

Analysis on the Design of Horizontal Garbage Compression Station

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Abstract

With the rapid advancement of urbanization and industrialization in China and the continuous improvement of people's living standards, the generation and accumulation of a large amount of garbage has caused serious environmental problems. Therefore, the garbage compression station is more important, through the loose garbage. Compressed into dense garbage and then re-discharged or buried, it can effectively solve the problem of massive accumulation of garbage and contribute to the beautification of the environment.

Keywords

Garbage compression station, horizontal type, push head gate, main compression box, hook head, walking hook.

1. Introduction

With the rapid advancement of China's urbanization and industrialization process and the continuous improvement of people's living standards, the generation and accumulation of a large amount of garbage has caused serious environmental problems. With the continuous increase of garbage collection and transportation, not only the higher requirements for the existing garbage collection and transportation system, but also the collection, transportation and treatment of urban domestic garbage have become more difficult. Improper handling not only affects the appearance of towns, occupies land, pollutes the soil, but also affects air quality, spreads diseases, and endangers the health of residents. This issue has attracted worldwide attention.

To this end, this project proposes the development of a new type of urban domestic garbage compression equipment, which effectively solves the secondary pollution problem caused by the floating of the garbage behind the back door of the garbage container during transportation and the problem of garbage blockage above the compression box.

2. Research Status and Analysis at Home and Abroad

2.1 Domestic Literature

(1) Research on New Compressor of Urban Domestic Waste Transfer Station

Abstract: A wedge-shaped indenter is used; the existing compression device mainly uses a flat indenter.

Disadvantages: The garbage compression ratio close to the indenter is large, the garbage compression is uneven, the overall compression ratio is small, and the effect is not good.

Wedge indenter advantage: there is no need to increase the compression factor by increasing the pressure without increasing the cost. The dotted line is the plane indenter.

(2) "Urban Waste Compression Transfer Station"

Two collection systems: towed container system, fixed container system

Transfer station type: small, medium, large

Transfer system: road transport, rail transport, water transport

Transfer method: direct transfer type, push-in box type

(3) Analysis of the application of the lifting mechanism in the loading and unloading bins of the compressed garbage transfer station

There are three main types of loading and unloading methods for garbage cans. One is to carry out loading and unloading by means of lifting; the other is to use the lifting equipment provided by the special transporting vehicle for loading and unloading; the third is to use loading and unloading.

The hoisting method requires loading and unloading equipment. In the garbage transfer station, a crane can be used to hoist a 20-ton crane. The cost of the equipment is quite high. On the other hand, the building structure requirements of the garbage station are increased. At least 7 meters, the corresponding building columns and beams of the garbage transfer station should be enlarged, and the construction cost of the garbage transfer station should be greatly improved. This structure is not applicable to many garbage stations that have already been built, so hoisting The way of its application is narrower and the economy is poor.

The lifting and unloading equipment provided by the special transport vehicle can be used for loading and unloading. If the hook and arm vehicle can be used for loading and unloading the garbage bin, the demand for the special transport vehicle is greatly improved, the cost of the special transport vehicle is greatly improved, and the space for lifting is also affected. Restricted, so the equipment investment is large, it will increase the transshipment cost, and the scope of application is also small.

The loading and unloading of the garbage can by the lifting method is to use the lifting mechanism disposed on the ground to drive the garbage box up and down to carry out the loading and unloading of the garbage can, which can better solve the problem of space adaptation and high equipment cost.

(4) The shortcomings of the rear-loading transport vehicle in the article "New-generation split-floor van-type garbage compression transfer station transport equipment" are as follows:

After the garbage compression mechanism is designed, the garbage compression mechanism is designed to be more than 1.5m-2m at the rear of the transport vehicle, and the weight ratio is increased by 1.5t-2t, and concentrated in the tail of the vehicle. During transportation, especially at high speeds, it is easy to cause unevenness, heavy directional mechanism, inflexible turning, etc. Especially when driving on a steep slope, the front part of the car is heavy and easy to roll over.

The rear-loading garbage compression transporter, regardless of whether it is empty or heavy, has always caused unnecessary load on the rear of the vehicle, and has high fuel consumption, increased energy, limited garbage load, and high cost.

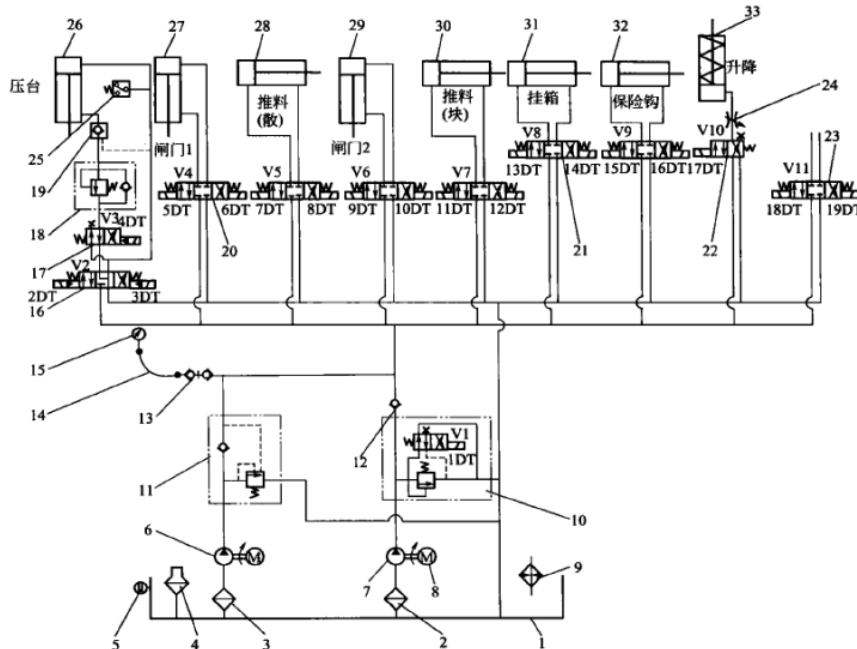
The rear-loading garbage compression transporter is inconvenient to load garbage because the hopper is 0.9 meters above the ground, and the sanitation workers are labor intensive.

The rear-loading garbage truck is basically fixed at home and abroad. When loading and compressing garbage, it relies on the engine of the car to drive the hydraulic oil pump to work. As a result, the consumption of oil is large, which leads to a significant increase in the cost of garbage transportation. After testing, the rear-loading garbage-compressed transport vehicle is compared with the split-type floor-type garbage-compressed transit transport (vehicle) equipment, when compressing and loading the same amount of garbage. The rear-loading type is higher than the transportation cost of about 1.7 times of the split floor type.

If the post-loading garbage-compressed car is changed to the component-type floor-standing transfer station, the rear-loaded occupied area is large. The original use of the container-type and other forms of the garbage transfer station cannot be rebuilt, and the sanitation departments must It is necessary to invest a lot of money in civil works.

The new split-floor van-type garbage compression transfer station consists of a chassis car, two movable garbage loading large compartments, two garbage compression boxes fixed in the transfer station site, and a hydraulic pump station console.

"Failure analysis and elimination of hydraulic system of garbage compression transfer station" (Figure 1.1).



1-tank; 2, 3-suction filter; 4-air filter; 5-level needle; 6, 7-hydraulic pump; 8-motor; 9-heater; 10-electromagnetic overflow valve; 11-unloading relief valve; 12-check valve; 13-pressure connector; 14-pressure gauge hose; 15-pressure gauge; 16-three-position four-electrolyte fluid reversing valve; 17-two-position four-electrolyte fluid reversing valve; 18-balance valve; 19-hydraulic check valve; 20~23-electromagnetic reversing valve; 24-throttle valve; 25-pressure relay; 26-compression cylinder; 27-middle gate cylinder; 28-pushing material cylinder; 29-front gate cylinder; 30-pushing block cylinder; 31-hanging tank; 32-safe hook cylinder; 33-lift cylinder

Figure 1. Schematic diagram of the hydraulic system of the garbage compression transfer station

2.2 Status and Analysis of Domestic Manufacturers

Domestic urban garbage compression stations are generally divided into four categories: vertical garbage compression, horizontal garbage compression, buried garbage compression, and intelligent mobile garbage compression.

The vertical garbage compression station is divided into single column, double column, four column, etc. according to the number of driving cylinders. The number of driving cylinders means the driving force, depending on the amount of garbage to be compressed and the running speed of the whole system.

The dumping or platform position of the above-mentioned horizontal garbage compression station is divided into the rear platform loading type, the rear dumping type, the side turning and the feeding type. These are considered to be related to the geographical location of the horizontal garbage compression station and reasonable use of space. Resources.

The underground garbage collection compression station is similar to the horizontal garbage collection compression station. The compression station is located underground and is more space-saving. When it is necessary to transport garbage, the power system will push the compression station out for loading.

The intelligent mobile compression garbage station is a conjoined machine that combines the compressor and the box. It does not separate during the collection, compression and transportation of

garbage. The overall equipment is highly intelligent, the failure rate is low, and the garbage is completely sealed in the garbage. Inside the box, it will not cause secondary pollution to the environment, and it is easy to clean. This type of compression station is intelligent and automated, and the compression and transfer are integrated, which is relatively new and advanced.

2.3 Research Methods and Significance of This Topic

First of all, to understand the functions implemented by the garbage compression transfer station, to understand the working principle of the horizontal garbage compression station and the structure of the garbage compression station, and then to view the design original data and problem description, and discuss how to solve the problem as follows:

- (1) The sealing of the gate is not strict, which brings secondary pollution such as floating along the road during transportation;
- (2) The problem of garbage blockage above the compression box.

According to the collection of existing drawings and materials, the construction of the horizontal garbage compression station to be designed, the overall plan of the horizontal garbage compression station, the structural design of the structure to be innovative, and the way to solve the problem from the root cause. Develop a variety of design options, select the most appropriate innovation structure for the next modeling and simulation analysis, and finally, evaluate the overall horizontal garbage compression station.

The successful development of the horizontal garbage compression station of this subject can produce positive results. SMEs are one of the pillars of China's economic development. However, due to lack of human resources and financial resources, and weak research and development, there are insufficient innovation capabilities and lack of sustainable development momentum. Problems such as weak market competitiveness have severely restricted the further development of enterprises. This topic, through the cooperation of production, education and research between enterprises and universities, has developed a horizontal garbage compression station that enables enterprises to have independent intellectual property rights, make up for their deficiencies in technological innovation and intellectual property, and enhance their core competitiveness and development. Laid a solid foundation.

3. Horizontal Garbage Compression Station Overall Plan

3.1 The Functions Implemented By the Garbage Compression Transfer Station

- (1) It has the function of initially compressing all kinds of domestic garbage and carrying out garbage loading and transportation.
- (2) By improving the hood of the compression station, the pusher, and the tailgate of the garbage truck, the transfer rate is improved and the garbage clogging of the garbage truck and the garbage clogging above the compression box are solved.

3.2 Overall Design Planning

The plan for the overall design based on the horizontal garbage compression station, as shown in the figure, mainly includes the following aspects:

- (1) First of all, we must understand the working principle and internal structure of the horizontal garbage compression station to achieve accurate modeling of the horizontal garbage compression station.
- (2) Collect the information of each component of the horizontal garbage compression station, collect the information of each component of the real horizontal garbage compression station, understand the material and shape of each component of the horizontal garbage compression station, and use the mobile phone. Take a photo record. Collect the relevant drawings and dimension information of each

component of the horizontal garbage compression station to facilitate modeling of the horizontal garbage compression station.

(3) Realize the three-dimensional modeling of each component of the horizontal garbage compression station in the modeling software, and process the material of the model to make the model more realistic. Light material rendering for the entire scene.

3.3 Structure of Horizontal Garbage Compression Station

The horizontal garbage compression station has a feeding hopper part, a main garbage compression box part, an auxiliary garbage compression box part, a garbage compression container part and a moving board part, and the main garbage compression box part is pushed by the main garbage compression box, the main garbage compression box part, the pull pin part and the walking hook device part are composed, and the auxiliary garbage compression box part is composed of the auxiliary garbage compression box and the auxiliary garbage compression box push head, the garbage compression container part is composed of the garbage compression container box, the garbage compression container back door and Garbage compression container gate composition.

3.4 Working Principle of Horizontal Garbage Compression Station

The working principle of the horizontal garbage compression station is divided into eight steps:

(1) In the first step, the empty garbage compressed container is placed on the moving board by the hook of the transportation vehicle of the garbage compression container, and then the moving board is driven by the oil cylinder to move the empty garbage compressed container to the main garbage. The position of the compression box is aligned to stop the movement of the cylinder of the cart.

(2) In the second step, the walking hook device of the main compression box starts to work. At this time, the rear door of the garbage compression container is still at a certain distance from the position of the push head of the main compression box, and the walking hook device starts to function. As the cylinder contracts back, the hook begins to rotate inward from the direction of compression of the original vertical main compression box. When rotated to 90 degrees, the hook portion in front of the hook enters the side rib of the garbage compression container. Inside the working port, as the cylinder continues to contract, the hook portion begins to contact the end face of the working port, the cylinder continues to contract, and the hook begins to move the garbage compressed container toward the port of the main compression box until the cylinder contracts to the innermost end, and the garbage is compressed. The rear gate of the container is just the port of the upper main compression box.

(3) In the third step, the hook head of the main garbage compression box pusher head and the back door of the garbage compression container are integrated. First, the main garbage compression box pusher head advances under the action of the oil cylinder until the main push head top to the rear gate exit. During the process, four hooks controlled by the compression spring are hooked into the four hook grooves of the rear gate, so that the hook head of the main garbage compression box push head and the back door of the garbage compression container are integrated, and then pulled out. When the latch device is started, the walking hook device of the main compression box hooks and tightens the garbage compression container, the wedge hook head is inserted into the opening of the bolt, and the single push cylinder piston rod extends from the outside to the inside under the action of the pressure oil. The square tube guide sleeve is moved along the fixed square tube, and the wedge-shaped hook head is welded on the square tube guide sleeve, and is integrated with the square tube guide sleeve. With the movement of the square tube guide sleeve, the hook head also hooks the opening of the bolt. From the gradual outward movement, the bolt is pulled out from the side of the gate of the back door. At this time, the hook head of the main garbage compression box pusher and the back door of the garbage compression container are integrated, and gradually retreat under the action of the oil cylinder. Back.

(4) The fourth step is to dump the garbage. The garbage truck loaded with domestic garbage enters the horizontal garbage compression station, first weighs the total weight of the weighbridge, automatically records the data from the weighbridge, and then drives the second layer along the road. The tail of the

garbage truck is backed up against the feeding hood. When the rear wheel touches the concrete pier in front of the feeding hopper, the garbage is poured into the feeding hopper. The width of the feeding hopper is 6 meters, and two garbage trucks can be provided to dump the garbage at the same time. After the garbage is poured into the feeding hopper, the next garbage compression work is carried out.

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