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Design and Fabrication of Manually Operated Wood Working Machine

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Abstract: ***this paper presents the concept of design and fabrication of manually operated wood working machine mainly for small wood factory. Today in this world every task have been made quicker and fast due to technology advancement but this advancement also demands huge investments and expenditure, every industry desires to make high productivity rate maintaining the quality and standard of the product at low average cost. We manufacture a machine which is powered by human. With the help of this machine we cut, grind the plywood and p.v.c. The machine operated by human peddling so no any other extra energy is needed. This machine cut the plywood, wood up to 2 inches. In the present work, a human powered multipurpose machine is developed which can perform three types of operations sawing and grinding. Power required for pedaling is above the capacity of an average healthy human being. But with the help of pulley we supply the more power.***
Keywords: grinding, multipurpose, sawing, pedal operated

I. INTRODUCTION

In today's world, we know that, the machining operations are essential for doing successful engineering jobs. We find these machining operations like drilling, grinding, cutting etc. In lot of sectors whether it is manufacturing or aerospace or in domestic or in industrial purpose. The grinding machine consumes up to 3.3 to 3.5 HP and power saw consumes up to 0.5 HP.

But here in this project, the maximum attention towards the saving of electrical power, for saving this the substitute way is that utilization of Human power. The machine is made such that it would be applicable to the normal field work where there is a scarce of electricity. In this machine, the objective is to get two machining operations. The whole device is running on the pedal power which produces 500W. This project provides grinding and cutting operations are obtained by using flexible shaft. This project use to increase the communication with the work piece which is away from the machine.

In this project a table saw is used. Table saw is a saw in which a circular blade rising through a slot in a table. A smaller version of bench can be set which is called as workbench saws. If set on steel legs it is called contractor's Saws. A heavier version, which more precise and more powerful and driven by multiple belts with an enclosed base stand is called a Cabinet saw.

The Flexible Shaft Grinders are widely used in most of the foundries producing cast iron, Steel casting, forging shop, various fabrication shops and rubber re-treading.

A. Problem Statement

1) Increasing a unemployment
2) The unit operating by means of electricity has limited applications in the rural area

II. LITERATURE REVIEW

According to literature information we found that there is plan of project done on cycling principle but only power generation excising vehicle bicycle etc.

In excising machine equipment peddling operation work with flying it requires some power to rotate flywheel exert by humans muscles (by legs). In this machine one alternator is attached to flywheel which transmits mechanical power into electrical power.

The machine has different gear transmission facilities which give different load as the requirement of exercise. There is no wide scope for that time of machine due to limited generation and efficiency is low as compared to another one (electrical drive, engine etc.) But for some area it comes too be very effective and important due to simplicity and low initial and running cost it becomes economical process.

Principle is used for some type of machining operations that we try to predict such as grinding, cutting etc. Which is very costly on

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the power (i.e. electrical power) consumption machine ?
Our intention is that approach which save electrical power and ultimately lower the cost of machining operation.

III. WORKING PRINCIPLE

Fig. Actual model of project

This multipurpose machine makes the machining operations like grinding, and wooden cutting operations etc very easy without electricity. Basically this machine is operated on pedaling which is done manually. For performing these operations we required rotational speed of shaft around 700rpm, but considering the human effort we reach up to 250rpm. variation in the speed caused by the torque fluctuation. Torque produced by the pedaling motion and it is transmitted to the flywheel with the help of chain and sprocket arrangement.

A. There are so many Advantages of Chain Drive instead of Belt-Drive

1) Transmission of power over considerable distance (up to 8 meters).
2) Comparatively high efficiency of this drive.
3) Small size compared to flat belt drive.
4) Smaller load on shafts.
5) Possibility of transmitting motion by one chain to several shafts.

Pulley is mounted on the left hand side of the shaft. Power is transmitted by using V-belt drive to the small puller with the gear reduction ratio of 3:1, where we get the rotation of the shaft unto 1500 rpm. On the second shaft , round wooden cutter blade and grinding wheel attached. with the help of which we can do the operations of wooden cutting and grinding.

B. Main Components of this Machine are: Frame, Flywheel, Shaft, Chain and sprocket, Wooden cutter & V- Belt

1) Frame: Frame plays a very important role in any machine, because it holds all the working part. All the parts are perfectly mounted on the frame. Generally M.S. pipe having rectangular cross-section is used for the frame. In this machine we will going to use light weighted and rigid frame. The base area required for this frame is 6x4 feet. The flexible shaft consists of metallic flexible inner core with multiple wound opposite layer. It is made up of high tensile spring steel or stainless steel and passed through heat treatment process to make it absolutely vibration free. External sheath is provided with antifriction liner to protect it from friction of high speed moment of inner core. It is very suitable for heavy or lengthy jobs where it is not possible to lift the job or get the same close to the machine.

The flexible shafts are comes in outer diameter of 22mm, 25mm, 32mm, 35mm,. It has inner friction lining made from the thick steel strip, duly interwound in the outer casing. The applications of this shaft in the following sector they are used for power

transmission along non-linear axes in industrial automation, heavy-duty, and specialized applications such as agricultural equipment, speedometer, dentistry, woodworking, and jeweller tools. Bidirectional flexible shafts can be rotated in either direction or reversed. They are well-balanced in both direction and suitable for cyclic application.

2) *Flywheel:* A flywheel is an inertial energy-storage device. It absorbs mechanical energy and serves as a reservoir, storing energy during the period when the supply of energy is more than the requirement and release it during the period when the requirement of energy is more than the supply. For performing the machining operation we required to rotate shaft at 700 rpm, but considering the human effort we reach unto 250 rpm. We can't reach this speed that's why we use the concept of flywheel for increasing the rotational speed of shaft and smoothen out variation in the speed of shaft caused by the torque fluctuations. The important Function of a flywheel is used to store rotational energy. Flywheels have an inertia called the moment of inertia and thus resist changes in rotational speed. The amount of energy stored in a flywheel is proportional to the square of its rotational speed. The geometry of a flywheel may be as simple as a cylindrical disc of solid material, or may be of spooked construction like conventional wheels with a hub and rim connected by spokes or arms small flywheel are solid discs of hollow circular cross section.

3) *Shaft:* A shaft is a rotating machine element which is used to transmit power from one place to another. The power is developed to the shaft by some tangential force and the resultant torque (or twisting moment) set up within the shaft permits the power to be transferred to various machines linked up to the shaft. In order to transfer the power from one shaft to another, the various members such as pulleys etc. are mounted on it. In other words, we may say that a shaft is used for the transmission of torque and bending moment. The various members are mounted on shaft by means of Nut and Bold. The shaft are usually cylindrical, but may be square or cross-shaped in section. They are solid cross-section but sometimes hollow shafts are also used. The material used for ordinary shafts is Mild Steel. When high strength is required, alloy steel such as Nickel, Nickel Chromium Steel is used. The 25mm diameter size of shaft is used.

4) *Chain and Sprocket:* The chain drive belonged to drive with an intermediate link (flexible connection) which is represented by a chain. This drive uses an endless chain running around two sprocket. This drive transmits motion between parallel shafts only.

a) *Merits of Chain Drive:*

Effective transmission of power over considerable distance (up to 8 meters).
Comparatively high efficiency of this drive (up to 98%).
Small size compared to flat belt drive.
Smaller load on shafts.
Possibility of transmitting motion by one chain to several shafts.

5) *Circular Saw:* A circular saw is a power-saw using a toothed or abrasive disc or blade to cut different materials using a rotary motion spinning around an arbor. A hole saw and ring saw also use a rotary motion but are different from a circular saw. *Circular saws* may also be loosely used for the blade itself. A circular saw is a tool for cutting many materials such as wood, plastic and may be hand-held or mounted to a machine. In woodworking the term "circular saw" refers specifically to the hand-held type and the table saw and chop saw are other common forms of circular saws. "Skil saw" has become a generic trademark for conventional hand-held circular saws. Circular saw blades are specially designed for each particular material they are intended to cut and in cutting wood are specifically designed for making rip-cuts, cross-cuts, or a combination of both.

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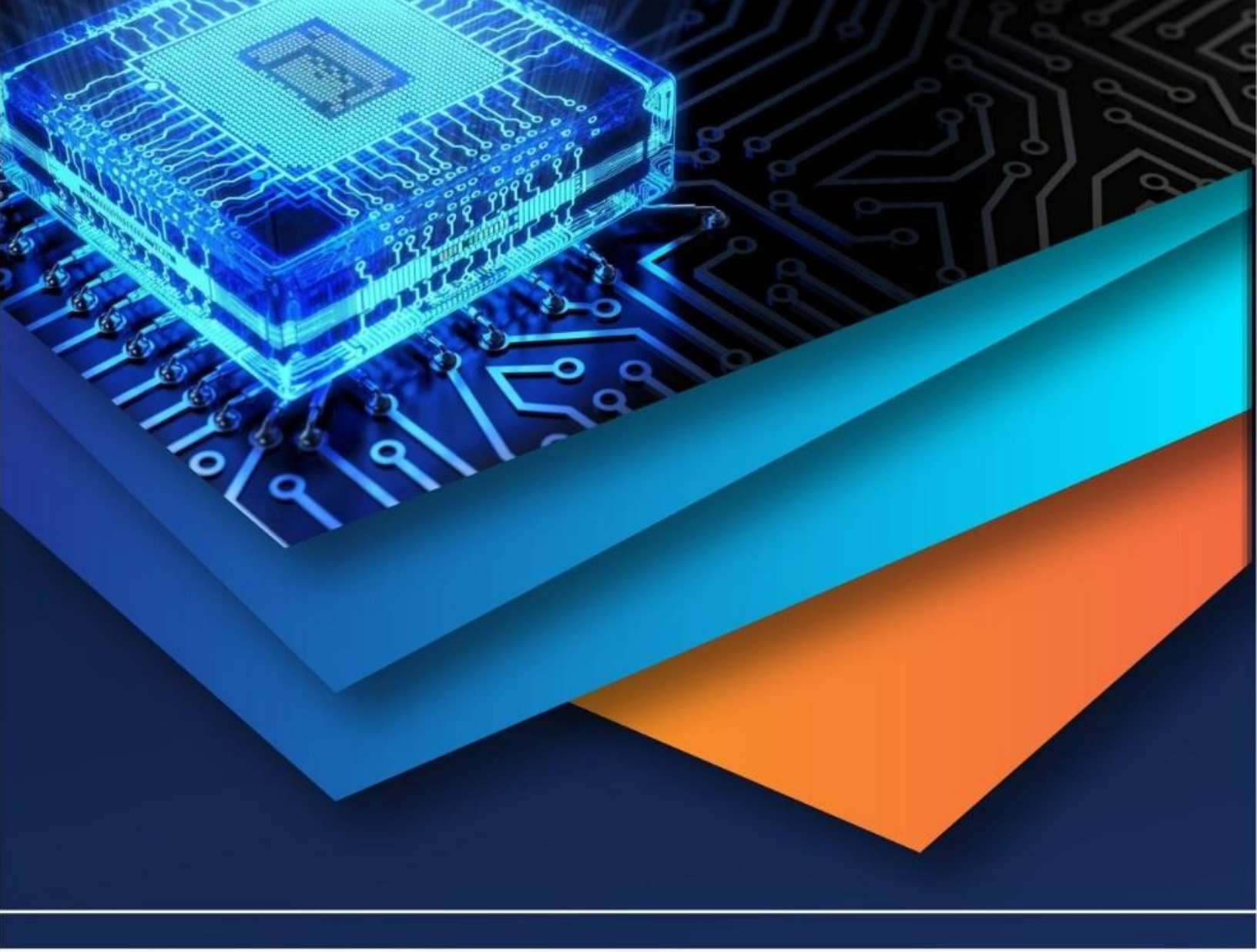

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