



Pedal Operated Cutter

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ABSTRACT

We can try to make a multipurpose mechanical machine that is portable because the prices of drilling, cutting, and grinding machines are so high and some are not portable. This machine motor does not require a high voltage to operate; instead, it relies on human effort. We propose the "Pedal operated cutter" project, which has many applications in modern equipment and systems for diverse activities such as grinding, finishing, cutting, drilling, and so on..

Keywords: Hacksaw Blade, Crank and Slider Parts, Pedal and Stand Setup Parts.

1. INTRODUCTION

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. 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. Consider a large vehicle repair business with specialized departments. Industries are primarily designed to provide usable goods and services at a cheap cost of production, low cost of machinery, and low cost of inventory. 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.

Every industry aspires to achieve a high rate of productivity while maintaining product quality and standard at a low average cost. Machinery installation accounts for a significant amount of an industry's investment. So, in this project, a machine is designed to perform cutting, drilling, grinding, polishing, and shaping, as well as some lathe operations, at multiple working centers simultaneously, implying that industrialists will not have to pay for machines to perform the above tasks individually for simultaneous operation. Manufacturing economics: Manufacturing, according to some economists, is a wealth-producing sector of the economy, whereas the service sector is wealth-consuming. Emerging technology have resulted in some fresh growth in advanced manufacturing job prospects in the United States' Manufacturing Belt. Manufacturing is critical in providing material support for national infrastructure and defense. Before beginning our work, we read a number of research papers that show that machine installation in production-based industries is a difficult task due to a number of factors such as power consumption (electricity bill per machine), maintenance costs, the number of units produced per machine (machine capacity), time consumption, and the number of machines that can perform operations such as drilling, cutting, grinding, polishing, and shaping..

2. WORKING PRINCIPAL

Electrical motors, bevel gears, a lengthy shaft, a scotch yoke mechanism, drilling, and grinding are all part of the setup. At one end of the shaft, the grinding wheel is mounted. The cutting motion is performed by the scotch yoke mechanism, which is located at the other end. Bevel gears are put in the centre of the shaft to make drilling action. All of the actions are carried out by feeding the motor with electrical current. The mechanical energy is then transferred to the rotating shaft, where it is divided into various activities.

2.1 Transmission system

This machine's transmission system is a pulley system that is powered by a V-Belt. A belt and pulley system has two or more pulleys that are connected by a belt. Mechanical power, torque, and speed can now be communicated between axles. A mechanical advantage is achieved when the pulleys have

different diameters. For various mechanisms with differing speeds, we employed 'A' type pulleys with various diameters. Six pulleys and three belts are utilized to carry power from one shaft to the other.

Bevel Gear Mechanism



Bevel gear

A bevel gear resembles a right circular cone with most of the tip removed. The imaginary vertices of two bevel gears must occupy the same place when they mesh. At this moment, their shaft axes also cross, forming an arbitrary non-straight angle between the shafts. Except for zero and 180 degrees, the angle between the shafts can be any angle. Bevel gears having an equal number of teeth and 90-degree shaft axis.

Belt & Pulley



Belt & Pulleys

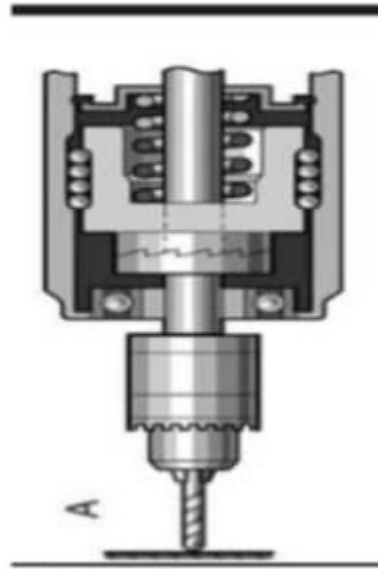
Belt And Pulley A belt is a flexible material loop that is used to mechanically connect two or more spinning shafts, usually in parallel. Belts can be employed as a source of motion, a means of efficiently transmitting power, or a means of tracking relative movement. Belts are wrapped around pulleys with a twist between them, and the shafts do not have to be parallel. In a two-pulley system, the belt can drive the pulleys normally in one direction (the same if the shafts are parallel), or it can be crossed, reversing the direction of the driven shaft (the opposite direction to the driver if on parallel shafts). A conveyor belt is one use where the belt is fitted to transfer a load constantly between two points as a source of motion.

3. PEDAL OPERATED CUTTER

3.1 The Drilling Mechanism

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).

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. *Grinding Mechanism*

GRINDING MECHANISM



Depending on the intended use for the wheel, abrasive particles are crushed and bonded together to produce a solid, circular shape with varying profiles and cross sections. A solid steel or aluminum disc with particles adhered to the surface can also be used to make grinding wheels. Grinding is a broad and varied area of manufacturing and toolmaking. It can achieve very fine finishes and precise measurements, but it can also rough out vast volumes of metal quickly in mass production situations. It is usually better suited to machining very hard materials than "normal" machining (cutting larger chips with cutting tools such as tool bits or milling cutters), and it was the only viable option to machine materials like hardened steels until recent decades. It is frequently more suited to taking very shallow cuts than "normal" machining, such as reducing a shaft's diameter by half a thousandth of an inch or $12.7\mu\text{m}$.

B. V-Belt



V-BELT

Its cross section is trapezoidal. It's utilized in auto shops to transmit a lot of electricity over a long distance. A belt is a flexible material loop that is used to mechanically connect two or more spinning shafts, usually in parallel. Belts can be employed as a source of motion, a means of efficiently transmitting power, or a means of tracking relative movement. Belts are looped across pulleys, which may twist, and the shafts do not have to be parallel. In a two-pulley system, the belt can either drive the pulleys normally in one direction (the same if the shafts are parallel) or it can be crossed, reversing the shaft direction (the opposite direction to the driver if on parallel shafts). Conveyor belts are one use where the belt is tailored to transfer a load constantly between two places as a source of motion. The problem of slippage alignment was overcome with V belts (also known as style V-belts or, less typically, wedge rope). It is now the most common power transmission belt. They offer the optimum mix of traction, movement speed, bearing load, and long service life. They are usually infinite in length and have a trapezoidal cross section (hence the name "V"). The belt's "V" form tracks in a mating groove in the pulley, preventing it from slipping off. As the load grows, the belt tends to wedge into the groove; the more the load, the stronger the wedging action, which improves torque transmission and makes the V-belt an effective option with less width and tension than flat belts. With their small center distances and high reduction ratios, V-belts outperform flat belts.

The preferred center distance is larger than largest pulley diameter, but less than 3 times the sum of both pulleys. Optimal speed range is 1,000-7,000 ft./min (300-2.130m/min). V-belts need larger pulleys for their thicker cross section than flat belts.

C. Pulley

A pulley is a wheel mounted on an axle or shaft that supports the movement and direction changing of a taut cable or belt around its circle. Pulleys are used to lift loads, apply forces, and convey electricity in a number of methods. The assembly of wheel, axle, and supporting shell is referred to as a "block" in nautical contexts.

A pulley, also known as a sheave or drum, may have a groove running around its circle between two flanges. A rope, cable, or chain that goes over the pulley inside the groove can be used as the drive element of a pulley system.



PULLEY

D. Bearing

A bearing is a machine component that supports another machine component in motion (known as journal). It allows relative motion between the parts' contact surfaces while carrying the load. Because of the relative motion between the contact surfaces, some power is spent in overcoming frictional resistance, and if there is direct contact between the rubbing surfaces, lubrication such as vegetable oil, greases, and other lubricants must be given to lessen this.



Function

- The bearing acts as an axle, supporting the shaft and keeping it in the proper position in relation to the frame or casing.
- The bearing ensures that the shaft or axle rotates freely and with minimal friction.
- The bearing absorbs and transmits the forces acting on the shaft or axle to the frame or casing.

4. Conclusion

Machinery installation accounts for a significant amount of an industry's investment. As a result, we may use this machine to conduct operations such as drilling, grinding, and cutting at multiple working centers at the same time. The industrialist does not have to pay for each machine that performs the above activities separately, lowering the overall cost of the finished product.

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