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Automatic 3 in 1 Coconut Crushing Machine

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Abstract: *This project aims to design and fabricate a versatile, efficient, and user-friendly 3-in-1 coconut crushing machine. The machine is designed to perform three primary functions: dehusking, shell cracking, and coconut meat extraction. By automating these labor-intensive tasks, the machine significantly reduces manual effort and time, while improving overall productivity and hygiene. The machine incorporates a robust mechanical design, incorporating suitable materials and components to withstand the rigors of coconut processing. The integration of innovative features, such as adjustable settings and safety mechanisms, enhances user experience and ensures safe operation. This project seeks to revolutionize coconut processing by providing a comprehensive solution that addresses the needs of both small-scale and large-scale coconut industries.*

Keywords: Automatic Coconut Crushing Machine, Pneumatic System, Coconut Cracking, Coconut Dehusker, Coconut Grating, Mechanical Design, Industrial Coconut Processing, Food Processing Machinery, Automation in Agriculture, Coconut Processing Efficiency, Motorized Conveyor System, Grating Drum, Coconut Industry Innovation

I. INTRODUCTION

The Automatic 3-in-1 Coconut Crashing Machine is an innovative solution designed to streamline coconut processing by integrating dehusking, shell breaking, and grating into a single unit. This machine is ideal for commercial and industrial applications, significantly reducing manual labor and increasing productivity. Equipped with high-speed cutting and crushing mechanisms, the machine can process multiple coconuts per minute, ensuring efficiency and consistency. Its stainless steel construction ensures durability and hygiene, making it suitable for food processing industries. The machine features adjustable settings to accommodate different coconut sizes and textures. With an easy-to-use control panel, operators can efficiently manage the process with minimal training. Safety features such as automatic stop sensors and protective covers enhance operational security. Designed for coconut oil extraction, desiccated coconut production, and coconut-based food manufacturing, this fully automated machine is a game-changer in the industry. It ensures faster processing, reduced waste, and higher yield, making it an essential tool for businesses handling large volumes of coconuts.

II. TECHNICAL SPECIFICATIONS

The Automatic 3-in-1 Coconut Crashing Machine is designed for dehusking, grinding, and milk extraction, making coconut processing efficient and labor-saving. Constructed from food-grade stainless steel (SS-304), it ensures durability, hygiene, and resistance to corrosion. The machine has a processing capacity ranging from 300 to 500 kg/h for small models and up to 4000 kg/h for larger industrial versions. It operates on 4 kW to 18.5 kW of power and typically runs on a 380V, 50Hz, three-phase power supply, though this may vary by region. The dehusking mechanism features adjustable pressure rollers, allowing it to handle coconuts of different sizes efficiently. The grinding system is equipped with sharp stainless-steel blades, ensuring fine and uniform shredding of coconut meat. For milk extraction, the machine uses a high-efficiency screw press mechanism, achieving up to 80% juice yield while automatically separating coconut waste. The entire process is fully automated, with separate outlets for waste disposal and extracted milk collection.

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Safety is a key consideration, with features like an emergency stop button, safety guards, and interlock systems to protect operators. The machine is designed for easy cleaning, with removable components that simplify maintenance. Depending on the model, the weight ranges between 100 kg and 500 kg, and some units come with wheels for portability. The machine operates at an adjustable speed, allowing customization based on production needs while maintaining a low-noise output. It delivers consistent quality processing, making it ideal for commercial coconut processing units, farms, and food industries. Most models come with a warranty of 1 to 2 years, and certain manufacturers offer customized features based on user requirements

III. LITERATURE REVIEW

Vishnu Murli: In this paper author says that coconut water used as a healthiest drink which is naturally available. In many countries like it is obtained by splitting and punching but this is risky. That's why the proposed model consists of hydraulic system and frame with fixture which hold the coconut. Piercing operation is done with the tool which is operated by hydraulic system. The lever is used to control the motion of the tool. The DCV is controlled by user, tool used is hollow steel pipe which penetrate the coconut and extract the water. With this piercing operation water is extracted which maintained the hygiene of water and increase productivity. Due to the use of hydraulic system, it reduced the time consumption for the water extraction process.

Mohd Fauzi Mohd Yunus: In this paper author given that this paper consists the development conceptual design for dual purpose coconut processing machine. Prototype of the machine is created and tested which used to obtained de-husked as well as grated coconut. Which operated at different speed for both the operations. Three conceptual designed machines are analysed where two persons are performing two different operations simultaneously to because tools are situated adjacently. The de-husking is carried out repeatedly until the complete husk is removed. Results obtained from this testing on prototypes a final conceptual design is proposed for performing both the de-husking and grating operation efficiently.

Krishnan.R: In this paper author found that the coconut is used by one third peoples of our world. But for the utilization it needs to de-husked before it, manual methods for dehusking are time consuming and it has risk of injury. It requires mechanized system but the existing technology consists hydraulic systems which is not affordable for the producer. To overcome these problems proposed system has simple mechanism having motorized shaft with spikes which penetrate into the husk and remove it. Gear box reduces speed from 960 rpm to 30 rpm of shafts to penetrate spikes in to the nut and peel off them. Gear box and connected with motor shaft which is lie on the same line to reduce the vibration and proper utilization of power to increase productivity.

Danny Thomas: In this research paper author analyzed that India is the third largest producer of coconut in the world and it accounts 50% of coir trade across the world. Coir is the outer cover of the coconut which is also called as husk. To remove the husk manually by labor and mechanized machine which requires skilled labor. To reduce the requirement of skilled worker to de-husk the coconut development and design of Automated coconut dehusking machine. This machine consists two rollers having spines mounted on frame, and powered with sprocket driven by chain drive. Motor is used with worm and worm gear assembly to drive chain drive. The experiments is done on the both the mature and immature coconut to determine the force to de-husk the coconut.

IV. LITERATURE GAP

The studies focus on improving coconut processing through mechanization, several gaps remain unaddressed. There is limited research on integrating automation and AI-based control systems to enhance efficiency and reduce manual intervention. The hygiene aspect of coconut water extraction needs further exploration, particularly in terms of sterilization and contamination control. The high cost of hydraulic and mechanized de-husking systems makes them inaccessible for small-scale farmers, highlighting the need for cost-effective, energy-efficient alternatives. Additionally, existing studies do not fully address the versatility of machines to process different coconut sizes and varieties. Research

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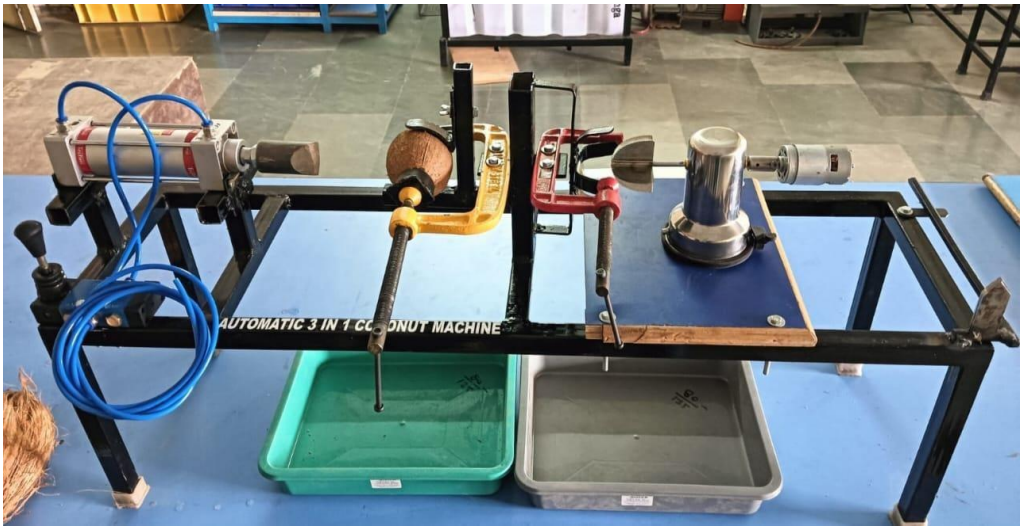
on sustainable power sources, material durability, and by product utilization is also lacking, which could improve the overall efficiency and environmental impact of coconut processing technologies.

V. METHODOLOGY

The Automatic 3-in-1 Coconut Crashing Machine operates through a systematic process of dehusking, shell breaking, and grating in a continuous sequence. The process begins with the dehusking unit, where sharp rotating blades or rollers efficiently remove the outer husk. Next, the shell breaking mechanism applies controlled pressure to crack the hard shell without damaging the inner coconut meat. Finally, the grating unit finely shreds the coconut flesh for further processing.
The machine is powered by an electric motor and controlled through an automated interface, ensuring precision and consistency. Adjustable settings allow customization based on coconut size and texture. Safety features like automatic shut-off sensors and protective enclosures ensure user protection and smooth operation



Automatic 3 in 1 Coconut Crushing machine

VI. CONCLUSION

The Automatic 3-in-1 Coconut Crushing Machine provides an efficient and automated solution for coconut processing by integrating dehusking, shell cracking, and grating into a single unit. This innovation significantly reduces manual labor, increases productivity, and ensures hygienic processing. With adjustable settings, safety features, and durable stainless-steel construction, the machine is ideal for both small-scale and industrial applications. Its high efficiency, minimal waste, and user-friendly design make it a valuable tool for coconut-based industries. Future advancements can focus on cost reduction, AI integration, and sustainability to further improve accessibility and performance.

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