Design of a New Type of Blade Sweeper

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Abstract

Nowadays, the level of mechanization is getting higher and higher, but in fact, the tedious work of cleaning up fallen leaves still depends mainly on manual cleaning. This not only results in high work intensity but also has low cleaning efficiency, which is not conducive to the secondary use of fallen leaves. Therefore, research and development of environmentally friendly defoliation sweepers and their cleaning operations have great practical value. In this paper, the electric defoliation sweeper sweeping operation device is taken as the research object. After understanding the structural characteristics of the various leafy sweepers in reality and the problems existing in the actual working conditions, an electric leaflet sweeper was innovatively designed. Clean the operating device.

Keywords

Cleaning speed, Sweep width, Collection box volume, Driving method

1. The Role of the Defoliator Sweeper

As one of the city's sanitation equipment, the leaf-sweeping sweeper is a new type of high-efficiency sweeping equipment that integrates pavement cleaning and defoliation and defoliation[1]. Can be widely used for learning, parks, streets and other places to clean up the leaves. Public opinion knows that a large amount of fallen leaves not only affects the urban environment, but also brings inconvenience to traffic. Manual cleaning of fallen leaves is now generally used. This not only increases the labor intensity of the cleansing notary but also inconveniences transportation due to the large space occupied by fallen leaves[2]. Falling leaves are organic matter that we can collect for papermaking, producing organic fertilizers and feeds.

2. Road Cleaner Development History

Europe is the birthplace of road cleaning machines. All the way through the development process has gone through the pure mechanical sweep sweeper, blower pure suction sweeper, and suction sweeper combined sweeper sweeper process. China's road cleaning and cleaning machinery is basically similar to the development process in developed countries[3,4]. It is also a prelude to the development of China's R&D sweeper trucks from pure sweeping sweepers. It was only in the 1960s that the first generation of pure sweep sweepers was developed. After 2000, road sweepers showed a trend of multi-angle development. Especially in recent years, the scale of manufacturing companies has grown and the types of production have become increasingly complete, including various types of cleaning vehicles. Afterwards, road sweepers that have been introduced to various operating methods and mechanisms have also made the products produced in China increasingly internationalized.

Now, all the indexes of the domestically produced clean car can meet the requirements of use, and the equipment function is simple to suck and clean. The use of multi-purposes has resulted in thorough cleaning and maintenance of particularly marginalized angles, and some have also developed cleaner equipment at heights, which has greatly improved people's living standards and technological advancement.

3. Overall Design of the Deciduous Sweeper

3.1 Cleaning Speed Requirements

The sweeper sweeps the forward speed at the time of execution according to the specified sweeping width and sweeping efficiency, and the sweeping mechanism should be able to increase the speed of the sweeping operation within the given width under the premise of a certain efficiency. At the same time, the cleaning speed will vary depending on the situation, and adjustments will be made according to the actual conditions of the road surface. In the actual use situation, it is generally 5-12km/h in a reasonable interval.

3.2 Sweep Width Requirement

When the sweeper sweeps and collects fallen leaves, the width of the maximum effective sweeping surface that the sweeping operation can continue to achieve within the specified sweeping speed range. Therefore, when the cleaning operation of the decantation sweeper is performed, the width of the sweeping operation can be widened to the maximum possible cleaning efficiency so that the operation capability of the leafy sweeper can be improved. In addition, the sweep width should not be less than 2000 mm. Sweep width requirement

3.3 Operational Efficiency Requirements

The ratio between the amount of fallen leaf cleaned by the sweeper and the total amount of fallen leaves on the site is called sweeping efficiency, which is mainly measured at a prescribed site.

3.4 The Magnitude of the Force Required to Clean

Under the premise of satisfying the cleaning efficiency, the range of roads that can be cleaned per hour is equal to the product of the average cleaning speed and the effective cleaning width, which is called the sweeping power of the leaf sweeper. Therefore, under the premise of satisfying the cleaning efficiency during the cleaning process, the operating speed should be increased as much as possible and the width involved in the two round brushes should be widened. The purpose is to increase the sweeping force. Considering the above factors, the sweeping area of the decantation sweeper is considered. Not less than 16-20 million square meters per hour.

3.5 The Defoliation Tank Capacity Requirements

The maximum loading capacity of the container collected in real time by the deciduous sweeping machine during the sweeping process is referred to as the effective volume of the deciduous sweeper. Taking into account the electric power of the defoliation sweeper operating range is mainly urban roads are cleaning and cleaning, short-range battery life, and under the conditions of good road conditions, the rubbish and large objects of the resistance is small, in addition to the small deciduous density, larger size As a result, the capacity of the container is increased as much as possible in consideration of the maximum loading capacity. The purpose is to increase the evacuation ability of the defoliation sweeper and to reduce the labor intensity of the cleaner. Through the actual market inspection and the above requirements usually design deciduous collection containers should ensure that the storage capacity of two or three days should not be less than 2800 liters.

4. Cleaning Organization Layout

4.1 Cleaning Device Hydraulic Power

The power of the leaf cleaning mechanism is derived from the hydraulic motor. The front disc brake uses a small hydraulic motor to provide rotational power. The rear roller brush and the transmission unit are hydraulically driven. The pressure of the hydraulic circuit is provided by the DC motor, making the cleaning mechanism connected to the hydraulic system.

4.2 Choose the Right Drive

According to the mechanical drive and hydraulic drive work properties are available, if the direct mechanical power drive requires complex shaft, box, gears, connectors and other complex structures, making the assembly complex and complicated assembly, mechanical efficiency of transmission

Lower; If hydraulic drive mode is used directly, the hydraulic components are connected with flexible hoses. The hydraulic drive has the characteristics of high torque and low speed, and the large transmission speed range is more conducive to the leaf-removing cleaning operations in complex environments. And the operation is simple and energy loss can be controlled within a certain range.

4.3 Perform the Role of Sweeping Organization

The decantation sweeper has the functions of sweeping, collecting and storing and transporting fallen leaves, which together form the core components of the sweeper. The designed cleaning organization includes the defoliation cleaning system, the defoliation collection system, the defoliation storage system, the driving power system, and the electromechanical-hydraulic control system.

4.4 Front Brush System

The front disc brush system is used to clean the fallen leaves during sideways and surrounding guardrails, and has the following functions: The two front disc brushes can be driven by a hydraulic motor to achieve stepless speed adjustment, which can expand the working area and range. The rod mechanism can be freely rotated; in order to ensure the cleaning efficiency, the front disc brush should have a certain ground pressure, and can control the size of the pressure.

4.5 Cleaning Roller Mechanism

The rear roller brushing mechanism performs the function of sweeping a large area of the road surface, and is capable of throwing the previously gathered leaves to the belt entrance. The disc brush can sweep the leaves to a certain height and distance, and at the same time ensure that the fallen leaves do not fly out, and can properly enter into the fallen leaves entrance to adjust the speed of the leaves of different thicknesses on the ground. The conveyor belt of the deciduous collection should be synchronized with the efficiency of the roller brush, so that it can coordinate with each other, and it can not only prevent the fallen leaves from blocking the inlet, but also improve the efficiency of the defoliation cleaning.

4.6 Transmission Belt Transport Function

The belt conveyor system can reliably and timely transport the fallen leaves to the deciduous reserve tanks, requiring good cooperation with the roller brush cleaning mechanism to prevent the occurrence of jamming; the rotating parts of the internal system of the transmission belt should have a certain speed of rotation, so that they can enter the fallen leaves. The formation of a certain air flow produces a certain degree of vacuum so that the fallen leaves can rely on the vacuum pressure differential flow inlet.

The general scheme designed in this paper is as shown in the figure:

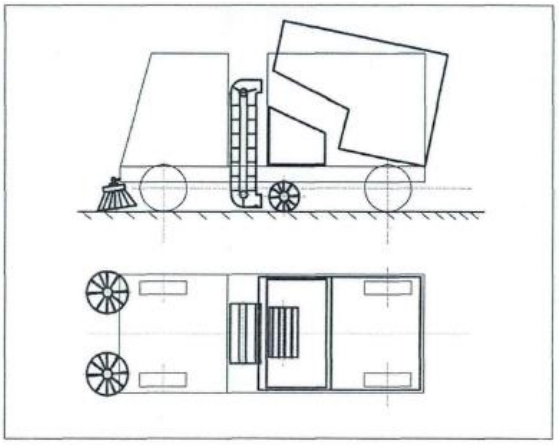

Fig.1 Cleaning device

This mainly improves the arrangement of the transport site of the deciduous conveyor belt. The vertical defoliation collection system is placed in the figure. This greatly reduces the space for the

deciduous transport system and also provides sufficient space for the rear hopper. In addition, it can also play the same effect as dust and dust removal.

5. Conclusion

The major advantages of the design: The first deciduous collection system is placed in the middle upright, and the point of standing upright is that the resistance of the defoliation in the process of transporting the conveyor belt is small, that is, the friction force is reduced and the transmission speed can be increased, so the indirect improvement is achieved. The efficiency of the defoliation sweep; the second is that the tangential speed of the roller brushing mechanism connected to the conveyor belt is opposite to the traveling speed of the vehicle. For some adhesive defoliation, the defoliation can be cleared off lightly, that is, the sweeping force is increased; the third is to consider The arrangement of the various parts of the car body facilitates the erection of the defoliation conveyor belt transfer device to facilitate assembly in actual production, which greatly saves space, thereby increasing the effective capacity of the leaf litter bin, and greatly increasing the cruising range of the vehicle, and reducing the number of workers. The labor intensity.

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