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Fabrication of Motorized Chain Mechanism Hacksaw

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Abstract--- *Hacksaw's have a very wide usage in the manufacturing industry. Hacksaw's are used for fast and efficient cutting of metal, wooden, plastic rods and pipes as per desired dimensions. Well manually operating a hacksaw is a quite strenuous and tiring process. So here we propose a fully automated motorized hacksaw that has the capability to automatically operate the cutting mechanism without any manual interference once set in process. The system uses a motor to drive the hacksaw shaft which is connected to a connecting rod. The connecting rod is now screwed to the cutting frame in such a way so as to achieve the desired back and fourth motion from the motor. The cutting frame is designed in a way to easily attach the saw blade to it. Now we use a chain sprocket arrangement in order to transfer the motor strength to the shaft. The other end of machine holds a holder that is used to hold the cutting part in place, so as to achieve desired cutting results. We use a high torque motor in order to achieve this cutting motion since the cutting process delivers a lot of resistance. We then build a supporting metal frame to support and hold the entire machine together. Thus our system provides a fully automated motorized hacksaw that works on chain mechanism.*

Keywords--- *Chain Mechanism, Fabrication of Motorized, Hacksaw.*

I. INTRODUCTION

Automation or automatic control, is the use of various control systems for operating equipment such as machinery, processes in factories, boilers and heat treating ovens, switching on telephone networks, steering and stabilization of ships, aircraft and other applications and vehicles with minimal or reduced human intervention. Some processes have been completely automated. The biggest benefit of automation is that it saves labor; however, it is also used to save energy and materials and to improve quality, accuracy and precision. The term automation, inspired by the earlier word automatic (coming from automaton), was not widely used before 1947, when Ford established an automation department. It was during this time that industry was rapidly adopting feedback controllers, which were introduced in the 1930s. Automation has been achieved by various means including mechanical, hydraulic, pneumatic, electrical, electronic devices and computers, usually in combination. Complicated systems, such as modern factories, airplanes and ships typically use all these combined technique. Nowadays almost all the manufacturing process is being automised in order to deliver the products at a faster rate. This project is designed for accuracy while cutting ms round bar and for ease while feeding.

II. NEEDS FOR AUTOMATION

Nowadays almost all the manufacturing process is being atomized in order to deliver the products at a faster rate. The manufacturing operation is being atomized for the following reasons.

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To achieve mass production

To reduce man power

To increase the efficiency of the plant

To reduce the work load

To reduce the production cost

To reduce the production time

To reduce the material handling

To reduce the fatigue of workers

To achieve good product quality

Less Maintenance

Hacksaw

A hacksaw is a fine-tooth saw with a blade under tension in a frame, used for cutting materials such as metal. Hand-held hacksaws consist of a metal frame with a handle, and pins for attaching a narrow disposable blade. A screw or other mechanism is used to put the thin blade under tension.

History

While saws for cutting metal had been in use for many years, significant improvements in longevity and efficiency were made in the 1880s by George N. Clemson, a founder of Clemson Bros., Inc of Middletown, New York, United States, Clemson conducted tests which involved changing the dimensions, shapes of teeth, styles of set, and variable heat treatments of blades. Clemson claimed enormous improvements to the cutting ability of blades and built a major industrial operation manufacturing hacksaw blades sold under the trade name Star Hack Saw. In 1898, Clemson was granted US Patent 601947, which details various improvements in the hacksaw.

1. Blades

Blades are available in standardized lengths, 10 or 12 inches (254 or 305 mm) for a standard hand hacksaw. "Junior" hacksaws are 6 inches (152 mm) long. Powered hacksaws may use large blades in a range of sizes, or small machines may use the same hand blades.

The pitch of the teeth can be anywhere from fourteen to thirty-two teeth per inch (tpi) for a hand blade, with as few as three tpi for a large power hacksaw blade. The blade chosen is based on the thickness of the material being cut, with a minimum of three teeth in the material. As hacksaw teeth are so small, they are set in a "wave" set. As for other saws they are set from side to side to provide a kerf or clearance when sawing, but the set of a hacksaw changes gradually from tooth to tooth in a smooth curve, rather than alternate teeth set left and right.

Hacksaw blades are normally quite brittle, so care needs to be taken to prevent brittle fracture of the blade. Early blades were of carbon steel, now termed 'low alloy' blades, and were relatively soft and flexible. They avoided breakage, but also wore out rapidly. Except where cost is a particular concern, this type is now obsolete. 'Low alloy' blades are still the only type available for the Junior hacksaw, which limits the usefulness of this otherwise popular saw For several decades now, hacksaw blades have used high speed steel for their teeth, giving greatly improved

cutting and tooth life. These blades were first available in the 'All-hard' form which cut accurately but were extremely brittle. This limited their practical use to bench work on a workpiece that was firmly clamped in a vice. A softer form of high speed steel blade was also available, which wore well and resisted breakage, but was less stiff and so less accurate for precise sawing. Since the 1980s, bi-metal blades have been used to give the advantages of both forms, without risk of breakage. A strip of high speed steel along the tooth edge is electron beam welded to a softer spine. As the price of these has dropped to be comparable with the older blades, their use is now almost universal.

Power Hacksaw

A power hacksaw (or electric hacksaw) is a type of hacksaw that is powered by electric motor. Most power hacksaws are stationary machines but some portable models do exist. Stationary models usually have a mechanism to lift up the saw blade on the return stroke and some have a coolant pump to prevent the saw blade from overheating.

III. DESCRIPTION

All power hacksaw machines are basically similar in design a typical power hacksaw and identifies its main parts, which are discussed below.

Base

The base of the saw usually contains a coolant reservoir and a pump for conveying the coolant to the work. The reservoir contains baffles which cause the chips to settle to the bottom of the tank. A table which supports the vise and the metal being sawed is located on top of the base and is usually referred to as part of the base.

Vise

The vise is adjustable so that various sizes and shapes of metal may be held. On some machines the vise may be swiveled so that stock may be sawed at an angle. The size of a power hacksaw is determined by the largest piece of metal that can be held in the vise and sawed.

Frame

The frame of the saw supports and carries the hacksaw blade. The machine is designed so that the saw blade contacts the work only on the cutting stroke. This action prevents unnecessary wear on the saw blade. The cutting stroke is on the draw or back stroke. Some machines feed by gravity, the saw frame having weights that can be shifted to give greater or less pressure on the blade. Other machines are power fed with the feed being adjustable. On these machines, the feed is usually stopped or reduced automatically when a hard spot is encountered in the material, thus allowing the blade to cut through the hard spot without breaking.

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IV. CONSTRUCTION AND WORKING PRINCIPLE

The crank lever mechanism consists of rotating plate which is activated by means of D.C Motor and chain drive arrangement this plate is coupled with lever which is attached with a slotted guide way for transferring the rotary motion into a translating motion and this is converted into useful work for operating sawing operation.

The slotted guide way is connected to a shaft of hacksaw frame whose path is guided by a guide way for attaining regular motion. The component to cut is fixed in the vice and the supply to the motor is turned on. Which activates the crank lever mechanism thus by activating the hacksaw for performing the sawing operation. The system is more efficient in performing cutting operation since the cutting is evenly distributed and time required for cutting operation is less.

V. APPLICATIONS AND ADVANTAGES

Advantages

- Relatively low capital investment required
- Tooling and maintenance cost are low
- Accuracy and finishes produced, range from fair to good depending on the material being sawed.

Applications

Performing operations like wood and metal cutting operations. So it can be useful for

- Small scale industries.
- Medium scale industries.
- Large scale industries.

Based on application we can converted it into fully automated machine in future

VI. CONCLUSION

Thus the work **DESIGN AND FABRICATION OF MOTORIZED CHAIN MECHANISM HACKSAW** has been made in accordance to the need. The initial mechanical setup of the project is made with mild steel material. The normal hacksaw blade is used for the cutting operation. The final cutting operation is obtained at the blade end. The d.c motors and chain drive setup is used to produce the actuation of hacksaw blade by using crank lever mechanism. They are placed accordingly to produce slip free actuation. The working condition and the operational costs were estimated accordingly. The remaining process such as controlling the speed of blade has remains for future work. In future the system can be fully automated by providing the remote controlled techniques. By providing proper dimensions to the crank and lever we can get as greater the forward stroke than return stroke.

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