Modern Multipurpose Plant Cutting Machine.

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ABSTRACT

The objective 'modern plant cutting machine' is to come up with a mover that is portable, durable, easy to operate and maintain .It comprises of a system of speed multiplication pulleys which drive the cutting blades and lift mechanism meant to alter the height of the cut. This is achieved by means of a system of chain with minimum slip effect; collapsible blades to reduce the common problem of wear. The prime mover is used as tractor having high efficiency with small amount of human effort. Thus, the machine is considered highly efficient and is readily adaptable to different cutting conditions. Now, in India the plant cutting is done by manually i.e. by the application of human effort. So on behalf of these types of plant cutting we have to made 'modern plant cutting machine' which is efficient, less noisy , portable and less time consuming .the basic idea is that we have made plant cutter with prime mover as tractor that runs from a 20 HP. Road accidents are now globally recognized as a serious public health problem. Those of the accident are because of the cutting of plant is not regularly and animals are not appeared to driver which comes with in front of the cars, bikes.

Keyword:- *Plant cutting machine, Prime mover, Cutting blades, Less human efforts, Cheaper, Reduced road accident, etc.*

1. INTRODUCTION

A plant cutter is a machine that uses revolving blades, to cut a garden land spaces, at an even length. Plant cutters using a blade that rotates about a vertical axis are called as cutters, while those operated in horizontal axis are known as cylinder or reel cutters. Many different designs have been made, each suited to a particular purpose. The different small types, driven by a human, are suitable for small residential lawns and gardens, while larger device ride-on mowers are suitable for large lawns, and the largest, multi-gang mowers pulled behind a prime mover such as a tractor, are designed for large expanses of grass such as golf courses and municipal parks.

The present technology commonly used for trimming the plant is by using the manually handle device. In this project we have automated the machine for trimming the plant. The device consists of blade which is operated with the help of a prime mover. The power supply for the motion is by using tractor. In a time where technology is developing with environmental awareness, consumers are looking for ways to contribute to the relief of their own carbon footprints. Pollution is man-made and can be seen in our own daily lives, more specifically in our own homes.

Our new project design relevant to modern life instead old habit will greatly help both customer and the environment. This project of a modern plant cutter will relieve the consumer from mowing their own lawns, farms and will reduce human efforts. The hope is to keep working on this project until a suitable design can be implemented and then be ultimately placed on the market. As the mower moves forward, the rotating blades come in contact with leaves, bushes, plants and grasses. The mower is adjusted to various cutting heights. Rotary mowers are often powered either by an internal combustion engine or an electric motor and are generally moved manually, with the engine only spinning the cutting blades. The most common types are fitted with wheels, but our design involves a tractor which is used for covering major areas of work. Some are attached with a grass collector at the exit point. The blade is seldom sharp enough to give a neat cutting.

1.1 PROBLEM DEFINITION

The modern multipurpose plant cutter is exist in Japan but does not exist in our country and this machine is operated on hydraulic power given from prime mover. The cost of this machine is very high i.e. up to 20 lakh so this machine is expensive for purchasing this equipment for human or PWD. Also small types of lawn movers are also available in market but it is used for only grass cutting in horizontal direction

We are trying to develop a new technology i.e. A Modern multipurpose plant cutting machine which is operated by using a prime mover as a tractor having capacity is 15HP. This machine can cut the plants in horizontal and vertical direction.

2. COMPONENTS OF PLANT CUTTING MACHINE

2.1 PRIME MOVER (TRACTOR)

Mahindra Yuvraj having capacity of 15 HP is a compact tractor with different style and solid performance. Ease of operation and fuel efficiency makes the Yuvraj 215NXT the ideal tractor for land holding and inter-culture operations.

Mahindra Yuvraj 215NXT is specially designed for agricultural crops cutting like Bajra, Wheat, Cotton and many more. Its unique compact design and adjustable rear track width makes it ideal for operating it between two crop rows as well as in orchards for a variety of inter culture applications. It is used by farmers majorly for various multiple applications like cultivation, sowing, threshing, spraying operation as well as haulage operations.

Fig-1: Prime mover (Tractor)

2.2 DRIVE TRAIN

Power is transmitted by a shielded universal joint to single speed, 2:1 ratio gearbox. The input shaft of the gearbox is spline to permit easy removal and installation of the universal joint.

2.3 BEARINGS

High capacity Timken and self- aligning ball bearing are a grease type bearing with seal incorporated. The bearing is locked to the shaft with cam lock collars.

Fig-2: Bearings

2.4 ROTORS

The rotor is the comprised of series of flanges uniformly positioned and fitted with four blades per flanges .four bolts per flanges with self- locking nut ,are required to hold blades in placed.

The optimum and recommended working rotor speed is 240rpm.The formula is used to determine the speed achieved with your tractor is;

P.T.O rpm + 2*0.59= Rotor speed

However, a lower 160 rpm may be used and can be obtained by using 540 rpm tractor P.T.O. speed. Remember that the tractor P.T.O. speed is achieved at a curtained engine rpm.

2.5 POWER TACK OF SHAFT

The P.T.O. is packaged separately from the machine. The standard P.T.O. is a shear bolt type universal joint assembly which is designed to protect the machine as well as tractor PTO. Periodic lubrication required. Checked routine maintenance and lubrication section for further information.

Fig-3: Power tack of shaft

2.6 UNIVERSAL JOINT

The universal joint is known to be one of the oldest of all flexible couplings. It is commonly popular for its use on automobiles and heavy duty vehicles such as trucks, buses, etc. A universal joint is made up of two shaft yokes at right angles (90 degree) to each other and a four point cross which joins the yokes. The cross fits inside the assemblies of bearing cap, which are pressed into the yoke eyes. Industrial applications operate continuously and with high torque loads. This needs maximum strength and long life of the universal joint components. The modern universal joint has become much more complex than its simple ancestor.

Fig-4: Universal joint

2.7 GEAR HOUSING

It used to transitions of power from the PTO shaft through universal joint to the plant cutting machine. Dynamic finite element analysis of real gear housing is presented. The analysis was carried out for the housing without the rotating components (gears, shafts, and bearings). Both rigid and flexible mounting conditions for the gear housing are considered in this analysis. The flexuous support simulates the realistic mounting condition on a

rotorcraft, and the rigid one is analyzed for comparison purposes. The effect of gear housing stiffeners is also evaluated.

Fig-5: Gear housing

2.8 CHAIN DRIVE

A chain drive consist of an endless chain running around two sprocket wheels as shown in fig 4.4The chain drive have features which are common to both the gear drives and the belt drives. The chain drive does not slip. It is positive drive compared to belt drive. The chain drives can be used for long as well as short center distance. The chain drives are compact as compared to belt drives. The chain drives can operate higher temperature than the belt drives. The chain drives are used for speed ratio upto 150 kW.

Fig-6: Chain drive

2.9 CUTTERS (BLADES)

A circular saw is a power saw having a toothed or abrasive disc or blade for cutting different leaves using a rotary motion spinning around a arbor's hole saw and a ring cutter also uses a rotary motion but is different from a circular saws and may also be loosely used for the blade itself. Circular saws where invented in the late 18th century.

A tool known as circular saw is used for cutting many materials such as woods, plastic or metal and may be hand- held or mounted to machine. In wood working the term circular saw indicates specifically to the hand-held type and the table saw and chop saw are other common forms of circular saw.

Fig-7: Cutting blades

3. WORKING PRINCIPLE

The modern multipurpose plant cutting machine can be operating by using the prime mover i.e. tractor having capacity 15 HP. When the tractor is started the hand lever is operated manually then the rotor or spline shaft started rotating. The power of spline shaft is transferred through the universal joint to the gear housing of machine by the application of bevel gears. The bevel gears used in this plant cutting machine for the transformation of power by 90 degree. The long shaft is connected to the bevel gear which transforms power perpendicularly to the sprocket mechanism. The chain drive is used for the transmitting the power from the sprocket mechanism to the cutter.

The speed variation or speed ratio can be varied by changing the diameter of the sprockets. When chain drive operates this motion is transferred to the saw cutter in vertical direction. The cutting action will be developed by variation of the spindle speed. The motion of the cutter can be developed by using the hydraulic lifter. There are primarily two types of mowers, namely the reel mowers, and the rotary mowers. The reel (cylindrical) mowers seem to be better. Made of blades on a revolving cylinder, they achieve clean cut by scissors action.

4. CONCLUSION

The modern multipurpose plant cutting machine is cheap and easy to handle for user. The machine is used for various application of agriculture such as cutting of pomegranate. This is machine is used for the cutting on road divider plant in vertical direction and grass cutting of garden in horizontal direction and cultivation of garden. This Machine is very cheap and easy to operate.

5. REFERENCES

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