

SOLAR OPERATED AUTOMATIC SEED SOWING MACHINE

Hemant pawar, Nitin ahire, Manthan zodgekar

GUIDED BY

Assistant professor:Sneha shirke

DEPARTMENT OF MECHANICAL ENGINEERING
SCHOOL OF ENGINEERING AND TECHNOLOGY
SANDIP UNIVERSITY MAHIRAVANI, NASHIK- 422 213
(2022-2023)

Abstract

Presently, small land holding farmers use work bulls mostly for land preparation. Generally cultivation of any crop involves various steps like seed selection, field preparation, fertilizing, sowing, irrigation, germination, thinning and filling, weed removal, vegetative stage, flowering stage, pesticide spraying, fruit or pod formation stage, harvesting and threshing. Farmer has to use various agricultural equipments and labours for caring out those steps, our purpose is to combine all the individual tools to provide farmers with automatic seed sowing equipment which implements all the scientific farming techniques and specifications and suitable for all type of seed to seed cultivation with as minimum cost as possible. This project work is focused on the design and fabrication of automatic seed sowing equipment which is used for land preparation, sowing, and levelling process. The automatic seed sowing agricultural equipment is very simple to use, the various adjustments are made with ease, and it is maintenance free.

Keywords: Solar power, agricultural equipment, soil digger, seed sowing, levelling

Introduction

Agriculture has been the backbone of the Indian economy and it will continue to remain so for a long time. —A man without food for three days will quarrel, for a week will fight and for a month or so will die. Agriculture is a branch of applied science. Agriculture is the science and art of farming including cultivating the soil, producing crops and raising livestock. It is the most important enterprise in the world. Over the years, agricultural practices have been carried out by small-holders cultivating between 2 to 3 hectare, using human labor and traditional tools such as wooden plough, yoke, leveler, harrow, mallet, spade, big sickle etc. These tools are used in land preparation, for sowing of seeds, weeding and harvesting. Modern agricultural techniques and equipment's are not used by small land holders because these equipment's are too expensive and difficult to acquire. By adopting scientific farming methods we can get maximum yield and good quality crops which can save a farmer from going bankrupt but majority of farmers still uses primitive method of farming techniques due to lack of knowledge or lack of investment for utilizing modern equipment. The use of hand tools for land cultivation is still predominant in India because 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. There is huge gap in technology adoption and Implement used with small and marginal farmers .

Literature Survey

M.V. Achutha, Sharath Chandra. N, Nataraj. G.K, done the work on, Design and Analysis of Multipurpose Farm Equipment, according to his work, all trades of village artisanship in black- smith carpentry, stone etc. contributed to the design of development of farm tools through artisan's ingenuity. Carpentry made the counterpoise to lift the water from wells to irrigate crops. Big size of earthenware was made by potters to store grains for month to be safe from insects and pest'scobblers used whole skins of animals to carry water to irrigate horticultural crops besides entering dust roads. Farming is the backbone of Indian economy. In this agriculture sector there is a lot of field work, such as weeding, reaping, sowing etc. Apart from these operations, spraying is also an important operation to be performed by the farmer to protect the cultivated crops from insects,pests, funguses and diseases for which various insecticides, pesticides, fungicides and nutrients are

sprayed on crops for protection. As agriculture was the mainstay of the population, farmer required hand tools to do work, improve labour productivity and quality of work, therefore the results in poor productivity and obtain low yield MAE (Multipurpose Agriculture Equipment) was developed. We have developed agriculture needs to find new ways to improve efficiency. One approach is to utilize available information technologies in the form of more intelligent machines to reduce and target energy inputs in more effective ways than in the past. The advent of new concept gives the opportunity to

develop a completely new range of agricultural equipment based on small smart machines that can do the right thing, in the right place, at the right time in the right way.[1]

Gare N. B., Devkar G. R., Deshmukh M. B., Garud Y. R., Prof. Baviskar A. C., Prof. Bhane A. B., done the work on, Three-In-One Agricultural Vehicle System, according to his work, The paper deals with utilization of solar energy and it is converted into the chemical energy, which is used to drive the different units of the system. In this paper we had tried to explain how the different agriculture equipments are combined and work together efficiently with reducing the manufacturing cost which will be in affordable beget. In this way we conclude that, the different operation can be performed at a time without polluting the environment and by using the non convectional power source with high efficiency.

Proposed System

While concluding this stage-1 report, we feel quite fulfil in having completed the project assignment well on time which is literature stage-1 , we had enormous practical experience on fulfilment of the report writing of the literature survey & working project model. We are therefore, happy to state that the in calculation of mechanical field proved to be a very useful purpose in future fabrication parts. Although the design criterions imposed challenging problems which, however were overcome by us due to availability of good reference books which work had already done by us in this stgsge-1 report. In future we will do the selection of raw materials as per design specifications given in stage-1 report which will help us in machining of the various project parts & components. In next stage-2 our work is to develop, fabricate & test the project by giving our potential efforts during machining, fabrication and assembly work of the project model to our entire satisfaction to solve the problem in agricultural field for social welfare in next stgsge-2.

CONSTRUCTION & WORKING

The main components of automatic seed sowing agricultural machine are as follows:

Frame:

The main function of frame is to carry whole assembly on it so it has to be strong enough to hold it. The frame is made of square pipe and it is formed out of mild steel.

Wheels:

Wheel is used to carry the whole assembly and move machine from one place to another by rotary motion of it. A bicycle wheel is a wheel, most commonly a wire wheel, designed for a bicycle. Bicycle wheel is designed to fit into the frame and fork via drop outs, and hold bicycle tire. A typical modern wheel has a metal hub, wire tension spokes and a metal or carbon fibre rim which holds a pneumatic rubber tire. We use a tubeless tire wheel.

Ball bearings:

This type of bearing consists brass bush split into two halves called "brasses", and iii) a cast iron cap and two mild steel bolts. The detailed drawing of a bearing is shown in image below. The rotation of the bush inside the bearing housing is arrested by a snug at the bottom of the lower brass. The cap is tightened on the block by means of bolts and nuts. The detailed part drawings of another block with slightly different dimensions are also shown in image below.

Shaft:

Shaft is a common and important machine element. It is a rotating member, in general, has a circular cross-section and is used to transmit power. The shaft may be hollow or solid. The shaft is supported on bearings and it rotates a set of gears or pulleys for the purpose of power transmission. Material for Shafts: The ferrous, non-ferrous materials and non-metals are used as shaft material depending on the application.

Washer:

A washer is a thin plate (typically disk-shaped) with a hole (typically in the middle) that is normally used to distribute the load of a threaded fastener such as a screw or nut. Other uses are as a spacer, spring (wave washer), wear pad, preload indicating device, locking device, and to reduce vibration(rubber washer).Washers usually have an outer diameter (OD) about twice the width of their inner diameter (ID).Washers are usually metal or plastic. High quality bolted joints require hardened steel washers to prevent the loss of pre-load due to Brinelling after the torque is applied. Rubber or fiber gaskets used in taps (or faucets, or valves) to stop the flow of water are sometimes referred to colloquially as washers; but,while they may look similar, washers and gaskets are usually designed for different functions and made differently. Washers are also important for preventing galvanic corrosion, particularly by insulating steel screws from aluminium surfaces.

Nut and Bolt:

As nuts and bolts are not perfectly rigid, but stretch slightly under load, the distribution of stress on the threads is not uniform. In fact, on a theoretically infinitely long bolt, the first thread takes a third of the load, the first three threads take three-quarters of the load, and the first six threads take essentially the whole load. Beyond the first six threads, the

remaining threads are under essentially no load at all. Therefore, a nut or bolt with six threads acts very much like an infinitely long nut or bolt.

Battery:

An electric battery is a device consisting of one or more electrochemical cells that convert stored chemical energy into electrical energy. Each cell contains a positive terminal, or cathode, and a negative terminal, or anode. Electrolytes allow ions to move between the electrodes and terminals, which allows current to flow out of the battery to perform work.

Solar Panel:

The photo-voltaic effect can be observed in nature in a variety of materials that have shown that the best performance in sunlight is the semiconductors as stated above. When photons from the sun are absorbed in a semiconductor, that create free electrons with higher energies than the created there must be an electric field to induce these higher energy electrons to flow out of the semi-conductor to do useful work. A junction of materials, which have different electrical properties, provides the electric field in most solar cells for the photon interaction in a semiconductor. A solar cell consists of,

1. Semi-conductor in which electron hole pairs are created by the absorption of incident solar radiation.
2. Region containing a drift field for charge separation.
3. Charge collecting front and back electrodes.

Solar charger:

The power charge regulator is also known as charge controller, voltage regulator, charge-discharge controller or charge-discharge and load controller. The regulator sits between the array of panels, the batteries, and the equipment or loads. By monitoring the voltage of battery, the regulator prevents overcharging or over discharging. Regulators used in solar applications should be connected in series: they disconnect the array of panels from the battery to avoid overcharging, and they disconnect the battery from the load to avoid over discharging. The connection and disconnection is done by means of switches which can be of two types: electromechanical (relays) or solid state (bipolar transistor). Solar chargers should never be connected in parallel. In order to protect the battery from gasification, the switch opens the charging circuit when the voltage in the battery reaches its high voltage disconnects (HVD) or cut-off set point. The low voltage disconnects (LVD) prevents the battery from over discharging by disconnecting the load..

DC Motors:

A DC motor is a mechanically commutated electric motor powered from direct current (DC). The stator is stationary in space by definition and therefore so is its current. The current in the rotor is switched by the commutator to also be stationary in space. This is how the relative angle between the stator and rotor magnetic flux is maintained near 90 degrees, which generates the maximum torque. DC motors have a rotating armature winding (winding in which a voltage is induced) but non-rotating armature magnetic field and a static field winding (winding that produce the main magnetic flux) or permanent magnet. Different connections of the field and armature winding provide different inherent speed/torque regulation characteristics. The speed of a DC motor can be controlled by changing the voltage applied to the armature or by changing the field current. The introduction of variable resistance in the armature circuit or field circuit allowed speed control. Modern DC motors are often controlled by power electronics systems called DC drives.

Specification:

DC supply: 12V

RPM: 60 at 12V

Shaft diameter: 6mm

Chain, Pinion & Sprocket Wheel:

In chain drive Sprocket Wheel is rotating machine part which is used to change speed and torque of the system. Set of Sprocket Wheel is used to transmit the power of the device.

Methodology

Processes involves in agriculture: India is known for its agricultural economy. According to 2011 census, 61.5% of Indian population is rural and dependent on agriculture. But still this major population lacks in mechanised agriculture. Since independence efforts are being made to modernise our economy by introducing newer kinds of

technology. This modernisation has been applied to our agriculture too, but due to prevailing socio-economic situation the three A's (accessibility, availability, affordability) are still missing or in layman words our poor farmers hasn't been able to access the new technology. Agriculture involves many processes. This includes preparation of soil, sowing adding, adding manures and fertilizers, irrigation, weeding, harvesting, threshing, and the last one is storage. The above figure clearly explains different processes involves in farming.

Processes involves in agriculture:

India is known for its agricultural economy. According to 2011 census, 61.5% of Indian population is rural and dependent on agriculture. But still this major population lacks in mechanised agriculture. Since independence efforts are being made to modernise our economy by introducing newer kinds of technology. This modernisation has been applied to our agriculture too, but due to prevailing socio-economic situation the three A's (accessibility, availability, affordability) are still missing or in layman words our poor farmers hasn't been able to access the new technology. Agriculture involves many processes. This includes preparation of soil, sowing adding, adding manures and fertilizers, irrigation, weeding, harvesting, threshing, and the last one is storage. The above figure clearly explains different processes involves in farming.

Working of automatic seed sowing machine:

Automatic seed sowing machine consists of soil digger blades at front end & leveller tool at rear end. Seed metering devices are those devices that meter the seed from the seed box and deposit it into the delivery system (plunger) that conveys the seed for placement. Seed to seed spacing and depth of seed placement vary from crop to crop for different agro-climate conditions. As machine will pushed or power to wheel is rotating which transmit power to disc through chain mechanism. Now disc is mounted on shaft which rotates the disc to seeding in soil. Construction of automatic seed sowing machine is consist of 12 Volt batteries, on off switch, & power transmitting wire. When we ON the switch at that time the power is given to the DC motor for propel the machine & seed sowing mechanism. We can use this automatic seed sowing machine will work on battery & solar charging unit as per requirement in the farm field.



ADVANTAGES & APPLICATIONS:

Advantages:

- 1) Machine is easy to fabrication & assembles.
- 2) Machine is profitable & easy to operate.
- 3) Maintenances cost of machine is low.
- 4) Multiple operations can be performed at a time.
- 5) No need of skilled operator & Controlling of operation easy with Smooth working.
- 6) It minimizes battery charging time & cost by using solar energy.

Applications:

- 1) Includes scientific forming techniques. Sequence spacing seed sowing machine has more advantages than

regular seed sowing machine.

- 2) Involves precision forming and fool proofing technology. By using this machine, a single seed can be placed in the desired spacing, so that the wastage of the seeds will be reduced. This will reduce the thinning operation during the germination time.
- 3) Suitable for all types of seed sowing application.
- 4) Low cost, it's the lowest priced agricultural equipment ever built.
- 5) Multitasking seed sowing done simultaneously.

FUTURE SCOPE

Solar operated seed sowing machines have a promising future scope in the agricultural industry due to their numerous advantages over conventional machines. Some potential benefits of solar-operated seed sowing machines include energy efficiency, cost savings, reduced carbon footprint, and increased productivity. As the world is moving towards sustainable and eco-friendly solutions, solar-powered equipment is gaining more popularity. The use of solar power reduces dependency on conventional sources of energy and helps decrease carbon emissions, making it an environmentally friendly option. Moreover, solar-powered seed sowing machines are portable, lightweight, and require minimal maintenance, which makes them cost-efficient and easy to operate. They can also cover larger areas in less time, resulting in increased productivity. All of these advantages combine to make solar operated seed sowing machines a popular choice for farmers and a promising option for the future of agriculture.

CONCLUSION

The solar operated seed sowing machine is an innovative and efficient solution to traditional manual methods of planting seeds. With the use of solar energy, it provides a sustainable and cost-effective option for farmers. The machine's accuracy and uniformity in seed sowing also ensure better yield and productivity while reducing labor costs. Overall, the solar operated seed sowing machine is a promising technology that can contribute to the improvement of agriculture and help meet the growing demand for food.

REFERANCES

- [1] M.V.Achutha, Sharath Chandra. N, Nataraj.G.K, Concept Design and Analysis of Multipurpose Farm Equipment, International Journal of Innovative Research in Advanced Engineering (IJIRAE) ISSN: 2349-2763, Issue 02, Volume 3 (February 2016),PP.30-36.
- [2] Nitin Kumar Mishra, Shashwat Khare, Sumit Singh, Mithun Dabur, Multi-Purpose Agriculture Machine, International Journal of Advances in Science Engineering and Technology, ISSN: 2321-9009, Vol-5, Iss-1, Spl. Issue-2 Feb.-2017,PP.40-43.
- [3] Kyada, A. R, Patel, D. B., Design And Development Of Manually Operated Seed Planter Machine, 5th International & 26th All India Manufacturing Technology, Design and Research Conference (AIMTDR 2014) December 12th–14th, 2014, IIT Guwahati, Assam, India,pp.1-7.
- [4] Gare N. B., Devkar G. R., Deshmukh M. B., Garud Y. R., Prof. Baviskar A. C., Prof. Bhane A. B., Three-In-One Agricultural Vehicle System,. International Journal of Recent Development in Engineering and Technology Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 4, Issue 4, April 2015),pp.35-37.
- [5] Dr. C.N.Sakhale, Prof. S.N.Waghmare, Rashmi S.Chimote multipurpose farm machine, International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056, Volume: 03 Issue: 09 | Sep-2016,pp.990-995.
- [6] Bhogade P.S, Mandlik A .V, Shinde S. S., Thorat K. A. , Godse S.P, Multipurpose Three In One Agriculture Automation System, International Journal of Advance Engineering and Research Development Technophilia-2018. Volume 5, Special Issue 04, Feb.-2018,pp.1-2.