DESIGN AND FABRICATION OF ADVANCED REALISTIC UNIVERSALS ORGANIC FERTILIZER MANUFACTURING MECHANISM WITH ORGANIC ANIMAL FOOD AND SLUDGE ENCAPSULATION ASSEMBLY

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ABSTRACT

A Fabrication of Universals Organic Fertilizer Manufacturing Mechanism with Organic animal food and sludge encapsulation assembly created effectively here taken into consideration as per the latest trends and technical evolution taken into consideration. According to their health is concern which is really required for animal this assembly generates organic fertilizer for organic farm and organic animal food which is really useful. There is no requirement of electricity because assembly works on completely human power. We know that Indian country basically introduced because of farms and available resources. A biggest evolution in organic farm which is possible only with the help of organic fertilizer. Basically it is easily available in the market and farm but no one take vision on that. Also animals are secondary animal dependent businesses for doing anything in the farm.

Keyword : - *Organic Fertizer, Sludge encapsulation assembly, Universal organic animal food, Organic material collector assembly, biogas plant, bio-fuel plant, gear arrangement, cutting assembly, mixing assembly, pedal operated circular saw machine, etc….*

1. INTRODUCTION

In this project , the fertilizer manufacturing process carried out over human power assembly sales in the market. It is seen that the purchased Fertilizers are very much costly in market so that normal person can able to invest a huge amount on fertilizers but as per latest Indian agriculture outcome is not that much kind. So all these things taken into consideration this assembly is fully based on human power and there is no need to use electricity in Fertilizers Manufacturing . So this project is advantageous to generate organic fertilizers without using electricity in those area where electricity is not available. This project able to generate low cost fertilizers which is useful to all farmers, gardener, because they can be with their own way i.e. mixing organic materials because they can be with their own way. This project uses mainly gear arrangement, cutting assembly and mixing assembly.

The overall objective of this research is to support the promotion of organic farming in the India through designed and development of demand driven prototype machines that can be utilized for organic fertilizer production by local farmers. Specially, to assess the utilization on the research based-technologies as evaluated in terms of it social and economic benefits derived by farmers and its contribution to our environment.

2. RESEARCH METHODOLOGY

1. Initially Set the design for project for the following resources.
    a. Length of System.
    b. Breadth of system.
    c. Height of System.
2. Creation of Shaft through lathe machine and Creation of Sprocket through lathe machine.
3. Create arrangement after drilling, to pass shaft through sprocket and Placement of Flange bearing.
4. Cut iron angles and prepare basement arrangement and Create dome according to body structure.
5. Place Dome on body and Create cutter on lathe machine.
6. Create mixer on lathe machine and Create collector on lathe machine.
7. Place cutter , mixer and collector on shaft and Place wood plates on body.
8. Place 3 shafts on body and Place sprockets on shaft.
9. Place chain on shaft.

3. PURPOSE OF WORK

The selection of this project is done according to problem identification of latest scenario taken into concern and effective modification with problem solution has been done. In this project initially taken vision over final manufacturing of 3 things i.e. food for animal, Fertilizer manufacturing and in the future vision can able to create Biogas outlet ventilation for biogas plant which is created by organic plants as ultimately need to create organic fertilizer. So for fertilizer manufacturing and animal food creation initially organic raw material collected from farms along with this animal waste. The organic food collected into mechanism and make loading alignment during moving mechanism using human power system. This organic mater cut into smaller pieces using multi-blade cutter and this sludge get collected into the dome and it is mixed with animal waste using mixing mechanism and finally after creation of fertilizer it is collected from dome using proper fertilizer outlet. This complete assembly is based on human powered so that, there is no requirement of electricity, cost is very low so it is economical, no atmospheric losses, healthy system for animal and crops and no wastage of any resource

4. EXPERIMENTATION

For proper healthy crops, healthy animals and low cost burners requirement of multiple resources i.e. for healthy crop requirement of organic fertilizer, for healthy animal requirement of healthy organic food finally for low cost burner requirement of biogas plant. There resources are very much costly and need to purchase separately. The average farmer cannot able purchase there resource so that is the reason farms and farmer no able to sustain in the view of earning. All these things taken into consideration here effectively created universal system i.e. Realistic universals Organic Fertilizer Manufacturing Mechanism for advanced Organic Farms with Organic Biomass/Biogas outlet and outlet for animal food and sludge encapsulation assembly. This universal assembly able to manufacture organic fertilizer, organic food for animal and biogas outlet over a single human power rotating mechanism. This system uses organic material collector assembly, alignment and holding mechanism, sharp cutter assembly, mixing assembly and finally dump encapsulation assembly which will depends on human power rotating system.

Now a day's organic farm it's a biggest evolution in the development of agricultural filed which is possibly only with the help of organic fertilizer which is basically easily available in the farm but no one take vision on that. Similarly animals are really important for doing anything in the farm along with secondary animal dependent businesses. In the future advancement this project can be able to generate biogas for biogas plant. This project uses organic material collector assembly This system reduces cost of the project because of human power optimized assembly. This project can be use where there is no availability of power and related resources, villages, biogas plant, bio-fuel plant, farms etc

Fig. Experimental Set-up

5. DESIGN OF FEED MECHANISMS

Design Of Chain Drive

Let us consider, an average men from ergonomics study may apply 40 RPM to 60 RPM and hence

Torque,

$T = F * R = 200\ N * 0.15\ m = 30\ N\ m$

Rated Power,

$Pr = 2 * \pi * N * T / 60 = 2 * \pi * 60 * 30 / 60 = 188.49\ Watt$

Designed Power,

$Pd = Pr * Kl = 188.49 * 1.0 = 188.49\ Watt$

Design Power in Horsepower

$Pd = Pd * 10\ ^{\wedge}\ -3 / 746 = 188.49 * 1.^{\wedge}\ -3 / 749 = 0.252\ HP$

For, Pd = 0.252 & N1 = 100 RPM

Selecting Chain No.

According to Design data for machine elements book by B. D. Shiwalkar, Pg no. 152 and 153

Chain no. # 40, Pitch = 12.7 mm

Now, deciding the no. of teeth on sprocket

$T1 = 17\ teeth,\ Dp1 = P / \sin(180/T1)$

According to Design data for machine elements book by B. D. Shiwalkar, Pg no. 150

Dp1 = 12.7 / Sin(180 / 17) = 69.11 mm

And, Vp1 = π * Dp1 * N1 / 1000 m/min Vp1 = π * 69.11 * 100 / 1000 m / min = 21.7 m / min

Similarly,

N1/N2 = T2/T1, 100/50 = T2 / 17, T2 = 34

Dp2 = 137.64 mm, Vp2 = 21.62 m / min

1) Power per strands

According to Design data for machine elements book by B. D. Shiwalkar, Pg no. 150

P = p^2 [V/104 - V^1.41/ 520(26-25Cos(150/T1))]

Where, Pitch =12.7 mm, V = 21.7 / 60 = 0.361 m/ sec, T1=17 and T2= 34, P = 0.45 KW

4) No. of strands required

N = Pd/ (power/ strands) = .188 / .45 = 0.417 < 1 = N = 0.417

5) Length of chain in pitches

According to Design data for machine elements book by B. D. Shiwalkar, Pg no. 150

Lp = T1 + T2 /2 + 2C/ P + P(T1-T2)^2/ 40*C

Where, T1 = 17, T2 = 34, P= 12.7 mm, C = Centre distance, C= Dp2 + ½ Dp1

According to Design data for machine elements book by B. D. Shiwalkar, Pg no. 151

C = 137.64 + ½ * 69.11 C = 172.195 mm, ∴ Lp = 53.15

6) Standard dimensions of sprocket

a) Width of sprocket teeth : to = 0.56 * P - 0.15 = 0.56 * 12.7 – 0.15 = 7.216 mm

b) Transverse pitch : A = 1.1525 * P A = 1.1525 * 12.7 A = 6.962 mm

c) Corner relief i.e, e = 0.125 * P = 0.125 * 12.7 mm = 3.175 mm

d) Chain per radius : r = 0.54 * P r = 0.54 * 12.7 r = 6.558 mm

a) Outside Diameter :

Do1 = P [0.6 + Cot (180/ T1)] = 12.7 [0.6 + Cot (180/ 17)] = 75.56 mm
Do2 = P [0.6 + Cot (180/ T2)] = 12.7 [0.6 + Cot (180/ 34)] = 144.674 mm

Design of Shaft (Bore Diameter) D > (T1 - 5) / 4 * P D > (17 – 5) / 4 * 12.7 D > 38.1

According to Design data for machine elements book by B. D. Shiwalkar, Pg no. 151

For Pd = .188 Kw of N1 = 100

Selecting Diameter (d) = 20 < 38.1 mm

Design of Bearing

Data : N = 60 RPM

Total weight on one bearing

= Wcutter + Wself weight

Selecting weight of shaft = ρ* A * L

= (7.8 * 1000) * π/ 4 * 20^2 * 0.6096

= 14.715 N ~ 15 N

Fr = 30 N + 15 N = 45 N/ 2 = 22.5 N ,

Ks = 1.5 Light Shock Load Pg no.144 Table T- XIII – 15

L hr = 5000 hrs

For Average life, Reliability 50%

1) Equivalent Load :

According to Design data for machine elements book by B. D. Shiwalkar,
Pg no. 150 Table No. T XIII-14
Fe = (X * Fr + Y * Fa) * Ks * KO * Kp * Kr
Where, Fr = 22.5 N, X = 1, Y = 0, Ko = 1, Kp & Kr = 1

Fe = (1 * 15.75 N) 1*1 *1 * 1 = 33.75 N ~ 34 N

2) Bearing Life :

L10 = Lhr * 60 * N / 10^6 = 5000 * 60 * 60 / 10^6 = 18 Million Revolution

3) Dynamic Capacity :

L10 = (C/ Fe)^n * Krd, Where, n = 3, Kref = 1, 18 = (C / 34)^3 * 1 C = 89.10

According to Design data for machine elements book by B. D. Shiwalkar, Pg no. 149

The lowest possible bearing No. is 0100, deep grove ball bearing.

For Durability, Safety and availability of Bearing, selecting 0204 deep groove ball bearing.

Design of Shaft

We know that torque transmitted by the shaft,

T = π/ 16 * d^3 * τ, 30* 10^3

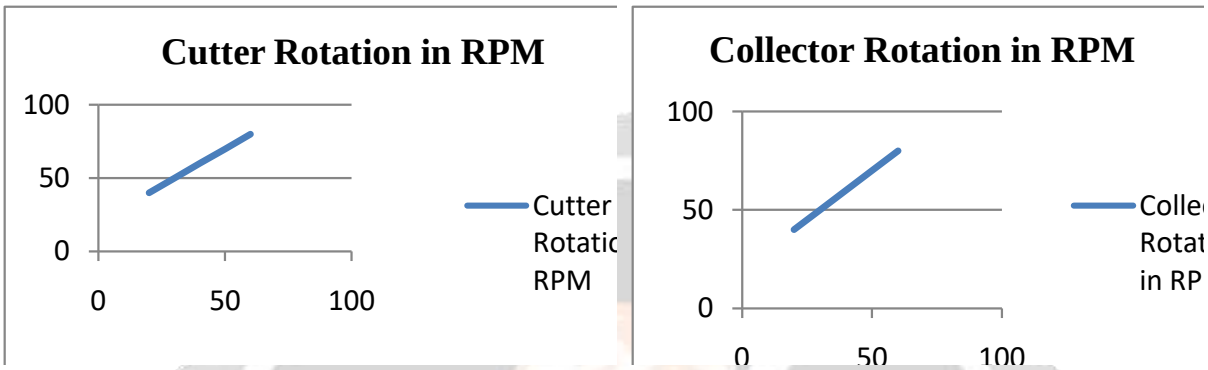
$= \pi / 16 * d^3 * 61$

d = 13.58 mm ~ 20 mm

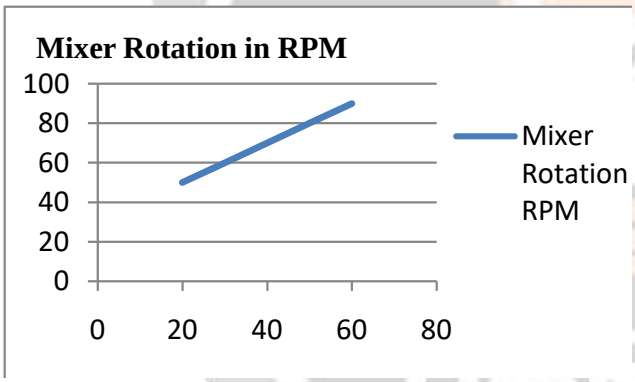
6. RESULTS AND DISCUSSIONS

Graphical Output:

RPM of handle verses RPM of Cutter :**Handle Rotation RPM Verses Collector**



Handle Rotation in RPM verses Mixer Rotation in RPM:



POWER SAVING CALCULATIONS:

For a single machine:

For a machine of 400 W running for 10hrs a day,

The kWH rating for a day = $\frac{(400w) * 10 \text{ hrs.}}{1000}$ = 4 kWH

Per unit price of power consumption, as of today = Rs. 7.39/- per unit

So, price for 1day (10hrs.) = Rs. 7.39 * 4 kWh = Rs. 29.56/-

For 1 month = Rs 886.8/-

For 1 year =Rs 10,641.60/-

Total expenses including the cost of the machine

= Rs. 12,200 + 10,641.60

= Rs. 22,841.60/- units

8. CONCLUSION

In this project organic fertilizer manufacturing process is possible with the help of human power arrangement and waster material generated from farms. The waste material required for organic fertilizers i.e. Waster material from farms i.e. Waste crops and grass, animal dung and other unused farming materials like waste farm food. In this project, with human power arrangement organic fertilizer manufacturing process followed. This project uses multi blade cutter assembly to cut waste crops which is collected from farms. This cutting arrangement works on rpm generated by human power based rotating handle. There is no requirement of any electricity and external supply power so system is optimistic and economical. Organic fertilizer is best suitable for form to generate natural products from farm and this products is very much healthy for human being. This oraganic material can be extract from the separate dome according to use.

9. ADVANTAGES

- There is No requirement of electricity as complete system is .Human power based optimized system i.e. complete system will operate over a single handle along with sprocket chain drive mechanism.
- This system can be able to generate organic fertilizer and food for animals both witout using electricity so no need to purchase from anywhere.
- Cost is very low so it is economical as organic material slfly available in farm itself and system do not have any requirement of electricity.
- Setup can be arrange anywhere so it is optimistic and low cost structure.
- Time saving arrangement as outcome in terms of organic fertilizer and animal for food getting in real time.
- Can be setup business of fertilizer.
- No atmospheric losses.
- Healthy system for animal and crops.
- No wastage of any resources.
- Reusable system.
- No harmful action on plant, animals or nature.
- Fabrication is easier.

10. APPLICATIONS

- As the system is human power based so where there is no availability of power sources on that place placement of this project will be suitable.
- It can be use at villages to provide food for animals as we are using multiblade cutter to cut the organic material which will be useful for animal with the favor of their health..
- Fertilizer is efficiently required in every agricultural area but cost of fertilizer is increasing daya to day so with the help of created system, it will be easier to create fertilizers by own.It can be use in agricultural areas where there is requirement of fertilizer.
- In addition to fertilizer manufacturing there is successive future arrangement, system can able to generate biogas so that energy created by biogas can be useful for cooking and heating purpose. It can be useful in biogas plant which will run biogas equipments..
- It can be useful in the bio-fuel industry to generate biofuel from organic fertilizer or organic material.
- It can be useful in Fertilizer manufacturing industry to create organic or artificial fertilizers.
- It can be useful in goat farm and cow farm business areas to provide organic food for animal also whatever waste taken out from animal can be use it for fertilizer manufacturing process..
- It can be use in gardens. And animal parks.

11. RECOMMENDATION FOR FUTURE WORK

This project is based on organic fertilizer manufacturing with the help of human power assembly. This project can be enhance-e up to bio gas plant so that system will be useful as a domestic application. Ultimately there is need to create bio gas nozzle arrangement and proper encapsulation to create oxide flame. Finally gas can be convert into electrical and heat energy as per requirement. In this project, there is multi blade cutting assembly which will cut crops extracted from farm which is required to generate fertilizer this complete arrangement works on solar plate so system being like power optimistic. The power generated from solar panel against energy absorbed from the Sun, this energy will be use full to rotate shaft with the help of electrical motor. Finally this motor will rotate complete assembly. This project can be useful to generate artificial fertilizer but for this there is need to include some artificial ingredients in that so that final mixture will be. In addition to this, separate organic fertilizer and artificial fertilizer with the help of single assembly possible long with bio gas assembly.

- Bio gas plant implementation.
- Solar based arrangement.
- Artificial Fertilizers manufacturing process.
- Solar based bio gas plant implementation.

Solar based dry sludge arrangement for chemical fertilizers.

12. REFERENCES

1) Dhanasegaran A , Dhilip Kumar H, Dinesh Kumar V T , Gopi Kumar K. and S.Gokul, "Design and Fabrication of Pedal Powered Circular Saw for Wood Working Applications", International Journal of Current Engineering and Technology, Vol.6, No.2 (April 2016) .
2) B.R. Chavan1 P.D. Kulkarni2, " Design and Development of Oil Seed Presser by Using Human Power ",International Journal of Engineering Development and Research (www.ijedr.org) 1442 © 2015 IJEDR | Volume 3, Issue 2 | ISSN: 2321-9939.
3) M. P. Mohurle1,D.S. Deshmukh2,P. D. Patil3, "Human Power Using Bicycle Mechanism as an Alternative Energy Source", International Conference on Global Trends in Engineering, Technology and Management (ICGTETM-2016) ISSN: 2231-5381 http://www.ijettjournal.org Page 417.
4) Asst. Prof. Zoeb khan, "International Journal on Recent and Innovation Trends in Computing and Communication", ISSN: 2321-8169 Volume: 3 Issue: 2.
5) Dharwa Chaithanya Kirthikumar, "A Research on Multi Purpose Machine", International Journal for Technological Research in Engineering (Vol.1, Issue.1, ISSN:2347-4718) (2013).