DESIGN AND FABRICATION OF AUTOMATED SPADE

MAIN PROJECT REPORT

Submitted in partial fulfillment for the award of B.Tech degree Course in Mechanical engineering from university of Calicut during the year 2016-17

Submitted by

MUHAMMAD FAKRUDHEEN	**JLANEME072**
NIDHIN P KAREEM	**JLANEME077**
RAGESH V K	**JLANEME085**
SACHIN CHANDRASHEKAR N R	**JLANEME093**
SHINU K J	**JLANEME102**
SUJESH M	**JLANEME111**
NIDHIN KRISHNA P U	**JLANEME130**

Guided by,

Mr. ANUMODH MENON

(Asst. Prof. Mechanical Dept.)

DEPARTMENT OF MECHANICAL ENGINEERING

JAWAHARLAL COLLEGE OF ENGINEERING AND TECHNOLOGY

LAKKIDI, OTTAPALAM, PALAKKAD, KERALA

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ABSTRACT

Here fabrication of Automated spade is mainly reducing the manual effort and increasing the efficiency while the operations of the farmers. Agriculture is cultivation of animals, plants, fungi, and other life forms for food, fiber, bio fuel, medicinal and other products used to sustain and enhance human life. Agriculture was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that nurtured the development of civilization.

In this project all the components are placed on the base frame. There are four wheels to move this vehicle. The fuel tank is connected with the engine for the continuous supply of fuel to the engine. The engine shaft is connected with a worm drive. The worm gear is attached with a soil cutter. We have to start the engine and move the vehicle in the respective direction. So that the worm gear will rotate with respect to the engine speed, here worm gear is used to minimize the speed of the engine. When the worm gear rotates the blade attached to it also rotates and dig the soil. Hence, by using this method we can easily finish the digging process in agriculture.

This project has a huge scope in the future as this can be used in all gardening purposes and this can be used under Solar power by means of Solar panels and help in eco-friendly pollution free purposes and hence make this system further compact by complete automation using advanced electronic systems and thus has an Incredible future and can be used in almost all gardening purposes to replace conventional spade.

CHAPTER 1
INTRODUCTION

Here fabrication of Automated spade is mainly reducing the manual effort and increasing the efficiency whilethe operations of the farmers.In this project all the components are placed on the base frame. There are four wheels to move this vehicle. The fuel tank is connected with the engine for the continuous supply of fuel to the engine. The engine shaft is connected with a worm drive. The worm gear is attached with a soil cutter.We have to start the engine and move the vehicle in the respective direction. So that the worm gear will rotate with respect to the engine speed, here worm gear is used to minimize the speed of the engine.A worm drive is a gear arrangement in which a worm (which is a gear in the form of a screw) meshes with a worm gear (which is similar in appearance to a spur gear). The two elements are also called the worm screw and worm wheel. The terminology is often confused by imprecise use of the term worm gear to refer to the worm, the worm gear, or the worm drive as a unit. When the worm gear rotates the blade attached to it also rotates and dig the soil. Hence, by using this method we can easily finish the digging process in agriculture.

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Agriculture was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that nurtured the development of civilization. The study of agriculture is known as agricultural science. The history of agriculture dates back thousands of years, and its development has been driven and defined by greatly different climates, cultures, and technologies. However, all farming generally relies on techniques to expand and maintain the lands that are suitable for raising domesticated species. For plants, this usually requires some form of irrigation, although there are methods of dry land farming.

Livestock are raised in a combination of grassland-based and landless systems, in an industry that covers almost one-third of the world's ice- and water-free area. In the developed world, industrial agriculture based on large-scale monoculture has become the dominant system of modern farming, although there is growing support for sustainable agriculture, including permaculture and organic agriculture.

CHAPTER 2

LITERATURE REVIEW

Paul Hughes (3 March 2011). "Castlepollard venue to host Westmeath ploughing finals". Westmeath Examiner.Retrieved 1 June 2011[1].Modern agriculture depends heavily on engineering, technology and the biological and physical sciences. Irrigation, drainage, conservation and channelling are all important fields to guarantee success in agriculture and require the expertise of agricultural engineers. Agricultural chemistry deals with other issues vital to agriculture, such as the use of fertilizers, insecticides and fungicides, soil structure, analysis of agricultural products and the nutritional needs of farm animals. Plant breeding and genetics represents an invaluable contribution to agricultural productivity.

Genetics has also introduced a scientific basis in animal husbandry. Hydroponics, a method in which plants thrive without soil by chemical nutrient solutions can solve other additional agricultural problems. The packaging, processing and marketing are closely related activities also influenced by the development of science. The methods of rapid freezing and dehydration have increased the markets for agricultural products. Mechanization, the outstanding feature of agriculture in the late nineteenth and twentieth century has relieved much the work of the farmer. Even more significantly, mechanization has increased efficiency and productivity of farms

The Performance of Rotary Power Tiller Using Prototype Rotary Blades in Arizona Field Examiner. Retrieved 1 June 2012[2]. That the effect of various shape of prototype rotary blades on the performance of rotary power tiller. The test was conducted in a dry-land field. The experimental results showed that the mean soil clod diameter decreased and soil inversion increased with increasing rotational speed of the rotor. The mean soil clod diameter decreased at pass 2. Soil inversion during pass 2 was higher than pass 1. There is no significant difference on mean soil clod diameter and soil inversion. Also it results that the Japanese C-shaped blade is better than any other type. B. Rotary Tiller Design Proportional to a Power Tiller using Specific Work Method (SWM). That the total specific work is the sum of static and dynamic specific work of the tiller. For selecting work width of tiller maximum benefit power of the power tiller was considered, which it could be decreased by increasing work speed. Again it was revealed that the addition of torsional moment the flexural moment was also effective on system safety design. The investigation of conclude that the power tiller selected for supporting the rotary tiller, could only pull the rotary tiller at first heavy gear..

Jethro Tull's seed drill (ca. 1701) was a mechanical seed spacing and depth placing device that increased crop yields and saved seed[3]. It was an important factor in the British Agricultural Revolution. Since the beginning of agriculture threshing was done by hand with a flail, requiring a great deal of labor. The threshing machine, which was invented in 1794 but not widely used for several more decades, simplified the operation and allowed the use of animal power. Before the invention of the grain cradle (ca. 1790) an able bodied laborer could reap about one quarter acre of wheat in a day using a sickle. It was estimated that for each of Cyrus McCormick's horse pulled reapers (ca. 1830s) freed up five men for military service in the U.S. Civil War. Later innovations included raking and binding machines. By 1890 two men and two horses could cut, rake and bind 20 acres of wheat per day. In the 1880s the reaper and threshing machine were combined into the combine harvester. These machines required large teams of horses or mules to pull. Steam power was applied to threshing machines in the late 19th century. There were steam engines that moved around on wheels under their own power for supplying temporary power to stationary threshing machines. These were called road engines, and Henry Ford seeing one as a boy was inspired to build an automobile. With internal combustion came the first modern tractors in the early 1900s, becoming more popular after the Fordson tractor (ca. 1917).

At first reapers and combine harvesters were pulled by tractors, but in the 1930s self powered combines were developed. (Link to a chapter on agricultural mechanisation in the 20th Century at reference) Advertising for motorized equipment in farm journals during this era did its best to compete against horse-drawn methods with economic arguments, extolling common themes such as that a tractor "eats only when it works", that one tractor could replace many horses, and that mechanisation could allow one man to get more work done per day than he ever had before. The horse population in the U.S. began to decline in the 1920s after the conversion of agriculture and transportation to internal combustion. Peak tractor sales in the U.S. were around 1950. In addition to saving labor, this freed up much land previously used for supporting draft animals.

The greatest period of growth in agricultural productivity in the U.S. was from the 1940s to the 1970s, during which time agriculture was benefiting from internal combustion powered tractors and combine harvesters, chemical fertilizers and the green revolution. Although farmers of corn, wheat, soy, and other commodity crops had replaced most of their workers with harvesting machines and combines enabling them to efficiently cut and gather grains, growers of produce continued to rely on human pickers to avoid the bruising of the product in order to maintain the blemish-free appearance demanded of consumers.

The continuous supply of illegal workers from Latin America that were willing to harvest the crops for low wages further suppressed the need for mechanization. As the number of illegal workers has continued to decline since reaching its peak in 2007 due to increased border patrols and an improving Mexican economy, the industry is increasing the use of mechanization. Proponents argue that mechanization will boost productivity and help to maintain low food prices while farm worker advocates assert that it will eliminate jobs and will give an advantage to large growers who are able to afford the required equipment. Since the beginning of agriculture threshing was done by hand with a flail, requiring a great deal of labor.

The threshing machine, which was invented in 1794 but not widely used for several more decades, simplified the operation and allowed the use of animal power. Before the invention of the grain cradle (ca. 1790) an able bodied laborer could reap about one quarter acre of wheat in a day using a sickle. It was estimated that for each of Cyrus McCormick's horse pulled reapers (ca. 1830s) freed up five men for military service in the U.S. Civil War.

Later innovations included raking and binding machines. By 1890 two men and two horses could cut, rake and bind 20 acres of wheat per day. In the 1880s the reaper and threshing machine were combined into the combine harvester. These machines required large teams of horses or mules to pull. Steam power was applied to threshing

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CHAPTER 3

DESCRIPTION OF EQUIPMENTS

3.1PETROL ENGINE:

A Petrol engine or Gasoline engine is an internal combustion engine with spark-ignition designed to run on petrol (gasoline) and similar explosive fuels. It differs from a diesel engine in the method of mixing the fuel and air, and in the fact that it uses spark plugs. In a diesel engine, just the air is compressed, and the fuel is injected at the end of the compression stroke. In a petrol engine, the fuel and air are pre-mixed before compression injection. Pre-mixing of fuel and air allows a petrol engine to run at a much higher speed than a diesel, but severely limits their compression, and thus efficiency.

The compression ratio is the ratio between the cylinder volumes at the beginning and end of the compression stroke. The higher the compression ratio, the higher the efficiency of the engine. Petrol engines may run on the four-stroke cycle or the two-stroke cycle.Common cylinder arrangements are from 1 to 6 cylinders in-line or from 2 to 16 cylinders in V-formation. Alternatives include Rotary and Radial Engines the latter typically have 7 or 9 cylinders in a single ring, or 10 or 14 cylinders in two rings. Petrol engines have many applications, including:

- Motor cars
- Motorcycles
- Aircraft
- Motorboats
- Small machines, such as lawn mowers, chainsaws and portable Engine-generators

3.2 WORKING OF FOUR- STROKE ENGINE:

A four-stroke engine is the most common type used in automobiles. The four strokes are intake, compression, power, and exhaust. Each stroke requires approximately 180 degrees of crankshaft (or flywheel) rotation, so the complete cycle would take 720 degrees. Each stroke plays a very important role in the combustion process, and each has a different pressure surrounding it.

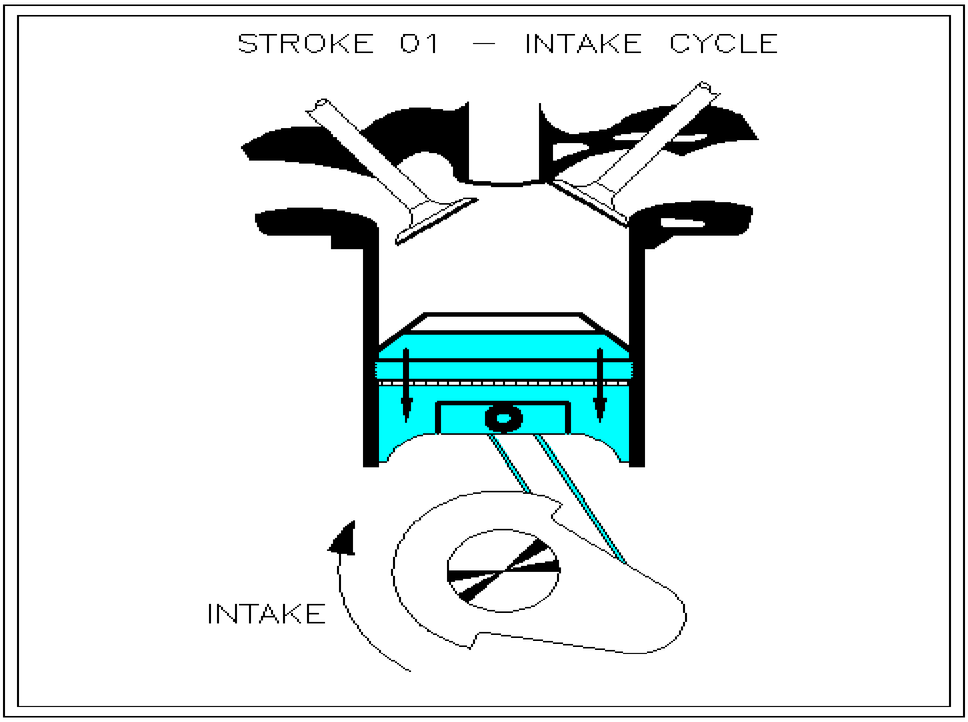

Fig 3.1 Suction

In the intake cycle, as the picture shows, the piston is moving downward while one of the valves is open. This creates a vacuum, and an air-fuel mixture is sucked into the chamber. This would be cause for very little pressure on the piston, so P is small.

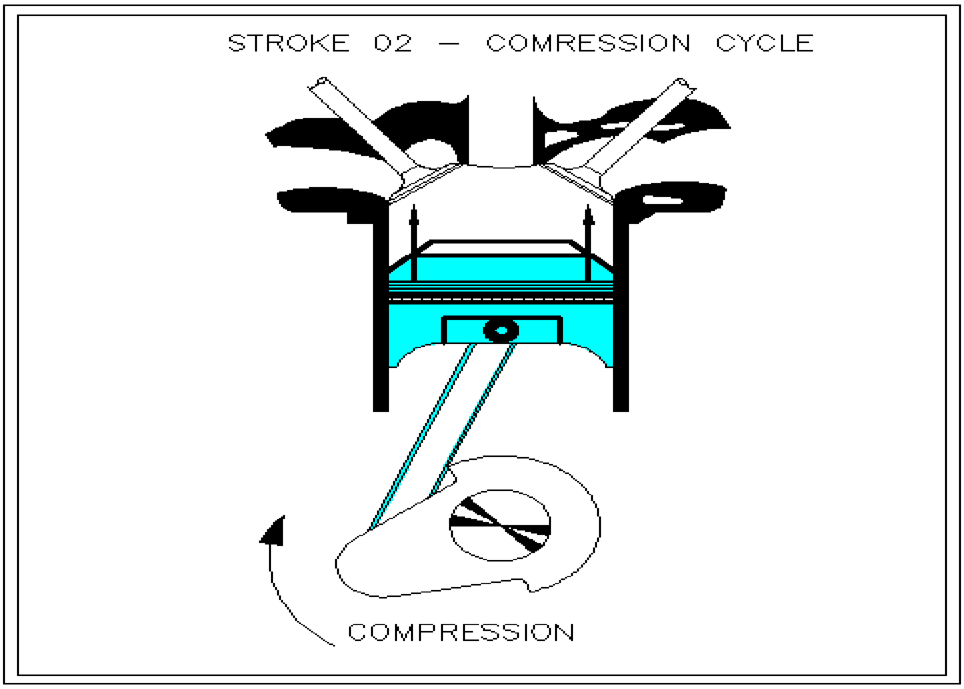

Fig 3.2Compression

Moving on to compression, we can see that both valves are closed, and the piston is moving upward. This creates a much larger amount of pressure on the piston, so we would have a different representation of P in our equation for this stroke.

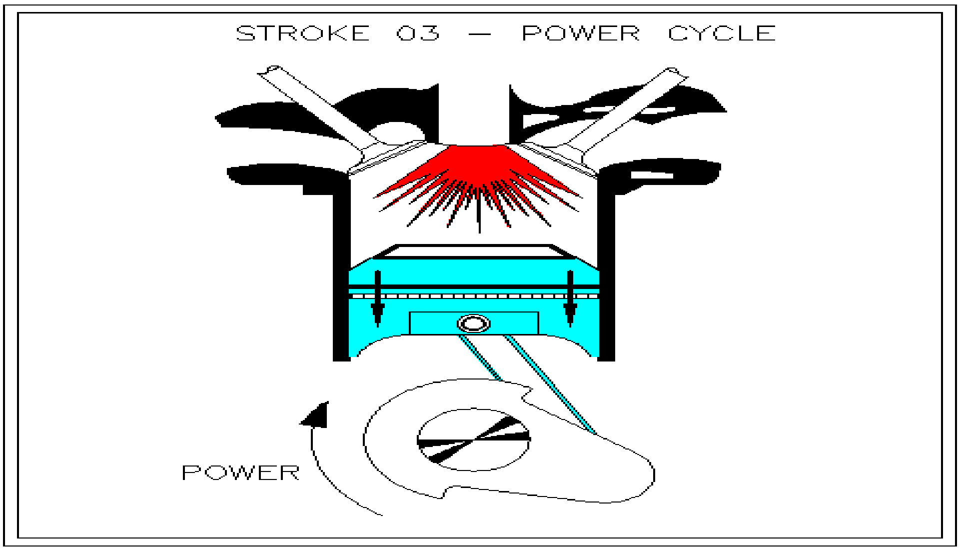

Fig 3.3 Power stroke

The next stroke is the big one power. This is where the compressed air-fuel mixture is ignited with a spark, causing a tremendous jump in pressure as the fuel burns. The pressure seems to "spike", so the most cause for concern occurs here.

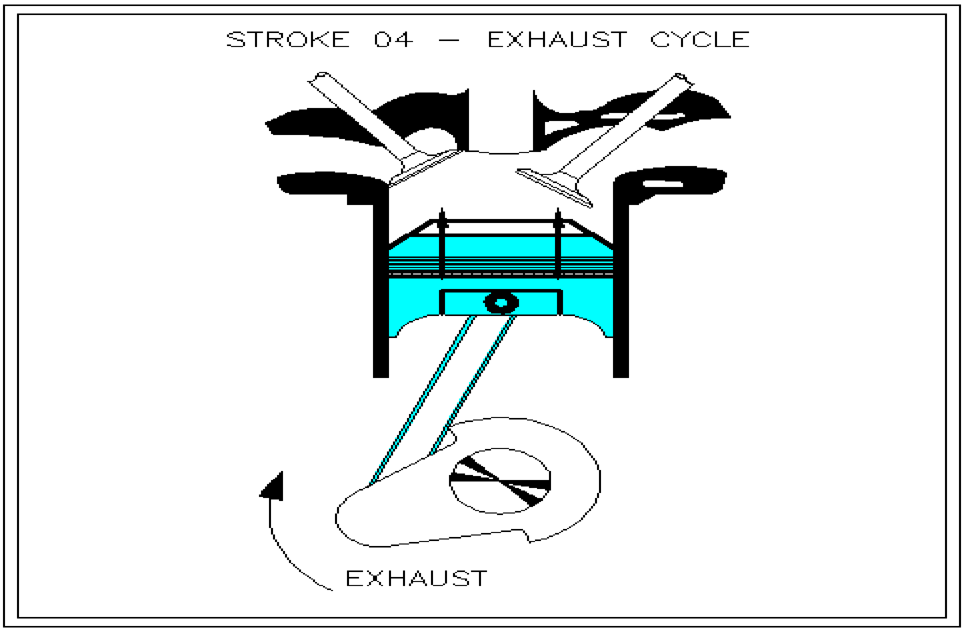

Fig 3. 4Exhaust

Finally, we have the exhaust stroke. In this stroke, the exhaust valve is open, once again creating a chamber of low pressure. So, as the piston moves back upwards, it forces all the air out of the chamber. The pressure in this region is therefore considered very low.

3.3 WORM DRIVE:

A worm drive is a gear arrangement in which a worm (which is a gear in the form of a screw) meshes with a worm gear (which is similar in appearance to a spur gear). The two elements are also called the worm screw and worm wheel. The terminology is often confused by imprecise use of the term worm gear to refer to the worm, the worm gear, or the worm drive as a unit.

Like other gear arrangements, a worm drive can reduce rotational speed or transmit higher torque. A worm is an example of a screw, one of the six simple machines.

A gearbox designed using a worm and worm-wheel is considerably smaller than one made from plain spur gears, and has its drive axes at 90° to each other. With a single start worm, for each 360° turn of the worm, the worm-gear advances only one tooth of the gear. Therefore, regardless of the worm's size (sensible engineering limits notwithstanding), the gear ratio is the "size of the worm gear - to - 1". Given a single start worm, a 20 tooth worm gear reduces the speed by the ratio of 20:1. With spur gears, a gear of 12 teeth must match with a 240 tooth gear to achieve the same 20:1 ratio. Therefore, if the diametrical pitch (DP) of each gear is the same, then, in terms of the physical size of the 240 tooth gear to that of the 20 tooth gear, the worm arrangement is considerably smaller in volume.

3.4 ROTOR

A Rotor is a circular device that is capable of rotating on its axis, facilitating movement or transportation or performing labor in machines. A Rotor together with an axle overcomes friction by facilitating motion by rolling. In order for Rotors to rotate a moment needs to be applied to the Rotor about its axis, either by way of gravity or by application of another external force. Common examples are found in transportapplications. More generally the term is also used for other circular objects that rotate or turn, such as a Ship's Rotor. The Rotor most likely originated in ancient.

The Rotor is a device that enables efficient movement of an object across a surface where there is a force pressing the object to the surface. Common examples are a cart drawn by a horse, and the rollers on an aircraft flap mechanism.

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The Rotor is not a machine, and should not be confused with the Rotor and axle, one of the simple machines. A driven Rotor is a special case that is a Rotor and axle. Rotors are used in conjunction with axles, either the Rotor turns on the axle or the axle turns in the object body. The mechanics are the same in either case. The normal force at the sliding interface is the same. The sliding distance is reduced for a given distance of travel. The coefficient of friction at the interface is usually lower.

CHAPTER 4

LIST OF MATERIALS

4.1 Factors determining the choice of materials

The various factors which determine the choice of material are discussed below.

1. PROPERTIES

The material selected must posses the necessary properties for the proposed application. The various requirements to be satisfied

Can be weight, surface finish, rigidity, ability to withstand environmental attack from chemicals, service life, reliability etc.

The following four types of principle properties of materials decisively affect their selection

- Physical
- Mechanical
- From manufacturing point of view
- Chemical

The various physical properties concerned are melting point, thermal Conductivity, specific heat, coefficient of thermal expansion, specific gravity, electrical conductivity, magnetic purposes etc.

The various Mechanical properties Concerned are strength in tensile,

Compressive shear, bending, torsion and buckling load, fatigue resistance, impact resistance, elastic limit, endurance limit, and modulus of elasticity, hardness, wear resistance and sliding properties.

The various properties concerned from the manufacturing point of view are,

- Cast ability
- Weld ability
- Surface properties
- Shrinkage
- Deep drawing etc.

2. MANUFACTURING CASE

Sometimes the demand for lowest possible manufacturing cost or surface qualities obtainable by the application of suitable coating substances may demand the use of special materials.

3. QUALITY REQUIRED

This generally affects the manufacturing process and ultimately the material. For example, it would never be desirable to go casting of a less number of components which can be fabricated much more economically by welding or hand forging the steel.

4. AVAILABILITY OF MATERIAL

Some materials may be scarce or in short supply, it then becomes obligatory for the designer to use some other material which though may not be a perfect substitute for the material designed. The delivery of materials and the delivery date of product should also be kept in mind.

5. SPACE CONSIDERATION

Sometimes high strength materials have to be selected because the forces involved are high and space limitations are there.

6. COST

As in any other problem, in selection of material the cost of material plays an important part and should not be ignored.

Some times factors like scrap utilization, appearance, and non-maintenance of the designed part are involved in the selection of proper materials.

CHAPTER 5

DESIGN AND DRAWING

5.1MACHINE COMPONENTS:

The soil digging machine is consists of the following components to full fill the requirements of complete operation of the machine.

1. ENGINE
2. WORM GEAR DRIVE
3. CUTTER
4. FRAME

1. ENGINE

In this project 52cc SAMSON single cylinder four stroke engine is used. The engine provide work torque for the system. This engine output coupled with a shaft. At the end of the shaft a worm gear is milled.A four-stroke engine is the most common type used in automobiles. The four strokes are intake, compression, power, and exhaust. Each stroke requires approximately 180 degrees of crankshaft (or flywheel) rotation, so the complete cycle would take 720 degrees. Each stroke plays a very important role in the combustion process, and each has a different pressure surrounding it.

Fig. 5.1 Engine

2. WORM GEAR DRIVE

The worm gear drive is specially designed to reduce speed and provide maximum torque to the cutter. The worm gear drive system consist of a worm gear and worm wheel. Worm gear is milled at the end of engine output shaft. The worm wheel is meshed with worm gear. It is coupled with to the cutter. The worm gear drive system is made up of cast iron.

A gearbox designed using a worm and worm-wheel is considerably smaller than one made from plain spur gears, and has its drive axes at 90° to each other. With a single start worm, for each 360° turn of the worm, the worm-gear advances only one tooth of the gear.

Fig. 5.2 Worm Gear and Wheel

3. CUTTER

The Cutter is made by arranging two sets of rotors having oppositely inclined blades and this helps in digging of soil. This helps in efficient digging of soil with ease and the material employed to make the blades is Cast Iron. This is directly coupled with worm wheel and thus it enhances Torque and thus reducing its speed and this increases the stability of the Rotor and even distribution of Torque to the entire system.

A Rotor is a circular device that is capable of rotating on its axis, facilitating movement or transportation or performing labor in machines.

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A Rotor together with an axle overcomes friction by facilitating motion by rolling. In order for Rotors to rotate a moment needs to be applied to the Rotor about its axis, either by way of gravity or by application of another external force.

Fig. 5.3 Rotor 1

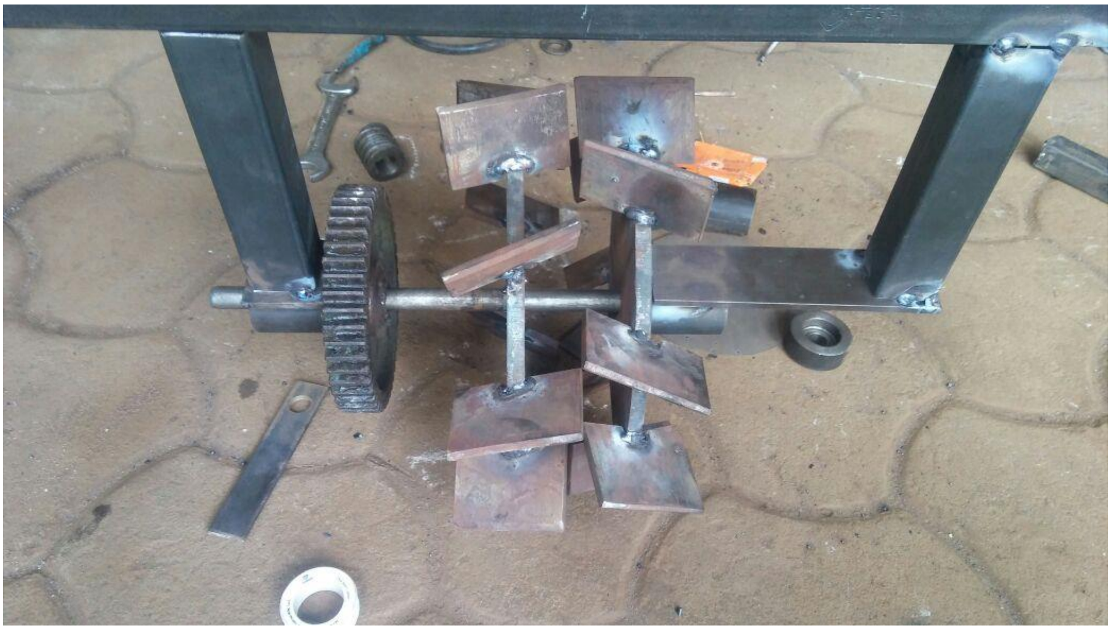

Fig. 5.4 Rotor 2

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4. FRAME

The Frame is to provide support to the entire system and thus this helps the driver to direct rhe machinery with its handle. And this is most preferentially the Most predominant weight of the machine and thus the material used directly determines the weight.

Fig. 5.5 Frame

5.2 DRAWING FOR AUTOMATED SPADE

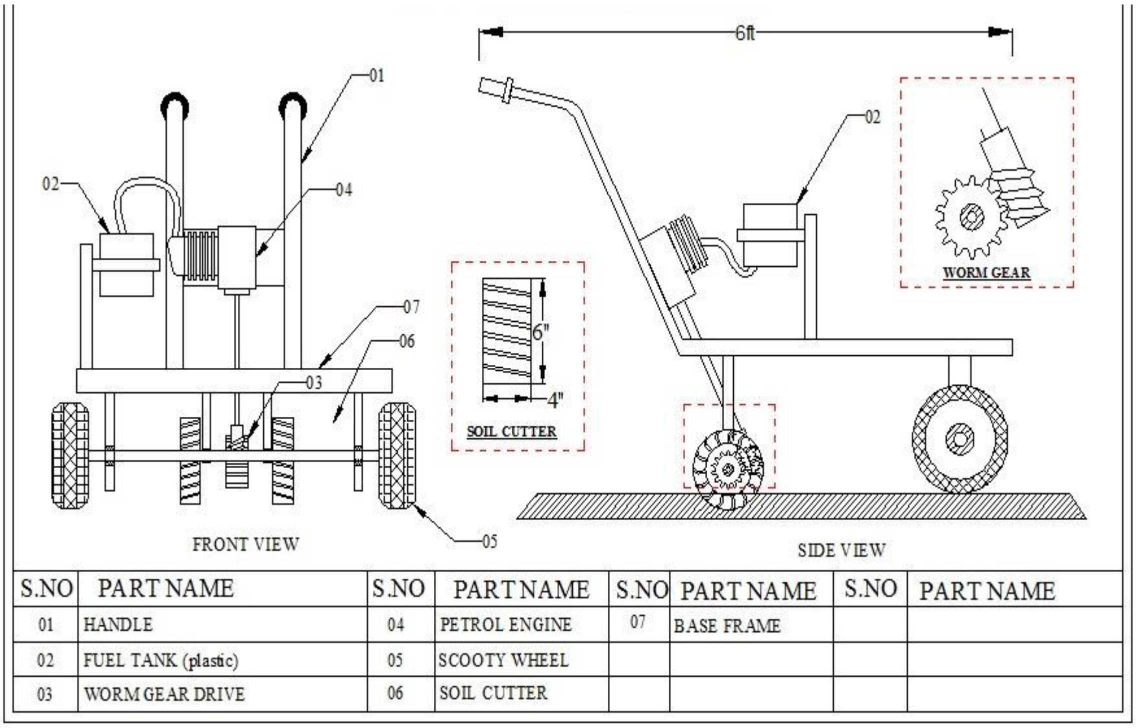

Fig: 5.6 Drawing

CHAPTER 6

WORKING PRINCIPLE

In the project, all the components are placed on the base frame. There are four wheels to move this vehicle. The fuel tank is connected with the engine for the continuous supply of fuel to the engine. The engine shaft is connected with a worm drive. The worm gear is attached with a soil cutter.The source of power in this system is derived from the Four stroke petrol engine and engine shaft is attached to worm gear and Worm gear helps in reducing the speed thereby increasing the Output Torque and this worm gear is coupled with worm wheel and this worm gear helps in changing the direction of transmission and is connected to rotor consisting of double array of blades that are oppositely inclined to each other.

This rotor need high stability for the perfect transmission ratio.In this project all the components are placed on the base frame. There are four wheels to move this vehicle. The fuel tank is connected with the engine for the continuous supply of fuel to the engine. The engine shaft is connected with a worm drive.

The worm gear is attached with a soil cutter.We have to start the engine and move the vehicle in the respective direction. So that the worm gear will rotate with respect to the engine speed, here worm gear is used to minimize the speed of the engine. When the worm gear rotates the blade attached to it also rotates and dig the soil. Hence, by using this method we can easily finish the digging process in agriculture.

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CHAPTER 7
DESIGN CALCULATIONS

The various calculations involved in the design and fabrication of the model are as follows:

7.1 Engine calculation:

Bore diameter = 4.5cm =450mm

Stroke length =9.6cm =960mm

To find:

7.2 Displacement:

Displacement= $(\pi/4)$ * square of bore diameter * length of the stroke * no. of strokes

D= (3.14/4)*4.5^2*9.6*4

D =610.76 cc = 0.611 liters

Cylinder Swept Volume (Vc):

V_c= Cylinder Area x Stroke length

$V_c = A_c \text{ x } L = \frac{\pi}{4}(D_C^2) \times L$

where:

V_c= cyl inder swept volume [cm^3 (cc) or L]

A_c = cylinder area [cm^2 or cm^2/100]

d_c = cylinder diameter [cm or cm/10]

L = stroke length (the distance between the TDC and BDC) [cm or cm/10]

BDC = Bottom Dead Center

TDC = Top Dead Center

$V_c = \pi/4$ * square of cylinder diameter * stroke length

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$= \pi/4 * 4.5^2 * 9.6$

$= 152.68\ cm^3$

7.3 Engine swept volume (V_e):

Engine swept volume (V_e) **=** Total Cylinder's Swept Volume of the Engine

$V_e = n \times V_e$

$V_e = n \times A_c \times L = n \times (\frac{\pi}{4} d_c^2) \times L$

where

V_e = engine swept volume [cm^3 (cc) or L]

n = number of cylinders

V_c = cylinder swept volume [cm^3 (cc) or L]

A_c = cylinder area [cm^2 or $cm^2/100$]

d_c = cylinder diameter [cm or cm/10]

V_e = number of cylinder $* \pi/4 *$ square of cylinder diameter * stroke length

$= 1 * \pi/4 * 4.5^2 * 9.6$

$= 152.68\ cm^3$

7.4 Engine Indicated Torque (Ti):

Engine Indicated Torque (Ti) $= \frac{Work(W)}{Angle(\theta)} = \frac{Work\ per\ one\ revolution}{Angle\ of\ one\ revolution} = \frac{Force \times distance}{2\pi} \times n$

$$T_i = \frac{(imep \times A_c) \times L \times n}{2\pi \times z} = \frac{imep \times V_e}{2\pi \times z}$$

Where,

imep = indicated mean effective pressure [N/m^2]= 2 bar

A_c = cylinder area [m^2]

L = stroke length [m]

z = 1 (for 2 stroke engines), 2 (for 4 stroke engines)

n = number of cylinders

θ = crank shaft angle [1/s]

T_i =(20* $\pi/4$ *4.5^2 * 9.6 * 1) / (2 π * 2)

= 243 N cm

7.5 Engine indicated power (P_i):

Engine indicated power ,

$$P_i = \frac{imep \times A_c \times L \times n \times N}{z \times 60}$$

$$= \frac{imep \times (A_c \times L) \times n \times N}{z \times 60} = \frac{imep \times (V_c \times n) \times N}{z \times 60}$$

$$= \frac{imep \times V_c \times N}{z \times 60} P_i = T_i \times \omega = T_i \times \frac{2\pi N}{60}$$

Where,

imep = is the indicated mean effective pressure [N/m^2]

A_c = cylinder area [m^2]

L = stroke length [m]

n = number of cylinders

N = engine speed [rpm]

z = 1 (for 2 stroke engines), 2 (for 4 stroke engines)

V_c = cylinder swept volume [m^3]

V_e = engine swept volume [m^3]

T_i = engine indicated torque [Nm]

ω = engine angular speed [1/s]

Power = (243* 2*3.14*1500) / 60

= 381.51W = 0.38 KW

7.6 Worm gear calculation

Number of teeth on worm wheel = 50

Outer diameter of worm wheel = 53 mm

Inner diameter of worm wheel = 10 mm

Number of starts on worm = 8

Axial Pitch of Worm or Circular Pitch of Gear P: 6.23
Pitch Circle Diameter of Worm D1: 16.07
Pitch Circle Diameter of Gear D2: 63.47

Centre to Centre Distance Between Worm and Gear C: 39.774

Engine speed = N = 1500 rpm

Power of motor = p = 24 watts

Torque of the motor = T = p x 60 / 2 x π x N

= 0.38x 60 / 2 x π x 1500

= 0.023 N - m

Gear ratio (i) = n1 / n2

(N2 = N1 / Gear ratio)

(n1) worm shaft speed = 1500 rpm

= 1500 / 50

(n2) worm wheel speed = 30 rpm

Torque of the worm wheel (t2) = p2 x 60 / 2 x π x N2

= 24 x 60 /2 x π x 30

= 7.639N m

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Angular velocity of worm wheel = 2 x π x 30 / 60

= 3.14 rad

Hence the worm wheel used here rotates at = 30 rpm

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CHAPTER 8

PROJECT MODEL

Fig: 8.1 Model

CHAPTER 9

ADVANTAGES AND LIMITATIONS

ADVANTAGES

1.These are very useful in Gardening processes.

2. This is more efficient for large scale uses.

3. This system further compact by complete automation.

4. It is more Reliable since it has automated parts and performs much more efficiently.

5. It is used to dig channels of different depth.

6. It is compact when compared to other automated digging machine.

7. This require less man power when compared to other conve3ntional spade.

8. Uniform channels can be digged.

LIMITATIONS

1. It require external source of power.

2. It is heavier and thus leads to its Bulky structure.

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CHAPTER 10

FUTURE SCOPE

This project has a huge scope in the future as this can be used in all gardening purposes and this can be used under Solar power by means of Solar panels and help in eco-friendly pollution free purposes and hence make this system further compact by complete automation using advanced electronic systems and thus has an Incredible future and can be used in almost all gardening purposes to replace conventional spade. Here,

We used only single rotor, Instead we can employ multiple Rotors that can be adjusted with our system. And hence make this system further compact by complete automation using advanced electronic systems and and thus has an Incredible future and can be used in almost all gardening purposes to replace conventional spade.

CHAPTER 11

CONCLUSION

This project is made with pre planning, that it provides flexibility in operation. This innovation has made the more desirable and economical. This project “DESIGN AND FABRICATION OF AUTOMATED SPADE” is designed with the hope that it is very much economical and help full to agricultural fields. This project helped us to know the periodic steps in completing a project work. Thus we have completed the project successfully.

This can be used to encorporate all agricultural machinery and machining purposes and this helps in eco-friendly pollution free purposes and hence make this system further compact by complete automation using advanced electronic systems and and thus has an Incredible future and can be used in almost all gardening purposes to replace conventional spade. And thus we can conclude that this system is perfect for replacing the conventional spade that need much more effort and thus this can be used in all gardening purposes.

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