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Recent development in the field of shaper machine

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Abstract
Shaper is a type of machine tool that uses linear relative motion between the workpiece and a single-point cutting tool to machine a linear toolpath. Its cut is analogous to that of a lathe. It can cut curves, angles and many other shapes. It is a popular machine in a workshop because its movement is very simple although it can produce a variety of work. A shaper is used to machine a single job by using a single point cutting tool and hence it cannot be used for high production rates. A single point cutting tool is rigidly held in the tool holder, which is mounted on the ram. The work piece is rigidly held in a vice or clamped directly on the table. The table may be supported at the outer end. The ram reciprocates and thus cutting tool held in tool holder moves forwards and backwards over the work piece. In a standard shaper, cutting of material takes place during the forward stroke of the ram the backward stroke remains idle. This is obtained by "Quick Return Mechanism". The depth of the cut is adjusted by moving the tool downwards towards the workpiece. The feed motion is given to the workpiece and follows the "Pawl and Ratchet mechanism".

Keywords: machine, motion, although, Shaper

Introduction

Shaping machine

A photographic view of general configuration of shaping machine is shown in Fig. The main functions of shaping machines are to produce flat surfaces in different planes. Fig shows the basic principle of generation of flat surface by shaping machine. The cutting motion provided by the linear forward motion of the reciprocating tool and the intermittent feed motion provided by the slow transverse motion of the job along with the bed result in producing a flat surface by gradual removal of excess material layer by layer in the form of chips.

The vertical infeed is given either by descending the tool holder or raising the bed or both. Straight grooves of various curved sections are also made in shaping machines by using specific form tools. The single point straight or form tool is clamped in the vertical slide which is mounted at the front face of the reciprocating ram whereas the work piece is directly or indirectly through a vice is mounted on the bed.

Types

Shaper are mainly classified as

- Horizontal
- Universal
- Vertical
- Geared
- Cranked
- Hydrolic
- Contour and traveling head

Construction

The main parts of the Shaper machine is Base, Body (Pillar, Frame, Column), Cross rail, Ram and tool head (Tool Post, Tool Slide, Clamper Box Block).

1. Base

The base is the necessary bed or support required for all machines tools.

The base is hollow casting made of cast iron to resist vibration and on which all parts of the shaper are mounted.

It is so designed that is can take up the entire load of the machine and the forces set up by cutting tool over the work.

2. Column

This is made of cast iron, which is a box-like and is mounted on the base.

Two accurately machined guideways are provided on the top of the column on which the ram reciprocates.

The column acts as a cover to the drive mechanism and also supports the reciprocating ram and the worktable.

3. Cross-rail

Cross rail is mounted on the front vertical surface of the column on which saddle is mounted.

The vertical movement is given to the table by raising or lowering the cross rail using the elevating screw.

The horizontal movement is given to the table by moving the saddle using the crossfeed screw.

4. Table

The table is bolted to the saddle and receives crosswise and vertical movements from saddle cross rail.

T-bolts are used for clamping on top and sides. The table can be swiveled at any required angle.

In a universal shaper, the table may be swiveled on a horizontal axis and the upper part of the table may be fitted up or down.

In heavier type shaper the table clamped with table support to make it more rigid.

5. Ram

The ram reciprocates on the column guide ways and carries tool head with a single point cutting tool. The tool head is in the clapper box, which causes cutting action only in forward stroke of the ram and sliding movement of the tool in the reverse stroke of the ram.

The depth of cut or feed of the tool is given by down feed screw. The tool head has swivel base degree graduations, which helps to move the tool head to any desired inclination for machining inclined surfaces on the work pieces.

Working and Principle

The job is rigidly fixed on the machine table. The single point cutting tool held properly in the tool post is mounted on a reciprocating ram. The reciprocating motion of the ram is obtained by a quick return motion mechanism. As the ram reciprocates, the tool cuts the material during its forward stroke. During return, there is no cutting action and this stroke is called the idle stroke. The forward and return strokes constitute one operating cycle of the shaper.

The work piece mounts on a rigid, box-shaped table in front of the machine. The height of the table can be adjusted to suit this work piece, and the table can traverse sideways underneath the reciprocating tool, which is mounted on the ram. Table motion may be controlled manually, but is usually advanced by an automatic feed mechanism acting on the feeds crew. The ram slides back and forth above the work. At the front end of the ram is a vertical tool slide that may be adjusted to either side of the vertical plane along the stroke axis. This tool-slide holds the *clapper box* and tool post, from which the tool can be positioned to cut a straight, flat surface on the top of the work piece. The tool-slide permits feeding the tool downwards to deepen a cut. This adjustability, coupled with the use of specialized cutters and tool holders, enable the operator to cut internal and external gear tooth

The ram is adjustable for stroke and, due to the geometry of the linkage, it moves faster on the return (non-cutting) stroke than on the forward, cutting stroke

Uses

- It uses to surface finish
- It is used to give shape if metal parts.
- Smoothness of a rough surface
- Shaper machine uses for internal splines and gear teeth.

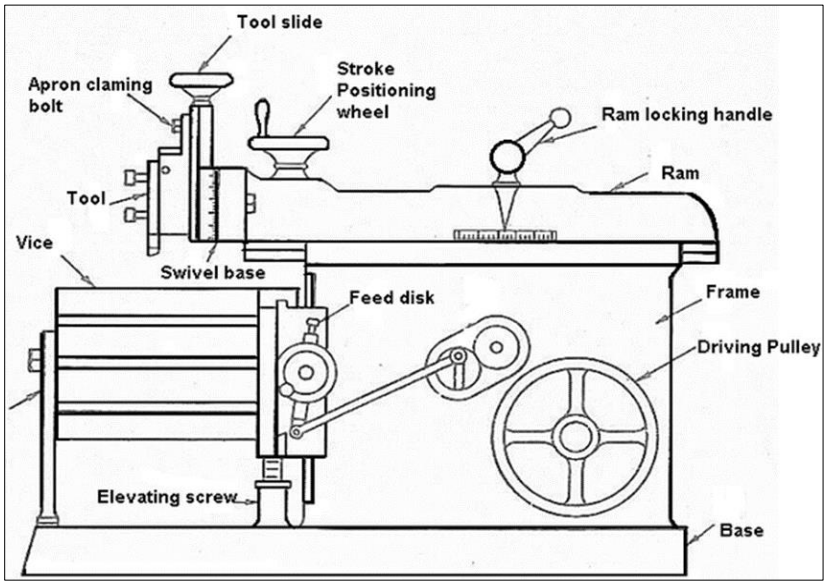

Fig 1

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