



Design of Full-automatic Marine Surface Garbage Cleaning Ship

Jun Ma, Suying Hu

University of Science and Technology Liaoning, China

Abstract: Marine garbage cleaning ships can clean up persistent, man-made or processed solid wastes in the marine and coastal environment. Marine garbage affects the marine landscape, threatens the safety of navigation, and has an impact on the health of marine ecosystem, thus having a side effect on the marine economy. Some of these marine garbage stay on the beach, and some can float on the sea or sink to the bottom of the sea. The marine garbage cleaning ship can effectively curb the impact caused by the above marine garbage.

Keywords: Automatic ocean, surface, garbage cleaning ship.

1. Research background and significance

In recent years, with the rapid development of marine economy, the marine environment has suffered unprecedented damage due to the over-exploitation and utilization of human beings. The coastal pollution is serious, the ecological environment has deteriorated, the biodiversity has dropped sharply, and an amazing amount of marine garbage has been produced. These marine wastes not only seriously affect the marine ecological environment, but also affect the coastal and marine landscape, threatening navigation safety. It brings negative effects to the development of marine economy. Marine garbage is mainly floating garbage on the sea surface. There are many kinds of marine garbage, including plastic products, foam products, fabric products and other persistent solid wastes. The size and shape of marine garbage are also different, some of which are larger and some of which are smaller.

Marine garbage cleaning ships can clean up persistent, man-made or processed solid wastes in marine and coastal environment. Marine garbage affects marine landscape, threatens navigation safety, and affects the health of marine ecosystem, and then has a surface effect on marine economy. Part of this marine litter stays on the beach, Some can float on the sea surface or sink to the bottom of the sea. The marine garbage cleaning ship can effectively contain the influence caused by the marine garbage mentioned above.

Marine garbage disposal is a topic of common concern in the international community at present. Participating in the global marine garbage control is not only the call of the new era, but also an important measure to realize China's "prosperity to the sea". In view of the increasingly serious situation of marine pollution, China has innovated the concept of marine governance and effectively promoted the construction of the Maritime Silk Road and a maritime power in the 21st century.

2. The design scheme

As shown in Figure 1, the marine garbage cleaning ship can mainly collect, collect and clean marine garbage. The rotating device rotates through the motor to collect the garbage on the ocean surface on the filter screen, so as to achieve the purpose of collecting garbage. The water pump can collect the garbage on the sea surface and wash the garbage on the surface of the filter screen on the rotating device at the descending time, Wash the garbage into the garbage collection box. The garbage collection device receives the garbage collected by the filter screen and stores it. Foam bucket can make water pump, rotating device and garbage collection device float on the water surface. Through the propeller, motor and control device, the movement of the foam floating barrel is controlled, so as to achieve the purpose of collecting garbage.

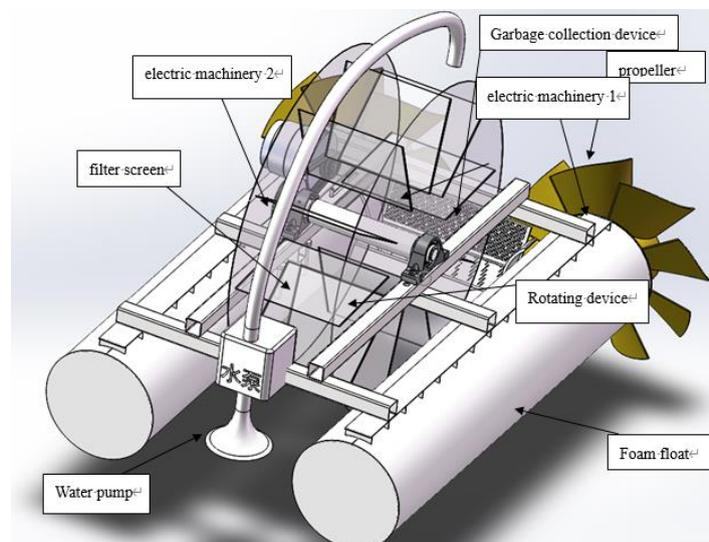


Fig. 1 Three-dimensional marine garbage disposal ship

Specifically, the method comprises the following steps: a water pump, a foam floating barrel and two sides of the foam floating barrel are fixedly provided with body garbage collection devices, one end of the garbage collection device is fixedly provided with an upright rotating device, the center of the rotating device is provided with a power device which is connected with the rotating device, and the power device can drive the rotating device to circularly reciprocate; Water pump absorbs seawater, Scour along the tangential direction of the descending of the filter screen in the rotating

device to ensure that the garbage in the filter screen can leave the filter screen and enter the collection bin. The hull is also provided with a control system which is connected with the power device and the collecting device.

3. Working principle and performance analysis

The marine garbage cleaning ship mainly comprises a double foam floating bucket, a rotating device, a power device, a garbage device, a control device, a propeller, a water pump and a water spraying device connected with the water pump.

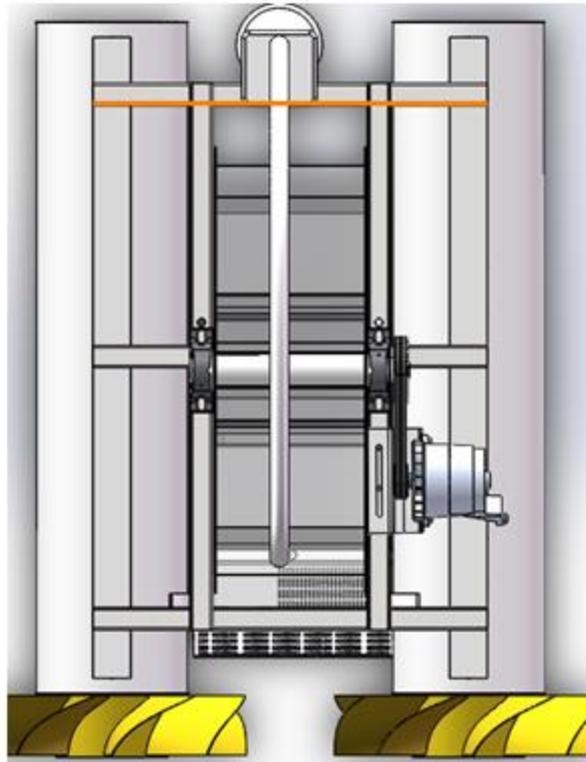


Fig. 2 Top view of marine garbage cleaning ship

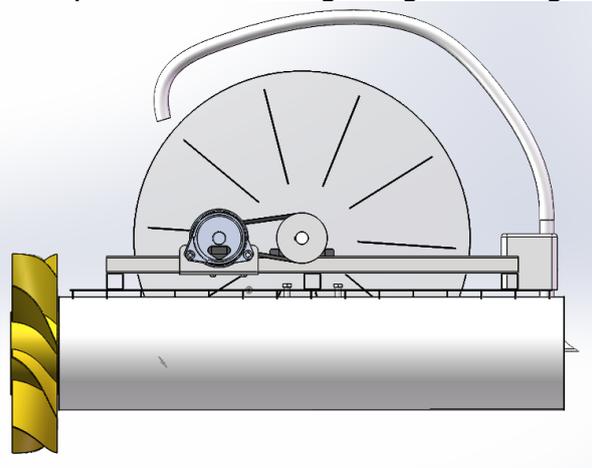


Fig. 3 Left side view of marine garbage disposal ship

As shown in Figure 1, the motor 1 drives the propeller to rotate, thus driving the hull to move, and the motor 2 drives the rotating device to rotate, so as to achieve the

purpose of collecting garbage. The water pump absorbs the garbage floating on the sea surface to approach the boat due to the water flow, and can wash the garbage on the surface of the filter screen on the rotating device at the descending time. The garbage attached to the filter screen that cannot fall naturally due to gravity is washed away, so that it falls into the garbage collection device, thus achieving the purpose of cleaning up the marine garbage.

3.1 Rotating device:

The rotating device uses the power given by the motor to rotate circularly to collect marine garbage on the filter screen. After the garbage on the filter screen rotates to a certain angle with the filter screen, the garbage falls into the garbage collecting device due to gravity and water pump flushing, and the rotating device continues to rotate circularly to complete this action.

3.2 Power plant:

Main components:

A 1: provide the power needed by the rotating device to rotate.

Motor b 2: provide the power needed for the propeller to rotate.

C remote control device: send a signal to control the propeller to rotate so as to control the movement of the boat.

D: Propeller: A device that converts the rotating power of the engine into propulsive force. It can have two blades connected to the hub, and the backward side of the blade is a propeller with a helicoid. It receives the signal from the remote controller, completes the forward and reverse rotation, and realizes the forward and backward movement and steering speed change of the boat.

Function: It can effectively control the movement of the boat, realize the steering and speed change of the boat, balance the stability of the boat on the water surface, and make it safer and more stable to improve the work quality when the boat finishes its work.

3.3 Water pump device:

Role:

A, the water pump absorbs seawater to form suction force, which attracts the garbage near the boat to approach the boat slowly while the boat is looking for garbage.

B The seawater absorbed by the water pump is sprayed onto the filter screen along the tangential direction of garbage falling through the water pipe, which flushes the micro-sized garbage into the garbage collection device, prevents the garbage from falling due to its own lack of gravity, sticks to the filter screen and returns to the seawater with the rotation of the rotating device, and improves the garbage cleaning efficiency.

3.4 Garbage collection device:

The garbage collection device is close to the garbage falling side of the rotating device, fixed on the foam buoy, and receives the garbage falling from the filter screen and the seawater washed by the water pump pipe. The bottom of the garbage collection device consists of the filter screen, which filters the seawater and leaves the garbage at the bottom of the collection device.

Achieve the purpose of garbage collection.

3.5 Hull fixing and floating device:

There are several fixing devices above the foam buoy, which are used to fix and support the rotating device, garbage collection box, foam buoy and other devices, and enhance the stability of each part of the hull. Foam buoy provides buoyancy for the whole hull.

4. Innovations

This hull realizes the functions of mechanization and manual control of garbage collection, and manually controls purposeful cleaning of garbage areas, which reduces the blindness of cleaning garbage when the hull floats on the sea surface and improves the efficiency of cleaning marine garbage. Mechanized garbage collection replaces manual garbage collection, which reduces the labor cost and greatly improves the collection speed. The amount of garbage to be cleaned is increased, and manual labor is saved.

The existing marine garbage collection technology mainly collects garbage by means of drum-type or conveyor-type collection device, hook and pick, etc. These methods have certain limitations, such as being only suitable for some garbage that is easy to be picked up, poor universality, immature technology and high input cost, and being unable to collect large pieces of garbage that are not easy to be picked up. Poor cleaning effect. This hull has the ability of gathering garbage and strong collection, and it can collect large garbage and small garbage.

Based on the principle of inertia, this hull has designed a rotating garbage separating device, which scoops up garbage from the water surface by the circular rotation of the rotating device, rotates to a certain angle in the filter screen and falls into the collecting device by gravity, thus achieving the goal of separating garbage from the filter screen to collect it.

This system collects garbage continuously through manual control, circular rotation, and can work in various waters. It can be used to clean up a large amount of accumulated garbage at the source of garbage, and also can be used to clean up scattered garbage in lakes and rivers. Can work in a large area of water, but also can work normally in a small area of water.

A water pump is installed under the hull. When the hull works normally, the water pump pumps water, which will cause the sleeping floating garbage around to approach the hull slowly, that is, when the hull is looking for garbage, the garbage also approaches the hull, and the ocean cleaning efficiency can be significantly improved. In terms of structure, this marine garbage cleaning ship is simple, with strong cleaning capacity and low manufacturing cost, which meets the hull structure standard of China's active participation in global marine garbage cleaning, and to a certain extent, promotes the scientific and technological development of marine garbage, which is not only the call of the new era, but also a step towards "prospering towards the sea".

5. Application prospect

In recent years, the rapid growth of water garbage has seriously affected human life. At present, plastic garbage is the most abundant of floating garbage on the sea surface, beach garbage and seabed garbage. As a tool to clean up garbage and maintain the environment, the demand range of marine garbage cleaning ship is global, but the demand is global. Clean up and treat the surface garbage, It can provide a good environmental foundation for the development of shipping and tourism, keep the waterway traffic unblocked, improve the environmental sanitation of water areas by improving the safety factor of water traffic, beautify the landscape of river basins, ensure the ecological balance of water biological species, ensure good water supply conditions, improve the utilization rate of limited water resources and promote the sound development of ecological environment. It has produced remarkable social, environmental and economic benefits. With the further development of China's economy, more and more attention is paid to environmental protection, the development of mechanized water surface cleaning boats, and the attention of human beings to their own health has also accelerated the demand for water surface cleaning boats, which shows a trend of rapid growth and has a broad application prospect in the future.

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