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Review on Design and Development of Eco-Friendly Road Sweeper Machine

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Abstract-
This project is related to design and development of most effective machine that is manually operated mechanical pollution free road cleaner. The Road cleaner is used to keep our mother earth clean. So that we feel fresh while walking on streets. Generally, in era of modern technology, different devices such as electric motors, diesel engines and robots are being used to clean floor, road. These methods make much pollution, maintenance and very tough to carry out. The main objective of this paper is to spread this idea of our prototype road cleaner to each one which aims to. Hence, the present work is aimed to design and develop a manually operated road cleaning machine which is eco-friendly, cost effective, portable and less maintenance. Cleaning has become a basic need for all human beings and it is unavoidable in our daily routine process. The conventional floor/road cleaning machine is most widely used in railway stations, airports, hospitals, Bus stands, colleges etc. also this machine needs electrical energy for its operation. It is not user friendly as well as ecofriendly. In summer time there is power crisis and most of the floor/roads cleaning machines are not used effectively due to this problem particularly. In our project we are using easily available materials with low cost. It is the better alternative for conventional machine. Hence this project is very useful in our day to day life.

Keywords: eco-friendly, floor clean, sweeper roller, effortless, manually operated, eco-friendly, human powered etc.

I. Introduction

Cleaning is a necessary factor of daily routine process. Directly and indirectly, good cleaning and sanitizing promote and safeguard human health. To maintain the area around us clean, we utilize the road cleaner. so that we can roam the streets feeling revitalized. Robots, diesel engines, electric motors, and other technologies are frequently employed to clean the ground and roads in the age of contemporary technology. But these procedures are difficult to carry out, produce a lot of pollution, and require a lot of upkeep. Therefore, user-friendly road and floor cleaning equipment must be developed in order to conserve energy and protect the environment. A machine that must be manually operated in order to replace the standard electric cleaning machine. A set of wheels that are fixed to the dust-cleaning machine system and connected by a shaft. The shaft connects the wheels to each other. With the use of manual force that can manage it, the wheels are shifted to the proper position. At either side, a chain drive connects the wheels and gear. The wheel and gear determine how the chain is moved. The brush sweeps up any debris on the road and deposits it in the waste-collection box while travelling in the opposite direction of the wheels. To dispose of the waste where you want it to go, remove the waste collection box. We used such type of materials for manufacturing of road cleaning machine finally. We have observed that all the components are with in safe limit in the manually operated road cleaning machine.

Cleaning machine is very much useful in cleaning around us like road and ground and our colleges campus and outside ground 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 road 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 cleaning the cricket ground, 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 ground cricket ground and road for cleaning regularly different...rotary motion on the floor which cleans the dirt or dust. The remaining water on the floor is wiping by the wiper present in end of the cleaning machine.

Road cleaning machines or floor cleaning machines are used in private as well as commercial area such as hospitals, bus stand, malls, lawns, floors etc. Many of these devices required high amount of electricity or fuel like petrol diesel for their operation. They produce enough pollution to pollute environment. So in order to save energy and save nature, it is need to develop low cost, user friendly road cleaning machine. Our focus is to develop a machine which should be operated manually so that it can be alternative for conventional electric road cleaning machine. In this work we have done modeling and analysis of the road cleaning machine. We used such type of materials for manufacturing of road cleaning machine finally. We have observed that all the components are with in safe limit in the manually operated road cleaning machine.

II. Problem Definition

- The conventional road sweeper machines used for cleaning streets and public areas contribute to environmental pollution and resource depletion due to their reliance on fossil fuels, emission of harmful pollutants, and inefficient waste management practices.
- In light of increasing environmental concerns and regulatory pressures, there is a pressing need to develop eco-friendly road sweeper machines that minimize environmental impact, reduce energy consumption, and promote sustainable cleaning practices.
- In response to these challenges, the development of an eco-friendly road sweeper machine presents an opportunity to mitigate environmental harm while improving cleaning efficiency and operational effectiveness.
- The proposed road sweeper machine aims to incorporate sustainable technologies such as electric propulsion systems, renewable energy sources, advanced waste management systems, and efficient cleaning methods to achieve.

III. Objective

- To develop a machine that helps in easy and quick cleaning.
- To Remove the dust from road by the use of scrubber which is rotate by using wheel motion and it collect into collection tank.
- To Provide the alternative method for road cleaning.
- To reduce the human effort and save the time.
- To reduce the cost of machine.
- To make environment sanitary.

IV. Literature Survey

Arjun V Murali et al. (2017) in their research, they work on floor cleaning machine. Their aim to develop and modernized process for cleaning the floor with wet and dry. At first dust is collected from vacuum cleaner. After that Water is sprayed from water tank and floor cleaning is done by rotating press which is coupled to the DC motor. Fan is used to dry the water which is fitted to the Back side of the vehicle.

Mr. S. Rameshkumar et al. (2018) in their research, they work on Design and fabrication of multipurpose floor cleaning machine. In their work, modelling and analysis of the floor cleaning machine was done using suitable commercially available software. From the finite element analysis, they observe that the stress level in the manually operated floor cleaning machine is within the safe limit.

Samarth G. Gaikwad et al. (2019) in their research, they work on Design and development of multifunctional floor scrubber and cleaner. They focused on to design and develop a multifunctional floor scrubber and cleaner which will substantially reduce the cleaning time and cost of the machine. At the same time, the floor cleaning machine should be capable of cleaning rough as well as smooth floors and inaccessible corners effectively. Through efficient project management, aspects like minimization of manufacturing and operational cost, aesthetic and ergonomic considerations were taken into account. Eventually this machine will lead to hefty decrease in time, money and effort.

Shubham Khade (2017) In his research, he works on multi-use floor cleaning machine. He developed machine which is capable of performing cleaning of floor and corners effectively, semiautomatic water spray, cleaning of byre, dry as well as wet cleaning tasks. This floor cleaning machine is designed by keeping the basic considerations for machine and operational cost reduction, efforts reduction, environment friendly and easy handling.

Shubham Antapurkar (2018) in his research, he works on Arduino based dry and wet automatic floor cleaner. His aim is to construct a floor cleaner which will be fully automatic providing dry and wet cleaning as well as UV sterilization. The current market is occupied by cleaners with only one or two functionality. For its cost reduction and simplicity, he is using Arduino. The cleaner will be a step for providing comfortable life by resolving problems in traditional floor cleaning methods.

Ms. R. Abarna et al. in their research, they work on Design and fabrication of automatic floor cleaning machine. Their system 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 household purposes and office floors. The cleaning purpose is specifically carried out by continuous relative motion between a scrubber and the floor surface.

Himani Patel (2019) in her research, she works on wireless multipurpose floor cleaning machine. She focused on the problems of long wires so to overcome this problem she use battery system which can be rechargeable when electricity is available and work as required.

M Ranjit Kumar and N Kapilan, The conventional floor cleaning machines is most widely used in airport platforms, railway platforms, hospitals, bus stands, and malls and in many other commercial places. These devices need an electrical energy for its operation and not user friendly. In India, especially in summer, there is power crisis and most of the floor cleaning machine is not used effectively due to this problem, particularly in bus stands. In this work, modeling and analysis of the floor cleaning machine was done using suitable commercially available software. From the finite element analysis, we observe that the stress level in the manually operated floor cleaning machine is within the safe limit.

Prathmesh Joshi, Akshay Malviya & Priya Soni, This project report is based on the “Manually Driven Platform Cleaning Machine” which serves the basic needs of cleaning large floors.

RitvickGhosh, H R Vinay Kumar, Dattatraya, Pavan Kumar B. Hiremath, Prof. Pradeep Kumar, This paper elaborates the design and fabrication of a floor cleaner which runs purely on mechanical power and also has the capability of being ridden at low speeds by the user. The mechanism used to drive the cleaning mechanism would be similar to the one used in a spinning mop commonly known as a „magic mop“. The

mechanism works using a bevel gear system wherein high speed multiplications can be obtained using the right gear specifications. The input to the system would be in the form a foot-pedal accessible to the user. Sandeep J. Meshram & Dr G.D. Mehta, This paper presents the design and fabrication of Tricycle operated street cleaning machine with the related search. At present we have few automated machines which are foreign made and can be used in our country. This basically instigates to thing for an alternative mechanism called Street cleaning process.

Manreet Kaur & Preeti Abrol, Manual work is taken over the robot technology and many of the related robot appliances are being used extensively also. Here represents the technology that proposed the working of robot for Floor cleaning. This floor cleaner robot can work in any of two modes i.e. "Automatic and Manual".

Mohsen Azadbakht et al 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 with suction blower system. He has framed the machine by using chassis, pump, blower, gearbox, hydraulic jack. They concluded total power consumption of that machine is around 14634W.

M. Ranjith Kumar et al 2015, "Design and Analysis of Manually Operated Floor Cleaning Machine"- The authors have been designed and analyzed manually operated floor cleaning machine. From his research he concluded the stress level in the manually operated machine is within the safe limit.

Sandeep.J.Meshrametal 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 where the street seems to be very rough and damaged.

V. Block Diagram

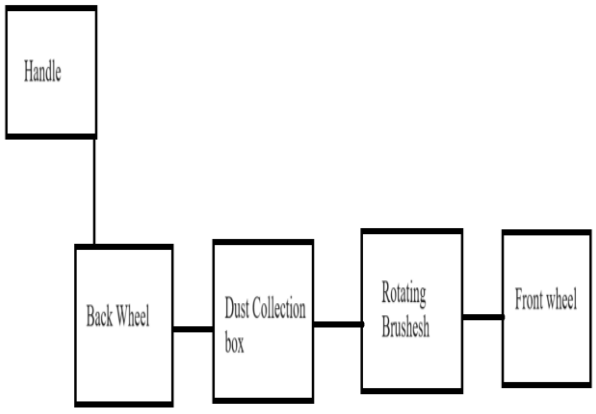

Fig.1.Block Diagram

VI. Working

In the design of the road cleaning machine is very compact as compare to other cleaning machine are available in the market but has the attractive design and high durability and cheap cost as compare to other road cleaning machine.

· It cleans the surface as well as catches all unwanted material from road.

· It is a tricycle operated system we have given motion to sweeper using chain drive mechanism.

· After main shaft secondary chain used to rotate secondary axle which are directly connected to sweeper axle.

· Third axle also connected to system which has cotton brush which clean surface.

· For properly working of sweeper addition of new shaft.

· Addition chine drive in both side used to increase gear ratio.

· Addition of two wheel in back side of machine for giving support to frame.

VII. Advantages

Manual effort is reduced.
· effective cleaning
· Power consumption is less.
· Design is very simple.
· Easy fabrication.
· Brush occupies large cleaning area.
· Net weight is less.
· Maintenance cost less.
· It can be used in various floors.
· Smoother operation.
· By further modification the drive or movement can be made automatic.

VIII. Conclusion

The manually operated eco-friendly road cleaner is successfully designed, analyzed and fabricated. This project works and implements the manually operated ecofriendly road cleaner for road cleaning that reduces the cost, human efforts as well as time. It is the best alternative for automated road cleaning machine during power crisis. It is found that the existing road cleaning machines uses petrol and diesel. It can cause pollution and also the vibration produced in the machine causes noise pollution. While manual cleaning may cause healthy problem as the person directly comes in contact with dust. Also, the shoulder problem due to continuously sweeping occurs.

In conclusion, the design and development of the manual operated road cleaning machine have yielded a practical, efficient, and cost-effective solution for maintaining cleanliness in various environments. Through meticulous attention to detail, including ergonomic design features, effective cleaning mechanisms, and robust construction, the machine offers operators a comfortable and safe cleaning experience while delivering exceptional performance.

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