

Multi-arm Power Hacksaw Machine

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ABSTRACT

The aim of the paper enables the power hacksaw machine to cut four workpieces at a time thereby improving the productivity. This model implies a conversion of rotary motion of crank to reciprocating motion of hacksaw blades, which is done by using **Scotch Yoke Mechanism**. This motion is used for hacksaw machine, in this model we can operate four hacksaws at same time. In today's world, there is a requirement that, machine should be less time consuming. "Multi Arm Power Hacksaw" overcome the time consuming problem over a general power hacksaw machine for cutting different materials at different location simultaneously. Fabrication of a power hacksaw of four blades mounted on four bars connected to wingnut upon a rotating disc driven by a motor. Our project, aim to increase the production rate for cutting light materials. The objective of this project is to transfer the rotary motion of disc into the reciprocating motion of the arm connected to the power hacksaw blades.

Keywords: Power Hacksaw Machine, Scotch Yoke Mechanism, Blades

1.0 INTRODUCTION

With the help of multi-way power hacksaw machine the four metal bars can be cut simultaneously to get high speed cutting rate and to achieve mass production for maximum profit in related companies. As this machine overcomes all the limitations and drawbacks of conventional hacksaw machines, it is also helpful for small scale industries due to its simple working and operating conditions along with its compatibility, efficiency and affordable price.

This paper is about cutting the wood, metal, pipe, angle, channel, flat plates, rods and such other things. This project is very much useful and easy to install by user.

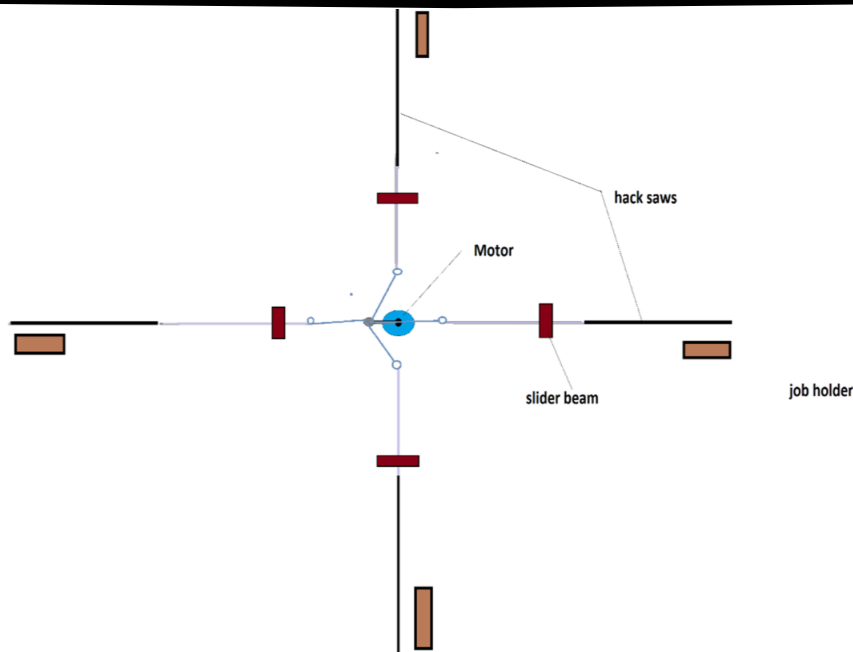


Fig: 1 shows layout of the working model

2. LITERATURE REVIEW:

- S.G.Bahaleyetal[1] designed and fabricated a pedal powered multipurpose machine. It is a human powered machine which is developed for lifting the water to a height 10 meter and generates 14 Volt, 4 ampere of electricity in most effective way. Power required for pedaling is well below the capacity of an average healthy human being. The system is also useful for the work out purpose because pedaling will act as a health exercise and also doing a useful work
- Prof. Kshirsagar Prashantetal[2]researched on Theoretical Analysis of Multiway Power Hacksaw Machine and concluded that to overcome problems in conventional hacksaw machines, due to high efficiency, easy to operate and affordable price the proposed model of multi-way power hacksaw machine is helpful and completes all the expectations needed in the mini industries. Future scope of proposed research work to increase the production rate, cuts the metal bars easily. It can withstand the vibrations, no hazards from jerk, no Special training required to operate it.
- Sreejith K. etal[3]investigated on design, fabricate and experimentally investigate the working of Pedal Driven Hacksaw (PDH). PDH is working on Slider Crank Mechanism.

3. PROBLEM DEFINITION:

To cut different metal bar pieces with high rate and accuracy to minimize an idle time.

3.1Objective of Model:

(1) The main objective of this project is to reduce the human effort for machining various materials.

(2) The basic principles of power driven hacksaw or four way hacksaw is **Scotch Yoke Mechanism**.

(3) The objective of this project is to save man power and time in cutting materials in order to achieve high productivity.

(4) By using scotch yoke Mechanism we can operate four hacksaw at same time.

4. CONSTRUCTION:

The machine consists of single phase vertical electric motor rigidly placed with the foundation provided. The shaft of motor rotates at 1100-1440 rpm with the power 0.25HP. The circular disc is mounted on the shaft of motor with the help of key and key slot arrangement along with pulley. The eccentric point on the plane of disc is provided such that the desired cutting stroke is achieved (around 4-5 inches). One end of each connecting rod is pivoted at this eccentric point by the use of suitable bearing. Another end of each rod is connected to the hacksaw blade frame with the help of universal joint to get vertical and horizontal Degree of Freedom of rotation for the proper cutting operation. The hacksaw frame slides on the guide ways provided. When motor is ON and disc starts rotating, due to the reciprocating motion of hacksaw frame the metal rod is cut which is firmly fixed in vise. The automatic feeding of coolant is provided to reduce heat generated due to friction which also avoids the jerk.

4.1 Elements:

□ **Base frame:** This frame rigidly supports all the components of the machine at desired positions. It is made up of hollow square metallic bar to provide strength and stability.



□ □ **Hacksaw blade:** The important element of the project is hacksaw, the blade is fit on hacksaw frame and this hacksaw is connected with the connecting rod (links). Hacksaw frame is adjustable type to fit the blade.



□ □ **Electric motor:** The motor used for this purpose is an AC motor. These are primarily used as a source of constant speed mechanical power as well as variable speed controllers with high efficiency, low maintenance and exceptional reliability. Moreover the AC motors use the AC power right off the lines making it efficient without any extended rectifier circuit unit unlike DC motors.



SPECIFICATIONS:

TYPE	AC Motor
POWER	0.25 HP
SPEED	1100-1440 rpm
PHASE	Single Phase

□ □ **Disc:** Disc is fitted on the shaft of motor. The internal diameter of disc is same as the diameter of shaft. The cylinder shape metal bar is fit on the eccentric center of disc this is known as the fifth and fix link.



□ □ **Vice:** Vice is used for fitting the job. Vice is fitted on the base frame by the extension of pipe. Generally vice is made from the iron metal.



5. METHODOLOGY:

□ □ **Scotch Yoke Mechanism:** Scotch yoke is a mechanism for converting the linear motion of a slider into rotational motion or vice-versa. The piston or other reciprocating part is directly coupled to a sliding yoke with a slot that engages a pin on the rotating part. The shape of the motion of the piston is a pure sine wave over time given a constant rotational speed.

6. CONCLUSION:

As per the above discussion we concluded that to overcome problems in conventional hacksaw machines, due to high efficiency, easy to operate and affordable price the proposed model of multi-way power hacksaw machine is helpful and completes all the expectations

needed in the mini industries. Future scope of proposed research work to increase the production rate, cuts the metal bars easily. It can withstand the vibrations, no hazards from jerk, no special training required to operate it.

After studying this report we have known that how the 4 way hacksaw machine will work, and knowing the construction and how mechanism work in the machine. We learnt how the theoretical design is possible in practical. Other hacksaw machine is only cut one part at one time but this machine cut the four part at a time, this hacksaw machine has lighter weight compare to other machine. The cost of machine is less and easy to operate so it affordable for all industry.

7. REFERENCES:

- i. S.G.Bahaley, Dr. A.U. Awate, S.V. Saharkar “designed and fabricated a pedal powered multipurpose machine”.
- ii. Prof. Kshirsagar Prashant R. “ Theoretical Analysis of MultiWay Power Hacksaw Machine”. International journal of research on advent technology. Vol.3, No-4, April 2015 E-ISSN: 2321-9637
- iii. Sreejith K. investigated on design, fabricate and experimentally investigate the working of Pedal Driven Hacksaw (PDH). International journal of engineering and science. Vol-4, Issue 7 (July 2014), PP 01-05, ISSN (e) : 2278-4721, ISSN (P): 2319-6483
- iv. D.V. Sabarinanda, Siddhartha, B. Sushil Krishnana, T. Mohanraj, “Design and Fabrication of Automated Hacksaw Machine”, International Journal of Innovative Research in Science, Engineering and Technology, ISSN (Online)
- v. R. Subhash, C.M. Meenakshi, K. Samuel Jayakaran, C. Venkateswaran, R. Sasidharan, “Fabrication pedal powered hacksaw”.
- vi. Prof. Nitinchandra R. Mohammad A. Vasanwala, Balkrushna B. Jani, Ravi Thakkar, Miteshkumar D. Rathwa, ”Material selection and Testing of hacksaw blade based on mechanical Properties”, International Journal of Innovative Research in Science, Engineering and Technology.
- vii. Build a power hacksaw with vise, Authors: - Vincent Gingery