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AUTOMATIC CHALKBOARD CLEANER AND DUSTER CLEANER

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ABSTRACT

As conventional chalkboards are widely used mostly all over the world which are cleaned with the help of manually operated duster or is in use of erasing data on boards. This tends to formed dust particles to scatter in the air, which affects on human body to avoid these problems caused by dust, automatic black board erasing machine is being modified now a days. The sliding motion is provided to slider with the use of electronic devices such as motors and chain and sprocket mechanism is used for transmitting motion further as to work done should be carried out in properly working manner, which also tends to increment in human comfort, by avoiding the effortiveaction carried out by a teacher to erase the data on boards but it seems very comfortable with the help of automatic black board cleaner, because it helps in cleaning the board in such way that the whole black board is cleaned in one stroke by just pressing one button and is easily operated using limit switches to stop the motion of slider when it is at extreme positions.

INTRODUCTION

This mechanism relates to automatic chalkboard erasers and comprises guide rails and sliders with powering and controlling with limit switch. The Mechanism is made up of two single guide ways mounted one above and one below the chalk board. The sliding member is attached with the bearings which fits on guides of guide way. The sliding member slides in the guide ways provided on the both sides of the chalk board. This sliding member is attached with the sponge which collects all the dust particles. There are some mechanisms available in the market which cleans chalk boards. But they are costly, andnot so much operational. This mechanism has many advantages like low cost compared to other mechanisms. Mild steel material is used hence it is light in weight. Although black board is very much useful, problem arises when one cleans the black board. Conventional method of erasing blackboard is very harmful. In conventional method teacher clean black board with the help of duster in his hand as This method allows the chalk dust particles to scatter in the air. These Particles when enter in the respiratory passage through nasal cavity, this may lead to severe problems like bronchitis and lung cancer. Some teachers have allergy regarding dust, it creates problems in teaching. So there is requirement to avoid scattering of dust particles in the air. Some achieved this by using white boards. It is plastic sheet on which we write with the help of ink marker. But these white boards also have problems. Continuous use of ink used in white boards may cause problems like memory loss and brain damage. Hence use of white boards is not suitable and we have to improve the method of erasing blackboards.

PROBLEM DEFINITION

- The time consumes in hand erasing is more.
- The problem of dust in hand erasing affect the human being.
- Hand erasing requires human power thus wastage of human energy .

OBJECTIVES

- In this automatic chalkboard duster the time require in erasing is very less as compare to hand erasing.
- The problem of dust in automatic blackboard duster is controlled by the use of vacuum cleaner.

METHODOLOGY

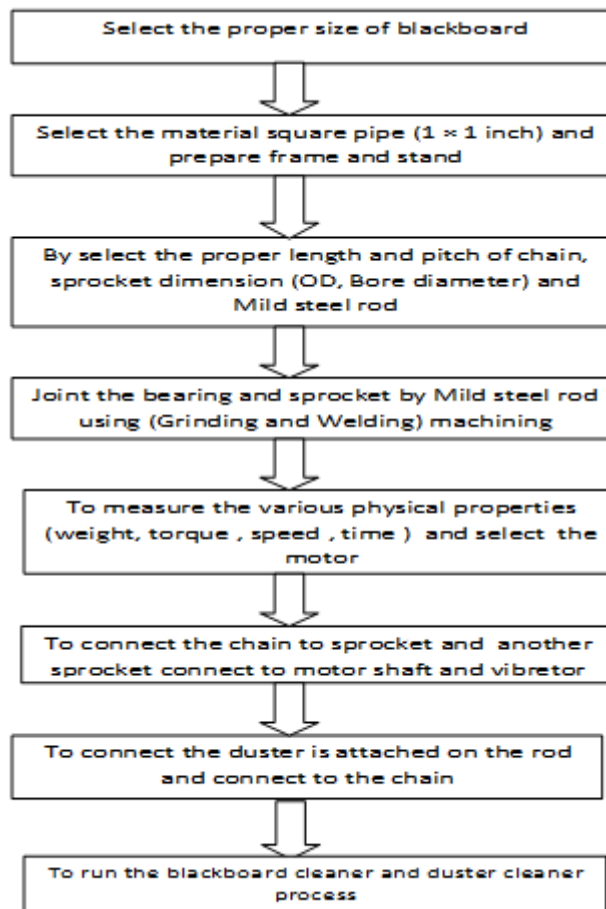


Fig :- Location of motor for power drive

MATERIALS AND METHODS

Design of shaft

- The shaft may be designed on the basis of Strength, rigidity, stiffness
- In designing shafts on the basis of strength the following cases may be considered;
- Shaft subjected to twisting moment or torque only,

- Shafts subjected to bending moment only,
- Shafts subjected to combined twisting and bending moments, and
- Shafts subjected to axial loads in addition to combined torsion and bending loads.
- Shaft Subjected to Combined Twisting Moment and Bending Moment
- Diameter Of shaft :- 15 mm .
- Length of shaft :- 44 inch= 1.11m.

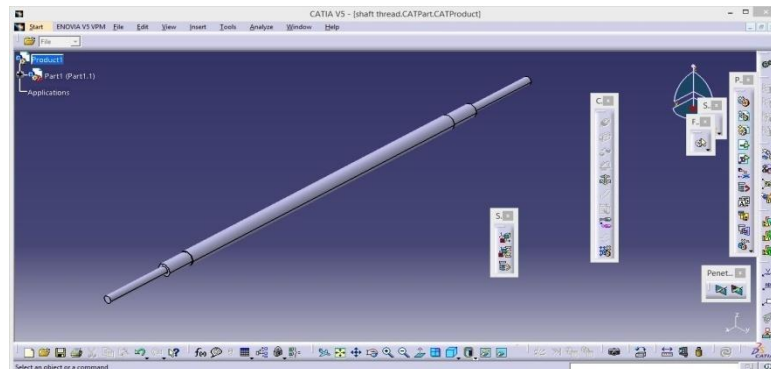


Fig :-3D View of Shaft

Chain length calculation

$$L=2C+1.57(D+d) + (D-d)^2 / 4C$$

Where : L= length of belt at pitch line(in inches)

C = center distance(in inches)

D = pitch diameter (in inches) of large sprocket

d = pitch diameter (in inches) of small sprocket

Ball bearing

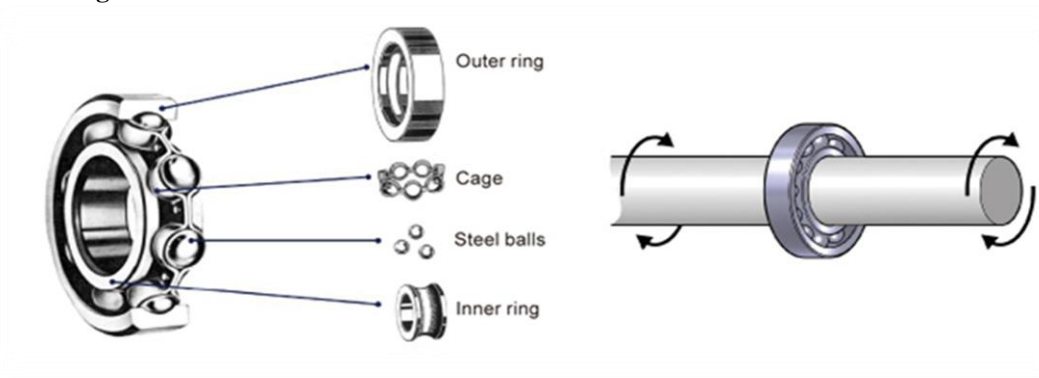


Fig:-.Details of ball bearing

Aesthetic and Safety

Aesthetic

Aesthetics gives an idea about how beautiful a product looks. It relates to the appearance of the product. To complete and succeed in the market the place manufacturing have to look beyond reliability and physical quality and pay more and more attention to aesthetic and subjective quality of their products

As this mechanism is concern, aesthetics consideration is also important. Outer frame gives good look to the whole mechanism. Colour of components used gives good look to the mechanism.



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Another thing is the motors are mounted on back side of the black board. So that wiring, wooden shaft, and strings are hidden.

Safety

While fabricating any machine or mechanism safety is very much important. The operation of mechanism should be safe to avoid damage to the user. The machine or mechanism should be safe for damage of itself as it have to use for big time. Regarding this mechanism the problem is sudden impact on the outer vertical supporting members, which are 12mm C-channels in this case. This impact can cause excessive stress in string. This sudden increase in stress in strings can break them. if these stresses are transferred to the motors can cause extra load on them. Option was 31

to remove the side members, but there were chances of getting out the sliding member if not topped at right time.

RESULTS AND DISCUSSION

Theoretically calculated speed of the duster movement:

The sliding member runs with the velocity given by:-

$$V = \frac{\pi d N}{60} = \frac{\pi \times 15 \times 150}{60} = 0.117 \text{ m/s}$$

Speed of duster when full voltage (12 V) is applied

Time required for completing movement from one extreme position to another: = 7sec

Distance between two extreme positions = 2feet

Time required = 7sec

Practically observed Speed of the Slider movement

Practically we need tachometer to find rpm of the motor. But we can find it by finding time required for the movement of the board. We note time required to move slider from one extreme position to another with the help of stop watch. We know that starting and stopping of slider is done manually. Also starting and stopping of time counting is done manually. So there are some human errors during taking results.

To increase accuracy of the readings taken, we take large no. of readings and then take average of it. While checking this mechanism we took 10 readings for the movement of slider. And then average of these readings is found. This average value is used for further calculations.

The results and discussion may be combined into a common section or obtainable separately. They may also be broken into subsets with short, revealing captions.

CONCLUSION

- Gives more output power for less input power.
- Covers more distance in less time.
- Easy reciprocating operation system.
- Easy operating system (effort less).
- Available at low cost.

FUTURE SCOPE

- By using sensors we can make arrangements such that eraser can detect chalk particles and erase only that part. It reduces the power wastage of power for cleaning whole black boards.
- By using sensors and PLC circuit we can run automatic cycle.
- By adding some improvements we can use the same mechanism for coloring the wall and also for cutting the grass



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