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Solar powered grain crusher

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Abstract
This the increasing need for energy in India, especially in rural areas, is the subject of this study. The necessity for alternate energy sources is clear since a sizable amount of energy needs are met by biomass and other non-commercial fuels. The purpose of this study is to investigate how solar energy might be used to power grain milling operations in isolated Indian communities as a sustainable energy source. The process entails designing and putting into place solar panel systems to harvest solar energy and turn it into electrical power for grain milling. Participants in the study are from isolated Indian villages that still use labor-intensive, traditional milling methods. The findings show that solar energy can greatly increase grain milling efficiency while lowering the time and effort needed.

Keywords: Alternative energy sources, solar power, sustainable energy solution, grain milling, solar panel systems, energy conversion

Introduction
India is the world's second most populated nation. People's requirements are expanding along with the population, and in these situations, there is a significant need for electricity. About 40% of India's energy needs are met by biomass and other non-commercial fuels. Although almost 85.49 percent of Indian villages have power, many isolated communities still lack it. Bicycles are the primary mode of transportation for people in villages, where our method is quite helpful for short trips. Through the photovoltaic effect, solar cells can directly convert solar energy into electrical power, or they can convert solar energy first into chemical or thermal energy.Solar panels are collections of cells used to create solar modules that use sunlight to generate energy. Solar power is the term used to describe the energy produced by these solar panels. When the light source is something other than sunlight, such as artificial light or lamplight, the cells are referred to as photovoltaic cells. The type and area of the material, the sunlight's strength, and the wavelength of the sun all affect how much electricity a photovoltaic device can produce. Specifically, saddle stone grain grinding.

Literature Survey and Background Study
Mr. Parvezalam I. Shaikh, Mr. Mahesh Gorde, Mr. Prasad A. Hatwalne, and Mr. Swapnil B. Patond: The investigator discovered. Rural residents in emerging nations like India deal with socioeconomic difficulties, the energy issue, and a growing demand for physical health. Pedal-operated devices have become more and more common because they address these problems. Among other things, they run flour mills and produce electricity. The degree of comfort during surgery is a common worry, though. Taking into consideration the anthropometric data, an ergonomically feasible pedal-operated flour mill has been built in order to address this. This meets the needs of the vast majority of Indians who depend on wheat and wheat flour as their staple food while ensuring a comfortable posture during operation. M.S. Giripunje is a food grain crusher that is powered by humans. to create a food grain crusher that is both affordable and energy-independent.
The pedal-powered grinding machines of Rahilpatel, Meet Shah, Dhavalparekh, Zenith Patel, and Parthesh Patel are only used for grinding. Additionally, it is limited for use with a single application and takes a lot of work. The current model's increased time consumption and decreased efficiency are more issues. Our goal is to create a human-powered grinding machine that can be utilized for a variety of tasks, including cutting, pumping, grinding, and washing.

The Proposed Solution

The issue of grain mill machinery's exorbitant electrical prices. By adding solar panels, our initiative seeks to solve this problem and drastically lower electricity costs. We're also adopting a more contemporary strategy by using wheels to make the devices smaller and more portable. The devices will be simpler to operate and move because to their increased mobility. Furthermore, we are making sure that the machine satisfies the wide range of market demands and preferences by including changeable blades. This is a very impressive combination of portability, versatility, and energy efficiency.

Implementation

Working Principle

In order to grind grains into flour, a grain mill machine mainly uses mechanical force, such as impact, compression, and friction. Centrifugal force helps move grains toward grinding surfaces for effective milling.

Major components

Solar Panel

A solar panel is an apparatus that uses photovoltaic (PV) cells to transform sunlight into electrical power. Materials used to make photovoltaic cells generate excited electrons when exposed to light. Direct current (DC) electricity is created when electrons go through a circuit; this electricity can be stored in batteries or utilized to power a variety of devices. PV modules, solar cell panels, and solar electric panels are other names for solar panels.

DC Motors

A DC motor is an electrical motor that generates mechanical force by means of direct current (DC). The most prevalent kinds depend on magnetic forces generated by coil currents. Almost every kind of DC motor has an internal mechanism, either electronic or electromechanical, that allows it to periodically alter the direction of the current flowing through a portion of the motor. Since DC motors could be fueled by the direct-current lighting power distribution networks already in place, they were the first type of motors to be widely employed. The speed of a DC motor can be adjusted across a broad range by varying the field windings' current strength or the supply voltage. Appliances, toys, and tools all employ small DC motors.

Battery

The sulfuric acid electrolyte in a sealed lead acid battery, also known as a gel cell, has coagulated (thickened) to prevent spillage. They feature vents in case gasses are inadvertently discharged, such as by overcharging, although they are only partially sealed. When employed upside-down, they can be applied to smaller applications. Although they cost more than standard lead acid batteries, they are safer.

Hopper

In industrial processes, a hopper is a sizable, inverted pyramidal or conical container that is used to store and dispense particulate matter or flowable material of any kind, such as dust, gravel, nuts, or seeds, from the bottom when needed. Small hopper systems can be used in some specialized applications to load and distribute even tiny metal or plastic assembly components. Dust can be collected from exhaled air in dust collection hoppers. To enable a larger collection quantity, dust collection hoppers are frequently fitted in groups. Hoppers are used in a variety of sectors to store materials until they are needed, including crushed ores for processing, food pellets for cattle, wheat, sugar, or nuts for food manufacture. Steel is used to make most hoppers.

Chamber

A mill is an apparatus that grinds, crushes, or cuts solid materials into smaller bits. It is frequently a building, machine, or culinary tool. In many processes, this kind of comminution is a crucial unit operation. Numerous kinds of mills exist, and they process a wide range of materials. Historically, mills were driven by hand, animals (like a hand crank), wind (like a windmill), water (like a watermill), or working animals (like a horse mill). These days, electricity is typically used to power them. Solid materials are ground by mechanical forces that overcome internal bonding forces and fracture the structure. Grain size, grain size distribution, and grain shape are all altered after grinding.

Controller

A solar controller is an electronic device that controls the circulating pump in a solar hot water system to harvest as much heat as possible from the solar panels and protect the system from overheating. The basic job of the controller is to turn the circulating pump on when there is heat available in the panels, moving the working fluid through the panels to the heat exchanger at the thermal store. There is heat available. In the event that the solar panel's temperature surpasses the heat exchanger's water temperature. When the store reaches its maximum temperature, the pump is turned off to prevent overheating. In other cases, when the store is hotter than the panels, the pump is turned on to cool the store.

Blades

Solid materials are ground by mechanical forces that overcome internal bonding forces and fracture the structure. Grain size, size disposition, and shape are all altered in the solid state following grinding. The process of breaking down, sorting, sizing, or classifying aggregate material (such as mining ore) is sometimes referred to as milling.

Frame

A flour mill machine's frame is an essential part that gives the entire system stability and structural support. The flour mill's performance, longevity, and efficiency are greatly influenced by the frame's design and construction. Here are some general facts regarding the frames of flour mill machines.

Working

The hopper essentially functions as a container that can hold up to 1 kg of grain. The grains remain in the hopper after being poured in until they are ready to be crushed. The hopper and the crushing chamber are connected by this passage. Like a conveyor belt, the grains move slowly along this course until they arrive at the chamber. within the chamber used for crushing. With the aid of a primary mover, these blades begin to rotate. A strong force known as centrifugal force is produced as the blades rotate. The grains are actually crushed by this force into little pieces or even a powder. Inside that chamber, it feels like crushing is taking

place. All of those tiny particles must be gathered once the grains have been crushed. It gathers all of the crushed grains, much like a large jar. There is a convenient strainer that removes any larger particles to ensure that only the tiny ones are gathered. Thus, every grain particle that has been crushed passes through the sieve and into the storage tank. It is easily accessible and manageable due to its handy location on the foundation. In this manner, all of the crushed grains can be gathered and used as you see fit.

Results and Discussion

According to the machine's results, the solar small flour mill can process 1.5 kg of wheat at a time.It takes 15 to 20 minutes to mill one kilogram of wheat. It takes roughly fifteen minutes to mill one kilogram of rice. The pedal flour mill machine took 25 to 30 minutes, whereas our small machine took 15 to 20 minutes. Compared to a machine on the market that runs on 230 volts and takes almost 10 minutes for 1 kg, ours requires 12 volts to operate and takes around 15 minutes.

Conclusion

The primary goal in creating the little grain mill machine was to create a low-cost, user-friendly system that could be put together with little electricity and readily available components. Therefore, we suggested a straightforward design that may result in a reliable, effective, and efficient flour mill that could be utilized in both urban and rural settings. Furthermore, it is convenient to locate these equipment in locations with insufficient power supplies.

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