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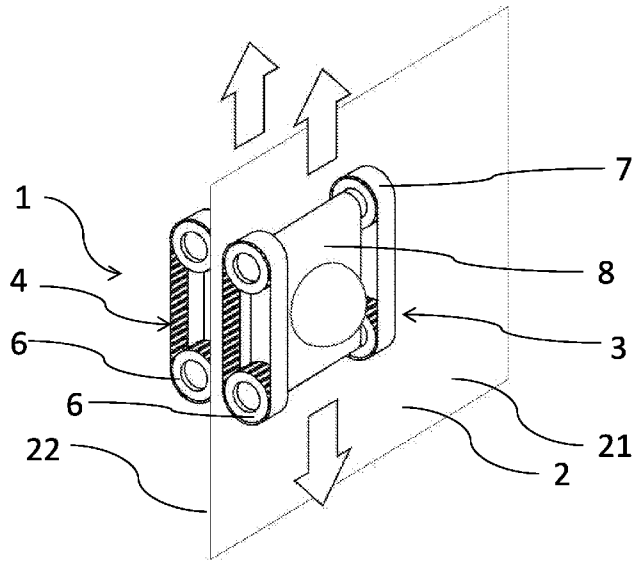


Fig. 1

(57) Abstract: There is described an assembly (1) for carrying out an operation on a net (2), the assembly (1) comprising an operation system (5), wherein that the assembly (1) further comprises: - a first movable unit (3) for being arranged on a first side (21) of the net (2); and - a second movable unit (4) for being arranged on a second side (22) of the net (2), the second movable unit (4) having a relative orientation with regards to the first movable unit (3); wherein the first movable unit (3) and the second movable unit (4) are provided with magnetic elements for holding said movable units (3, 4) at the same position but on opposite sides of the net (2), and for fixing the relative orientation of the movable units (3, 4).

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ASSEMBLY FOR CARRYING OUT AN OPERATION ON A NET

The invention concerns an assembly for carrying out an operation on a net, net cage, seine, or pen used in the fish farming industry. The assembly may also be used for carrying out operations on other substantially flat structures. The seine, net, net cage or pen may be completely or partly submerged in water, but may also be placed in a dry environment. Said net, seine, net cage or pen may be in use, i.e. at least partly submerged and enclosing fish, while the assembly carries out an operation on it, or it may be taken out of the water for the operation to be performed. The operation may be an inspection, a cleaning operation, or another maintenance operation.

In fish farming, in order to prevent diseases and ensure satisfactory living conditions for the farmed fish, it is important to keep the seine or net clean and avoid fouling. A clean net ensures good circulation of water, which is essential to the environment inside of the net cage. Installations in the sea, such as net cages, are subjected to fouling by shellfish, algae, barnacles and hydroids.

It is known to clean substantially flat structures such as seines and nets of net cages, by means of a cleaning device comprising rotating discs which is lowered inside the net cage by means of a crane or the similar, for instance arranged on a boat on the outside of the net cage. The cleaning device then cleans the net by applying high pressure water and by the rotation action of said discs. The discs will help loosen fouling from the net, and the high pressure water will flush the fouling and dirt out of the net cage. One disadvantage of such a prior art cleaning device, is that it has to be operated from the surface. This requires mobilisation of both personnel and equipment, which might lead to cleaning of the net less often than desired. There are also known cleaning devices which do not require operation from a vessel on the surface. Typically, such devices will be provided with propelling means, each propel requiring a motor, and either a GPS-system or a remote control system. A disadvantage of such a device may be that the propelling means, and the device, may interfere with the fish in the net cage and that the cleaning device may be driven against the net with too much force. Also, keeping such a device running along the net requires more energy than what is the case for devices suspended from a vessel on the surface. Examples of known prior art devices will be given in the following.

Patent publication EP2348828B1 discloses an in situ submarine net cleaning and inspecting device which includes a skid chassis adapted for sliding across the surface of a net. A buoyancy device is associated with the chassis to provide the cleaner with buoyancy. A driving device is adapted to

cooperate with the net and manoeuvre the cleaner about the surface of the net. A propulsion device is adapted to propel the cleaner onto and maintain contact with the net, and a cleaning device is adapted to remove contaminants, including fouling, from the surface of the net.

Patent publication EP2251102A1 discloses a submersible cleaning robot comprising a robot body that moves along the surface of a cleaning subject item present underwater, and a cleaning nozzle unit that is provided within the robot body and cleans the cleaning subject item by jetting high-pressure water towards the surface of the cleaning subject item, an auxiliary cleaning work device is installed to the robot body. A propeller is provided for pushing the work device body towards the surface of the cleaning subject item.

Patent publication NO336915B1 discloses an autonomous device for cleaning a surface of a submerged structure. The device includes a chassis having at least one brush and two electrically driven driving wheels, one electrically driven propeller and at least one buoyancy body. The device includes a rechargeable internal energy source and the publication further discloses a charging station for the autonomous device and a method of cleaning the submerged structure.

The invention has for its object to remedy or to reduce at least one of the drawbacks of the prior art, or at least to provide a useful alternative to prior art.

The object is achieved through features, which are specified in the description below and in the claims that follow.

The invention is defined by the independent patent claim. The dependent claims define advantageous embodiments of the invention.

More specifically, the invention relates to an assembly for carrying out an operation on a net, the assembly comprising:

- an operation system for carrying out the operation on the net;
- a first movable unit for being arranged on a first side of the net; and
- a second movable unit for being arranged on a second side of the net, the second movable unit having a relative orientation with regards to the first movable unit;

wherein the first movable unit and the second movable unit are provided with:

- magnetic elements for holding said first and second movable units at the same position but on opposite sides of the net, and for fixing the relative orientation of the movable units; and
- belts (7) for crawling over the surface of the net (2).

In the following, the word "net" is used to represent a seine, net cage, pen or any other term used in the fish farming industry for different kinds of enclosures in which the fish is farmed. A seine or net may in this context be seen as a sheet-shaped, or substantially flat, structure. However, it is not of any hindrance to the assembly if there are ropes or pipes or other elements, relatively small compared to the structure to be cleaned, which are present on the surface of the structure to be

cleaned. The fact that the surface of a net cage is slightly curved is of no concern with regards to carrying out operations on such a structure with the assembly according to the invention. It must be understood that the invention may also be used on other substantially flat structures, not only related to the fish farming industry. By "substantially flat structures" is herein meant for instance sheets/plates such as windows, signboards or the like, or even more uneven structures.

It is implicit from the above that the net, or structure on which an operation is to be carried out, must be accessible from two opposite sides in order to place one movable unit on each side. The magnetic elements arranged in the first movable unit will attract the magnetic elements arranged in the second movable unit. In this way the net will be squeezed between the movable units as the units synchronically drive over the net.

By "movable unit" is herein meant a unit which is provided with a drive unit of some kind, for instance a motor. Each movable unit will be provided with rotatable elements, preferably wheels, in order to be able to roll or drive over the net on which an operation is to be carried out. The movable units could alternatively be named carriages or vehicles. The movable units of the assembly can be identical to or different from each other. The important feature is that the two movable units are arranged to be kept in a fixed relative position to each other by means of the magnets.

By providing two carriages or movable units which are able to form a kind of sandwich structure with the structure or net on which an operation is to be carried out, i.e. the two movable units cling to each other by magnetic forces which are strong enough to extend through the structure, there is no need for operation from a vessel on the surface. Also, in providing an assembly which "walks", "crawls", rolls or drives over the structure, while holding the structure, there is no need for a propelling unit which disturbs the fish in the net cage. In addition to this, the magnetic forces will cause the assembly to be very energy efficient, since no motor force is needed for keeping the assembly in contact with the net or surface on which an operation is to be carried out. Permanent magnets are preferably used.

The movable units are provided with belts for crawling over the surface of the net. By "belts" is herein meant belts or straps or any elongated member suitable for being arranged typically around two wheels in order to provide some kind of crawler or tracked vehicle. Since the movable units are held in place by means of the magnets, the belts do not need to be of a certain kind in order to grip to the surface of the net.

The magnetic elements may be embedded in the belts. This is a preferred embodiment of the invention because it makes the synchronized movement of the two movable units easier to obtain. Preferably the belts of the two movable units are of the same size, such that the belt of the first movable unit drives "on" the belt of the second movable unit, in the sense that if no structure were held between the movable units, the belts would be in contact with each other over substantially the entire contact surface of the belt. This means that for instance when the assembly is in the

process of carrying out an operation on a net, the belts of the two movable units are in contact with each other through the holes of the net. In an alternative embodiment, the magnets may be arranged in connection with, but not embedded in, the belts.

The belts may comprise two parallel belts in each of the movable units. An embodiment where both movable units are provided with two parallel belts is a preferred embodiment of the invention.

Typically the movable units are provided with two pairs of wheels each, where the two wheels in each pair are connected to each other by a belt.

The two belts may be arranged for being driven at different speeds for manoeuvring of the movable units. The two belts on each movable unit, or carriage, may be driven by the same engine and the speed of the one belt may be altered with regards to the speed of the second belt by means of a gear unit. The movable unit will then turn in the direction of the belt with the slowest speed. The two movable units are preferably driven synchronically such that the belts corresponding to each other, or driving "on" each other, have the same speed and thus move simultaneously and in the same direction. However, it is conceivable to have an embodiment of the invention where the belts on one movable unit is driven by a motor and the belts on the other movable unit just follow the belts of the first movable unit by means of the magnets.

The assembly may further comprise thrusters for initial positioning. Thrusters may be arranged in both the first movable unit and in the second movable unit. The thrusters are for the initial positioning of the two movable units relative to the net and relative to each other such that the magnets of the movable units get into reach of each other. Four thrusters may be arranged on each of the movable units, preferably placed just above the wheels. A control system may be arranged for communicating with the thrusters on both movable units. The assembly may preferably be provided with a GPS system which comprises transmitters, for example four transmitters, for arranging on the net. Receivers in the movable units will receive information from the transmitters and the position of the movable units relative to the net may thus be calculated. The use of a GPS system is known to the skilled person and will not be described further herein.

The initial positioning of the movable units relative to the net may alternatively be done by arranging both movable units on a docking station at an end portion of the net or substantially flat structure on which an operation is to be carried out. In connection with a fishing net the docking station will preferably be arranged at a top portion extending out of the water. The docking station is made of a magnetic material such that the magnets of the movable units will keep the movable units connected to the docking station. The docking station will be arranged such that it creates access to the net from both sides. The movable units will be arranged such that when they start moving, they will, at the same time, access one side of the net each exactly opposite of each other.

The operation system may comprise an inspection device for carrying out an inspection of the net

or structure on which the assembly drives. The inspection device may comprise a sensor unit for detecting damages of the net. It is a problem in the fish farming industry that fish escape from the net cages through holes where the net is damaged. The assembly according to the invention already has the advantage that it "crawls" over the entire surface of the net and is therefore in a good position to discover any damages of the net or structure. A sensor may be able to detect irregularities in the structure, and give feedback regarding any holes exceeding a certain size, for instance the size which is likely to be sufficient for a fish to escape through. The sensor may be a camera arranged to send real time photos of the net to a screen on the surface, for visual inspection of the net. Alternatively, or in addition, an ultrasonic sensor may be arranged on the side of one or both of the movable units facing the net. Such a sensor may for instance register the density of the fibres of the net, and data from the sensor will be compared to preferred data ranges. If the registered data are outside of the preferred data ranges, a warning signal may be activated. The assembly may preferably further be programmed to stop and cover such a hole while waiting for the net to be repaired. For instance the assembly may also be arranged for blowing air into the water for creating bubbles in order to scare the fish away from the hole. This is particularly relevant if the hole is placed such that the assembly is not able to cover it totally. Or, even more preferably, the assembly may be provided with means for repairing the net, such as a net sewing machine, preferably in miniature.

The operation system may comprise a cleaning system. This is a preferred embodiment of the invention. The assembly according to this embodiment of the invention may then be used to clean the surface of the net.

The cleaning system may comprise a first cleaning unit arranged in connection with the first movable unit, and a second cleaning unit arranged in connection with the second movable unit, for cleaning the net from both sides. The effect of cleaning the net from both sides is that fouling which is difficult to access from one side can now be removed and not just left there, which would be the alternative for many prior art cleaning devices. Another option would have been to provide a second assembly, or to clean one side at a time. By providing both movable units with a cleaning unit, the cleaning process is made more efficient.

The cleaning system may comprise at least one of the following: a steam unit, an ultrasound unit, a high-pressure washing unit, and a water suction unit. A disadvantage of the prior art is that the rotation of discs over the net will cause abrasion of the net. This effect is intensified by the force applied to the prior art cleaning devices by means of a propeller or the like which pushes the cleaning device towards the net. The assembly according to the invention may, as mentioned above, be provided with cleaning units on both sides of the net, i.e. on both movable units. This is one feature which causes the assembly to cause less abrasion to the net because with access from both sides, less force is needed in order to properly clean the net. Also, the assembly according to the invention will preferably not be provided with discs which are in contact with the net during cleaning. Instead the assembly will clean the net by means of steam, ultrasound, high-pressure water or

suction. These cleaning methods cause less, if any, abrasion to the surface which is cleaned. This is particularly advantageous with regards to the fact that new nets and seines in the future may not be protected by impregnation, such as to extend the lifetime of the net. The reduction of abrasion is obviously also advantageous for other structures than fishing nets.

The operation system may further comprise a collecting unit for collecting waste water and bringing it to the surface. A common problem related to prior art cleaning devices for cleaning of nets for fish farming, is that the waste material is flushed out into the marine environment outside of the net cage. To add to this problem, impregnation of the seine/net is used in the prior art in order to prevent fouling. The impregnation also has other functions, such as making the net stiffer, prevent UV radiation from damaging the net and reduce any gaps between the filaments in the net. Impregnation of nets for the fish farming industry will soon become banned in Norway due to considerable leaching of copper and other toxins into the marine environment around the net cages. For these reasons, there is an urgent need to provide a cleaning device which cause less abrasion of the net, and which collects and handles the waste water. By providing the assembly according to the invention with a collecting unit for collecting waste water, the waste water will not be dumped in the environment in and around the net cage. Instead the waste water will be brought to the surface and treated properly in facilities adapted thereto.

The movable units may comprise a water hydraulics motor. This is an eco-friendly way of driving the movable units. In case of any leakage, oil hydraulics is not preferred, especially not for use in fish farming. The use of water hydraulics requires a connection from the cleaning assembly to a supply on the surface. An alternative to water hydraulics is an electric motor.

The movable units may comprise a hollow portion such as to constitute a buoyancy means. The hollow portion may be accessible such that it may be filled with or emptied of water to regulate the buoyancy of the assembly. Thus, the weight of the movable units may be adjusted, and the assembly will not weigh down the net. The pressure applied on the net by the movable units may be monitored by means of a pressure sensor, and the hollow portion may be filled or emptied according to this monitoring.

In the following is described an example of a preferred embodiment illustrated in the accompanying drawings, wherein:

Fig. 1 shows a principle sketch of two movable units arranged on a substantially flat element;

Fig. 2 shows a principle sketch of two assemblies according to the invention, arranged on a net cage;

Fig. 3 shows a principle sketch of an assembly running over an obstruction;

Fig. 4 shows one movable unit of an assembly in perspective view, the movable unit is shown partly transparent and cut through, for better clarity;

Fig. 5 is a side view of an assembly according to the invention;

Fig. 6 shows a movable unit seen from below;

Fig. 7 shows the assembly of Fig. 5 in a front view; and

Fig. 8 shows an assembly comprising two different movable units.

The figures are shown in a simplified and schematic manner, and details that are not important in order to highlight what is new about the invention may have been omitted from the figures. The various elements in the figures are not necessarily shown to scale relative to each other. Like or corresponding elements will be indicated by the same reference numeral in the figures.

Any positional specifications such as "over", "under", "above", "below", "left" and "right" reflect the position shown in the figures.

Reference is first made to Figure 1 which shows an assembly 1 for carrying out an operation on a substantially flat surface 2, which for instance could be a net. A net will therefore in the following be denoted by the reference numeral 2. The assembly 1 comprises a first movable unit 3 and a second movable unit 4. The two movable units 3, 4 are arranged on opposite sides, i.e. a first side 21 and a second side 22, of the structure 2 on which an operation is to be carried out. In this embodiment of the assembly 1 the movable units 3, 4 are shown as crawlers or tracked vehicles in the sense that they are provided with wheels 6 which in pairs are connected by belts 7. Furthermore, the movable units 3, 4 are provided with a body 8 or housing in which necessary driving units and connections (not shown) are provided. It can be seen from Figure 1 that the wheels 6 and belts 7 of the two movable units 3, 4 are arranged directly opposite of each other and the structure 2 is held between the movable elements 3, 4. The movable units 3, 4 are held in place by means of magnetic elements (not shown) embedded in the belts 7. In another embodiment the magnets may be provided in connection with the belts 7 without being embedded in the belts 7. The magnetic elements in the first movable unit 3 are of opposite polarity to the magnetic elements of the second movable unit 4. The magnetic elements are for positioning and orientation of the movable units 3, 4 relative to each other when they are arranged on opposite sides of the structure 2. The assembly 1 comprises an operation system 5 (see Fig. 4) which may be in the form of different tools or devices like for instance a cleaning system 9, and/or an inspection device 14, both shown in figure 4, or any other suitable device.

The arrows in the drawings indicate that the movable units 3, 4 are movable in both directions, i.e. forwards and backwards (i.e. upwards and downwards as shown in the figures).

In Figure 2 two assemblies 1 are shown arranged on a net cage wherein the net 2 of the net cage is the substantially flat structure 2 which the assemblies 1 are set to perform an operation on. The net cage is shown for the most part submerged in water. Typically an upper part of a net cage will extend above the water surface 15 in order to prevent fish from escaping over the net cage, and to provide a platform or the like for personnel to walk on. The net cage will preferably not be open at the top end, but be covered by a net at a distance from the water surface 15 in order to prevent birds from catching fish from the net cage (this is not shown in the drawings). On the figure one assembly 1 is shown submerged and another assembly 1 is shown as it emerges from the water while climbing to the top portion of the net cage. This is to illustrate that one or more assemblies 1 may be arranged on the same structure 2 for performing the same or different operations on the structure 2, and also to illustrate that the assembly 1 may be arranged both on submerged surfaces and on surfaces in open air.

Figure 3 shows the assembly 1 in the process of passing over an obstacle 13 present on the surface of the net 2. When the belts 7 pass over the net 2, there may be various obstacles 13, like for instance ropes or lead lines or even intertwining of the net itself, which come between the net 2 and the belts 7 of the movable units 3, 4. As shown in the figure, the belts 7 will separate while passing over the obstacle 13 and then "close" again – either by getting into contact with each other again or by getting into contact with the net 2 or other surface which the movable units 3, 4 drive along.

The wheels 6 are provided with grooves 61 (illustrated by black and white stripes) such that the wheels 6 appear as toothed wheels 6 for engaging with corresponding features of the inside of the belts 7, i.e. the belts 7 may be toothed belts 7. Typically, the magnets may be placed in the teeth of the belts, which makes it possible to use thinner belts than if the magnets are located other places in or on the belts 7. The toothed wheels 6 and the toothed belts 7 synchronize the movement of the movable units 3, 4.

Figure 4 shows one of the two movable units 3, 4 of a preferred embodiment of the assembly 1 according to the invention. In the further description of this figure, only the first movable unit 3 will be mentioned. It must however be understood that the movable unit shown could also be the second movable unit 4. The first movable unit 3 is provided with an operation system 5 comprising a cleaning system 9 and an inspection device 14, here shown both in the form of a camera 141 and in the form of a sensor 142 for scanning the net 2 with regards to irregularities.

The movable unit 3 is shown with two pairs of wheels 6 where the wheels 6 of each pair are connected to each other by means of a toothed belt 7. The grooves 61 of the wheels 6 correspond to the teeth of the belt 7, or the other way around. The teeth of the belt 7 will fit into the grooves 61 of the wheels 6 and thereby keep the movement of the belts 7 synchronized as mentioned above. The cleaning system 9 in this example comprises two sets of nozzles 91 arranged at a front portion and at a rear portion of the movable unit 3, respectively. The nozzles 91 may be used either for high pressure washing or steaming. It is conceivable that another embodiment of the assembly 1

could be provided with the cleaning system 9 provided either at a front portion or at a rear portion, and not necessarily both places. It must be understood that the appearance of the movable unit 3 may differ according to which kind of cleaning system 9 is provided, i.e. whether it is a jet water washing unit, an ultrasound unit, a suction unit, a steam unit, or other. The movable unit 3 may also be provided with a cleaning system 9 comprising different types of cleaning units at the same time.

In the shown embodiment, partly enclosing the nozzles 91, is a collecting unit 10 for collecting waste water and waste material released from the net 2 during the cleaning. The collected material and water will be transported to a proper treatment plant at the surface (not shown) through a hose (not shown) connected to the collecting unit 10 at least on one of the movable units 3, 4. The waste water may be transported by means of suction. Also in the figure is shown a housing or capsule 81 as part of the body 8 of the movable unit 3. A hose 121 of a water hydraulics system 12 is shown connected to the capsule 81. The capsule 81 is merely for protection of the movable unit's 3 different devices. The capsule 81 is here shown rotatably connected to the body 8 by means of a swivel 123 (shown in figure 5). The hose 121 is connected to a pump (not shown) at the surface. Water for water hydraulics motors 122 (shown in figures 5-8) is received through the hose 121. The water hydraulics system 12 is of a type known *per se* and will thus not be explained in detail herein. The water hydraulics system 12 is for driving the movable unit 3, 4. In an alternative embodiment the movable units 3, 4 may be driven by an electric motor. The hose 121 may comprise two hoses which are running parallel to each other, they may for instance be glued together, such that water to the water hydraulics system 12 runs through a separate hose from the water for the cleaning system 9. It is conceivable that, in some cases water for both the water hydraulics system and for the cleaning system may run through the same hose, i.e. a single hose. This may especially be the case if the cleaning system 9 comprises a steam unit which requires fresh water. In case the cleaning system 9 comprises a high pressure washing unit, also sea water may be used. Separate hoses are then required.

Figure 5 shows the assembly 1 in a side view. In this embodiment of the invention the two movable units 3, 4 are shown identical, i.e. the first movable unit 3 is like a mirrored image of the second movable unit 4, the reference numerals are thus not indicated on both movable units 3, 4. The movable units 3, 4 are arranged such that the net 2 may be provided between their belts 7. The collecting unit 10 may comprise shields 101 and opening means 102 connected thereto for lifting the shields 101 sufficiently for avoiding to crash into any obstacles 13 (see Fig. 3) and to make sure the nozzles 91 of the cleaning system 9 are kept out of contact with the net 2.

Figure 6 shows a movable unit 3, 4 seen from below. The movable unit 3, 4 comprises four wheels 6 being connected in pairs by means of shafts 62, and wherein said pairs are connected to each other by means of connecting elements 63, or bars 63. On the shafts 62 are provided gear units 621 arranged such that the wheels 6 on the same shaft 62 may be driven at different speeds in order to facilitate turning of the movable unit 3, 4. In this embodiment one of the two shafts 62 is provided with a water hydraulics motor 122 for driving the movable unit 3, 4. It is sufficient that one

of the shafts 62 in each movable unit 3, 4 is provided with a motor, either a water hydraulics motor 122 as shown or an electric motor (not shown). Other kinds of motors may also be possible in embodiments of the assembly 1 for use in a non-marine environment. However, in a marine environment and in connection with food production, i.e. fish farming, it is preferable to use motors which provide clean energy and which have a minimized risk of spilling of toxins to the environment. The shafts 62 and/or the bars 63 and/or other components of the movable units 3, 4 may be hollow in order to constitute a buoyancy means as described hereinabove in the general description of the invention.

Figure 7 shows the assembly 1 of figure 5 turned 90 degrees, and with the cleaning system 9 removed. The position of the hose 121 is unchanged regardless of the turning of the assembly 1 as such, which illustrates that the hose 121 is connected to the movable unit 3, 4 through the swivel 123.

Figure 8 shows an alternative embodiment of the assembly 1 according to the invention. In this embodiment the two movable units 3, 4 are different from each other, but still have corresponding wheels 6 and belts 7 provided with magnetic elements (not shown) in order to keep the two movable units 3, 4 correctly positioned relative to each other on each side of the net 2. The first movable unit 3 is similar to the movable unit 3, 4 shown in figure 4, whereas the second movable unit 4 is a simple carriage provided only with the features necessary for synchronized movement with the first movable unit 3.

It should be noted that the above-mentioned embodiments illustrate rather than limit the invention, and that those skilled in the art will be able to design many alternative embodiments without departing from the scope of the appended claims. In the claims, any reference signs placed between parentheses shall not be construed as limiting the claim. Use of the verb "comprise" and its conjugations does not exclude the presence of elements or steps other than those stated in a claim. The article "a" or "an" preceding an element does not exclude the presence of a plurality of such elements.

The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

C l a i m s

1. Assembly (1) for carrying out an operation on a net (2), the assembly (1) comprising:
- an operation system (5) for carrying out the operation on the net (2);- a first movable unit (3) for being arranged on a first side (21) of the net (2); and
- a second movable unit (4) for being arranged on a second side (22) of the net (2), the second movable unit (4) having a relative orientation with regards to the first movable unit (3);
c h a r a c t e r i z e d i n that the first movable unit (3) and the second movable unit (4) are provided with:
- magnetic elements for holding said movable units (3, 4) at the same position but on opposite sides of the net (2), and for fixing the relative orientation of the movable units (3, 4); and
- belts (7) for crawling over the surface of the net (2).

2. The assembly (1) according to claim 1, wherein the magnetic elements are embedded in the belts (7).

3. The assembly (1) according to any one of claims 1-2, wherein the belts (7) comprise two parallel belts (7) in each of the movable units (3, 4).

4. The assembly (1) according to claim 3, wherein the two parallel belts (7) are arranged for being driven at different speeds for manoeuvring of the movable units (3, 4).

5. The assembly (1) according to any one of the preceding claims, wherein the operation system (5) comprises an inspection device (14).

6. The assembly (1) according to claim 5, wherein the inspection device (14) comprises a sensor unit (141) for detecting damages of the net (2).

7. The assembly (1) according to any one of the preceding claims, wherein the operation system (5) comprises a cleaning system (9).

8. The assembly (1) according to claim 7, wherein the cleaning system (9) comprises a first cleaning unit arranged in connection with the first movable unit (3) and a second cleaning unit arranged in connection with the second movable unit (4), for cleaning the net (2) from both sides.

9. The assembly (1) according to claim 7 or 8, wherein the cleaning system (9) comprises at least one of the following: a steam unit, an ultrasound unit, a high-pressure washing unit, and a water suction unit.

10. The assembly (1) according to any one of claims 7-9, wherein the operation system (5) further comprises a collecting unit (10) for collecting waste water and bringing it to the surface.

11. The assembly (1) according to any one of the preceding claims, wherein the movable units (3, 4) comprise a water hydraulics motor (122).

12. The assembly (1) according to any one of the preceding claims, wherein the movable units (3, 4) comprise a hollow portion such as to constitute a buoyancy means.

13. The assembly (1) according to claim 12, wherein the hollow portion is accessible such that it may be filled with or emptied of water to regulate the buoyancy of the assembly (1).

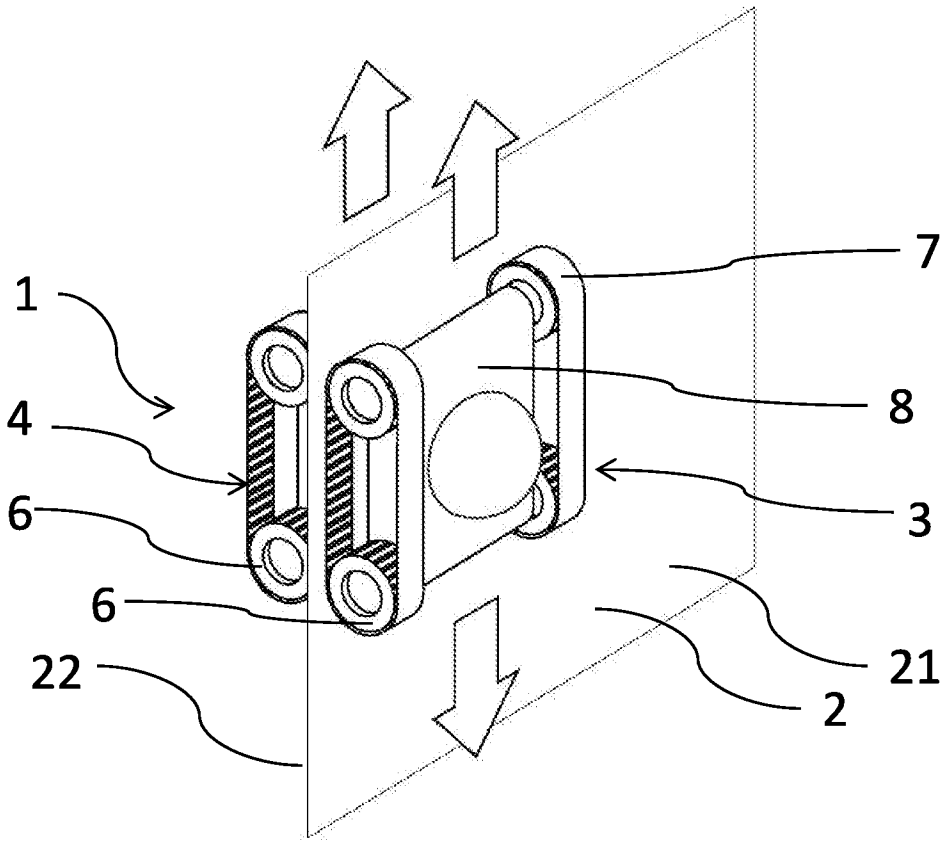


Fig. 1

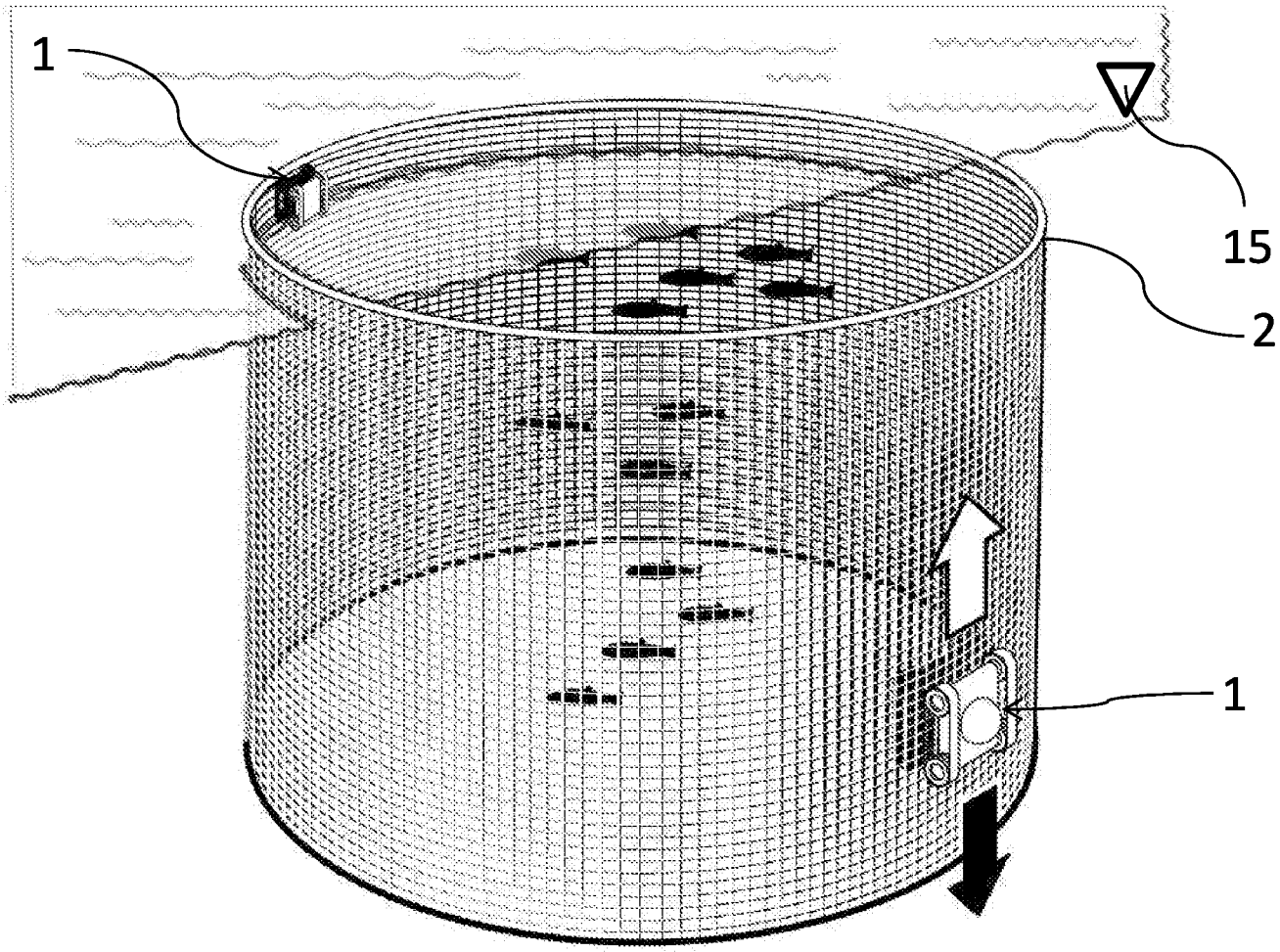


Fig. 2

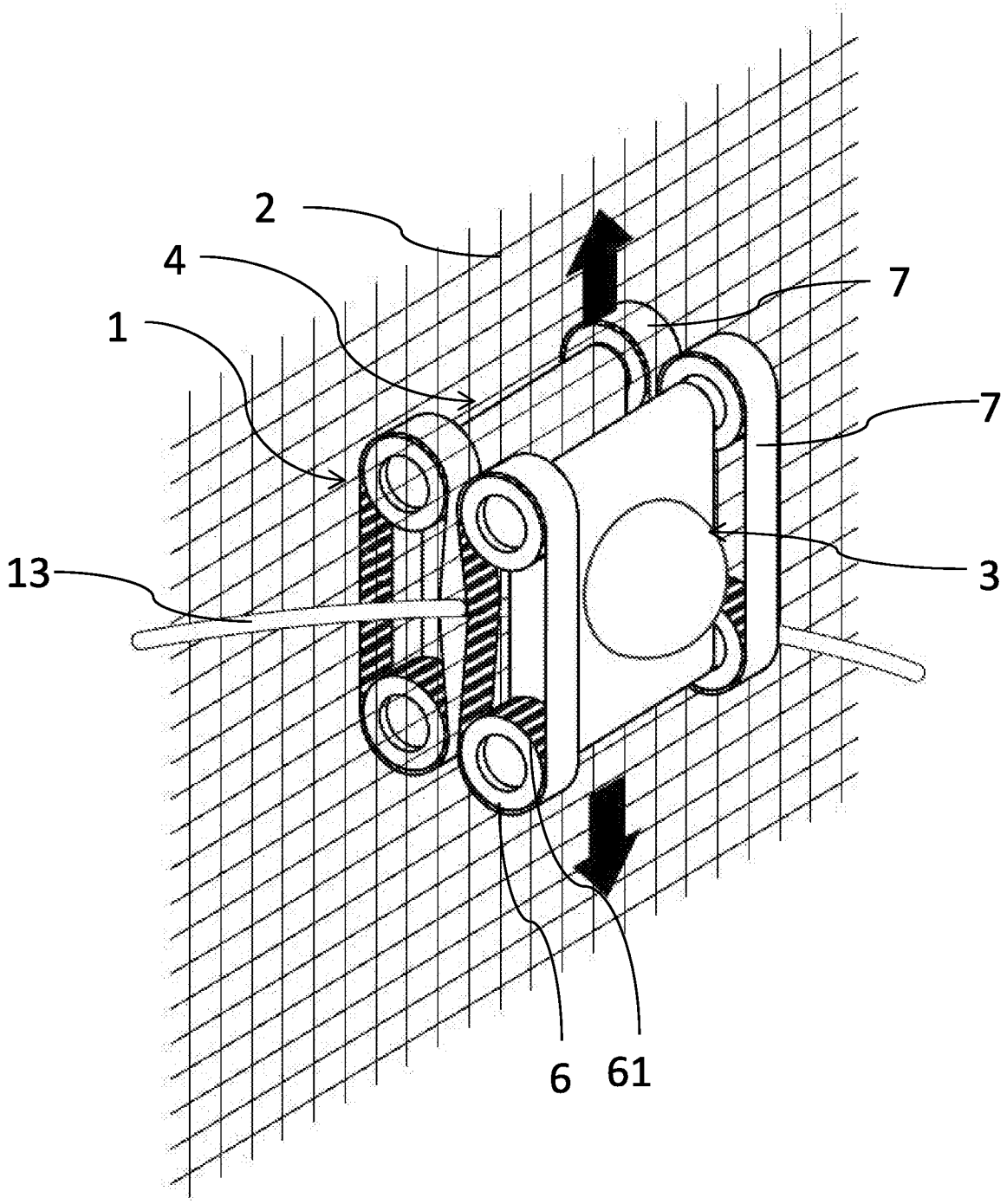


Fig. 3

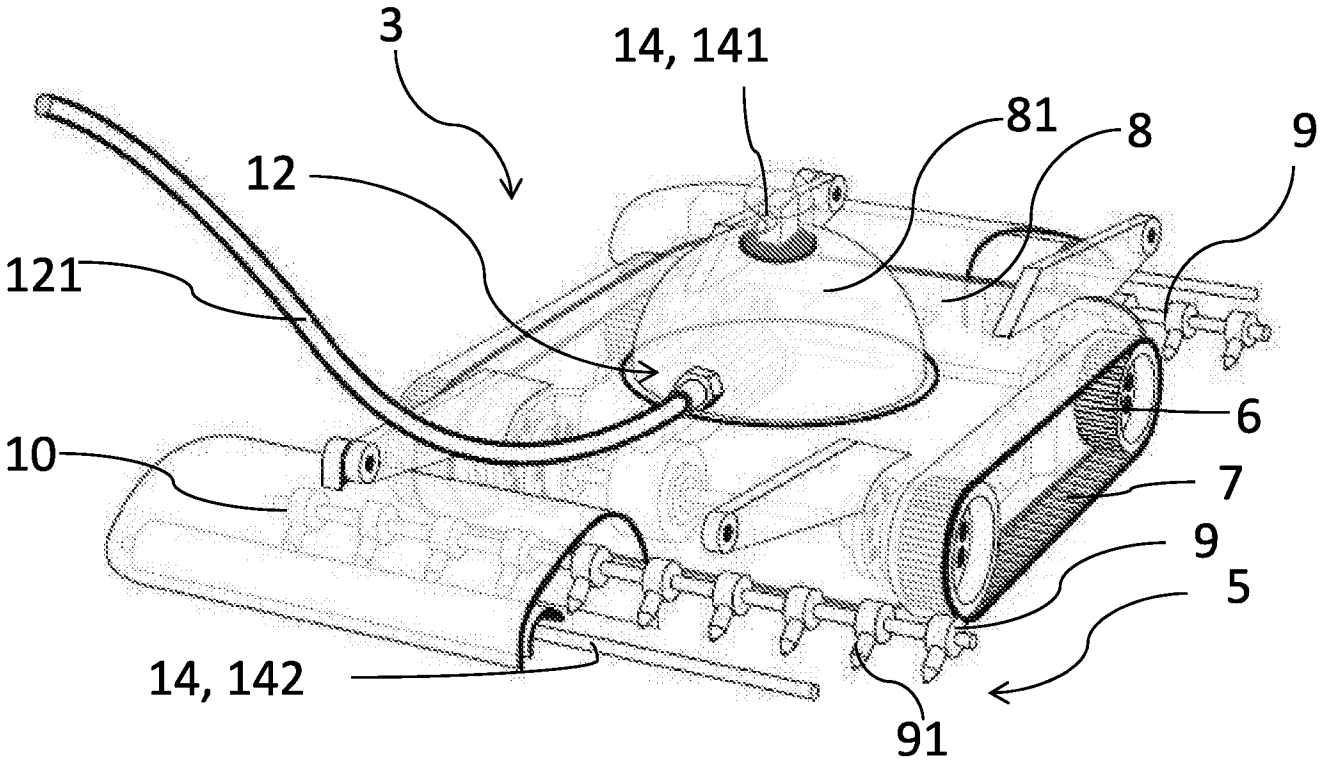

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Fig. 4

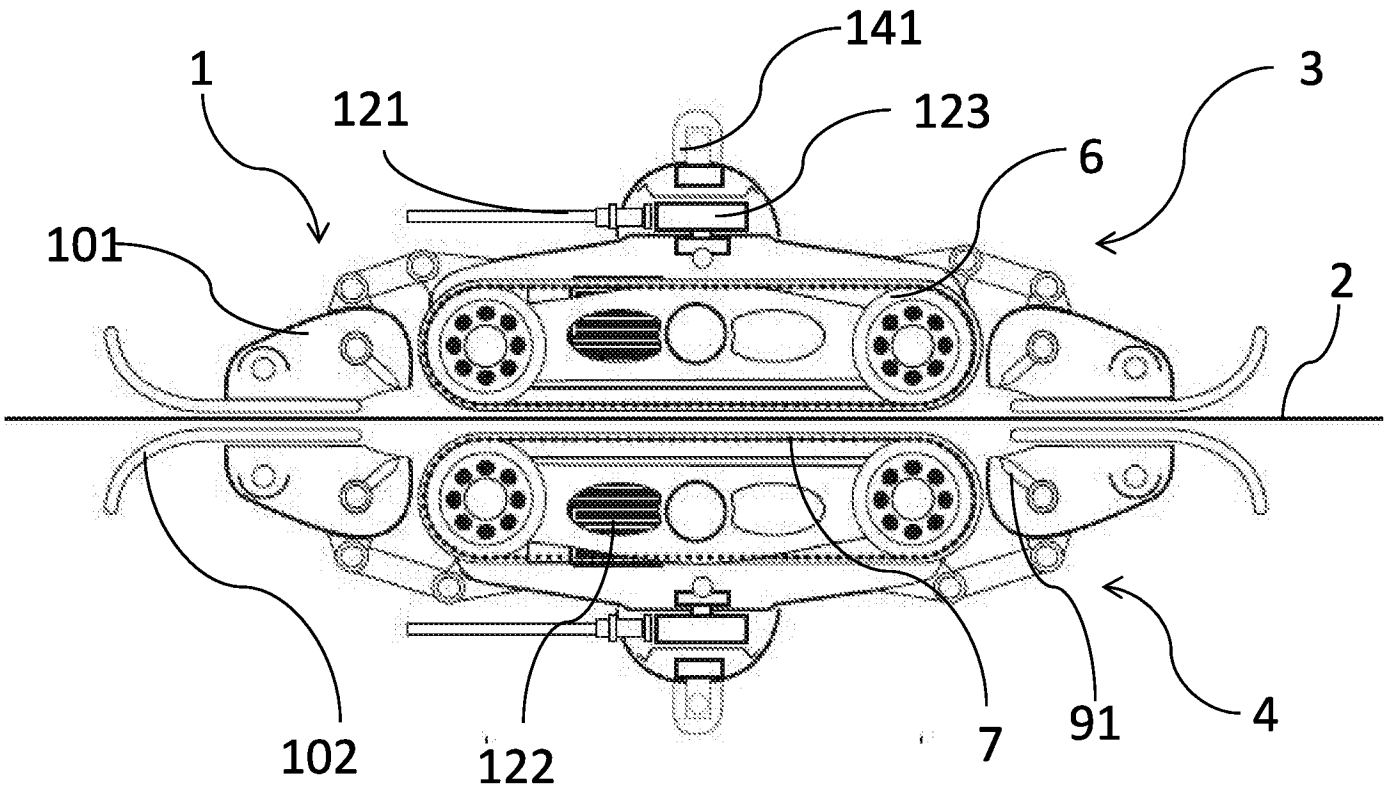

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Fig. 5

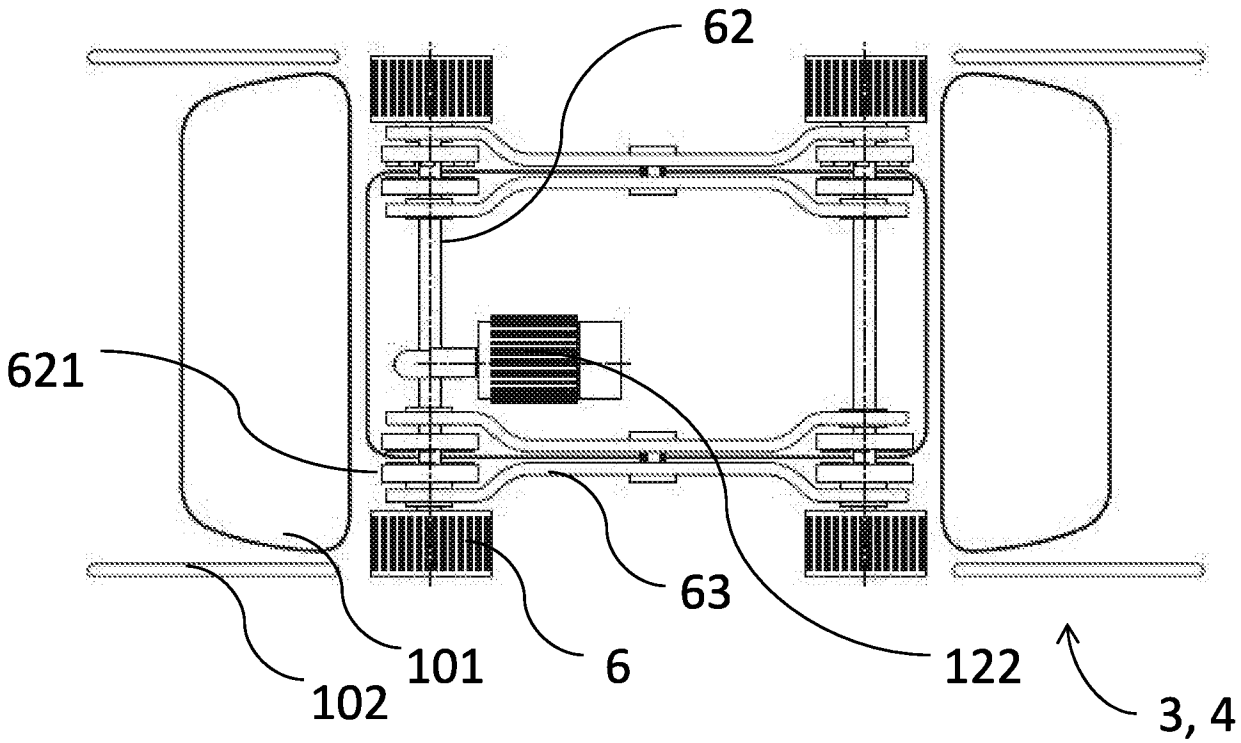


Fig. 6

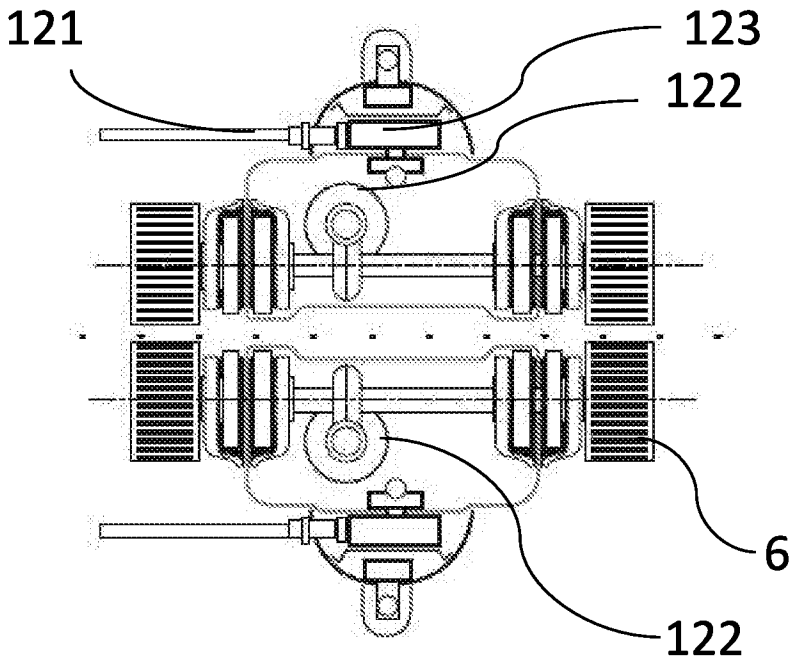


Fig. 7

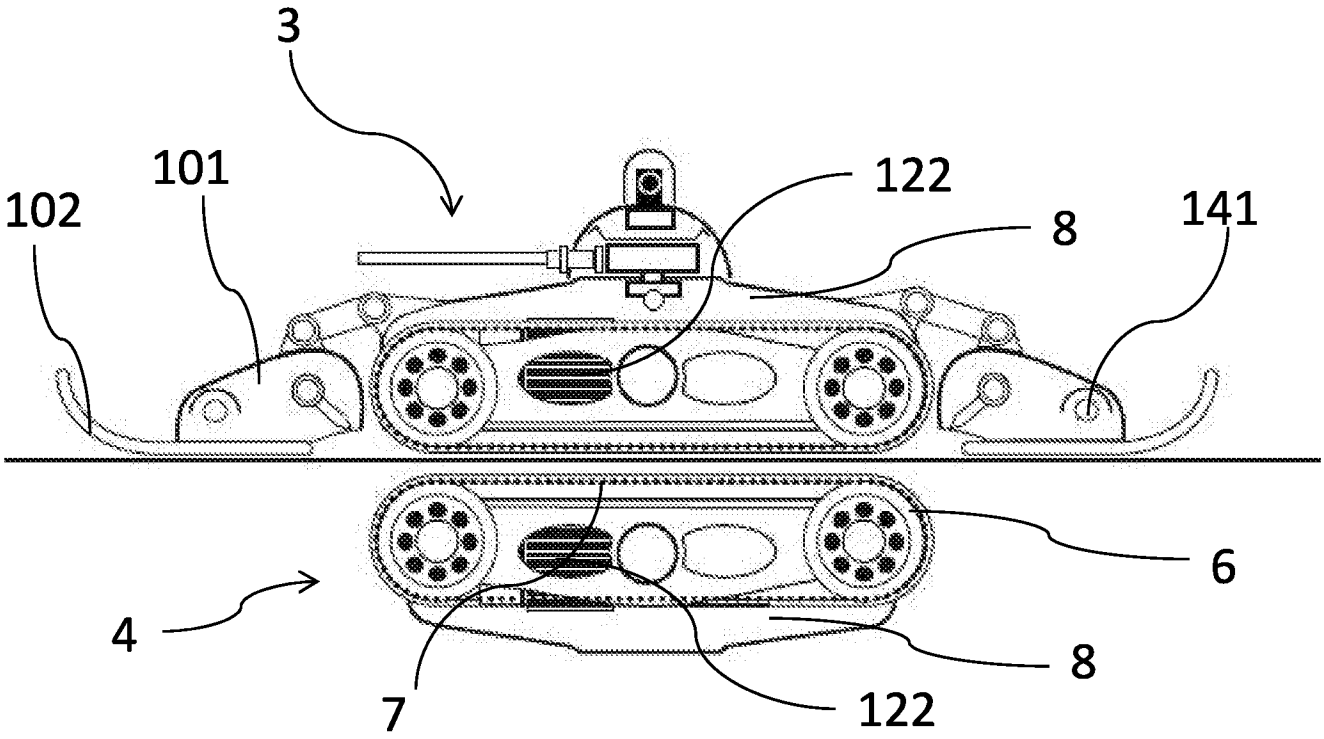


Fig. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO2017/050271

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A01K, A47L, B63B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	EP 2151163 A1 (ISLAND MARINE SYSTEMS LTD), 10 February 2010 (2010-02-10); abstract; figures 1-4 --	1-13
A	EP 2732885 A1 (YANMAR CO LTD), 21 May 2014 (2014-05-21); abstract; figures 4-5 --	1-13
A	JP 099818 A (MITSUBISHI HEAVY IND LTD), 14 January 1997 (1997-01-14); figures 6-7; Abstract from databases Epodoc and WPI --	1-13

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12-02-2018	13-02-2018
Name and mailing address of the ISA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. + 46 8 666 02 86	Authorized officer Ann Börjeson Telephone No. + 46 8 782 28 00

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO2017/050271

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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				CL	2014000729	A1	05/09/2014
				HR	P20160388	T1	20/05/2016
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International application No.
PCT/NO2017/050271

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International Patent Classification (IPC)

A01K 61/60 (2017.01)
A01K 75/00 (2006.01)