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PORTABLE BATTERY OPERATED FLOOR CLEANING MACHINE WITH MULTIPLE OPERATIONS

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ABSTRACT— this project deals with the design of new products. In before years, floor cleaning is manually operated. The normal floor cleaning machines is most widely used in airports, railway platforms, hospital areas, bus depot, malls and in many other commercial areas. These devices need an electrical energy for its operation not user friendly. In our country, especially in summer season, there is electricity problems and therefore maximum the floor cleaning machine is not used effectively due to this problem, particularly in bus stands. Hence it is a need to develop low cost, user friendly floor cleaning machine. In this project, we used to develop a manually operated floor cleaning machine so that it can be used in the place of conventional floor cleaning testing of the floor cleaning machine was done using suitable available software. The conventionally used parts are, considered for the components of floor cleaning machine.

Keywords-,multiple operations, lowest costing, floor cleaning system, sewage problems.

I. INTRODUCTION

Floor cleaning machine is very useful for cleaning. It is simple in construction and easy for operating. Every people can operate this machine easily. It is madeup of cotton brush, the brush cleans the floor and dried with use of small blower. That's why it is very useful in Temples, malls, etc. The time will be required for cleaning is very less and the cost is also minimum. Maintenance cost is less. Much type of machines is widely used for this operation. But they are working under different principles and the costing is also very high. For residential and office buildings about 80 to 90% of the dust and dirt is tracked form outside. Installing a total of 15 feet of matting consisting of both indoor and outdoor sections will remove 80% of this. Thus about two-thirds of the dirt can be removed at the entrance. Reasons for floor cleaning.

The principal reasons for floor cleaning are

a) To preventing accidents due to tripping or slipping. Injuries due to slips and trips on the floors are a major reason for accidental injury. Bad practice in floor cleaning is itself a major cause of accidents.
b) To adorn or clean the floor.
c) To remove stains dirt, dust and barrier.
d) To remove grit and sand which scratch and wear down the surface.
e) To remove allergens, in particular dust.
f) To prevent wear to the surface (e.g. by using a floor wax or protective sealant).
g) To make the environment clean (e.g. in kitchens).
h) To maintain an optimum traction (e.g. for dance floors).

II. OBJECTIVE OF PROJECT

Design Development and analysis of kinematic linkage for water soaking mechanism and purging mechanism using kinematic overlay method and analysis of strength of components using theoretical method. Design Development and analysis of floor scrubbing mechanism, analysis of strength of components using theoretical method.

III. PROBLEM STATEMENT

Floor cleaning is a laborious task that takes a lot of energy , time and labor and although significant in the function not much research and equipment development is not done. The machines available in the market are either too bulky and and costly and more over they are designed for very large scale operations. The high cost of the machine and space requirement make them un-suitable for small hospitals, clinics, restaurants etc. to use them.

IV. LITERATURE REVIEW

[1] R. A. Haslam, H. J. Williams "Ergonomics consideration in the design and use of single disc floor cleaning machines" Loughborough University, Leicestershire UK (Elsevier) 15 Nov-1998. This paper investigating ergonomics issues related with single disc floor cleaning machine.

[2] Elizabeth Gillespie BN, Dianne Treagus RN "Improving operating room cleaning results with microfiber and steam technology"American journal of infection control,Australia (Elsevier) 2015. Microfiber and steam technology is a cleaning methodology that uses for cleaning by using chemicals , by using this technique reducing the risk of slips and falls along with improving cleaning outcomes

[3] Jordi Palacín, Member, IEEE, "Building a Mobile Robot for a Floor-Cleaning Operation in Domestic Environments" Ieee transaction on instrumentation and measurement (Sceince Direct) Vol. 53, NO 5 Oct - 2004**.** In this paper we studied about how to domestic robot work in industrial or domestic areas

[4]C.R.Balamurugan*,P.Kirubha, S.ArunKanna"Bluetooth Based Automatic Floor Cleaning System" International journal of chemtech research (Science Direct) Vol 11 no. 04 2018. Bluetooth based module is used for controlling the entire system with the help of remote or mobile.

[5] Akash A. Nagtode1, Amit P. Kamdi2 "solar operated floor cleaning machine" Issue 6-ICRTEST Jan 2017.

[6] Anup Mendhe1, Mayank Lalka2 "Multipurpose floor cleaning machine" IJRISE Vol 5 , May-2017. In this paper we studied and investigated for by using solar energy we generate electricity and uses this electricity for the cleaning purpose.

V. NOMENCLATURE

Table No 1:Nomenclature

Sr. No	Abbreviation	Meaning	Unit
1.	Fsall	Allowable shear stress	N/mm^2
2.	Fsmax	Maximum shear stress	N/mm^2
3.	E	Youngs modulus	N/mm^2
4.	M	Poisson's Ratio	N-s/m
5.	P	Density	Kg/m^3
6.	J	Polar moment	N/mm^2
7.	Syt	Yield strength in tension	N/mm^2
8.	Sut	Ultimate tensile strength	N/mm^2
9.	Mt	Torsional moment	N-mm
10.	Mb	Bending Moment	N-mm
11.	P	Power	HP

VI. 2D DIAGRAM & WORKING

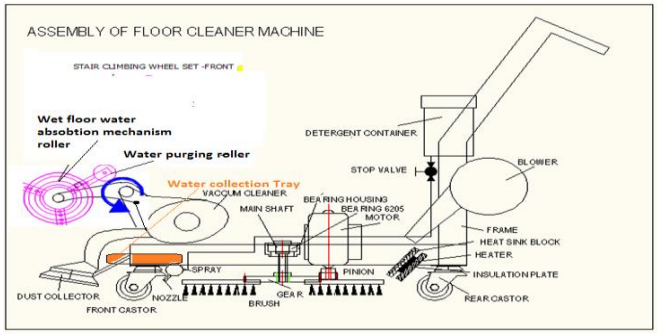

Fig 1: Block diagram of setup

Start vacuum cleaner, vacuum cleaner dust making the floor dust free, Start the detergent spray stop valve, it sprays .the detergent onto the floor, thereby wetting the surface the next cleaning operation. Start the clear motor, this will make the brushes to rotate and clean the floor. Using the regulator brush rotor speed can be changed. Start the heater, this heats the heater plate and the sink block, start the blower which will force air onto the heat plate and thus hot air will dry the cleaned floor.

Selection of Motor

- Specifications:

Speed = 0-6000 rpm (variable)
Volt = 12V
Current = 3A

The motor shaft is made of alloy steel (EN 24) and its allowable shear stress,τ = 97.5 N/mm2

A) Design of Shaft

P = 50 Watt

To find motor torque,

T= 1.19×10^3 N.mm

For the diameter of motor shaft,

d = 4.00 mm

d $\cong$ 16 mm

selecting minimum diameter of spindle = 16 mm from ease of construction because the standard pulley has a pilot bore of 12.5 mm in as cast condition, and a bore of minimum 16 mm for keyway slotting operation.

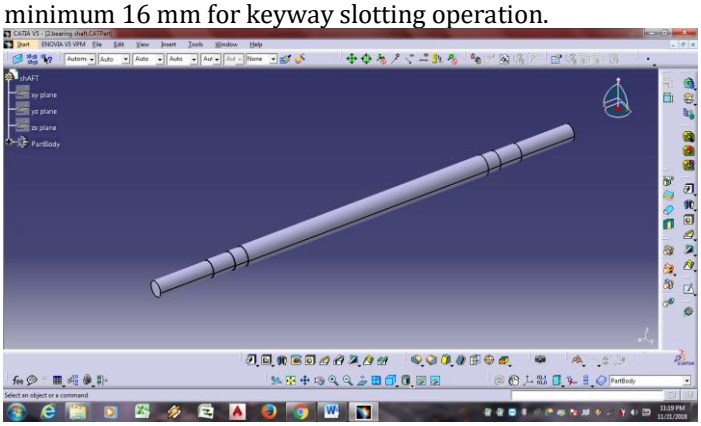

Fig 2: Shaft

B) Design of input crank

The material of input crank is C45 which having tensile strength and yield strength is equal to 600 & 380 N/mm2 respectively.

Fb = Mb x y/I

fs = Mt r/J

d = 6.64 mm

But as per manufacturing considerations we have to consider the minimum section on the shaft to be 16 mm

C) Design of Connecting link

The material of connecting link is AL which having tensile strength & yield strength is equal to 400 & 320 N/mm2 respectively.

Ft = $\frac{W}{A}$ = 0.328 N/mm2

We have concluded that connecting link is safe under tensile load.

D) Design of Leg

The material of leg is AL which having tensile strength & yield strength is equal to 400 & 320 N/mm 2 respectively.

Fs all = fyt/fos

$$Fsmax = \sqrt{(\frac{fb}{2})^2 + fs^2}$$

=6.65mm

Ftact < Ftall

VII. ADVANTAGES

a) With suitable modification the same set up can be made to climb stair cases.
b) The mechanism is reversible; hence forward as well as reverse motion is possible.
c) The rechargeable battery is the power source that moves allow with the vehicle hence no external power is required.

VIII. CONCLUSION

Features of this machine can be enhancing with addition of total automatic working using Bluetooth/Wi-Fi module. Battery Monitoring, Self-charging, and to set alarm on/off time manually are the future scope of this project. By using solar panel can be increase battery backup.

IX. REFERENCES

[1] R. A. Haslam, H. J. Williams "Ergonomics consideration in the design and use of single disc floor cleaning machines" Loughborough University, Leicestershire UK (Elsevier) 15 Nov-1998.

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