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# FABRICATION OF GRASS CUTTING AND WASTE COLLECTING MACHINE

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**Abstract:** This project is to fabricate a grass cutter with helix shaped blade. At present grass cutter is operated by fuel and electrical energy. The design objective is to come up with a mower that is portable, durable, easy to operate and maintain. In our project we fabricate the grass cutting machine for the use of agricultural field, to cut the crops in the field. This is a new innovative concept mainly used in agricultural field. It is simple in construction and its working is easy. The components that are use dare wheel, gear arrangement, roller, bearing, and base frame. Below the gear arrangement cutting blade is revolved. As the gear arrangement rotates the reel mover tends to cut the plants or crops. The reel consists of several helix shaped blades mounted to a rotating shaft. The whole setup is placed on a movable base which has a wheel arrangement. It is used to maintain and up keep lawns in gardens, schools, college's etc.

## 1. Introduction

The lawn mower is an important equipment to maintain the beauty of the lawn. The mower is with revolving blades to cut a lawn at an even length to make it good-looking. For the domestic purpose and in villages, people cannot spend more money on heavy machineries. In villages there is more power cut problem, and in these areas, this manual lawn mower used effectively. In market there are so many lawn mowers are available. It is not easy and also very difficult to maintain uniform size. Hence, we design to make a lawn mower without any power source due to reduce the power consumption. The blade removes the extra growth of the lawn and roller gives light pressure to the top surface of Lawn. It gives fine look to the lawn and uniform look throughout the Lawn. The cutting mechanism is made of a flat blade rigidly fixed to the frame behind the spiral arrangement which is configured to contact at least one reel bar of the spiral blades during the rotation of the spiral mechanism.

A traditional lawn mower is the height of the grass cut cannot be adjusted spontaneously because the height adjustment of the rotor blade is done by lifting the whole deck with the help of wheel support and this mechanism takes time at least (4-5 minutes) to adjust the rotor.

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## Beach Cleaner

The coastal area beaches are main attraction for tourism, so in attracting tourist the beach must be kept clean. For the purpose of cleaning the beach, some cleaning machine must be used so we have manufactured a cleaning machine which is helpful in cleaning the beaches. The motor is responsible for driving mechanism of conveyor.

The strainer attached to the conveyor will collect the wastages from the surroundings and transferred to storage bucket through conveying belt. As today's era is moving towards being digitalized and automated with a great speed, the youth want everything very easily and smart. Not only the youth but the people of all generation are finding it very easy to be smart effort and more and more being healthy and are getting attracted or joined towards latest technology of being "smart work". Anywhere you go, you get this technology available. So we thought of using this technology and adding more to it for our final year project.

Types of beach cleaning machine

1. Manually Method
2. Automatic Method
   a) Raking technology
   b) Sifting technology
   c) Combined raking and sifting technology

## 2. Literature Survey

### SURVEY ON LAWN MOVER: -

Prof. C. J. Shende: In this paper they have prepared manually handle device which is capable to cut the grass. This device consists of linear blades and it does not affected by climatic conditions. The main objective of this paper is to move the grass cutter is different directions to prepare various designs as per requirements. By using link mechanism, the height of the cut can be adjusted. The unskilled labour can easily operate this device.

### SURVEY ON BEACH CLEANING MACHINE: -

K. Amma: Beach litter collection is a concern for Bang Sane beach, one of the popular tourist attractions of Thailand. In order to solve this problem, a beach cleaning trailer was designed and fabricated with emphasis on the use of local materials and local production. The design trailer prototype 3.7x1.6meters was carried out using a three-dimensional solid modeling computer program. This paper explores the economics of the beach-cleaning trailer in terms of payback period, charging rate to customer, working areas Nov 2013.

### Advantages:

They're better for the health of your lawn. The torn and shredded results of electric or gas powered motors leaves your lawn vulnerable to disease and Ottawa lawn insects. Grass that is cleanly cut heals faster.

Push reel mowers make your lawn look nicer. The scissor-like cutting motion of A the reel mower makes for a clean and even looking lawn. Need proof? Consider this:

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many professionally kept lawns are cut by large reel mowers.

They don't give off noise pollution. There's more than one way of polluting the environment. Gas powered lawn mowers give off quite the racket upon starting, and then stay loud while in operation. As such, you can't mow too early or too late during the day, which can be troublesome when the temperature skyrockets. Push reel mowers don't produce either noise issues.

Clean beaches have many benefits for human health because the polluted beaches may imperil human lives by beach accidents. Many items left on beaches such as broken glasses, sharp metals, or hard plastics may injure beach-goers physically. Also, marine debris such as fishing gear or nets may risk human life on the beaches. Such pollutants may be a trap for beach users and cause very serious injuries or drowning accidents for tourists.

## 3. Working Procedure

Working of the lawnmower is depending on the wheel rotation. Wheel is the main component of this machine. The rotation is transferred from wheel to the spider by gear engagement. Also the rotation of the spider is controlled in one direction by the ratchet mechanism. It is placed on the pinion inside. Rotating spider is striking the bed knife and the grass is sheared to applied level of cutting height. Maintenance of the height of cut is done using support rollers.

Reel mowers also cut lawns more evenly and much closer. The cylindrical drum on a reel mower cuts every individual blade of grass like a pair of scissors. This produces a clean cut, which will protect the grass from disease and increases the health of the grass. Optimum clip rate is achieved when the bed knife and reel blades create small, even gatherings that are then cut. The result is a small, unnoticeable clip and an even after cut appearance.

## 4. FABRICATION OF MECHANICS

The fabricated unit consists of mainly Two parts, the first one is lawn mower and the second is the beach cleaner. This consists of a waste collecting and grass cutting operated by the manual power. The machine is moving by the manpower the wheel is connected to the gear and the other gear is connected to the shaft when the gears are meshing the chain will stared rotating and pick up the waste bottles, papers, plastic etc. The lawn mower is also started rotating and cut the grass. In the machine the lawn mower can be dismantled. It can move on the roads, beaches, grounds etc.

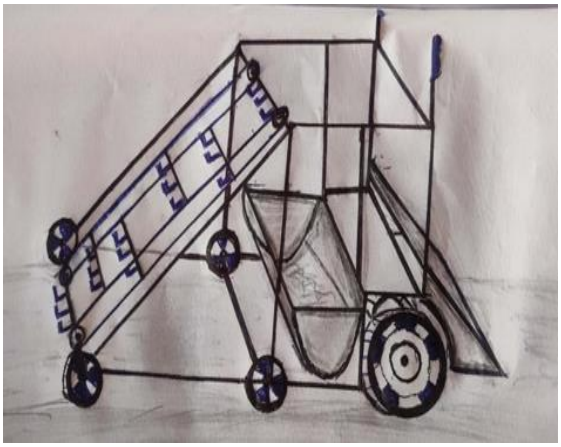

***Fig. 1.*** *Network model of system*

The chain containing of fingers which will collect the waste from the ground and drop it into the waste collecting bin. The grass will cut and through into the bin. This will decrease the man effort instant of two persons we can use only one man by collecting the waste and grass cutter.

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## 5. Mathematical calculation:

No. of teeth on ring gear($Z_1$)=63

No. of teeth on pinion ($Z_2$)=12

Module (m)=3mm

Diameter of gear ($d_2$) =m×$Z_2$
=3×63
=189mm

Diameter of pinion ($d_1$) = m×$Z_1$
=3×12
=36mm

Average forward speed(V)=0.8m/s

Velocity(V) $=\frac{\pi D_2 N_2}{60}$

Wheel diameter($D_2$) =200mm

$0.8\times10^3=\pi\times200\times N_2$

Speed of wheel $N_2 = 77rpm$

$$\frac{N_1}{N_2}=\frac{Z_2}{Z_1}$$

Speed od cutter $N_1 = \frac{63}{12}\times 77$

$N_1 = 402rpm$

Weight of mower =13.5kg
=132.435N

Average forward speed=0.8m/s
Power on machine wheel ($P_w$)= Weight × velocity of machine
=132.435 × 0.8
$P_w = 105.95watts$

$T_2=\frac{P\times60}{2\pi N_2}$

$=\frac{105.95\times60}{2\pi\times402}$

$T_2 = 2.517Nm$

Shear stress on cutter blade(T)=1.602$\frac{N}{mm^2}$

$T_2=\frac{\pi}{16}\times T\times d^3$

$2.517\times10^3=\frac{\pi}{16}\times 1.602\times d^3$

d=20mm

## 6. Results & Discussion:-

The fabricated unit consists of mainly Two parts, the first one is lawn mower and the second is the beach cleaner. This consists of a waste collecting and grass cutting operated by the manual power. The machine is moving by the manpower the wheel is connected to the gear and the other gear is connected to the shaft when the gears are meshing the chain will stared rotating and pick up the waste bottles, papers, plastic etc. The lawn mower is also started rotating and cut the grass. In the machine the lawn mower can be dismantled. It can move on the roads, beaches, grounds etc. The chain containing of fingers which will collect the waste from the ground and drop it into the waste collecting bin. The grass will cut and through into the bin. This will decrease the man effort instant of two persons we can use only one man by collecting the waste and grass cutter.

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