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Analysis the Design of Pulverizer Machine

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Abstract: ***The objective of this project is to design and fabricate a pulverizer machine for efficient preparation of masala juice for buttermilk. The machine aims to extract the juice from the fresh masala ingredients such as ginger, garlic and chili peppers, while minimizing waste and preserving the nutritional value of the ingredients. The pulverizer machine is designed to handle a variety of masala ingredients and consists of a feed hopper, grinding chamber and juice extraction system. The grinding chamber is equipped with a rotating shaft and hammer blades that pulverize the ingredients into a fine paste. The juice extraction system uses a hydraulic press to extract the juice from the paste.The machine is fabricated using stainless steel and food-grade materials to ensure hygiene and durability. The design is optimized for easy operation, maintenance and cleaning. The performance of the machine is evaluated based on its efficiency, productivity and quality of the final product. The results show that the machine can extract juice at a rate of 20 liters/h, with a yield of 80-90%. The machine has the potential to benefit entrepreneurs and small-scale industries involved in juice production.***

Keywords: Pulverized, masala juice, Hammer Mill

I. INTRODUCTION

Masala juice prepartion is a major process in butter milk prepartion . The juice is extracted from a variety of spices, including ginger, garlic, chili peppers and others. The traditional method of preparing masala juice involves manual grinding and squeezing of the spices, which is a time-consuming and labor-intensive process.With the increasing demand for masala juice, there is a need for a machine that can efficiently and hygienically extract the juice from the spices. The objective of this project is to design and fabricate a pulverizer machine that can prepare masala juice quickly and efficiently. The pulverizer machine will be designed to handle a variety of spices and herbs and will be equipped with a grinding chamber and juice extraction system. The machine will be fabricated using stainless steel and food-grade materials to ensure hygiene and durability.

II. LITERATURE SURVEY

The design and fabrication of a pulverizer machine for preparing masala juice is a complex task that requires a thorough understanding of the underlying principles and existing technologies. A review of the existing literature on pulverizer machines and masala juice production is essential to identify the current state of the art, gather information on the design and development of similar machines and understand the challenges and limitations associated with this project. This literature survey aims to provide an overview of the existing research and development in the field of pulverizer machines and masala juice production. The survey will cover various aspects of pulverizer machines, including their design, development and performance evaluation. Additionally, the survey will review existing literature on masala juice production, including traditional methods, mechanized systems and quality control measures. The literature survey will provide a foundation for the design and fabrication of the pulverizer machine, ensuring that the final product is efficient, effective and safe for use. The survey will also identify areas for future research and development, providing opportunities for innovation and improvement in the field of masala juice production

III. METHODOLOGY

Design and fabricate a pulverizer machine for fine grinding of masala to create buttermilk.ist the types of masala (spices) involved (e.g., cumin, coriander, black pepper, etc.) and understand their properties (e.g., hardness, moisture content).Source materials for fabricating the prototype (e.g., stainless steel, motor components, electrical parts).

Develop a conceptual design of the pulverizer machine, including the machine's layout, components and operating principles. Develop a detailed design of the pulverizer machine, including the machine's dimensions, materials and manufacturing processes.Use CAD software to create a 3D model of the pulverizer machine and simulate its operation. Select the materials for the pulverizer machine's components such as stainless steel, aluminum and food-grade plastics. Manufacture the pulverizer machine's components using various manufacturing processes such as cutting, welding and grinding. Assemble the pulverizer machine's components into a complete machine.

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The materials selected for the machine include stainless steel, aluminum and food-grade plastics.The machine components include the feed hopper, grinding chamber, mixing tank and churning system.

The machine assembly involves the assembly of the machine components into a complete machine. Create a 3D model of the machine using CAD software. Simulate the machine operation to identify any design flaws or areas for improvement. Create a prototype of the machine based on the CAD design.Test the prototype to identify any design flaws or areas for improvement. Then it involves the process of fabrication. The Fabrication process invloves several steps. In the village, we followed the design thinkingprocess to identify the problem and conducted a participatory rural appraisal activity. Through this activity, we identified the resources available in the village and the technical-related problems faced by the community.

A. Material Requirement

The following materials are required for the design and fabrication of the pulverizer machine:

1) Mild Steel: Mild steel (also known as low-carbon steel) is one of the most commonly used materials in the design and fabrication of machines, including pulverizer machines. It has several properties that make it ideal for use in many mechanical applications. Here's a brief overview of mild steel, including its suitability for your pulverizer project.

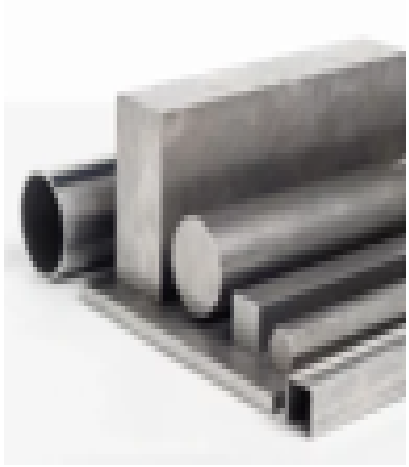

Fig 3.1 Mild Steel

2) Stainless Steel: Stainless steel is a high-quality, corrosion-resistant material that is widely used in food processing and machinery applications, making it an excellent choice for your pulverizer machine designed for grinding masala. Given its superior properties, stainless steel can significantly enhance the performance, durability, and hygiene of your pulverizer.

Fig 3.2 Stainless steel

3) Electric Motor:A 2HP electric motor is a common choice for machines that require moderate power, such as your pulverizer machine designed for grinding masala. Let's go over some key points related to a 2HP electric motor, its suitability for your pulverizer machine, and important considerations for selecting the right motor.

Fig 3.3 Electric Motor

4) Mixing Blade: In a pulverizer machine designed to grind masala for buttermilk**,** the mixing blade plays an essential role in ensuring that the ingredients are evenly ground and mixed before being processed. Mixing blades help distribute the ingredients evenly and ensure a consistent texture in the final product. Let's explore the types of mixing blades that can be used, their design considerations, and the materials suitable for the application.

5) Bearings:Bearings are a crucial component of any machine, including your pulverizer machine, as they reduce friction and allow smooth rotation or movement of parts like shafts, mixing blades, or grinding components. In a pulverizer, the bearings are typically used to support the motor shaft, the rotating grinding plates or blades, and other moving components.

Fig 3.4 Bearings

6) Belts: Bearings are a crucial component of any machine, including your pulverizer machine, as they reduce friction and allow smooth rotation or movement of parts like shafts, mixing blades, or grinding components. In a pulverizer, the bearings are typically used to support the motor shaft, the rotating grinding plates or blades, and other moving components.

Fig 3.5 Belts

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IV. DESIGN

Designing a module for pulverizer machine involves several considerations, primarily focused on efficiency, safety, and ease of use.

1) Research and Requirements Gathering

Understand the target market and their specific needs.Research existing pulverizingmethodsandtechnologies. Determinethekey features and functionality required for the module.

2) Conceptual Design

Brainstormandsketchoutpotentialdesignconcepts.Considerfactorssuchas power source,user friendliness and automation.

3) Component Selection

Choose appropriate materials and components based on the design requirements.Select a power source (e.g., electric or solar) depending on the intended use case.

4) Mechanical Design

Develop detailed mechanical drawings using sketch-up software. Design the structure to be study and resistant to rain. Incorporate features for easy maintenance and cleaning.

5) Testing and Validation

Conductthoroughtestingtoensurethemodulemeetsalldesignspecifications. Test for durability, efficiency and safety under various conditions. Obtain any necessary certifications or approvals.

V. TESTING

Testing is an essential phase of the design and fabrication of a pulverizer machine for buttermilk preparation. Here's a general outline of what such testing might involve

Typesoftestingstrategies

- UnitTesting
- Preliminary Design Testing
- Performance Testing
- Capacity Testing
- Quality Testing
- Userfeedback

1) Unittesting

This involves the testing of the components used in the projects by the calibration it properly. The accuracy can be verified by taking the reading againand again. The sound frequency can be tested by the reading of different sources. These are all the initial testing to be done on the setup.

2) Preliminary Design Testing

The preliminary design testing invloves simulation testing, protyping and 2d, 3d modelling, prototype testing. It is the primary testing in the design of the pulverizer machine. This can evaluate the design flow of the system.

3) Performance Testing

The system can be connected and the performance can be tested. The data can be obtained from the testing can be compared and verified. The real monitoring of the data can be obtained.

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4) Capacity Testing

Analyze how much masala can be porepared per hour can be calculated. Compare monitored data and calculate the capacity of the pulverizer machine.

5) Quality Testing

The quality of the product is to be testing by the process of giving more load and the life of the blades are to be tested to ensure the quality.The masala is mixed with the butter milk to check the taste for ensuring the quality.

6) User Feedback

Finally, collecting feedback from farmers or users who test the system inreal-world conditions can provide valuable insights into its practicality, usability, and overall satisfaction.

VI. APPENDICES

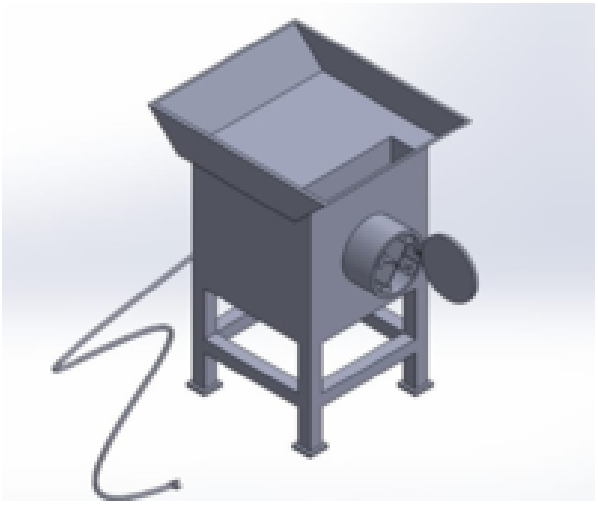

Fig 6.1 Proposed System

Outputs

Fig 6.2 Outputs Model

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VII. CONCLUSION

In conclusion, The design and fabrication of a pulverizer machine for buttermilk preparation was successfully completed. The machine was designed to address the limitations of traditional methods of buttermilk preparation, which are time-consuming, labor-intensive, and often result in inconsistent quality.The machine was designed with a focus on efficiency, productivity, and quality. The machine's performance was evaluated in terms of its efficiency, productivity, and quality of the final product. The results showed that the machine was able to prepare buttermilk with a higher efficiency, productivity, and quality compared to traditional methods. The machine's design and fabrication were done with a focus on ease of operation, maintenance, and cleaning. The machine's components were made of food-grade materials to ensure hygiene and safety. The project's objectives were successfully achieved, and the machine was found to be efficient, productive, and able to produce high-quality buttermilk. The machine is suitable for small-scale and medium-scale dairy industries, and can be used to prepare buttermilk for both domestic and commercial purposes.

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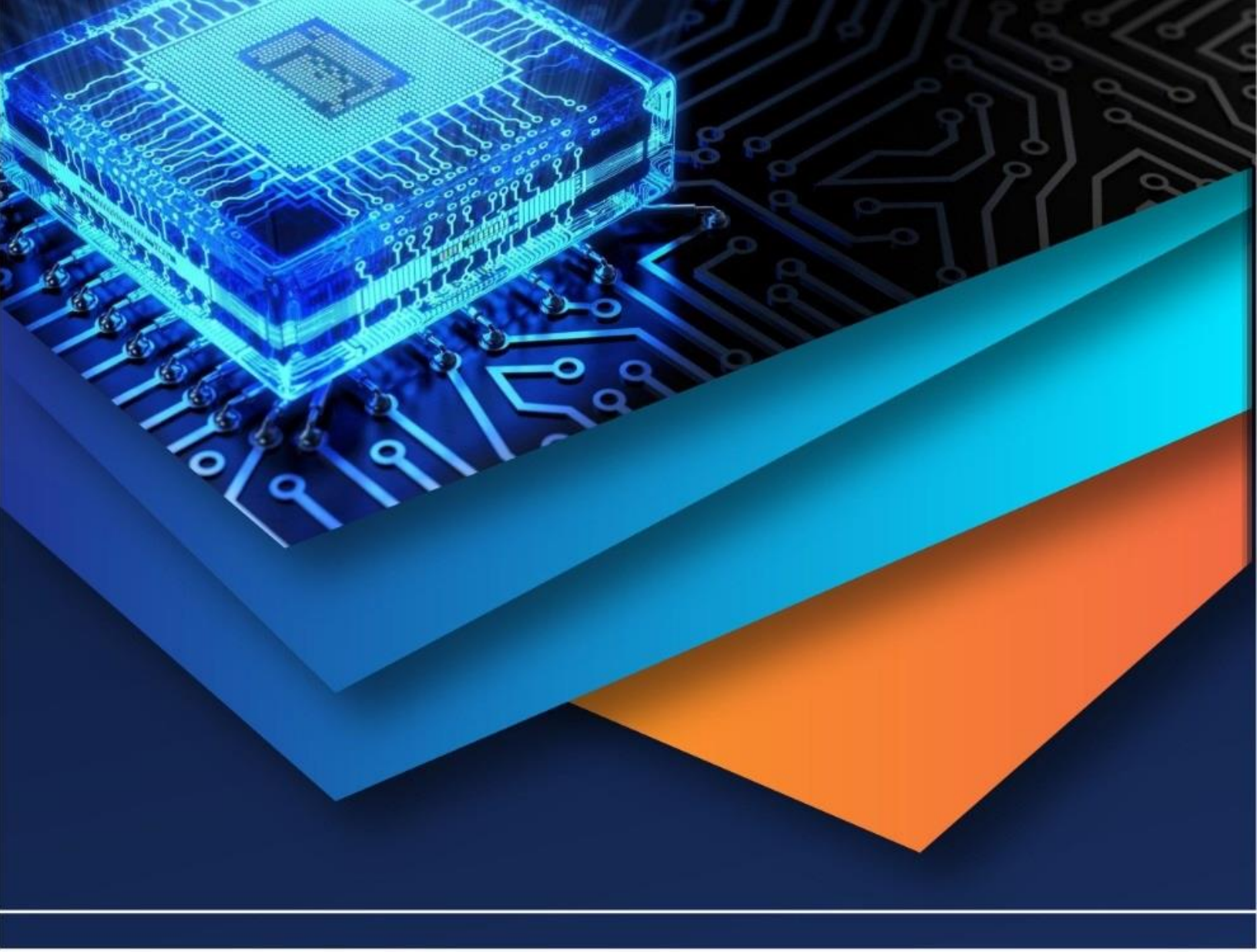

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