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Design and Development of Multi operation Functional Floor Cleaning Machine

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ABSTRACT

The project paper is based upon the design, development and manufacturing of floor cleaning machine having multioperational provision and work on solar as well as electricity. The aim of this paper is to develop the machine which can be useful to society with minimum consumption of energy, cost and easy to handle. This paper emphasizes on effective cleaning and sanitizing the floor to protect the health of human beings in context to covid-19.

Key words: Optimum level, Slip Traction, Environment Sanitary, Sanitizing etc.

INTRODUCTION

Effective cleaning and sanitation directly and indirectly help and protects human health. In addition, cleaning and sanitation reduce pest infestations by reducing residues that may attract and support bees, insects, etc. It also improves the shelf life of floors, walls etc. due to regular cleaning and maintenance. In recent years, most of the people prefer to use trains or buses for commuting and hence these places are littered with biscuit covers, cold drink bottles etc. Therefore, it is necessary to sanitize the bus stands and railway stations at regular intervals. There is no single cleaning method that is suitable for all locations and occasions, and effective cleaning depends on the type of cleaning equipment, cleaning technique as well as whether the equipment must be user-friendly. Cleaning work can be physically demanding and the need for developed methods for systematic ergonomics evaluation of new products has been identified. In recent years, floor cleaning robots are becoming more popular for busy and aging population due to labor shortage. However, unemployment is high in India and hence there is a need to develop less labor oriented cleaning machines. Therefore, the aim of the present work is to design, develop and evaluate a manually operated floor cleaning machine.

In our project we have made the machine with a small amount of electrical components to operate in a completely mechanical way. The floor cleaner is of very simple construction and it is very easy to operate, anyone can operate it safely without any kind of prior training. It is very important in any hospital, hotel, bus stand etc.

PROBLEM IDENTIFICATION

The cleaning machine is very useful in cleaning the floor and outside ground in hospitals, homes, auditoriums, bus stands and public places etc. In modern days interior as well as cleanliness is becoming an important role in our life. Cleaning of waste is very important for our health and reduces the requirement of manpower. There are many floor cleaning machines available but the machine we developed is very simple in construction and easy to operate. Anyone can operate this machine easily. So, it is very useful in hospitals, any large area.

OBJECTIVE

- To develop a machine that helps in easy and quick cleaning.
- To provide the alternative method for road cleaning.
- To reduce human efforts.
- To save the time.
- To reduce the cost.
- To beautify the floor.
- To remove stains dirt.
- To remove grit and sand which scratch and wear down the surface.
- To remove allergens, in particular dust.
- To make the environment sanitary.

LITERATURE REVIEW

- Akash Nagtode (2017)

"Solar powered floor cleaning machine. He had made a project on the sanitation system based on solar energy. For this, he has used Pv panels which convert energy particles (photons) into electricity. He uses this clean energy to run his cleaning machine."

- Sandeep. J. Meshram et al [2016]

"Design and Development of Tricycle Powered Street Cleaning Machine" - He has developed Tricycle powered street cleaning machine. In this research article, he prepared a model especially for the rural area. He concluded that cleaning the streets is less effective.

- Mohsen Azadbakht et al. [2014]

"Design and Manufacture of Tractor Operated Levee Collector Machine Equipped with Suction-Blower System" – "The authors explained the manufacture of Leaves Collector Machine by Tractor Operated Blower. He made use of Chassis, Pump, Blower, Gearbox, Hydraulic Jack The machine is framed. He concluded that the total power consumption of that machine is about 14634 W which can cover distance up to 20 meters in distance.

- Manreet Kaur [2014]

"Design and manufacture of floor cleaner robot (manual and automatic). The author has designed a robot to clean the floor in both automatic mode as well as manual mode. His robot is equipped with IR sensor for obstacle detection, four Equipped with motor and water pump. They concluded with the convenience of dual-mode operation of easy floor cleaning.

- Manyajin, Pankaj Singh Rawat (2016)

"This project is used for domestic and industrial purposes to automatically clean a surface. When it is turned on, it swirls around the surface (floor or any other area) in dust Occurs as it passes over it. In the modern era, there is a need for automatic floor cleaners. Thus, the cleaner is designed in such a way that it minimizes the human effort by simply starting the cleaning unit able to clean the area.

- Sahil Bharti, S.R. Sandhya (2016)

"To develop an automatic cleaning aid that helps to clean flat surfaces with the ease of remote control with greater efficiency at work. The surface cleaning machine proposed in this project is the device that helps in surface cleaning. It helps. There are many tasks that have to be coordinated for speed control".

BLOCK DIAGRAM

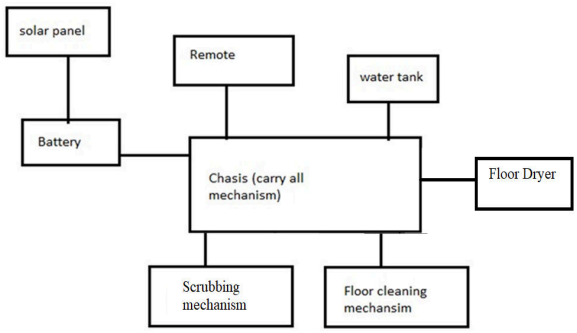

Fig. 1 Block Diagram

WORKING

When a 10w solar panel is installed and their electrical energy is stored in the battery. 12 V DC battery supply is provided to the electrical switch board of the machine. The mains supply from the power board is supplied to the SMPS and mopping mechanism, while DC is supplied to the mopping mechanism and SMPS during operation.

DC motors are used for the rotation of mop with higher torque than the motor used for brushes. The other two DC motors with higher RPM are used to clean the front part of the floor. The DC motor rotates the brush through the shaft which is connected to the shaft of the motor by means of nuts and bolts.

The rotational direction of the mop is opposite to each other so that more water is collected in the middle section and this mixture of water and dirt is collected in the mop through the inlet pipe which is located in the middle of the mop. Water spray pump is provided at the bottom of the water tank which supplies fresh water for efficient cleaning of clean water and is controlled through control valves. Number of holes is made in the water flowing tube for the same amount of water. Separate buttons are provided in the electrical board to control the power supply of each appliance of the floor cleaning machine.

CONSTRUCTION DIAGRAM

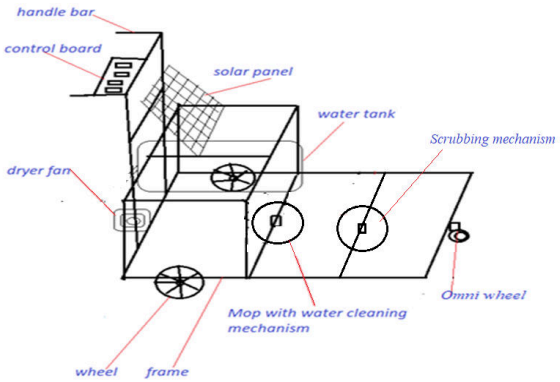

Fig. 2 Construction diagram

The manually operated floor cleaning machine consists of various elements such as DC motors, fresh water sprayer pump, mop, LED lights, chassis and fresh water tank. Switched Mode Power Supply (SMPS) is used to convert AC supply to DC. Fresh water tank is used to store water in this. It provides water as per requirement while doing wet cleaning. The switch board is mounted on the handle. It is used to start and stop the machine as per the wish of the operator, different buttons are provided to operate the different component. The chassis is the main part of the machine that holds all the other parts to itself. It is made of mild steel as it fulfills all the required conditions. Water is stored in a chamber with an opening controlled by a motor. Keeping this motor in the running position allows water or cleaning liquid to flow out of the tank. It is connected by means of connecting pipes to a shower type arrangement. Sprinkler systems consist of several sequentially arranged holes that can be modified manually. An arc is provided to adjust the position of the mop when there is no need for the mop.

ADVANTAGES

- Manual effort is reduced
- Operating time is short
- Cleaning and polishing can be done at the same time:
- Power consumption is low
- This machine requires low maintenance cost.
- Easy control of the supply of cleaning solution by controlling valve in this machine.
- It can be used on various places other than rough surfaces.
- The drive or movement can be made automatic by further modification.

DISADVANTAGES

- Floor Scrubber produces vibration when used on rough floors or rough surfaces.
- The floor sweeper is only suitable for flat surfaces.
- The floor sweeper is a semi-automatic machine.
- It is heavy to lift.
- It is not capable of clearing any building ladder.
- Maintenance of mop is required.

APPLICATIONS

- Hospital - Hospitals use floor cleaning machines for both wet and dry cleaning. To get a clean surface.
- Computer Center - to maintain the desired cleaning surface finish.
- College - It is mainly used to clean the dust collected on the surface.
- Railway Station- It can be used in any weather on the railway station platform.
- Auditorium and Mall.
- Cinema Hall.

FUTURE SCOPE

If the panel high watt is used, the machine can be used for garden lighting or room lighting at night. Because we can store more power. And at night though you put it aside. So battery power can be used for this purpose. By using a valve in the pipe, we can also use it for gardening *i.e.* to pour water for plants. By connecting a box type carrier we can use it to carry files, books or other items from one place to another office or any other place. Mowing can be made more efficient by adding two more motors with blades on the front of the machine.

CONCLUSION

In our project we introduced a floor cleaning robot that is capable of doing both vacuuming and mopping. The main objective of the project is to incorporate aspects of cleanliness in the society. The many applications provide a wide range of functions in which we can clean pipes, perform surface scrubbing for proper floor cleaning, remove dust and dirt from the road, provide a pick and place mechanism by which the barriers can be removed. This project is very useful for the society and plays an important role in the cleanliness of the country. Some of those motors are not detachable and the high rpm causes the whole system to vibrate. If these features will be modified, it will work well. Overall, it is a successful product developed which can be used in current Indian homes.

The use of innovative technology not only significantly reduces costs, but also reduces human effort while increasing the effectiveness of floor cleaning. Less human effort means more frequent floor cleaning which results in increased overall cleanliness and supports healthy well-being. Thus, small steps in technological advancement will have a high impact in the long run in the future, making India a better country.

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