



Paddle Operated Drilling Machine

Saurabh S. Khonde¹, Shubham S. Lonkar², Assist. Prof. Chaitanya. G. Deshmukh³

¹Student, Dept. of Mechanical Engineering, DES'S COET, Dhamangaon Rly, 444709, India

²Student, Dept. of Mechanical Engineering, DES'S COET, Dhamangaon Rly 444709, India

³Professor, Dept. of Mechanical Engineering, DES'S COET, Dhamangaon Rly 444709, India

ABSTRACT

Legs came to be recognized as a technique of developing power from human muscles with the invention of the bicycle and pedaling. As the population grows and electricity shortages continue, it is critical to envision new ways to supply power to the people. When compared to hand cranking, pedaling generates four times the power. Continuous cycling at 1/4hp is only possible for short periods of time, roughly 10 minutes. However, pedaling at half the power (1/8hp) can last for up to 60 minutes. Many of the power sources available to humanity today are unsustainable; new ideas are required to transition to a post-cheap petroleum society. Humans have used their arms, hands, and backs to apply energy. As a result, pedaling can be used to turn human applied energy into mechanical work. When compared to hand cranking, pedaling generates four times the power. Pedaling will be used for two operations: grinding and drilling. It will save money and electricity, and it will be useful in remote areas. The technique is also useful for working out because pedaling is both a healthy exercise and a productive activity. In remote areas, the equipment that runs on electricity has a restricted application.

Keywords: Drilling Machine, Manual, Paddle operated, Multipurpose.

1. INTRODUCTION

Because of the rapid growth of technology, every task has become faster and faster. The mechanics of this pedal-operated machine is simple, with a chain drive, belt drive, and sprocket arrangement. Pedaling converts human power into mechanical energy, which is then used for machining. The pedal-operated multipurpose 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 Multipurpose Machine is a manual system that is mostly used for grinding and drilling without the usage of electricity.

The utility model solves a technological problem: in the prior art, the process is quite straightforward, small parts of the object are small grinders, and employing electric drive is inefficient. The design goal was to grind and use as a blender, lift water to a height of 10 meters, and create 14 volts, 4 amps of power in the most efficient manner possible. The operator holds the component to be machined, sits on the seat cushion, places two feet on the foot pedal handle, and spins the handle, the handle foot drive shaft rotates, the first drive shaft on which two sprockets revolve, according to the aforementioned technical solution. The 'exercise bicycle,' a multipurpose equipment that was originally designed for exercising, has been modified for grinding, water lifting, washing machines, and power generating. Pedal power is the source of power used for the above purposes. Because of its low cost, availability, and design simplicity, the 'exercise bicycle' was chosen for this purpose. This is a foot-operated manual drilling machine for drilling larger pieces of metal, wood, PVC, and other materials. This is especially beneficial in locations where electricity is intermittent or nonexistent. The power is transferred from the pedal to the drill via various transmission gears in this machine. It can also be driven by a motor if the device pulley is connected to the motor pulley. An average human being can create 150 rpm of drill bit using this machine. Although drilling machines are available on the market, they are not pedal controlled. Electric-operated semi-automatic or automatic machines are the most common. This machine, which costs around Rs 2000/-, is particularly useful for small-scale workers and fabricators.

It was created to drill a cylindrical hole in metal workpieces with the required diameter and depth. One of the most crucial machine tools in a workshop is the drilling machine. A drilling machine can quickly drill at a low cost and in a shorter amount of time. Though numerous machine tools in a workplace can make holes, a drilling machine is intended primarily to conduct drilling and comparable operations. The hole can be dug to the specified depth.

Drilling is the process of removing metal with the revolving edges of a drill to create a cylindrical hole of the desired diameter and depth. The rotating drill is inserted into the work after being forced into place. The drill is a cutting tool that is attached to the drilling machine's spindle. A center punch is used to make an indentation mark at the required spot.



Fig 1.1: Paddle Operated Drilling Machine

2. OVERVIEW OF PROPOSED SYSTEM

Drilling fluids, also known as drilling muds, have been used in rotary drilling since the early twentieth century. Rotary drilling is the process of boring a well using a rotating bit/chisel attached to a drill string (a rigid rod-based drilling column) and supported by a derrick. Drilling fluid is used to provide buoyancy to the drill string, lubricate and cool the bit, and remove cuttings from the wellbore. This event was a watershed moment in the history of petroleum technology, but it was more of a culmination than a start from scratch. Since the mid-nineteenth century, wells have been dug using a combination of rotary equipment and muds. In Spindletop, however, the drilling team used a water-mud mixture that proved to be more efficient. Since then, a cumulative process of know-how and practices has begun, based on an age-old empirical practice of trials and errors produced between Asia, Europe, and North America. The petroleum gushing well completed at the Spindletop Hill field in Beaumont, TX, in 1901 is recognized with being the first to be drilled using such technology in the history of drilling fluids.

- The major goal is to create a multi-operational machine that can function even when there is no electricity.
- To create a multi-functional machine that can execute machining and water lifting tasks without the use of power.
- To provide a pedal-operated machine in rural or distant regions where electricity is unavailable.
- To meet the needs of rural people by providing an alternate method of executing machining activities such as cutting, grinding, buffing, energy production using a dc motor, and water lifting from a well for irrigation and home use. The created product has no operational costs and maximizes profit.

Bicycles were used for machining and household uses. Every work has been made faster and easier in modern world as a result of technological advancements, but this improvement also necessitates large investments and expenditures. Every industry seeks to increase productivity while keeping product quality and standard at a low average cost. Industrialists are drawn to it as well. Industries that are primarily focused on producing valuable goods and services at a low cost of production, low cost of machinery, and low cost of inventory. In the realm of bicycles, according to civilization and globalization. Bicycles are the most commonly utilized mode of transportation, business, and exercise. The inventions on cycling systems are based on the human power system. The point of view shifts. The main goal of this project is to learn how to make and build the most useful pedal-powered multipurpose machine in rural and industrial settings.

3. WORKING PRINCIPLE

The industries are primarily designed to provide usable goods and services at a low cost of production, low cost of machinery, and low cost of inventory. Consider a large vehicle repair business with specialized departments. It contains four arms, each of which performs four separate operations. Questions arising in industrial manufacturing, production planning, and computer control have sparked interest in multi-operation machines as a research subject. Every activity has been made faster and easier in modern society as a result of technological growth, but this advancement also necessitates large investments and expenditures. The Pedal Operated Multi Tool Machine, as it is known, is a machine designed specifically for small-scale companies where laborers have limited access to technology. Pedal Operated Multi Tool Machine is a machine that performs multiple operations on a workpiece fast and efficiently without the inconvenience of switching between machines. Pedal-operated machines also improve human health by providing exercise through the pedaling process. Because electrically powered equipment are typically hefty, they cannot be operated on the move. Because our human-powered machine is inexpensive, it lowers production costs. Electrically powered machines are often single-purpose machinery. As a result, the cost of machine equipment rises. This automation is also causing workers' health to deteriorate. Our versatile machine can perform multiple tasks on the same platform at the same time. As a result, we create human-powered machines that can be used in both rural and urban settings to cut costs and maximize manpower usage. Because of modern technology, manufacturing in the industries has been much faster and more efficient, but this technology also necessitates a significant investment. In today's world, most machinery are electrically powered to boost productivity and cut labor costs, however in rural areas, electricity is intermittent or non-existent.

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 instrument. The bit is pushed against the workpiece and spun at speeds ranging from hundreds to thousands per minute. As the hole is drilled, the cutting edge is forced against the workpiece, cutting off chips (swarf).

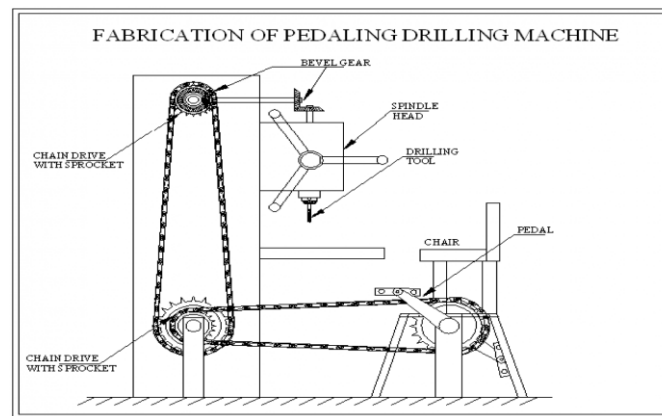


Fig 3.1: Drilling Mechanism

The sharp edge on the entrance side and the presence of burrs on the exit side distinguish drilled holes (unless they have been removed). There are frequently helical feed marks on the interior of the hole as well.

By introducing low residual stresses around the hole opening and a very thin layer of highly strained and disturbed material on the freshly formed surface, drilling may influence the mechanical characteristics of the work piece. The workpiece becomes more prone to corrosion and crack propagation at the strained surface as a result of this. To avoid these negative consequences, a finish procedure may be performed.

A. Components for Construction of Machine

- Bicycle frame
- Hacksaw assembly
- Water pump assembly
- DC Motor assembly
- Grinding assembly
- Lever arrangement

The hacksaw is attached to the rod's end. This configuration is similar in size and form to a cycle. For effective hacksaw assembly operation, a chain mechanism and lever arrangement are also used to reduce power loss. The multi-operational machine's entire assembly will be supported by the frame. The work piece is put on the work piece holder, which prevents the work piece from moving throughout the cutting process. The machine structure will not be harmed by the frame structure. Bolts link the pedal and connecting rod to each other. The flywheel attached closer to the pinion rotates when the wheel is pedaled, reducing speed fluctuations and ensuring even cutting. The pedal-operated hacksaw features a simple mechanism that uses a chain and sprocket system. A bearing is installed between the wheel or pedal's center and the hacksaw to ensure that it moves smoothly back and forth during pedaling. The chain is attached to the wheel and pinion teeth. Simple electrical gadgets are charged using pedal power. The motor generates electrical energy as a result of this motion. Rotary and reciprocating pumps are two types of displacement pumps. Any liquid can be handled by any of the pump designs in theory. The rotating motion of the shaft is caused by the motion of the tire in contact with the motor shaft as the rider pedals. When a variety of pump designs are available, centrifugal pumps are usually the most cost-effective, followed by rotary and reciprocating pumps. The system is set up as

shown in the diagram. The impeller shaft is attached to the bicycle's back tire, and the impeller rotates at a very high speed while the tire rotates. Mechanical energy is turned into electrical energy in a human-powered power generation system. They are classed as dynamic or displacement pumps based on their primary operating mechanism. Centrifugal and special effect pumps are two types of dynamic pumps. Pumps are available in a number of sizes to suit a variety of uses. For power generation, a motor is mounted to the bicycle's tire.

4. Conclusion

This machine puts out a good effort and is simple to operate. The guide plate is simple to install. This is viable and implementable with the HMT Multi Drilling Machine in question. This equipment is used to drill and grind materials with low hardness and thickness, such as wood, aluminum, and steel. This machine is especially beneficial in rural areas, where power outages occur on a regular basis. We can do more than two operations concurrently with this equipment, reducing both production time and cost. There is no requirement for a highly skilled technician to operate this machine. In comparison to our pedal-operated machine, the machine operated by motor saves a lot of time, but there is no need for electricity. The cost of labor is zero. Only human strength is required. Useful for villages who have their power switched off every day for several hours. When compared to the cost of a standard machine in use, our equipment is half the price.

REFERENCES

- Bearing Failure: Causes and Cures." Barden Precision Bearings Gray, Will, and Don Macdonald. "A practical guide to understanding bearing damage related to PWM drives." IEEE, 1998.
- Roger Bridgeman. 1000 Inventions and Discoveries. The Smithsonian Institution. DK. New York; 2006.
- Charles Singer; E. J. Holmyard and A. R. Hall. A History of Technology, Volume 1: From Early Times to Fall of Ancient Empires. Oxford University Press; London, England. 1967. p. 189
- Charles Singer; E. J. Holmyard and A. R. Hall. A History of Technology, Volume 1: From Early Times to Fall of Ancient Empires. Oxford University Press; London, England. 1967. p. 188
- "Variable Speed Driven Pumps-Best Practice Guide." GAMBICA Cowern, Edward H. "Bolder Motors and Drives." Baldor Electric Company, 1999.
- Les Manz. "Applying Adjustable-Speed Drives to Three-Phase Induction NEMA Frame Motors." IEEE Transactions on Industry Applications 33. 2 (1997): 402-407.