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Portable Manually Operated Deburring Machine

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Abstract: *As we can see the Portable Manually Operated Deburring Machine is a machine designed primarily for removing imperfections from wooden and plastic surfaces, rough edges, and burrs. Its body or frame is constructed with a wood , the machine features a sandpaper roller that effectively smooths and refines the surfaces of various non-metallic materials. Its design ensures ease of use, reducing user fatigue during prolonged operation. This machine is portable, making it ideal for both on-site and workshop applications where space is available. While not suitable for metalworking, the deburring machine offers an efficient, simple, and affordable solution for enhancing the quality of plastic and wood products, ensuring a smooth, finished appearance in a variety of DIY projects, craft, and carpentry..*

Keywords: Portable, Manually Operated, Deburring, Wood frame, Smooth, Cheap

I. INTRODUCTION

Portable manually operated deburring is a efficient tool designed for surface finishing for various materials, such as plastic and wood. This machine operates on pedal without the need for electricity, utilizing a Manual pulley and belt mechanism to generate the necessary deburring motion, making it ideal For use in remote areas or situations where power supply is unavailable. Its lightweight And portable design ensures ease of transportation and operation, enabling users to Perform deburring tasks on-site with minimal setup.

The deburring machine features adjustable deburring speeds and pressure controls, allowing for precise surface treatment and a smooth finish. Built from durable materials, it offers long-lasting Performance and is designed to handle continuous manual operation. This eco-friendly device provides an affordable, sustainable solution for users seeking to reduce energy Consumption while maintaining high-quality results in woodworking, And other surface preparation tasks. By controlling the foot pedal speed, the user can adjust the Deburring Intensity, making the machine suitable for various materials And finishes from rough deburring to fine polishing.

A foot pedal system is employed, which drives the deburring belt or disc with a continuous motion, freeing the user's hands for positioning and controlling the material being. This machine is designed to be portable and lightweight, enabling easy transportation to different work sites. It can be carried by hand and set up in remote locations, making it perfect for outdoor projects or areas where electricity is not available.

II. TECHNICALSPECIFICATIONS

The following table illustrates the technical specifications of portable manually operated deburring machine

Table 2.1: Technical Specifications corn thresher machine

Sr. No.	Category	Specifications
1.	Power Source	Manually Pedal
2.	Tool Material	Sand Paper
3.	Power Transmission	Belt and pulley
4.	Frame Material	wood
5.	Belt Material	Leather
6.	Bearings	Ball Type Bearings
7.	Pedal Material	Wood

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III. LITERATUREREVIEW

[1] Sayyed et al. (2014) discussed automation in burr removal techniques and how modern manufacturing processes aim to integrate automated systems for high precision and efficiency. The study highlighted various methods such as robotic deburring, CNC-integrated burr removal, and electrochemical deburring. While automation improves consistency and speed, it often requires complex setups and high investment costs. Compared to automated methods, the manually operated portable deburring machine offers a cost-effective and accessible solution, particularly for small-scale industries or workshops. However, automation can provide insights into optimizing the mechanical design and efficiency of manually operated machines.[2] Park et al. (2017) introduced a portable micro-deburring system utilizing Micro-EDM, which is particularly effective for precision components. The study emphasized how electrical discharges effectively remove burrs without direct mechanical contact, making it ideal for delicate parts. While Micro-EDM is effective, it requires electrical energy and controlled environments, making it less suitable for manually operated, low-cost solutions. However, the concept of portability in their research aligns with the objective of the manually operated deburring machine, reinforcing the importance of lightweight design and ease of operation. [3] Yeo et al. (2006) explored ultrasonic deburring, a technique that uses high-frequency vibrations to remove burrs with minimal force. This method is particularly useful for small and fragile components, as it reduces mechanical stress. While ultrasonic deburring provides precision, it Involves specialized equipment that is not practical for a manually operated deburring system. However, the principle of controlled force application can be applied to improve the effectiveness of the sandpaper roller in the proposed machine. [4] Zou and Shinmura (2007) developed a magnetic deburring method that removes burrs from the inside of tubes using a magnetic machining jig. This technique is highly effective for internal features and complex geometries that conventional deburring methods struggle with. While the manually operated machine focuses on external surfaces and accessible edges, magnetic deburring highlights an alternative method for internal deburring, which may be considered for future enhancements of the design.

IV. METHODOLOGY

To manufacture portable manually operated deburring machine the process begins with selection of proper materials which are suitable for manufacturing of portable manually operated deburring machine. Consists fame, belt, pulley, sand paper roller, pedal etc. of frame for wood material is a good option. It is easy to work with and lightweight. For bet there are so many like rubber, lather, rope etc. Also pulley have some many options like wood, steel, iron etc. Sandpaper roller is made of wood Sandpaper which to use to remove burrs or perform deburring operation. Pedal is made of wood for lightweight it is used to rotational motion to pulley.

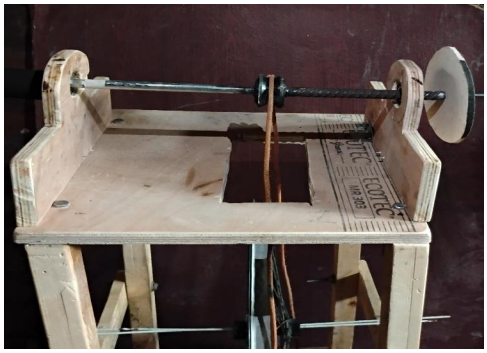

Fig. 1.1 – Portable Manually Operated Deburring Machine

Working of portable manually operated deburring machine is when force is applied on pedal it oscillate around pivot point that motion is transferred to the big pulley with the help of connecting shaft. That big pulley is connected with small pulley with belt. As big pulley rotates that rotational motion is transferred to small pulley with belt.

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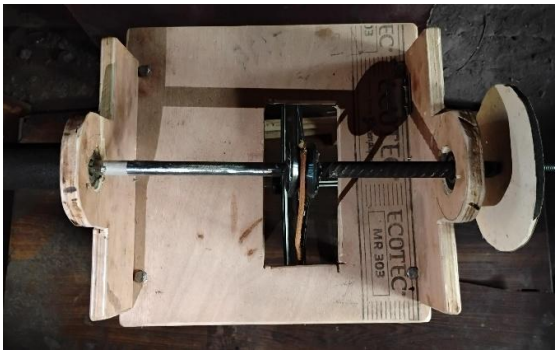

Fig. 1.2 – Portable Manually Operated Deburring Machine Top View

Small pulley is connected to sand paper roller and Sandpaper plate with shaft as small pulley rotates that rotational motion is transferred to sand paper roller and sand paper plate as sand paper roller and sand paper plate rotates deburring operation is performed and burrs are removed.

V. CONCLUSION

design and manufacturing of a portable manually operated deburring machine involve careful selection of materials for each component, such as wood for the frame, rubber or leather for the belt, and wood for the sandpaper roller. The machine operates by converting the force applied to the pedal into rotational motion, which is transmitted through pulleys and belts to the sandpaper roller, where the deburring process occurs. This system allows for efficient burr removal through simple, manual operation, making the machine lightweight and portable while maintaining functionality.

VI. ACKNOWLEDGMENT

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