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Design and Fabrication of Seed Inplanter using Conversion of Energy

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Abstract:- **Nowadays world is moving towards the rapid growth of all sectors including the agricultural sector. To meet the future food demands the farmers have to implement new techniques which will not affect the soil but will increase the overall crop production. In this project, our concept is made for the Fabrication of seed inplanter by using conversion of energy. In this technique seeds in a hopper get sprayed by means of reciprocating piston directly to land by electrical energy which is stored in the battery. By this process the seed is fed into the land at the time of plough .The main benefit of using this method is to reduce the time of seed to the land and reduced human effort.**
Keywords **Slider crank mechanism, sprocket and chain**

INTRODUCTION

A developing country like India is expected to continue to rely more on hand tools for the foreseeable future for cultivation. The use of hand tools for land cultivation is still predominant in India because draft animals and tractors require resources that many Indian farmers do not have easy access to. The need for agricultural mechanization in India must therefore be assessed with a deeper understanding of the small holder farmer's activities and what values farm power generated for them.

As our population continues to increase, it is necessary that we must produce more food, but this can only be achieved through some level of mechanization. Manual method of seed planting, results in low seed placement, spacing efficiencies and serious back ache for the farmer which limits the size of field that can be planted. However, planting machine or planter that is normally required to produce more food is beyond the buying capacity of small holder farmers. and drudgery and enable small holder farmer to produce more foods and also environmental friendly.

In the past, various types of design have been developed with different design approaches which have their advantages and disadvantages and also operational limitation. kyada, a. r,patel, is described the development of manually operated seed planter machine by using of this machine, achievement of flexibility of distance and depth variation different seed plantation is possible. kalaykhan, dr.s.c.moses is described about the manually operated single row multi-crops planter, for this design, the drive shaft directly controls the seed metering mechanism which eliminates completely attachments power transmission system. Tejminderkaur is described about the design and development of calibration unit for precision planter, the calibration unit incorporates information of seed drop events relative to the planter with seed interval timing and planter travel speed to obtain the seed spacing data. adisa a. f,braide is described about the design and development of template row planter to template row planter was able to plant on both ridged and flat seed bed at average field capacity of 0.2ha/h (effective planting rate) which was quite adequate for small scale farming. ola jide o. g,manu was.i is described about the design, fabrication and testing of a low cost row crop planter for peasant farmers the planter was able to effectively meter maximum of two to three seeds per hill.

In this paper we are designing of an fabrication of seed inplanter using conversion of energy, their utilization methods advantages, disadvantages and the process involving to design and fabrication of these planters for the purpose of utilization of poor farmers

METHODOLOGY AND MATERIAL

METHODOLOGY

In this section we are discussed about the types of the crop planters used in the agriculture field and also discus about their performance, working and usefulness. The basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed. There commended seed to seed spacing and depth of seed placement vary from crop to crop and for different agro-climate conditions to achieve optimum yields Crop planting operations may involve placing seeds or tubers (such as potatoes) in the soil at a predetermined depth, random scattering or dropping of seeds on the surface (broadcasting), or setting plants in the soil (transplanting). Machines that place the seed in the soil and cover it in the same operation create definite rows. If the rows or planting beds are spaced far enough apart to permit operating ground-engaging tools or other machinery between them for in tertilling or other cultural operations, the resulting practice is called row-crop planting; otherwise, it is considered to be solid planting. Thus, grain drilled in rows15 to 36cm (6 to 14 in) apart is a solid planting, where as sugar beets, with rows commonly 51 cm

(20 in) apart, are grown as a row crop (Kepner et al., 1978). With appropriate planting equipment, seeds may be distributed according to any of the following methods or patterns. In this section we are going to discuss about the proposed methodology of my current research. My proposed methodology is that design and fabricate a seed inplanter by using conversion of energy. Since most of our farmers especially in the rural areas and/or small scale farmers use dibbler, matchet or sticks to sow different seeds. This dibbler, matchet or sticks is used to open the soil as the farmer drops the required numbers of seed (often times more than they require numbers are dropped) and then cover them up.

Material used for design a Seed In planter

Main Frame

The main frame is the skeletal structure of the seed planter on which all other components are mounted. The two design factors considered in the determination of the material required for the frame are the weight and strength. In this work, mild steel angle bar of 40 mm x 40 mm and 5mm thickness were used to give the required rigidity.

Adjustable type Furrow opener

The design of furrow openers of seed planters varies to suit the soil conditions of particular region. Most seed planters are provided with pointed tool to form an arrow slit in the soil for seed deposition. The adjustable furrow opener permits planting at each variety's ideal ground depth. The type used for this work is the pointed bar type. These types of furrow openers are used for forming narrow slit under heavy soils for placement of seeds at medium depths. The Furrow opener is a thin mild steel (angle bar). The angle bar iron was fabricated to shoe type like structure to facilitate an easy cut through the soil. Nut and both were used to fasten the device to the frame through a hole drilled on the frame for adjusting sowing depth according to crop.

Plough

Fig.1: plough

The seed plough was made of mild steel having a frustration cross-section of a pyramid of 75mm square at the bottom, 214mm square at the top and 300mm height and the thickness is 2mm. The design capacity of the seed plough is 1,750mm3. The capacity is based on the volume of seeds required to plant a hectare

FLOW CHART

DC MOTOR WITH GEAR ASSEMBLY

↓

SPROCKET & CHAIN

↓

CRANK SHAFT

↓

PISTON

DC MOTOR

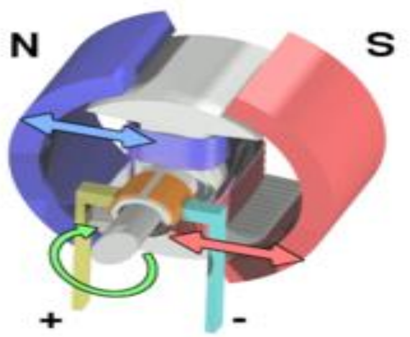

Fig.2: dc viber motor

Workings of a brushed electric motor with a two-pole rotor (armature) and permanent magnet stator. "N" and "S" designate polarities on the inside axis faces of the magnets; the outside faces have opposite polarities. The + and - signs show where the DC current is applied to the commutator which supplies current to the armature coils.

A **DC motor** is any of a class of rotary electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.

first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

Sprockets and Chains

A sprocket is a toothed wheel upon which a chain rides. Contrary to popular opinion, a sprocket is not a gear.

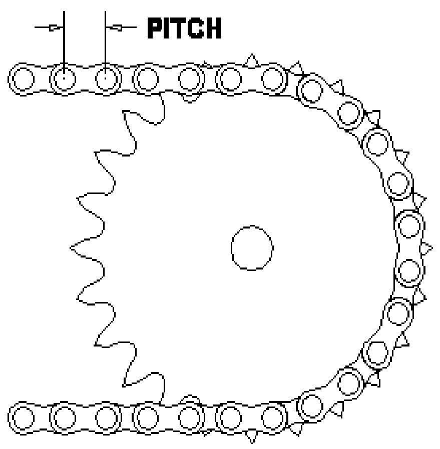

Fig.3: Sprocket & chain

Chain Construction

Chains have a surprising number of parts. The *roller* turns freely on the *bushing*, which is attached on each end to the *inner plate*. A *pin* passes through the bushing, and is attached at each end to the *outer plate*. Bicycle chains omit the bushing, instead using the circular ridge formed around the pin hole of the inner plate.

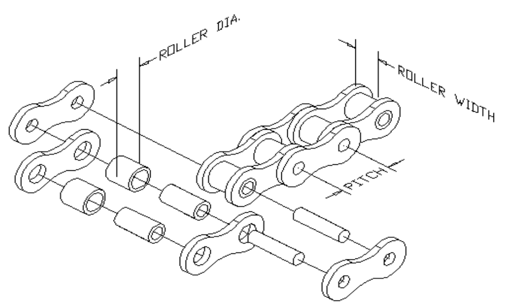

Fig.4: chain construction

Chain Dimensions

Chain types are identified by number; ie. a number 40 chain. The rightmost digit is 0 for chain of the standard dimensions; 1 for lightweight chain; and 5 for rollerless bushing chain. The digits to the left indicate the *pitch of the chain in eighths of an inch*. For example, a number 40 chain would have a pitch of four-eighths and would be of the standard dimensions in width, roller diameter, etc..

Plate thickness is 1/8th of the pitch, except "extra-heavy" chain, which is designated by the suffix H, and is 1/32" thicker

Bicycle and Motorcycle Chain Dimensions

Chain No.	Pitch	Roller Diameter	Roller Width	Sprocket thickness
Bicycle, with Derailleur	1/2"	5/16"	1/8"	**0.110"**
Bicycle, without Derailleur	1/2"	5/16"	3/32"	**0.084"**
420	1/2"	5/16"	1/4"	**0.227"**
425	1/2"	5/16"	5/16"	**0.284"**
428	1/2"	0.335"	5/16"	**0.284"**
520	5/8"	0.400"	1/4"	**0.227"**
525	5/8"	0.400"	5/16"	**0.284"**
530	5/8"	0.400"	3/8"	**0.343"**
630	**3/4"**	**15/32"**	**3/8"**	**0.343"**

Selecting a Chain

Two factors determine the selection of a chain; the working load and the rpm of the smaller sprocket. The working load sets a lower limit on pitch, and the speed sets an upper limit.

Maximum Pitch = (900 ÷ rpm) $^{2/3}$

The smaller the pitch, the less noise, wear, and mechanical losses will be experienced.

Sprockets

There are four types of sprocket;

- Type A: Plain Plate sprockets
- Type B: Hub on one side
- Type C: Hub on both sides

- Type D: Detachable hub

Sprockets should be as large as possible given the application. The larger a sprocket is, the less the working load for a given amount of transmitted power, allowing the use of a smaller-pitch chain. However, chain speeds should be kept under 1200 feet per minute.

The dimensions of a sprocket can be calculated as follows, where P is the pitch of the chain, and N is the number of teeth on the sprocket;

Pitch Diameter = P ÷ sin (180° ÷ N)

Outside Diameter = P × (0.6 + cot (180° ÷ N))

Sprocket thickness = 0.93 × Roller Width - 0.006"

Proceedure for Laying Out a Sprocket

The first thing you need to know to lay out a sprocket is the dimensions of the chain which is to run upon it, specifically the *pitch*, *roller diameter*, and the *roller width* of the chain. The second thing you need to know is the number of teeth in the sprocket, which will depend entirely on your application. From these numbers, the outside diameter and thickness of the required blank can be calculated.

You'll also need to know the angle between teeth - this is simply the 360° divided by the number of teeth.

Piston

Fig. 5: piston

A **piston** is a component of reciprocating engines, reciprocating pumps, gas compressors and pneumatic cylinders, among other similar mechanisms. It is the moving component that is contained by a cylinder and is made gas-tight by piston rings. In an engine, its purpose is to transfer force from expanding gas in the cylinder to the crankshaft via a piston rod and/or connecting rod. In a pump, the function is reversed and force is transferred from the crankshaft to the piston for the purpose of compressing or ejecting the fluid in the cylinder. In some engines, the piston also acts as a valve by covering and uncovering ports in the cylinder wall. The petrol enters inside the cylinder and the piston moves upwards and the spark plug produces spark and the petrol is set on fire and it produces an energy that pushes the piston downwards.

OPERATING PRINCIPLE- SLIDER-CRANK MECHANISM

Fig. 6: slider-crank mechanism

The slider-crank mechanism is frequently utilized in undergraduate engineering courses to investigate machine kinematics and resulting dynamic forces. The position, velocity, acceleration and shaking forces generated by a slider-crank mechanism during operation can be determined analytically. Certain factors are often neglected from analytical calculations, causing results to differ from experimental data. The assumption is frequently made that the crankshaft's angular velocity is constant. In reality, angular velocity is slightly higher on the power stroke than the return stroke. The study of these slight variances produces useful in sight into the characteristics of piston driven engines. The following report details the successful design, fabrication and testing of a pneumatically powered slider-crank mechanism for the purpose of classroom demonstration and experimentation. Complete analysis of the engine's kinematics was performed, assuming a constant angular acceleration.. Shaking forces of the unbalanced mechanism were calculated and balancing weights were designed for statically and dynamically balanced configurations at the same constant angular velocity. Transducers mounted to the mechanism were used to record kinematic and dynamic force data during operation, which was then compared to the analytical values. The engine was successfully manufactured and operates as intended. Data recorded by the device's accelerometers is comparable to calculated values of acceleration and shaking force.. Satisfactory operation of the engine was achieved with minimal tuning. The engine is capable of operating at angular velocities ranging from 80 to 330 RPM, using a balancing weight optimized for 200RPM. Sustained motion is achievable with cylinder pressures as low as 4.5psi, with a loss of only 2 psi through the system. The reduction in shaking force achieved through use of the balance weights is apparent both visually and in recorded data. All experimental values were reasonable when compare with analytical calculations.

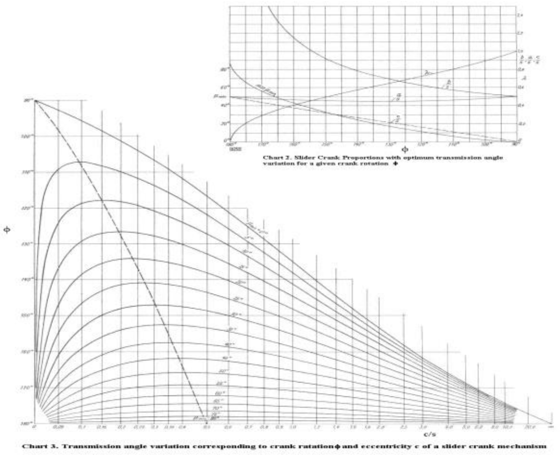

Fig. 7: graphical representation of slider-crank mechanism

DETERMINATION OF PLANTER CAPACITY

The capacity of the planter may be determined in terms of the area of land covered per time during planting or the number of seeds planted per time of planting. The capacity of the planter in terms of the area of land covered per time may be obtained from the following expression

Capacity of planter in hectare/time

The capacity of the planter in terms of number of seeds planted per time may be obtained from the following expression

Capacity of planter in terms of number of seeds/tim

BRIEF EXPLANATION OF PROJECT

In this design, the first stage, motor is connected with helps of battery. , the motor is fixed to assembly of idle gear of wheel and worm wheel. and the 24 teeth of sprocket is connected with chain and it mould in the crank shaft and the crank shaft is starts to rotate at the movement of connecting rod and piston which were linked with motor. By use of slider crank mechanism, the rotary motion is converted into linear motion. The piston moves front and return stroke and return stroke is rotate faster then front stroke then it pulls the seed to the furrow opener which falls the seed to land after plough of the land.

The plough is used to ploughed the sand and the water tank is used to spray water after the ploughed the sand, then the seeds are planted to sand the furrow opener open the seed and pull into the ground after planted the seed in the ground the furrow closer are close the sand and it planted easily.

PHOTOGRAPHY OF DESIGNED SEED IN PLANTER BY USING CONVERSION OF ENERGY

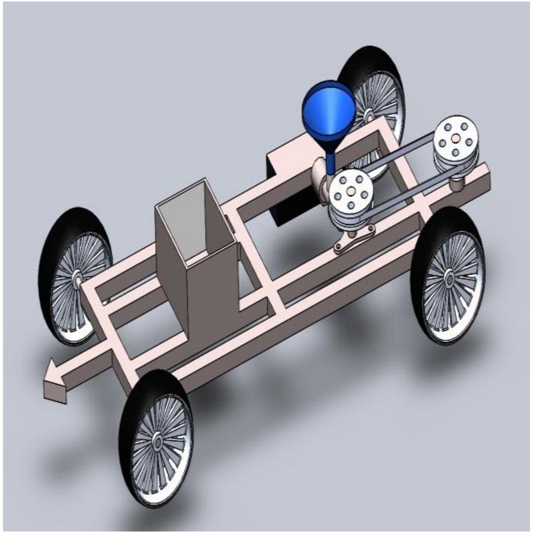

Fig.8: photography

CONCULSION

The need of a poor and small land farmer has fulfilled by the manual operated seed planter and they can easily and effectively plants their seed in the field by these planters. But due to different crops have different requirement for the seed planting in the field. So the usefulness of the single seed planter is limited. Hence the requirement of the manually operated seed planter is very high. So we are going to design and fabricate a seed in planter by using conversion of energy.

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