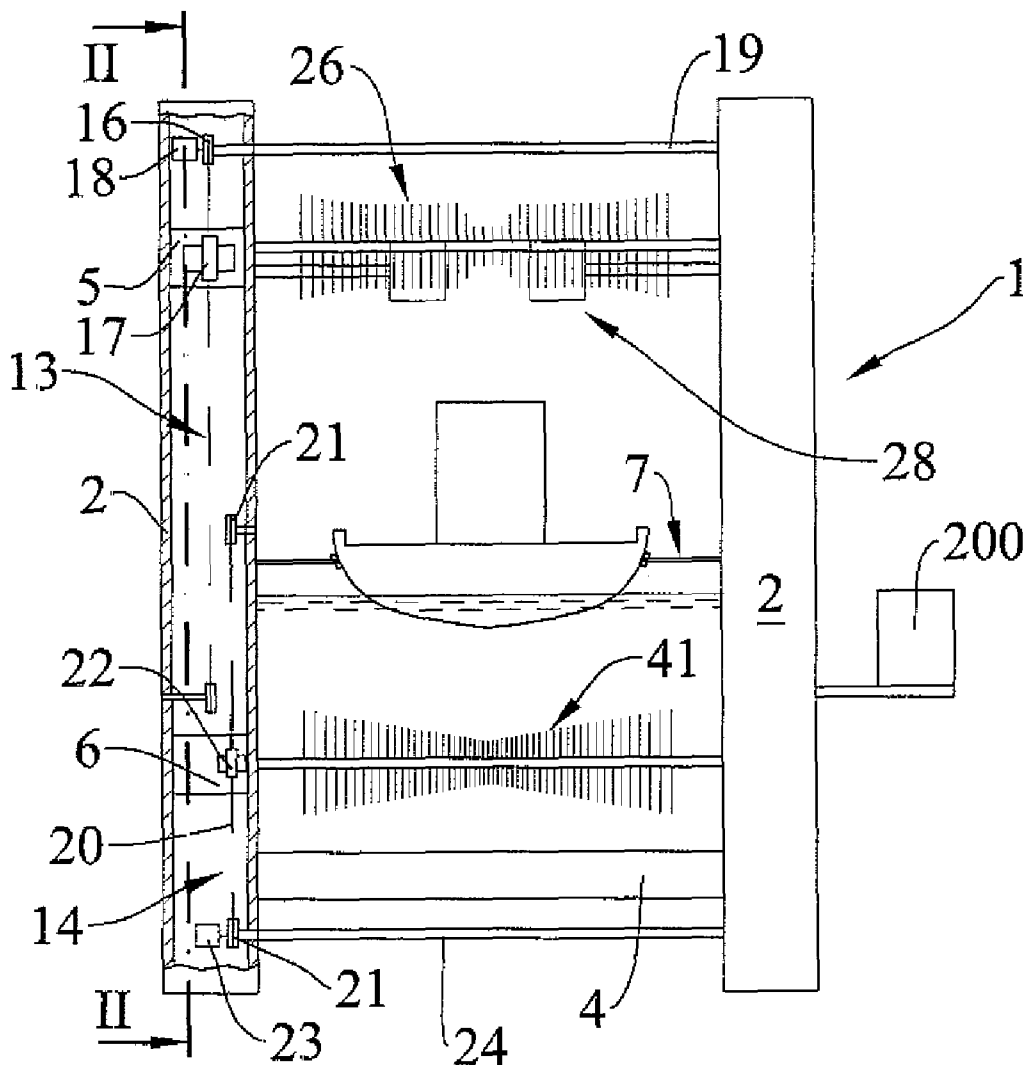
(21) **Appl. No.: 12/095,061**

Herein described is a marine plant for the automatic washing of boats, characterised in that it comprises a supporting structure (1) partially submerged, means (26, 28, 41) for cleaning the boat, means (13-14, 25-26, 40) for transmitting the motion commanded by at least one motor (18, 23, 34, 39) suitable for reciprocally positioning at least part of said cleaning means (26, 28, 41) in relation to the boat (8, 30), and a command unit (200) for the operator to control the marine plant.

(22) **PCT Filed: Sep. 25, 2006**

(86) **PCT No.: PCT/EP2006/066696**

§ 371 (c)(1),
(2), (4) **Date: May 27, 2008**



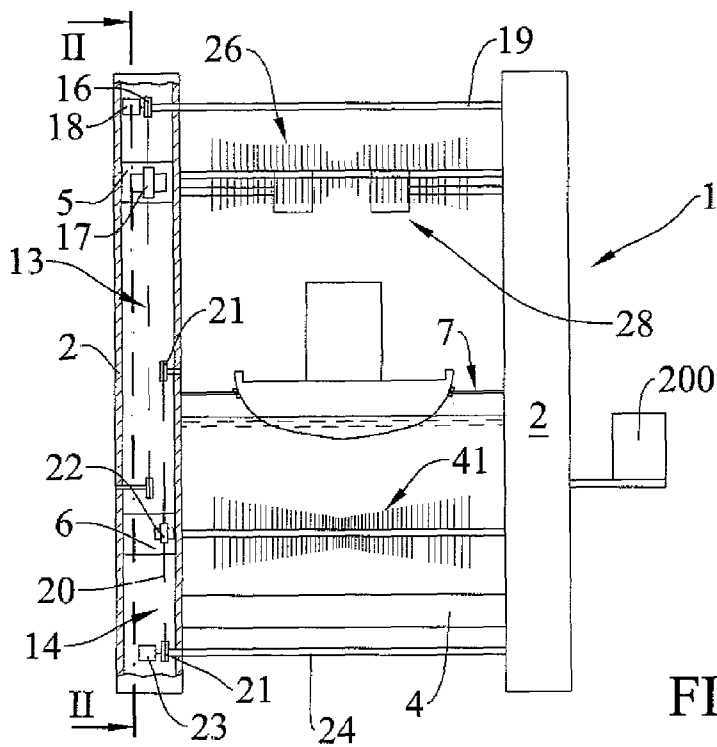


FIG.1

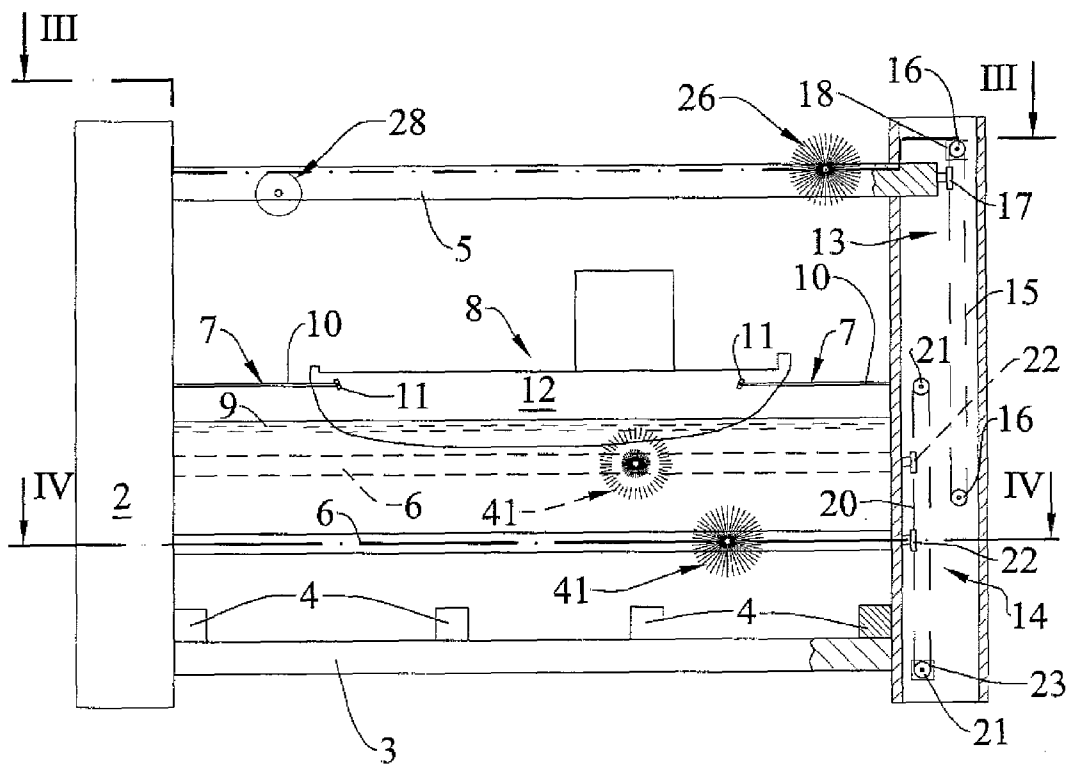


FIG.2

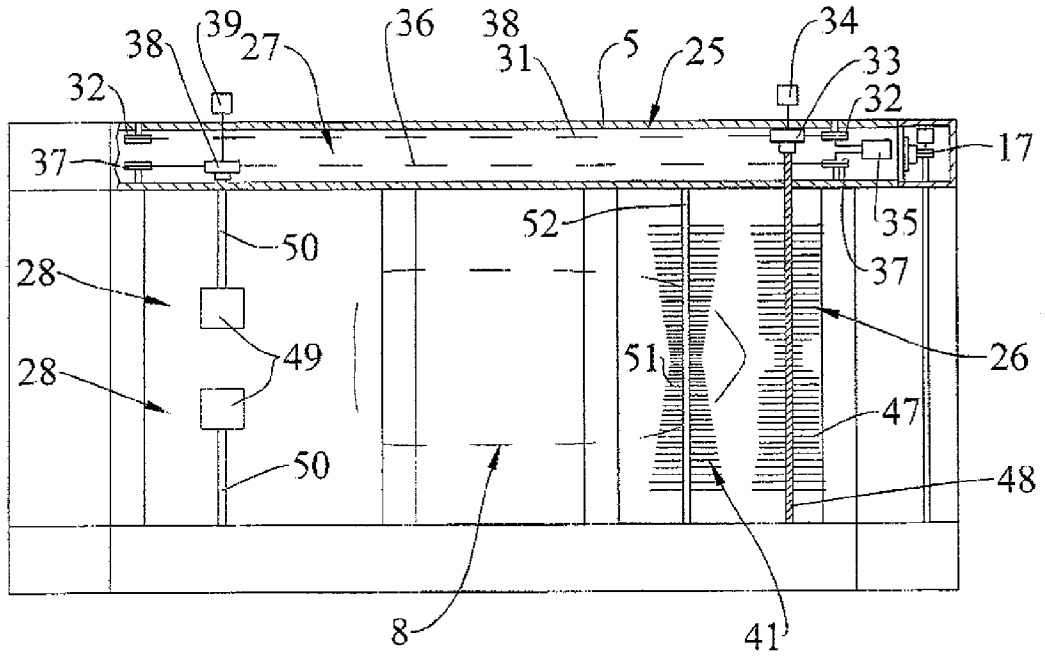


FIG.3

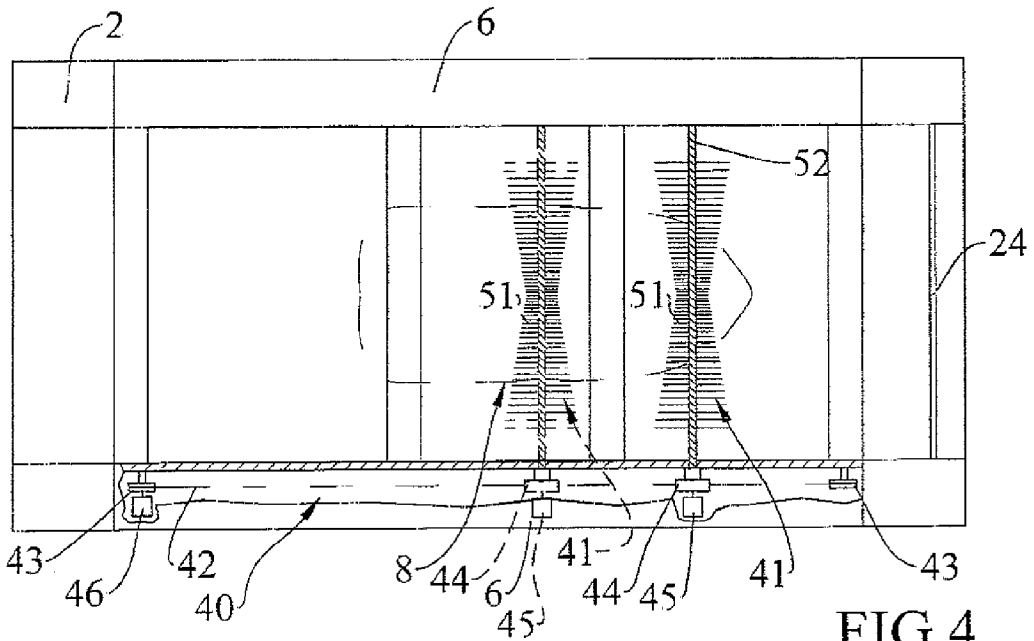


FIG.4

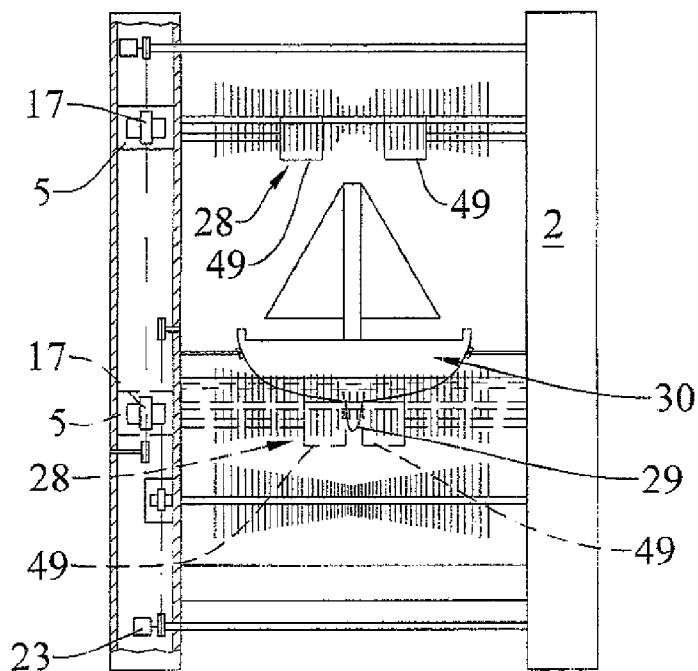


FIG.5

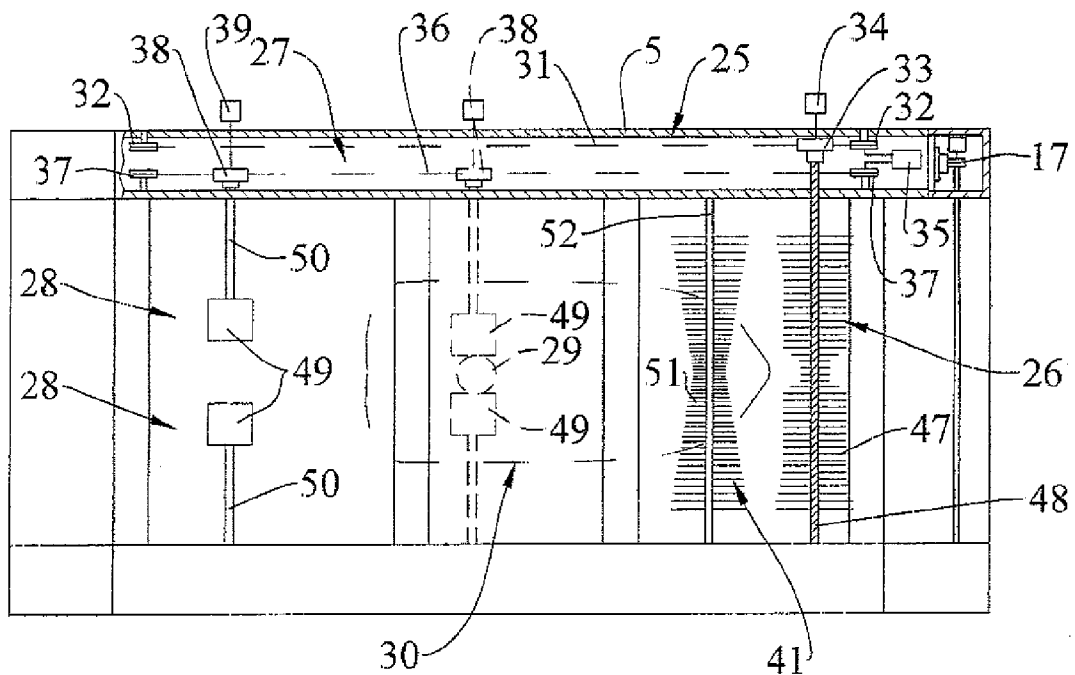


FIG.6

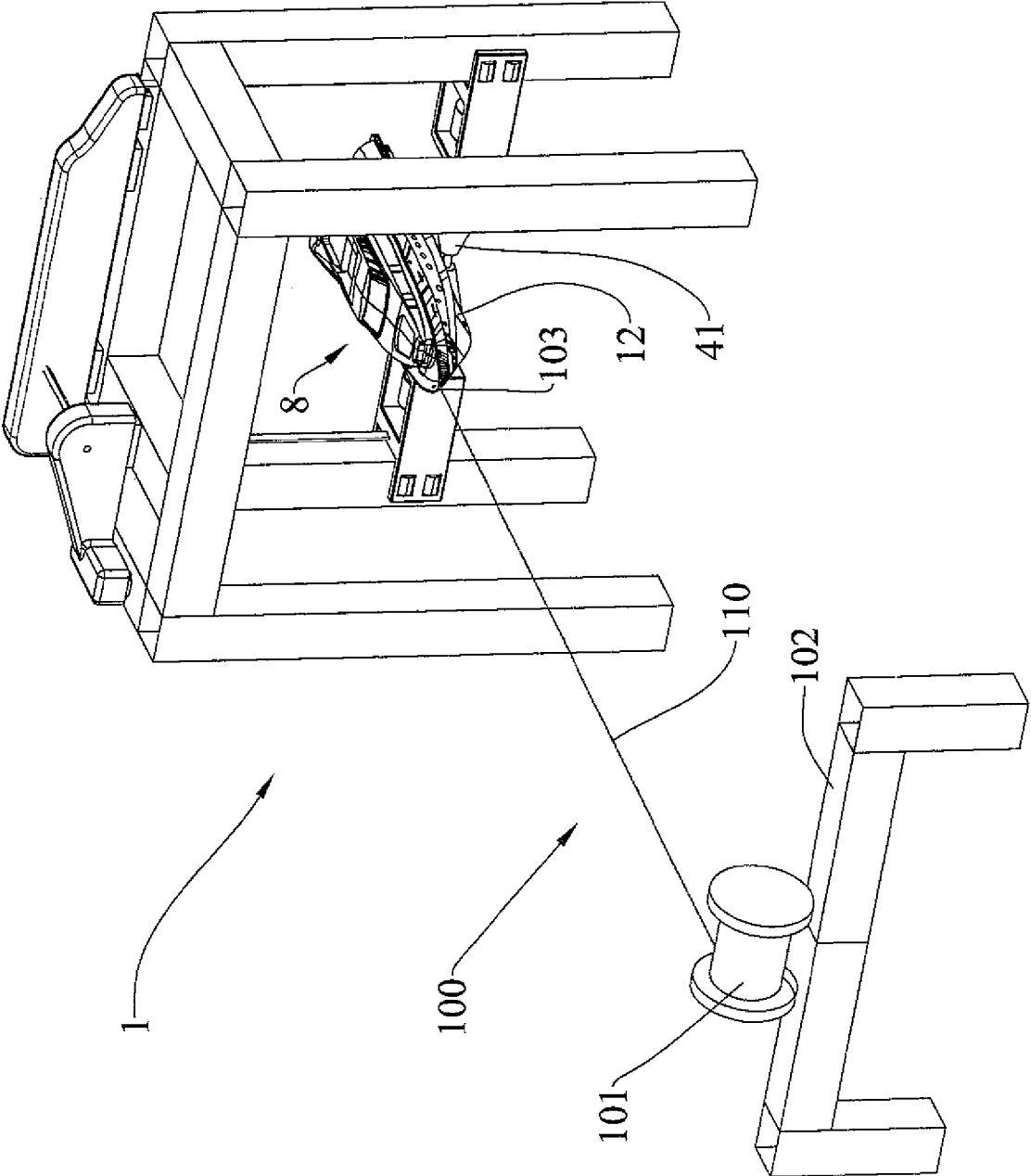


FIG. 7

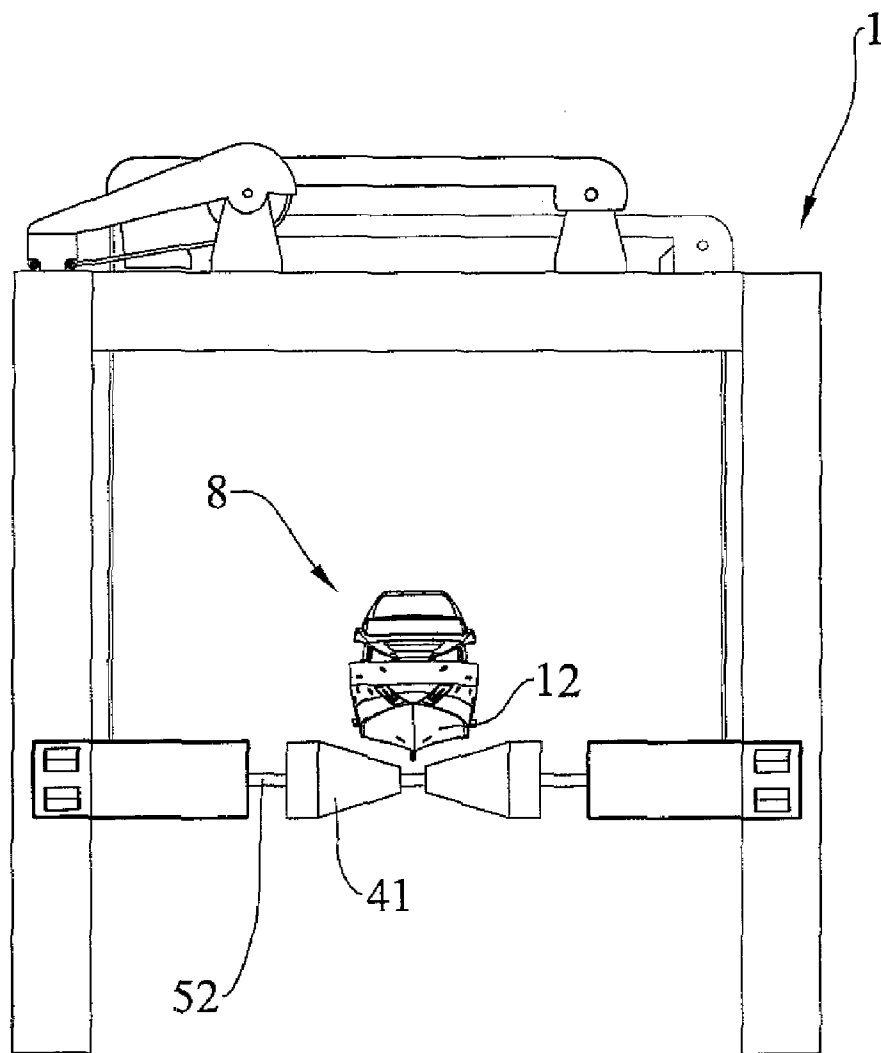


FIG. 8

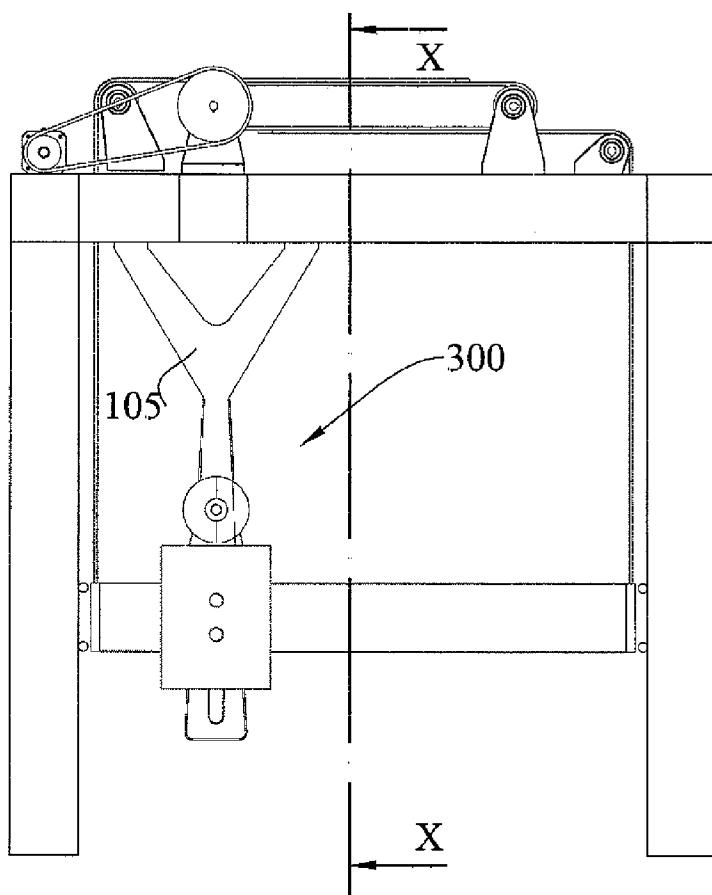


FIG. 9

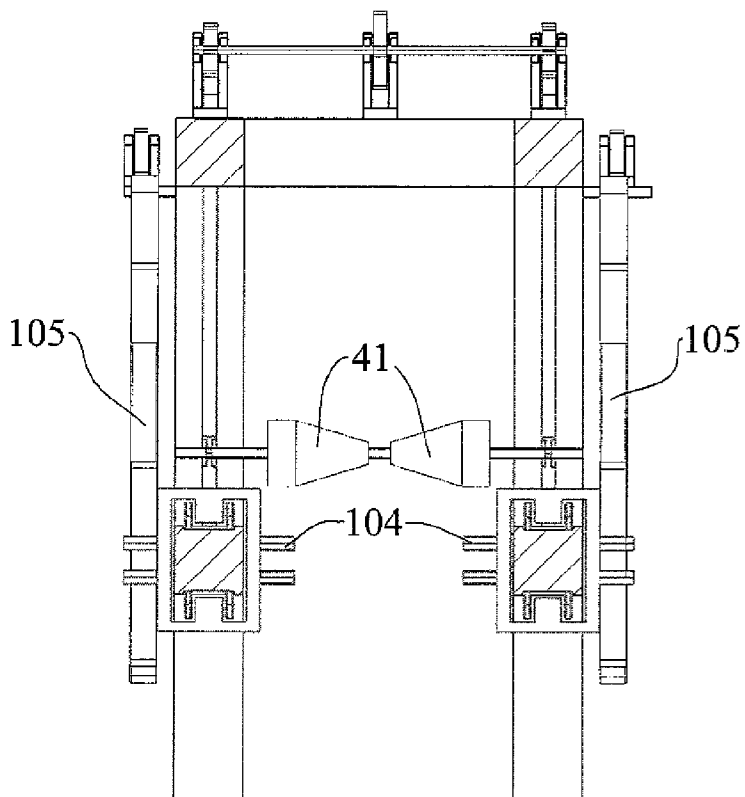


FIG. 10

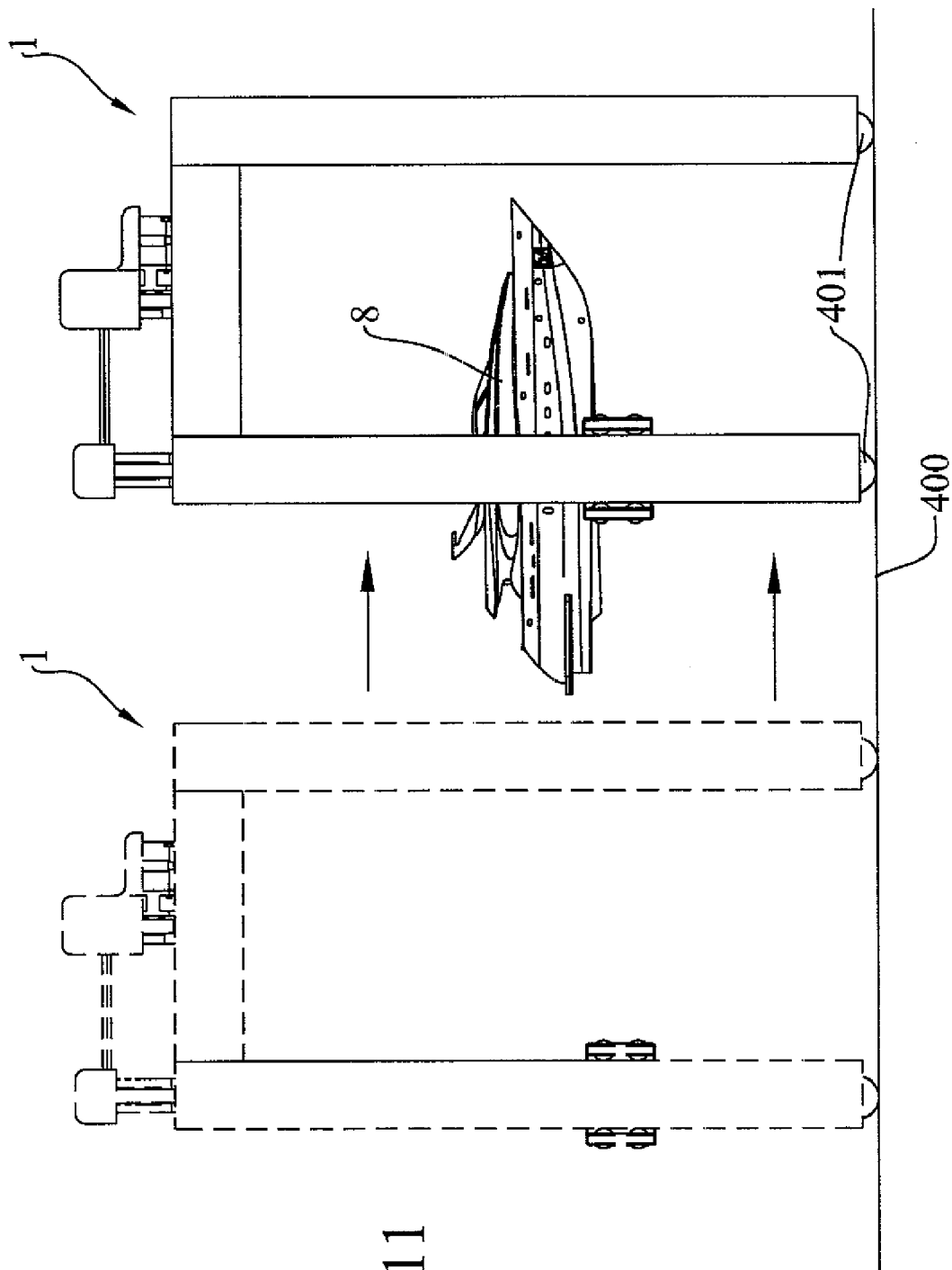


FIG. 11

MARINE PLANT FOR THE AUTOMATIC WASHING OF BOATS, IN PARTICULAR FOR CLEANING THE HULL

[0001] The present invention relates to a marine plant for the automatic washing of boats, in particular for cleaning the hull.

[0002] The hull of boats, more precisely the submerged part that is the so-called "underwater hull", is particularly subject to wear as it is constantly in contact with water.

[0003] If we consider a new boat with a perfectly clean hull, in a few days a thin vegetative layer is formed from the moment it is placed in water.

[0004] After about one month said vegetative layer consolidates and small shellfishes adhere to the hull.

[0005] After several months said layer is almost a crust that starts to deteriorate the hull.

[0006] To safeguard the hull it is necessary to periodically remove the vegetative layer and the formations of shellfishes.

[0007] Commonly two-three times a year the boat is taken to the shipyards and is removed from the water by a crane so that the hull can be worked on.

[0008] Special treatment is necessary to remove the layer and then to paint the hull with anti-vegetative substances.

[0009] When the maintenance work has been completed the boat is returned to the water.

[0010] The current procedure for the maintenance of the boat presents various disadvantages because it is necessary to:

[0011] raise the boat completely from the water, which is a very complex operation (also dangerous) for medium-large boats; special cranes may be needed which are present only in ports of a certain size;

[0012] involve various people;

[0013] use special instruments for removing the vegetative layer and the shellfishes adhering to the hull; the hull treatment comprises sanding of the entire underwater hull thereby introducing deleterious dusts in the atmosphere;

[0014] paint the hull with anti-vegetative paint that is very damaging for the environment;

[0015] return the boat to the water.

[0016] All these disadvantages inevitably lead to costs that are not negligible.

[0017] In addition if a boat with a "dirty" hull is used its performance in water drops considerably: the speed decreases and the consumption increases. Substantially there are also "hidden" costs that can have a high incidence on the overall maintenance cost of a boat.

[0018] Object of the present invention is to produce a plant capable of carrying out automatic cleaning of the boat and in particular of the hull without having to remove the boat from the water.

[0019] In accordance with the invention, said object is achieved with a marine plant for the automatic washing of boats, characterised in that it comprises a partially submerged bearing structure, means for cleaning the boat, means for transmitting the motion commanded by at least one motor suitable for reciprocally positioning at least part of said cleaning means in relation to the boat, and a command unit for the operator to control the marine plant.

[0020] The plant is partially submerged so that the entire cleaning operation is carried out in water. The removal of the

vegetative layer comes about underwater. The cleaning of the hull can be carried out quite frequently (once a month for example) thus preventing said layer from becoming excessively hard.

[0021] These and other characteristics of the present invention will be made clearer by the following detailed description of an embodiment thereof illustrated as non-limiting example in the enclosed drawings, in which:

[0022] FIG. 1 shows a partially sectioned front view of a plant according to the present invention with the cleaning means in a rest position;

[0023] FIG. 2 shows a view according to the line II-II of FIG. 1;

[0024] FIG. 3 shows a view according to the line III-III of FIG. 2;

[0025] FIG. 4 shows a view according to the line IV-IV of FIG. 2;

[0026] FIG. 5 shows a partially sectioned front view similar to that of FIG. 1 but with several cleaning means in a work position;

[0027] FIG. 6 shows a partially sectioned plan view of the plant of FIG. 5;

[0028] FIG. 7 shows a perspective view of a second embodiment of the plant according to the present invention;

[0029] FIG. 8 shows a frontal view of the plant of FIG. 7;

[0030] FIG. 9 shows a lateral view of a third embodiment of the plant according to the present invention;

[0031] FIG. 10 shows a sectional view according to the line X-X of FIG. 9;

[0032] FIG. 11 shows a further embodiment of the plant according to the present invention.

[0033] The marine plant shown in the FIGS. 1-6 comprises a supporting structure 1 in steel or other rigid material, placed on the seafloor (or anchored floating) and partially submerged, having hollow bearing columns 2, fixed longitudinal beams 3 and fixed transversal beams 4.

[0034] Said columns 2 support couples of hollow beams 5-6 (upper 5 and lower 6) mobile in a vertical direction, and means 7 for blocking a boat 8 floating on the water 9 in the basin generated by the marine plant itself.

[0035] Said blocking means 7, controlled by the operator by means of a command unit 200 (FIG. 1), comprise extendable and retractable mobile rods 10 hinged to the columns 2 and ending with an plate 11 resting on the hull 12 of the boat 8. Said plate is covered with a soft material so as not to damage the hull 12 while it is in contact with it.

[0036] A chain transmission 13 for the vertical motion of the upper beam 5 and a chain transmission 14 for the vertical motion of the lower beam 6 are housed inside each of the columns 2.

[0037] The transmission 13 (FIGS. 1-2) is made up of a chain 15 drawn between a couple of gear wheels 16. A carriage 17 hooked to the chain 15 pulls the upper beam 5 suitably hooked to said carriage 17. A motor 18 commands one of the gear wheels 16. A transversal upper shaft 19 transmits the rotary motion from one column 2 to the other.

[0038] The transmission 14 (FIGS. 1-2) is made up of a chain 20 drawn between a couple of gear wheels 21. A carriage 22 hooked to the chain 20 pulls the lower beam 6 suitably hooked to said carriage 22. A motor 23 commands one of the gear wheels 21. A transversal lower shaft 24 transmits the rotary motion from one column 2 to the other.

[0039] A chain transmission 25 for the horizontal motion of a roller 26 and a chain transmission 27 for the horizontal

motion of a couple of rollers **28** for a fin **29** of a sailboat **30** are housed inside each upper beam **5** (FIG. 3).

[0040] The chain transmission **25** comprises a chain **31** drawn between gear wheels **32**, and a carriage **33** that supports the roller **26** made to rotate by a motor **34**. A motor **35** commands at least one gear wheel **32**.

[0041] The chain transmission **27** comprises a chain **36** drawn between gear wheels **37**, and a carriage **38** that supports one of the rollers **28** made to rotate by a motor **39**. The motor **35** commands at least one gear wheel **37**.

[0042] A chain transmission **40** for the horizontal motion of a roller **41** is housed inside each lower beam **6** (FIG. 4). Said transmission **40** comprises a chain **42** drawn between gear wheels **43**, and a carriage **44** that supports the roller **41** made to rotate by a motor **45**. A motor **46** commands at least one gear wheel **43**.

[0043] The roller **26** comprises brushes **47** supported by a rotating shaft **48** revolvingly connected to the carriage **33**.

[0044] Each roller **28** comprises a cleaning element **49** supported by a rotating shaft **50** revolvingly connected to the carriage **38**.

[0045] The roller **41** comprises brushes **51** supported by a rotating shaft **52** revolvingly connected to the carriage **44**.

[0046] FIG. 7 shows towing means **100** whose allow to move horizontally the boat **8** when the horizontal motion of the rollers **26**, **28**, **41** is not provided. Substantially instead of blocking the boat **8** and horizontally moving the rollers **26**, **28**, **41**, the boat **8** is moved horizontally and rotating rollers **26**, **28**, **41** are kept still in position.

[0047] The towing means **100** comprise a motorized pulley **101** supported by a frame **102** eventually fixed to the harbour platform, a cable **110** and a hitch **103** for connecting the boat **8**.

[0048] FIG. 9-10 show boat raising means **300** whose comprise coupling rod **104** and motorized raising means **105**.

[0049] FIG. 11 shows underwater guiding rail **400** for wheels **401** for translating the supporting structure **1**.

[0050] Concerning the operation, we shall consider the marine plant with the rollers **26**, **28** and **41** in a rest position as shown in FIG. 1.

[0051] The boat **8** enters the basin of the plant and is positioned by means of the blocking means **7**.

[0052] The operator chooses the type of roller that is more suitable to the hull **12** of the boat and positions it.

[0053] The rollers **26** and **41** present different geometrical dimensions, the roller **26** being the most suitable in the case of hull **12** with lowered central portion.

[0054] In FIGS. 1-2 an average type of boat **8** with hull **12** suitable for being cleaned by the roller **41** is considered. The operator thus commands the raising of the beam **6** and translates the carriage **44** until the brushes **51** are near the hull **12** (dotted part of FIGS. 2 and 4).

[0055] To start the cleaning the motor **45** is commanded to start the rotation of the roller **41**. The brushes **51** interact with the hull **12** for its entire length, in the meantime the carriage **44** being moved.

[0056] If the operation is carried out quite frequently (for example once a month) only a light clean is needed to remove the vegetative layer and other impurities adhering to the hull **12**. If desired a light re-clean can also be provided for.

[0057] The control unit comprises software with memory by means of which the positioning and cleaning of the roller

can be programmed. The system is similar to that of automatic car washes where the vehicle is positioned and all you have to do is press a key.

[0058] The marine plant comprises as shown in the Figures two standard rollers **26** and **41**, and a couple of rollers **28** useful for cleaning any protuberances under the hull **12** of the boat, such as the fin **29** of the sailboat **30** (FIGS. 5-6).

[0059] To bring the rollers **28** to the work position (dotted part in the FIGS. 5-6) all that has to be done is to lower the upper beam **5** commanding the gear wheel **16** by means of the motor **18**.

[0060] The roller **41** is sufficiently submerged to permit excellent positioning of the rollers **28** or **26** (they are supported by the same upper mobile beam **5**).

[0061] After lowering the beam **5**, the motor **35** is made to work thus permitting the translation of the carriage **39** taking the elements **49** near the fin **29**. Then the rotation of the rollers **28** is activated by means of the motor **39** and the shafts **50** are lengthened to bring the cleaning elements **49** even closer.

[0062] The rollers **26**, **28** and **41** can be replaced, either for wear or for the hulls **12** that need specially shaped rollers.

[0063] Special rollers with a "V" shape enable the cleaning of the part of the hull that is not submerged.

[0064] In addition rollers **26** and **41** can be used consisting of facing couples similar to the couple of rollers **28**. The single rollers of the above mentioned facing couples can comprise variable orientation shafts that is not only horizontal orientation. A particular joint enables them the same to rotate around the axis.

[0065] The plant described with reference to FIGS. 1-6 can be simplified providing the towing means **100** (FIGS. 7-8) whose allow to move the boat horizontally on the water without means for horizontally translating the rollers **26**, **28**, **41**. The roller truncated cone shape (FIG. 9) allows to guide the boat **8** thereby linearly going on.

[0066] It's enough hooking the boat **8** to the towing hitch **103** and starting the washing operation (towing and rotating the rollers).

[0067] The advantages of the marine plant according to the present invention are numerous and can be summed up as a 70% lower cleaning cost compared to the known systems of cleaning the hull. The plant is in fact fixed to the seafloor (lake, river or sea) in ports or nearby. All that has to be done is to pilot the boat inside the basin of the plant, wait for a few minutes (even without getting off the boat), and the hull is perfectly clean. Thus the risks of raising the boat are avoided.

[0068] The only warning, as has already been mentioned, is that frequent cleaning must be carried out (about once a month).

[0069] The savings are even higher if the greater performance in water of the boat is considered, due to the clean hull that keeps friction at a minimum.

[0070] Further it is possible to provide a mobile supporting structure **400** (FIG. 11), In this case the horizontal motion of the rollers happens following the translation of the entire marine plant. The boat **8** is blocked and remains always on the water.

[0071] Said guides **400** can be underwater guides, as shown in FIG. 11, or outside water guides arranged on harbour platforms not shown (in case of hostile seafloor).

[0072] The functions of the marine plant shown in the Figures can be broadened. For example the following can be provided for:

- [0073] means 300 for raising the boat to carry out extraordinary jobs on the hull (see FIG. 9-10);
- [0074] further longitudinal fixed beams useful as gangway for the operator and further supporting cleaning means (for example powerful suction cleaners for cleaning the interior of the boat, high pressure water jet machines, air compressors);
- [0075] automatic systems for replacing the rollers (a side roller loader with mechanical arms useful for the replacement);
- [0076] powerful electronic circuits in the control unit with integrated software for more automated management of the cleaning;
- [0077] sensors for precise positioning of the boat in the basin;
- [0078] transmissions of the motion by belt and/or with pneumatic systems and/or hydraulic systems, thus reducing the number of gears.

- 1. Marine plant for the automatic washing of boats, wherein it comprises a supporting structure partially submerged, means for cleaning the boat, means for transmitting the motion commanded by at least one motor suitable for reciprocally positioning at least part of said cleaning means in relation to the boat, and a command unit for the operator to control the marine plant.
- 2. Plant according to claim 1, wherein it comprises blocking means of the boat.
- 3. Plant according to claim 1, wherein it comprises boat towing means.
- 4. Plant according to claim 3, wherein said towing means comprise a motorized pulley, a cable and a hitch.
- 5. Plant according to claim 1, wherein said cleaning means comprise at least a roller for cleaning at least the hull of the boat.
- 6. Plant according to claim 5, wherein said means for transmitting the motion allow the translating motion and the rotating motion of said at least one roller.
- 7. Plant according to claim 1, wherein said supporting structure partially submerged comprises supporting hollow columns and longitudinal beams and transversal beams.

- 8. Plant according to claim 1, wherein it comprises at least one couple of hollow mobile beams suitable for supporting at least a part of the cleaning means.
- 9. Plant according to claim 1, wherein said at least one roller comprises brushes supported by a rotating shaft.
- 10. Plant according to claim 1, wherein said cleaning means comprise at least one couple of rollers one in front of the other supported by shafts.
- 11. Plant according to claim 10, wherein said shafts can be lengthened and retracted.
- 12. Plant according to claim 10, wherein said shafts are oriented.
- 13. Plant according to claim 5, wherein said at least one roller can be varied in shape thus being able to adapt itself to the shape of the hull of the boat.
- 14. Plant according to claim 1, wherein said means for the transmission of the motion comprise at least one chain transmission made up of a chain drawn between gear wheels moved by motors.
- 15. Plant according to claim 1, wherein said means for the transmission of the motion comprise at least one belt transmission.
- 16. Plant according to claim 1, wherein said means for the transmission of the motion comprise pneumatic and/or hydraulic command devices.
- 17. Plant according to claim 1, wherein it comprises raising means for raising the boat from the water.
- 18. Plant according to claim 1, wherein said supporting structure rests on the seafloor.
- 19. Plant according to claim 1, wherein said supporting structure floats anchored to the seafloor.
- 20. Plant according claim 1, wherein it is horizontally movable along guides.
- 21. Plant according to claim 20, wherein said guides are underwater guides.
- 22. Plant according to claim 20, wherein said guides are outside water guides arranged on a platform.
- 23. Plant according to claim 1, wherein said cleaning means are automated by means of said command unit.
- 24. Plant according to claim 1, wherein it comprises mobile beams automated by means of said command unit.

* * * * *