

Design of Manually Operated Eco Friendly Trash Collector

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Abstract: The intention of this mechanical engineering project is to manufacture a trash collecting machine. We have developed a floor cleaning machine which ensures that dust, dirt and other littered items will be picked up with minimum effort. Our design intends to successfully implement the use of a cylindrical fiber brush that will move the above stated material into the collection box attached to the main frame of the machine. The brush is driven by a speed magnification mechanism which consists of a chain and gear drive. The box can then be removed from the main machine and the contents of the box can be dumped into a separate detachable storage bin attached to the top of the machine. The top box has a capacity to store about 4-5 kg of trash. The trash can then be dumped at a separate convenient location.

Keywords: Eco friendly, Littering, Trash collector.

1. Introduction

Cleaning work can be physically and economically demanding and a need has been identified to develop methods for systematic evaluation of new products. Leaves and trash littered around or scattered on the passages and the corridors have a detrimental effect on the beauty of the environment, In recent years cleanliness is becoming an important factor for the benefit of the society and so, to support the cause we prepared a design and working of a eco-friendly trash collecting machine. In modern days interior as well as outside cleaning are becoming an important role in our life. Cleaning of waste is a very important factor for our health and reduces the man power requirement. Many floor cleaning machines are available but the either require high power or electric power, we have developed a machine that is very simple in construction and easy to operate. Anybody can operate this machine easily. Hence it will be very useful in our college or any large area space. The time taken for cleaning is very less and the cost of cleaning would also be low. With the help of our machine the time and the work force can be drastically reduced. We made the device such that it will be ergonomically suitable for any person regardless of their height (as it is adjustable) to handle it with the utmost efficiency and get the job done in a fraction of the time that was previously required. Not only will this be effective in reducing the amount spent to clean, it will also be helpful to reduce the manpower required for the job. Maintenance cost of our device is also really low as the device hardly requires any cleaning at all and no part is covered. The brush can be easily removed from the machine and cleaned. The

trash collector device is an approach to deliver quick and time efficient cleaning of corridors, passages and hallways of the college by reducing human efforts. The basic functions of the trash collector mainly are:

- 1) Remove the trash and other littered items from the path by the use of the roller brush which is operated by using gear drive and a chin drive.
- 2) Collecting the trash into the collector.

2. Need for the project

One of the main predicaments in our college campus, or anywhere for that matter is littering. Not only does it affect the general aesthetics of the environment, it also makes the place disorderly and a complete eyesore. Hence it is important to clean the environment to make it a better place for all the individuals involved. It has been proven how suitable environments increases productivity and moreover those objects often prove to be major distractions.

This is a significant problem to overcome, specifically in our college as the college employs a number of people for the job of making the corridors (about 25m-28m) litter free and orderly. This approach often proves to be ineffective and uneconomical as they must keep coming back to check if there is any more littering in the area. And this is one of the main complications with the current system of working and amounts for the college administration spending more than what would actually ideally be required to get the job done.

This is where our device comes in. We have created a device to cater for the specific problem of littering in our college. The device can be operated easily by one person and can efficiently pick up any and all littered objects as:

The main littered objects that we find on our campus are:

- Pieces of chalk
- Leaves
- Unwanted paper
- Random plastic objects
- Small fruits
- flowers
- Unwanted pens/pencils/

3. Construction

Two bicycle wheels are mounted on either side of the chassis to carry the load of the device. The roller brush is mounted on

the back of the device. A pinion is mounted above the roller and meshes with the gear mounted on the shaft and is coincident with the roller. A chain and sprocket mechanism is carried by the main frame on which the wheels are attached. It transmits the power from the wheels to the pinion which then rotates the brush. The brush is facilitated with a collection bin to collect the trash. A separate storage bin is provided on the top of the device to dump the trash into. A handle is attached to the main frame to make the device ergonomic and easy to move.

the forward direction by applying force on the handle, bicycle wheels act as the prime mover of the device. The wheel is connected to the sprocket. The chain drive is employed to transmit the motion from sprocket to the pinion. This rotates the gear. The gear is mounted on the same shaft as the roller. Pinion rotates in the same direction as that of wheels. The gear is meshed with the pinion externally; this reverses the direction of rotation of gear so as to make the roller rotate in desirable direction. Adequate gear ratio is selected to get the suitable speed increment from wheels to the roller. The rotation of the roller results in the trash being moved into the collection bin. When the bin is filled up to its maximum capacity it can be detached and dumped into the storage bin mounted on the chassis of the device. The trash can then be discarded at a convenient location.

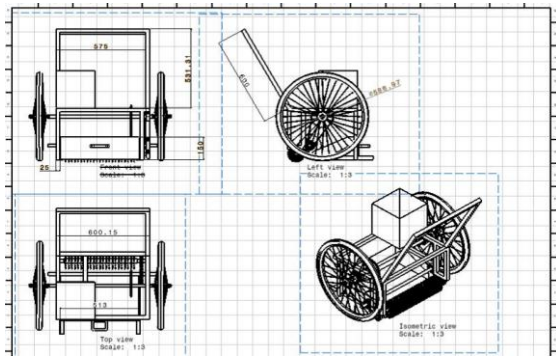


Fig. 1. Drafted sheet

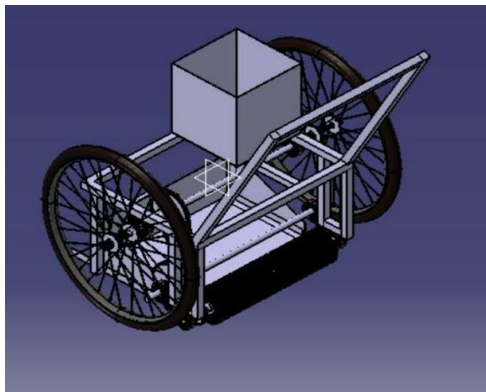


Fig. 2. CATIA ml of the device



Fig. 3. Actual image of the device

4. Working

The device starts working after it is pushed horizontally in



Fig. 4. Working of the device

5. Conclusion

The manually operated eco-friendly trash collector is successfully designed for road cleaning that reduces the cost, human efforts as well as time. It is the best alternative for automated road cleaning machine during power crisis. Manual cleaning may cause shoulder problems due to continuous sweeping. Such problems are avoided using these machines. It works very efficiently and economically with respect to covering area, time and cost of road cleaning process compared with the existing machineries. It was seen during testing of machine that the cleaning is less effective where the road seems to be very rough and damaged. It can provide job to uneducated people because human energy is needed to drive the machine. Maintenance of machine is less as it is easy to control and clean. It mainly protects environment from getting polluted.

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