

SAFETY PRECAUTIONS

Safety Precautions

When operator enters into the workshop he should first observe safety to save himself and others.

Precautions when using machines

- i) Do not lean against the machine, it is a bad practice and also a dangerous one.
- ii) Do not work on a machine in bad light.
- iii) Never switch on a machine unless or otherwise you know all mechanism and operation of machine.
- iv) When using any grinding parts, protect the eyes by wearing goggles or using shields.
- v) Do not clean metal chips by hand, use wire brush for cleaning.
- vi) Be in a habit of cleaning the machine, equipments and tools regularly

Precautions in workshop

- i) Keep the workshop neat and tidy. Many accidents are caused due to people tipping over things left, trying over gangways.
- ii) Do not run on in the workshop. Walk carefully.
- iii) See that the floor is free from slippery substances.
- iv) Keep gangways clean and clear.
- v) Everything should be in place and wasting should be provided to throw waste metal pieces.
- vi) Workshop should have proper lighting and ventilation.

Precautions while using hammer

- i) There should be no grease or oil on the handle.
- ii) Hammer head should not be projecting outward
- iii) Handle should not be too long or too short

Precautions while using chisel

- i) It should be handled carefully and must be grounded.
- ii) Goggles must be used while chipping.

Precautions while using file

- i) The finger of left hand must not be crooked under file as this may injure the fingers.
- ii) Metal chips must not be removed while doing job by bare hands where brush is used.
- iii) Files without handles or those with crook must not be used

Precautions during welding

- i) We should never use oxygen cylinders near inflammable substances.
- ii) Acetylene or oxygen cylinder must be kept separately.
- iv) Do not weld in continued space without adequate ventilation.
- v) We should always use goggles while welding.
- vi) Make sure that connection are air tight by using soap water.
- vii) Never use matches for lighting while welding.
- viii) When welding is to be stopped, close the cylinder valve and release all the gas pressure from regulators and holes by opening torch. When regulator shows zero, release pressure, adjusting screw and closing values.

Precautions on clothing

- i) Tight fitting coats are safer than loose fitting coats.
- ii) Avoid wearing rings, long sleeved shirts and watches while working.
- iii) Clear covered footwear having thick soles and tough above.
- iv) Hair must be combed well and kept away from danger.

EXPERIMENT NO. 1

OBJECT:-

To study of tools and operations in fitting shop.

TOOLS

VICES:-

Vices are used for gripping different jobs in position during various operations.

MATERIAL:-

Main body and Detachable jaws are made of case steel.
Screw is of mild steel.

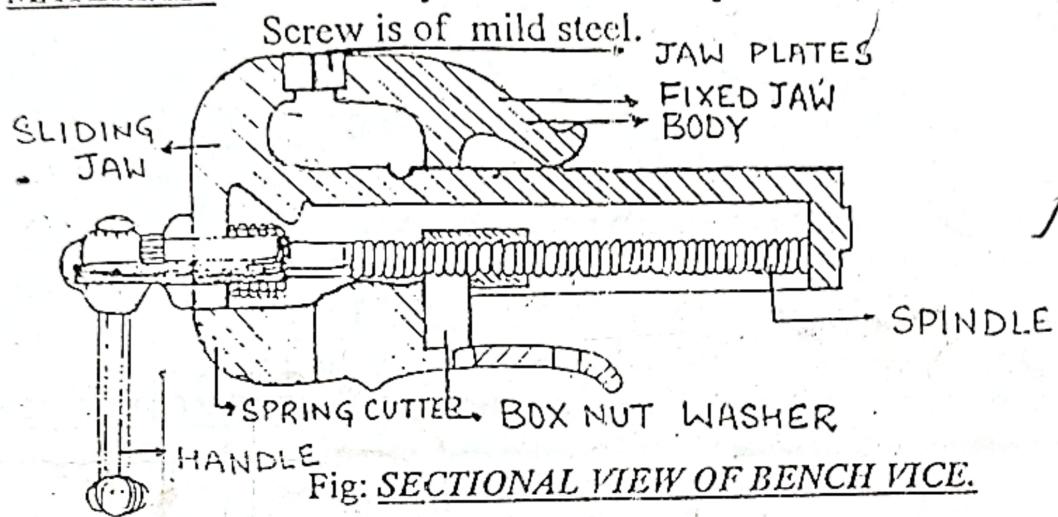


Fig: SECTIONAL VIEW OF BENCH VICE.

V-BLOCK:-

It is usually works in conjunction with a u-clamp and is used to support the work in marking and drilling.

Surface Plate:

It is used for testing trueness of finished surfaces, testing a try square. It made of cast iron.

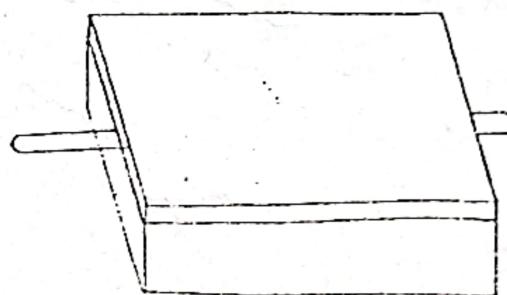


Fig. Surface Plate

Try Square: - It is used for testing true surface at right angles or testing the trueness of naturally normal surfaces.

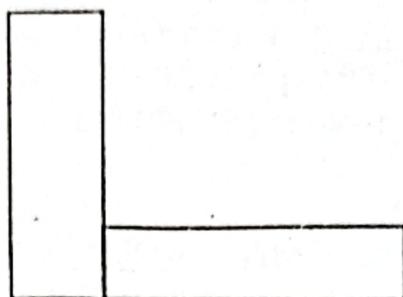


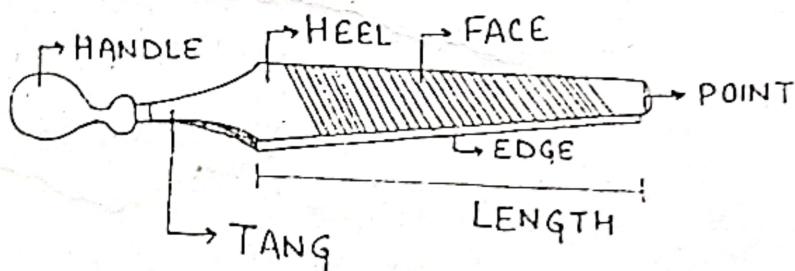
Fig. Try Square.

BEVEL PROTECTOR: - It consists of a steel dial divided into 360 divisions. Dial can be rotated around the center. The lines at any angle can be marked or measured by the straight edge. Straight edge can be slide along the length.

COMBINATION SET: - It is a multipurpose instrument that can be used as protector, a level, a meter, a center square and a try square.

FILES: -

File is used to remove extra material by rubbing the metal. Files are available in a number of sizes and degree of coarseness.



CLASSIFICATION OF FILES ON THE BASIS OF GRADE:-

- (i) Rough (20 Teeth per inch)
- (ii) Bastard (30 Teeth per inch)
- (iii) Second Cut (40 Teeth per inch)
- (iv) Smooth files (50-60 Teeth per inch)
- (v) Dead Smooth (100 Teeth per inch)

ROUGH AND BASTARD FILES:- Are big cut files and used for cutting where the material removing is more.

DEAD SMOOTH AND SMOOTH FILES:- These files are used for finishing work. Second cut files have the degree of finish mid way between bastard and smooth file.

SCRIBERS:- It is used for making of lines. It is made of high Carbon steel.

CHISELS:- Chisels are used for chipping away the material from the work piece. Chisels are generally made of high carbon steel. They are 6" to 8" long. The top is flattened and a sharp cutting edge is made.

TYPE OF CHISELS:-

- (i) Flat Chisels.
- (ii) Cross cut Chisels.
- (iii) Half round Chisels.
- (iv) Diamond point.

CLASSIFICATION:- Chisels are classified with their shape and width of the cutting edge.

Cutting of Chisels is kept as:-

- (a) For hard materials - 70° to 75°
- (b) For medium hard - 60°
- (c) For soft materials - 40°

(4)

HAWKSAW: - Hacksaw is used for cutting rods, flats etc. in fitting shop. It consists of a metal frame, fitted with a wooden handle, carrying metal clips with wing nuts at its end to hold and stretch the metal blade. Teeth of the blade are generally forward cut. The hacksaw should be used in straight direction otherwise it will result in breaking of blades.

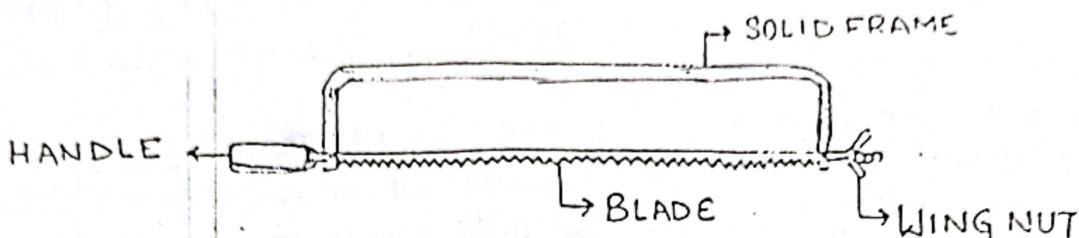


Fig. Hacksaw Frame

The thickness and width of blade are 1mm and $\frac{1}{2}$ " respectively.

Blades are classified as under:-

- (a) Depending upon the direction of cut.
 - (i) Forward Cut. (ii) Backward Cut.
- (b) Depending upon the pitch of the teeth
 - (i) Coarse - (8 to 14 Teeth per inches)
 - (ii) Medium - (16-20 Teeth per inches)
 - (iii) Fine - (24-32 Teeth per inches)

UNIVERSAL MARKING SURFACE GAUGE - It consist of a heavy base, a scriber and a bar. The scriber can be adjusted to any position with the help of screw and nut. It is used for marking purpose.

STEEL RULES:- It is made of stainless steel and are available from $\frac{1}{2}$ feet to 2 feet. These are marked in inches or millimeters.

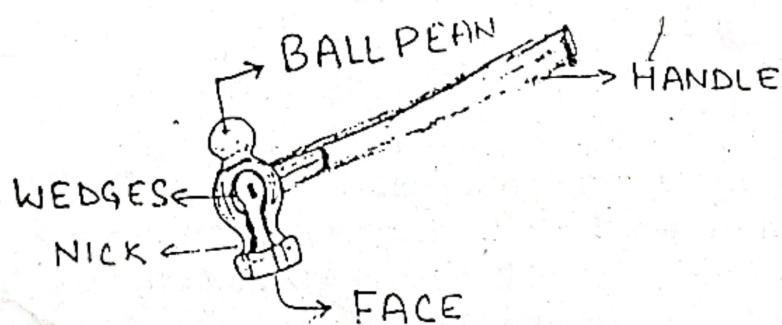
PUNCHES:- It is used for marking round indentation on the metal surface for providing location of marking for further operation such as cutting, sawing, drilling and chipping etc.

(a) DOT PUNCHES:- It is used for marking dotted lines.
Punching angle is 60°

(b) CENTER PUNCHES:- It is used to mark the center of the hole before drilling. Angle of punching end is 90°

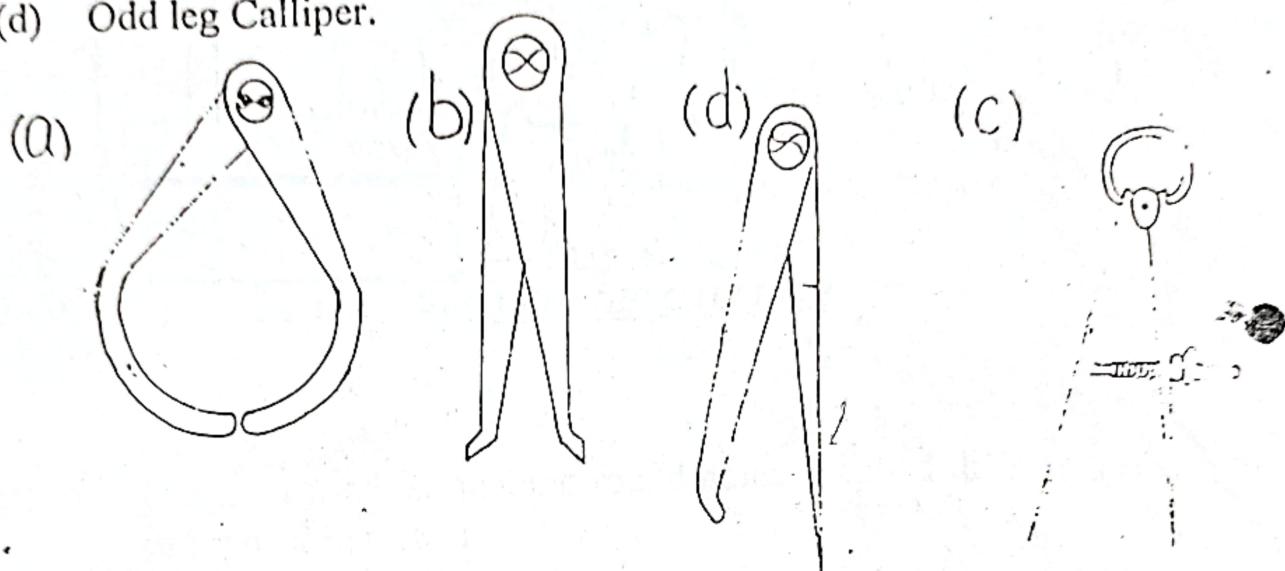
HAMMERS:- Are used for striking chisels in chipping and cutting and the punch in marking. A hammer consists of a heavy iron body with a wooden handle. The weight ranges from 0.25 kg to 2 kg. The main types of hammers are as follows:

- (i) Ball Pean hammer.
- (ii) Straight Pean hammer.
- (iii) Cross Pean hammer.



CALLIPERS:- It is generally used to measure the inside or outside diameters. It is made up of different size and shapes. It consists of two legs connected to one end by means of rivet or bolt. The edges are made just to touch the job, and then the diameter is measured with the help of steel rule. These are of four types:-

- (a) Out Side Calliper.
- (b) Inside Calliper.
- (c) Spring Calliper.
- (d) Odd leg Calliper.



MICROMETER:- It is used for measuring diameter or thickness of any job. It is more precision than vernier caliper. It consists of hook type frame. A hard anvil is screwed on one end. On the second end a spindle moves to and fro carrying another small anvil on its end. The graduation on micrometer is available in inches as well as in millimeters.

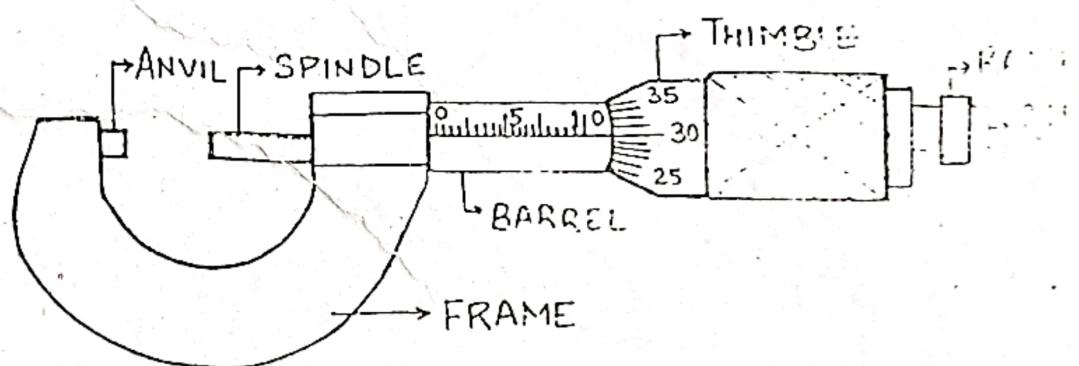
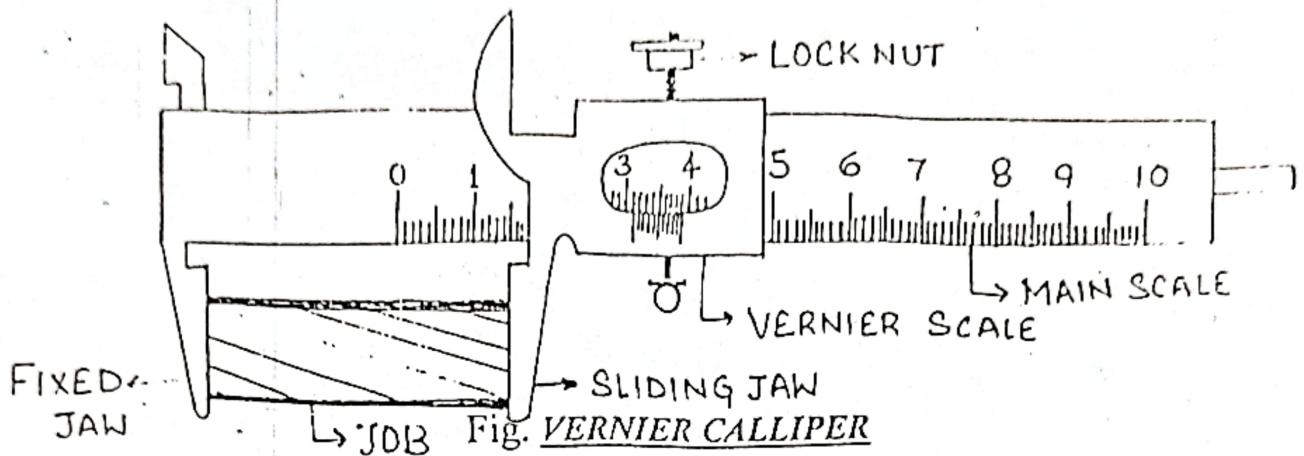


Fig. Metric outside micrometer

(7)

VERNIER CALLIPER:- It is used for measuring lengths and diameters. It can be used for measuring external and internal diameters. It can be used for measuring external and internal dimensions. The minimum dimension that can be expressed on vernier calliper is known as least count. Material of all parts is stainless steel.



DRILLS:- The tools used for making round holes is called drill. It is made of high carbon steel.

TAPS:- Tapes are used for making internal threads in cylindrical holes or cleaning damaged threads in similar parts.

» DIES:- Dies are used for cutting external thread in cylindrical parts such as bolts and pipes. Dies are made of tool steel.

GAUGES:- It is used to check the diameter of wires. It is made up of a steel sheet disc.