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Magnetic Grass Cutter

Dhanesh Biju[1], Raneesa Nassar[2], Safwan P.N[3] , Saina Byju[4], Lipin Paul[5]

[1]EEE Department, Ilahia College Of Engineering And Technology, Muvattupuzha
[2]EEE Department, Ilahia College Of Engineering And Technology, Muvattupuzha
[3]EEE Department, Ilahia College Of Engineering And Technology, Muvattupuzha
[4]EEE Department, Ilahia College Of Engineering And Technology, Muvattupuzha
[5] Asst. Prof. EEE Department, Ilahia College Of Engineering And Technology, Muvattupuzha

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Abstract - The goal of the research is to design eco-friendly and cost-effective grass cutters. In the current arrangement, the device typically uses a two-stroke petrol engine to power an electric motor. The engine burns petrol, which is expensive, and releases greenhouse gases that contribute to global warming and other environmental issues. Also, the running and maintenance costs of conventional grass-cutting machines are high. The decision to alter the present system, which is reasonably priced and easy to use, was made after a thorough examination of all these problems. This study develops a mechanism to lessen pollution by reducing the need for fossil fuels using a permanent magnet attraction or repulsion system. The system's key characteristics are zero emissions of greenhouse gases, reduced pollution, decreased reliance on fossil fuels, and production of environmentally beneficial goods. It is easy to maintain and of low cost. Also, the magnetic-free energy generator is a renewable energy source. For homeowners and gardeners who wish to maintain their lawns in good condition with the least amount of work and expense, this is the ideal option. The grass-cutting equipment is necessary for keeping a gorgeous, lush lawn in good condition

Key Words: Grass cutting machine, Attraction-repulsion system

1.INTRODUCTION

For modern world, the value of the environment is as important as food and shelter. Grasses are found to survive in a variety of conditions and thus there is a need to curtail their growth to enhance the beauty of our habitual environment. In the past, cutting grass was done by manual cutting. This method is time-consuming and lots of efforts are needed.

The conventional system generally consists of a two-stroke petrol engine, motor, and grass cutter rotor blades. The engine drives and powers the motor by internal combustion. The motor converts electrical energy into mechanical energy and this power is then transferred to the cutting head rotor.

So in this system, the engine needs petrol or gasoline as a driving fuel which is extracted from fossil fuels. As we all aware that fossil fuel availability is depleting day by day and its cost increasing day by day. So the key problem is that too much dependence on fossil fuels is not sustainable and economical. Large amounts of toxic gases like carbon dioxide are released from burning fossil fuels into the atmosphere. And also, it emits greenhouse gases which may lead to global warming and other environmental problems. Global warming is caused by greenhouse gas emissions that trap heat in the atmosphere. As of today, the mean global temperature is rising

by 1^0C. This leads to an urgent need for more environment-friendly energy solutions that can reduce greenhouse gas emissions and prevent the further depletion of fossil fuels. As a result, it is essential to move towards greener or renewable energy sources such as the solar energy and wind energy, which are more environmentally friendly[5]. But It is expensive and takes a lot of time. And their initial cost is high and sometimes unaffordable. Also, they are strongly dependent on the weather condition. So when we have bad weather conditions, it will be of less use.

We have to find an alternative solution for all these problems. So we are using free energy to power the motor. Because it doesn't need an external electrical source to generate electrical power[1][6]. The major advantages of using free energy are that it is extremely easy to operate, maintain, and build and it does not require input energy or any external energy.

2. Conventional System

To keep our yards looking tidy, probably we have to use at least one kind of grass cutter. Grass cutters are designed to keep the grass cut short. Grass cutters work for removing grass for new garden spaces or for preparing a new lawn.

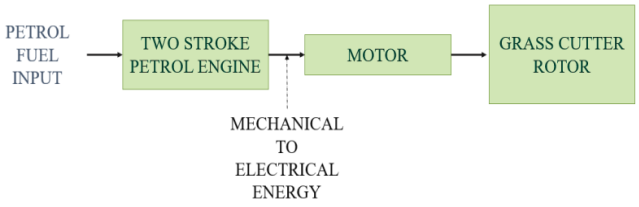

Fig -1: Block diagram of conventional system

The existing system consists of engine, motor, and rotor blades. The engine powers the motor, which in turn operates the rotor blades to cut the grass. Fig-1 shows the block diagram of the working of a conventional grass cutter. In this, the two-stroke engine uses petrol as fuel input. The two-stroke engine operates through a repeated sequence consisting of intake, compression, power, and exhaust strokes. The engine drives and powers the motor by internal combustion. The motor converts electrical energy into mechanical energy and this power is then transferred to the cutting head. The motor plays a vital role in the functioning of a grass cutter, delivering the necessary power and control to ensure efficient grass-cutting. The overall effectiveness and longevity of the grass cutter are influenced by the motor's performance, efficiency, and maintenance. The rotor blade of a grass cutter is usually mounted directly to the motor shaft. The grass cutter blade is the primary cutting element responsible for trimming or mowing the grass[5]. Its design aims to achieve a precise and uniform cut throughout the entire lawn surface.

But the working of the engine needs petrol which is a fossil fuel. The utilization of fossil fuels, including coal, oil, and natural gas, for energy generation brings about numerous drawbacks and adverse consequences for both the environment and human health. Major problems include Greenhouse gas emissions, air pollution, environmental degradation, and negative health impacts, etc. Most people do not associate air pollution with mowing the lawn. Yet emissions from conventional grass cutters and similar outdoor power equipment are a significant source of pollution. The small engines that we use emit high levels of carbon monoxide. They also emit hydrocarbons and nitrogen oxides and pollutants that contribute to the formation of ozone, which is a toxic air pollutant. We don't just meet our energy needs when we're burning oil, coal, and gas, we're also driving the current global warming crisis. When burned, fossil fuels produce a large amount of carbon dioxide. Carbon emissions trap heat in the atmosphere and are responsible for climate change levels. Thus, the use of fossil fuels for energy has caused tremendous damage to humanity and the environment. To mitigate these drawbacks, there is a growing emphasis on transitioning to cleaner and renewable energy sources, such as solar, wind, hydroelectric, and geothermal power. The shift towards sustainable and low-carbon alternatives is essential to mitigate climate change, reduce air pollution, protect human health, and promote long-term environmental sustainability[5].

While renewable energy sources offer numerous advantages over fossil fuels, they also have some drawbacks and challenges. It's important to acknowledge these limitations to develop effective strategies for integrating and maximizing the benefits of renewable energy. The drawbacks include Initial investment and cost, Land and resource requirements, Environmental impact, etc.

3. Proposed System

Proposed designed system will overcome the main drawbacks of the conventional existing systems. In contrast to other energy sources such as fossil fuels, magnetic energy is regarded as a cleaner and more sustainable alternative choice of energy, since it does not generate greenhouse gas emissions during power generation and free of cost. And also it can be used in any weather conditions[6]. So, instead of using a two-stroke engine, we are generating the energy using repulsion between two magnetic fields. The release of this energy occurs when there is a change in the magnetic field, such as the attraction or repulsion between two magnets[1][6].

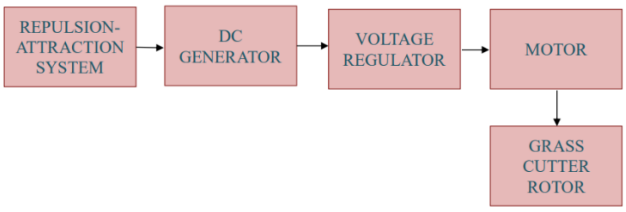

Fig -2: Block diagram of proposed system

The working principle of the Repulsion-Attraction system is the repulsion between two magnetic fields or the attraction between them.

Fig -3: Stator and rotor arrangement

$$F_c = \frac{1}{4\pi\epsilon_0}\frac{|q_1||q_2|}{r^2}$$

From this equation, we can see that force is directly proportional to the product of charge and inversely proportional to the square of the distance between the poles. So here based on this, as the distance decreases, the force will be high. This force makes the magnets repel each other. The system is not self-starting, so using this force it is started.

The rotor consists of a wooden yoke that has rotor poles at equal lengths and permanent magnets of the same pole strength are screwed on it. Also, the stator has permanent magnets of the same pole strength placed on it. Rotor is balanced using supports and it is placed inside the stator. Using the force of repulsion from the magnets, the rotor rotates. The shaft consists of a gear system that doubles the speed of the rotor. Also, the motor is connected to the rotor using a belt. so as the rotor rotates, this mechanical energy is transferred to a generator through the belt. The output of the generator is connected to a voltage regulator to withstand fluctuations in voltage. Thereby we get a constant voltage which is enough to run the motor. The motor converts this electrical energy to mechanical energy and this power is then transferred to the cutting head. Thus the machine works.

4. CONCLUSIONS

In this research work, we modified the conventional grass cutter into a magnetic grass cutter to reduce pollution caused by conventional systems. The proposed system utilizes the attraction-repulsion principle by employing permanent magnets. This system helps reduce pollution by decreasing the usage of fossil fuels while being eco-friendly and renewable. Additionally, this grass-cutting machine proves to be more cost-effective and easier to maintain in comparison to conventional fossil fuel–powered machines. This makes it an ideal choice for operators looking for a reliable, efficient, and environment-friendly grass-cutting solution.

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