# SLOTTING MACHINE

By Guest Lect.
SNEHASIS SAHOO
Govt. Polytechnic ,
Bolangir

# Slotting Machine

- The slotter or slotting machine is a reciprocating type of machine tool similar to a shaper or a planer.
- It is used for cutting grooves, key ways and slots of various shapes for making regular and irregular surfaces both internal and external.
- It may be considered as a vertical shaper .
- The machine operates in a manner similar to the shaper, however, the tool moves vertically rather than in a horizontal direction. The job is held stationary .
- The slotter has a vertical ram and a hand or power operated rotary table.

# Difference between SLOTTER & SHAPER

**SLOTTER**

The ram holds the tool and reciprocates in a vertical axis.


**SHAPER**

The ram holds the tool and reciprocates in a horizontal axis.

# Parts of a Slotting Machine

1. BASE
2. FEED GEAR
3. CROSS SLIDE
4. TABLE
5. CROSS FEED HANDLE
6. LONGITUDINAL FEED HANDLE
7. CIRCULAR FEED HANDLE
8. TOOL
9. RAM
10. CRANK DISC
11. LEVER FOR COUNTERBALANCE WEIGHT
12. BULL GEAR
13. CONE PULLY
14. COLOUMN
15. FEEDSHAFT
16. PAWL ACTUATING CRANK

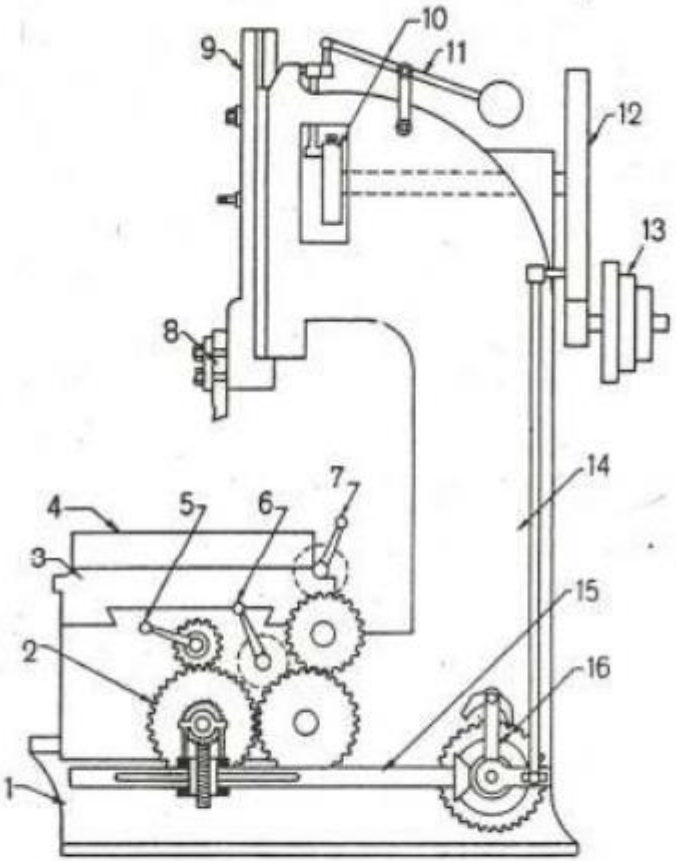
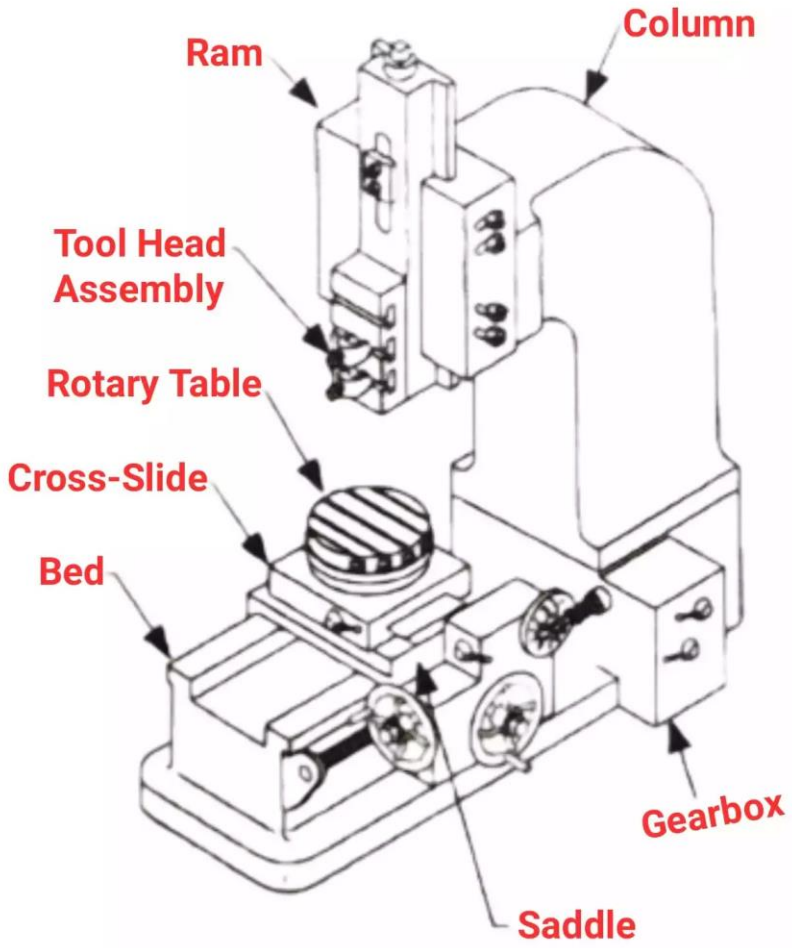



**Figure 9.1 Slotting machine**

1. Base, 2. Feed gear, 3. Cross-slide, 4. Table, 5. Crossfeed handle, 6. Longitudinal feed handle, 7. Circular feed handle, 8. Tool, 9. Ram, 10. Crank disc, 11. Lever for conterbalance weight, 12. Bull gear, 13. Cone pulley, 14. Column, 15. Feed shaft, 16. Pawl actuating crank.

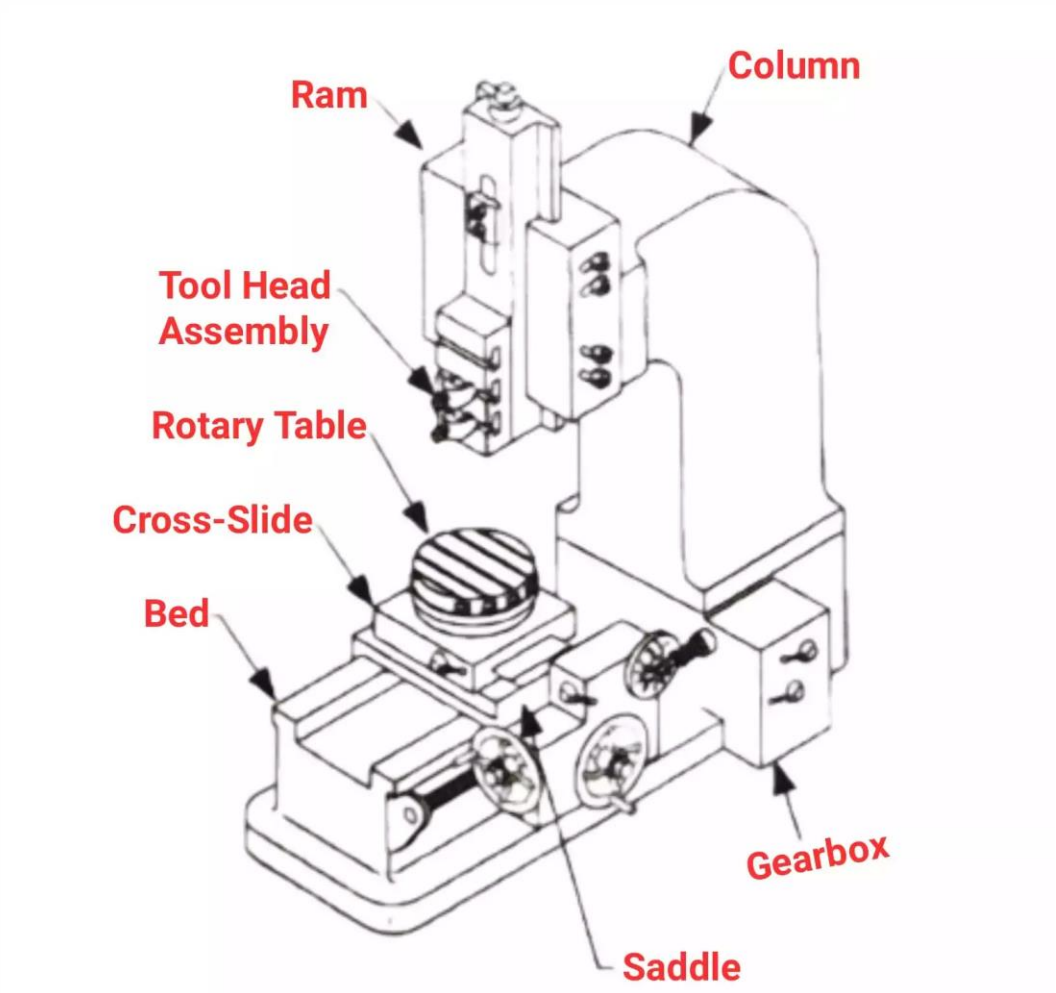
# 1. Base or BED

- The base is rigidly built to take up all the cutting forces and the entire load of the machine.
- The top of the bed is accurately finished to provide guideways on which the saddle is mounted.
- The guide ways are perpendicular to the column face.



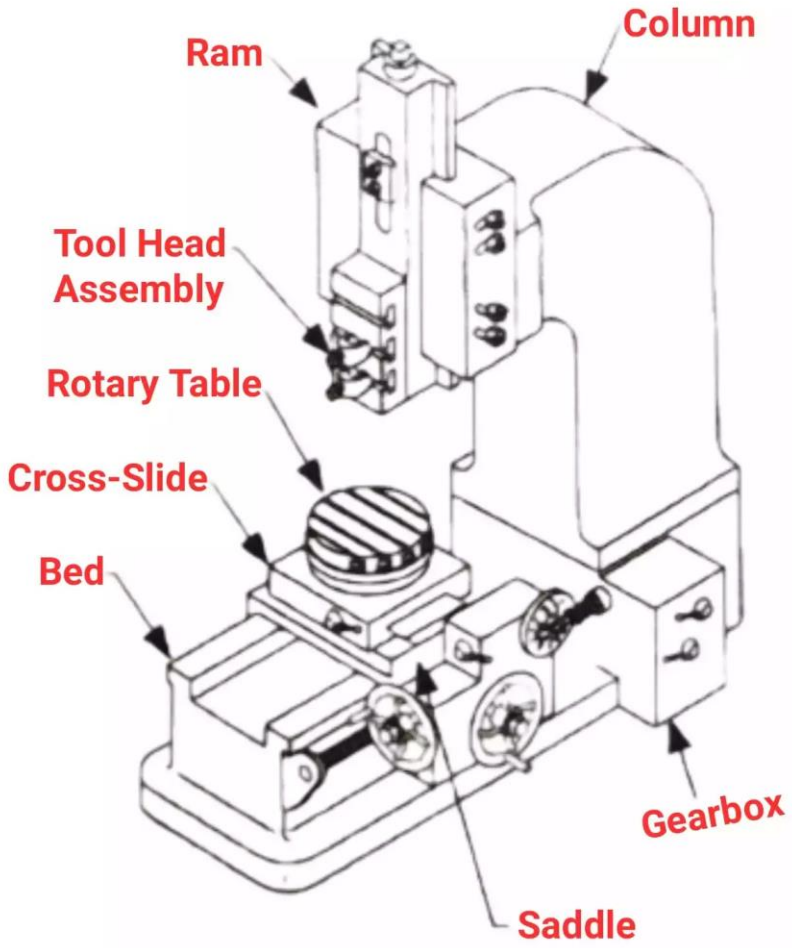
# 2. Column

- The column is the vertical member which is cast integral with the base.
- Driving mechanism and feeding mechanism are inside the column.
- The front vertical face of column is accurately finished for providing ways on which the ram reciprocates.



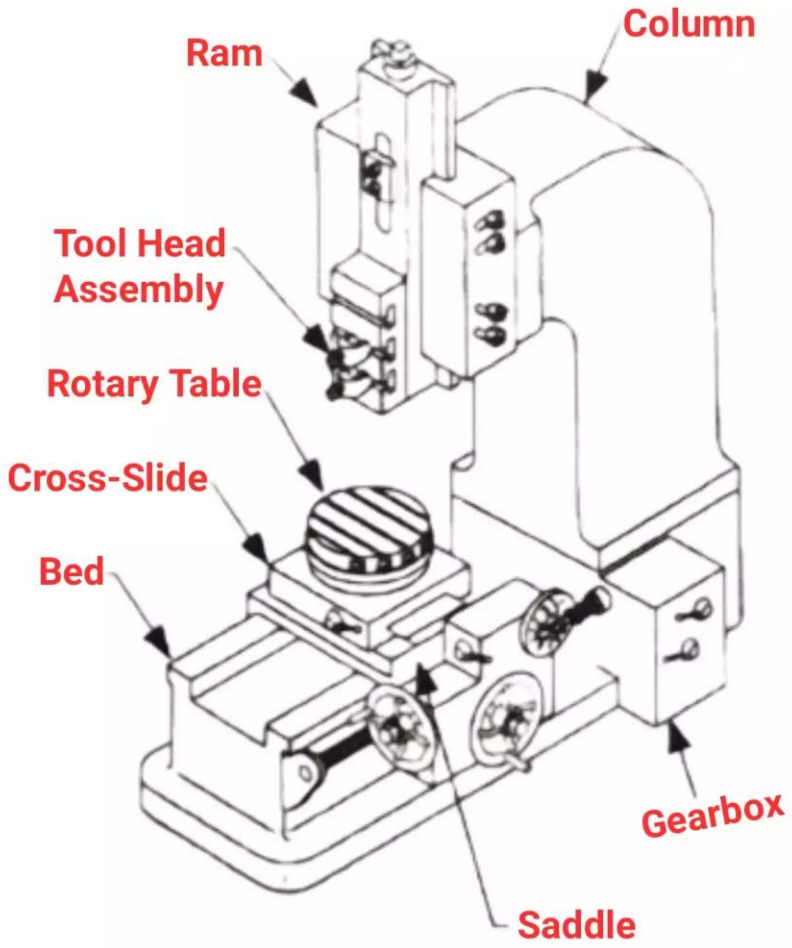
# 3. SADDLE

- The saddle is mounted upon the guideways and may be moved toward or away from the column either power or manual control to supply longitudinal feed to the work.
- The top face of the saddle is accurately finished to provide guideways for the cross-slide.
- These guideways are perpendicular to the guideways on the base.



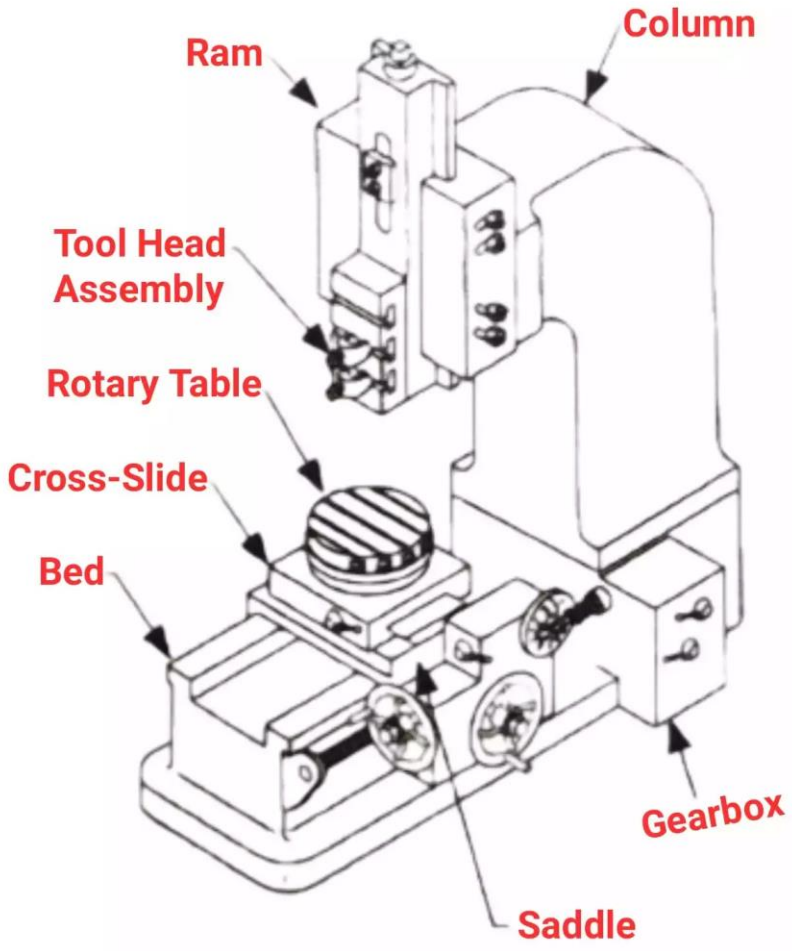
# 4. Cross-slide

- The cross-slide is mounted upon the guideways of the saddle and maybe moved parallel to the face of the column.
- The movement of the slide may be controlled either by hand or power to supply cross feed.



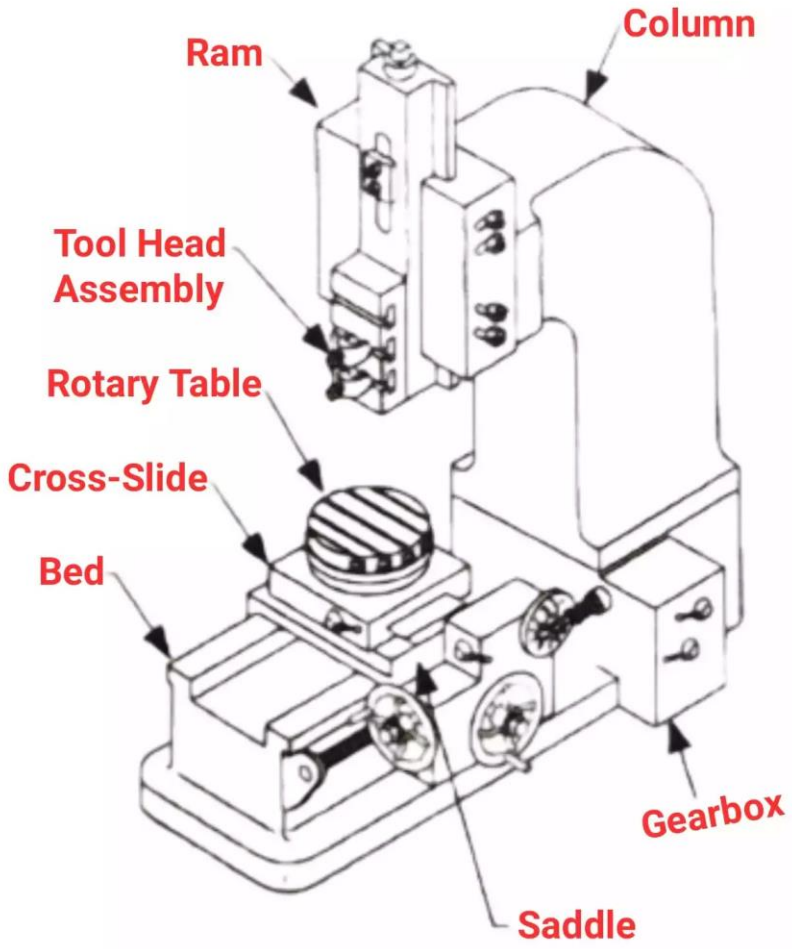
# 5. Rotary Table

- The rotary table is a circular table which is mounted on the top of the cross-slide.
- The table may be rotated by rotating a worm which meshes with a worm gear connected to the underside of the table.
- The rotation of the table may be effected either by hand or power.
- In some machines, the table is graduated in degrees that enable the table to be rotated for indexing or diving the periphery of a job in the equal number of parts.



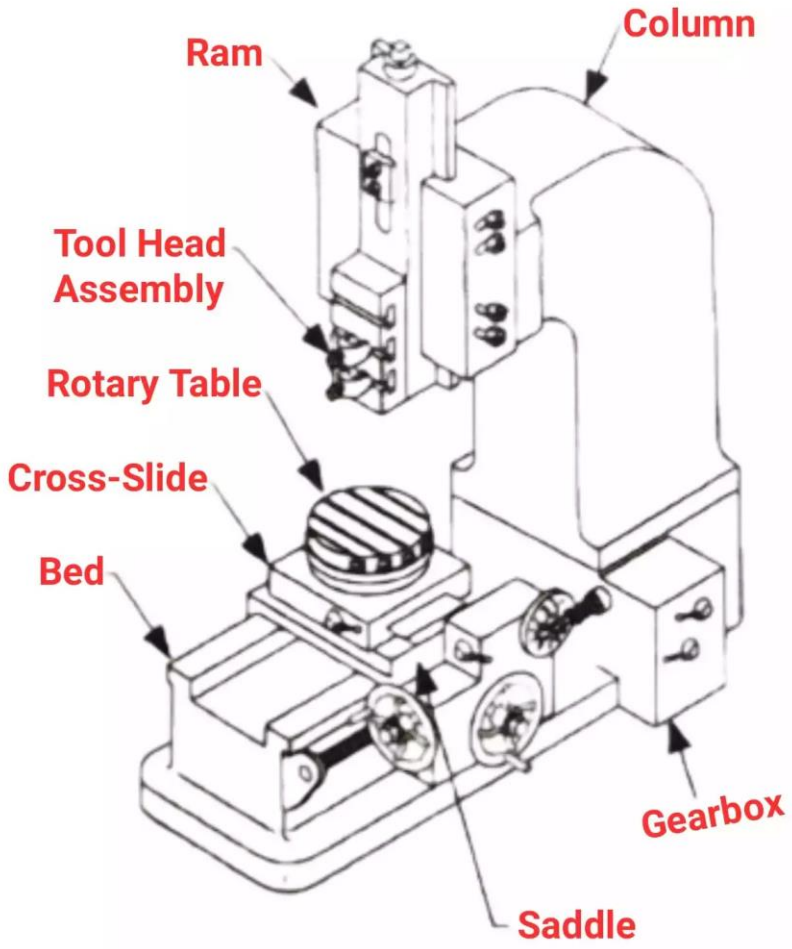
# 5. Rotary Table

- T-slots are cut on the top face of the table for holding the work by different clamping devices. The rotary table enables a circular or contoured surface to be generated on the work-piece.



# 6. Ram and Tool head Assembly

- The ram is the reciprocating member of the machine mounted on the guideways of the column.
- It supports the tool at its bottom end on a tool head.
- A slot is cut on the body of the ram for changing the position of the stroke.
- In some machines, special type for tool holders is provided to relieve the tool during its return stroke.



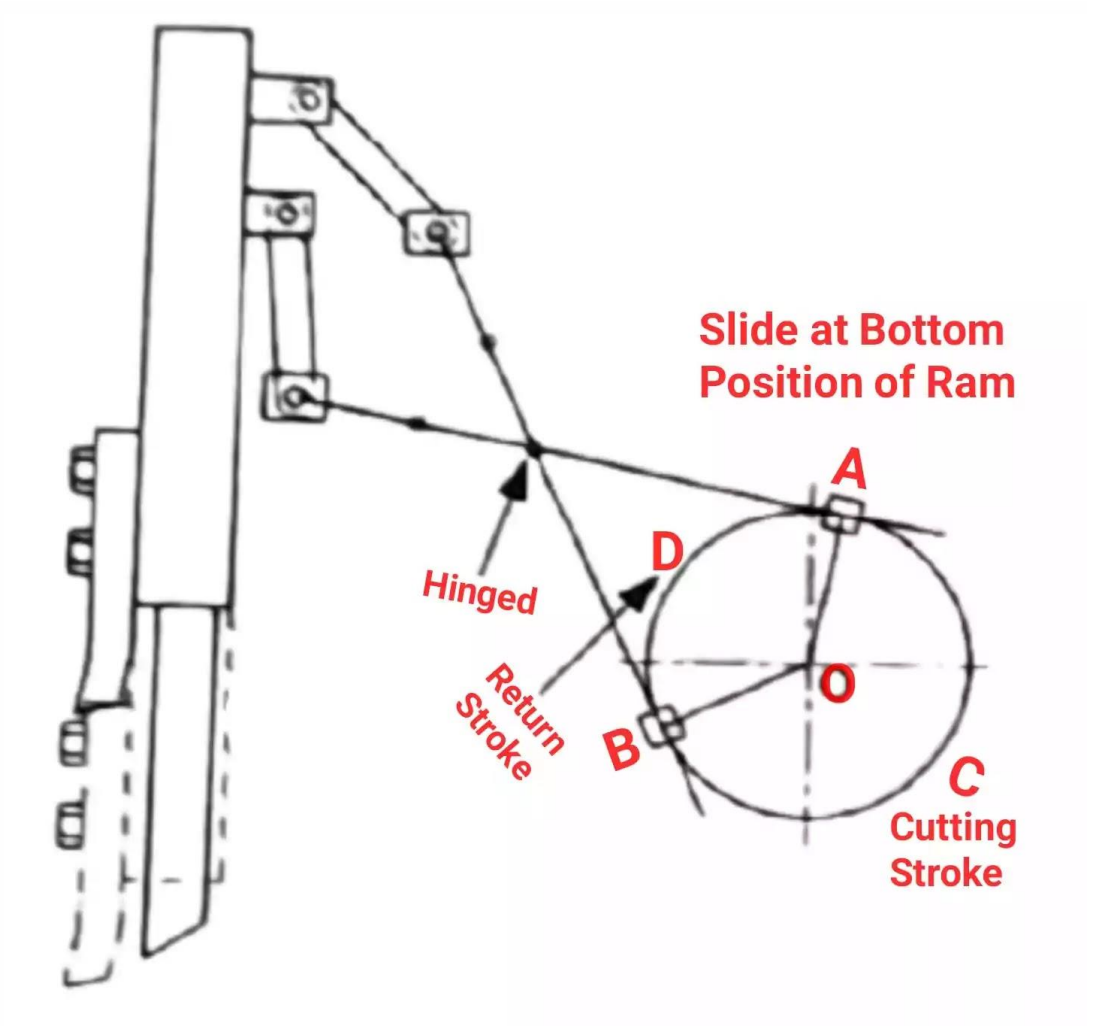
# Ram Drive Mechanism

- A slotter removes metal during downward cutting stroke only.

  Where as during upward return stroke no metal is removed.

- To reduce the idle return time quick-return mechanism is incorporated in the machine. The usual types of ram drive mechanism are,

  1. Whitworth quick return mechanism
  2. Variable speed reversible motor drive mechanism
  3. Hydraulic drive mechanism



# Working Principle Of Slotting Machine

- The vertical slide holding the cutting tool is reciprocated by a crank and connecting rod mechanism . The job, to be machined, is mounted directly or in a vice on the work table.
- In slotting machine, in addition to the longitudinal and cross feeds, a rotary feed motion is also provided in the work table.

Slotter

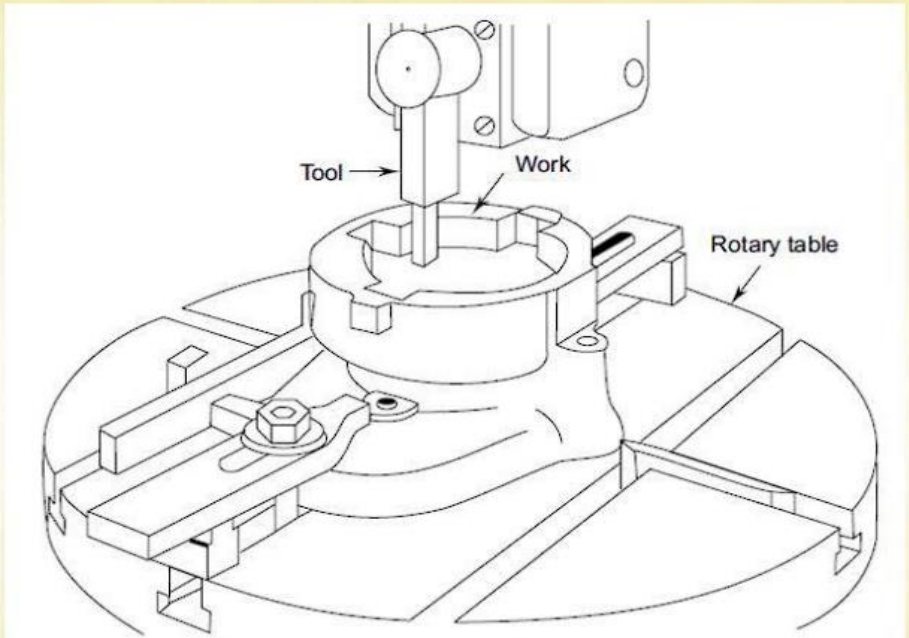



Fig. 6.8 *Typical component machined in a slotting machine.*

# Types of Slotter Machine

## 1 . Puncher Slotter

1. The puncher slotter machine is a heavy, rigid machine designed for removal of a large amount of metal from large forgings or castings.
2. The length of stroke of a puncher slotter is sufficiently large. It may be as long as 1800 to 2000 mm.

## 2. Precision Slotter

1. The precision slotter machine is a lighter machine and is operated at high speeds.
2. The machine is designed to take light cuts giving the accurate finish.

# Types of Slotter Machine

## 1 . Puncher Slotter

3. The puncher slotter ram is usually driven by a spiral pinion meshing with the rack teeth cut on the underside of the ram.
4. The pinion is driven by a variable speed reversible electric motor similar to that of a planer.
5. The feed is also controlled by electrical gears.

## 2. Precision Slotter

3. Using special jigs, the machine can handle a number of works on a production basis.
4. The precision slotter machines are also used for general purpose work and are usually fitted with Whitworth quick return mechanism.

# Application of Slotting Machine

- Internal flat surfaces
- Enlargement and / or finishing non-circular holes bounded by a number of flat surfaces.
- Blind geometrical holes like hexagonal socket.
- Internal grooves and slots of rectangular and curved sections.
- Internal keyways and splines, straight tooth of internal spur gears, internal curved surface of circular section, internal oil grooves etc. which are not possible in shaping machines.

# Difference Between Shaping, Planing and Slotting Machine

| SHAPER | PLANNER | SLOTTER |
| --- | --- | --- |
| • It can use light cuts and finer feed.<br>• Use for shaping greatly smaller jobs<br>• Work is held at a stop and the tool on the ram is moved back with forth across the work.<br>• Driven use quick-return link mechanism.<br>• Uses single cutting tool at a time.<br>• It is fewer rigid and fewer robust.<br>• It is a light machine. | • It can use heavier cuts and coarse feed.<br>• Inevitable for much bigger jobs.<br>• The tool is fixed and the work-piece on the table movements back and forth under the tool.<br>• Drive on the planer table is too by gear or by hydraulic means.<br>• Some tools can cut at the same time.<br>• Enhanced rigidity that gives more precision on machined surfaces.<br>• It is a heavyweight machine. | • It can use light cuts and improved feed.<br>• It use for make shots in smaller jobs.<br>• The job is held at a stop and the tool on the ram is moved up and down across the work.<br>• The rams are also crank-driven or hydraulically driven.<br>• Shaper uses single cutting tool at a time.<br>• It is fewer rigid and fewer robust.<br>• It is a light machine. |

# THANK YOU