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ECOFRIENDLY DUSTER CLEANING MACHINE

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Abstract - *The Project is based on the concept of developing a mechanism which is used to recover the dust from duster. In short, swallowing a piece of black chalkboard chalk won't kill a person, but inhaling the dust for a long span can create or trigger respiratory problems. Therefore, it is necessary to have the ability of automatic cleaning of the duster and also the function for collecting the dust so that it cannot permit to fly dust in the atmosphere which causes health hazards. This project is implemented to make human work easier and can reduce the use of human power because of its potential applications.*

Key Words: Duster cleaning institutional experimentation, Mechanical Structures, Small Vacuum Pump, Removable Dust collector etc.

1. INTRODUCTION

Nowadays projectors are used in the class rooms but it is not feasible and has complex operations so such a device has been made which has the ease and the simplicity of the blackboard duster cleaning. Writing on the board is very easy job and erasing is still easier one the main problem arises when the task of cleaning the duster eraser comes. After quite some time the duster eraser becomes saturated and it doesn't clean the black board efficiently. Then it needs cleaning. Cleaning the duster eraser is very simple job just rub it or impact it against the wall and most of the dust falls off .Generally the teacher needs to clean the blackboard while he is teaching. Banging of duster against the wall produces noise, destructs the wall texture, makes the class dirty, and worst of all quite a lot of chalk dust is released which, when inhaled can lead to troubles like bronchitis that is asthma and lung diseases or if it goes into the eyes it may cause irritation in the eyes.

Chalks (dusty or dustless) are commonly made up of limestone (CaCO3) and/or gypsum (dehydrated form of CaSO4) as their main constituent. Kaolinite (hydrated aluminum silicate), car boxy methyl cellulose (CMC), poly vinyl alcohol, starch are present in small quantities. It may also contain some dross like silica and colored chalks contain some metals. The chalk is made from "plaster of Paris and calcium carbonate", that is CaSO4.1/2H20 which is hydrated and allowed to set in fixed If the colored chalks are to be prepared some pigments and dies are added to it which may be toxic or nontoxic.

Studies have shown that limestone (natural chalk) factory workers have increased prevalence of respiratory symptoms. Results of a survey conducted in Spain showed that shaking and/or frequent use of the eraser or of chalk in class was associated with an increased risk of respiratory symptoms. The design is able to achieve automated clean the duster eraser and collect dust in one stroke. In this research paper, concept puts forward a kind of mechanism design scheme, the mechanism can automatically remove the chalk dust particle after putting the duster clean in fixture and erase the duster Clean, keep the duster eraser free from dust particle.

2. LITERATURE REVIEW

Ren, Z. G., Chalk dust on the health hazards of teachers. Chinese Journal of School Health [1]. According to the survey and the medical report from experts and various doctors, it was concluded that the most of the teachers did not know or were ignorant about the problems caused by the chalk dust, Chalk generates a large amount of airborne dust, and particularly sub micrometer dust and nano particles that can penetrate into the respiratory system. This machine mechanism automatically cleans the duster eraser; the only human effort is to do is to placed the duster in the duster cleaning Fixture device.

Yang, S. Z., & Chong, Y. K., Mechanical engineering control. University of Science and Technology Press [2]. Among the five ventilation modes, doors open and ceiling fans on are the best ventilation mode to reduce chalk dust particles accumulated in the classroom while teaching. Wearing face masks for teachers and keeping an appropriate distance from chalkboard for students

during chalk teaching is highly recommended. Because using chalk can increase the mass concentration of dust particles in the proximity of the chalkboard and deteriorate air quality, other teaching methods, such as slides, video, digital whiteboards, and electronic tools, may be better alternatives in the classroom.

International Journal of Emerging Technology in Computer Science & Electronics (IJETCSE) ISSN: 0976-1353 Volume 13 Issue 1 –MARCH 2015 [3].

In this prototype, there were some problems that occurred and must be solved to make it perfect. The problem occurs in design, the efficiency of movement of duster machine. In order to bring this machine in high performance category and good condition many factors need to be considered.

1) Development of this machine must be tough form the mechanical design, electronic design and how to control it.

2) In electronic design the best way to controlled the machine by a perfect configuration of microcontroller. This microcontroller act as brain of the machine and make the machine more intelligence. In this project PIC was use as microcontroller for this project

3) As conclusion, an automatic whiteboard cleaning machine was designed and fabricated using low cost material and with user friendly interface.

International Journal of Emerging Technology and Innovative Engineering Volume I, Issue 2, February 2015 ISSN [4]. In this fast growing world there are different new technologies adopted to increase work rate in minimum time period. Thus, automatic blackboard duster is also a new technology for cleaning the board automatically in minimum time period. In this advanced world the competition is increasing day by day thus the time of every person is most precious. As automatic blackboard duster clean the board in less time and saves the time of student which is too important.

3. STUDY AND SUGGESTED HEALTH ANALYSIS

Consumption of Chalks:

a) Science Stream: 4-5per Period,

b) Non-science Stream: 2-4 Period.

Material of Duster eraser: a) Fabric -85%

b) Sponge-15%.

While studying, almost all the teachers about 80% agreed, that the Chalk Dust released during cleaning of the duster eraser in the class resulted in the loss of concentration and various other reactions from the students sitting in the front row.

Almost 88% of the teachers were facing problems due to Chalk Dust and majority agreed that it happened due to improper way of cleaning the Duster eraser.

It is observed that about 45 to 55% of the teachers were ignorant of the problems caused by the Chalk Dust.

The frequency of cleaning the Duster eraser varied according to the consumption of chalk dust.

4. PROPOSED WORK

The aim of the present work is to construct Duster cleaning machine details of the experimental set- up are as follows.

Table 1 Details of experimental set-up

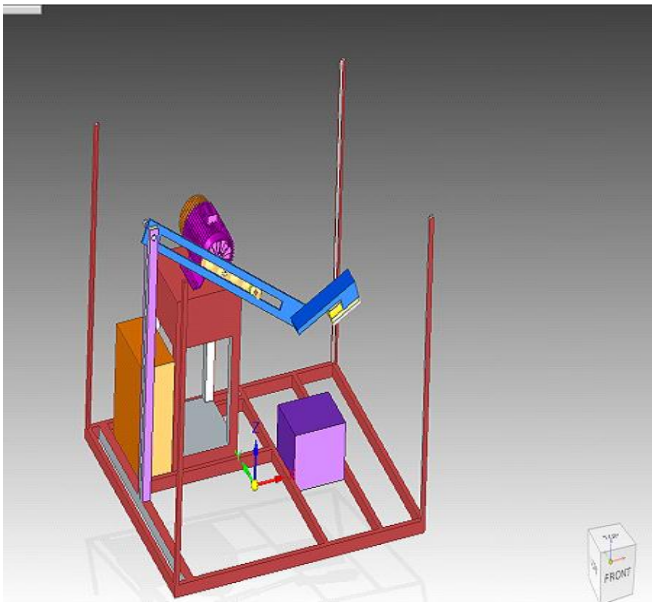
Sr. No.	Description	Dimensions / Range
1	Base Frame	560×300 mm (L×W)
2	Connecting Link	400 mm
3	Vertical Column	440mm
4	DC Motor	12 V /60 RPM
5	Duster Holder	Adjustable Up To 8 inch For all type of Duster
6	Vacuum Pump	12 V / 1.5AMP
7	Metal Sheet Bed	240×100 (L×W)

5. Construction and Working Principle of Duster Cleaning Machine

The mechanism consists of only one motor for rotation motion. The brief construction of mechanical structure is, rotary motion is transferred to the Disk which is attached to large connecting link. The larger link have attached duster holder. The whole mechanism is set up inside the air tight chamber with the bottom surface of duster eraser having small holes on metal net sheet. The duster holder is hammered on metal net sheet which is fixed on base part of

mechanism. Motor drives the connecting link and vacuum pump used for creating the suction in the bottom surface of the duster eraser to absorb the dust particle. Due to hammering of Duster on metal net sheet, it vibrates so that the dust particles free from duster eraser and absorb the generated dust particles through small openings with the help of vacuum pump and collect it into removable collecting block.

5.Figure and Table Captions



5.1 Traditional Method

Table 1:- Traditional Method Reading

Sr. No.	Weight Of Person (Kg)	Strokes	Time (sec.)
1	47-50	14	6.28
2	62-65	17	8.37
3	70-80	22	9.50
Mean	62.33	18	8.05

5.2 Machine Method

Table 2:- Machine Method Reading

Sr. No.	Strokes	Time (sec.)
1	14	18
2	17	20
3	22	24
Mean	18	20.66

6. CONCLUSIONS

According to our study it was found that the machine cleans the duster more effectively and efficiently. The teachers were not aware of such serious health problems and thus making such a machine will not only reduce health problems but will make the teachers more aware of it. The machine is easy to operate and any teacher or person can use it. The machine runs smoothly and can cause no damage to the person who is putting the duster in the machine to clean. Initially there were problems with the machine which were corrected and were solved to make it perfect. This machine mechanism cleans the duster with ease, the only effort the person has to do is to get the duster and fix it in the duster cleaning machine.

7. Acknowledgements

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