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A Systematic Literature Review Of Pedal-Operated Flour Mill

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ABSTRACT

Pedal-operated flour mills are an alternative to electric flour mills and have been used for many years in various parts of the world. They are a sustainable, low-cost solution that can be constructed using locally available materials. Pedal-operated flour mills can be used in areas where there is a shortage of electricity or where the cost of electricity is high. Pedal-operated flour mills can also improve users' health, create employment opportunities, and provide educational and training opportunities for individuals and communities.

1. INTRODUCTION:

Pedal-operated flour mills are an ingenious, sustainable, and low-cost way of grinding grains into flour without the need for electricity. These mills have been used for centuries in rural areas where electricity is not available, and people rely on manual labor to grind grains. With the increasing awareness of the need for sustainable and eco-friendly solutions, the use of pedal-operated flour mills has become popular in rural areas and urban areas for small-scale flour production [1,2,3].

The pedal-operated flour mill consists of a simple design that is easy to construct and maintain. It uses the principle of pedal power, where the rotation of the pedals is transferred to a shaft that rotates the Flour Mill. The grain is fed through a hopper into the Flour Mill. The flour is then collected in a container for use. The advantage of using a pedal-operated flour mill is that it is affordable, easy to operate, and does not require electricity. It is a sustainable solution that can be used in areas where there is a shortage of electricity or where the cost of electricity is high. It is also an eco-friendly solution that does not contribute to carbon emissions [4,5,6].

There has been a renewed interest in pedal-operated flour mills in recent years due to the growing awareness of the need for sustainable and eco-friendly solutions. With advancements in technology, the design and construction of these mills have improved, making them more efficient and durable. In this review paper, we will discuss the design and construction of pedal-operated flour mills, their advantages and disadvantages, and their applications. We will also compare pedal-operated flour mills with other types of mills and discuss their prospects [7,8,].

2. LITERATURE REVIEW

1. S. M. Rokade and S. S. Bhagat [9], describes the design and development of a pedal operated flour mill with a capacity of 15 kg per hour. The authors evaluated the performance of the mill and found an efficiency of 78% and a fineness of 90%. They also considered the ergonomic aspects of the mill to reduce operator fatigue.

2. T. D. Walshaw, J. A. F. Kiel and S. D. Taylor [10], reports on the design and development of a pedal powered grain mill in Tanzania. The authors evaluated the performance of the mill and found a grinding capacity of 5-7 kg per hour. They also highlighted the potential of pedal operated grain mills to improve the livelihoods of rural communities.

3. R. H. Patel, R. B. Patel, and N. K. Patel [11], describes the design and development of a pedal-powered grain mill for rural India. The authors evaluated the performance of the mill and found a grinding capacity of 7-10 kg per hour. They also highlighted the potential of the mill to reduce carbon emissions by 0.051 tons per year.

4. Shrikant B. Bhosale and S. A. Bharade [12], describes the design, development and performance evaluation of a pedal operated flour mill with a grinding capacity of 10 kg per hour. The authors evaluated the efficiency of the mill and found it to be 68% with a flour fineness of 89%.

5. Vishal R. Wankhede [13], describes the design and development of a pedal operated flour mill with a capacity of 6-8 kg per hour. The author highlighted the potential of the mill to reduce the workload of women in rural communities.

6. S. A. Bharade and S. B. Bhosale [14], provides a review of the design and development of pedal operated flour mills. The authors highlight the potential of these mills to improve the livelihoods of rural communities and the need for further research in this area.

7. Alex Weir [15],provides a broader review of the potential of pedal powered machines in developing countries. The author highlights the potential of these machines to reduce poverty and improve the livelihoods of rural communities.

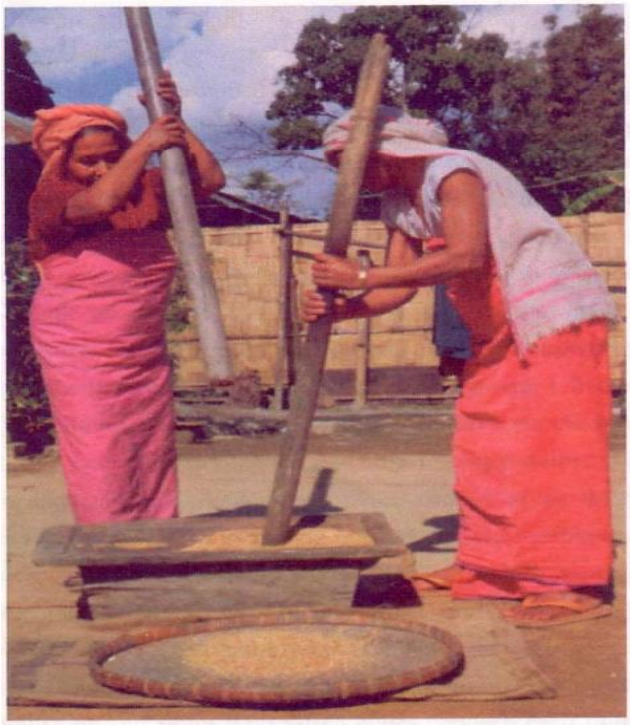
3. HISTORY OF FLOUR MILLS

3.1 Traditional mortar and pestle method:

As of today in rural areas, throughout the country, the village area (rural) uses the pounding method to obtain flour from grain. This method is an Indian traditional method in which wooden mortar has

one or more empty pockets for keeping the paddy flour and one or two rural women pound the paddy using long rounded wooden which is up to 5 ft-6 ft long and is called a pestle.

In this old Indian traditional method, the mortar is made of stone and wood. However, for both mortar and pestle the village areas (rural) people cut down the trees thereby depleting the natural wealth.



Pounding Method practised

Therefore millions of rural households in the Country, large amounts of wood are regularly consumed by rural areas peoples which destroys nature by cutting great amounts of trees thus setting ecological balance.

Another drawback of this traditional method is that it takes a long time and uniform products cannot be obtained and grains get often broken [18,19,20,21].

Traditional Mortar and Pestle

3.2 Hand-Operated Flour Mill:

Millstones or mill stones are stones used for grinding wheat or other grains. They are sometimes referred to as grindstones or grinding stones. A stone means also known as a grist mill, grinds a variety of grains using buhr stones instead of still rollers because mill stone grind at slow speed and cool temperature, the inherent nutrients and flavor of grains are preserved, a production that allows us to seal in the freshness and bring you wholesome, quality foods, just as nature intended.

Fig 3: The Ancient Hand Mill or Quern Stone, Grinds the Grain into Flour ...

It is also the traditional method used by fellow village people. Because it can be operated without electricity.

The working of the stone mill is very simple. Grains are poured through a hole in the center of the rotating mill stones, flowing into shallow grooves, called channels, which radiate from the center of the stationary millstone.

The channel leads the grains onto the flat grinding section, called the lands, and to the age where it emerges as flour[22,23,24].

3.3 Mini Electric Motor Flour Machine:

An electric motor flour mill is a machine that grinds grains into flour using an electric motor as its power source. However, the ideal motor used for electric flour Mil Is A three-phase Four Pole 1440 RPM motor.

The working of an electric motor flour mill involves feeding grains into a hopper, grinding the grains into flour using rollers or blades powered by an electric motor, and collecting the flour in a container at the bottom of the mill[25].

(Low Prices Sale Small Scale Flour Mill Machinery Electric Wheat ...
https://images.app.goo.gl/deEBY7DPvjDhQrFq7)

4.ELECTRIC FLOUR MILL

Purpose Of Making Pedal Operated Flour Mill

The purpose of building a pedal operated flour mill is to provide a sustainable and cost-effective means of processing grains in areas where access to electricity is limited or unreliable. This technology is particularly relevant for rural areas in developing countries, where people often rely on manual labor or expensive diesel-powered mills to grind their grains into flour. By using a pedal operated mill, individuals can generate their own power using their own physical energy, which is an affordable and reliable source of energy. Additionally, pedal operated mills are environmentally friendly, as they do not produce any greenhouse gas emissions or require the use of non-renewable fuels. The overall goal of building a pedal operated flour mill is to improve the quality of life for individuals living in rural areas, by providing them with a means of producing their own flour that is sustainable, affordable, and accessible.

Scope Of Work Of Pedal-Operated Flour Mill:

The primary function of a pedal-operated flour mill is to grind grains into flour. It can be used to grind various types of grains such as wheat, rice, corn, and millet.

The pedal-operated flour mill is a sustainable solution that does not require electricity. It can be used in areas where there is a shortage of electricity or where the cost of electricity is high.

The pedal-operated flour mill is a low-cost solution that can be constructed using locally available materials. It is an affordable alternative to electric flour mills, which can be expensive.

The pedal-operated flour mill is suitable for small-scale production of flour. It can be used in households, small businesses, and community centers. Improved health: The use of pedal-operated flour mills can improve the health of the users. It eliminates the need for manual grinding, which can cause musculoskeletal disorders, and reduces exposure to dust and allergens associated with manual grinding.

The construction and operation of pedal-operated flour mills can create employment opportunities for local communities. It can provide an alternative source of income for individuals and families.

The construction and operation of pedal-operated flour mills can provide education and training opportunities for individuals and communities. It can help improve their technical skills and knowledge

5. ADVANTAGES:

1. Sustainable
2. Low-cost
3. Improved health
4. Customizable

6. CONCLUSION

the pedal operated flour mill is a sustainable and cost-effective solution for grain processing in areas where access to electricity is limited or unreliable. This technology provides a means of producing flour that is environmentally friendly, affordable, and accessible to rural communities in developing countries. The review paper has highlighted the importance of the design of the mill to ensure that it is safe, adaptable, and capable of processing enough grains to meet the needs of the community. Overall, the pedal operated flour mill has the potential to improve the quality of life for individuals living in rural areas, by providing them with a sustainable and affordable means of processing grains into flour. Further development and adoption of this technology can lead to increased food security, economic growth, and environmental sustainability in rural communities.

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