

A Floating Garbage Disposal Vessel

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Abstract: "green water and green mountains are mountains of gold and silver". At present, domestic river management and water cleaning work lack of unity and coordination, floating objects on the surface of the source is numerous, cleaning range is wide, but water cleaning funds are insufficient, resulting in water garbage seriously affect the image of the city, causing economic losses. However, special personnel are required to take charge of the garbage salvage work. The salvage personnel work in coastal areas on the ship surface, and the ship equipment is backward, which poses certain safety risks. In addition, the salvage personnel need to work in the harsh environment for a long time, which can easily cause discomfort and lead to diseases. In order to maintain the water environment of scenic lakes, urban inland rivers and coastal areas, this project designed an automatic water garbage collector, aiming to change the current lack of high efficiency and intelligent water garbage cleaning method, which is dominated by manual cleaning. The floating garbage cleaning guard includes the hull, the hull driving mechanism, the collection and transportation device, the solar panel group and the control system. The front part of the hull has a gap in the middle part, and the middle part of the hull has a collection box, which is located at the back side of the gap. The hull driving mechanism is arranged at the rear and lower part of the hull, which comprises a propeller, a reducer and a first motor. The propeller is located outside the hull and is connected to the first motor through the reducer. The collecting and conveying device is installed at the gap on the front side of the hull, including the mounting bracket, the conveying belt and the second motor. The mounting bracket is fixed on the front side of the hull. The conveying belt is set on the mounting bracket through the active roller and driven roller, and the output end of the second motor is connected to the active roller. The utility model has the advantages of reasonable structure design, low manufacturing cost, replacing manual salvage, saving time and labor, safety and reliability, flexible operation, small dead Angle of salvage, high degree of automation, good collection effect and high efficiency. This project can be combined with specific water area for path planning, effectively improve the efficiency of garbage cleaning, save human resources, and has a broad market prospect.

Key words: Garbage, Collect Clean up, Environmental protection, Transfer

INTRODUCTION

In the 21st century, when mankind is exploiting and utilizing the oceans, it has become the norm and mission for all mankind to protect the Marine environment and prevent pollution of the Marine environment. With the development of industrial technology, it is inevitable for ships to directly or indirectly introduce some materials and energy into the Marine environment in the process of operation, so as to damage biological resources, endanger human health, hinder various Marine activities and cause Marine pollution. The use of water cleaning guards can not only reduce water garbage and keep water clean, but also improve the image of the city and prevent public health accidents. The floating garbage disposal robot is suitable for the small area water area of the scenic spot and the water surface (such as small reservoirs, port areas, etc.) that is not suitable for the existing large garbage collection ship to work garbage disposal problems, can salvage most of the floating garbage on the water surface, such as leaves, packaging, etc. Based on radio remote control technology, simple control, good mobility, is very suitable for the park or scenic area small area of water surface garbage cleaning work. When using, just use a simple modified pickup truck

to transport it to the work place, hang it into the water, and the staff can remotely control it on the shore. After the garbage is cleaned, it can be recycled by using the lifting device. Convenient. It can also be parked in a certain water area for regular cleaning, which can save transportation equipment. However, the current salvage methods and ships are accelerating with the modernization process in China, the increase in garbage production, and the increasing amount garbage on the water. The existing manual cleaning methods are not only inefficient, but also have certain risks. In order to realize the flexible operation of collecting clean surface garbage in rivers and lakes, the purpose of salvaging dead angles and good collection effect, we designed water garbage cleaners to achieve environmentally and efficient collection of floating garbage.

SYSTEM STRUCTURE

The utility model discloses a floating floating garbage cleaning ship, which comprises a hull, a hull driving mechanism, a collecting and conveying device, a solar panel and a control system. The central part of the front side of the hull is provided with a gap, and a collecting box is arranged in the middle of the hull, and the collecting box is located in

the gap. Backside. The hull driving mechanism is disposed at the lower rear of the hull, and includes a propeller, a speed reducer and a first motor. The propeller is located outside the hull and is connected to the first motor through a speed reducer. The collecting and conveying device is installed at a notch on the front side of the hull, and includes a mounting bracket, a conveyor belt and a second motor. The mounting bracket is fixed on the front side of the hull, and the conveyor belt is disposed on the mounting bracket through the driving roller and the driven roller. The second motor output is connected to one end of the drive roller. The utility model has reasonable structural design, low manufacturing cost, replaces manual salvage, saves time and labor, is safe and reliable, has flexible operation, small salvage dead angle, high automation degree, good collection effect and high efficiency.

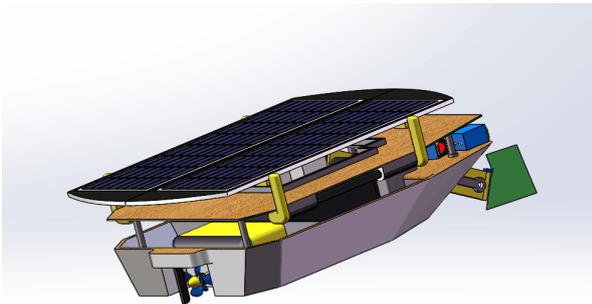


Figure 1 hull structure diagram

OVERHULL DESIGN

The mounting bracket comprises a bottom plate and two vertical plates, and the front end of the bottom plate is slanted and fixedly mounted on the hull, and the two vertical plates are symmetrically fixed on both sides of the bottom plate. The front ends of the two vertical plates extend out of the bottom of the bottom plate, and a collecting plate is detachably mounted. The two collecting plates are vertically arranged and have a figure-eight opening shape. In the state of use, the lower portions of the two collecting plates are deep below the water surface. The conveyor belt is located above the bottom plate, and the driven roller and the driving roller are disposed in a front-to-back manner between the two vertical plates; the conveyor belt is composed of a plurality of raft plates which are movably connected in sequence, and the outer surface of the conveyor belt extends along the direction thereof. A plurality of anti-slip strips are disposed at equal intervals in sequence. A ceiling is arranged above the hull, and the solar panel is fixedly mounted above the ceiling, and is composed of a plurality of regularly arranged solar panels, and each solar panel is connected to the battery. The upper surface of the hull is provided with a deck, and the front end of the deck is symmetrically provided with two searchlights,

two searchlights are respectively located on both sides of the notch, and the battery is powered by the searchlight. The signal terminals of the first motor and the second motor are all in communication with the control system. The upper part of the front side of the collecting box is provided with a feeding port, and the top of the conveying box is provided with a box cover, and the rear end of the conveyor belt is adjacent to the front side of the feeding port [Qi Qiang, et. al., 2009].

3.1 Ship Thruster Design

A propeller is a tool that powers a ship. Its function is to convert the power provided by the power unit into thrust and advance the ship. It is an energy converter that converts natural, manpower or mechanical energy into ship thrust. The propeller can be divided into active and reactive according to the mode of action. Active, pulp, paddle wheel, water jet propeller, propeller and other reactive types driven by manpower or wind power. The most widely used modern transport ship is the propeller [Zeng Ping, et. al., 2006].

According to the characteristics of the DC power supply of the battery and the simple structure of the hull, the electric ship propeller is selected. The propeller has strong function, simple structure, convenient and safe operation and wide application range. The propeller is a novel underwater propulsion device. It has the characteristics of small size, compact structure, high performance conversion rate, no noise during operation, green environmental protection, convenient installation and easy maintenance. It is used by some small boats. The preferred product of power is more in line with the functional needs of this design.

3.2 Battery Selection

A battery, also called a secondary battery, is an electrical device that stores the obtained electrical energy in the form of chemical energy and converts chemical energy into electrical energy. The battery is usually divided into an alkaline battery and an acid battery according to the electrolyte. In recent years, due to the rapid development of the transportation, communication, and computer industries, the product range, product types, and product performance have undergone tremendous changes to meet the needs of different uses. The battery is mainly used in the starting of various internal combustion engines such as vehicles, ships, airplanes, lighting, ignition, energy storage, emergency power, telephone switches, uninterruptible power supplies, mobile communications, computers, electronics, meters, portable power tools, electric toys, etc [editor-in-chief of Xi'an Micro-Electrical Research Institute, et. al., 2007].

In view of the purpose of the design of the work is to develop an environmentally friendly, efficient and technologically advanced environmentally-friendly surface floating garbage salvage ship, the battery is

selected as the power source. The battery has two functions in this design. On the one hand, it drives the portable marine propeller (motor) to realize the driving and steering of the ship in the water; the other is to drive the motor, and then drive the garbage conveying device to realize the garbage transportation.

The 200ah or 150ah flat-head battery for marine battery stocks currently has uniform, sail, white clouds, Haiou, CCB and so on. Among them, the unified battery has a national-level ship inspection certificate, and it is safe to use. After finishing the data, the battery model is 200ah (150ah). The green battery has the largest capacity, the highest specific volume, high collection efficiency and strength, stable performance and long battery life.

3.3 Overall Design of the Conveyor Belt

The transport device is driven by the power unit to transport the surface waste to the garbage storage device. According to the construction principle of the hull, the transmission device is placed between the left and right hulls[Zeng Ping, et. al., 2006].

In view of the fact that a part of the front end of the transmission device needs to be in the water, the chain drive is selected in consideration of adapting to a harsh environment and avoiding elastic sliding and slipping[Chang Degong, Fan Zhimin, Meng Zhaoming, et. al., 2010]. The entire transmission device is designed as a transmission between the gear and the chain, which in turn drives the transmission of the conveyor belt. The connection between the connection form and the conveyor belt is fixed by bolts, and some barbs are welded on the conveyor belt to ensure that the surface garbage can be transported to the inside of the garbage storage tank inside the hull. In addition, the garbage may be hooked by the barb, and the garbage cannot enter the garbage smoothly. Inside the storage device, prepare a long rod with a hook. 4 is a schematic view showing the structure principle of a floating garbage cleaning ship of the present invention. 5 is a cross-sectional structural view of a floating garbage cleaning ship of the present invention.

SPECIFIC IMPLEMENTATION METHOD

The utility model will be described in detail below with reference to the accompanying drawings 4 and 5, a floating garbage cleaning ship includes a hull 1, a hull driving mechanism 2, a collecting and conveying device 3, a solar panel group 4, a battery 5, and a control system, and a central portion of the front side of the hull 1 is notched. The inner side of the hull 1 is provided with a collecting box 6 which is located at a position opposite to the rear side of the notch. The collecting box 6 is made of iron plate, and the upper part of the front side is provided with a feeding port 61 and the top is provided with a box cover. 62. The collected garbage enters the inside of the collection box 6 through the feed port 61 for

collection. When the hull 1 is docked, the worker opens the cover 62 to clean the garbage from the collection box 6. The upper surface of the hull 1 is provided with a deck 11 which is divided into two parts, a front deck and a rear deck, respectively, and the deck 11 is fixedly connected to the hull 1 by a support structure. The front end of the front deck is symmetrically disposed with two searchlights 12, two searchlights 12 are respectively located on both sides of the notch, and the battery 5 supplies power to the searchlight 12, and the searchlight 12 provides illumination for the cleaning ship to work at night[Wei Bing, et. al., 2006].

The hull driving mechanism 2 is disposed at the lower rear of the hull 1, and includes a propeller 21, a speed reducer 22, and a first motor 23. The propeller 21 is located outside the hull 1, and is connected to the first motor 23 through the speed reducer 22, and the first motor 23 is decelerated. The machine 22 drives the propeller 21 to rotate. The first motor 23 is communicatively coupled to the control system, and the speed and direction of the hull 1 is controlled by the control system. The collecting and conveying device 3 is installed at a notch on the front side of the hull 1, and includes a mounting bracket 31, a conveyor belt 32 and a second motor. The mounting bracket 31 is fixed in a notch on the front side of the hull 1, and the mounting bracket 31 includes a bottom plate 311. And two vertical plates 312, the front end of the bottom plate 311 is slanted and fixedly mounted on the hull 1. The two vertical plates 312 are vertically symmetrically arranged on two sides above the bottom plate 311, and the bottom end of the vertical plate 312 is fixedly connected to the side of the bottom plate 311. In one [Wang Wei, et. al., 2006].

The front ends of the two vertical plates 312 extend outward from the front end of the bottom plate 311. The front end of each vertical plate 312 can be detachably fixed to and mounted with a collecting plate 33. The two collecting plates 33 are vertically arranged and have a figure-eight opening shape. In order to facilitate more garbage to enter between the two vertical plates 312 for collection, in the state of use, the lower portions of the two collecting plates 33 are deep below the water surface. The rear end of the conveyor belt 32 is immediately adjacent to the front side of the feed opening 61, the conveyor belt 32 is located above the bottom plate 311, and the conveyor belt 32 is provided on the mounting bracket 31 by the driving roller 34 and the driven roller 35, the driven roller 35 and The driving roller 34 is disposed between the two vertical plates 312 in a front-to-back manner. The driven roller 35 is located below the driving roller 34, and the conveying belt 32 is also inclined in a front low rear height. One end of the driving roller 34 is fixedly connected to the power output end of the second motor, and the signal end of the second motor is communicatively connected to the control system.

The conveyor belt 32 is composed of a plurality of rafts which are movably connected in sequence. The outer surface of the conveyor belt 32 is disposed at equal intervals in the extending direction thereof with a plurality of anti-slip strips 321 which are inserted between the two vertical plates 312 during the traveling process. The garbage is transported by the conveyor belt into the collecting box 6. Above the hull 1, there is a ceiling 13 which is located above the deck 12. The ceiling 13 is fixedly connected to the hull 1 via a support column. The solar panel 4 is fixedly mounted above the ceiling 13 by a plurality of regularly arranged blocks. The solar panels are formed, and the solar panels are connected to the battery 5. The solar panel 4 converts the solar energy into electrical energy and stores it in the battery 5. The battery 5 supplies power to the first motor 23, the second motor power supply and the searchlight, and satisfies the garbage cleaning ship. The demand for electricity for driving and collecting operations.

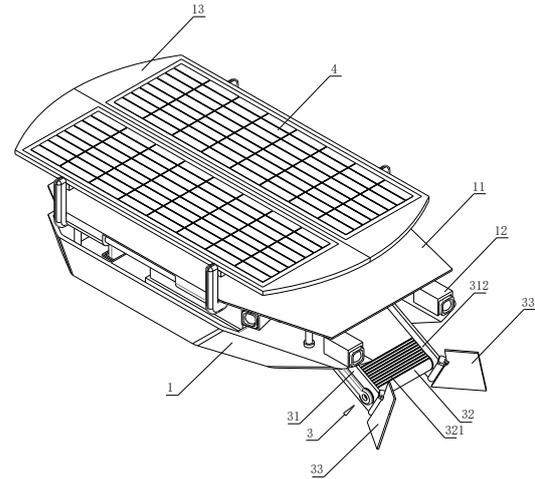


Figure 4 schematic diagram of structure principle

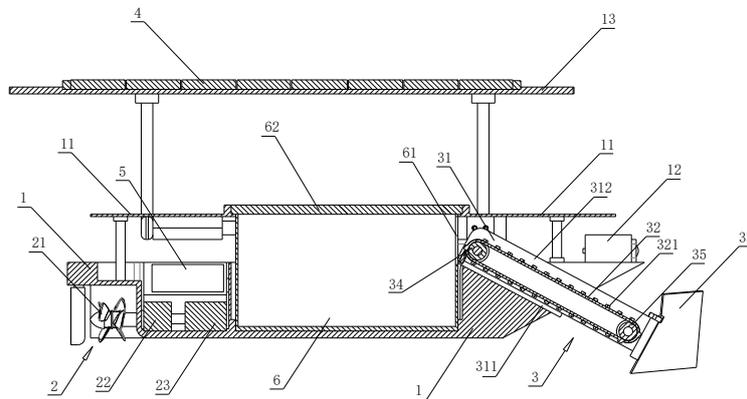


Figure 5 schematic diagram of sectional structure

CONCLUSIONS

This study is aimed at the current lack of unified coordination of domestic river management and water cleaning work. There are many sources of surface floating objects, and the scope of cleaning is wide. However, insufficient funds for water cleaning have caused waterborne garbage to seriously affect the image of the city and cause economic losses. According to the functional requirements, the hull structure has been completely selected; the selection of the power unit mainly involves the selection of the battery, the selection of the motor and the selection of the propeller; this design is mainly the design of the salvage and transmission device, mainly involving Collect the design of the conveyor belt.

This time I further cultivated my hands-on ability and benefited me a lot. The whole process is not only for me to re-consolidate and deepen my expertise, but also to let me study the PRO/E, AutoCAD and other

drawing software. I will continue to work hard in my future work and study. , constantly enriching their knowledge.

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