UNIT: 2

Carpentry

Structure

Introduction

Measuring Tools and Marking Tools

Cutting Tools

Boring Tools

Striking Tools

Holding Devices & Miscellaneous Tools

Carpentry Process

Carpentry Joints

Wood Working Machines

INTRODUCTION:

Carpentry deals with the all works such as roofs, floors, partitions, making of doors, windows, cupboards, dressers, stairs and all interior fitments for a building. Wood is the material used for any type of wood work.

Measuring tools:

1. **Steel rule:**

   It is direct measuring instrument. Various sizes and designs are available for measuring and setting out dimensions.

2. **Steel tape:**

   This is used for longer dimensions. They are available from lengths from0.6m to2.5m.

Marking tools:

1. **Straight Edge:**

   It is a machined flat piece having truly straight and parallel edges. It is used for testing trueness and straightness of edges.

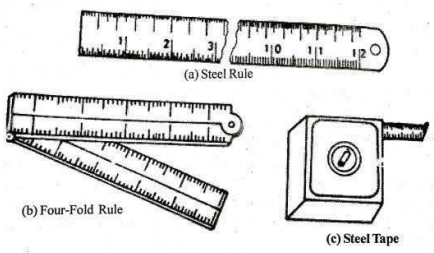

Fig 2.1 Marking tools

2. Try Square:

It is used for marking and testing angles at 90 . It consists steel blade riveted to a hard wood stock, which has protective brass plate on the working surface.

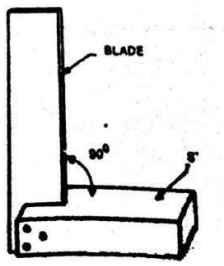

Fig 2.2 Try square

3. Metre Square:

It is used for marking and testing at 45. It has a steel blade fitted in a wooden or metal stock.

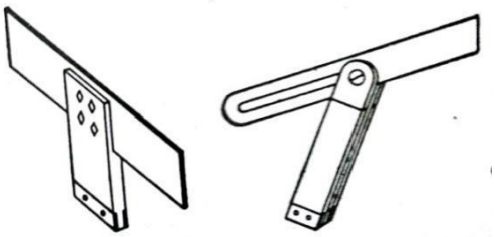

Fig 2.3 Metre Square

4. Marking Knife:

All the dimensional line marked with pencil are cut with marking knife. It has a chisel edge at one end and sharp point at other end.

Fig 2.4 Marking knife

5. Marking Gauge:

It has a stem with a sharp point pin at one end. It is used to cut line along the grains and parallel to an edge.

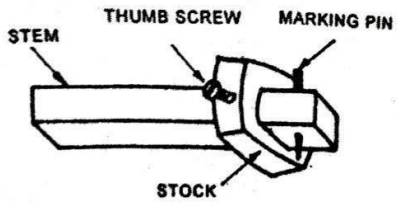

Fig 2.5 Marking Gauge

6. **Divider:**

It has two pointed legs. It is used for transferring dimensions and scribing curves or circles.

Cutting tools:

1. **Saw:**

The saw is commonly used cutting tool in wood working. The saw has a blade which carries cutting teeth and handle.

2. **Rip saw:**

It used to cut the wood along the grains.

3. **Crosscut saw:**

It is used for cutting the wood across the grains.

4. **Panel saw:**

It has a fixed saw. It is used for fine work. It is used for ripping and crosscutting.

5. **Tenon saw:**

It is used for cross cutting when a fine and accurate finishing is required.

6. **Dovetail saw:**

It is used to get accuracy.

7. **Bow-saw:**

This saw is used for cutting quick curves and the handle can revolve in their sockets. The blade can be adjusted to any desired positions.

8. Key Hole Saw:

It is smallest aw. It has a trapped blade fixed into the handle by crews. It is used for cutting key holes and is very useful for internal and intricate work.

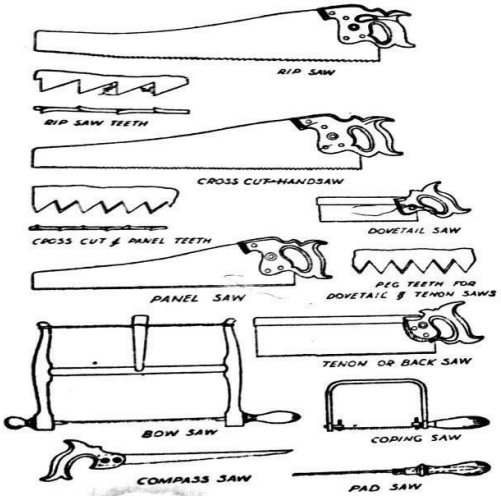

Fig 2. 6 Different types of saws

Chisels:

A fairy large number of chisels are used in wood work for cutting in different manners to produce desired shape and cavities. The chisel consists of these parts irrespective of their size and use. The common types of chisels are used in carpentry work are the following.

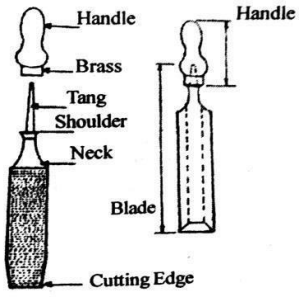

Fig 2.7 Chisels

1. Firmer Chisel:

This chisel is capable of doing heavy work and is used for joining and shaping the wood with or without mallet. The blade is made of rectangular sections with bevel edge.

2. Paring Chisel:

These chisels have a long blades used to cut the deep corners with hand pressure. They are mostly used for pattern making.

3. **Mortise Chisel:**

It is used for taking heavy and deep cuts resulting in more stock removal as in case of making mortises.

4. **Socket Chisel:**

It is provided with socket instead of tang. The wooden handle is inserted into this socket. This prevents splitting of handle while removing heavy stock.

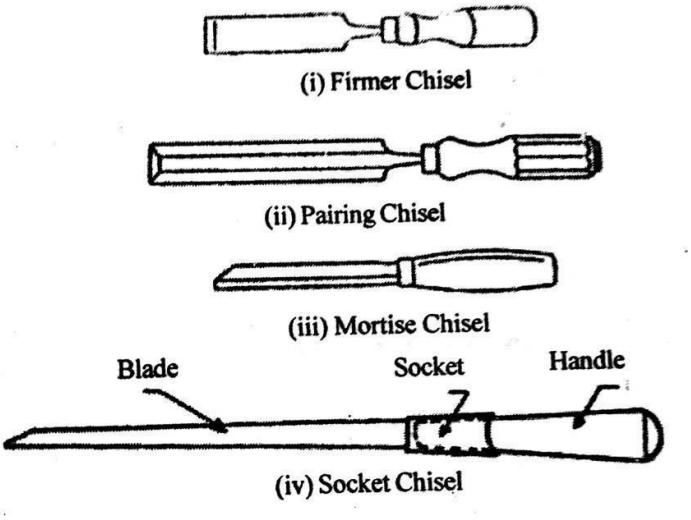

Fig 2.8 Different types of Chisels

Planes:

Planes are used in producing flat and smooth surfaces by cutting thin layers of wood. The plane consists of these parts – Body, cutting blade, handle, knob and other controls. The common types of planes used in carpentry are

1. **Jack Plane:**

It consists of a wooden body or stock in which blade or cutter is fastened at an angle of 45 degree to the sole. The plane iron and cap iron are assembled and inserted in a mouth of plane along with the wedge. The back iron supports the cutting edge and also breaks the shavings so that curl away from the blade. The blade can be set for taking deeper or shallower cuts.

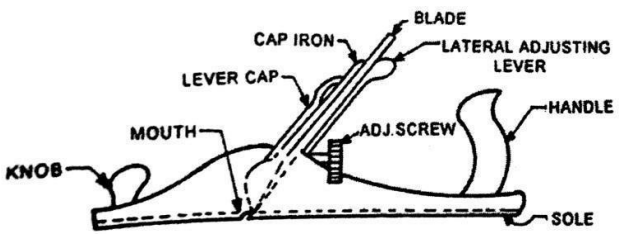

Fig 2.9 Jack Plane

2. Trying Plane:

These are used to make true flat surfaces which are formed by jack plane. It is longer than jackplane.

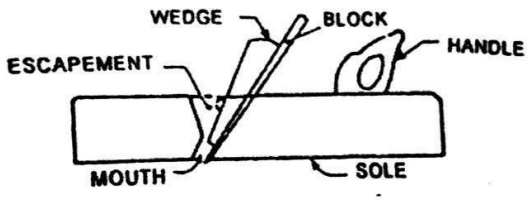

Fig 2.10 Trying Plane

3. Smoothing Plane:

It is nothing but a smaller wooden jack plane without handle. In operation its stock itself is held in both hands. It is used for better finish and smoothness to the surface already plane by ajackplane.

4. Rebate Plane:

It is small in size and is used to cut the recess along the edge of a work piece. In rebate plane the edges of cutting iron is in line with the side of plane.

5. Plough Plane:

It is used for making deep grooves of standard size. A deep gauge is fixed on the body, and is operated by thumb screw. It allows the plane to make a groove of constant depth.

6. Router Plane:

It is used for finishing the grooves to a constant depth which are formed by chisel or saw.

Boring Tools:

Boring tools are necessary to make holes in wood. The various types of boring tools are as follows:

1. Bradawl:

It is used for boring small holes for inserting the screws and mails. It has chisel like point and is operated by hand.

2. Gimlet:

It is hand operated tool used for making small holes for screws. It has a spiral flutes with screw like point.

Fig 2.11 Bradawl

Fig 2.12 Gimlet

3. Brace:

It is a boring tool used for making holes. It holds and rotates various types of bits for producing holes and is operate by hand. The most commonly used braces are ratchet brace and wheel brace. These are used for making larger holes of different sizes.

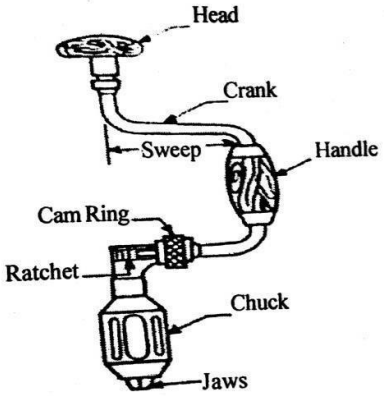

Fig 2.13 Brace

4. Auger bit:

It is used for producing long deep holes of diameter ranging from 6 to 40 m. It is steel bar. An eye at top to which the handle is fitted. The bottom end is provided with a screw point.

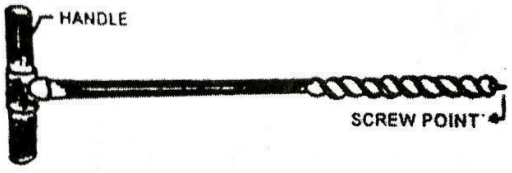

Fig 2.14 Auger bit

Striking Tools:

Striking tools are called Hammers used to drive in nails and to operate chisels. The most common striking tools used in carpentry are hammers and mallets.

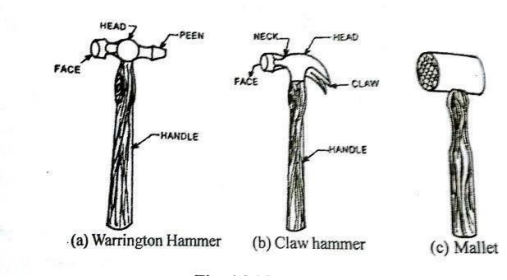

Fig 2.15 Different types of Striking Tools

1. Warrington Hammer:

It is used for bench work and light work. It is made of cast steel with tampered face and pen. The wooden handle fits in the eye and steel wedge s driven into form a rigid joint.

2. Claw Hammer:

It is dual purpose hammer and face is used to drive in nails, and claws at the other end for pulling out nails.

3. Mallet:

It is used for operating the chisel and gauges. It is made of hard wood and is provided with handle.

Holding Devices:

To enable the wood worker to cut the wood accurately, it must be held steady. There are number of devices to hold the job.

1. Bench vice:

It is made of steel. It has the jaws, one is fixed to the side of the table while the other is kept movable by means of a screw and handle. The job is held between two jaws. The faces of jaws are lined with hard wood to prevent damage of work surface.

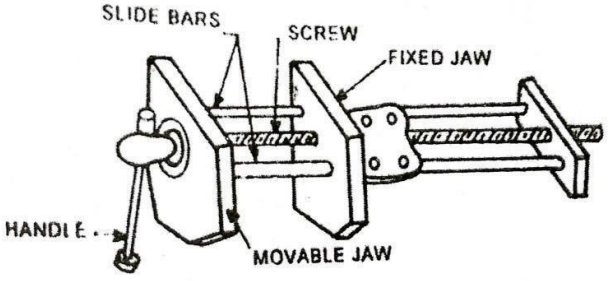

Fig 2.16 Bench vice

2. Bench Stop:

It is simply a block of wood projecting above the top surface of the bench. This is used to prevent the wood from moving forward when being planned.

3. Bench Hold Fast:

It consists of a cast iron pillar, steel arm and screw with a handle. It is used for securing the work to the bench. The pillar drops into a hole bored in the bench and the screw operates the arm to hold work on the table.

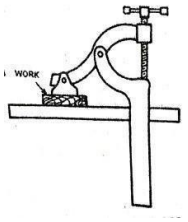

Fig 2.17 Bench hold Fast

4. Bench hook:

It is used to support work while planning or cutting. It is made of wood and can be placed conveniently on the worktable.

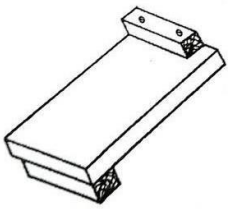

Fig 2.18 Bench hook

5. Sash cramp:

This is used for holding wide work such as frames or tops. It consists of a steel bar fitted with two jaws one of which is movable by a screw and other is fixed into one of the spaced holes by a fastening pin.

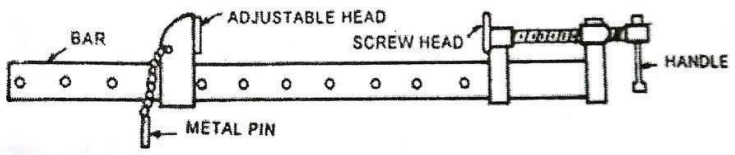

Fig 2.19 Sash Cramp

6. G-Clamp:

It is used to hold small works and it consists of frame with a fixed jaw at one end and movable jaw is operated by a screw and a thumb nut at the other end. It I also used to hold small parts for gluing.

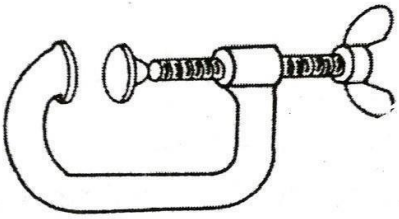

Fig 2.20 G-Clamp

Miscellaneous Tools:

1. Raspor File:

It is used for finishing the wood surface. It has sharp cutting teeth and it is used for finishing small curved surfaces.

2. Scraper:

It has fine edge which cuts fine shavings and remove plane marks.

3. Glass paper:

Where a surface is having very small imperfections that the no other cutting tool will do, then glass paper is used. It consists of small particles of glass struck to sheet of paper. Its sharp edges cut the wood.

4. Ratchet Screw Driver:

It is very useful for turning screws through a few degrees in.

5. Screw Driver:

These are used for screwing or unscrewing for the screws used in woodwork.

Carpentry Processes:

1. Marking:

The marking is the operation of setting out dimensions of a product on work surface. The success of completing a job depends on accurate and orderly marking .The dimensions and other internal details are marked with respect to the finished edge and face of a work piece.

2. Sawing:

It is the process of cutting wood by using saw. While sawing the work should be gripped perfectly in a vice. To start a saw cut hold the saw nearly horizontal. Support the blade with left thumb and draw the blade backward and push forward until it has started a cut.

3. Planning:

Planning is a process of smoothing the surface of wood by a planer. The work for planning is supported by the back bench stop or held firmly in the vice. The pressure is applied during the cutting stroke and relieved on the return stroke. It is important to move plane in a straight line to avoid rounding at the ends, and to obtain smooth surface planning is done along the grains.

4. Chiseling:

Chiseling is the process of cutting excess wood with chisel to obtain desired shape and required form of joint. In chiseling hand pressure is applied to remove thin layers. For quick removal of excess wood large cuts can be made using a mallet.

5. Boring:

It is the process of making holes in wood. The work is secured firmly in a vice or suitable cramp and the hole position is marked with punch. The hole is produced by turning and feeding the bit into work.

6. Rebating:

It is the process of cutting a recess along the edge of wood by a rebate plane. While rebating, the plane must be kept pressed into the side of the wood.

7. Grounding:

These operations are involved in joining of wood. Grooving is the process of cutting a channel in a wooden piece this is usually performed by plough plane.

8. Tongueing:

It is the process of making a projection corresponding to a groove in which it has to fit. This operation is usually performed by Moulding plane.

9. Moulding:

It is the process of making curved surface along the length of wood. This operation is performed with Moulding plane and is used for decoration work.

10. Polishing:

It is the process of producing a smooth reflecting surface with inly the minimum removal of material. To obtain such a finish it is necessary to incorporate suitable abrasive within the polishing composition.

Carpentry Joints:

1. Halving Joints:

Halving joints or half-lap joints are used in construction of frames. Marking and cutting of any joint must be accurate so that it can be glued together with the final external surface level.

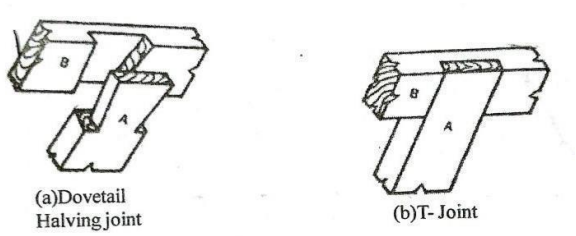

Fig 2.21 T Halving joints

2. Mortise and Tenon Joints:

It is strongest joint, and is used for the construction of doors, windows and frames.

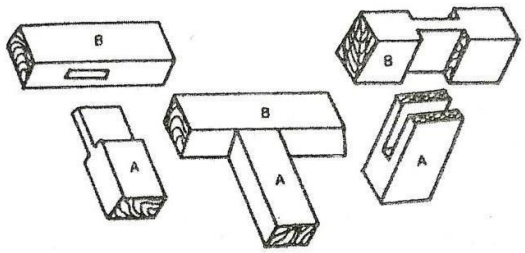

Fig 2.22 Mortise & Tenon Joint

3. MitreJoint:

It is formed by cutting the ends at an angle. The two ends are joined by nails or screws. This joint is used in photo-frame.

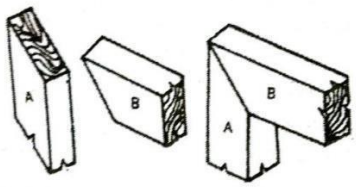

Fig 2.23 Mitre joint

4. Dovetail Joint:

This is the strongest corner joint and is used for construction of boxes and cupboards.

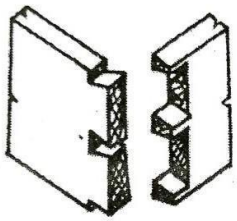

Fig 2.24 Dovetail joint

5. Butt or Rubbed Joint:

It is a widening joint, used to produce wide boards like drawing boards, table tops. To make the joint the edges are planed true with trying plane, butted and joined together with glue.

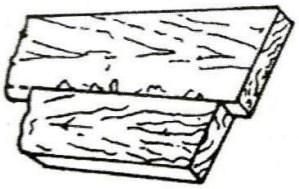

Fig 2.25 Butt joint

6. Tongue and grooved Joint:

It is a widening joint used for planks and boards. This joint is prepared by means of special plane. The tongue is fitted into the groove. Sometimes grooves are made on both the edges and a separate tongue is inserted in it. Such joint are called inserted tongue and groove joint.

7. Screw joint:

This joint is used for thick wooden pieces which do not glue readily. One piece carries the screw while the other piece has a hole for head of the screw and as lot for shank.

8. Corner joint:

Corner joint in which the butt end of one piece is joined against the other at right angles are called square corner joints.

Wood Working Machines:

1. Wood turning Lathe:

It is used for producing cylindrical, conical (tapered) and spherical components.

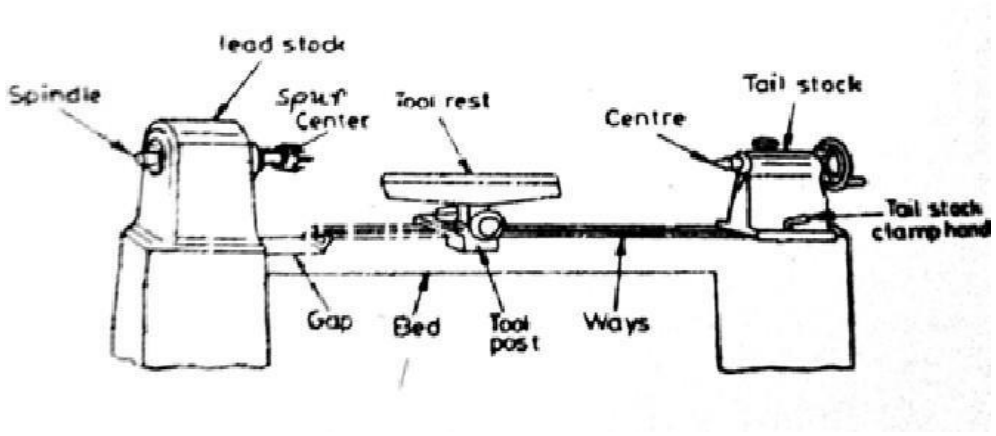

Fig 2.26 Wood Turning Lathe

A cast iron bed is fixed horizontally on the base. It supports head stock, tail stock and tool rest. Head stock is fixed permanently to the left hand end, and the head stock spindle is connected to the motor shaft by means of cone pulley drive. Tailstock is located to the right hand and can be secured rigidly at any desired position. Tool rest which supports the gauges during cutting (turning) may be fixed on the bed in the required position. The workpiece is rotated between the spur center and dead center and cutting tools supported on tool rest are manipulated by hand to obtain desired shape.

Wood Planner:

It is used for planning large work pieces and capable of producing true surface with enough accuracy at a faster rate. It consists of table over which the work is fed against a revolving cylindrical cutter head carrying 2-3 knives. The cutter is mounted on a over head raft and the table can be raised or lowered to attain desired thickness.

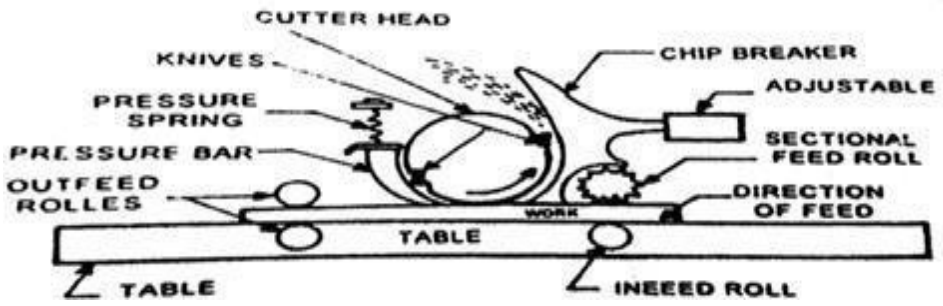

Fig 2.27 Principle of Wood Planer

SHORT ANSWER QUESTIONS

1. Draw the chisel and label the parts.
2. Explain the boring tool brace.
3. Explain the holding device bench vise.
4. Write the names of miscellaneous tools.

LONG ANSWER QUESTIONS

1. Explain carpentry processes.
2. Explain carpentry joints with sketches.
3. Explain wood working machines with sketches.