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Design & Fabrication Of Agriculture Weed Removal Equipement

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Abstract: ***Introducing the advanced technology for ploughing, weed removal. A ploughing machine is done with using bike engine which gives the more mileage and it can be produced in lesser price, this equipment is useful to farmers to plough, weeds removal and so on application this machine is very cheap in cost and can serve needful to the farmers.***

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, this paper proposes a simple, economical and efficient machine to remove the weed, which would be operated by a single person – savings of labour as well as time. The machine has been designed, fabricated and tested.

Keywords: Weed, cultivation, farmers.

I. INTRODUCTION

Weeding is the removal of unwanted plants in the field crops. Weeding control is done by mechanical weeding, thermal weeding, flaming, biological control, chemical control, and by farming pattern. It has always been a problem to successfully and completely remove weeds and other innocuous plants. Invariably, weeds always grow where they are not wanted. Weeding with the use of tools like cutlass and hoe requires high labor force in a commercial farming system. Weeder demands less body effort as compared to operation by bullocks. The bullock implements require the hand and body pressure to achieve depth and alignment of the implement in use, whereas weeder the implements are mostly self guided. This reduces human drudgery to agreat extent. The comparative higher output of operation by the weeder as compared to bullocks reduces the operational time and achieves timeliness in operation. The maintenance of the weeder is easy. It is ideally suited for mechanizing small farm holdings which account for 80 % of the farm holdings of the country.

Cost wise weeder should be an obvious choice of smaller farmers, if they are intending to have a mechanical power source for farm-operation. Weeder reduces the drudgery of collecting the waste grass between crops in the field during operations as compared to operations by bullocks.

II. LITERATURE SURVEY

With agriculture facing a shortage of manpower, need for automating the various activities in the field arises or it is becoming the need of the day. With this in mind, a simple machine has been designed and fabricated for removal of weed and unwanted plants between the rows of paddy plants. As the machine is moving the weed remover removes the weeds present between the plants. This machine can be used effectively in the agricultural fields such as paddy field.

To use this machine in agriculture field the seeds should be sowed at a distance equal to or more than the width of this machine. This machine is of simple design without using any motor or engine. Only a chain and sprocket arrangement is used. This machine eliminates the need for many workers and makes the work easier, economical and efficient.

III. WORKING

This is equipment used for plowing the land by using the bike engine and well as other 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 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 the attachments which application we want to use the equipment can be removed and attach.

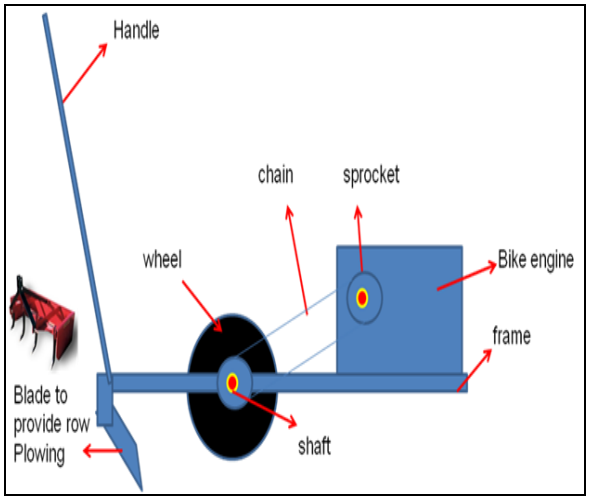

Figure 1

IV. STRUCTURAL DESIGN METHODS

This chapter describes some of the mathematical technique used by designers of complex structures. Mathematical models and analysis are briefly describe and detail description is given of the finite – element method of structural analysis. Solution techniques are presented for static, dynamic & model analysis problems. As part of the design procedure the designer must be analyses the entire structure and some of its components. To perform this analysis the designer will develop mathematical models of structure that are approximation of the real structure, these models are used to determine the important parameters in the design.The type of structural model the designer uses depends on the information that is needed and the type of analysis the designer can perform.

Three types of structural models are

- ✓ *RIGID MEMBERS:* The entire structure or parts of the structure are considered to be rigid, hence no deformation can occur in these members.
- ✓ *FLEXIBLE MEMBERS:* The entire structure or parts of the structure are modeled by members that can deform, but in limited ways. Examples of this members trusses, beams and plates.
- ✓ *CONTINUUM:* A continuum model of structure is the most general, since few if any mathematical assumptions about the behavior of the structure need to be made prior to making a continuum model. A continuum member is based on the full three – dimensional equations of continuum models. In selecting a model of the structure, the designer also must consider type of analysis to be performed. Four typical analysis that designers perform are:

- *Static equilibrium:* In this analysis the designer is trying to the determine the overall forces and moments that the design will undergo. The analysis is usually done with a rigid members of model of structure and is the simplest analysis to perform.
- *Deformation:* This analysis is concerned with how much the structure will move when operating under the design loads. This analysis is usually done with flexible members.
- *Stress:* In this analysis the designers wants a very detailed picture of where and at what level the stresses are in the design. This analysis usually done with continuum members.
- *Frequency:* This analysis is concerned with determining the natural frequencies and made shape of a structure. This analysis can be done with either flexible members of a structure. This analysis can be done with either flexible members or continuum members but now the mass of the members is included in the analysis.

The subject of MACHINE DESIGN deals with the art of designing machine of structure. A machine is a combination of resistance bodies with successfully constrained relative motions which is used for transforming other forms of energy into mechanical energy or transmitting and modifying available design is to create new and better machines or structures and improving the existing ones such that it will convert and control motions either with or without transmitting power. It is the practical application of machinery to the design and construction of machine and structure. In order to design simple component satisfactorily, a sound knowledge of applied science is essential. In addition, strength and properties of materials including some metrological are of prime importance. Knowledge of theory of machine and other branch of applied mechanics is also required in order to know the velocity. Acceleration and inertia force of the various links in motion, mechanics of machinery involve the design.

V. DESIGN OF WELDED JOINT

Checking the strength of the welded joints for safety

The transverse fillet weld welds the side plate and the edge stiffness plates,

The maximum load which the plate can carry for transverse fillet weld is

P = 0.707 x S x L x ft

Where, S = factor of safety, L = contact length = 35mm

The load of shear along with the friction is 50 kg = 500N

Hence, 500 = 0.707 x 3 x 35 x ft

Hence let us find the safe value of ‘ft 500

$$\text{Therefore ft} = \frac{}{0.707 \times 3 \times 35}$$

$$\text{ft} = 6.73536 \text{ N/mm}^2$$

Since the calculated value of the tensile load is very smaller than

The permissible value as ft=56 N/mm^2. Hence welded joint is safe.

VI. DESIGN OF BOLT

The bolts are used for fixing the connections which can be used as temporary joints. Bolts are been used as they can be removed and properly adjusted as per the requirements. Bolt is to be fastened tightly also it will take load due to rotation. Stress for C-25 steel f_t =120 N /mm$^{2.}$ Std nominal diameter of bolt is 8 mm. Let us check the strength: -Also initial tension in the bolt when belt is fully tightened

P = 1420 d
P = 1420 x 8
P = 11360 N
Therefore the total load on bolts
P = 11360 + 500 N
P = 11860 N
Being the four bolts the load is shared as
P= 11860/4
=2965 N.
Also,
2965 = (Π /4 dxc$^{2)}$ x f_t
2965 = (Π /4) (8x (0.84)$^{2)}$)x f_t
f_t = 83.59 N / mm^2

The induced f_t 83.59 N / mm^2 is less than the maximum ft 120 N /mm^2 hence our design is safe.

VII. DESIGN OF BEARING

Depending upon the nature of contact the bearing lies in I contact bearing. Here contact is rolling one. The advantage of bearing here is that it has low starting friction due to this, we also call it an antifriction bearing.

Therefore in order that for easy use we have provided pedestal bearing which is easily available in market.

VIII. DESIGN 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

IX. CALCULATION

Torque applied = Force * length
=100 * 0.18
=18 N
Power = (2*π*N1*T)/60
= (2*π*60*18)/60
= 0.13 kW

Now N1/N2 = D2/D1
Where D1 = 180 mm = 0.18 m
D2 = 78 mm = 0.078 m
N1 = 60 rpm
Therefore
60/N2 = 0.078/0.18
N2 = 138 rpm

X. 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 for p < 25mm
Pitch p= 8mm
Ds= 15mm
Z_{min} = (4 x 15) / 8 +15
= 12.5

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

On bevel gear shaft = φ80mm and 24 teeth's On rear wheel shaft = φ60mm 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 = $(T_1 + T_2) / 2 + (2 x / p) + [(T_1 - T2) / 2 \pi]^2 p / x$
x = centre distance = 400mm
K = $(24 + 18) / 2 + (2 \times 400)/8 + [(24 - 18) / 2 \pi]^2 \ 8 / 400$
= 121.0182
Therefore length of chain = L = K.P
= 121.0182 x 8
= 968.145mm

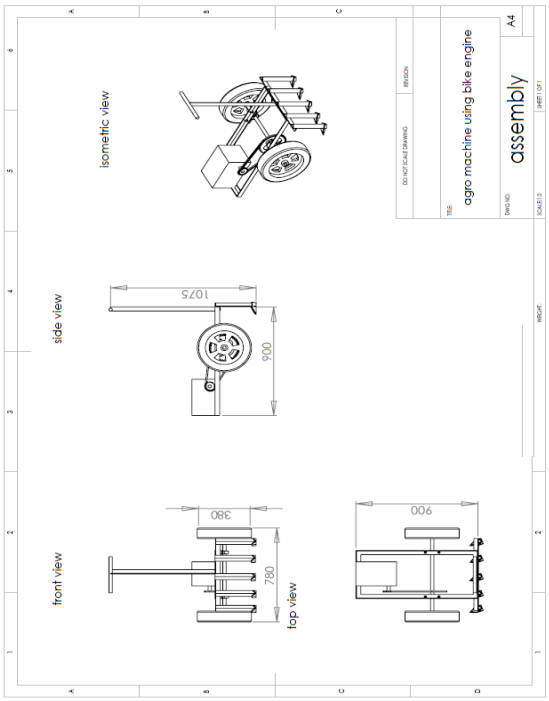

Figure 2

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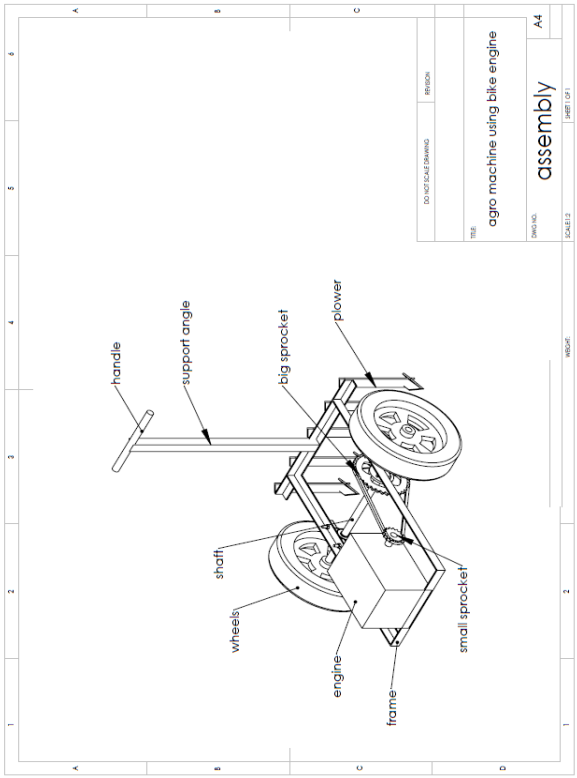

Figure 3

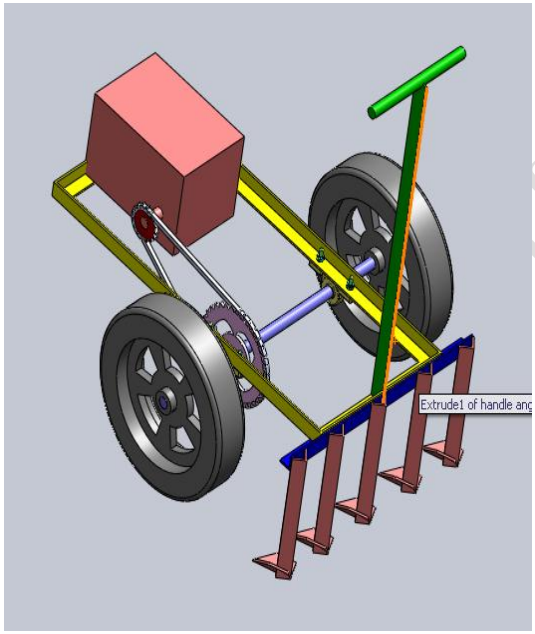

Figure 4: Design 3 rd diagram

XI. FABRICATION

- ✓ Shaft Material: Mild steel
  Operation: cutting, facing, turning
- ✓ L angle Material: Mild steel
  Operation: Bending. Fitting.
- ✓ Bearing Material: assembly
  Operation: Fitting.
- ✓ Fasteners Material:
  Operation: Fitting.
- ✓ Forks Material: -mild steel
  Operation: cutting sharping
- ✓ Chain Material: mild steel
  Operation: cutting, fitting.
- ✓ Engine Material: assembly
  Operation: Fitting.
- ✓ Sprocket Material: mild steel
  Operation: Fitting.
- ✓ wheelsMaterial: assembly
  Operation: fitting, welding
- ✓ BushMaterial: mild steel
  Operation: facing, planning.

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