Three in One Floor Cleaner

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***Abstract*— In the normal cleaning application there are three stages of cleaning the floor which includes first the sweeping of floors. The second stage is to apply some water i.e. wet the floor area and rub it with sponge or cloth to clean the surface. The third stage is to dry up the floor. There is a necessity of such machine which will do all this in a single stroke with more efficiency and less efforts. Overall this paper describes design, fabrication and assembly of Three in One Floor Cleaner.**

***Index Terms*— Efficiency, Design, Fabrication, Assembling, etc.**

I. INTRODUCTION

The commonly used floor types for conventional uses are Unglazed Ceramic (Quarry Tile), Glazed Ceramic, Marble, Graanite.In the normal cleaning application there are three stages of cleaning the floor which includes the sweeping of floor i.e. removing the dirt and dust before applying some water on it. The second stage is to apply some water i.e. wet the floor area and rub with sponge or cloth to clean the surface. The third stage is to keep the floor surface idle for getting dried up by wiping it with simple soaked cloth or by switching on the ceiling fan to quickly dry up.

But this type of cleaning is very time consuming, inefficient, the processes are to be done at some stage so it becomes difficult for single labor to carry out all processes i.e. at least two people are required for the whole cleaning. And it is very difficult to clean very large corridors and floors which occupy large area such as halls.

So, Three in One Floor Cleaner is specially designed while keeping the problem in mind as discussed above. So all the three processes discussed are carried out in one take i.e. the processes are carried out simultaneously one after the other.

The floor cleaner consist of trolley and as trolley moves forward the brush in the front rotates to take in all the dust and dirt and store it in a box which can be removed when needed. After this water is dipped on the floor with the help of water pipeline which has small hole in it. Water is provided from water tank situated on the frame. When water cock is switched ON the water flows through the pipeline and drips on the floor surface. A sponge roller then rotates to rub the floor surface which does the work of cleaning the surface and soaking the water. At the back of the trolley there is a blower fan which blows sufficient air so that the remaining water can be dried efficiently.

II.PROBLEM FORMULATION

We are going to design and fabricate such machine that will eliminate most of the problems which will reduce the human effort.

Concept and Objective of the machine is explained below.

a. Concept

By introducing a low cost machine was to overcome various limitations with the current manual traditional method. The concept of the work is,

(1) Observe the manual method and to identify the drawbacks.
(2) Identification of various process variables.
(3) Investigate different areas of automating the technology.
(4) Produce a low cost automatic system.

b. Objective

The main objective of this project is to overcome the manual method

(1) To increase the efficiency of surface cleaning.
(2) To reduce fatigue to hands.
(3) To build an economic system at lowest possible cost.

II. WORKING PRINCIPLE

The whole project works on the principle that as the trolley moves forward the whole floor covered by the trolley should be cleaned thoroughly including the washing and drying of the surface which is to be covered. The three processes consist of cleaning of floor; washing of floor and drying of floor are explained below.

For cleaning purpose i.e. for cleaning of the dust and dirt and foreign material like small paper, chocolate wrapper etc, a plastic brush is provided in the front of the trolley which rotates in clockwise direction so as to collect the particles efficiently in the collector which is provided just behind it which is a box having its space such that the dust particle collector in it can enter but unable to come out. It can be removed by side of it where a handle is provided to remove the tray and after cleaning the tray it can

be again fitted into the collector. The brush is fixed with the DC geared motor which can rotate at 200rpm and 12V battery. The motor runs in clockwise direction so as to move the dust in the inward direction.

For the floor washing purpose a water tank is provided which a capacity of about 1.5 liter has stored of water. From this tank there is a water outlet to which flexible pipe are attached which have hole in it. When the water knob is switched ON, water starts dripping on the floor surface and floor gets wet. Just behind the water pipe, outlet is fixed with a horizontal motor to which a sponge is fixed with the help of steel shaft. The rpm of motor is very less about 30 rpm but its torque is about 4.5 kg-cm because the sponge is in continuous contact to the floor there is lot of friction so a high torque is required. This sponge does the work of rubbing the floor and it also perform the function of soaking and spreading the water which is spilled on the floor. There is wiper at the back of it to assist it to clean the floor efficiently.

Finally the floor cleaned and washed with water and some amount of water is soaked by the wiper but some amount of water still remain on the floor so it is needed to be soaked. So, for this purpose a fan with a motor unit is fixed at the back of the trolley which acts as a blower to dry away the remaining water. The fan motor rotates at about 800 rpm which is enough to get dried away.

III. DESIGN OF THE MACHINE

(1) **Design of Motor Shaft to move front brush**

(1) Voltage = 12 V, DC motor
(2) Speed = 200 rpm
(3) Current rating = 0.4 A without load, 0.6 to 0.8 A with load
(4) Torque = 1.5 kg-cm
(5) Diameter of shaft = 6 mm

(2) **Design of Motor Shaft to move the sponge**

(1) Voltage = 12 V, DC motor
(2) Speed = 30 rpm
(3) Current rating = 0.4 A without load, 0.6 to 0.8 A with load
(4) Torque = 4.5 kg-cm
(5) Diameter of shaft = 6 mm

(3) **Design of Fan motor as a blower**

(1) Voltage = 12 V, DC motor
(2) Speed = 800 rpm
(3) Current rating = 0.6 A without load, 0.6 to 0.8 A with load
(4) Diameter of shaft = 6 mm

(4) **Battery**

(1) Battery type = Rechargeable battery
(2) Output voltage = 6 V
(3) Cycle use = 7.2 to 7.5 V
(4) Stand-by rating = 6.75 to 6.90 V
(5) Maximum charging current = 1.35 A

IV. MODELLING, FABRICATION AND ASSEMBLY

After completion of design model, then regarding development is done on floor cleaner. Parameters are selected according to objectives. Main mottos of this project are to develop the first prototype of easy use, low price and greater performance. It musts be easy to maintain and should not require highly skilled worker or operator, which is hard to be found in rural and urban areas. Fabrication process should be simple and based on locally available techniques in rural areas. Important components of the three in one floor cleaner:-

(1) Main Frame.
(2) Wheels.
(3) Water tank.
(4) Motor to move the front brush.
(5) Motor to move the sponge.
(6) Motor to move the blower.
(7) Battery.
(8) Switches.
(9) Wires.

(10) Pipes.
(11) Brush.
(12) Fiber.

The assembly of various components of "Three in One Floor Cleaner" is done as follows:

(1) The brush is mounted on the front of the trolley and motor is attached to it.
(2) At top of the frame, water tank is provided to which pipe is fitted to drip the water on the floor.
(3) At the middle of the frame, sponge is fitted and at its side, wiper is provided to soak the water.
(4) At back of trolley blower is mounted to dry the floor.

Fig. 1 Front Brush

Fig. 2 Sponge and Wiper

Fig. 3 Final Assembly of Three In One Floor Cleaner

V. CONCLUSION

The three in one floor cleaner is capable of carrying out entire operation in one take. After carrying out all the operation it is observed that the surface of the floor was cleaned efficiently and it was also observed that the output of the cleaner gave the same results as that given if the three processes were to be done separately and the floor was cleaned, washed and dried as the processes are described all in one take.

VI. ACKNOWLEDGMENT

A guide acknowledges the help rendered by Dr.D.R. Patil, HOD of Mechanical Engineering Department, Jawahar Institute of Technology, Nashik for the help rendered in design and fabrication of the machine.

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