

Modification of Sweeper Weed Cutter Machine Into Multipurpose Agriculture Machine

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Abstract- Agriculture sector have major share in Indian economy with 60% population depending on agriculture process for their remuneration. Most of the farmers possess small farming land areas. With introduction of mechanization, agriculture processes are becoming more quick and efficient. But cost for this machines and there rent is high. Most of the farmers cannot afford to work with those and opt for the traditional methods. Thus there is need of affordable equipment's which will satisfy most of agricultural needs. This paper focuses on modification of existing engine operated sweeper weed cutting machine into the multipurpose agriculture equipment. The main objective is to fabricate cost effective machine that can be used for multiple farm operations.

Keywords- mechanization, sweeper, fabrication

I. INTRODUCTION

Most of the Indian population is depending on the agriculture and related process. Due to lack of technical knowledge most of the processes are still traditional. Even though mechanization is introduced into agriculture, its use is quite low. The main factor responsible for this problem is that the high cost of farm machineries. Most of the farmers have small share of land in their possession and cannot afford to own these machineries also the hourly rent for these machines is not feasible. thus need of low cost agriculture machines arises. The machine should be value for money. The following machine should have multiple use in agriculture. It should be handy and easy to operate.

The existing engine operated sweeper weed cutting machine can be modified into multipurpose agriculture machine. The current machine consisting of a sweeper blade that cuts the weed during forward motion of machine. The machine body can be modified to house multiple farm equipment.

II. LITERATURE REVIEW

1. D.A. Mada, Mahai, [2013], In this research paper author has mentioned the magnitude of automation in

agricultural field by giving some instance. The conclusion from the paper was need of multifunctional vehicle for pre and post harvesting. We have taken this as base of our research and take further changes in production of our multipurpose agricultural vehicle.

2. Nikhil Patil [2018], in this research paper author has mentioned the design and fabrication of agriculture equipment. Paper concludes that the machine can be useful in tilling, seed sowing, leveling and ploughing operations.

III. SWEEPER WEED CUTTING MACHINE

A. Parts of Sweeper Weed Cutting Machine:

Body: The body is a supporting member of machine. The engine is mounted on this body at front side. The handle is attached to the front side of the engine. The reaper is attached behind the front wheels. The cultivator and the seed sowing arrangement is attached at back side. The bar which is used for making the body is made from mild steel. The length is 36 inch and the width is 24 inch. The overall length of the assembly is 6 ft. and overall height of the assembly is 3ft.

Engine: Engine is the heart of an automobile. It is a device that converts chemical energy of fuel into mechanical energy which is used to drive vehicle. It is basically a device that produces power. In automobile I.C. engines are used. I.C. engine is the engine in which combustion (burning of fuel) takes place inside a cylinder and it suddenly generates a high pressure force. This pressure force generated is used to drive vehicle or rotate wheel by use of some mechanism.

Engine specifications:

Type: two stroke, single cylinder, forced air cooled, 174.44cc engine

Max. power: 6.29Hp@ 5200rpm

Fuel efficiency: 27 kmpl

Max speed: 50kmph

Transmission: four forward gears and one reverse gear

Air Filter: The function of air filter is to remove the moisture and particulate matter present in the air. It passes only fresh air into the carburetor. The carburetor is attached to the filter. An air filter is a device composed of fibrous material which removes solid particulate such as dust, pollen, mold, and bacteria from air. Filter containing an absorbent or catalyst such as charcoal (carbon) may also remove odors and gaseous pollutants such as volatile organic compounds or ozone. Air filters are used in applications where air quality is important, notably in building ventilation system and in engines.

Carburetor: A carburetor is a device that mixes fuel and air together and delivers the mixture to the intake manifold of an internal combustion engine. Early carburetors achieved this by simply allowing air to pass over the surface of the fuel (i.e. gasoline), but most later dispensed a metered amount of fuel into the air stream.

Differential: The differential is a device that splits the engine torque two ways, allowing each output to spin at a different speed. The differential is found on all modern cars and trucks, and also in many all-wheel-drive (full-time four-wheel-drive) vehicles. These all-wheel-drive vehicles need a differential between each set of drive wheels, and they need one between the front and the back wheels as well, because the front wheels travel a different distance through a turn than the rear wheels.

Silencer: When an engine runs, high pressure exhaust gas is released. This causes a pressure wave in the air causing an explosion very fast to form a steady noise. These are two groups of low frequency from 50 HZ to 500 HZ. To reduce the noise, the engine exhaust is connected to an exhaust pipe to the silencer; it is also called a muffler in automobile vehicles. In the muffler, the gases or the polluted air are allowed to expand gradually and to cool.

Drive shaft: A drive shaft, driveshaft, driving shaft, propeller shaft (prop shaft), or Cardan shaft is a mechanical component for transmitting torque and rotation, usually used to connect other components of a drive train that cannot be connected directly because of distance or the need to allow for relative movement between them. As torque carriers, drive shafts are subject to torsion and shear stress, equivalent to the difference between the input torque and the load. They must therefore be strong enough to bear the stress, while avoiding too much additional weight as that would in turn increase their inertia.

To allow for variations in the alignment and distance between the driving and driven components, drive shafts frequently incorporate one or more universal joints, jaw

couplings, or rag joints, and sometimes a splined joint or prismatic joint.

Chain drive: One of the most powerful transmitting components in transportation machines like motor-cycles, bicycles, automobiles, conveyors, agriculture machinery and machine tools. Chain drives are flexible and made of a number of links and it's an intermediate between belts and gears drives. Chains can only be used to transmit power between parallel shafts. Unlike belt drives, chain drives use special toothed wheels called sprockets.

Wheels: Automotive tires go on steering axles and drive axles. As such, they're made to bear the load and provide the traction that motorized rotation and steering require. Trailers, by their very nature, don't have powered wheels, and most don't have steering or brakes. Trailer wheels, which mount on trailer axles, simply have to bear the load of the trailer and its intended cargo.

Blades: Blades are the component which directly interact with soil and as such have a major impact on the operation of the weeder. The blades are the main component of the machine which remove the unwanted trash from the field. It directly contacts with the soil and is inserted into the soil. The grass found in farms which is harmful for the crops. The nutrients which are needed to the crops are taken by this grass, which affects the growth of plants and because of this net profit will be reduced. So the weeder blades are very helpful to remove the trash.

B. Limitations:

1. Weed cutting takes place in forward motion only.
2. The existing machine is based on 3-wheeler arrangements, thus cannot be operated when crops are present.
3. Only weed cutting operation can be done.



Fig. Engine Operated Sweeper Weed Cutter

IV. MODIFICATIONS IN EXISTING MACHINE

Cultivator: A cultivator is any of several types of farm implement used for secondary tillage. One sense of the name refers to frames with teeth (also called shanks) that pierce the soil as they are dragged through it linearly. Another sense refers to machines that use rotary motion of disks or teeth to accomplish a similar result. The rotary tiller is a principal example. Cultivators stir and pulverize the soil, either before planting (to aerate the soil and prepare a smooth, loose seedbed) or after the crop has begun growing (to kill weeds—controlled disturbance of the topsoil close to the crop plants kills the surrounding weeds by uprooting them, burying their leaves to disrupt their photosynthesis, or a combination of both). Unlike a harrow, which disturbs the entire surface of the soil, cultivators are designed to disturb the soil in careful patterns, sparing the crop plants but disrupting the weeds. Cultivators of the toothed type are often similar in form to chisel plows, but their goals are different. Cultivator teeth work near the surface, usually for weed control, whereas chisel plow shanks work deep beneath the surface, breaking up hardpan. Consequently, cultivating also takes much less power per shank than does chisel plowing. Small toothed cultivators pushed or pulled by a single person are used as garden tools for small-scale gardening, such as for the household's own use or for small market gardens. Similarly sized rotary tillers combine the functions of harrow and cultivator into one multipurpose machine

Cultivators are usually either self-propelled or drawn as an attachment behind either a two-wheel tractor or four-wheel tractor. For two-wheel tractors they are usually rigidly fixed and powered via couplings to the tractors' transmission. For four-wheel tractors they are usually attached by means of a three-point hitch and driven by a power take-off (PTO). Drawbar hookup is also still commonly used worldwide. Draft-animal power is sometimes still used today, being somewhat common in developing nations although rare in more industrialized economies.



Fig. cultivator cum seed drill

Seed Drill: A seed drill is a device that sows the seeds for crops by metering out the individual seeds, positioning them in the soil, and covering them to a

certain average depth. This makes sure the seed will be placed evenly. The seed drill sows the seeds at equal distances and proper depth, ensuring that the seeds get covered with soil and are saved from being eaten by birds and being blown by the wind. This allows plants to get sufficient sunlight, nutrients, and water from the soil. Before the introduction of the seed drill, a common practice was to plant seeds by hand. Besides being wasteful, planting was usually imprecise and led to a poor distribution of seeds, leading to low productivity. The use of a seed drill can improve the ratio of crop yield (seeds harvested per seed planted) by as much as nine times. Some machines for metering out seeds for planting are called planters. The concepts evolved from ancient

Sweeper Blades: Blades are the component which directly interact with soil and ass such have major impact on the operation of weeds. The blades are the main component of the machine which remove unwanted trash from the field. It directly contacted with seed and inserted into soil.

Sprayer: Sprayers are commonly used on farms to spray pesticides, herbicides, fungicides, and defoliant as a means of crop quality control. There are many kinds of machine-operated sprayers, the most common of which are low-pressure, high-pressure, air-carrier, and fogger types. Insects and weeds are largely responsible for the crop destruction. In modern horticulture and agriculture, insecticides/pesticides, a man made or natural preparation are used to kill insects or otherwise control their reproduction. These herbicides, pesticides, and fertilizers are applied to agricultural crops with the help of a special device known as a "Sprayer." Based on the concept of high or low pressure, sprayer provides optimum performance with minimum efforts.



Fig. sweeper blades

V. ADVANTAGES

1. Following machine can perform multiple farm operations like tilling, spraying, weed cutting, seed sowing etc.
2. Simultaneous operations can be done like spraying and tilling can be done at same time.
3. The following machine is handy and easy to operate.
4. The cost of fabrication is low.



Fig. Multipurpose agriculture machine

VI. CONCLUSION

This machine is useful in multiple agriculture operations like tilling, seed sowing, spraying etc. the machine is cost effective and handy. Can be easily operated by farmer. Simultaneous operations can be done on this machine, reducing the total work time.

VII. FUTRE SCOPE

The multipurpose machine can be equipped with solar operated pump for spraying. Also the grass cutter can be added to the machine.

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