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Design and Fabrication of Multipurpose Eco-Friendly Cleaning Machine

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Abstract: Cleaning is the main basic need for all human beings and it is necessary for daily routine process. The conventional road and floor cleaning machine is most widely used in many applications such as example roads, railway stations, airports, hospitals, Bus stands, in multi buildings, colleges etc. also this machine uses human energy for its working operation. It is a user friendly as well as eco-friendly. In our project we are aimed to use easily available materials with low cost and it can be easily fabricated and easy to use and control. It is the better alternative for conventional machine.

The manually operated eco-friendly road and floor cleaner can work very efficiently with respect to covering area, time and cost of road cleaning process compared with the existing machineries. Also it is economical to use.

Keywords: Cleaning, road, floor, conventional, economic

I. INTRODUCTION

Effective cleaning and sanitizing helps and protect the health of the human beings directly and indirectly. Also, cleaning and sanitizing prevents the pest infestations by reducing residues that can attract and support bees, pests etc. It also improves the shelf life of the floor, walls etc. due to regular cleaning and maintenance. In recent years, most of the people prefer to use trains or buses for commuting and hence these places are littered with biscuits covers, cold drink bottles etc. Hence, it is necessary to clean the bus stands and railways stations at regular interval. There is no one single cleaning method that is suitable for all locations and occasions and effective cleaning depends upon type of cleaning device, cleaning technique and also the equipment should be user friendly. Cleaning work can be physically demanding and a need has been identified to developed methods for systematic ergonomic evaluation of new products. In recent years, floor cleaning robots are getting more popular for busy and aging populations due to lack of workers. However in India, unemployment is more and hence there is a need to develop less labour oriented cleaning machine. Hence, the present work is aimed to design, development and evaluation of a manually operated road and floor cleaning machine M. Ranjith Kumar - "Design of Manually Operated Floor Cleaning Machine"-The authors has been designed manually operated floor cleaning machine. From his research he concluded the stress level in the manually operated machine is within the safe limit. Sandeep.J.Meshram - "Design and Development of Tricycle Operated road Cleaning Machine" – He has developed the street cleaning machine by tricycle operated. In this research article he framed a model especially for rural area. He concluded that the cleaning is less effective where the street seems to be very rough and damaged.

II. DESIGN AND FABRICATION



Fig.1 Design of Eco Friendly road cleaning machine

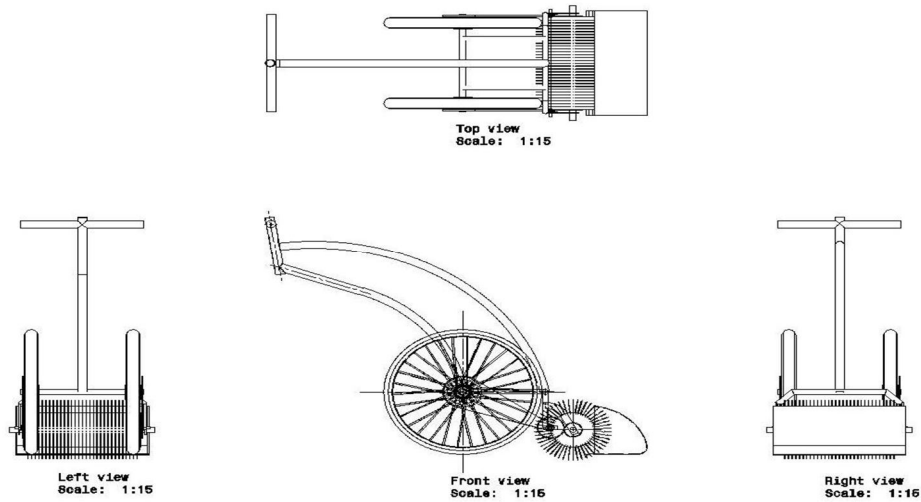


Fig.2 2D views of road cleaning machine

A. Materials

In this work components used as given below,

- 1) **Wheels:** Use two wheels each wheel having diameter of 609.6mm. As shown in the figure 3(a).
- 2) **Shaft:** The shaft length 500mm long and 25mm diameter. As shown in the figure3 (b).
- 3) **Chain:** Total chain length used 1219mm of 75 numbers. As shown in the figure3(c).
- 4) **Supporting wheels:** Diameter of wheel 200mm. As shown in the figure3 (d).
- 5) **Handle:** For the handle we are using two rods they are usually in bending shape .One of the rod length is 1092.2mm and another small rod of size is 685.8mm.For these two rods a vertical shape of rod is connected of length 203.2mm for this vertical rod an horizontal rod is attached of size of 457.2mm and the height adjustment is made with the rods.
- 6) **Gears:** Use two gears driver and driven the smaller gear has a diameter of 50mm, and the larger gear has diameter of 130mm As shown in the figure3 (e).
- 7) **Bearings:** Bearings having an outer diameter of 60mm and inner having a 50 mm diameter. As shown in the figure3 (f).
- 8) **Brush:** Brush having a length of 480mm long and outer diameter of 250mm and inner diameter of 20mm. As shown in the figure3 (g).
- 9) **Collecting box:** The function of the collecting box is to collect the waste upto some quantity after that remove box and dump the waste. The dimensions of the collecting box measures length of 546 mm and width 233mm. As shown in the figure3 (a).

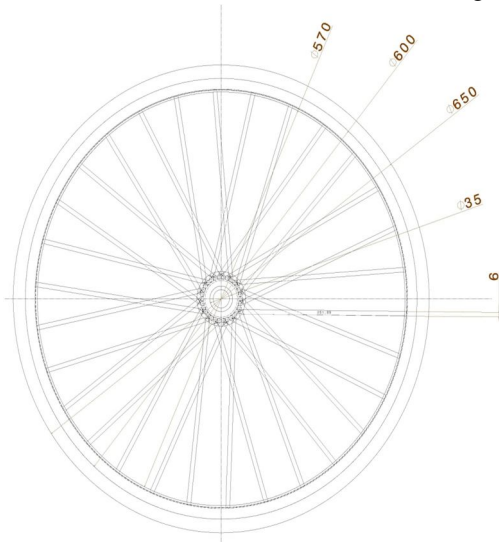


Fig.3 (a) Wheel



Fig. 3 (b) Shaft

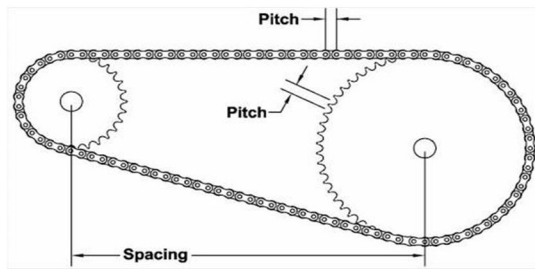


Fig. 3(c) Chain

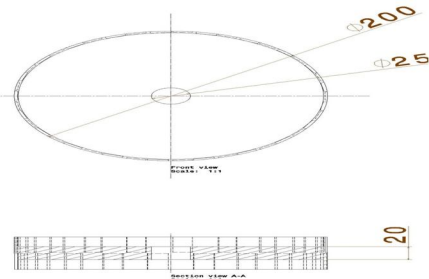


Fig .3(d) Supporting wheel

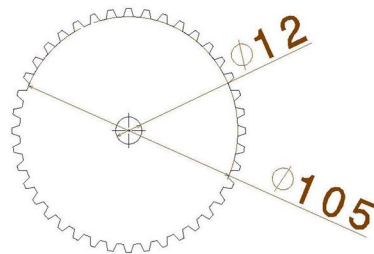


Fig.3 (e) Gears

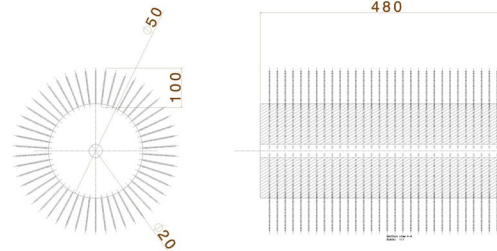


Fig.3 (f) Brush

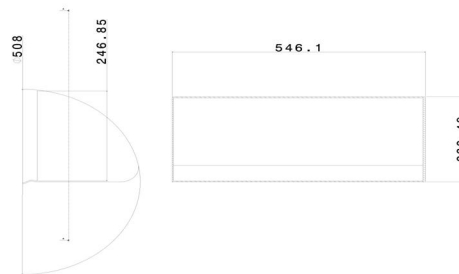


Fig. 3(g) Waste collecting box

III.FABRICATION TECHNIQUES USED AND ASSEMBLED MODE

Fabrication process is carried out by using following operation as given below.

Welding, grinding, drilling and cutting these process are performed as shown in the following figures.



Fig .4 Welding



Fig .5 Grinding



Fig .4 Drilling



Fig .4 Welding



Fig.8 Assembled model

IV. WORKING PRINCIPLE OF ROAD CLEANING MACHINE

Eco friendly road cleaning machine is an advanced type of machine used for the roads or streets .The detail working of the Eco friendly road cleaning machine is explained below Eco friendly road cleaning machine we are making without using any power supply, fuels and engines .The machine is run by a human effort or a man power.

The system is fixed with pair of wheels which are connected with the help of shaft .The shaft makes the wheels connected to one and other .The wheels are moved for a desired position with a help of manual force which can handle is provided to move .The handle can be adjusted for a required height and provided three adjusting holes for it. A chain drive is connected to the wheels and gear at both sides .The chain is moved according to the wheel and gear .the brush moving opposite direction of the wheels move and the brush brooms the waste present on the road also it dumps the waste into the waste collecting box. The waste collecting box is removed to dump the waste into desired places.

V. FLOOR CLEANING MACHINE

The manual operating floor cleaning machine uses two separate rods, in this one is connected at the front of the machine and another one is connected at the back of the machine as shown in the figure 7, the rod connected which is below having one dry mat cloth which having a function to clean the dust, and sweeps dust.

Another one back congaing a wet cloth which function a to clean floor at a maximum extent length, here we cover about 5 foot length having maximum area of cleaning.

When coming to the function of a floor cleaning, when manually move the machine with the help of hand, machine starts moving when moving starts front and back having a cleaning rods it starts moving in forward direction first rod work in sweeping a dust on a floor and back rod work to clean the floor with wet cloth it covers a maximum area of cleaning.

VI. ACKNOWLEDGEMENT

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VII. CONCLUSION

The manually operated eco-friendly road and floor cleaner is successfully designed, and fabricated. This project works implements the manually operated eco friendly road cleaner for road cleaning that reducing the cost, human efforts as well as time. It is the best alternative for automated road cleaning machine during power crisis. It is found that the existing road cleaning machines works with a human simple effort. Manual cleaning may causes shoulder problem due to continuous sweeping. The manually operated road cleaning machine is alternative concept for avoiding such problems. It works very efficiently with respect to covering area. It is very economical to use. The manually operated eco-friendly road and floor cleaner can work very efficiently with respect to covering area, time and cost of road cleaning process compared with the existing machineries. Also it is economical. It was seen while testing of machine, that the cleaning is less effective where the road seems to be very rough and damaged. It can provide job to the



uneducated person who is in need for such jobs as human energy is needed to drive the machine. Maintenance of machine is less and it is easy to control and clean it having health benefits and it mainly protects environment pollution.

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