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FABRICATION OF POWERLESS VACCUME CLEANER

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ABSTRACT

A “cleaning machine” or a “cleaner” is a radical concept which has come up according to the changing and ease of lifestyle being adopted by people and due to men’s constant emphasis on trying to automate the work he does with the hand or with the conventional machines. “Vacuum cleaner” is the most popular cleaning machine in the world today (though not so in India). It cleans by sucking any sort of dirt present. The project is a special purpose machine. Its rate of production is very high. It required no skilled worker for its operation and is having low power consumption. The maintenance required for the floor-cleaning machine is very less and it is not very costly machine. It is very flexible, having the property of self-mobility by saving the operator being embedded with the mud and the slurry which abstracts from the rubbing action so that it has a tremendous scope in the future.

INTRODUCTION

The floor-power less vacuum cleaner is driven by the self-generated power, which have a speed around 500 rpm. The pair of gear is used for transmitting power from wheel-shaft gear to the broom-brush shaft-gear. The conventional machines, which are present in the market are not having the arrangement of self-power generation. Our power less vacuum cleaner moves by its own using gear drive. The gears used are pair of spur gears. Here the moment duration for which the machine has to be motioned is equal to the time for which the machine is cleaning the floors at a certain floor path.

It is very useful for cleaning the floor dust. It can be widely used in railway stations, hospitals, auditorium, shops, bus stands, etc. In our project floor dust are cleaned without electricity. Hence our project is very useful in our day to day life. It consists of large number of brush and this brush is used to clean the floor dust. Hence it is very useful in public places etc. The time taken for cleaning is very less and the cost is also very less. Maintenance cost is less. There are several numbers of floor dust cleaning machine and are working under different principles and the cost is also very high. our project has very simple drive mechanism and easy to operate like any persons or children can run this setup without any extra effort. The size of the machine is also portable, so we can transfer from one place to another place very easily.

PROBLEM STATEMENT

India is a tropical country. Average temperature in India is approximately 25^o C to 30^o C. Now there is a lot of dust in the air. Dust mixes with air while sweeping and settles down on other cleaned place also causes trouble to people.

Sources of electricity are likely to deplete: It is true that energy can neither be created nor be destroyed. But the sources from which the energy is harnessed are likely to deplete. For instance, coal which directly contributes to the generation of electricity is depleting in a big way. Obviously, wastage is contributing to the same. This makes it necessary to save electricity. Thus, ultimately it aids the conservation of natural resources, helping you realize its potential value. Restrained use of natural resources is ultimately effective for your pocket. Careful use of electricity reduces the impact of pollution. Obviously by minimizing the use of energy producing sources of nature, you are adding an edge to the natural greenery. Conservation can save you money. This is one of the

biggest reasons many begin to cultivate a culture of conservation, however, as more and more people learn, it is certainly not the only reason. Less electricity used means less fossil fuels burned. It's true that we can obtain electricity from cleaner sources of energy such as wind and solar power, but much of the electricity that we use is still from sources such as oil and coal. Fossil fuels are not renewable sources and the more electricity we consume, the faster these resources will be depleted.

By using powerless vacuum cleaner concept in every society considerable amount of energy can be saved which can be used in village areas in India where there is lack of electricity. Also, electricity bill can be minimized.

OBJECTIVE

1. Harnessing the cleaner system which does not harm the environment.
2. Eliminate dependency over conventional energy.
3. Making portable as well as easy operatable machine which can be easily used by any age group of peoples.
4. Cleaning the large area in less working time.

LITERATURE RIVIEW

1. **M. Ranjit Kumar** studied design of a manually operated floor cleaning which is developed with major list of objectives, one; to achieve simultaneous dry and wet cleaning in a single run, secondly to make the machine cost effective and thirdly to reduce the maintenance cost of the manually operated floor cleaning machine as far as possible. Body is pedal operated to achieve dry and wet cleaning simultaneously. Its 2D design was carried out in Unigraphics tool and by using Ansys tool 3D meshed model is developed according to the required dimensions. Using Ansys tool, 3D model is checked for Deflection, Stresses. Maximum deflection and stresses in the frame (dry cleaner) i.e. for total load (dead load and live load), dead load is the self-weight of the body and live load is the rider weight over the body. For total load, induced deflection and induced stress were found and these values are small and negligible. For Maximum total load on the beam (wet mop), induced stress and induced deflection were found and these values were small and negligible.
2. **Vaibhavi Rewatkar** studied design is more aim focused towards the economical and better sensors technology for avoiding collision with obstacles, navigating its own path and making the vacuum cleaner functionally more compliant i.e. doing various functions of floor cleaning like vacuuming, mopping and soaking at the same time. comprehends of automated vacuum cleaner which having components to DC motor operated wheels, roller brush, cleaning mop, the garbage container and obstacle avoidance sensor. A 12V rechargeable battery is used as power supply. Other than this is compresses of special technique of UV germicidal cleaning technology. The study has been done keeping in mind economic cost of product. It is a complete autonomous system that work by itself; IR sensors are used to avoid collision with obstacles. This robot capable of vacuuming the floor of room without any human interaction other than just starting the system. All mechanisms work simultaneously.
3. **Dhiraj M. Bankar** develop a manually operated floor cleaning machine so that it can be an alternative for conventional floor cleaning analysis of the floor cleaning machine was done using suitable commercially available software. The conventionally used materials were, considered for the components of floor cleaning machine. In this Machine consist of rollers, water tank, sprocket & chain mechanism, collector brush assembly, drive wheel, and cotton etc. cotton is wound around supporting roller and main rollers. but main roller is placed in water tank so that wetted cotton is transfer forward for cleaning. Cotton is rotate due to use of chain drive. and for chain drive gives the drive from wheel. two small rollers are mounted on surface. The compression rollers are used for removing the excess water.
4. **Dr. J. Hameed Hussain** designed the floor cleaning machine which is automated by micro controller which is run to clean the floor and sweeps the dust away. In this the module a remote-controlled car has gear motor is attached at front axis in between the front wheels, this motor is attached with a cleaning brush at front, and the gear motor is connected to 12volts battery and the remote car is attached with 9volts battery. The remote car is controlled by the micro controller which can cover up to 20m range in distance. When the remote-controlled car is operated the DC gear motor is manually operated in switch type, the motor runs in clockwise direction at high speed of 1000 rpm and the brush below the motor cleans the floor. we can control the movement of the car by micro-controller and we can able to turns directions using it to clean the floor. By this way the module runs and cleans the floor.
5. **Sahil Bharti** developed an automated cleaning assistance this helps in cleaning flat surface with the ease of remote control with greater efficiency at work. This is solely aimed to replace the men at work to "no man at work." The surface cleaning machine that is proposed in this project is the device that helps in cleaning of

surfaces and vertical walls. The automatic surface/Window (anti-gravity) cleaning system has an advantage of providing efficient surface/window cleaning which can be performed semi-manned or fully automated. Here we considered semi-manned cleaning platform, where the directional control was established using a remote by a human operator to facilitate control over the machine from a distance. The cleaning is inspired from the conventional stages of any wiping or sweeping operation, which are blend with the design and placed in the operational order of working stages. It consists of four dedicated wipers that are attached to the platform. Among them, one of the wipers is cylindrical and the others are flat in geometry. The flat wipers are symmetrically placed at the bottom of the Platform arranged in 'V' shape so as to ensure efficient cleaning and collection of dust. The roller wipers are placed at the end of the platform using proper links and a driver motor. The cleaning is made efficient using wet wiping system. This system employs a small bottle that carries water in it. This ensures a complete cleaning of the surface. Only the wipers in the front are made wet. This ensures that the wiper from the back remove the water from the surface when sweeping again on the surface. Wall climbing is made possible using four suction Cups. Infra-Red sensors are fitted on the edges for obstacle detection. An onboard wireless camera is installed to provide run time analysis and dirt location. This automatic machine is only suitable for flat surfaces.

6. **Ms.R.Abarna** fully unified cleaning application. It features the requirements needed for floor cleaning such as water supply, scrub and fan. It is a wheeled type machine with a movement control. This floor cleaning machine is comprised of several AC motors that drives the wheels and rotating objects for the scrub. Wiring of the motors are properly designed that the wheels set up considering the control is from two dual two-way switches. A pushbutton is also set as ON/OFF switch of the rotating objects as scrubs. Plastic pipe is also designed in which it has holes and gate valve that manages the release of cleaning liquid on the floor. The machine is wired using LAN wires connected to its controller while the controller has the connection of the AC supply. This project is applicable for several floor cleaning activities. The present work is aimed at designing a compact floor cleaner that can be useful for house-hold purpose the complete process of the machine starts from the front vacuum pump. It is used to suck dry debris from the floor. This is very much useful for the purpose of reclining the surfaces having heavier dirt particles. The debris thus sucked has to be stored so that it could be removed later. This is achieved by using a vacuum pump with a debris chamber attached to it. The next aim is to make the surface wet which is carried out by sprinkling water on the floor. The aim is achieved by using a motor and a sprinkler system. This system has a shower like outlet and a chamber whose outlet is controlled by a dc motor pump. To clean the surface scrubber has to move or scrub over the floor. The dirt should be completely removed and the debris laden water will flow towards the rear of the bot. the scrubber is fixed to the chassis using clamps. The construction of the scrubber includes fixing one side to the motor and the other to the ball bearing. The bearing is clamped to the chassis. At the rear of the system a vacuum mechanism is used to suck the debris laden dirty water. This is also the same type of pump and the chamber.
7. **Sandeep J. Meshram** designed a vehicle containing broom at bottom which continuously rotating, clean the street as well as sucks the dust spread by the rotating broom. Which run on a human power. When a rider will pedal, the human energy will be converted into the rotational kinetic energy. This energy will be pass to the shaft, brush and finally to the blower. In this project It is found that the existing street 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 health problem as the person directly comes in contact with dust. Also, the shoulder problem due to continuously sweeping occurs.
8. **Muhammad KashifShaikh Ghaffar** developed a working floor cleaning machine consist of moisture cotton mop, swiping brushes, wipers and vacuum cleaner for reducing the cleaning time. The overall cost of this machine is also cheap. Such type of machines is widely used for this purpose but they are working under different principles and the cost is very high. In recent years, floor cleaning machines are getting more popular for cleaning large floor area in minimum time. This design of automated floor cleaning system can be used to clean any kind of remote places. As the motors selected can consume much less power so it will be the power saving and cost saving too. Semi- automatic floor cleaning machine is designed and manufactured using D.C Motor and wiper mechanism. Manufactured machine is flexible and effortlessly operated. Manual Sweeping done by man might not be that effective as it will not be picking up everything in as it is not in sight but using the floor cleaner it can be done easily. In this project the 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.

9. **Uman Khalid** designed, “smart floor cleaning robot (CLEAR)” has been designed for consumer/office environments and its each component in accordance with IEEE Standard is discussed. Proposed design is being operated in dual modes. In one of the modes, the robot is fully autonomous and making decisions on the basis of the outputs of infrared proximity sensors, ultrasonic sensors and tactile sensors after being processed by Arduino (mega) controller and control the actuators (2 DC encoder motors) by the H-bridge driving circuitry. In manual mode, the robot can also be used to clean a specific area of a room by controlling it manually from laptop with a Graphical User Interface (GUI) in Visual Studio (C# programming language) via Bluetooth connectivity.
10. **Raj Vishaal** designed a Dual-Purpose Cleaning Robot with Wall climbing mechanisms which is helpful systems for the various applications on the vertical surface. Building maintenance is one of the most effective applications of the wall climbing robot. Cleaning of walls is carried out through manual cleaning methods such as use of cables and gondola systems. Recently, we recognize tall buildings covered by glass façades. Wall cleaning at the high places is one of the most laborious and dangerous work, therefore, a lot of research has been conducted for past two decades to liberate human from this laborious and dangerous task.
11. **Veerajagadheswar Prabakaran** developed a working model of Floor cleaning robot with reconfigurable mechanism. this robot has four square blocks connected by three active hinges. The walls of the robot enclosure are fabricated in honeycomb patterns to minimize weight and maximize tensile strength. The total weight of the robot, including all its peripheral devices, is approximately 3 kg. The robot is equipped with a set of six motors for mobility and three motors for transformation. This robot is can be controlled by smartphone app.
12. **Liu, Kuotsan** studied a Technical Analysis of Autonomous Floor Cleaning Robots Based on US Granted Patent. This study focusses on a service robot of everyday tools for mankind, a cleaning robot in home. Residential robots are quite different from industrial robots because of nonprofessional users. It needs high reliability and safety. Autonomous cleaning robots are getting more popular for aging populations, it is necessary to design ‘really autonomous’ robots, easy to stagnate or stasis are not allowable, especially for old users.

DEVELOPMENT OF POWERLESS VACCUME CLEANER

Cleaning is the operation where unwanted and excess quantity of surplus particles of garbage is removed from the surface of the floors which are falling on the floor using fast rotating multipoint tool called as the sweeping multi-hair brush rotated against the floor. sweeping multi-hair brush has a series of tentacle edges on its circumference, each of which acts as individual sweeper in the cycle of rotation. The sweeping multi-hair brush rotates at a fairly high-speed with the help of a pair of spur gear mover and the garbage particles is slowly fed against the rotating multi-hair brush. The garbage feed is self-adjusted using the self-weight of the machine. While cleaning the floor. As the sweeping multi-hair brush advances, the sweeping multi-hair brush removes the particles from the floor surface to produce the desired clean floor surface.

In powerless vacuum cleaner as the holding and push type handle installed on the body of the machine which can be pulled or pushed, while prime mover i.e. rear wheels start rotating. The spur gear installed on the rear shaft starts rotating. As it is meshed with another spur gear, it will rotate the brush-shaft. The Arbor (brush shaft) also starts rotating along with the brush tentacles in the reverse direction, which sweeps the dust particles and the garbage. As the brush tentacles rest against the rest-strip, the garbage will fall in to the bin installed nearby it. The trolley is operated by the operator. This machine should bring a lot of respite as it gives least trouble to people with weak bones, backache problems etc. and also to housewives, thus improving their efficiency.

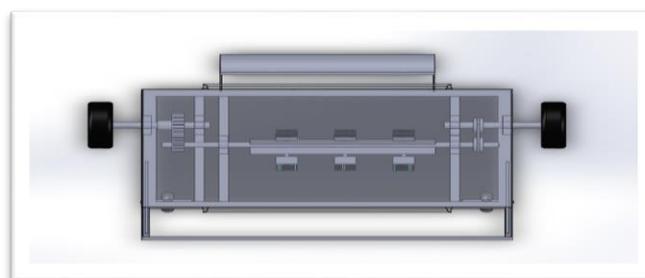


Figure 1:Top View Of Vaccume Cleaner



Figure 2: 3D Model of Vacuum Cleaner

ADVANTAGES

1. It requires no electric power only human power for its operation.
2. It is convenient to convey it from one place to another place, due to its compact size and being installed on the single frame and wheels.
3. It is easy for the maintenance.
4. It requires very less skill for its operation.
5. It is multipurpose.
6. It is cheap as compared to the conventional vacuum cleaners.

CONCLUSION

The innovative design of our project was to avoid the problems caused in the manual cleaning this will help us at cleaning following places with higher efficiency.

1. For cleaning the residential house floor.
2. For cleaning the floor of cinema hall.
3. For cleaning the floors of commercial halls, offices, auditorium etc.
4. For cleaning railway station platforms.
5. For sweeping the floor space.
6. For sweeping and water washing the ship-deck.

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