

# DESIGN AND FABRICATION OF POTATO PLANTING MACHINE

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**Abstract** -A potato seed planter includes one or more planting units with an endless conveyor. A plurality of cups is attached to the conveyor and each cup receives a potato seed as the conveyer travels upwardly between upper and lower sprockets. As the cups pass around the upper sprocket, any extra seeds in cups are removed by centrifugal force, differential velocity and/or a vibration unit. These extra potato seeds are recycled and returned to the seed bowl. The cups then travel through a generally horizontal simulation section and around a third sprocket. The cups are inverted as they pass around the third sprocket and the seeds fall onto the back surface of the next forwardly adjacent cup. A guide structure holds the seeds in the desired position until they reach a discharge area where the individual seeds are discharged into the furrow.

The functioning of potato planters is based on transport and placement of the seed potatoes by a cup-belt. The capacity of this process is rather low when planting accuracy has to stay at acceptable levels. The main limitations are set by the speed of the cup-belt and the number and positioning of the cups. It was hypothesized that the inaccuracy in planting distance, that is the deviation from uniform planting distances, mainly is created by the construction of the cup-belt planter. To determine the origin of the deviations in uniformity of placement of the potatoes a theoretical model was built. The model calculates the time interval between each successive potato touching the ground. Referring to the results of the mode.

**Keywords:** Potato plantation, potato seed, transmission system, conveyor, hopper.

## 1. INTRODUCTION

In India more than sixty percent peoples are dependent on agriculture fields and state government for development of sectors . Potato seed being vital input to agriculture, endless efforts are being made to assure availability of quality foods grains to farmers in order to sustain the agricultural development and best vegetables to consumer end. In this situation the demand of quality potatoes are very high and our proposed potato planting

In view of above, our project has been formulated with the objective to produce quality potato, with minimum cost.

The paper is designed based on the principles of farmers view and the system is automatic type. By using automation the productivity of the product can be increase.

## 2. LITERATURE SURVEY

1. Jackson, Michigan et al. Have first mechanical potato planter has been attributed to the Aspin wall Manufacturing Co. in 1878. Because of the invention's success, the company devoted itself solely to creating and building potato equipment in 1883 in.

2. The Aspin wall Co. later built another plant in Ontario, Canada, in keeping with the demand for its products. Fred Bateman et al. [2] Have owner of the Iron Age Co. in Glenoch, New Jersey, developed an assisted-feed planter solving the problem of missed hills. This assistive device placed the seeds on a rotating plate, much like a lazy Susan, before dropping them into the hole. This device ensured that a piece of potato was ready to be fed into the furrow. It also allowed the driver to manually deposit a potato seed into position if necessary.

## 3. CONSTRUCTION& WORKING

In Our potato planting machine consists of mainly digger, potato seed container, fertilizer container, two sets of roller chain drive mechanisms then a set two discs.

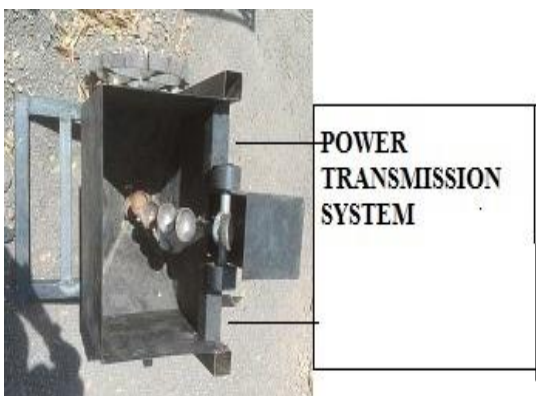
Firstly dried pieces of potatoes will be loaded into the potato seed container and fertilizer into fertilizer container. Here one roller chain drive mechanism will be provided for free moment of wheels, carrying heavy load. Another will be provided for carrying seed potatoes from the container and place it into the land.

This chain consists of set of cups attached to the chain. As the tractor pulls or drives the machine then the digger will make the row with required depth. Then chain drive with

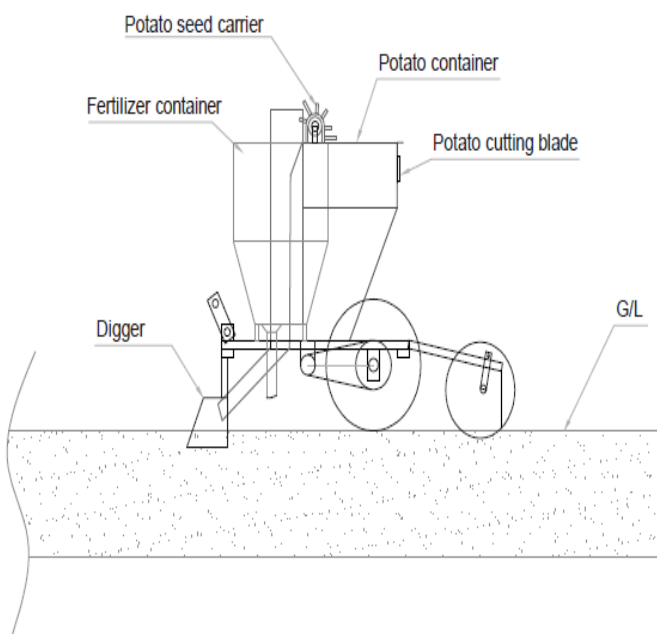
cup arrangement will also rotate along with wheels, which carry seed potatoes one by one and place it into the appropriate position made by the digger.

Besides this only fertilizer container will be their consists of a passage for fertilizer and to fall on ground. Behind this a set discs will be provided which overlap the soil on the placed potato seed.

**3.1 PHYSICAL MODEL:**



**Fig 3.1 Physical model**

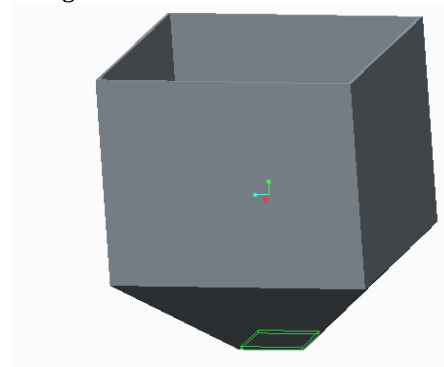


**Fig 3.2 general construction of potato planter**

**4. DESIGN CALCULATIONS**

Selection of Potato hopper:

Fertilizer container is fabricated with the size shown in the figure and it has a capacity of around 10 kg of Fertilizer.

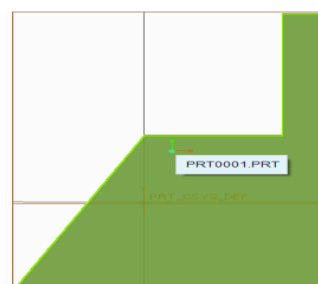


**Fig. 4.1 potato hopper**

Production of potatoes with natural fertilizers is simple and much more effective if it is done before the crop is planted. Growing a healthy and hassle free crop of potatoes is best achieved by sheet composting your garden in the autumn-fall. This is a separate chamber built on the machine for containing the Fertilizer and the dimension is around 500mm Height x 400mm Width x 400mm.

**Design of Tiller**

The design of a tiller in such a way that, the tiller will penetrate the soil and allowing the seed to be planted in the way it has formed. M.S. Steel used for abricating the unit and the design .



**Fig.4.2 Design of tiller (all dimensions in mm)**

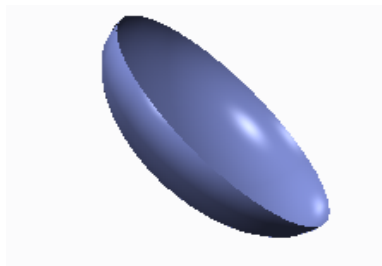
**Selection of Disc Harrow**

The primary purpose of ploughing is to turn over the upper layer of the soil, bringing fresh nutrients to the surface, while burying weeds, the remains of previous crops, and both crop and weed seeds, allowing them to break down. It also aerates

the soil, allows it to hold moisture better and provides a seed-free medium for planting an alternate crop. In modern use, a ploughed field is typically left to dry out, and is then harrowed before planting. Ploughs were initially human powered, but the process became considerably more efficient once animals were pressed into service.

**Selection of Disc Harrow**

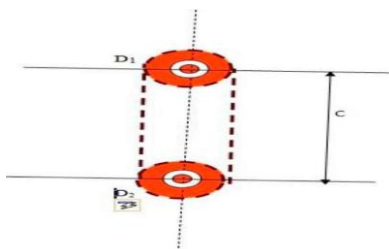
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**Fig4.3 side view of disc**

Disc plough implement in our project is fixed type and for measuring the width of cut, the tilt angle shall be set at 15 to 25°. For nonadjustable plow disc blades, the tilt angle shall be set at 18 to 20° and we have set up at 20°.

**Selection of cup conveyor**



**Design of Conveyor Chain Drive**

$$1. \text{ Chain length: } L = 2C + 1.57(D_1 + D_2) + (D_1 D_2)^2 / 4C$$

$$= 2(940) + 1.57(60 + 60) + \frac{(60 \cdot 60)^2}{4 \cdot 940}$$

4(940)

=2068mm.

Pitch :-

$$P = d \cdot \sin(180/z) = 60 \cdot \sin(180/15) = 12.47\text{mm.}$$

**5. RESULTS&DISCUSSION**

The machine was tested in field to achieve following results:

The machine works fine, It was able to planting the potato, The wheel support provide to be sufficient, The machine was handy and achieve the desired result, It will reduce the much manual efforts and saving the time consuming.

Generally for plantation of 1acre farm we required 20-25 labours so that labour cost will be increases and also more time required.

**Obtained Results-**

According to our results we required for planting 1acre farm 3 hours and only required 1 labour for driving machine

**6. CONCLUSION**

The paper presents theoretical aspects of the kinematics and dynamics of the potato planting machine. In this work, we have implemented all that is required to sowing and planting of potato seed, which includes tilling, planting, fertilizing and ditching of soil all process in a single operation. The outlook and prediction of high growth of crop of cultivators are very high because intensive soil cultivation requires consistency and reliability. In the meanwhile, cultivators are also expected to work smoothly and cultivate large areas. Our design competes with all these benefits. They intensively cultivate the soil while destroying annoying clods. The soil thus becomes loose and can be used for crease forming and create the basis for a harvest with a higher yield. Furthermore, our prototype model can be converted to full width cultivators with a few manual actions to planting. The machine which we have invented is working properly and the design and fabrication is matched the requirement. The present work is implemented all the process for single row and machine can only support for one single operation.

**7. FUTURE SCOPE**

The present work is implemented all the process for single row and machine can only support for one single operation. This can be expanded by placing two, four different tillers, so that, we can sow the seeds in two rows

and four rows at a time by increasing the tiller in the same machine. By using the springs it can be made as flexible.

The present work is also implemented for putting fertilization to plants such plants are maize, sugarcane, tomato etc....

## 8. REFERENCES

- [1] Post harvest Manual for Export of Potatoes, 2009, Agricultural & Processed Food Products Export Development Authority (APEDA).
- [2] Handbook of Agricultural Sciences, Dr. Singh, S.S, 1998
- [3] Marketing of Vegetables in India by Vigneshwara Varamudy Published by Daya Publishing House, Delhi.
- [4] Paul, Vijay, R. Ezekiel, and G.S. Shekhawat, Traditional methods of potato storage in changing scenario, Indian Farming, August 2002.
- [5] [www.huaxinmachine.com](http://www.huaxinmachine.com)
- [6] V.B. Bhandari, Handbook of design of machine element.