

Beam Engine Geneva Mechanism

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Abstract - The motor powered cutter has a very simple mechanism operated with motor by electrical current with circular disk wheel rotary motion is converted into to and forward motion of the cutting tool. The aim of this paper is to cut materials like wood, plastic etc., with less effort and quickly. That is by connecting a rotary cutter to the disk which produce electric EMF and forces are transmitted and get the work done. The size and shape of the power cutter setup is similar to the grinding cutter. It can be used in the place where electricity is available. As it required very high power it is operated at very low power. In this power operated cutter connected directly to the rotary disk. While rotary disk directly rotating motion of the linkage is converted into and forward motion of the cutting tool.

The end of the cutting tool is placed on the work piece. By the tool and forward motion of the cutting tool action is done on the work Piece. In this way by applying force on the linkage of the cutting tool undergoes to and forward motion and we get the required work done.

Key Words: Design in CAD1, Manufacturing process2, Applications3.

1. INTRODUCTION

1.1 Raw materials:

Cast iron is an alloy of iron and carbon, and is popular because of its low cost and ability to make complex structures. The carbon content in cast iron is 3% to 4.5% by weight. Silicon and small amounts of Manganese, Sulphur, and Phosphorus are also presenting it. The products of cast iron exhibit reasonable resistance against corrosion. It is neither malleable nor ductile, and it cannot be hardened like steel. It melts at about 2100 °F, and has either a crystalline or a granular fracture. The mechanical properties of cast-iron are very much dependent on the morphology of its carbon content. Carbon is present in the form of plates in gray cast iron, whereas, it is incorporated in compound Fe₃C (cementite) in white cast iron. Nodular cast iron, which show better tensile strength and strain than gray cast iron, carry carbon in the form of sphere shaped graphite particles

1.2 Properties of Cast-iron:

Tensile Strength: Different varieties of cast iron are used in the construction of machines and structures. Cast iron having tensile strength of 5 tons per square inch, or less, is of no value for the purpose where strength is required. This

type may however be used for balance weights, foundation blocks, or for purposes where weight alone is of consequence. Some varieties of cast iron show a tensile strength as high as 19 tons per square inch, but on an average, the strength is 7 tons per square inch. Addition of vanadium can increase the strength of cast iron.

High Compressive Strength: Compressive strength is defined as the ability of a material to withstand forces which attempt to squeeze or compress it. Cast iron shows high compressive strength, which makes it desirable for use in columns and posts of buildings. The compressive strength of gray cast iron can be almost as high as that of some mild steels..

2. MACHINING OPERATIONS

2.1 Cutting:

The raw material has to be cut to size. This is done with a variety of tools. The most common way to cut material is by Shearing (metalworking); Special band saws designed for cutting metal have hardened blades and a feed mechanism for even cutting. Abrasive cut-off saws, also known as chop saws, are similar to miter saws but with a steel cutting abrasive disk. Cutting torches can cut very large sections of steel with little effort.



Fig. Cutting Machine

2.2 Drilling:

Drilling is used to produce holes in the objects. In this project plates requires holes for making assembly. These holes are done by vertical type drilling machine. As this machine is used various operation of drilling each and every type of holes can be obtained from this drilling machine.

2.3 Welding:

Welding is the main focus of steel fabrication. The formed and machined parts will be assembled and tack welded into place then re-checked for accuracy. A fixture may be used to locate parts for welding if multiple elements have been ordered. The welder then completes welding per the engineering drawings, if welding is detailed or per his own judgment if no welding details are provided. Special precautions may be needed to prevent warping of the weldment due to heat. These may include re-designing the weldment to use less weld, welding in a staggered fashion, using a stout fixture, covering the weldment in sand during cooling and straightening operations after welding. Straightening of warped steel weldments is done with an Oxy-acetylene torch and is somewhat of an art.

3. TERMINOLOGIES

3.1 Link:

A component forming a part of a chain; generally rigid with provision at each end rod connection to two other links.

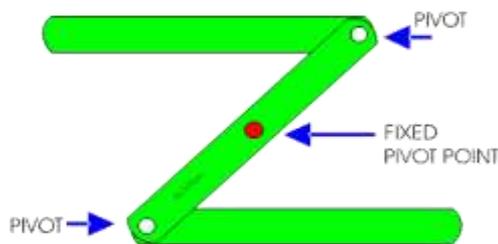


Fig Link:

3.2 Mechanism:

A combination of rigid bodies (links) is connected by kinematic pair. Each part of machine is in relative motion to some other part of machine.

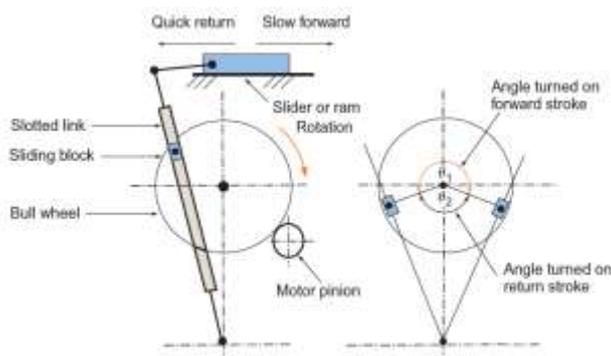
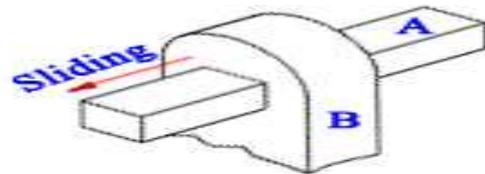


Fig: Mechanism

3.3 Kinematic pair:

A joint which is formed by the contact between two bodies and allows relative motion between them. A kinematic pair is a connection between two bodies that imposes constraints on their relative movement. Franz Reuleaux introduced the kinematic pair as a new approach to the study of machines that provided an advance over the motion of elements consisting of simple machines



Kinematic of Sliding Pair

Fig Kinematic pair:

3.4 Machine:

A simple machine is a mechanical device that changes the direction or magnitude of a force. In general, they can be defined as the simplest mechanisms that use mechanical advantage (also called leverage) to multiply force. ... Lever. Wheel and axle. Pulley

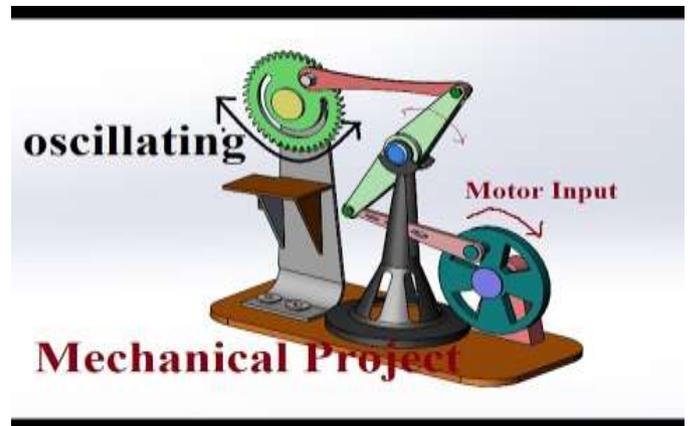


Fig Machine

4. ELECTRIC COMPONENTS

4.1 AC Motor:-

An Ac motor is an electric motor driven by an alternating current (AC). The AC motor commonly consists of two basic part, an outside stationary stator having coil supplied with alternating current to produce rotating magnetic field. The rotor magnetic field may be produce by permanent magnets or dc or ac electrical winding. The reciprocating motion of the circular blade, because of which the cutting process takes place, is produce with the help of ac motor, which operate by a simple crank mechanism to convert motion of an a crank into reciprocating motion circular blade.



Fig. AC Motor

4.2 Regulator:

A fan regulator is a crucial component that serves to increase or decrease the speed of your fan according to your needs. You have a choice between conventional and electronic regulators. The technology along with the circuitry that controls the fan speed is quite complex

4.3 Capacitor:

A capacitor is a passive two-terminal electronic component that stores electrical energy in an electric field. The effect of a capacitor is known as capacitance. While some capacitance exists between any two electrical conductors in proximity in a circuit, a capacitor is a component designed to add capacitance to a circuit. The capacitor was originally known as a condenser or condensate.

3. CONCLUSION

This being a creative project, there are no particular instances of this type of machine being available in the commercial market. But the aim of this project is to show that this type of machine too is an option for wood working industry in remote places in the presence of electricity. Further improvements include using reduction gears, to vary the speed of the circular blade, having an adjustable bed with slots for adjusting the table length, so that even large sizes of

timber can be sawed by varying the distance of the table and the size of the circular blade.

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