Automatic Leaf Collector And Chopper For The Greenery Lawn

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Abstract: The leaves that are found in the pathways, gardens, roads etc. are not disposed of properly and they cause pollution in the land. During autumn season the leaves are found to be larger in number, thus the people are spending more time and energy for collecting the leaves. There is a need of specific device which is used to overcome this problem. In recent years a greater number of devices are introduced for the purpose of collecting the leaves and debris from the ground. In this, people are facing different issues such as size of the disposable bag, noise produced by the device, safety precaution when it is operated by current etc. In order to avoid this problem, we are developing a machine for the purpose of collecting the leaves and debris from the ground. The vacuum blower and the storage tank which is used for collecting the leaves is mounted on the main frame. The hole is created for connecting the vacuum blower and the storage tank. The electric motor is mounted on the corner of the main frame and it is attached with the blade. When the power is given the vacuum blower collects the leaves due to the pressure difference created inside the vacuum blower. The collected leaves can be feed into the blade. The leaves are chopped well by the blade and it is disposed.

1. INTRODUCTION

Leaves scattered on the parks, passages, and other places have a detrimental effect on the beauty of the environment, and decrease photosynthesis, hence, the efficiency of plants. Leaves are also used in the production of peat. This makes using leaves collectors in parks, and organizations with a green space useful. Because leaves take up a high volume, their transportation is difficult. Using the machine introduced in this paper, which was, equipped with a suction-blower system, increases efficiency, and at the same time decreases the costs of green space, and their workforce cost. Focusing on overcoming the mentioned difficulties, this study was carried out in order to design and produce a tractor powered leaves collector equipped with suction-blower system. Various designs were studied and based on their advantages and disadvantages, the best design was selected. The initial modeling was carried out using the engineering software of SolidWorks. After designing different parts of the machine, such as the chassis, transmission system, the tank, handling system, suction-blower system, they were analyzed. It can be operated in both as a blower and a vacuum so there a no need a any other instruments for this purpose. The leaves that are collected they are chopped well by the leaf collected and the resultant leaf i.e., coming-out from the leaf collector can be used as a mulch or a manure in the garden. It is ecofriendly and cost efficient does not cause any pollution to the environment

LITERATURE REVIEW

John et al. (1984) article represents associate degree improved leaf and trash assortment equipment for the aim of grouping the leaves. This invention relates to the sphere of machinery for grouping leaves and different trash from lawns, flower beds and therefore the like. additional notably, the invention relates to American statevice[a tool] for grouping leaves and different trash within which the trash is collected directly into a disposable bag in order that no ensuant transfer of the collected be Bris want be created. The object of the invention is to produce associate degree equipment for cleansing up leaves and different trash within which the machinery is sufficiently versatile that its mechanism are often used for different connected functions like processing or vacuuming leaves out of flower beds for prepared assortment. The leaves collected are to be sliced well and reborn into mulch then they're thrown out on the garden. Michael et al. (1992) article represents a transportable hand-held blower vacuum equipment. A convertible blower vacuum may be a device which might be used as a blower or reborn to control as a vacuum. Conversion involves simply grouping an electron tube to the air body of water to direct the suction and putting a bag over the air outlet to gather the accumulated dirt. Blowers which might convert to vacuums give an extra degree of skillfulness to the current product. Charles et al.1980 article represents a transportable blower-vacuum unit. A transportable blower-vacuum unit has associate degree blade for drawing air axially through a housing air body of water, and for discharging the air centrifugally through a tangential housing air outlet. in a very blower mode, a perforate covering prevents activity of solid material by the blade. in a very vacuum mode, a dust bag attaches to their outlet. A mulching blade rotates with the blade to cut any solid material passing through the hose. A suction tube or nozzle forms the body of water to the flow path whereby dirt leaves and therefore the like is drawn by the blade into the flow path for capture among vacuum bag fashioned from an appropriate filtering material like porous cloth or the likes of. David et al.1995 article represents convertible leaf blower and vacuum. A convertible leaf blower and vacuum equipment includes a friend and baffle supported. on one finish of a cylindrical member for insertion into a collar shaping associate degree air body of water of the fan for narrowing the diameter of the air body of water once the equipment is being connected to the collar. A electron tube replaces the cylindrical member once the equipment is in a very vacuum. The electron tube is connected to the collar within the same manner because the cylindrical member, a canopy for overlaying the air body of water is hooked on up on one facet to the fan housing by a hinge and therefore the different facet by a releasable fastener. The fan includes associate degree blade embowered among a housing having associate degree body of water gap associate degree an outlet gap. The motor is mounted to the fan housing and typically conjointly embodied among a separate housing. The fan is often reborn to be used as either a blower or a vacuum by attaching associate degree elongated tube to either the body of water or the outlet of the fan housing, in a very blower mode, the tube concentrates air expelled through the air outlet to form a highly-directed stream of high-speed air at the top of the tube. in a very vacuum mode, the traditional tube is hooked up to the body of water and disposable back is connected to the outlet. The objects ar carried by the flow into the fan then dischaged into a porous sack decorated round
the outlet to gather trash. Robert et al.1986 represents convertible vacuum blower arrangement. A convertible vacuum blower which incorporates a housing having a separate degree air body of water associate degree an air outlet is disclosed. A motor associate degree an blade are supported within the housing. The blade is supported for move and is driven by the motor. The blade is in fluid communication with each the air body of water and therefore the air outlet. The air body of water is by selection coated by associate degree aperture, removable air body of water cowl. A mechanism removably secures the air body of water cowl to the housing. A switch mechanism is carried by the housing and permits the motor to control once the air body of water is roofed, however not once the air body of water is uncovered.

MATERIALS AND METHODOLOGY

MATERIALS

The list of the materials used are explained here. An electric motor is associate degree electrical machine that converts current into energy. The motor is turned with a continuing speed of 16000rpm and its hooked up with the frame. A blade is additionally hooked up with the motor to chop the leaves into little items. The vacuum blower is employed for the aim of suctioning and processing the leaves. It consists of air water and air outlet in the middle of the electrical motor. The conversion of the vacuum to blower is solely done by rotating the adjustable water. There is half-dozen totally different speeds whereas it's operated in blower mode and suction mode. The base is created of steel. The steel could be a sort of steel with low quantity of carbon. It consists of iron alloyed with but zero.3 % carbon, most ordinarily between zero.1to0.25 percent. It’s value effective steel compare to different steels. A hose a versatile hollow tube designed to hold fluids or air from one location to a different. Hoses are the mix of the assorted materials from polyurethane, polythene, nylon and natural or artificial fibres. Hoses are used supported the applications and performance. we tend to had used polythene material for our project. The L-bend pipe is employed for the aim of connecting the vacuum blower and collector. The opening is made on the collector then the pipe is inserted thereon thereby connecting the vacuum blower to that. The blade is created of untarnished that is employed to cut the leaves into little components. There ar differing types of blades are used supported the applications and uses. The leaves that are collected by the vacuum blower is directly fed into the blades via the L-bend pipe. The wheels ar used supported the appliance and its functions. we've used nylon material for the aim of value effective and it carrying capability. The fasteners are wont to connect the wheels and base. The lock nut is employed to limit the wheels that runoff from the bolt. The collector that we tend to ar used for grouping leaves is created of plastic material. It doesn't add weight to the person once collected leaf is disposed. It carries the sliced leaves from one to a different to a different simply while not serious usage of the person power.

METHODODOLOGY

- Planning of the project.
- Selection of the materials.
- Designing the parts and assembly
- Fabrication of the parts.
- Assembling the parts.
- Final Experimental setup.

FABRICATION PROCEDURE

The motor is connected at a corner of the frame. The mild steel is welded in the frame, then the, motor is fitted on the mild steel horizontally by the fasteners. The hole is created on the cover of the collector. The L-bend pipe is fixed on the collector, it is arranged in such a way that leaves are directly fed into the blade. The vacuum blower is fixed on the top of the collector. The L-bend pipe is connected on the outlet of the vacuum blower. The other end of the pipe is connected to the inside of the collector, then the hose is connected to the inlet of the vacuum blower. After all the arrangements the tray made up of the plastic cardboard is inserted into the collector and then the wheels are fixed. All the components are arranged accordingly and then fabricated.

DESIGN CALCULATION

The calculation of vacuum blower, motor, collector capacity and blower rate are given below.

CALCULATION OF MOTOR

Motor Speed = 9000 rpm
Motor Power = 500 W
Horse Power = 0.67 hp
Power = (2πNT)/60
Torque = (60×power)/(2×π×900)
Torque = 0.53Nm

CALCULATION OF VACUUM BLOWER

Motor Speed = 13000 rpm
Motor Power = 950 W
Horse Power = 1.27 hp
Rated Voltage = 220 V
Rated Frequency = 50Hz
Power =(2πNT)/60
Torque=(60×Power)/(2×13000)
Torque=0.69 Nm

CALCULATION OF COLLECTOR CAPACITY

Length = 0.450m
Breadth = 0.300m
Height = 0.250m
Volume= length × breadth × height
= 0.450×0.300×0.250
= 0.03375mm³
Volume = 33.75 liters

CALCULATION OF BLOWER RATE

Velocity of vanes(u) = (π×B×N)/60
The leaves before enter into the leaf collector

The leaves after enter into the leaf collector

CONCLUSION
Thus, the whole product is fabricated as per the requirements and needs of the leaf collector into the environment. It is eco-friendly and can be easily move from one to another for the purpose of collecting the leaves and debris, thereby reducing the man power, time consumption and the time to dispose the collected leaves in efficient manner. By adopting this simple technique for the application of collecting the leaves we can greatly reduce the time and human power. The main aim of the leaf collector project is to make a clean environment with less human effort. The leaves that are collected is chopped well by the blade attached to the motor. The chopped leaves can be used as manure or mulch for the garden purpose. This project is collecting the leaves in the garden, roadways, pathways etc. The human power is reduced and time consumption is reduced for collecting the leaves. It is cost effective and easy operating mechanism compare to other leaf collecting instruments and machines. It is eco-friendly and energy efficient and does not cause any pollution the society. In autumn season a greater number of leaves are found to be in roadways, pathways and garden, by using this simple application we can easily remove the leaves from the ground thereby reducing the human effort and time.

REFERENCES
[5] Lipar P, et al. Psychoacoustic approach used for developing the model of sound pleasantness of
vacuum cleaners and suction units, based on objective and subjective analysis, 2012.

