

DESIGN & FABRICATION OF AGRICULTURE EQUIPMENT

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ABSTRACT – Comfort coupled with safety & simplicity is what man strives for. Our project has been to bring about both. The culmination of our effort has resulted in development of a new “ **BIKE AGRO EQUIPMENT** ”

The project present a basic as well as very professional treatment of the subject in a very comprehensive, based on learning efforts & understanding capability of today as per their levels.

The device is simple & comfortable. Basic calculation, drawing, designing is included in the project. The salient features of our machine can be listed as the mechanism used is very simple, easy for operation; no skill is required to operate this machine.

To make a complete mechanical device: The idea is to make a device which does not uses any electrical power so that it is wholly independent of its own, to develop a device which can be used for multipurpose operations like plowing, weeds removal.

1. INTRODUCTION

Introducing advanced technology for ploughing & weed removal, a ploughing machine is done with using bike engine which gives more mileage & meanwhile it produced in lower price, this equipment is useful to farmers for ploughing , weed removal & so on, the tool holder which is provided at rear end is flexible to adopt different types of agriculture tools for different agriculture operations, this machine is very cheap in cost & can serve a needful to the farmers.

In today's world everything is getting modernized. Agriculture fields are slowly destroying & these lands are

used for some other purpose this is because the income from agriculture is less, although the work involved is high. Most of field work is done manually & so the farmers depend on fields workers for doing it. In other sectors like industries, construction etc workers prefer those jobs so the agriculture sector takes shortfall of man power this is being the scenario hence workers are not available for work such as plucking out of unwanted grass & weed growing in between crops. It is very important to pluck out the grass and weeds in order to obtain fruitful results from the cultivation, as the grasses and weeds observe a part of nutrition given to the plants .Given the present situation, removing weeds becomes a costlier affair

In order to address this problem a simple, economical & efficient machine remove weed ,ploughing & other operations , which would be operated by a single person which saves the person savings & labour time . The machine has been designed ,fabricated & tested.

2. WORKING

This is equipment used for ploughing the land by using the bike engine that is 2stroke ic engine and as well as it can remove the weeds which grow in different crops so that the machine can be used for multipurpose and reliable this device has a bike engine which will work on petrol and serve the farmers in better way

As the engine operates it drives the wheel by using sprocket & chain mechanism, As this device moves in forward direction the wheels rotates and move in forward direction the engine is mounted on the frame and back side of the equipment is flexible to adopt different tools for different agriculture operations.

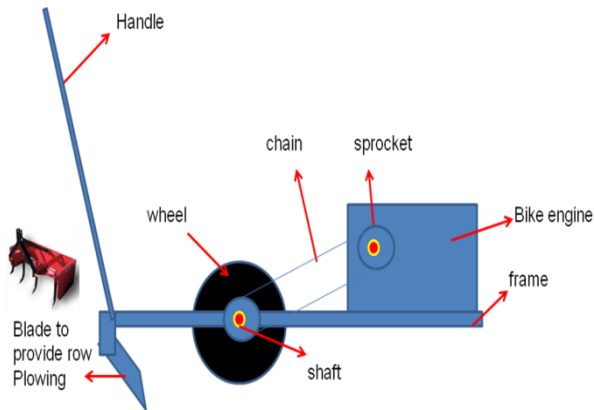


Fig -1 Block diagram of BIKE AGRO EQUIPMENT

The block diagram which is shown above represents the cycle of operation where the power from engine is transmitted from GV shaft to sprocket which is fixed to the shaft with the help of bushes, then the Chain sprocket mechanism is going to actuate and power is transmitted to the shaft. Shaft rotates which in turn drives the two wheels mounted on the bearings and wheel hubs. The vehicle then moves in forward direction and the blades attached at rear end enter into the soil between rows of crops and thus weed removal takes place.

Due to this, a huge amount of labour effort can be reduced and within less time more weeds can be removed with less cost and easy operation. Then finally one labour is required to remove the weeds which are not removed by powered weeder around the plants. Depending on the requirement of the farmer, tools can be designed & fabricated & can be mounted on the tool holder.

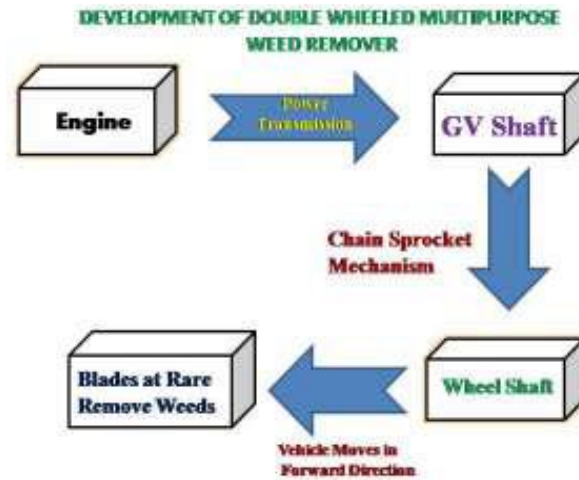


Chart-1 Development of double wheeled multipurpose weed remover

3.DESIGN CALCULATIONS

3.1DESIGN OF SPEED RATIO

SYMBOLS

- N1 = speed of larger sprocket
- N2 = speed of smaller sprocket
- T = torque applied
- P = N = power applied
- D1 = diameter of larger sprocket
- D2 = diameter of smaller sprocket

Calculation :

$$\begin{aligned} \text{Torque applied} &= \text{Force} * \text{length} \\ &= 100 * 0.18 \\ &= 18 \text{ N} \end{aligned}$$

$$\begin{aligned} \text{Power} &= (2*\pi*N1*T)/60 \\ &= \\ &= (2*\pi*60*18)/60 \\ &= 0.13 \text{ kW} \end{aligned}$$

Now

$$N1/N2 = D2/D1$$

Where $D1 = 180 \text{ mm} = 0.18 \text{ m}$

$D2 = 78 \text{ mm} = 0.078 \text{ m}$

$N1 = 60 \text{ rpm}$

Therefore

$$60/N2 = 0.078/0.18$$

$N2 = 138 \text{ rpm}$

3.2 SPROCKET AND CHAIN:

As per the design requirements the minimum number of teeth's on the sprocket can be found out by using bore dia.

$$Z_{min} = 4 ds / p + 5 \quad \text{for } p < 25\text{mm}$$

$$\text{Pitch } p = 8\text{mm}$$

$$Ds = 15\text{mm}$$

$$Z_{min} = (4 \times 15) / 8 + 5$$

$$= 12.5$$

The minimum numbers of teeth's to be taken are 12.5, but chosen are

On bevel gear shaft = $\phi 80\text{mm}$ and 24 teeth's

On rear wheel shaft = $\phi 60\text{mm}$ and 18 teeth's.

The chosen above the minimum requirements hence the design is on safer side.

$$N_2 / N_1 = T_1 / T_2$$

$$N_2 / N_1 = 24 / 18$$

$$= 1.333$$

Velocity ratio = 1.33

Number of chain links can be found out by.

$$K = (T_1 + T_2) / 2 + (2x / p) + [(T_1 - T_2) / 2 \pi]^2 p / x$$

Where x = centre distance

$$= 400\text{mm}$$

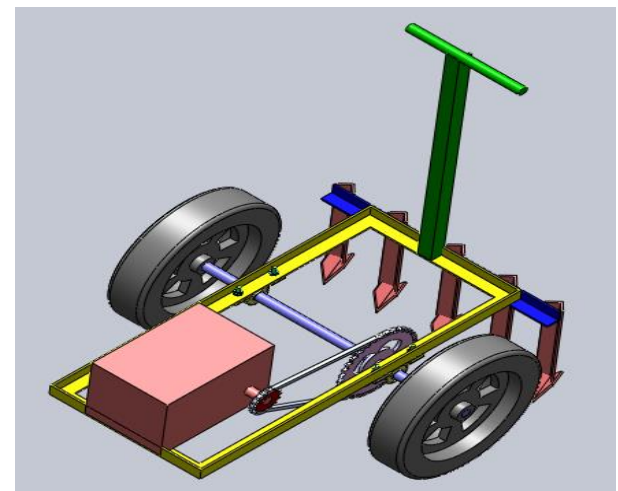
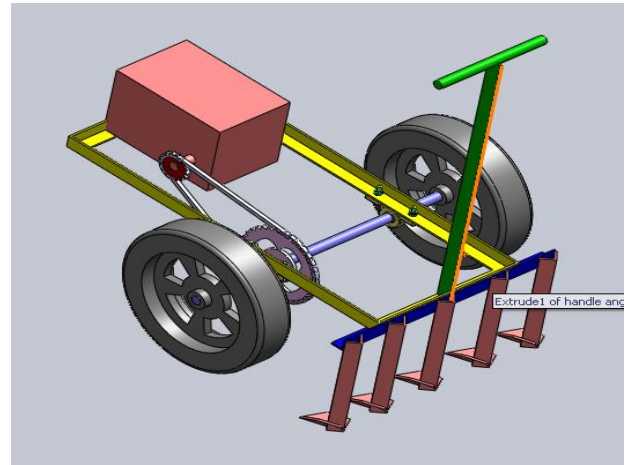
$$K = (24 + 18) / 2 + (2 \times 400) / 8 + [(24 - 18) / 2 \pi]^2 8 / 40$$

$$= 121.0182$$

Therefore length of chain = $L = K.P$

$$L = 121.0182 \times 8 = 968.145\text{mm}$$

4. 3-D MODEL OF AGRICULTURE EQUIPMENT



5. ADVANTAGES

1. Easy in operation, Low cost, Light weight.
2. Power saving, No skill operator required, adaptable.
3. Simple construction, Automation can be implemented.
4. High performance, Multi-operational, Time saving.
5. Pure mechanical, easy maintenance.
6. One labour is enough for operation.
7. Working is very easy compared to primitive work method.
8. Environmental friendly.

DISADVANTAGES:

1. Machine performs multi-operations hence unemployment increases.
2. Emission of harmful gases to the environment.
3. Produces less power as compared to bulky agriculture vehicle like tractor etc

6. APPLICATIONS

1. ploughing
2. Weeds removal
3. For softening land
4. For harvesting small crops

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7. CONCLUSION

This work is about integrating of mechanical system to the agriculture fields for the agriculture operations. Many operations including ploughing, weed removal, ground softening etc can be performed. Different agriculture tools can be adopted by applying different mechanisms to the machine. Hence it's a multi operational device that can be effectively used in fields.

The device is cost effective, feasible & sustainable. It effectively reduces labour work & save the time. It accelerates the farm work, affordable by farmer & is farmer friendly. Proper designing in accordance with the farmer requirements surely popularizes these tool & implements in near future. Applying the innovative ideas & advanced technology to the farms is necessary to revolutionize the Indian agriculture there by erasing the old manual methods, By using the modern wisdom, theses traditional implements needed to be standardized keeping in the mind economy of the rural people.

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