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Original Research Paper

ENGINEERING

AUTOMATIC OPERATED HACKSAW

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KEYWORDS :

1. INTRODUCTION:

1.1 Definition

Hacksaw Machines offered by us are used for metal cutting ranging from transportable model to giant size machine. Owing to smooth & speedy functioning abilities, these hacksaw machines operations spontaneously for aiding the worker in consistently carrying his work with ultimate competence. The sewing machine is a machine tool designed to cut material to a desired length or contour. It functions by drawing a blade containing cutting teeth through the work piece. The sewing machine is faster and easier than hand sawing and is used principally to produce an accurate square or mitered cut on the work piece

1.2 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. The Scotch yoke (also known as slotted link mechanism) is a reciprocating motion mechanism, 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 location of the piston versus time is a sine wave of constant amplitude, and constant frequency given a constant rotational speed. Machines are mechanical devices used to accomplish work. A mechanism is a heart of a machine. It is the mechanical portion of the machine that has the function of transferring motion and forces from a power source to an output. Mechanism is a system of rigid elements (linkages) arranged and connected to transmit motion in a predetermined fashion. This setup is most commonly used in control valve actuators in high-pressure oil and gas pipelines. Although not a common metalworking machine nowadays, crude shapers can use Scotch yokes. Almost all those use a Whitworth linkage, which gives a slow speed forward cutting stroke and a faster return. It has been used in various internal combustion engines, such as the Bourke engine, SY Tech engine, and many hot air engines and steam engines. Theterm scotch yoke continues to be used when the slot in the yoke is shorter than the diameter of the circle made by the crank pin. For example, the side rods of a locomotive may have scotch yokes to permit vertical motion of intermediate driving axles.

1.3 Construction

The scotch yoke mechanism is constructed with iron bars. Here the crank is made in some length and the yoke is also made using the same material. It is noted that the minimum length of the yoke should be double the length of the crank. The crank and yoke is connected with a pin. Iron bars are welded to both sides of the yoke to get the reciprocating motion. The yoke with the iron bars is fixed on the display board with the help of c clamp. Now the crank is welded to the end of the shaft of the motor. Now the pin on the crank is connected to the yoke. The pin used to connect yoke and crank is a bolt.

2. HACKSAW MACHINE

2.1 Types of Hacksaw Machine

(1) Light duty hacksaw machine.
(2) Hydraulic hacksaw machine.
(3) Power hacksaw machine.
(4) Circular band hacksaw machine.
(5) Horizontal swing type band saw machine.
(6) Band hacksaw machine.
(7) Jigsaw machine.
(8) Universal type circular hacksaw machine.

Fig -1: Hacksaw Machine [1]

2.2 Working principles of hacksaw machine using scotch yoke mechanism

A hacksaw machine is work on principle of SCOTCH YOKE MECHANISM in this rotary motion of shaft is to be convert into the reciprocating motion of hacksaw frame. Working principle of hacksaw machine is very simple. First of all the hacksaw machine is put on ground and after that whatever metal, wood, pvc, is cut is fixed on vice at required length, after that the electric motor is connect with electricity. Now start the electric motor so due to that the shaft of motor and hollow disc will be rotate and also rotate the eccentric Centre and link connect to it. Due to rotation of links the hacksaw frame will be reciprocate on the metal and cutting of metal is done

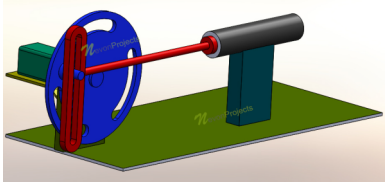

Fig 2: Scotch Yoke Mechanism [2]

2.3 Assembly of Hacksaw Machine

For assembly of hacksaw machine first of all on base plate electric motor is mount vertically, hollow disc having internal circle radius is same as the radius of shaft of motor is fit on shaft and also the disc have eccentric centre, metal bar is weld at the eccentric centre. The links one end is connect with the end of hacksaw frame and second end is connecting with the metal bar of eccentric centre. The buckle type elements are connecting at the end of hacksaw frame and link is connecting in this buckle, pipe provides support to the hacksaw frame, the pipe is connecting to the base. Vice is also fit on pipe and which also connect with the base.

2.4 Features of Hacksaw Machine

- Power efficiency.
- High productivity.
- Superb performance.
- High operational fluency.
- Sturdy and robust design.

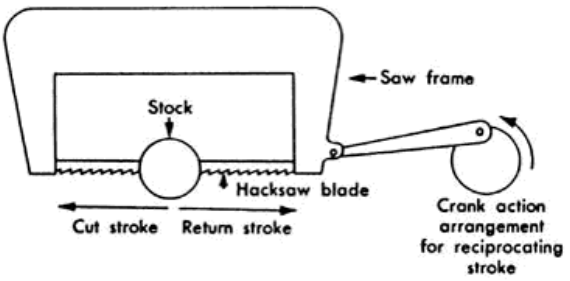

Fig 2.4: Components of hacksaw machine

2.5 Characteristics of Hacksaw Blade

The hacksaw blade has 2 main characteristics:

1. Teeth pitchwhich is the number of teeth per 25 mm.
2. Blade lengthwhich is the length between the centers of its pin holes.
3. Bladesare available in standardized lengths, 10 or 12 inches (254 or 305 mm) for standard hand hacksaw
4. The pitchof 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.

a. Hacksaw blades are normally quite brittle, so care needs to be taken to prevent brittle fracture of the blade.
b. For several decades now, hacksaw blades have used high speed steel for their teeth, giving greatly improved cutting and tooth life.
c. Hacksaw blades have two holes near the ends for mounting them in the saw frame and the 12 inch / 300 mm dimension refers to the center to center distance between these mounting holes.

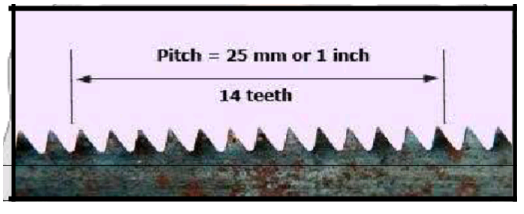

Fig 2.5: Characteristics of Hacksaw blade

3. SENSORS

In the broadest definition, a sensor is a device, module, or subsystem whose purpose is to detect events or changes in its environment and send the information to other electronics, frequently a computer processor. A sensor is always used with other electronics, whether as simple as a light or as complex as a computer.

Sensors are used in everyday objects such as touch-sensitive elevator buttons (tactile sensor) and lamps which dim or brighten by touching the base, besides innumerable applications of which most people are never aware. With advances in micromachinery and easy-to-use microcontroller platforms, the uses of sensors have expanded beyond the traditional fields of temperature, pressure or flow measurement,[1] for example into MARG sensors. Moreover, analog sensors such as potentiometers and force-sensing resistors are still widely used. Applications include manufacturing and machinery, airplanes and aerospace, cars, medicine, robotics and many other aspects of our day-to-day life.

A sensor's sensitivity indicates how much the sensor's output changes when the input quantity being measured changes. For instance, if the mercury in a thermometer moves 1 cm when the temperature changes by 1 °C, the sensitivity is 1 cm/°C (it is basically the slope Dy/Dx assuming a linear characteristic). Some sensors can also affect what they measure; for instance, a room temperature thermometer inserted into a hot cup of liquid cools the liquid while the liquid heats the thermometer. Sensors are usually designed to have a small effect on what is measured; making the sensor smaller often improves this and may introduce other advantages. Technological progress allows more and more sensors to be manufactured on a microscopic scale as micro sensors using MEMS technology. In most cases, a micro sensor reaches a significantly higher speed and sensitivity compared with macroscopic approaches.

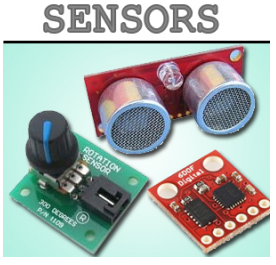

Fig3: Sensors

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