

Fabrication of Pedal Operated Drilling Machine

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ABSTRACT

This pedal-operated drilling machine is a manually operated drilling device that utilizes a pedal mechanism to rotate a drill bit. The machine is designed to provide a reliable and efficient drilling solution for various industries, including woodworking, and construction. With its compact design and lightweight construction, the machine is easy to transport and can be used in a variety of settings. The main advantage of this machine allows for smooth and consistent drilling operations, reducing operator fatigue and improving accuracy. This innovative mechanical project of pedal drilling machine is an ideal solution for applications where electricity is not available, and also reduces the labor cost. This machine is very useful for small scale industries. Nowadays Power generation is a considerable one in our world. Small force operations are to be performed by manual power. Then only we Save the Electric energy. In this drilling machine we give power same as pedaling operation to get rotation of the drill bit. Sprockets are used to increase the speed of the drill. We can achieve different speed rate of spindle with respect to drive the pedaling force. This is a simple type of automation project.

Keywords: Pedal-operated, Drilling Machine, Manually operated, Reliable and Efficient drilling, Low cost, Small scale industries.

INTRODUCTION

These days as a result of increasing population we are facing many issues of electricity. As we create pedal-operated drilling machine, like from variety of materials chosen for their strength. The mechanics of this pedal-operated machine is simple, with a chain drive, and sprocket arrangement. Pedaling converts human power into mechanical energy, which is then used for machining. The pedal operated machine is mostly used for this. This machine is cost-effective and can be utilized in areas where electricity is scarce. This machine is not only inexpensive, but it may also be used for mobile applications. It reduces human labor and time by allowing a large number of activities to be carried out simultaneously on a single platform. However, technological advancements necessitate a significant investment in industries, with the primary goal of each industry being to increase productivity while retaining quality at a cheap cost of production. Pedal Operated Machine is a manual system that is mostly used for drilling without the usage of electricity.

LITERATURE REVIEW

In [1], the demand and importance of electricity are discussed. The development of machines that

utilizes human leg power through pedalling, offering an alternative to electricity-dependent devices. This is particularly relevant in areas with limited or unreliable access to electricity.

In [2], various applications in rural & resources-limited. In rural communities and small scale operations, it is more useful where electricity is limited access. Though compared to the other technique, less design to be relatively simple to operate, maintain, and repair, making them suitable for use in remote locations, but the advantage is that it would not require any kind of fuel as an input. The maintenance cost for this machine and the cost of components of this design are less compared to other techniques.

In [3], the idea of the generation of drilling machine using a pedal operating system by manual method just by pedalling the foots is stated. Drilling operation using foots requires no fuel input. Generating drilling operation just with the help of chain and sprockets arrangement along with the help of rotating shafts using bearings is the main idea. For its proper functioning, it converts Force into mechanical energy, the mechanism consists of a chain and sprockets, shafts, and bearings. The pedal drilling machine is much worthy but it has little initial cost-effective factors.

In [4], the mechanism by which the pedal drilling machine involves converting into mechanical energy by proper arrangement is explained. The chain and sprockets, arrangement is fixed at the lower shaft and upper shaft. The bearing is used to rotate the shaft and bevel gears are used to rotate. The gear wheel is coupled to the smaller pinion gear. The pedal mechanism used here to operate the machine. This arrangement is fitted in supporting frame the complete arrangement is kept on the frame body for the support. The pedal drilling machine has the advantage that it utilizes any external source.

In [5], the working mechanism of the mechanical system which mainly relies on an external force is demonstrated that can be supplied by a human being's foots (legs) on the pedal and the mechanical energy that can be converted in the drilling operation. It is expected that the person, who has a normal weight of about 75 kg, could operate the pedal drilling machine. The model design of the pedal drilling machine has a dimension of 55 *inch*.

In [6], the application of pedal drilling machine is discussed like the design can be used to enlighten the drilling operation is manually operated by foots. We can use this machine in small scale workshops. They are ideal for tasks that don't require high precision or heavy-duty drilling. The kinetic energy of the moving parts can be converted into mechanical energy through a chain and sprockets mechanism and this mechanical energy is converted to rotational energy using a shaft which is used for rotation for drilling. Therefore, by using this mechanism we can save a lot of energy which can fulfil future needs.

In [7], an overview of the use of pedal drilling machine for the generation of drilling. The pedal drilling machine is not only a source but also unique, safe, reliable,

The fundamental concept involves converting the kinetic energy generated by pedalling into rotational force for drilling.

Mechanical power transmission:

System typically employs:

Chains and sprockets are used to transfer power from the pedals to a rotating shaft. Gear systems like (bevel gears) are used to adjust the speed and torque of the drill bit.

In [8], an explanation of the costing of the project for materials.

In [9], the operations which are performed in doing the project are explained.

COMPONENTS SELECTION RAW MATERIALS:

Table 1. List of components

S. NO	PARTS	QTY	MATERIAL
1	Iron pipes	1	Galvanized iron
2	Chain and sprockets	2,4	Iron
3	Shaft	1	Iron
4	Bevel gears	4	Iron
5	Nuts and Bolts	4	Mild Steel

CUTTING PROCESS

Cutting processes work by causing fracture of the material that is processed. Usually, the portion that is fractured away is in small sized pieces, called chips. Common cutting processes include sawing, shaping (or planning), broaching, drilling, grinding. And milling. Although the actual machines, tools and processes for cutting look very different from each other, the basic mechanism for causing the fracture can be understood by just a simple model called for orthogonal cutting. In all machining processes, the work piece is a shape that can entirely cover the final.

DRILLING PROCESS

Drilled holes are characterized by their sharp edge on the entrance side and the presence of burrs on the exit side (unless they have been removed). Also, the inside of the hole usually has helical feed marks. Drilling may affect the mechanical properties of the work piece by creating low residual stresses around the hole opening and a very thin layer of highly stressed and disturbed material on the newly formed surface.

WELDING PROCESS

Introduction to welding process Introduction Welding is a process in which two or more parts are joined permanently at their touching surfaces by a suitable application of heat and/or pressure. Often a filler material is added to facilitate coalescence. The assembled parts that are joined by welding are called a weldment. Welding is primarily used in metal parts and their alloys. Welding processes are classified into two major groups: 1. Fusion welding: In this process, base metal is melted by means of heat.

GRINDING OPERATION

Grinding practice is a large and diverse area of manufacturing and tool making. It can produce very fine finishes and very accurate dimensions; yet in mass production contexts it can also rough out large volumes of metal quite rapidly. It is usually better suited to the machining of very hard materials than is "regular" machining (that is, cutting larger chips with cutting tools such as tool bits or milling cutters), and until recent decades it was the only practical way to machine such materials as hardened steels. Compared to "regular" machining, it is usually better suited to taking very shallow cuts, such as reducing a shaft's diameter by half a thousandth of an inch or 12.7 μm .

ADVANTAGES

- No electricity is required ideal for remote areas, workshops without power, or during power outages.
- Easy to transport and store due to their smaller size and lighter weight.

- It is affordable often more cost-effective to purchase and maintain compared to electric models.
- Low maintenance fewer moving parts, reducing the need for frequent repairs.
- It is environmental friendly for use.
- Can be used for various drilling tasks.
- It is easy to operate, no experts needed to use.
- It eliminates the risk of electric shock.
- Improved physical health of the user.
- It reduces fatigue compared to hand-cranked drills, it reduces operator fatigue, especially for longer drilling tasks.
- It can be easily modified or customized to suite specific needs or applications.
- It can be used in educational institutions to teach about the mechanical principles and the conversion of energy.

APPLICATIONS

- In Rural Areas it is used where electricity is unavailable.
- Small-Scale Workshops and Fabrication.



- In DIY and Home it is used for drilling holes on wood.
- These machines can be used for educational demonstrations, illustrating the principles of mechanical power transmission.



OUTPUT FIGURE

WORKING AND DISCUSSION

The pedal-operated drilling machine, as it known, is a machine designed specifically for small-scale

companies where laborers have limited access to technology. Pedal-operated drilling machine is a machine that performs drilling operation on a work piece. Pedal-operated drilling machine also improve human health by providing exercise through the pedaling process. As a result, we create human-powered machines that can be used in both rural and urban settings to cut costs and maximize manpower use age. Drilling is a cutting technique that involves using a drill bit to create a circular hole in solid materials. The drill bit is commonly a multi-point rotary cutting edge is forced against the work piece, cutting of chips.

The pedal mechanism is used to operate by the foot to control or activate a mechanism. The pedal is the main part of the machine assembly. The pedal should be designed to fit comfortably under the user's foot. The power transmission is based on chain drive to operate. A chain connects two sprockets (wheels with teeth) - one on the pedal shaft and another on the main shaft.

As the pedal shaft rotates, it drives the chain, which in turn rotates the main shaft in horizontal direction. Since the assembly of chain and sprockets in horizontal directional then the other chain is assembled in perpendicular direction to the surface. By using bearings it reduce the friction between the moving parts the shaft rotates. The frame (base) is prepared to lift or carry the mechanical components to work and they are arranged by welding process. The bevel gears are used to transmit the power to other moving parts to rotate and the arrangement of gears in the unit are attached to the moving shaft for the moment. As it was arranged the two sides of the shafts are joined by the small gear and large gear. Most of the machine is constructed with mild steel material.

As the arrangement of shaft and gears one end of the spindle is connected with a drill chuck to rotate with spindle. The suitable drill bits are used to fit in the drill chuck to make a hole on the work piece. The specific work piece is used to make holes where it is necessary.

CONCLUSION

The pedal-operated drilling machine stands out as an effective solution for small-scale operations in areas with limited access to electricity. It provides a unique blend of sustainability, low-cost operation, and making it particularly suitable for environments where electric-powered tools are impractical. This machine puts out a good effort and is simple to operate. This equipment will used to drill materials with low hardness and thickness, such a wood. This machine will especially beneficial in rural areas. Where power outages occurs on a regular basis. We can do only one operation with this equipment. There is no requirement for highly skilled technicians to operate this machine the cost of labor is zero. Only human strength will required. This project successfully demonstrates the fabrication of a pedal-operated drilling machine. The machine effectively utilizes human power to perform drilling operations. The design incorporates to optimize drilling performance and user comfort.

FUTURE SCOPE

1. The pedal drilling machine has a reliable and efficient tool for industries. As technology advances, the future scope of pedal drilling machine is expected to expand, with potential development like "connecting motor" to the unit using belt or chain to the machine for electricity. The future scope of pedal drilling machine with wood is promising, with potential applications in various industries and communities. Enhancing the design for better ergonomics and reduced operator fatigue, developing hybrid systems that combine pedal power with electric or solar power for increased efficiency.
2. Technological Advancements like Improved Efficiency, reducing the effort required to drill holes.

3. By modifying the machine we can add grinding wheel for small tools.

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