

Mechanically Operated Floor Cleaning Machine

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Abstract

This paper presents the design and development of a Mechanically operated floor cleaning machine is a system that enables cleaning of the floor by the help of highly stabilized and rapidly functionalized electronic and mechanical control system. Current project work targets to use automatic floor cleaner for large floor in house-hold purposes and office floors. The cleaning purpose is specifically carried out by continuous relative motion between a scrubber and the floor surface. During the cleaning and moving operation of vehicle a propulsion mechanism such as driven wheels and guide wheels for the dry tracking on the floor surface to be cleaned, suction of water is carried out by vacuum pump, scrubbing action is done by the scrubber directing water towards rear end. The new mechanical floor cleaner will save huge cost of labor in future. The basic advantage of this product is that it will be cost effective and no human control is needed. Once put in on mode it will clean the whole room without any emission of surface. Although there have been multiple precedents demonstrating the benefits of deploying floor cleaning robots to maintain constructed structures, standard platforms have performance issues. Their fixed morphological design, which severely limits their navigation and access, is a primary contributor to their performance shortfall. The designed robot can change its morphology to seven one-sided tetrominoes in reaction to its sensed environment to maximize its coverage area. This research examines the coverage area performance of the robot and compares it to two widely available fixed morphology robot platforms. The traditional mechanically operated floor cleaning machine is most used in road, school, house, bus stand, mall, airport and other commercial place. This machine does not require any type of external source of energy for its operating.

The aim of present work is to design and develop process for cleaning the dry as well as wet floor manually. This mechanically operated floor cleaning machine is designed by keeping the basic consideration for reduction in cost and efforts while being environment friendly and easy to handle.

1. INTRODUCTION

Cleaning is the essential need of current time. cleaning machines are very useful in cleaning floors, outside ground in hospitals, houses, auditoriums, bus stands and public places etc. Many researchers have done so many works in evaluation of design of cleaning machine to give better outcomes, but many researchers were operating their machine with the help of any external source like electrical energy, but this machine has been designed in such a way that it can be operated by manual power

and there is no need of electric energy or any other energy. For the above said purpose the manual power is transferred from the chain socket to the gear through chain mechanism then its power transfer to bevel gear and it result Floor cleaner is very much useful in cleaning floors in hospitals, houses, auditorium, shops, computer centers etc. it is very simple in construction and easy to operate. Anybody can operate this machine easily. It consist of moisture cotton brush, the brush cleans the floor and dried with aid of small blower. Hence it is very useful in hospitals, houses, etc. The time taken for cleaning is very less and the cost is also very less. Maintenance cost is less. Cleaning is the essential need of the current generation. Basically in household floors the floor has to be cleaned regularly. Different techniques are used to clean the different types of surfaces. The reasons for floor cleaning are :

- ☐ Injuries due to slips on the floors are cause of accidental injuries or death. Bad practice in floor cleaning is a major cause of accidents.
- ☐ To beautify the floor.
- ☐ Debris and obstructions are to be removed.
- ☐ Allergens and dusts are to be removed.
- ☐ Surface wear to be avoided.
- ☐ To make the environment sanitary (kitchens).
- ☐ Traction should be maintained at optimum level, so that no slip will occur.

Floor cleaning is achieved by different technique which might be of different kinds. Different types of floor need different type of treatment. The floor should be totally dry after the cleaning process. Otherwise it may result in hazard. On some floors sawdust is used to absorb all kinds of liquids. This ensures that there will no need of preventing them from spill of. The sawdust has to be swept and replaced every day. This process is still used in butchers but it was common in bars in the past. In some places tea leaves are also used to collect dirt from carpets and also for odor removing purposes. Different types of floor cleaning machines are available today such as floor buffers, automatic floor scrubbers and extractors that can clean almost all types of hard floors or carpeted flooring surfaces in very less time than it would have taken using traditional cleaning methods. Again the cleaning would be different for different floorings.

2. OBJECTIVES

To design and fabricate a floor cleaning machine using continuous relative motion between the scrubber and floor surface. To Uses less water. To allowing the floor to dry more quickly but also leads to a more efficient cleaning compared to the traditional mop and bucket.

3. METHOD

The system is assembled with a pair of existing wheels that rotates with the help of a shaft. The shaft and wheels are joined together. The wheels provide power to the gear through the chain mechanism, and the bevel gears are connected perpendicularly. The help of bevel gear rotates the brush. The revolutions start to move when we exert forces on this machine manually. As the wheel starts spinning, it becomes straightforward to move it forward or backward, and as the lower end of the machine is installed with a brush, the brush starts operating, cleaning the surface where it is interacting. 3.1 Belt mechanism The total length of the belt used is 1319 mm. A bely mechanism is a way of transmitting mechanical power from one shaft to another shaft. The pulley used in the belt mechanism, it is used to give power to the wheels. The emphasis is conveyed by a roller, known as the drive belt or transmission belt.

4. ISSUES AND SUGGESTION

A mechanically operated floor cleaning machines, often used in large spaces, can encounter issues

like insufficient cleaning, water pickup problems, and motor/brush issues. To address these, ensure proper maintenance, including regular inspection of brushes and vacuum hoses for blockages, and cleaning the brush to prevent motor damage. Choosing the right machine for the environment (e.g., battery-powered for areas without power outlets) and utilizing innovative technologies like fleet management systems can also enhance efficiency.

Common Issues and Solutions:

Insufficient Cleaning:

If the machine isn't cleaning effectively, ensure the pads and brushes are properly chosen for the floor type and the chemical solution is appropriate. Regularly inspect and clean the brush to prevent debris buildup, which can impede cleaning and potentially damage the motor.

Water Pickup Issues:

Blockages in the vacuum hoses, filters, or squeegee system can cause water pickup problems. Regularly check these components for blockages and ensure the hose cap is securely fastened.

Brush Bind-up:

Debris, such as wrapping from pallets or wire, can become entangled in the brushes, hindering cleaning and potentially damaging the motor. Regularly check and clean the brush to prevent this.

Reduced Battery Performance:

If using a battery-powered machine, ensure the battery is properly maintained and charged. Consider investing in a good quality battery and charging station to prevent premature degradation.

Lack of Power/Power Outages:

In areas where power outages are common, consider fuel-powered or battery-powered options. For areas with stable power, electric machines are generally more efficient.

Inefficient Operation in Certain Environments:

If the machine's design limits its ability to maneuver in tight spaces or around obstacles, consider a machine with greater maneuverability or a design that allows for cleaning in different environments, according to a paper on the topic.

Motor Damage:

Allowing debris to accumulate in the brush can overload the motor, potentially causing damage. Regular inspection and cleaning of the brush is crucial to prevent this.

Suggestions for Improvement:

Regular Maintenance:

Implement a routine inspection and cleaning schedule for all components of the machine, including the brush, vacuum hoses, filters, and tanks.

Proper Chemical Selection:

Use the appropriate cleaning chemicals for the type of floor being cleaned to maximize cleaning effectiveness.

Consider Fleet Management Systems:

Machines equipped with fleet management systems can provide valuable insights into machine performance and potential maintenance needs, allowing for proactive repairs and reduced downtime.

Optimize Cleaning Procedures:

Develop a clear cleaning procedure for each type of floor to ensure efficient and effective cleaning.

Training for Operators:

Provide operators with proper training on how to use and maintain the machine to ensure they are aware of potential issues and how to address them.

Evaluate Machine Design for Specific Needs:

Consider the specific needs of the cleaning environment when selecting a machine, such as maneuverability, power source, and noise levels.

Explore Innovative Technologies:

Investigate technologies like orbital bases for floor scrubbers, which can improve cleaning effectiveness and reduce chemical consumption.

5. CONCLUSION

Mechanically operated floor cleaning machines offer efficient and effective floor cleaning solutions, particularly for large areas and tasks that are physically demanding. They can be more efficient and quicker than manual cleaning methods, and some designs incorporate features like drying functions to address both wet and dry conditions. While manual operation provides flexibility and is often cost-effective, advancements in mechanical designs offer potential for even greater efficiency and ease of use.

Here's a more detailed look at the benefits and considerations:

Advantages of Mechanically Operated Floor Cleaning Machines:

Efficiency and Speed:

These machines can cover large areas much faster than manual cleaning methods, saving time and effort.

Reduced Labor Costs:

By automating the cleaning process, they can reduce the need for extensive human labor, particularly in larger facilities.

Effective Cleaning:

Many designs incorporate features like scrubbing brushes, water sprayers, and vacuum systems to effectively remove dirt, grime, and stains.

Wet and Dry Cleaning Capabilities:

Some machines can handle both dry and wet floor cleaning, offering versatility.

Improved Hygiene:

Mechanical cleaning can help prevent the spread of germs and bacteria, contributing to a cleaner and safer environment.

Versatility:

They can be adapted for various floor types and cleaning needs, making them useful in diverse settings.

Considerations and Potential Limitations:

Cost:

The initial investment for a floor cleaning machine can be higher than manual cleaning tools, but the long-term cost savings can be significant.

Space Requirements:

Some machines may require a dedicated storage space.

Maintenance:

Regular maintenance, including cleaning and potential repairs, is necessary to ensure optimal performance and longevity.

Operator Training:

While generally user-friendly, some machines may require some training to operate effectively.

Potential for Damage:

Careless operation can potentially damage floors, so it's important to follow manufacturer guideline

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