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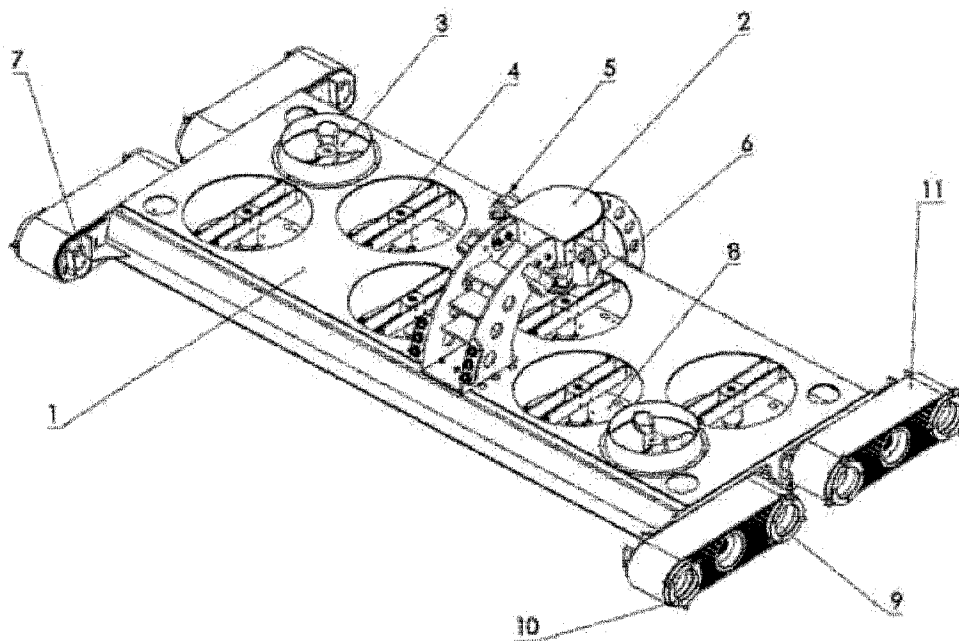


Fig. 1

(57) **Abrégé/Abstract:**

The present invention relates to a device for cleaning nets used for fish, which can be used to clean fish farming nets down to depths of 70 metres. The device includes: a structure comprising geometric sections for different components and mechanisms of the device; at least one base disposed on the structure; at least two ducted propellers, disposed in parts of the geometric sections of the structure; at least three high-pressure rotary cores; a plurality of rotary discs, each comprising at least three injectors that can withstand the high outlet pressures; and a plurality of tracks on at least four belts, for the movement of the device.

ABSTRACT

The present invention relates to a fishing net cleaning device, capable of cleaning fishing farm nets, up to 70 m depth. The device comprises: a structure comprising geometric divisions for different components and mechanisms of the device; at least one base arranged on the structure; at least two propellers with nozzles, arranged in parts of the geometric divisions of the structure; and at least three high pressure rotating cores; a plurality of rotating discs which in turn each comprise at least three injectors with the capacity to withstand high outlet pressures; and a plurality of tracks comprised of at least four belts, for displacing the device.

DESCRIPTIVE MEMORY

FIELD OF APPLICATION

The present invention belongs to the area of the aquaculture industry, and in particular to a cleaning device for fishing nets.

BACKGROUND

In the global aquaculture industry, due to the effects of the marine environment fouling, algae and seeds of marine crustaceans from the farming areas that hinder the oxygenation of the fish inside the cages are adhered to the nets. Currently, there are different devices that are intended for cleaning fishing nets, in particular, for detaching these and other elements attached to the nets.

Document EP 2348828 describes an on-site underwater net cleaner comprising a sliding chassis adapted to slide smoothly and snare free across the surface of that net, a means of flotation associated with that chassis to provide buoyancy to that cleaner, a means of operation adapted to cooperate with that net and maneuver that cleaner on the surface of that net, a means of propulsion adapted to propel such cleaner and maintain contact with that net and a means of cleaning adapted to remove contaminants from that net including biofouling from the surface of that net to clean the net. Cleaning media are vacuum-based adapted to extract water and contaminants through and from the surface of the net. The cleaner of the invention is also provided with a centrally mounted propeller-shaped propulsion medium adapted to provide a measured propulsion force to ensure that the cleaner is gently maintained against the underwater net during operation. In addition, and

separately from the vacuum function of the net cleaning device, the device may be also provided of a series of high pressure water jets preferably mounted on the sliding chassis and directed downwards to allow the invention device to direct a high-pressure water spray over the net to assist in the cleaning operation.

On the other hand, document CL 201400729 a waterproof cleaning robot to clean a submerged object by throwing water at high pressure from a cleaning nozzle provided in a nozzle unit to a surface of the cleaning object as it moves along the surface of the cleaning object, in which the cleaning nozzle unit is provided in a lower portion of a revolving shaft supported in a rotating way by a robot body, in which a displacement device is provided to move the robot body, where the mobile device includes first displacement units used for a normal path provided on the left and right sides of the robot body and second displacement units to pass over a protrusion of the cleaning object, where the second displacement units have a diameter less than the first displacement units , where the lower ends of the first displacement units are ground contact surfaces, and the lower ends of the second displacement units are positioned higher than the lower ends of the first travel units, and where, a motion direction in which the waterproof cleaning robot moves linearly through the first displacement units is defined as a front and back direction of the robot body , and an orthogonal direction to the front and back direction is defined as a left and right direction of the robot body, in which the first displacement units and the second displacement units move to turn in the same direction. The second displacement units include second front and back displacement units that are provided in the robot body in the front and back direction to face up to the respective inner sides in the left and right direction of the robot body compared to the first displacement units.

CL 201100049 describes a cleaning device for removing biofouling from nets and pens below the surface comprising at least one device for maneuvering and propelling the cleaning device in which each of the maneuvering and propulsion devices comprises at least one; an induction part adapted to supply a fluid under high pressure; a nozzle with an inlet for supplying the fluid under high pressure, and a tubular body with an induction side and an outlet where said nozzle is arranged near the induction side. The device also comprises a plate-like body with one or more rotating cleaning units mounted thereon and that one or more of such maneuvering and propelling devices are mounted on the plate-like body such that the devices for maneuvering and propelling have their induction part that covers a plate-like opening in the body while the outlet protrudes from the back of the plate-like body.

These solutions are not economical from the energy point of view, since they require energy not only for propulsion, but also for cleaning systems, which increases their consumption. On the other hand, they are not always suitable for cleaning large areas per hour, which is why periodic net changes are frequently required, which worsens oxygenation inside the cages with fish.

On the other hand, these solutions have proven to be inefficient, in that it frequently presents the plugging of injectors, which makes the devices lose functionality, being necessary to remove them to repair or unclog said injectors.

SUMMARY

The present invention relates to a fishing net cleaning device. The device corresponds mainly to a flat metal structure, operated remotely using electric wires, hydraulic hoses and

a minimum 70 m long seawater high pressure hose, from the surface in a boat, with the purpose of moving over the salmon farm nets. The device has the capacity to pull on the net with the thrust of two propellers and also comprises six discs rotating at high revolutions with water pressure, which fulfil the purpose of releasing mussel, fouling, algae, etc., attached to the nets and thus fulfilling the aim of cleaning farm nets.

The main purpose is to clean large quantities of square meters per hour of approximately 1200 m² per hour minimum, therefore avoiding the change of periodic nets, thus improving oxygenation inside the cages with fish. The present invention in general is also applicable in the cleaning of hulls and marine structures.

The advantages of the present invention regarding the state of the art is that it has a propulsion capacity with attachment traction and pressure on the net by means of at least two propellers with a capacity of 140 kgf to perform cleaning more efficiently. It provides advantages for regulating high pressure seawater pumps and lower fuel consumption compared to existing technologies. Finally, the device of the invention has the capacity of traction on the net with four independent tracks with more efficient displacement than currently existing technologies.

DESCRIPTION OF THE DRAWINGS

Figure 1 shows a right perspective view of the device, according to a preferred embodiment of the invention.

Figure 2 shows a left perspective view of the device, according to a preferred embodiment of the invention.

Figure 3 shows a top and bottom view of the device, according to a preferred embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to a fishing net cleaning device (100). The device (100) corresponds to a Remote Operated Vehicle (ROV) with the capacity to clean fishing farm nets, up to 70 m deep.

The device (100) comprises a structure (1), preferably metallic of stainless steel, which comprises geometric divisions for the different components and mechanisms of the device (100). In an embodiment of the invention, the structure (1) has a rectangular geometry, with dimensions of 2,422 x 910 mm surface and 172 mm high.

On the structure (1) at least one base (2) is provided, preferably curved. In an embodiment of the invention, the base (2) is projected upwards on the structure (1), preferably from the center of one of the major sides of the rectangular surface towards the center of the structure surface, and where the base curvature (1) is provided towards the upper surface of the structure (1). The curved base (2) is intended to support at least one camera (6) and a plurality of lights (5), which in a preferred embodiment may be LED lights. In a preferred embodiment of the invention, the base (2) is made of aluminum, 180 mm wide and 273 mm high.

In some of the geometric divisions of the structure (1) there are at least two propellers (3) with nozzles, which are propelled by hydraulic motors (7). In an embodiment of the invention, the propellers (3) have a diameter of 285 mm, and the hydraulic motors have a speed of 1000 rpm with a capacity of 20 l/min, for driving the propellers (3) with nozzles.

The device (100) also comprises at least three high-pressure rotating cores (4) with a mechanical seal system inside, which reduces the flow rate of the water from each core (4) to some rotating discs (8) to increase the outlet pressure.

As indicated above, on the curved base (2) there are at least four light bulbs (5), preferably

LEDs, of adjustable intensity, and at least one camera (6). In one embodiment of the invention, the light bulbs (5) are adjustable in intensity and have 49mm diameter. The camera (6) is a high definition camera with a 270° movement capacity regarding the horizontal and vertical axes, and also equipped with compass, depth and temperature sensors.

The hydraulic motors (7) are preferably four, and in one embodiment of the invention, the hydraulic motors (7) are 4x4 traction motors arranged on each track (1q), with a speed of 600 rpm, and adjustable by a proportional joystick.

The rotating discs (8) comprises at least three injectors with the capacity to resist the high outlet pressures. Each rotating disk (8) comprises a metallic disk embedded in its lower part that helps to withstand the rubbing of crustaceans and make it resistant to wear. In a preferred embodiment of the invention, the rotating discs (8) are six and have a 400mm diameter.

The device (100) also comprises power transmission elements (9), preferably gears. In an embodiment of the invention, the power transmission elements (9) are made of high-density plastic. In an embodiment of the invention, the power transmission elements (9) have 147mm diameter, with 20mm gear in passband, where the passband guarantees traction and prevents any lag.

The device (100) also comprises a plurality of spikes (10), preferably of the star-like, located by each track (11) for effective grip on the weave section of aquaculture nets. In one embodiment of the invention, the star-like spikes (10) have three tips, two of which are located per each track.

The tracks (11) are comprised of at least four belts, each equipped with its respective hydraulic motor (7) and at least three gears (9).

For control from the surface, at least one electronic ROV controller is provided.

The device also has at least two sealed boxes with distribution of solenoid valves hydraulic connections, distribution to the surface of at least three hoses that distribute the pressures and returns of hydraulic energy, and at least one energy conductor underwater electrical wire for lights and video. The energy required to operate the cleaning rotating discs (8) with high-pressure seawater is by means of a high-pressure pump with a high-flow rate capacity of liters per minute and high pressure. The high pressure seawater pump is powered by a motor, preferably diesel. Regarding the hydraulic motors (7) required for this device (100), they are also powered by the high pressure pump motor, according to an embodiment of the invention.

The device (100) can be operated from the surface, on a platform or boat, by means of an electronic controller that has a screen, a joystick, and sensors and total control of the movements and elements of the ROV from the surface.

CLAIMS

1. A fishing net cleaning device, with the capacity to clean fishing farm nets, up to seventy meters deep, CHARACTERIZED in that comprises:
 - a. a structure comprising geometric divisions for different components and mechanisms of the device;
 - b. at least one base arranged on the structure;
 - c. at least two propellers with nozzles, arranged in parts of the geometric divisions of the structure;
 - d. at least three high-pressure rotating cores;
 - e. a plurality of rotating discs which in turn each comprise at least three injectors with the capacity to resist the high outlet pressures;
 - f. a plurality of tracks comprised in at least four belts, for the displacement of the device; and
 - g. a plurality of spikes placed in each track for effective grip on the weave section of aquaculture nets.
2. The device according to claim 1, CHARACTERIZED in that the device corresponds to a Remote Operated Vehicle.
3. The device according to claim 1, CHARACTERIZED in that the structure is rectangular.
4. The device according to claim 1, CHARACTERIZED in that the structure is metallic.
5. The device according to claim 4, CHARACTERIZED in that the structure is made of stainless steel.
6. The device according to claim 1, CHARACTERIZED in that the base is curved with a hydrodynamic forward advance.

7. The device according to claim 6, CHARACTERIZED in that the base is projected upwards on the structure, where the curvature of the base is arranged towards the upper surface of the structure.
8. The device according to claim 1, CHARACTERIZED in that it comprises at least four hydraulic motors to power the propellers.
9. The device according to claim 1, CHARACTERIZED in that each high-pressure rotating core comprises a mechanical seal system inside.
10. The device according to claim 1, CHARACTERIZED in that it comprises at least four light bulbs and at least one camera, arranged on the base.
11. The device according to claim 10, CHARACTERIZED in that the light bulbs are LED light bulbs of adjustable intensity.
12. The device according to claim 10, CHARACTERIZED in that the camera is a high definition camera with 270 ° movement capacity in the horizontal and vertical axes.
13. The device according to claim 12, CHARACTERIZED in that the camera comprises sensors of compasses, depth and temperature.
14. The device according to claim 8, CHARACTERIZED in that the hydraulic motors are 4x4 traction motors arranged on each track to further control the movement of the tracks.
15. The device according to claim 1, CHARACTERIZED in that the rotating discs comprise a metallic disc embedded in its lower part that helps to withstand the rubbing of crustaceans and make it resistant to wear.
16. The device according to claim 15, CHARACTERIZED in that the discs are six and have a diameter of 400 mm.
17. The device according to claim 1, CHARACTERIZED in that it also comprises power

transmission elements.

18. The device according to claim 17, CHARACTERIZED in that the power transmission elements are gears.
19. The device according to claim 17, CHARACTERIZED in that the gears are made of plastic.
20. The device according to claim 1, CHARACTERIZED in that the spikes are star-like and have three tips, two of these located in each track.
21. The device according to claim 1, CHARACTERIZED in that it comprises at least one electronic controller for controlling from the surface.
22. The device according to claim 1, CHARACTERIZED in that also comprises at least two sealed boxes with distribution of solenoid valves hydraulic connections, distribution to the surface of at least three hoses that distribute the pressures and returns of hydraulic energy, and at least one energy conductor underwater electrical wire for lights and video.
23. The device according to claim 1, CHARACTERIZED in that it comprises a high-pressure seawater pump to generate the energy required to operate the high-pressure cleaning discs.

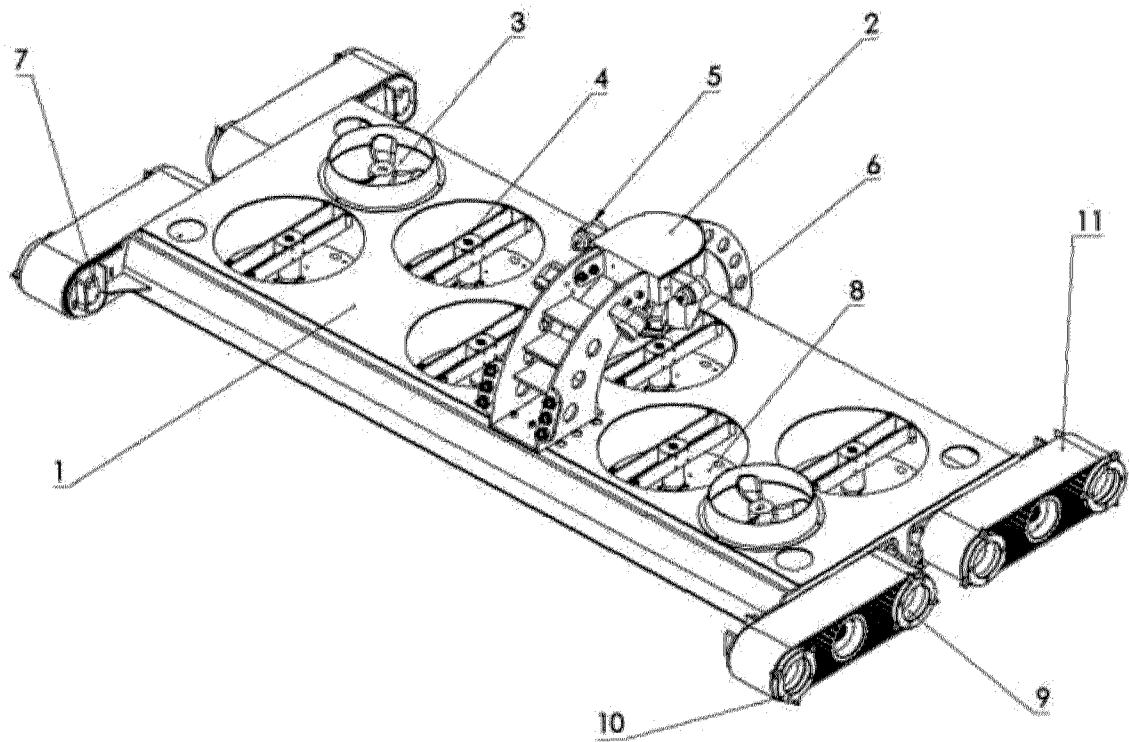


Fig. 1

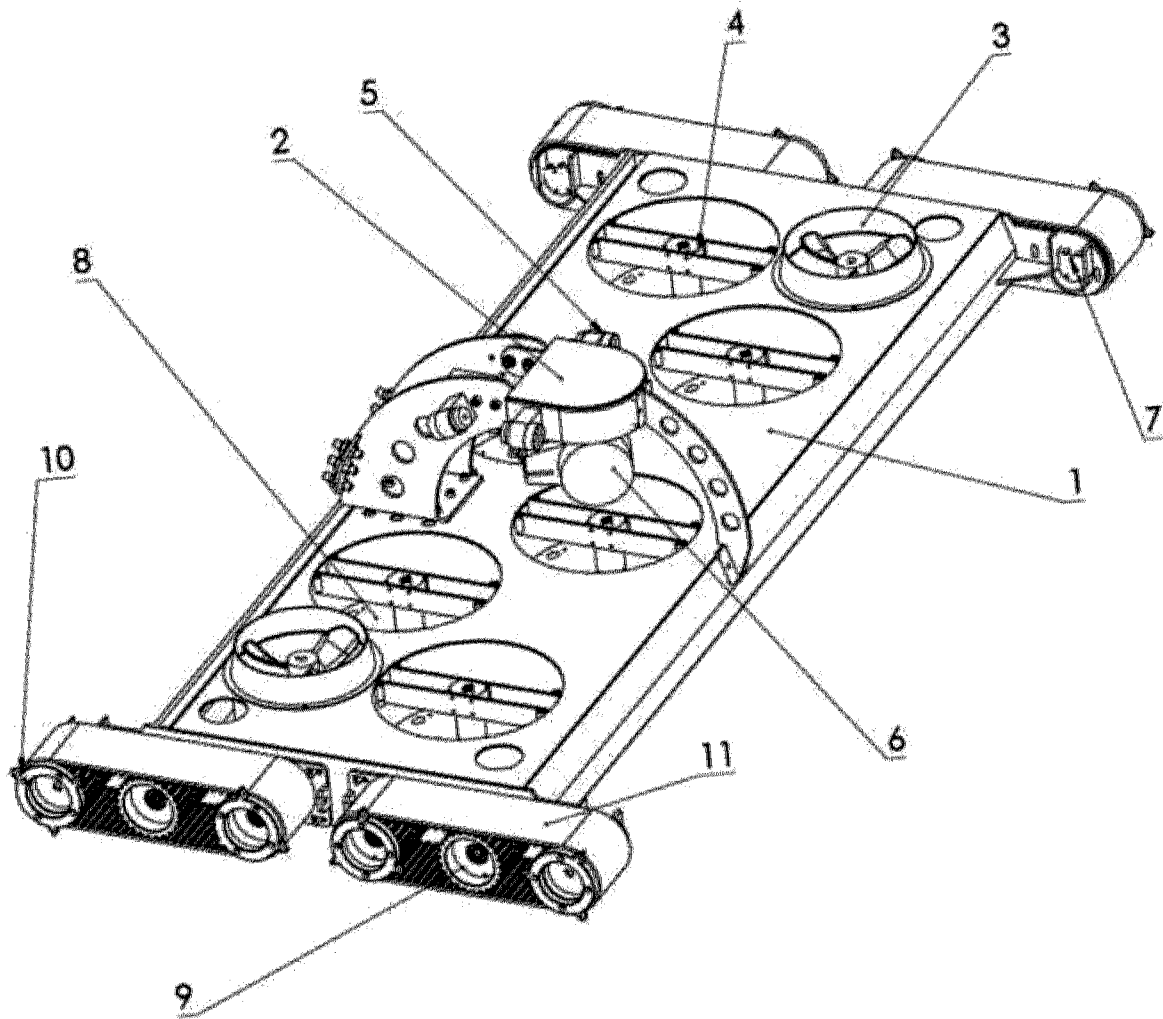


Fig. 2

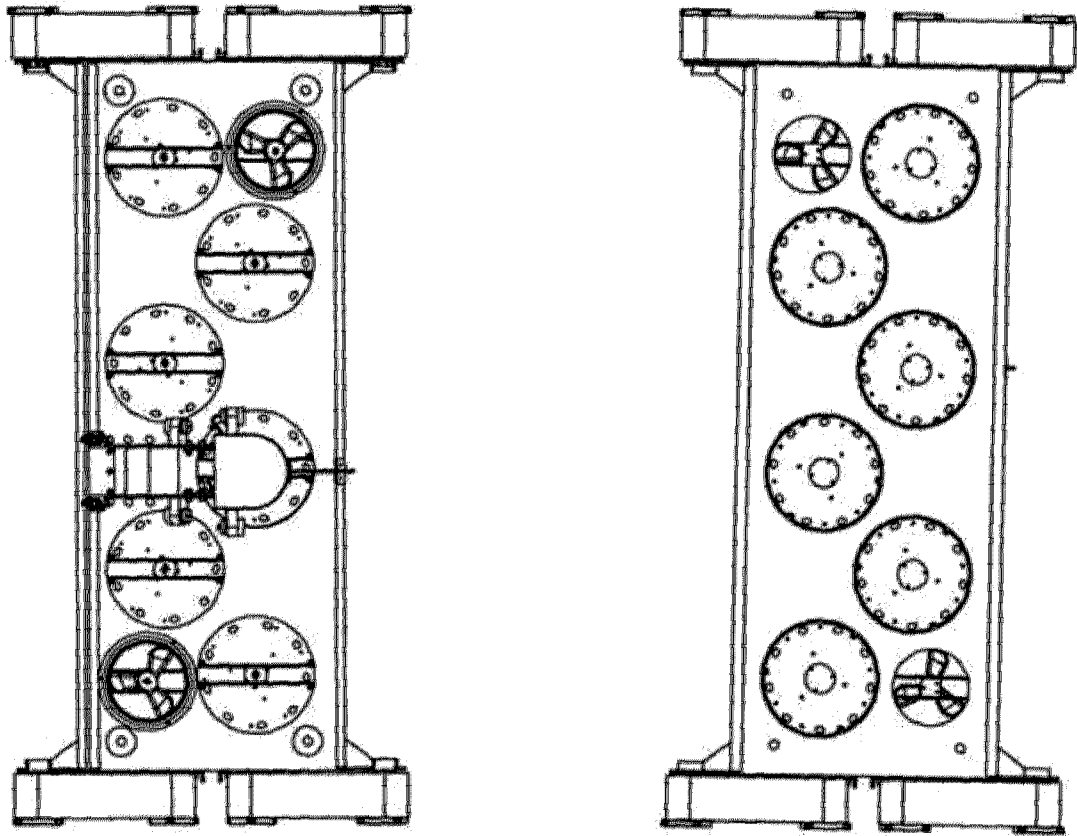


Fig. 3

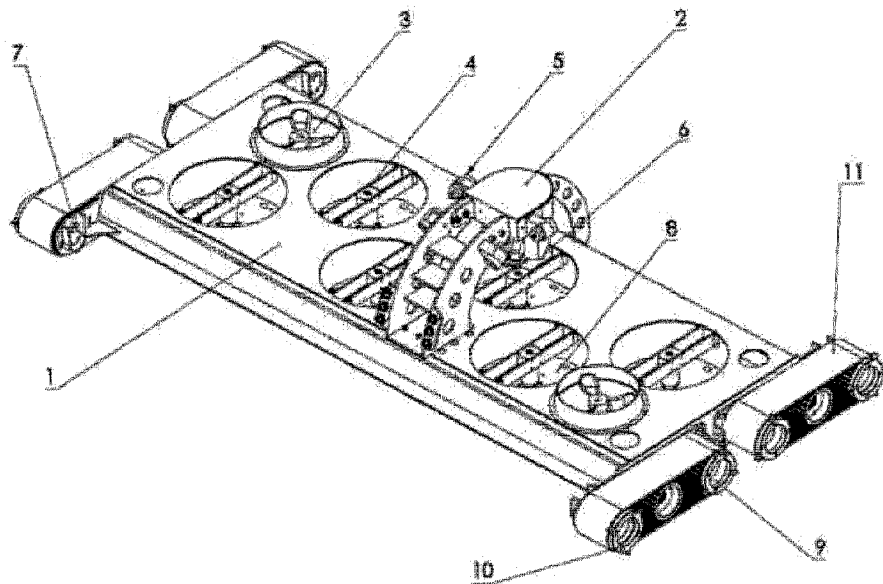


Fig. 1