

Human Powered Multipoint Seed Sowing Machine

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Abstract - This paper gives the information about fabrication and design of human powered multi point seed sowing machine. Agriculture is demographically the broadest economic sector and plays a significant role in the overall economy of India. For the growth of Indian economy, mechanization is necessary. The main purpose of mechanization in agriculture is to improve the overall productivity and production. Planting is conventionally done manually which involves both animate (humans and draught animals), this result in higher cost of cultivation and delay in planting. The main purpose of this paper is to compare between conventional sowing method and new proposed machine which can perform number of simultaneous operation. The required row to row spacing, seed rate, seed to seed spacing and fertilizers placement varies from crop to crop can be achieved by the proposed machine. This machine reduces the sowing time, human efforts and labour cost. Our project of seed sowing machine is based on the mechanization of seed sowing. We developed such mechanization that uses human power to operate it.

Index terms - Seed metering mechanism, hopper, chain drive, rectangular frame, steering mechanism, furrows, peddling system.

I. INTRODUCTION

Agricultural sector is changing the socio-economic environment of the population due to liberalization and globalization. About 75% people are living in the rural area and are still dependent on agriculture. About 43% of geographical area is used for agricultural activity. Agriculture has been the backbone of the Indian economy. As per the requirement of crop production according to the increasing population of India there is a necessity of high-capacity machine at low cost & human power. Nowadays we are using the machineries in agriculture sector which are so costly and fuel consuming. Therefore, the human powered seed sowing machine will be more economical for small areas where large machines cannot be implement properly.

This paper works over the design for mechanism by human power which is used for seed sowing in agriculture. This mechanism is most preferable for continuous seed sowing in small size firm.

II. MAIN COMPONENTS

The complete mechanism is based on the importance component as seed metering system which seeds the grain and ferrow which opens the soil to seed grain. The other supporting components used are Structure frame having length 60" x width 37" x height 35", Four wheels having 20" diameter, Steering mechanism, Chain drive and hopper of 28X8".

A. Seed Metering System

Seed metering system is the gear type where rotation of gear is used to transfer the seeds from a hopper to pipe provided behind the ferrow. When the seed metering system is used the seed metering shaft turns the fluted

roller which drops the seed from the seed box into the seed tubes. Adjust the length of flute droller that extend into the seed box to determine the amount seed release for any given time.

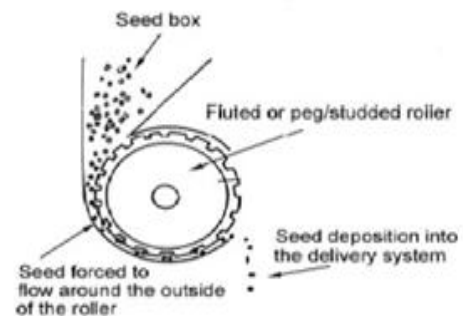


Figure1. Seed metering mechanism

B. FERROW

The design of ferrow openers of seed drills varies to suit the soil conditions of particular region. Most of the seed cum fertilizer drills are provided with pointed tool to form a narrow slit in the soil for seed deposition.

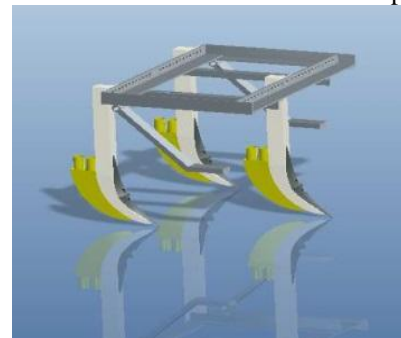


Figure2. Ferrow

III. DESIGN FOR MECHANISM

With reference to the figure3 based on human power output pedaling shows the graphical remarks for maximum sustainable power for duration required for seed sowing, the design of complete mechanism has been specified. Human beings are very adaptable and can produce power up to 200w.

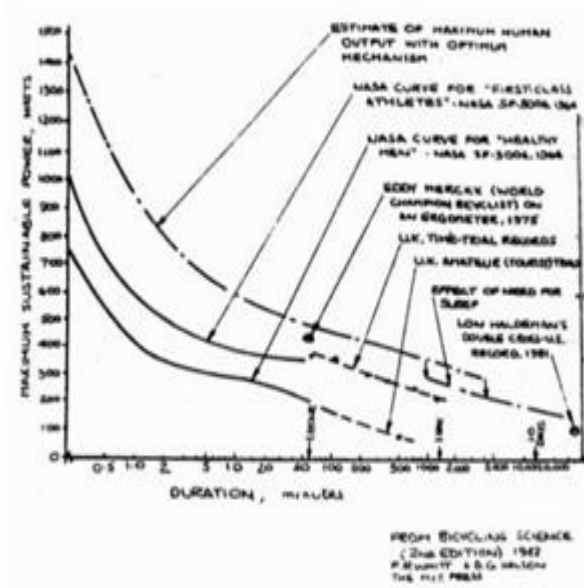


Figure3: Human Power Output pedaling

A. Force and Torque Calculations

Power = 200w at 60 rpm for 60 min.

$$P = [2\pi nT]/60$$

$$T=31.83Nm$$

Radius of crank(r)=0.18m

$$Force=176.83N$$

$$F=f_1+f_2$$

$$F1=f2=88.415N$$

This is all above the force required to starting to get the required speed.

B. Chain Drive

Rated power, $P_r = 200w$

Design power, $P_d = 280w = 0.375HP$

Speed of smaller sprocket = 107rpm

Chain pitch no. = 40

$$P=12.7mm$$

$$T_2=18 \text{ teeth}$$

$$D_{p1}=194.18mm$$

$$D_{p2}=73.13mm$$

$$V_{p1}=406.31mm/sec$$

$$Power/strand = 0.539kw$$

No. of strand=1

Length of chain = 2124mm

IV. CONSTRUCTION AND WORKING

The mechanism is based metering of seed with the help of chain drive for power transmission from rear axle to the seed metering mechanism. The complete system is mounted on four wheeler human operated vehicle having proper distance between two wheels to move in the area for seed sowing in farm. The seed are transfer to the seed metering unit from the hopper placed above it. The ferrows are used to open and cover the soil over seed. A block diagram of working model is shown in figure 4.

The power is transmitted by human pedaling to the rear axle and from rear axle to the shaft of seed metering unit via chain drive. The mechanism started with opening soil while driving with the help of ferrows provided. Due to rotation of rear axle the shaft provided at hopper also rotates and seeds are transfer to the seed metering unit which are transmitted to the open soil. After seeding the soil covers all seeds due to back plates provided to the ferrows.

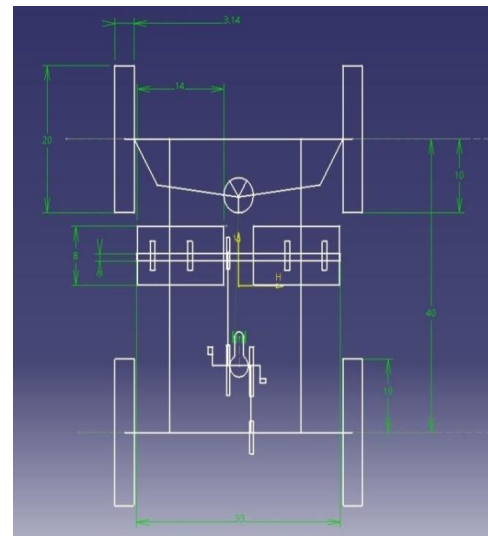


Figure4. Block diagram of seed sowing machine

The basic advantages of seed sowing machine are as follows:

- Easy operation and attachments.
- Easy to install and use anywhere.
- It improves the environmental condition.
- No electricity consumption.
- Easy to operate.
- Robust in design.
- Low maintenance.

V. CONCLUSION

The main objective is to provide a product with an alternative way to seed sowing when there is no machinery, vehicle available it has to be understood that in rural areas it is a very stressful and laborious task so the product which is a paddle driven machine it is satisfied the need of rural people by giving them an alternative way of seed sowing. Which is cost effective and ecofriendly the product design has no operating cost and it can be used minimal effort.

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