Name: Yash Sarang

Roll no.: 47

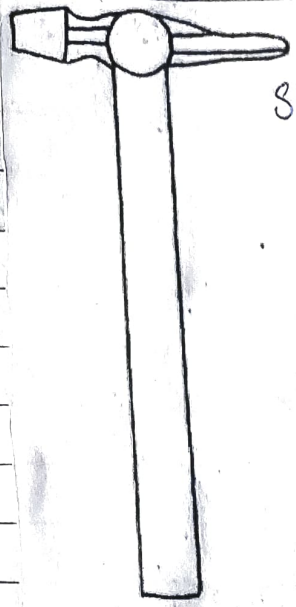
Class: D1AD

Topic: Basic Workshop - II

CARPENTRY

WORK

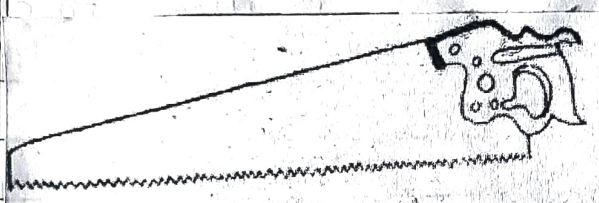
SKETCH



WRAUNGTON HAMMER

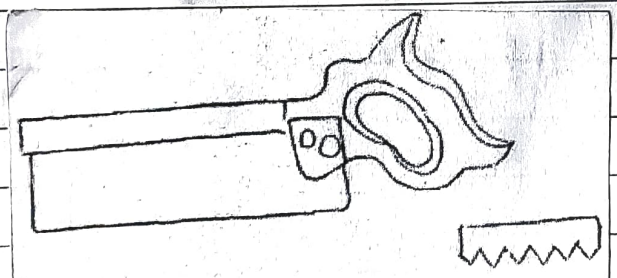
SPECIFIC USE

It is used for bench work and all types of light jobs



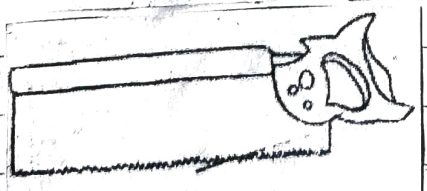
CROSS CUT HAND SAW / CROSS CUT TEETH

It is basically designed for cutting across grains of wood but it is used as a general purpose saw in wood work.



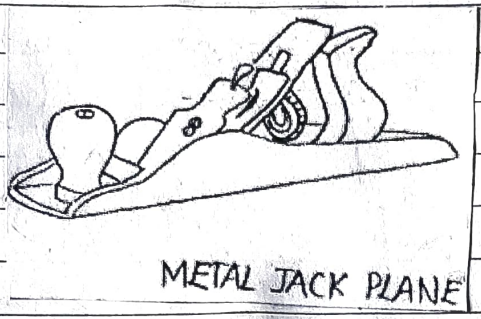
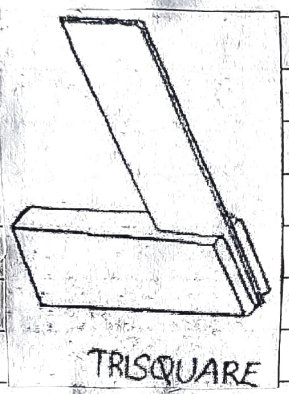
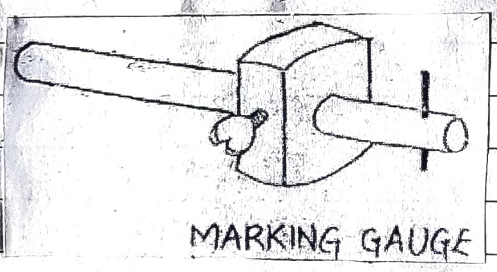
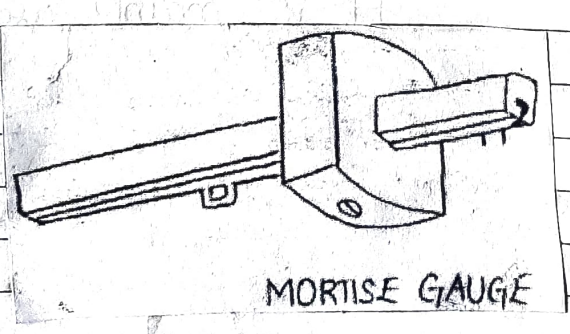
DOVETAIL SAW

It is used for finer work particularly for cutting tongues for dovetail joints.



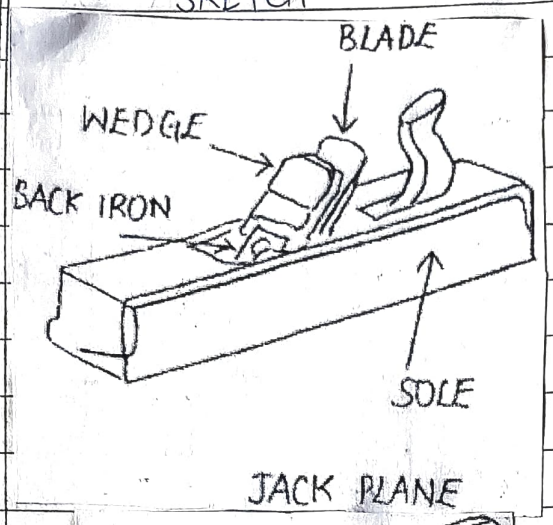
TENON OR BACK SAW

It is mainly used for taking short, straight ~~cuts~~ cuts such as for tenons.

SKETCH	SPECIFIC USE
 METAL JACK PLANE	It serves the same purpose as the wooden planes by this plane, a smoother operation and better finish is obtained.
 TRISQUARE	It is used to check: a) The straightness / flatness b) The squareness c) For drawing perpendicular lines
 MARKING GAUGE	It is used to scribe lines parallel to and at any distance from a finished face or edge.
 MORTISE GAUGE	It is specifically used for marking mortises and tenons and similar joints requiring parallel lines.

SKETCH		SPECIFIC USE
	PARTING CHISEL	It is used for sharping and preparing surfaces of wood.
	BEVELLED EDGED CHISEL	It is used for delicate and fine work where ordinary firmer chisel is not useful, this chisel is very useful in case of corners.
	FIRMER CHISEL	It is used for taking wider cuts and finishing flat surfaces inside the grooves.
	MORRISE CHISEL	This chisel is used for taking heavy and deep cuts for removing more stock as in case of morrises.

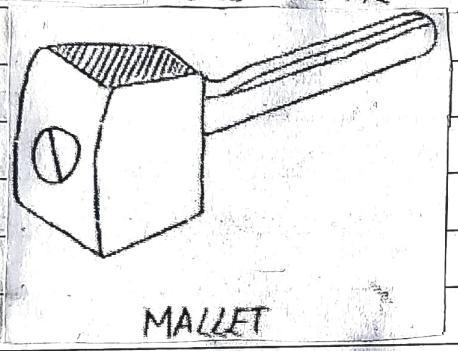
SKETCH



JACK PLANE

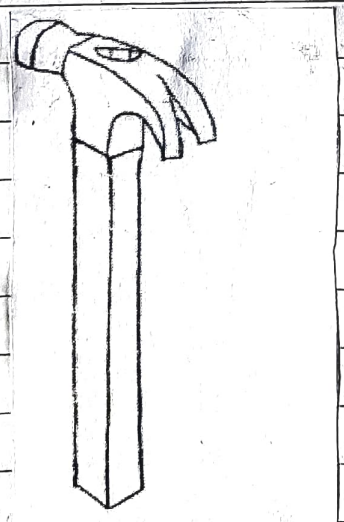
SPECIFIC USE

It is used for planing or smoothening the wooden surface.



MALLET

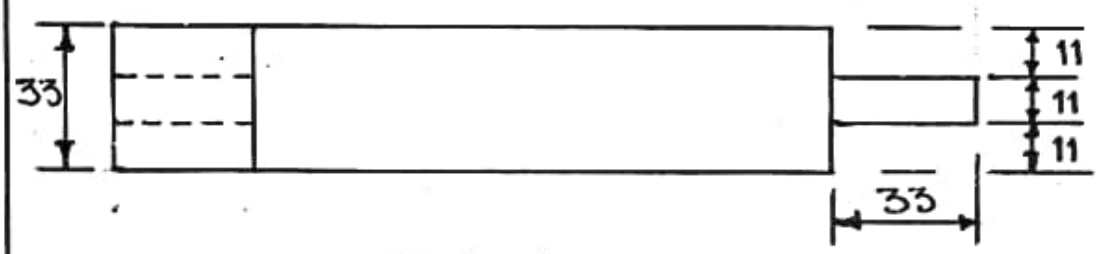
It is used for striking the cutting tools having handles such as chisels and gauges.



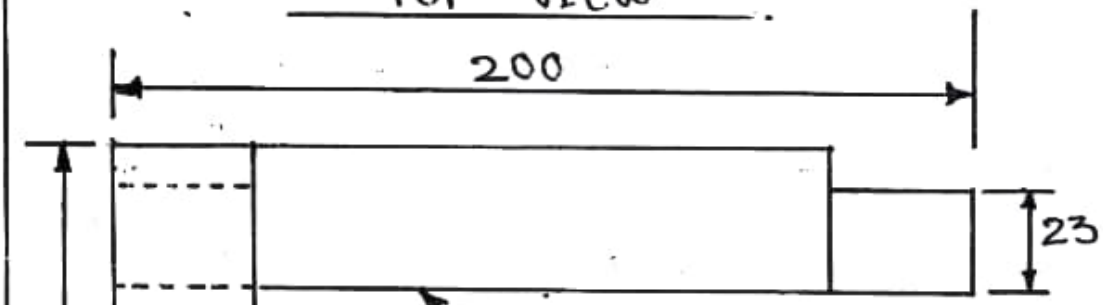
CLAW HAMMER

The face of the hammer is used to drive the nails into the wood and for other striking purposes. Claw is used for extracting nails out of wood.

A MORTISE AND TENON JOINT

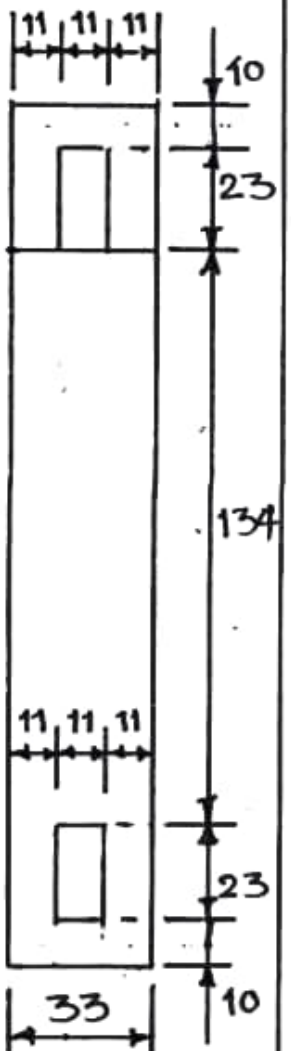


TOP VIEW



FRONT VIEW

ASSEMBLY DRAWING OF PART A & B

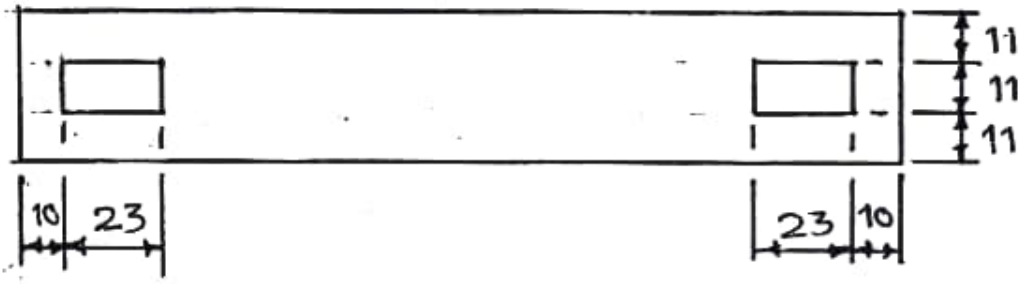


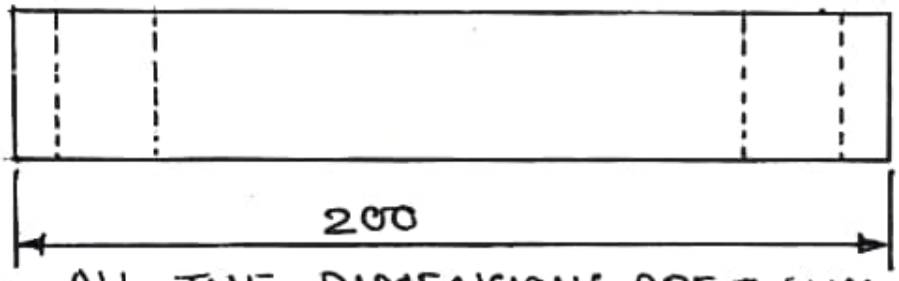
SIDE VIEW

ALL THE DIMENSIONS ARE IN MM.

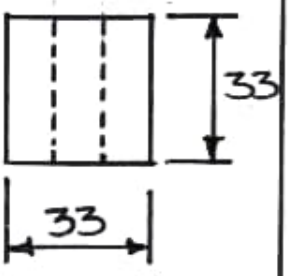
SCALE - 1:2

ORTHOGRAPHIC VIEWS OF PART-A



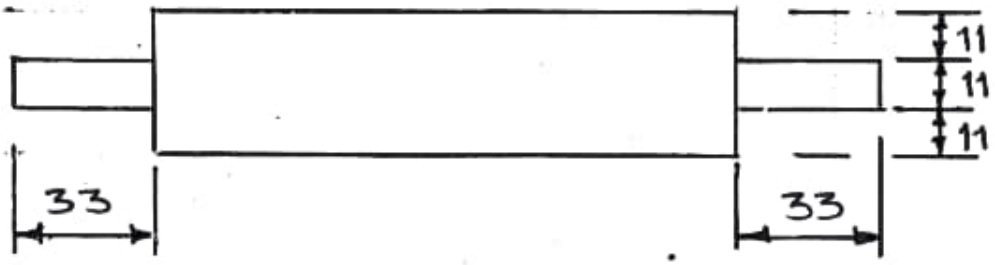


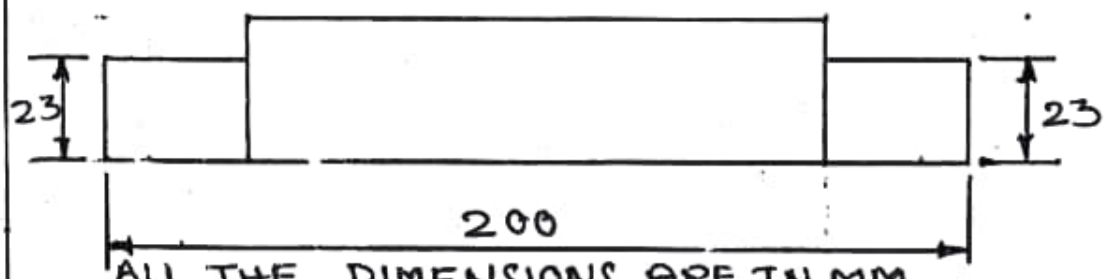
ALL THE DIMENSIONS ARE IN MM.



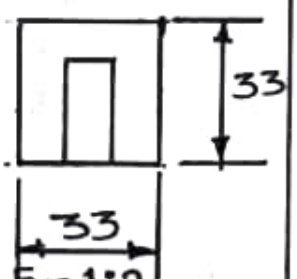
SCALE - 1:2

ORTHOGRAPHIC VIEWS OF PART-B





ALL THE DIMENSIONS ARE IN MM.



SCALE - 1:2

Name of the Job: A Mortise and Tenon Joint

Aim: To learn individual carpentry skills given below and integrate them by manufacturing a mortise and tenon joint.

Tools and equipment required:

(i) Steel Rule
(ii) Pencil
(iii) Tri square
(iv) Marking gauge
(v) Jack plane
(vi) Hand saw
(vii) Firmer chisel
(viii) Mallet

Operations involved:

(i) Planning
(ii) Sawing
(iii) Measuring
(iv) Chiseling
(v) Fitting and finishing

Raw material: Teak Wood
Size - 38 x 38 x 450 mm

Stepwise Procedure:

(i) Study the job drawing carefully and understand it.
(ii) Check the given material. See whether the size of raw material is slightly bigger than size prescribed in the job drawing.
(iii) Make any two adjacent sides of given wood flat, smooth, even and perpendicular by planning process. Check both the sides for same with the trisquare.
(iv) Mark the breadth and thickness on the remaining

two sides by using steel rule and marking gauge. Plane the remaining two sides upto the marking with the help of jack plane.
(v) After making the required size of given wood, mark the length of part-A and part-B as well as the positions of mortises and tenons as per the given dimensions.
(vi) Make the mortises and tenons by chiseling process using mortise and firmer chisel and the hand-saw.
(vii) Afterwards, cut the length of the two parts A and B.
(viii) Fit both the parts A and B together as per the drawing by putting tenon into the mortise. If it doesn't fit, it needs some careful chiseling.
(ix) In this way, prepare the mortise and tenon joint.

Carpentry:
I. Wood Planning:
(i) Place the work piece on the bench against bench stop.
(ii) Keep jack plane horizontal to the surface which is to be planed.
(iii) Start planing by moving jackplane forward and backward.
(iv) While applying forward stroke, apply pressure and release pressure on back stroke, apply pressure and release on backward stroke. Continue till be surface becomes flat and plane.
(v) After that, check the straightness as well as prependicularity with the help of trisquare.

* Care to be taken while planing.

(a) Try to cut wood uniformly
(b) Don't have heavy cuts.
(c) Don't plane continously without checking surface at frequent.
(d) Keep the plane when not in use on its side and not on its cutting edge.

II. Sawing:

(i) Hold the piece formly ∅ in carpentry vice. Take care of marking line to be vertical, leaving some place of the job.
(ii) Avoid putting the job just near the sharp teeth of the saw while staring.
(iii) Hold the saw by putting three fingers inside the handle, one finger pointing the mention and the thumb will be up.
(iv) Don't exert full pressure when you start saw cut.
(v) Place the ~~saw before~~ saw blade a bit farther right from the mark where it is actually to be cut.
(vi) Place the piece still with hand firmly when the cut is about to finish and give slow strokes of saw.
(vii) Care should be taken to see that saw teeth should not strike aginst vice jaws.

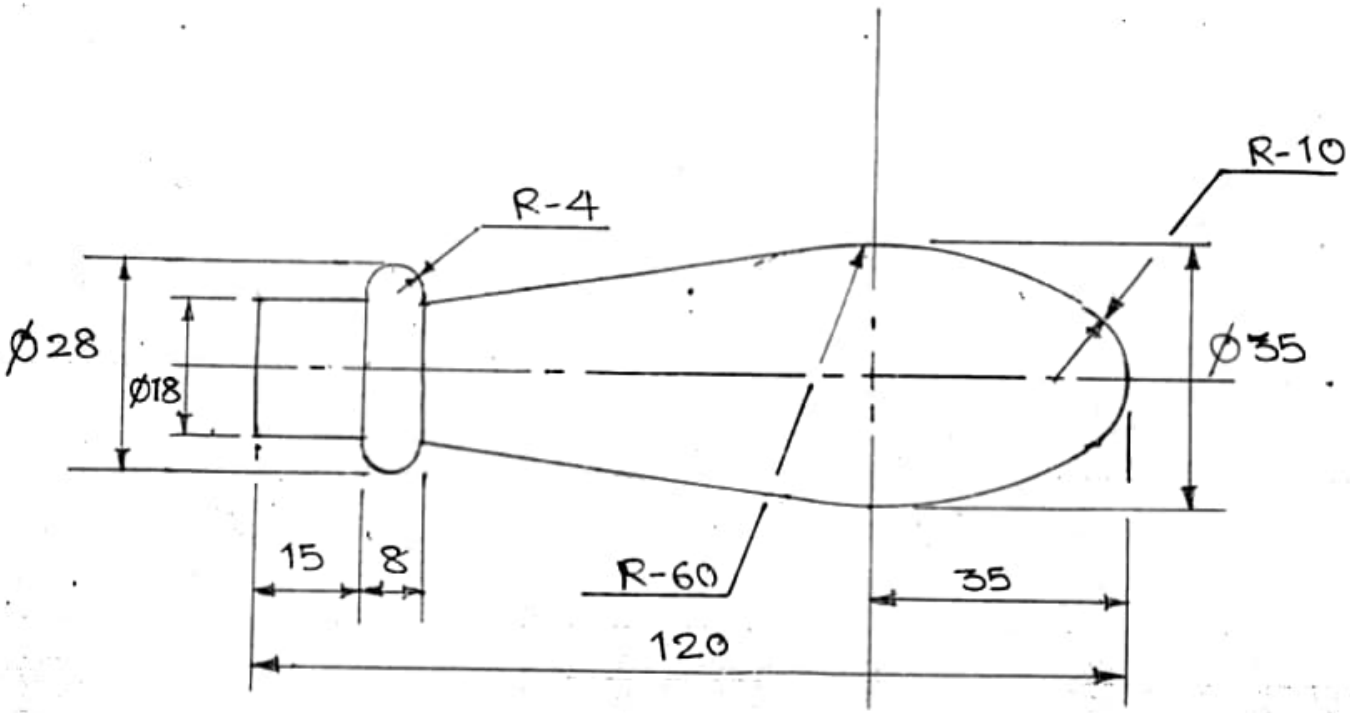
III: Chiselling:

This process consists of removing small stock of wood for producing desired shape.
The operations are as follows:

(i) Mark the side where the chiseling is to be done.
(ii) Mark the saw cuts on the side of lines up to requires depth.
(iii) Keep the wooden piece horizontal against bench stop.
(iv) Hold the chisel with the flat side up. Slice of the wood in thin shavings. Use mallet to drive chisel if wood is too hard.
(v) Thin the piece around and do the chiseling from other edge.
(vi) Remove the middle hump portion by holding the chisel on flat side down and applying pressure by hand or mallet.
(vii) Do final finishing by holding the chisel on the marking and slicing by hand.
(viii) Check flatness with blade of the trisquare.
(ix) Do not complete chiseling from one side only.

WOOD TURNING

A FILE HANDLE



ALL THE DIMENSIONS ARE IN MM

SCALE: 1:1

RAW MATERIAL:- BABUL WOOD

SIZE :- 150 X 45 MM.

F.E. DEGREE (SEM-II)

(5)

Name of the Job: A File Handle

Aim: To learn wood turning skills such as rounding, turning, shaping, tapering, etc by manufacturing a wooden file handle.

Raw Material: Babul wood
Size – 150 x 50 x 50 mm

Tools and equipment required:

(i) Steel rule
(ii) Scriber or pencil
(iii) Jack plane
(iv) Hack saw
(v) Sand paper
(vi) Wood turning lathe machine
(vii) Gauge
(viii) Skew chisel
(ix) Parting chisel
(x) Round nose chisel

Operations involved: Wood turning.

Stepwise procedure to prepare the job:

(i) Take a babul wood.
(ii) Mark centre on both ends by joining the diagonals.
(iii) Mark the circles of required diameter on both ends.
(iv) Make the job roughly cylindrical by planing operation with jack plane.
(v) Make one of the centers a little bit deep and broad with the help of centre punch and hammer.
(vi) Make a deep cut diagonally with hand saw on the other end.
(vii) Mount the job between centers on the wood turning lathe. While mounting drive the cut end 3mm on

to the spurs of the chuck with a mallet. To much driving may split the wood. Slide the tail stuck on the free end of the wood and let the point of the dead centre, so oil it. Clamp the tail stock. Grasp the wood and try to shake it end ways and revolve it. It should revolve free but there should be no feeling of looseness between the centres.

(viii) Set the tool rest a little bit away from the job and slightly above the axis of the job.

~~(viii)~~ (ix) Start the lathe machine

(x) Hold the gouge with both hands, lay it on the tool rest. Advance the blade gradually through the left hand until more taking a cut. ~~Make~~ Move the gouge in this position bodily to the right. Repeat this cutting operation several times.

(xi) Stop the lathe and examine the wood. If there are still flat surfaces remaing, continue with the gouge until the wood is entirely rounded as regular as you can make it.

(xii) Set the outside caliper a little greater than the desired diameter. Reduce the entire piece of wood to the same diameter as the size placed, making it is straight as possible.

(xiii) Finish the surface with skew chisel. Hold skew chisel similarly to gouge, cut left and right towards the ends. Keep the edge of the blade on the tool rest about 45° to the axis of the wood.

(xiv) Test the diameter frequently with the outside caliper.

(xv) After rounding the wood to correct diameter, hold the ruler on the tool rest close to the

work and do the markings as shown in the diagram.

(xvi) Using different types of scrapping chisels make taper, convex and concave shapes.

(xvii) While turning, check the diameters frequently with the outside caliper and check the shape of the job by using the template of the job.

(xviii) After completion of the job, smoothen and polish the whole surface of job by sand paper.

(xix) Remove the job from the lathe machine and cut unwanted ends.

(xx) In this way, prepare the job on wood turning lathe.

SHEET METAL WORK

Steel Metal Work

Use of steel metal:

Sheet metal is generally regarded as the working of metal, from 16 gauge down to 30 gauge with hand tools and simple machines into various forms by cutting, forming into shape are joining. Common examples of sheet metal work are hoppers, canisters, gauards, covers, pipes, hoods, funnels bends, boxes, etc. Such articles are found less expensive, ligther in weight, at many places they easily replace the use of casting and foldings.

Black iron sheet:

This is the sheet metal. Since, it is uncoated, it corrodes rapidly. The use of this metal is limited to articles that are to be painted or enamled such as tanks, pans, store pipes, etc.

Galvanised iron sheet:

Zinc coated iron is known as galvanised iron. This zinc coating resists rust, improves the appearance of the metal. Articles such as pans, buckets, funnel, heating ducts, cabinets, gutters, etc. are mainly made from galvanized iron sheets.

Stainless steel sheets:

This is an alloy of steel with nicked, chromium and traces of other metals. It has good corrosive resistance and can be welded easily. It's cost is very high. This is used in canneries, dairies, food processing and chemical plants, kitchenwares, etc

Aluminium sheet:

It is highly resistant to corrosion and abrasion, whitish in color and light in weight. It is now widely used in the manufacture of a number of articles such as household appliances refrigerators trays, lighting fixtures, windows in construction of aeroplanes in the fitting and fixtures used in door windows and building requirements and in many electrical and transport industries.

Tin sheet:

It is a tin coated sheet. Tin protects the sheet against rust. This metal has a very bright silvery appearance and is used principally in the making of roofs, food containers, dairy equipments, furnace, fitting cans, pans, etc

HAND-TOOLS FOR SHEET-METAL WORK

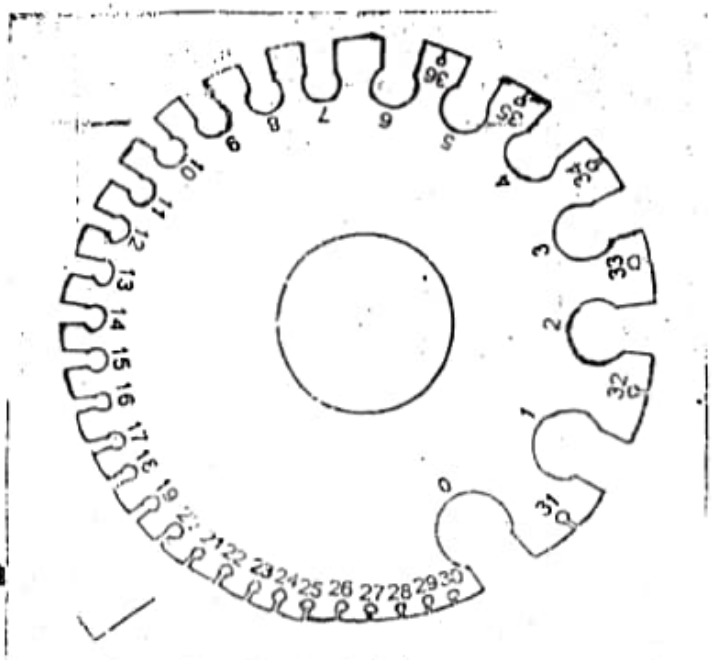
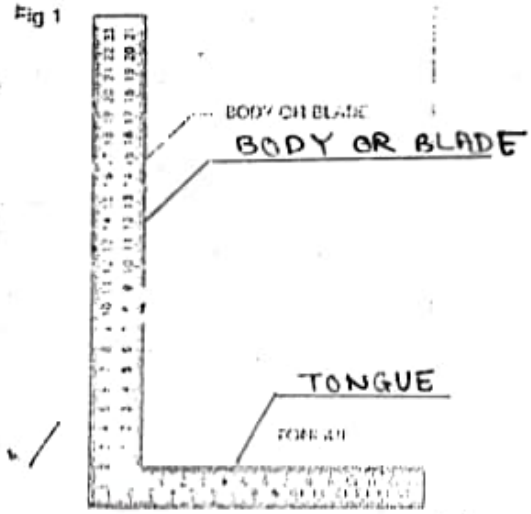


Fig. 5.1 : Standard wire gauge

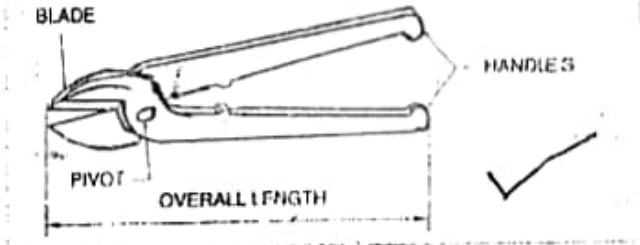
'L' SQUARE

Fig 1



SCRIBER

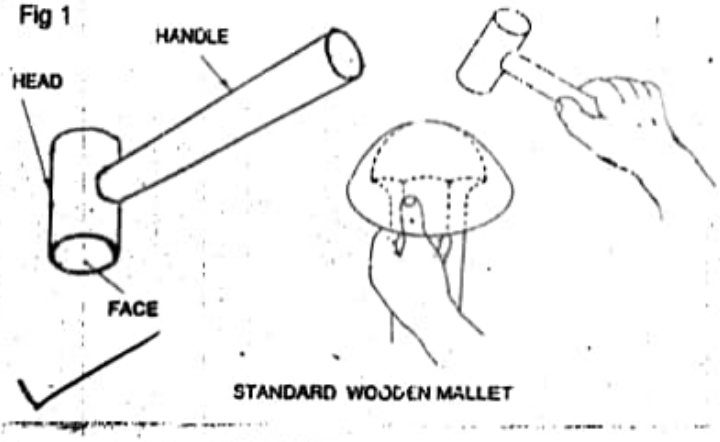
STRAIGHT SNIPS



BENT SNIPS

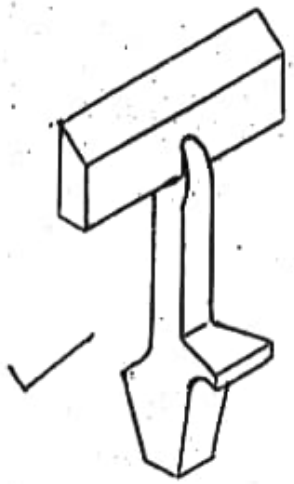
Fig 3

Fig 1



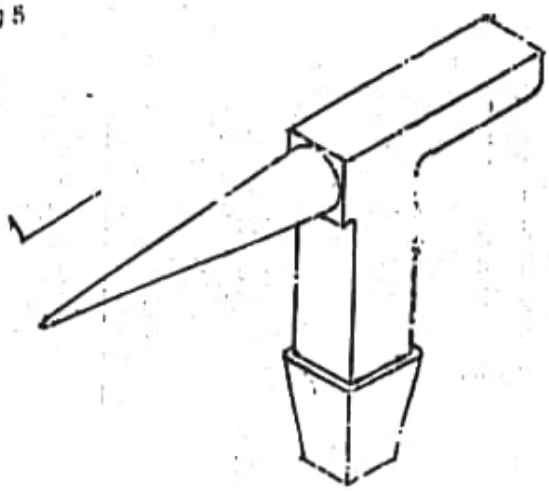
STANDARD WOODEN MALLET

Fig 2



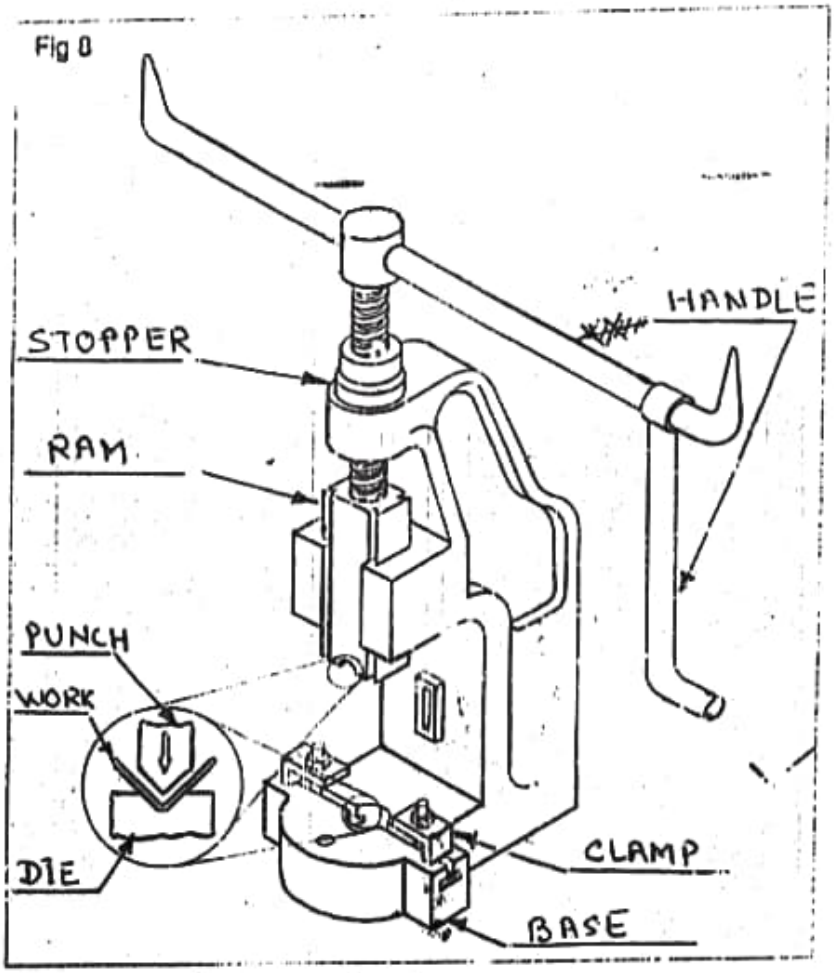
HATCHET STAKE

Fig 5



BEAK OR HORN

Fig 8



FLY PRESS

Sheet metal - Hand tools

Standard wire gauge:

The sheets are specified by standard gauge numbers because sheets are available in different dimensions and thickness. The thickness of a metal sheet is normally measured in terms of standard wire gauge number. The wire gauge is used to check the thickness of the metal sheets. The sheet, under ~~inspect~~ inspection in allowed to pass through the appropriate slot on the gauge. The wire gauge is also used to check the diameter of the wire.

'L' square:

The 'L' square is a very valuable instrument for the sheet metal worker in layout work. An accurate layout work in pattern drafting on a sheet of metal is very important. All layouts starts from a square corner. The long arm of the square is called as 'body' and the short arm is called as the 'tongue'. The body/blade and tongue are at right angle to each other. The blade and tongue are graduated in inches and millimeters.

Scriber:

It is a needle pointed steel rod. It is used for scribing the lines on a sheet metal with the guide of steel rule. It is made of high carbon steel.

Snips:

Snips are used to cut the sheet metal up to 1.2 mm thickness. There are two common types of snips. Straight snips of curved snips. Straight snips have thin blades which are only strong on a vertical plane. They are, therefore, only suitable for straight cuts and external ones.

Bent snips have curved blades for making ciralar cuts. They are also used for ~~making~~ trimming cylindrical or conical work in sheet metal.

Wooden Mallet:

Mallets are soft hammers and are made of raw hide, hand, rubber, copper brass lead or wood and are used to strike a soft and light blow on the metal.

It is used for flattening, bending sheet metal of 26 gauge or lighter so, there will be no damage to the job surface.

Stakes:

Stakes are the sheet metal workers anvils used for bending, seaming, or forming, using a hammer or mallet. They actually work as supporting tools as well as forming tools.

Stakes are made in different shapes and sizes. They are made of cast iron or cast steel.

Different types of stakes:

(i) Hatchet stake:
It has a sharp, straight edge, beveled along one side. It is very useful for making sharp bends, folding the edges of sheet metal, forming boxes and pans by hand.

(ii) Break or Bick iron stake:
This has two horns, one of which is tapered; the other is a rectangular shaped anvil. The thick tapered horn or beak is when making spouts and sharp tapering articles. The anvil may be used for squaring corners, seaming and light riveting.

Fly press:
The fly press is operated by hand. The frame of the machine is rigid 'c' shaped casting. The screw of the press operates in a nut which is incorporated in the top end of the frame. Two heavy cast iron balls are mounted at the two ends of the arm. The connecting arrangement between the screw and the arm is such that when the screw is rotated, the arm only slides up and down within the guide. The punch is fixed to the lower end of the arm and the die is fixed on a plate on the table.
A fly press is used for bending. Depending upon the angle of the bend required, the puch and the die are fixed on the press.

Sheet Metal Operations

(a) Shearing:
Shearing is another name given to most sheet metal cutting. It includes following points:
(i) Cutting off - A piece of strip is cut along a straight line.
(ii) Blanking - It means cutting a whole piece from the sheet metal.
(iii) Punching - Circular holes are produced on a sheet metal by a punch and die. It is a process of producing holes of any shape.
(iv) Notching - It is a process of removing the metal from the side of edge of the strip.
(v) Trimming - It is a process of cutting away excess metal in a form of piece.

(b) Bending:
It occurs when forces are applied to any localized area. Forming occurs when complete items or parts are shaped. In all metal bending the metal is stressed beyond the elastic limit.

(c) Hemming:
It is a process of folding an edge on border of sheet metal ~~is turned or round. The~~ to make it stiff.

(d) Curling or wiring:
In this process, the edge of sheet metal is turned round. The wire was placed into the rounded edge which

is then hammered over a little and completely pulled over a wire. This is done for stiffening the edge of the sheet metal.

(e) Seaming:

It is the process of fastening the two edges together.

(f) Spot welding:

This process is used to join overlapping strips, sheets on plates of metal upto a thickness of 0.5 to 3.2mm. The workpieces to be welded are assembly and placed between copper electrodes. They provide high thermal electrical conductivity. The current is allowed to flow till the plastic state of metal is reached. The temperature reached is called welding temperature. The mechanical pressure is applied on the electrodes which are forced against metal workpieces. This welds the two workpieces over the area of contact between the electrodes. Then the pressure is released. To get good quality weld, the metals welded are to be free from scale or rust.

Spot welding procedure:

(i) Set the knobs on required electric current and timing according to thickness of sheet metal job.
(ii) Place the job in desired shape on the lower electrode tip of the machine.
(iii) Press foot pedal down and bring upper electrode down. Rest it where spot welding is to be done.
(iv) Do the spot welding in the overlapping area only.