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Solar Operated Multifunctional Floor Cleaning Machine

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ABSTRACT
Automated floor cleaning machines are commonly used in developed countries since many years because of high cost of labour, time, efforts and affordability. The concept is not popular in developing or emerging economic countries. Reasons for non-popularity are cost of machine and operational charges in terms of power tariff. This project is based upon on our innovation to design, develop and manufacture semi-automatic floor cleaning machine which will work on solar energy, battery or electricity. This machine is multifunctional. Five functions of cleaning like garbage collecting, scrubbing, mopping, drying and wiping can be performed using this machine. A semi-automatic floor cleaning machine having advantages like less energy consumption machine as well as operational cost reduction, reduce the human effort, environment friendly and easy to handle. Base of the paper was to use renewable energy which is abundant in most of the countries, will have less environmental impact and easy to construct for commercial scale in future.

KEYWORDS: *Solar energy, Floor cleaning mechanism , Air-dryer , Garbage collector etc.*

I. INTRODUCTION

Cleaning machine is very much useful in cleaning floors and outside ground in hospitals, houses, auditorium, shops, bus stands and public place etc. In modern days interior as well as outside cleaning are becoming an important role in our life. Cleaning of waste is a very important one for our health and reduces the man power requirement. Many of floor cleaning machines are available but we developed machine is very simple in construction and easy to operate.

Anybody can operate this machine easily. Hence it is very useful in hospitals, any large area space. The time taken for cleaning is very less and the cost is also very less. Maintenance cost is less. Much type of machines is widely used for this purpose. In our project we have made the machine to operate in a fully mechanical way with a little amount of electrical components. The Floor cleaner is of very simple construction and is very easy to operate, anyone can operate it without any prior training of any sorts with safety. It is very important one in any hospitals, hotels, bus stands etc.

Effective cleaning and sanitizing helps and protect the health of the human beings directly and indirectly. Also, cleaning and sanitizing prevents the pest infestations by reducing residues that can attract and support bees, pests etc. It also improves the shelf life of the floor, 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 biscuits covers, cold drink bottles etc. Hence, it is necessary to clean the bus stands and railways stations at regular interval. There is no one single cleaning method that is suitable for all locations and occasions and effective cleaning depends upon type of cleaning device, cleaning technique and also the equipment should be user friendly. Cleaning work can be physically demanding and a need has been identified to developed methods for systematic ergonomics evaluation of new products.

II. METHODOLOGY

Cleaning machine is very much useful in cleaning floors and outside ground in hospitals, houses, auditorium, bus stands and public place etc. In modern days interior as well as outside cleaning are becoming an important role in our life. Cleaning of waste is a very important one for our health and reduces the man power requirement. Many of floor cleaning machines are available but we developed machine is very simple in construction and easy to operate. Anybody can operate this machine easily. Hence it is very useful in hospitals, any large area space. The time taken for cleaning is very less and the cost is also very less. Maintenance cost is less. Much type of machines is widely used for this purpose. In our project we have made the machine to operate in a fully mechanical way with a little amount of electrical components. The Floor cleaner is of very simple construction and is very easy to

operate; anyone can operate it without any prior training of any sorts with safety.

Cleaning is essential need of this generation. Basically in colleges and hospitals for floor cleaning 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.

- Allergens and dusts are to be removed.
- Surfaces wear to be avoided.
- To make the environment sanitary (kitchens).
- Traction should be maintained at optimum level, so that no slip will occur.

III. OBJECTIVE

1. To develop a machine that helps in easy and quick cleaning.
2. To reduce human efforts.
3. To save the time.
4. To reduce the cost.
5. To prevent injuries due to tripping or slipping. Injuries due to slips and trips on level floors are a major cause of accidental injury or death. Bad practice in floor cleaning is itself a major cause of accidents.
6. To remove grit and sand which scratch and wear down the surface.
7. To remove allergens, in particular dust.
8. To make the environment sanitary.

IV. LITERATURE REVIEW

- AKASH NAGTODE(2017) , "Solar operated floor cleaning machine. He had made a project on cleaning system based on solar power. For this he has used Pv panel which convert particle of energy (photons) into electricity. He use this clean energy to power his cleaning machine".

- RANJIT KUMAR (2016) , "The regular floor cleaning machines is most generally utilized as a part of airplane terminal stages, railroad stages, healing centres, transport stands, and shopping centres and in numerous other business places. These gadgets require an electrical vitality for its activity and not easy to use. In India, particularly in summer, there is control emergency and the vast majority of the floor cleaning machine isn't utilized successfully because of this issue, especially in transport stands. In this work, demonstrating and investigation of the floor cleaning machine was finished utilizing appropriate financially accessible programming. From the limited component investigation, we watch that the feeling of anxiety in the physically worked floor cleaning machine is inside as far as possible".

- SANDEEP. J. MESHRAM ET AL [2016] , "Design and Development of Tricycle Operated Street Cleaning Machine" – He has developed the street cleaning machine by tricycle operated. In this research article .He framed a model especially for rural area. He concluded that the cleaning is less effective in streets".

- MOHSEN AZADBAKHT ETAL [2014] , "Design and fabrication of a tractor powered leaves collector machine equipped with suction-blower system"- "The authors explained about the fabrication of leaves collector machine by tractor powered blower. He has frame the machine by using chassis, pump, blower, gearbox, hydraulic jack. They concluded total power consumption of that machine is around 14634 W which can cover up to 20m range in distance".

- MANREET KAUR[2014] "Design and fabrication of floor cleaner robot(manual and automatic).the author designed a robot to clean floor in both automatic mode as well as manual mode. His robot was equipped with ir sensors for obstacle detection, four motors and water pump .He concluded with convenience of dual mode operation of easy floor cleaning".

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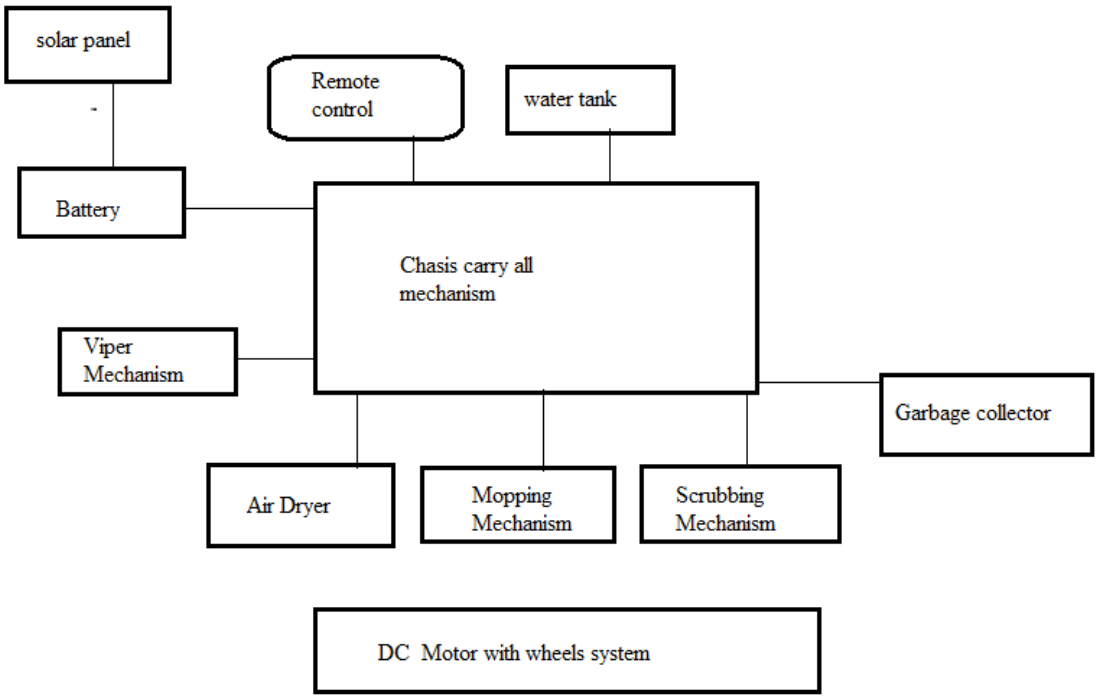
V. BLOCK DIAGRAM



VI. WORKING

When Solar Panel of 20w is applied and their electric energy stored in battery. 12v DC battery supply is provided to the electrical switch board of the machine. The main supply from electrical board is supplied to SMPS and vacuum cleaner, during working DC is supplied to the vacuum cleaner and SMPS. Vacuum cleaner is used to operate the d.c motors which performs a key role in cleaning operation. There are three D.C motors one is used to rotate the mop for cleaning the middle surface that is covered by the chassis.

The DC motor used for rotation of the mop having high torque than the motor used for the brushes. The other two DC motors having high RPM are used to clean the front section of the floor the DC motor rotates the brushes through the shaft which is connected to the shaft of the motor through nut and bolt. During summer season the uneven particles which collects on the surface of the floor are clean through the front two brushes and from the middle slots the dirt particles enters into vacuum cleaner from the suction pipe and the position of the mop can be adjusted with the help of arc provided on the left hand side of the chassis. During the dry cleaning the supply of water is disconnected.

During the rainy season the working of floor cleaning machine slightly changes in this condition the water and dust or dirt particles are brought into the middle section of the chassis through the rotating brushes. The rotational direction of the bushes are opposite to each other in order to collect the more amount of water in the middle section and this mixture of water and dirt is collected into the vacuum cleaner through inlet pipe which is located in between the two brushes. The third motor rotates the mop for efficient cleaning. At the bottom of the water tank water spray pump is provided which supply the fresh water for efficient cleaning the supply of fresh water is controlled through the control valve. In the water flowing tube number of holes are created for equal amount of water Different button in the electrical board is provided to control the electrical supply of each equipment of the floor cleaning machine.

ADVANTAGES

1. Manual effort is reduced.
2. Operating time is less.
3. Cleaning and polishing can be done at same time.
4. Power consumption is less.
5. This machine requires low Maintenance cost.
6. In this machine Easy control of cleaning solution supply by controlling valve.
7. It can be used on various places other than rough surfaces.
8. By further modification the drive or movement can be made automatic.

VII. DISADVANTAGES

1. Floor cleaning machine produces vibrations when used on rough floors or rough surfaces.
2. Floor cleaning machine is Suitable for only flat surfaces.
3. Floor cleaning machine is Semi-automated machine.
4. It is heavy to lift.
5. It is not capable to clean stair of any building.
6. Maintenance of mop is required.

VIII. APPLICATIONS

1. Hospitals – floor cleaning machines are used in hospitals for both wet and dry cleaning. In order to obtain hygienic surface.
2. Computer centers – To maintain the desired cleaning surface finish.
3. Colleges – it is mainly used to clean the dust which is collected on the surface.
4. Railway station– On the platform of the railway station it can be used in any seasons.
5. Auditoriums & Malls
6. Cinema Halls

IX. CONCLUSION

In our project we introduced a floor cleaning robot capable of performing both vacuum and mopping. The main motive of the project is to cover the aspects of cleanliness in the society. The multiple applications provide a wide range of functions in which we can clean the pipe, scrubbing of surface for proper cleaning of the floor, remove dust and dirt from the road, provide a pick and place mechanism by which obstacles can be removed. This project is very helpful for the society and plays a vital role in cleanliness of the country. Few of those are the motor is not detachable and the high rpm leads to vibration of the whole system. If these features will be modified, this will work well. As a whole this is a successful product developed that can be used in current Indian house-hold.

The use of innovative technology not only reduces cost significantly but also reduces the human effort while increasing the effectiveness of floor cleaning. Reduced human effort means more frequent floor cleaning which results in increase in overall cleanliness and supports healthy well-being. Small steps in technological advancement like this will have higher impact in long run in future, making India a better country.

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