
Design of the External Walls of High-Rise Building Washing Machine

Zhiyuan Jiao ^a, Jianlong Zhao ^b

College of Mechanical and Electronic Engineering, Shandong University of Science and Technology Shandong, 266590, China.

^a1062036204@qq.com, ^b990668197@qq.com

Abstract

The external walls of high-rise building cleaning machine is a low cost, safe, reliable, efficient machines. The machine is divided into two parts, It is part of the building on top of the washing machine lifts, washing machines through the lift rope, hook driven another part, that is, washing machine attached to the external walls of high-rise building cleaning work. The external walls of high-rise building cleaning machines work, lift the two-speed motor launch, led by wire rope rack rising rapidly, up to the scheduled location, two-speed motor and braking to stop, adjust the location of washing machines, lifting brake, Reverse two-speed motor launch, the rack is slowly moving down at the same time, rack at the top of the water spray, brush with the rails in the motor driven along the rails of their respective reciprocating At the same time moving to rotate, cleared on the external walls of the stains, clean the external walls of white beauty.

Keywords

The external walls of high-rise building cleaning machine; washing machine lifts; washing machine.

1. Introduction

With the continuous development and progress of human society, the scale of the city is constantly expanding, and the urban architecture is more standardized and perfect. Various styles of buildings, especially high-rise buildings, are decorated with various building materials. After a certain period of time, the surface of the building will become dirty and distressed to varying degrees. In areas with poor environment, the pollution or damage is still quite serious. In recent years, the awareness of environmental protection at all levels of government in China has changed a lot. Some large and medium-sized cities in China have formulated regulations to maintain the cleanliness of the building surface. Among them, the cleanliness of the external walls of high-rise buildings has become a major issue.

The surface cleaning of buildings mainly includes the cleaning of exterior walls and the cleaning of central air-conditioning ducts. At present, the external wall cleaning uses the traditional "Spiderman" cleaning, which is a non-human work at the expense of life. Therefore, providing a complete solution to the construction surface cleaning will inevitably break a traditional industrial pattern and change people's working methods. Using robotic cleaning instead of traditional manual cleaning or inability to clean is an inevitable development trend.

2. Introduction of Cleaning Methods for High-rise Building Exterior Walls

Maintaining the cleanliness of urban buildings, especially the outer walls of high-rise buildings, will inevitably require the development of new types of cleaning machines, especially those that can replace people's automatic cleaning of the outer walls of high-rise buildings to meet the needs of emerging industries.

Artificial, physical, and chemical methods have emerged in society. They are briefly described as follows:

2.1 Manual Cleaning

In order to maintain the clean and beautiful appearance of the building, external walls should be regularly cleaned. To clean the outside of the building's exterior walls and glass, you need to wipe it often to keep the building clean and bright. Cleaning outside the building's exterior walls and glass requires working outdoors and high above the ground. The work of high-altitude glass wiping methods is generally as follows: First, look at the job site to determine the work plan; Install the vehicle - hanging basket or hanging plate; Prepare the wiping tools, including buckets, detergents, hair rollers, squeegee, towel and spare auxiliary tools Blades, spatulas, solvents, etc.; Workers carry tool hanging baskets or hanging plates; working methods are from top to bottom; wipe the glass; after all operations are completed, tidy up the tools and remove the ground protection ropes and billboards.

From the above, it can be seen that this cleaning method is a dangerous operation, which has great labor intensity, requires a large number of laborers, and is inefficient.

2.2 Physical Cleaning

The main method is to remove the dirt from the external wall of the building by external force. The specific method is to use ultrasonic waves or water to make the dirt soft, peel, melt, and finally rinse with water. The cleaning method has large environmental pollution, high costs, and wastes a lot of energy and resources.

2.3 Chemical Cleaning

The chemical cleaning method uses chemical reagents to dissolve, separate, and degrade the dirt and chemical reactions to decontaminate the external walls. This cleaning method has a high degree of environmental pollution and causes great damage to human health.

Aiming at the shortcomings and shortcomings of the above three cleaning methods, a low-cost, safe, reliable, high-efficiency high-rise building exterior wall cleaning machine was designed to solve the conventional cleaning using high-altitude hanging baskets, hanging plates, lifting tables, etc. Vehicles, work difficult and other shortcomings. Elimination of physical and chemical methods, serious pollution, waste of resources.

3. High-Rise External Wall Cleaning Machine Working Principle and Parameters

There are two main parts for the automatic wall cleaning of high-rise buildings. One is the elevator on the top of the building and the other is the washing machine. The lift is driven by a wire rope and a hook to move the washing machine to the outer wall of a high-rise building. When the automatic high-rise building exterior wall clearing machine works, the lift's two-speed motor starts, the rack is driven by the steel rope to rise quickly, rise to a predetermined position, the double-speed motor stops and brakes, after adjusting the position of the washing machine, the system is released. The two-speed motor starts in the opposite direction, and the rack moves slowly downwards. At the same time, the spray nozzle at the top of the rack sprays water, and the brush on each guide rail is rotated and moved along the respective guide rails under the drive of each motor, and the outer wall of the wall is cleaned so as to make the outer wall clean and beautiful.

Its working principle is as follows:

The cleaning machine includes a frame, a spray nozzle installed on the top of the frame, and three guide rails horizontally placed on the frame, respectively, which are driven by the decelerating motor through the transmission mechanism and can reciprocally move along the guide rails. Each guide rail is provided with a support which moves along the guide rail via a guide wheel matched with the guide rail at the top of the guide rail, a rack along the bottom of the guide rail, a drive sprocket on the output shaft of the geared motor, and a guide rail at the bottom of the guide rail and on the guide rail. The gear rack meshed with the gear shaft, the driven sprocket mounted on the end of the gear shaft protruding from the bearing is driven by the driving sprocket through the chain, the brush is mounted on the brush shaft, and the gear motor is opened when the gear is working. The brush is rotated to clean the wall surface, and at the same time, the driving sprocket on the brush shaft drives the driven sprocket to rotate through the chain, so that the gear shaft rotates, and the gear rotates relative to the rack on the guide rail to drive the bearing to reciprocate along the guide rail mobile.

The above controller has a limit switch disposed on both ends of each rail.

Washer lifts include two-speed motors, brakes, worm gear reducers, reels, lift lever arms, and other components. Before the work began, the lift was on the ground and the lift was lifted on top of the building. First adjust the position of the elevator and use the support rod to hold it in place. Then release the hook to the ground and connect it to the washing machine. Start the two-speed motor forward rotation, then the cleaning machine will quickly rise to the predetermined position, stop the two-speed motor, brake brake to prevent The washing machine descends by gravity. The double nut is used to adjust the position of the lifting lever arm, so that the washing machine approaches the wall surface, and the cleaning bristles stick to the wall, and the cleaning brush maintains a certain pressure on the wall during the cleaning process.

At this time, the tap water of the building is connected to the top of the rack of the washing machine through the water pipe. After the preparation, the brake can be released and the double-speed motor can be reversed, and the water pipe can be opened at the same time. In this way, the washing machine begins to slow down and clean the wall. When the washing machine walks up and down, stop the two-speed motor, then re-adjust the position of the elevator, and then clean the wall.

The main parameters for the two-speed motor rated power: 2.4KW, 1.5KW;

Two-speed motor rated speed: 1500r/min, 750/min;

Reducer gear ratio: 8

Reel rotation speed: 186 r/min, 93 r/min,

Wire rope rising speed: about 0.6m/s;

The wire rope descends at a speed of about 0.3m/s;

4. Design of Control Circuits

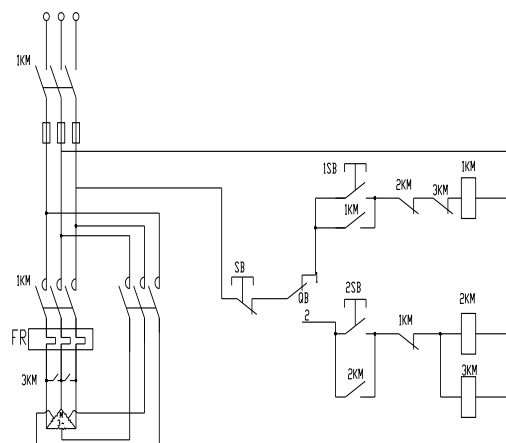


Fig 1. Electrical schematic

Its working principle is: Select the desired rotation speed by manual control of the switching switch QB. When the hook and washer are connected, move QB to "2" position, and then press 2SB, then 2KM gets power and self-locking, make the motor stator winding into "YY" type and connect to the grid at high speed. . At this time, the lifter lifts the washing machine at a speed of approximately 0.6 m/s, and when the washing machine rises to an appropriate position, the stop button SB stops rising. Adjust the position of the washing machine and the wall to reach the working position of the washing machine. Put QB to "1" position, press 1SB again, then 1KM is electrified and self-locking, make the motor stator windings connected into "" type and connected to the grid at low speed. At this time, the lifting machine carries the washing machine slowly at a rate of about 0.3 m/s. This time is the working time for the washing machine to clean the wall surface. When the washing machine is lowered to the ground, the stop button SB is pressed to stop descending. Adjust the position of the lift to prepare for the next round of cleaning. In this circuit diagram, the contactor 1KM is interlocked with 2KM (or 3KM), so that both will not be energized at the same time to avoid accidents such as power short circuit.

5. Conclusion

The design content is mainly for the overall design of the automatic high-rise exterior wall cleaning machine. The specific design includes the hoisting mechanism of the cleaning machine, the design of the automatic control plan and the drawing of the circuit diagram.

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