

Design and Fabrication of Organic waste shredding and mixing machine

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Abstract- Organic composting plays vital parts as being both necessity and an alternative backbone for poor farmers. The conventional method of shredding organic residue is not convenient. In addition getting the required fertilizer is not feasible for all farmers. Being in shredded amount exhilarates the process of composting by the increased surface area for anaerobic degradation which otherwise requires 4 to 3 months for the whole process to occur. The crops residue is been inserted in the cutting chamber which by the cutting action of the multi blade cutter convert them into shredded amount. The machine requires less space and less compact as compared to most of the traditional shredding machine being used in farms. This assembly generates shredded organic waste which is really useful or organic farm and organic animal food which is really required for animal according to their health is concern. This complete assembly works on human power so there is no requirement of electricity. This project uses organic material collector assembly. Importance of this paper lies in the very fact that it is green project and helps us to reduce our electricity need too.

INTRODUCTION

Agriculture is a highly intensified industry in many parts of the world. Basic occupation of about 70% population in India is agriculture. This produces vast quantity of crop residue and other animal waste and byproducts. Due to lack of proper treatment and management this useful products are either burnt or thrown. Thus for providing the farm animals with proper food and required fertilizers for farming farmers have to provide at the extra cost. This project is supposed to provide a remedy on that problem.

Handle power is transfers energy from a human source through the use of handle and crank system. Hand driven tricycles. An individual can generate ¼ HP of power through pedaling sustainable for 10 min. However if the rate of power generation is halved it

can be sustained for 60 min depending upon age factor. In this project, the crops residue shredding process we carried out over human power assembly. As per the market it is seen that the purchased Fertilizers are very much costly but as per latest Indian agriculture outcome is not that much kind so that normal person can able to invest a huge amount if fertilizers. So, all these things taken into consideration this assembly is based on human power and there is no need to use electricity. This assembly can able to generate organic fertilizers without using electricity so this project is advantageous in that area where electricity is not available. This project is useful to all farmers, gardener, because they can be able to generate low cost compost with their own way i.e. mixing organic materials. This project uses gear arrangement, cutting assembly and mixing assembly.



Fig no. 1 Pits filled with Shredded Crop Residues to decompose to obtain Compost

Initially whatever raw materials used like dry crop, farm waste crops and animal dumb etc. pass through cutter which will cut into small pieces and pass towards mixer. Mixing assembly mix this sludge and the output will be collected from mixer dome.

LITERATURE REVIEW

According to paper published by Dhanasegaran A, Dhillip Kumar H, Dinesh Kumar V T, Gopi Kumar K.

And S.Gokul^[3], Pedal operated circular saw machine which can be used for industrial applications and household needs is fabricated. It does not require any specific input energy or electric power. The objective of this model is using the conventional mechanical process which plays a vital role.

In the paper published by B.R. Chavan and P.D. Kulkarni^[4], their project discusses the importance of human power from the earliest times to the present and its future scope. As the use of natural fuel is increased due to industrial development., its storage going to end. More effective use of human power can do by using mechanisms. The technology used to transmit human power to the working unit is termed as human powered machine

Study conducted by P. Mohurle, D.S. Deshmukh, P. D. Patil^[5] in their paper importance of human power as an alternative energy source is investigated, since beginning to present state and its future scope. Human power credit is more because of health benefit as a source of energy. More effective use of human power could be achieved through properly designed mechanisms. Human power as prime mover used to operate working unit is termed as human powered machine.

Asst. Prof. Zoeb khan's^[6] study says This is improved design of the human powered wood cutting machine which gives the less efforts of man and commonly used in rural areas where there is no power supply. The design ensures a smooth operation during the cutting process. The cutting force is provided by means of chain drive, gear assembly and other kinematic mechanism and all the parameter need to be optimized to get maximum cutting force.

DESIGN PROCEDURE

Parameters considered while designing the complete mechanism are:

1. Required cutting force = 190 KN
Doctoral thesis (LULPO University of technology)
2. Average force applied by human hand = 100N
(engclick.com)
3. Diameter of shaft = 20 mm
4. Diameter of minor sprocket = 3 inches
5. Teeth on cutting sprocket = 21
6. Diameter of major sprocket = 5 inches
7. Teeth on major sprocket = 34
8. Rpm of pedal manually operated = 20 rpm

9. Gear ratio (G) = 5
 8. Input torque and output torque = T_1, T_2
 10. Calculated horse power = 1.86 hp
- Material considered = SAE 1030

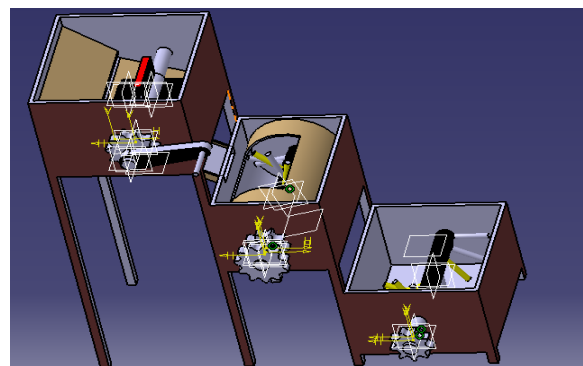


Fig. frame assembly

WORKING PROCEDURE

- This project operates multiple system i.e. handle sprocket arrangement, collector assembly, Multiple blade cutter, mixer assembly and biogas dome
- This project can able to generate food for animal, organic fertilizer and biogas dome.
- In this system collector assembly which will pickup agricultural waste and pass this material towards cutter.
- This cutter assembly is basically multiple blade cutter i.e. there is availability of shaft and over that shaft multiple blades are placed.
- The next arrangement is mixer arrangement, the output of cutter i.e. cutting waste. This waste finally collected at mixing dome where there is availability of mixer, this mixer will mix cutting waste and animal dump along with some chemical so as to fabricate fertilizer.
- There complete systems i.e. collector, multiple blade cutter and mixer works on individual shaft and mechanism but with the help of chain drive i.e. drive and driven sprocket all will rotate on single handle.
- During manufacturing person will rotate handle, so over that handle all systems will rotate with the help of sprocket driven and drive mechanism.
- In this project which a person enter agricultural waste i.e. wet or dry crop waste into the machine so the first part will accept this waste which is collector.

- This collected waste cut by the multiple blade cutter and finally we will get food for animal.

ADVANTAGES

- ❖ No requirement of electricity.
- ❖ Human power based optimized system.
- ❖ Able to install anywhere.
- ❖ Cost is low so it is economical.
- ❖ Time saving.

CONCLUSION

- Thus a low cost and simple design handle operated cutting and mixing machine is fabricated. This machine reduces the human effort and hence only one or two person can do the job. This simple design reduces efforts and eases household functions. By using these operations we can save electricity as this doesn't require electrical energy necessarily.

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