FABRICATION OF A DUST REMOVER AS WELL AS FLOOR SWEEPER WITH DEODORIZING EFFECT

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Abstract

Cleaning has became a basic need of all the human beings. Throughout the world many researchers are conducting experiments in order to eradicate and solve the dust removing process. There should be improvision with innovative ideas and techniques which may ensure good health. If a an equipment is developed it should be eco friendly with its usage. All the designer people should be aware of its affects and advantages in preparing a particular equipment. It's a great task inorder to improve the quality and standards of a particular equipment for its better usage. It should be designed by keeping the ergonomic aspects. Not removing but also deodorizing that particular environment also is needed. Here in this paper it describes the dust removal principle and its working which has been prepared by the scrap materials for the domestic purpose only with low cost expenditure. A vacuum pump sucks out all the air and blows out fresh with deodorizer. This paper also aims at a fabricating a small prototype which uses DC motor to remove the dust and to make clean and hygienic environment and thus avoids health inequalities and safety concerns with regards to workers as well as common people.

Keywords: *DC Motor, Blowers, Fans, and Vacuum pump*

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1. INTRODUCTION

Dust removing problem are increasing more and more now a days. Hence it has became to provide some equipments for removing dust. There different types of waste, dry waste, vegetable waste, dust particles and soon. Generally few equipments have been evolved in the market for cleaning the dust particles which are known as vacuum cleaner. But these vacuum cleaner costs more in the market and not every human being can afford it. Meanwhile these equipments removes dust from the floor and collects in the dust bag present inside the equipment. We aims at fabricating a dust remover with the use of scrap materials to minimize the cost as well as anybody can prepare at home with these crap materials. If we go past into the history of the vacuum cleaner, we find different types of dust remover.

A dust remover is one type of device which is usually using to remove the dust, this device uses an air pump which creates little vacuum which will be utilized to suck dust and dirt, and it mostly utilized for floors. These vacuum cleaner may be used in homes as well as in industry.

1.1history

The first ever vacuum cleaner evolved in the year 1860 and it was manually operated model by using bellows. Then motorized design came in the 20th century. During the 1840s for carpets it had been a difficult task, as devices of mechanical were present for the cleaning purpose. During that period cleaning was done by the maids and women of the family. Usually rugs are made up of rags which woven together. These rugs are of heavy weight and to clean it, it has to be taken out. It used to be difficult to wash so with the help of bat shaped beaters to drive out the dust and brushed..

1.2 Types of Vacuum Cleaners

Manual predecessors: It is known as manual vacuum cleaner. In 1860 a person named called Daniel Hess who was from West Union has evolved it. He made use of brush which rotates and bellows which probably utilize for suction.

Fig-1 Manual Vacuum cleaner

Motorized Vacuum cleaner: It is also dedusting pump, it has been carried out by a scientist called Hubert Cecil who was from England and it was carried out in 1901.

Fig-2 Dedusting pump

Domestic Vacuum cleaner: it is the first vacuum cleaner designed specially for domestic purpose, it was built in 1905 by Walter Griffiths. This type of vacuum cleaner was portable, easy to handle and can be operated by normal person doesnot need any skilled person.

In 1906 James developed a vacuum cleaner, which has a change different from the domestic cleaner although this ws also meant for domestic purpose only. It was also known as domestic cyclone which was a new idea in vacuum cleaner.

Fig-3 Pneumatic cleaner

The first portable vacuum cleaner invented by Electric Suction Sweeper company and it obtained patent for the eclectric suction sweeper. This portable sweeper it blews the dirt and dust into a small box . Due to financial problem he was unable to fund it so he sold hi patent to other. Later William henry had redesigned with steel casing casting and attachments. It was sold at $60.

Fig-4 Electric suction Cleaners

1.3 Recent Developments

Upright: In United states, Britain and many countries one of the most popular dust remover is of upright type, but these type were not famous in Europe. It was comprised of cleaning head, bag and handle. It had a peinciple of common sweeping and also with vibration effectby employing a brush which was of rotating type. There are some other types of upright systems those are direct fan and fan by pass. There was a large impeller which was situated in the direct fan type and it was situated at mouth of the suction nozzle by which dirt used to pass directly. The efficiency of the upright dust remover was less at above floor situation.a filter is utilized. Usually the upright cleaners are utilized bvelt drives. It was a more effective cleaning for the purpose of carpet cleaning. It has a switch separate for the brush roll in order to make it off if the floor is rough.

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Canister: These are another type of dust remover which are also called as cylinder models. The main advantage of this was the dust collector and the motor was mounted separately but both mounted on wheels which was connected by a flexible nose to the head. It has some add onn feature, which can be detachable and attached as when required according to the needs of the purpose these were the ahead of upright type in the market it took over the market due to its advance advantages compared to the upright.

Drum: As canister was mainly used for the domestic purpose it was vertically large positioned drum , but fro the use in garages needed a small type dust remover, then evolved the drum type. It was often utilized compressed air. To get apartial vacuum effect venture effect utilized..

Pneumatic: this is the type of a dust remover which utilizes the compressed air. It is best used in industries and it can remove both type wet and dry type of dusts and any spills of oils. Mainly utilized in the production unit and manufacturing unit.

Backpack: for the use commercial purpose a typer of dust remover was developed which is known as backpack type. These are also a type of canister but smaller in size. From th backpack a large area can be cleaned in simplest and easiest form by the user..

Hand-held: as the technology started emerging fast and steady new varities of cleaner evolved. Earlier the cleaners were of heavy weight and cannot be carried out easily anywhere. So in order to eradicate this problem a portable type cleaners evolved which are named as hand held. It was evolved in 1984. It mainly utilized a battery or the mains its depend upon the usage need. Some handled were designed in such a way that it can be detachable partially to carry out easily anywhere.

Robotic: Due to the emerging technology and involvement of the robots in the field of technology in the industry, there was an era in the technology that the usage of robot started. In many decades when the robotic era started it replaced human power. In keeping in view of this technology, in the beginning of 2000s a new variety of cleaner introducer knowns as robotic which can be operated remotely and also if programmed it can work by itself. These were designed in such a way that it can collect the dust automatically and can put it into the dustbin. These are all automatic system, which can charge itself as it comprises of reachargeable batteries. These were expensive in terms of cost so it were never introduced for the home purpose.

Cyclonic: The most widely cleaqner dragged the market in one type of cleaner which is portable and is known as cyclonic which is based upon the cyclonic principle in its working principle. First when it was evolved it was designed without the filter. Later when the technology emerged and need of filter started in the market for the cleaning purpose then company started introducing filter into it. Filter main purpose for the filtering purpose of the air which will be giving out to the atmosphere back.

Central vacuum cleaner: Another type of canister model which wasa evolved was central cleaner, its nearly about 8m long pipe attached to it. The machine would be situated at a central place, then with the help of long pipe it can be mobved room to room by keeping the machinme at one place. It comprises of large dust collector bag into it. So that the cleaning need not to be done regular to the machine. It was heavy duty machine built in for commercial purpose. And are of very efficient.

Constellation : It was another benchmark in the field of technology as other cleaners where housing wheels for its movement but a company known asHoover evolved a different kind of cleaner. This type of cleaner doesn't house wheels for its movement but cleaner would float by the vacuum created by it and when at exhaust pressure while air coming out, by its its used to float on the ground. This type of cleaner were known as constellation. This type are capable to use them at any type of surface of the floor euther rough or smooth.

Other: as the era changed then dust cleaning equipment usage became more popular and new advancement started in it. Then later became the need of cleaning the dry aswell as wet floors. And to collect the water which is dirty in different tank.

1.4 Selection of Fans

Before designing the dust remover it needs to be known the different varities of fans and their efficicency for its selection for the need of the requirement as per the fabrication purpose, in order to get proper pressure. Hence blowers and fans are mainly depend on its parameters such, pressure, and its flow rate, efficiency, handling.

Table-1 Fan Efficiencies

Type of fan	Peak Efficiency Range
Centrifugal Fan	85-88
Backward curved	80-84
Radial modified	73--80
Radial Type	70-74
Pressure type	57-66
Forward curved	59-64
Axial fan	
Vanaxial	77-84
Tubeaxial	68-71
Propeller	44-51

1.5 Categories Of Fans

Generally there are two categories of fan which are broadly classified as axial flow and centrifugal flow.
In the type of centrifugal flow, the direction of the air flow changes from twice to oncewhile in inlet and exit.
In the type of axial flow, there will be no any change in the air flow in inlet and exit..

Centrifugal Fan: Types

Paddle Blade (Radial blade)	Forward Curved (Multi-Vane)	Backward Curved
		

Fig-5 Centrifugal Fans

The categories of centrifugal fans are shown in the fig they are of mainly three types as discussed below

Radial fans are type of centrifugal fans mainly utilized for industrial purposes because of its high static pressure. And radial fans are well designed for the work in high temperatures..

Forward-curved fans are one more type of centrifugal fans which are also widely used for cleaning purpose, it is best for high volumes of air.

Backward-inclined are another type of centrifugal fans and with comparision to the forward curved fans these fans work well than them with high efficiency and well suited for cleaning purpose..

1.3 Advantages:

1. It helps to keep surroundings clean
2. It helps to removing the dust and make the surroundings free from germs, insects.
3. It helps to eradicate odour problem.

1.4 Disadvatages:

1. It is applicable to domestic purpose only for home.

2. LITERATURE SURVEY

[1]Rajath et .al, 2015 has explained about the vacuum cleaner and deodorizing the atmosphere and what are the measures to be taken. He has framed a model like foot operating vacuum cleaner using microcontroller. He has fabricated the model using rollers, mild steel material casing for the low cost and availability.

[2]D.N. Dharamsena et.al, 2005 He has developed a model specially for the environment like chilli grinding shop to remove the dust. As the chilli grinding shop contains of minute particles of the chilli powder in the atmosphere in that shop, which are harmful for the human beings and on his health. In order to overcome this problem, he has developed the model which removes the dust as well as give good fragrance in that particular area where it is used

3. METHODOLOGY

Firstly we study the basic principle/ working of the dust remover, by preparing a small prototype of dust remover using scrap materials to minimize the cost. We are using a battery which is of 12 V, and a dc motor , a fan attached to the motor shaft. If the rpm is more to control the speed we can use speed regulator. But here we are not using the regulator.

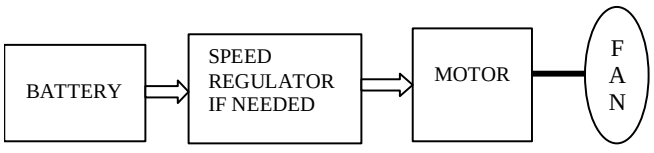

Fig-6 Schematic line diagram of the pre model

When the dc motor is powered up with a battery, it starts rotating and a fan which is attached to it also rotates and creates a suction pressure due to speed of the rotating fan, due to which all the dust which is near by to the nozzle of gets sucked into it and all the dust collects in the dust collector.

To accomplish the work we have used a 6 V DC motors which runs around 2400 rpm as per its section mention on it. The schematic figure as shown in the fig 1. and to power up to the battery we have used a 12V battery. And the fan is made up off GI sheet.

			
12 V DC Motor	12 V battery	Metal Mesh	Fan

Fig-7 Parts used in pre-model

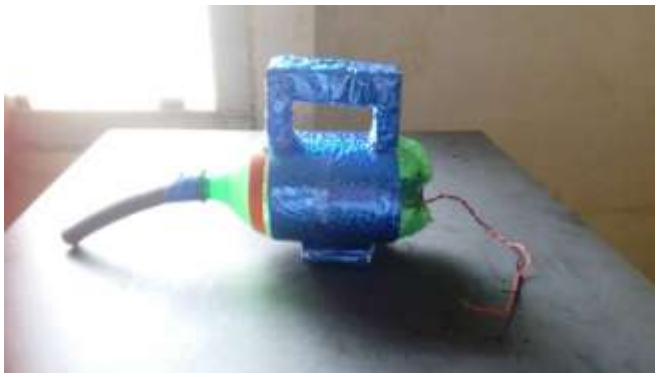

Fig-8 Fabricated pre-model

This is the basic methodology behind the working of the dust cleaner. In order to enhance its utilization and work, we planned to further work on it, and study the drawbacks of the present dust remover in the market. After studying the basic principle behind vacuum cleaner and on the prepared pre-model we thought to fabricate a sound dust remover and also to provide some features to it, that not only to remove the dust from the floor but also to wipe out the floor in order minimize the human work. So we planned to fabricate a dust remover with additional feature like floor sweeper. For this we utilized the scrap mixer grinder for its motor specification which gives high rpm and which is enough for our model and kept fragrance filter at the backside of the fan to give out frangrance to make the environment odourless. We fabricated it to minimize the workload for the human beings in cleaning the, and it is meant for domestic purpose only.

CONCLUSIONS

During the study we made three attempts with different dc motor configuration. With less rpm aswell as with high rpm. In this observed that the motor which was with less rpm

creates less suction pressure and which got low capability to suck the dust. Later we changed to high rpm to get enough suction pressure so as to suck the dust through the nozzle. And we came to know about the detail working principle of the dust remover which is commonly known as vacuum cleaner. The name vacuum got because as the fan rotates some vacuum is created inside the closed chamber. Later we utilized scrap mixer grinder, and fabricated a dust remover which also sweep the floor which is mounted with gear arrangements.

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