TYPES OF WOOD (Soft wood / hard wood) / MATERIAL OF CARPENTRY

Timber is the basic material used for any class of wood working and nails, screws, paints, varnishes etc are the auxiliary materials of Carpentry.

TIMBER :- Timber is the name given to the wood obtained from exogenous trees by cutting these trees after their full growth and made suitable for engineering or building purposes by sawing and converting into various commercial sizes.

When the tree is a living one, the timber is called Stationary timer, felling the tough timber and after sawing into suitable market sizes it is known as converted timber.

According to manner of growth the timber trees can be broadly classified as:-

(I) Exogenous or outward growing trees and
(II) Endogenous or inward growing trees.

(i) Exogenous growing trees :- The exogenous growing trees are those which grow outward from the centre adding almost concentric layers of fresh wood every year known as annual rings. It is this variety of trees which yields the timber suitable for building and other engineering uses. Sal, Teak, Mango, oak etc. are the example of exogenous trees.

(ii) Endogenous Trees :- The endogenous trees are those which grow inwards i.e. every fresh layer of sap wood is added inside instead of out side. These trees are known as Endogenous trees. The common example of Endogenous trees are cane, bamboo, Coconut etc.

CLASSIFICATION OF EXOGENOUS TREES

The exogenous trees are classified as (i) Conifers (ii) Deciduous trees. The conifers give soft wood and the deciduous class hard wood.

Therefore, timber for commercial purposes are divided into two classes:-

(I) SOFT WOOD (ii) HARD WOOD

(i) SOFT WOOD:- Soft woods belong to conifers which have long narrow leaves. Pine, Deodar, Chir, Kail, walnut, Semal, Toon, Spruce etc are the example of the Soft wood.

(ii) HARD WOOD:- Hard woods belong to deciduous which have broad leaves. Sal, Teak, Shisham, oak, Beach, Ash, Ebony, Mango, Babid etc. are the example of the hard wood.

CHARACTERISTICS OF SOFT AND HARD WOOD

SOFT WOOD	HARD WOOD
i) It is a resinous wood having a fragrant smell and regular texture	i) It is a non-resinous wood containing a fairly good amount of acid.
ii) It carries straight fibers and fine texture.	ii) It's fibres are quite close and compact.
iii) It is light in colour.	iii) It is dark in colour.
iv) It is light in weight	iv) It is heavier.
v) The annual rings are quite distinct in it.	v) The annual rings are not distinct in it.
vi) It has a good tensile resistance but is weak accross the fibres.	vi) It has both good tensile as well as shear resistance.
vii) It gets split quickly	vii) It does not split quickly.
viii) It is relatively weaker and less durable.	viii) It is stronger and more durable

SOFT WOOD	HARD WOOD
i) It may catch fire soon and can not withstand high temperatures	i) It has an added advantage in its refractoriness.
ii) It is easy to be worked	ii) It is difficult to be worked.

SEASONING OF TIMBER

Seasoning of timber is the process whereby surplus moisture is drawn from the green timber by evaporation, thus allowing the natural juices to harden so that the timber becomes lighter in weight, more resilient and less liable to twist and split and also retain its shape and size after being made into a piece of joinery.

THE OBJECTS OF SEASONING:- The main object of seasoning is to reduce the moisture content in the wood to the extent it is desirable so as to make it suitable for various purpose. If this excess or unwanted amount of moisture is not taken out of the wood its presence will render the wood unsuitable due to uneven shrinkage warping or twisting etc.

ADVANTAGE OF SEASONING:- The main advantages of seasoning of the wood are the following:-

1. Wood becomes hard.
2. Its resistances to shock and stresses are increased.
3. It becomes more durable.
4. Its workability is improved.
5. Its density is reduced.
6. It does not warp after seasoning
7. Shrinkage does not occur after seasoning.
8. Defects like twisting, bowing and splitting does not occur.
9. Its ability for taking up polishing and painting is improved
10. It resistance to fire is increased.

METHODS OF SEASONING

The following methods are commonly used for seasoning of timber

1. NTURAL OR AIR SEASONING:- In this method the balks of timber are stacked in a shed such that they are not directly exposed to sun and rain but a free circulation of air takes place through them. For this a platform is constructed on the ground, about 30 to 40 cm high, and is perfectly levelled at the top. Usually a layer of cinder ash or sand is put over the levelled floor so as to prevent the effect of moisture on the wood from the bottom. A proper arrangement of drainage should always be made. The shed is erected over this platform and the timber stacked. They are then allowed to undergo various temperature changes by allowing to remain under this shed for a considerably long period. The stacked balks should be periodically turned upside down so as to accelerate the rate of drying.

Due to the circulation of free air through the stack the excess moisture content in the wood is evaporated and the wood gets dried.

This method gives best seasoned wood and is, at the same time, cheapest also, but the time taken is too much i.e. 1 to 5 years. The actual time required depends largely on the type of wood and its section. Harder wood and thicker sections take more time than softer wood and thinner sections.

2. WATER SEASONING:- This process consists of ~~soaking~~ immersion of timber balks in flowing water for a period of 2 to 3 weeks. During this time the flowing water drives away the sap of the wood with it. The timber is then taken out of the water and air seasoned in the usual way. In this case the platform is made tapered instead of flat, but rest of the process is the same as described above for air seasoning.

This method takes relatively less time than the former method but the strength of the wood is reduced.

3° ARTIFICIAL OR KILN SEASONING:- This process is the quickest of all the commonly used process for wood seasoning. In this the timber balks are stacked over large trollies which are, then, driven into hot chambers or ovens called kilns. Inside these kilns the stacked balks are allowed to remain, under controlled conditions of temperature humidity, for nearly a fortnight or so. The exact time again depends upon the quality of wood and the amount of moisture it contains originally. Hot air or dry steam is pushed into the chamber wherein the temperature rises gradually. With the result, drying or evaporation of moisture from wood is slower in the beginning and it gradually increases with the rise in temperature.

This method enables seasoning at a much faster rate but the quality of the wood is inferior to that seasoned through natural seasoning. Also, this method involves more recurring expenditure.

9

TOOLS USED IN CARPENTRY SHOP WITH DIAGRAMS

Tools may be classified according their use are given below:-

1) Measuring tools 2) Marking tools 3) Cutting tools 4) Planning tools 5) Drilling or boring tools 6) Striking tools 7) Holding and supporting tools (8) Sharppening tools 9) Miscellaneous tools.

1. MEASURING TOOLS:

i) Four Fold Box Wood Rule:- It is generally 2 feet long and is folded. It is marked with inch and milli-metre scale. It is mainly used for measuring and selling out dimensions.

ii) Steel rule :- It is made up of stainless steel and is marked with centimetre scale and inch scale.

iii) Inch Tape :- It is made up of a flexible thin steel strip. It is folded around a centre pin attached with a small handle.

iv) Try Square:- It is used to draw lines at right angles, parallel or to check the trueness of planed surface. It is made up of a steel blade with ~~heavy~~ heavy base.

v) Bevel Square:- It consists of a wooden handle. A blade can be adjusted in the space of the handle and can be rotated 180 degree with respect to handle. It is used for marking various angles, Testing and comparing angles and bevels also.

2. MARKING TOOLS

i) Marking Gauge:- It is used to scribe the line parallel to and at a desired distance from a finished face or edge stock is the movable portion and can be adjusted at any position on the stem with the help of thumb screw. So are can adjust the space between the marking pin which is fastened at the stem and the stock.

ii) Mortise Gauge:- It is used to draw two parallel lines. Its working is similar to marking gauge except it has two pins. In some mortise gauges, one pin is fixed while other is movable.

iii) Compass/Divider:- It is used for drawing arc and circles. It is also used to transfer any dimensions. It consists of two legs with a spring on the top of the legs. A screw is also attached for adjustment.

iv) Scriber :- It has a sharp conical edge used to mark on even hard surface. The front edge is hardened to reduce the wear and tear. It is made up of carbon steel.

v) Pencil :- Lead pencil is generally used for marking purpose on wood.

3. CUTTING TOOLS: There are three types of cutting tools used in wood work.

(a) Those which are given a reciprocating motion by hand and carry teeth for cutting the wood i.e. ~~Saws~~ SAWS.

(b) Those which are driven into the wood by the application of blows i.e. CHISELS

(c) Those which are given a swinging action by one hand or both hands and are struck against the wood for cutting the same i.e. ADZE and AXE.

(A) SAWS:- A saw consists of a thin spring steel blade attached with a wooden handle. The front portion of the saw is called toe and the back portion is called heel.

TYPES OF SAWS

i) Rip Saw :- It is a hand saw from 30 cm to 75 cm long (length of blade). The width of blade is about 120 mm to 150 mm near the handle and 60 mm to 70 mm at the toe. It is used to cut along the grains of wood. It carries ~~8 to 10 teeth per 25 mm~~ about 2 teeth per cm length of the blade.

ii) Cross Cut Saw :- Cross cut saws are used for cutting across the grains of wood. Its blade is 50 cm to 70 cm long with 8 to 10 teeth per 25 mm. The action of the teeth is that of a series of knives which sever the fibres and force out the waste wood in the form of saw dust.

DIFFERENCES BETWEEN RIP AND CROSS CUT SAW

(1) The rip saw teeth have a greater pitch than that of cross cut saw teeth.
(2) The depth of rip saw teeth is more than that of cross cut saw teeth.
(3) Rip saw teeth have more set as compared to the setting of cross cut saw teeth
(4) For the same size of saw, a cross cut saw will have more teeth per unit length than the rip saw.

II

iii) Tenon Saw :- It has a parallel blade 25 to 40 cm long and 6 to 10 cm wide, having 5 to 8 points per cm length. Its teeth are designed as those of a cross cut saw. It is used for finer work than rip saw, panel or cross cut saw. The main use of this saw is in taking short straight cuts, such as for tenons.

iv) Panel Saw :- It is about 50 cm long with 10 to 12 teeth per 25 mm and is very much like the cross-cut saw. It has a finer blade and is used for fine work, mostly on the bench. This is often used for ripping as well as cross cutting. The teeth have slightly more hook than those of a cross-cut saw.

v) Compass Saw :- It is used for sawing small curves in confined spaces and has a narrow tappering blade about 25 cm to 40 cm long, fixed to an open-type wooden handle. There are two types of compass saw, one having a fixed blade and the other with three interchangeable blades of different widths

vi) Keyhole or Pad Saw :- This is the joiner's smallest saw, the blade being about 25 cm long. The blade of the keyhole saw is secured to the handle, through which it passes, by two screws. This arrangement allows the blade to be adjusted to the best length required according to the work. This saw is used for cutting key holes or starting of any interior cuts.

vii) Bow Saw :- The bow saw consists of a narrow blade, 25 to 35 cm long held in a wooden frame. The blade is held in tension by twisting the string with a small wooden lever. These saws are used for cutting quick curves, and, as the handles revolve in their sockets. The blade can be adjusted to any desired position when in use.

viii) Dovetail Saw :- A smaller version of the tenon, this saw is used where the greatest accuracy is needed and fine shallow cuts are to be made. The number of teeth may be from 12 to 18 per 25 mm, while the length may vary from 20 to 35 cm.

B. CHISELS :- Chisels are used for cutting in different manners to produce desired shapes and cavities in the wood. The common types of chisels used in carpentry work are the following.

i) Firmer chisel :- It is a general purpose chisel and is used for taking wider cuts and finishing flat surfaces inside the grooves. It carries a wide blade, the common widths varying from 3 mm to 8 mm at the cutting edge. The blade has a rectangular cross-section such that the longer side of the rectangle represents the width and the smaller side the thickness of the blade at that point.

ii) Mortise Chisel:- It is used for taking heavy and deep cuts resulting in more stock removal, as in case of making mortises. It is available in various assorted sizes, the maximum width of blade ~~blade~~ in commonly used chisels upto 15 mm. The blade thickness varries from 6 mm to 15 mm.

iii) Dovetail Chisel:- It has a long carbon steel blade with bevelled back. The bevelled shape enables reduction of blade thickness on the sides due to which it can enter sharp corners to finish them. Such a requirement usually occurs in case of dovetail joints and other 'V' grooves.

iv) Gouge chisels:- It is used to finish curved curved surfaces ~~and~~ and holes. Moreover, it is also used in turning the wood on lathe. It carries a hollow curved blade. Gauge chisels are of two type - i.e. Inside gauge and out side gauge.

C. AXES

i) Axe:- It is a cutting tool made of carbon steel. The cutting edge is formed by bevelling both sides of the axe. It is employed for splitting wood along the grains for rough work.

ii) Side Axe:- It has one side plane and the other is bevelled to form a cutting edge. It is used for making the surface roughly plane.

iii) Adze:- It has outer face convex, inner face concave and edge is bevelled to form a cutting edge. It is used to remove the thick chips.

4. PLANNING TOOLS:- This category of wood working tools includes various types of planes - spook shave and knives etc. The common types of planes used in ~~Carpent~~ Carpentry work are the following:-

i) Wooden jack plane:- It is the commonest and is used for the first turning - up of a piece of wood. It consists of a block of wood into which the blade is fixed by a wooden wedge. The blade is set at an angle of 45° to the sole.

on the cutting blade another blade is fixed called cap iron or back iron. This does not cut, but stiffens the blade near its cutting edge to prevent chattering and partially breaks the shaving as it is made. It is the back iron which causes the shavings to be curled when they come out of the plane. Some types of planes do not have a cap iron. Jack planes are obtainable from 350 to 425 mm in length and with blades 50 to 75 mm wide.

ii) Trying Plane :- It is nothing but a longer wooden jack plane. The length of its stock varies from 50 to 76 cm and the cross-section is equal to that of jack plane body. It is applied after the surface has been planed by a jack plane in order to make it a true flat surface. The iron cutter used in this plane is about 6 cm in width.

iii) Smoothing Plane :- The smoothing plane is similar in action to a jack plane, except that it is set to cut a much thinner shaving. ~~A Smoothing~~ A smoothing plane, as its name indicates generally is used for smoothing or finishing after a jack plane. The cutting edge of the jack plane is slightly curved, but a smoothing plane has a straight cutting edge. It is 200 to 250 mm long having a blade of 70 mm wide.

iv) Rebate / Rabbet plane :- It is used for planing into corners and against perpendicular surfaces. Its size is determined by the width of the blade.

v) Plough plane :- It is a type of moulding plane and is used for cutting grooves of different shapes and sizes on the edges.

vi) Router plane :- It carries a chisel-like blade and is used for ~~planning~~ planing the bottom surfaces of small grooves and other depressions. The blade can be adjusted to cut at different depths below the face of the plane.

vii) Circular plane : It carries a flexible bottom face made of steel which can be adjusted to any curvature to plane different sizes of convex and concave surfaces.

viii) Spoke-Shave :- This is a form of small plane used for cleaning up quick curves. Spoke shaves are two types, one which has a flat sole for outside curves and one which has a curved sole for inside curves. Now a days, spokeshaves are made of iron, and some have a screw adjustment for the amount of cut.

ix) Iron Jack Plane :- It is also used for the same purpose as a wooden jack plane, but it gives a better finish than the latter. Its whole body is made of cast iron, provided with a wooden handle at the back and a wooden knob at the front for holding it by both hands. Both these wooden parts are fastened to the body of the plane by means of long screws passing through them. This plane, obviously, carries a more rigid body than the wooden plane and has longer life than the latter, but is equally costly also. It is also available in different sizes.

x) Rasp file :- It is a finishing tool used to make the wood surface smooth, remove sharp edge, finishing fillets and other interior surfaces. Sharp cutting teeth are provided on its surface for this purpose. This file is exclusively used in wood work only.

5. BORING OR DRILLING TOOLS :- Boring tools are used to produce holes in wood and some commonly used tools for this purpose are the following:

i) Auger :- It consists of a steel bar carring a fluted body for about half of its length from the bottom. At the end of the flutes, that is at the bottom of the tool, is provided a screw point which acts as a pilot and helps centring the tool. The upper portion of the bar is left plain and its top end forged to form an eye through which a wooden handle passes. It is available in different sizes to produce holes upto 25 mm diameter.

ii) Gimlet: It is a smaller form of auger for producing relatively smaller holes. It consists of a spiral fluted

body to the top of which is filled a wooden handle. It is held in both hands in operation and used in the same way as an auger.

iii) Ratchet brace :- The Ratchet brace consists of a crank, a head, a ratchet and a chuck for holding the drill. The Ratchet arrangement is provided just above the chuck i.e., when the crank is rotated in the reverse direction, the chuck and the bit does not rotate in the reverse direction. During its operation, the head is pressed with one hand and the crank is rotated by the second hand. It is used for holding turning a bit for boring holes.

IV) Hand Drill :- Hand drill consists of a spindle, drill chuck, crank, handle and two bevel gears. Bevel gears are filled on the body. Drill is held in chuck and rotation to spindle is given through gears with the help of a crank. In this operation, handle is pressed downwards with one hand and the crank handle is rotated by other hand. Due to this bit rotates which is gripped in the jaws of the chuck and the hole is drilled.

6. HOLDING ~~TOOLS~~ & SUPPORTING TOOLS :- This category includes those tools which are either used to hold or support, or both, the job while other operations are performed on it. The common tools used for ~~His~~ these purposes include the following:

i) Work Bench : It is a heavy table of rigid construction made of hard wood, about 150 to 180 cm in length and nearly 90 cm in width. two or four carpenter's vices are filled on opposite sides to hold the jobs during the operations.

ii) Carpenters vice or bench vice : It is provided on the work bench. One jaw of the vice is secured to the table and the other is kept movable. The movable jaw is mounted on a screw which carries a handle outside. The screw works inside a fixed half nut which can be engaged or disengaged as needed. When it is engaged,

The jaw movement is effected by rotating screw. This tool is used to hold the jobs during operations.

iii) Bench Hook :- It is made of wood and can be suitably placed any where on the table top. It is used for supporting the work during the operation.

iv) Bar Cramp :- It is made of a steel bar of rectangular section, with malleable iron fittings and a steel screw. This is used for holding wide work such as frames or tops.

v) 'C' clamp :- It is used for smaller work. It consists of a malleable iron frame that can be swivelled and a steel screw to which is fitted a Thumbscrew.

7. STRIKING TOOLS :- Striking tools include hammers and mallets. Main string tools are as under :-

i) Claw Hamer : It is used for striking as well as for pulling the nails from the wood. The claw face is used for pulling out the nails and head face is used to drive the nails. It is made of cast steel.

ii) Cross Pean Hammer : It has a cast steel body and a wooden handle. Body has two parts: face and pean. In cross pean hammer, the pean is in the form of a narrow-round edge ridge placed at right angle to the axis of the handle.

iii) Mallet :- It is used to strike the chisels that have wooden handles. It is made up of a hard wood and is round or rectangular in shape.

8. SHARPENING TOOL :- After constant use for a long time the saw teeth, chisels and iron cutters become blunt and needed resharpening. The common Sharpening tools used in Carpentry are the following.

i) Triangular file :- It is used to give required depth and angle and make the teeth sharp of saws.

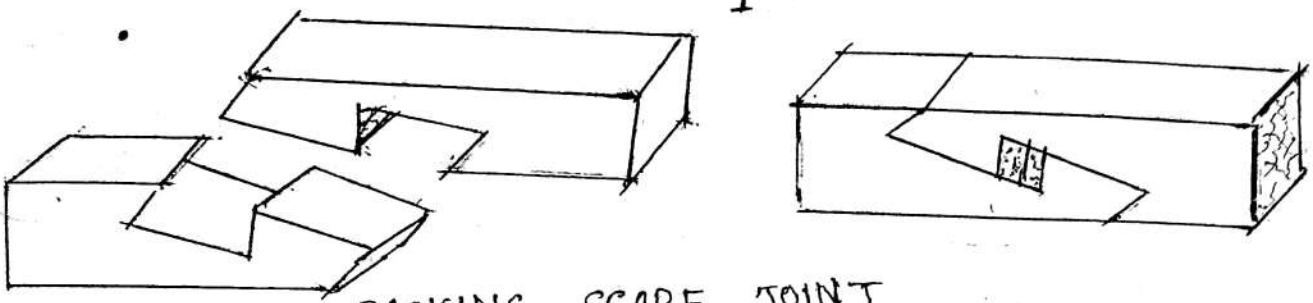
ii) Water Stone :- As soon as chisels and cutters get blunt. They are held at the correct angle on a water stone and moved to and fro, to sharpen the cutting edge of chisels and cutter using water.

9. MISCELLANEOUS TOOLS :- There are many other tools used in wood work, which do not fall in any of the above categories. A few commonly used of these are the following:

i) Screw driver: It is used for driving the wood screws into the wood or unscrewing them. Since screws are quite frequently used for fastening wooden parts and other fittings, this tool is equally required.

ii) Pincer: It is made of steel having a hinged joint. The two jaws are bevelled inside and their other surfaces are plain. Thus the contact surfaces of the two jaws have a sharp edge. Its main use is in pulling out small nails from wood.

1.



RACKING SCARF JOINT

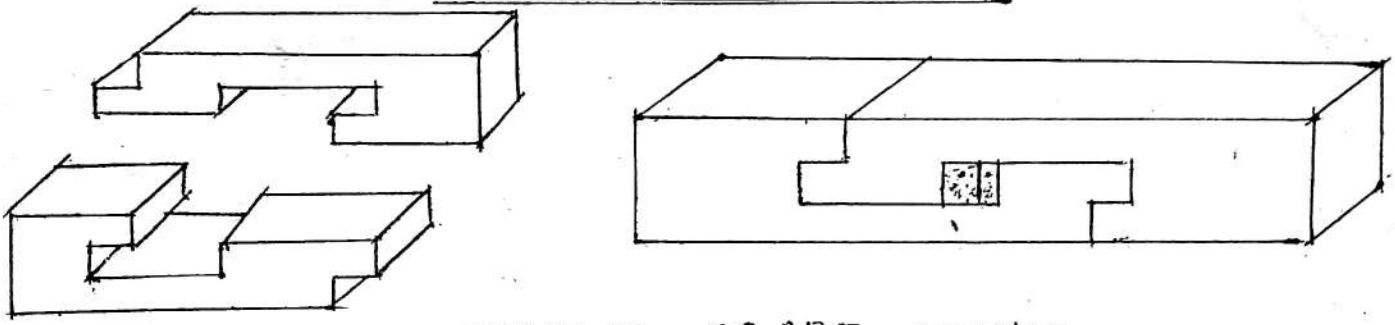
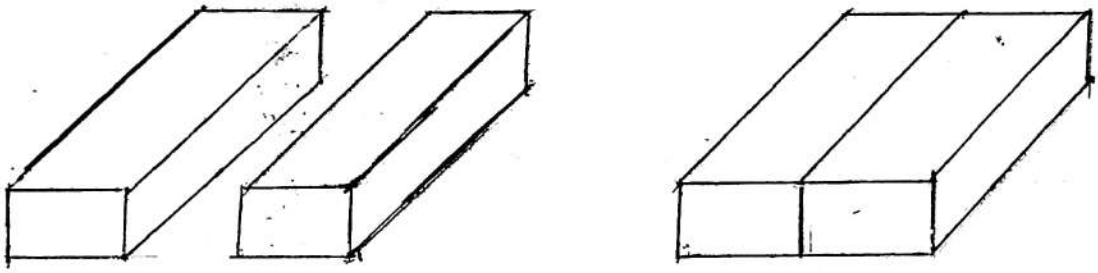
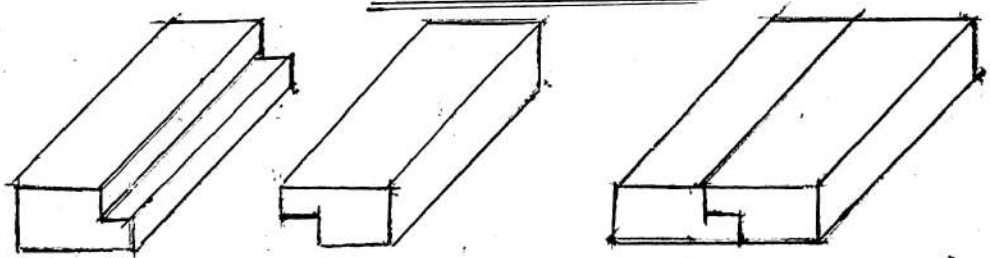


TABLE SCARF JOINT

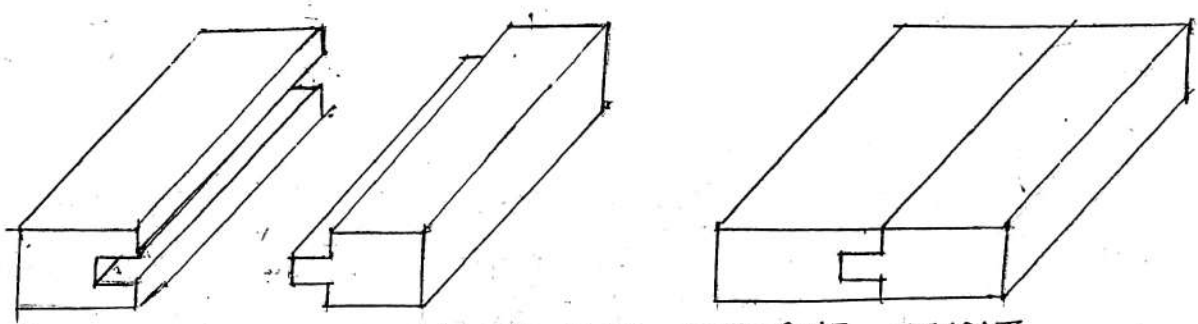
2.



GLUE JOINT



RABBET JOINT



GROOVE AND TONGUE JOINT

19

49.

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CLASSIFICATIONS OF JOINTS

The various joints used in wood-work can be classified as

1. Lengthening joints :- These joints are used for joining small lengths of wood-pieces end to obtain large lengths. i.e. Racking scarf joint, Table Scarf joint etc.

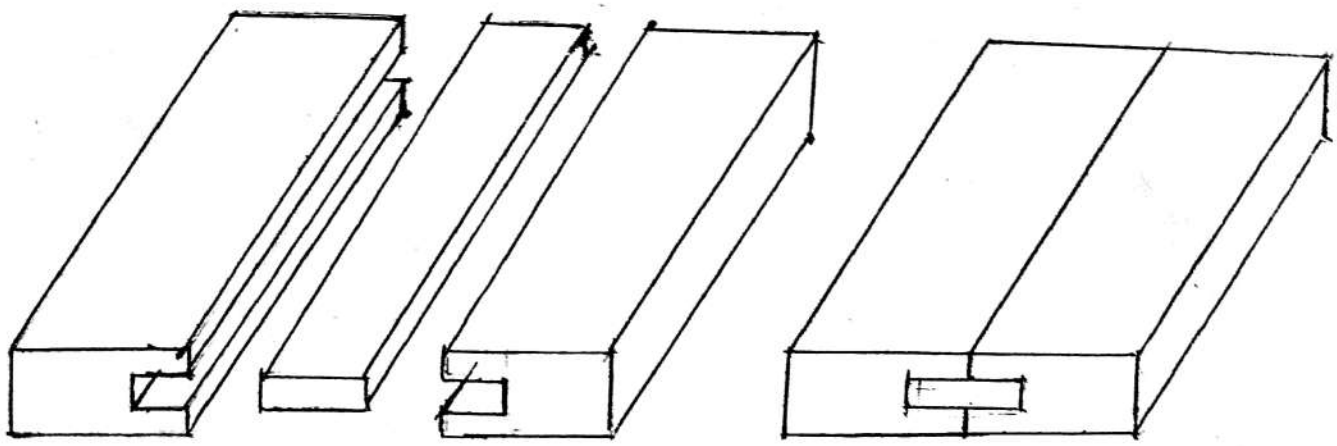
2. Widening joints :- These joints are used fore joining wood pieces among their sides in order to obtain increased width. e.g. Rabbet joint, Groove and tongue, Glue joint, Dowel joint, Matched joint. etc.

3. Framing joint :- These joints are used to connect wood pieces at desired inclinations and are commonly employed in framework. eg., mortise and tenon joint, 'T' bridle joint, lap dove-tail joint (dovetail-tail halving) cross half lap joint etc.

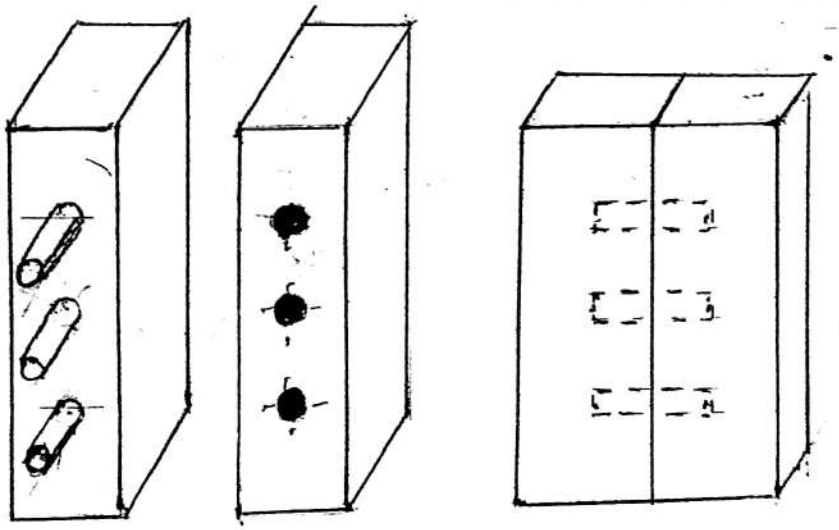
4. Box joint :- These joints enable joining of wooden planks and scantlings at desired inclinations, so as to obtain box-shaped structures and wooden cases. e.g. Common dove-tail joint, Lapped dove-tail joint, mitre & rebated dove-tail joint, mitred dove-tail joint etc

5. Circular joints :- These joints are used for connecting wood pieces to foran a hollow cylindrical

Opening

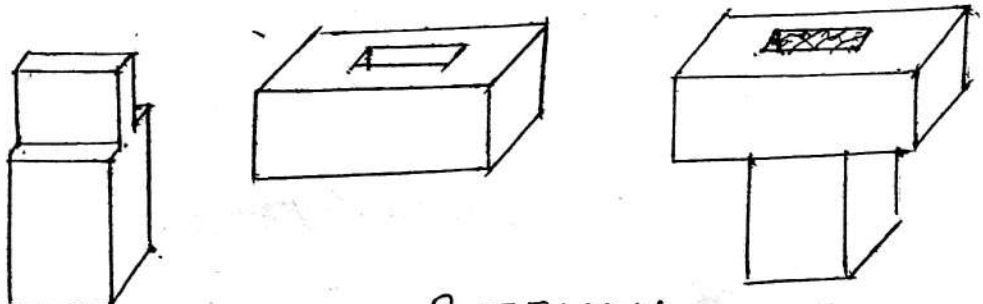


MATCHED JOIN



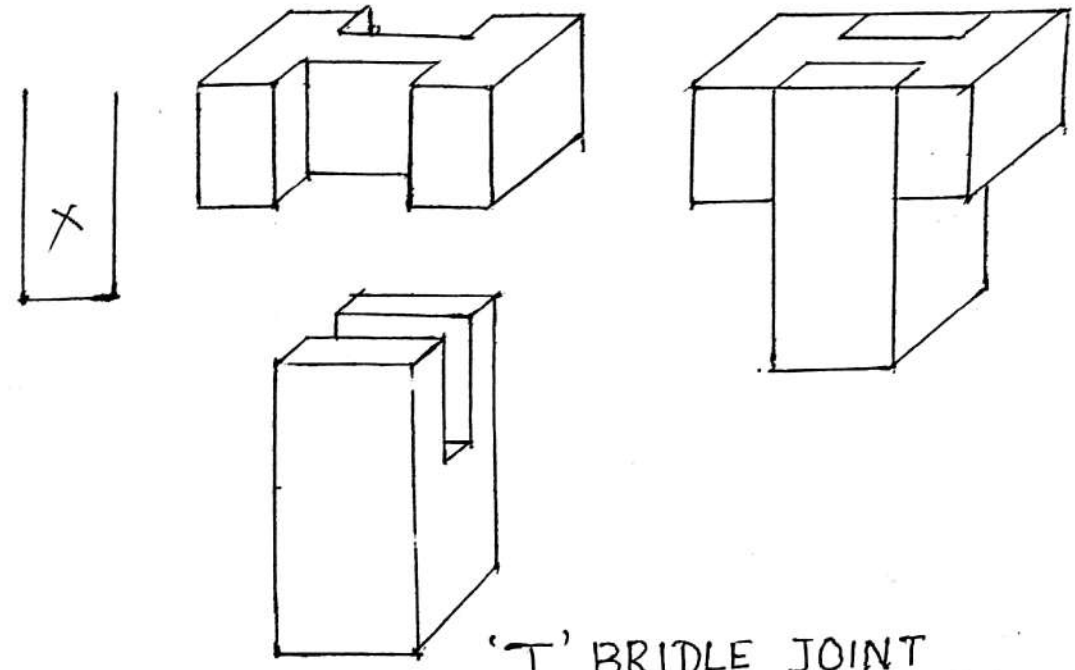
DOWEL JOINT

3. FRAMING JOINT

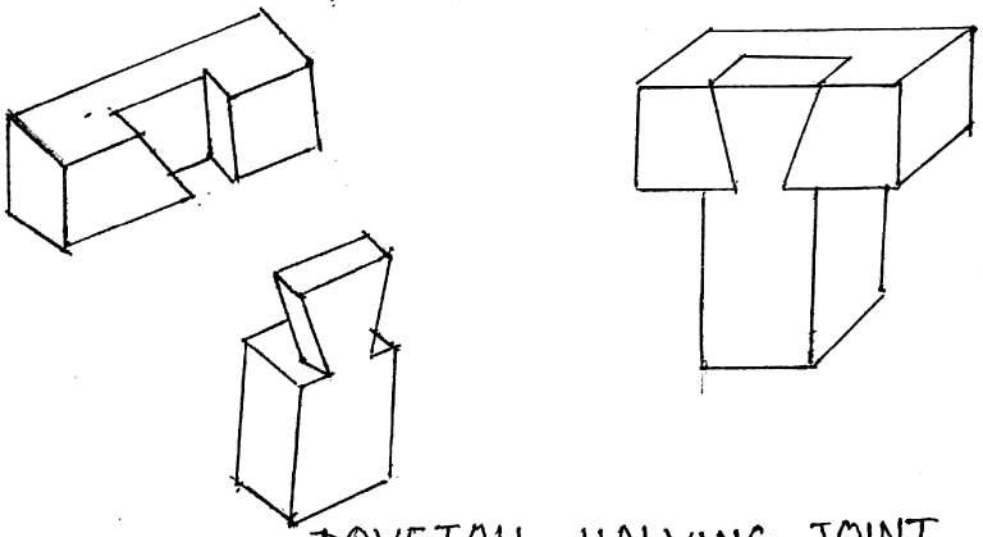


MORTISE & TENON JOINT

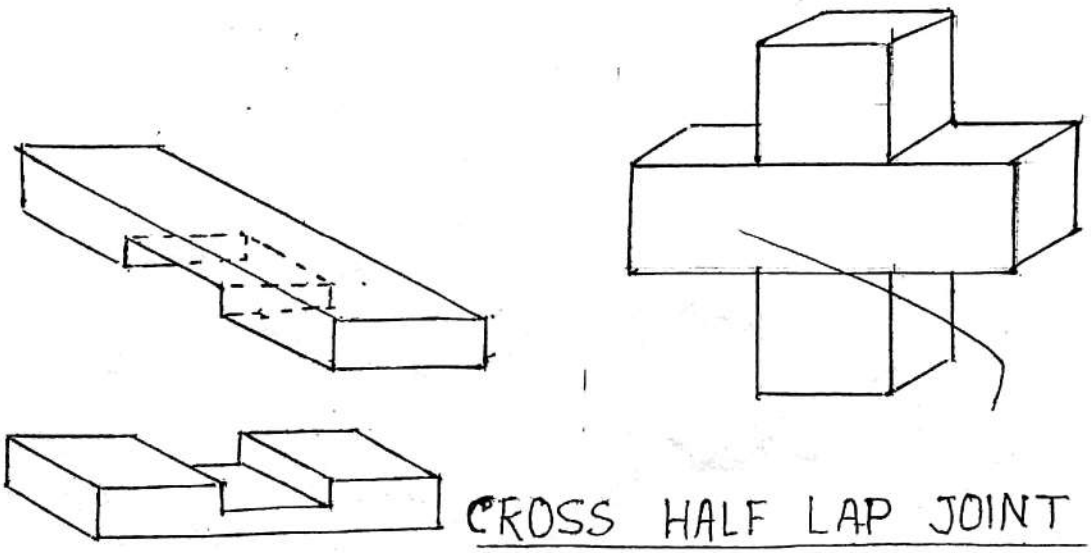
structure. The joints commonly used for this purpose are Bevelled joint, Coopered joint etc.



'T' BRIDLE JOINT

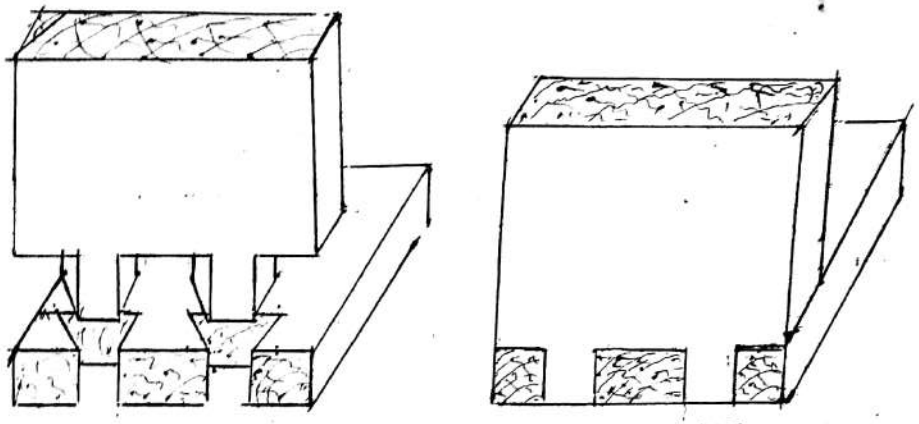


DOVETAIL HALVING JOINT

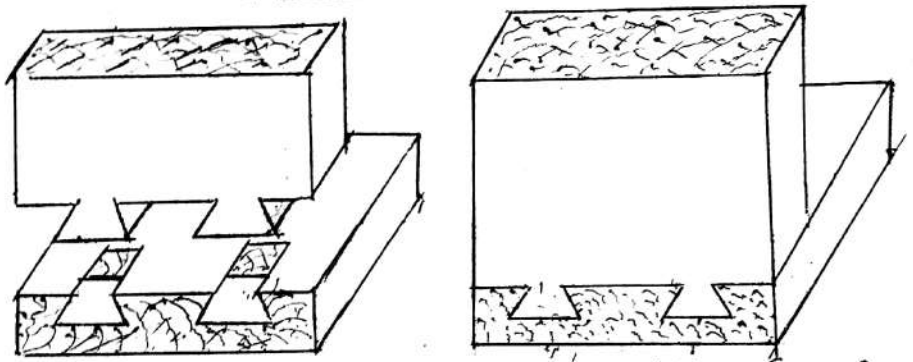


CROSS HALF LAP JOINT

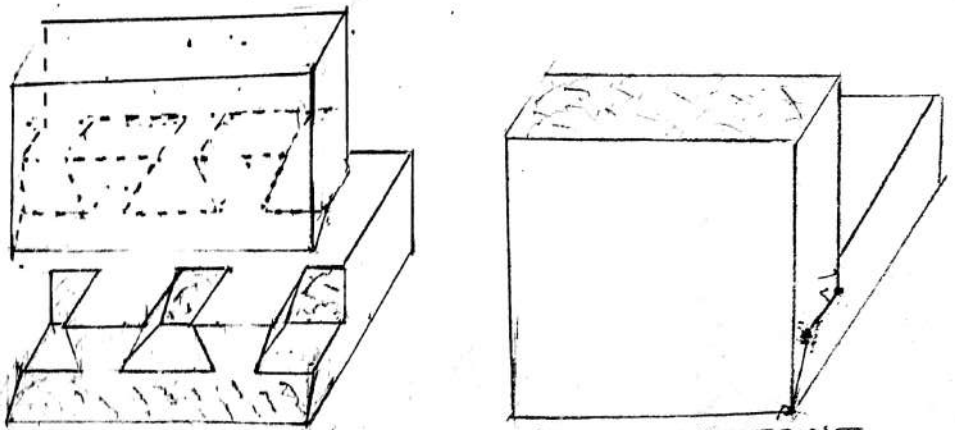
4. BOX JOINT



COMMON DOVETAIL JOINT



LAPPED DOVETAIL JOINT (BOX)



MITRE & REBATED DOVETAIL JOINT

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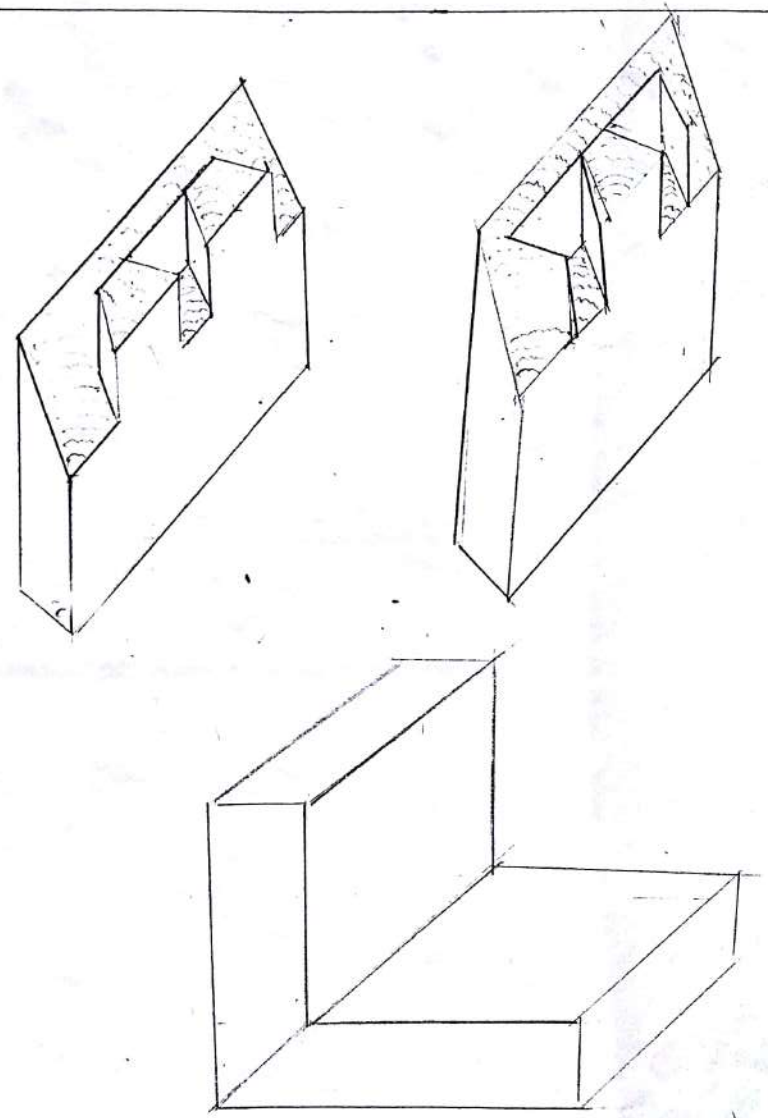
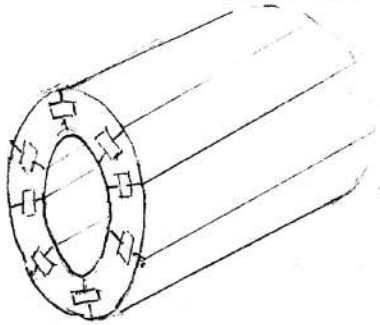
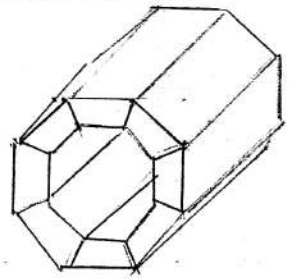


MITRED DOVETAIL JOINT.
OR
SECRET DOVETAIL JOINT.

5. CIRCULAR JOINT



COOPERED JOINT



BEVELED JOINT

~~THE END~~

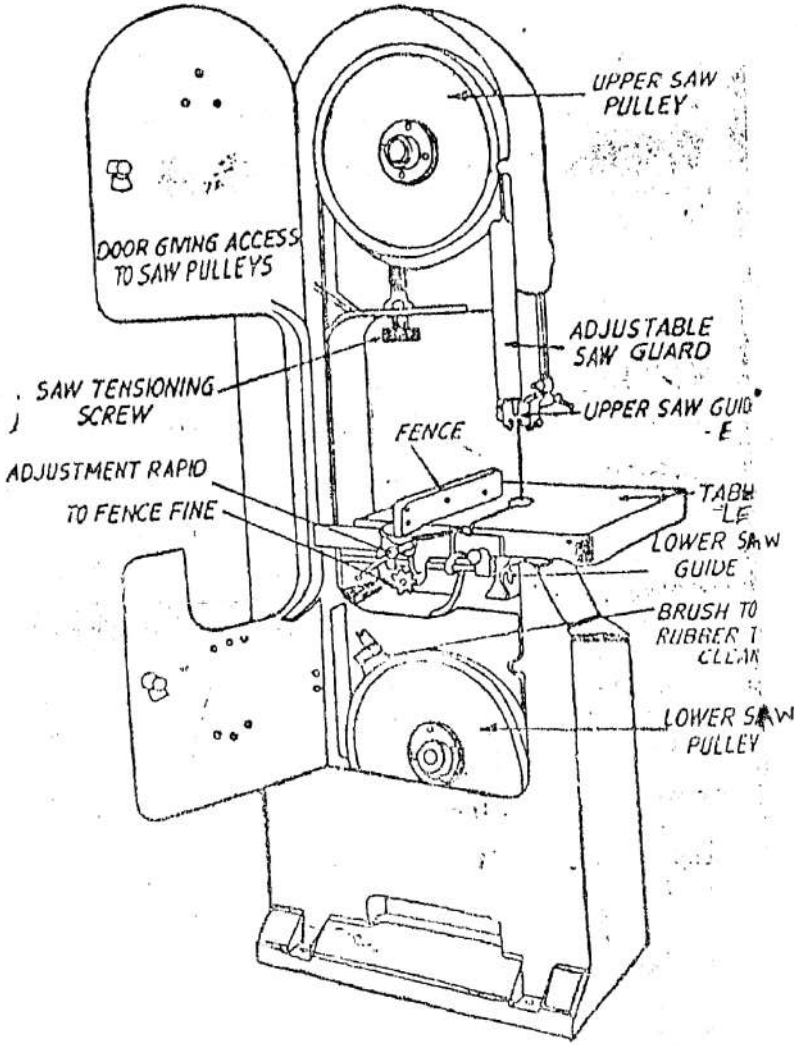


Fig. 8·4. A band saw.

WOOD WORKING MACHINES

BAND SAW :- There are different sizes of band saw. The smaller and lighter designs are used for recutting previously sawn planks to required smaller sizes and other light production work. The heavy duty band mills are specifically designed for mass cutting of heavy logs to required lengths and sawing them to standard market sizes. Bench type smaller band saws can be used for cutting curved and fine straight line work.

It essentially consists of a heavy cast bed, which acts as support for the whole machine, a column, two wheel pulleys, one at the top and the other at the bottom, an endless saw blade called band, a smoth steel table and the guide assembly.

The saw band revolves on the two wheels of which both are of the same size. The upper wheel is mounted on the goos-neck arm of the frame and is adjustable both vertically as well as forward and back-ward. This vertical adjustment is required for provi-ding proper tension to the saw blade and also to accomodate shorter blades. The lower wheel can not be adjusted. Both the shafts, carrying upper and lower wheels are mounted in roller bearings in the frame. The wheels are generally made of cast iron, the rims being provided with rubber tyres to prevent slipping of blade.

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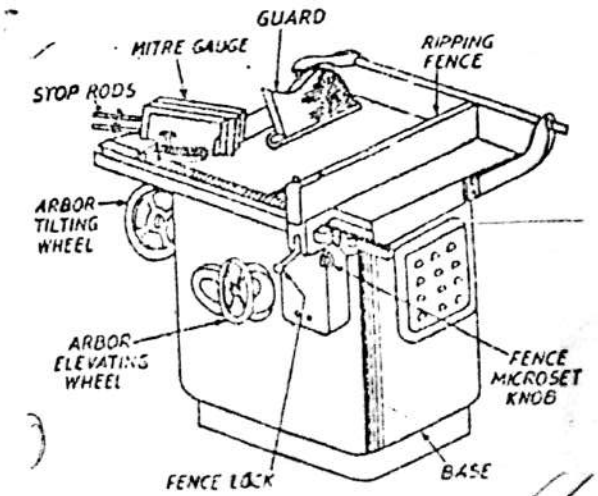

Fig. 3·2. Circular saw.

a soft throat plate with a slot inside to allow the blade to pass through it. Two guides are provided on the machine, one above the table and the other below the table to keep blade straight and true during the operation and thus prevent in from buckling and running off the wheels. The guide mainly consists of two hardened steel guide plates or jaws between which runs the blade, and a wheel which runs about its axis when the back of the blade is forced against it. The upper guide is adjustable in a vertical direction. It is attached to a guide post which can be moved up or down according to the need, depending upon the thickness of the stock to be sawn.

CIRCULAR SAW :- This machine is primarily designed for ripping and cross-cutting the wood, more over Other operations like grooving rebating tenoning chamfering, bevelling tapering, mitring and splining etc. can be successfully performed on this machine. There are different sizes of Circular saw machines. The most commonly used Saws includes the universal saw, variety saw and the bench saw. Universal Saw has two arbors which can be adjusted separately to make different cuts. Against this the variety saw has only one, on which different blades can be inter-changed. Some saws are belt or gear driven, whereas others carry a direct driven i.e. the circular

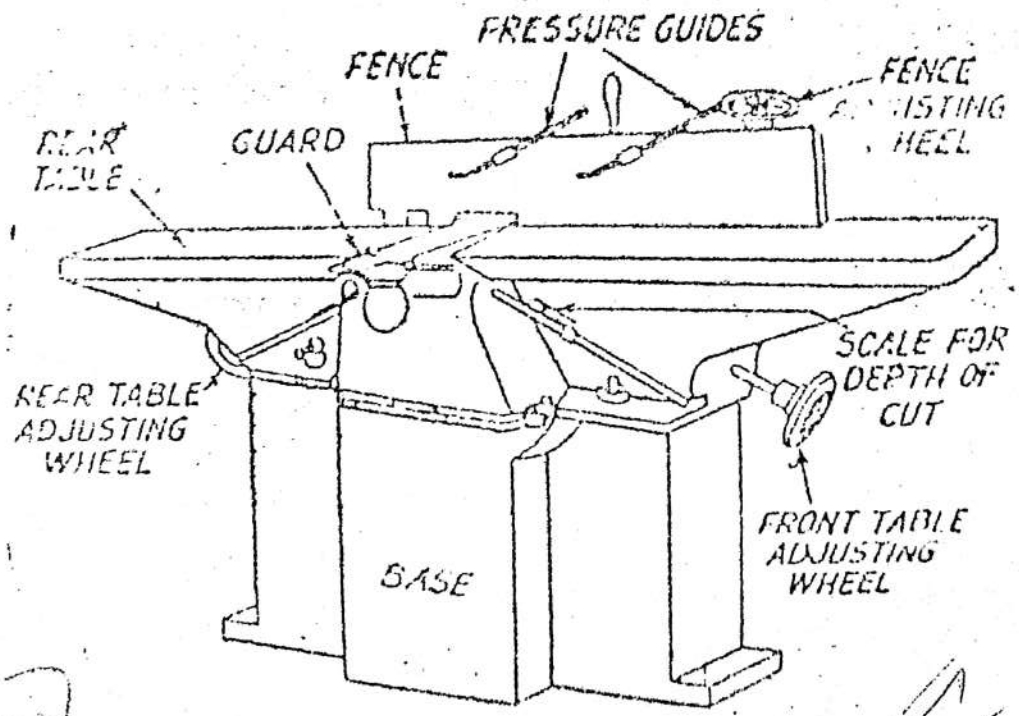

Fig. 8·14. A Jointer or hand planer.

blade is mounted on the extension of the rotor of the electric motor itself.

Its principal parts include the frame, arbor, table, blade, cut-off guide, fence and guard.

Tables of some saws are made in pieces and joined together. Some tables are made solid and are equipped with throat plates through which the saw blade projects outside. With such tables several throat plates are required to accommodate different sizes of blades.

Formerly circular saws were made having tilting type tables to enable cutting at different angles. The ~~mordo~~ modern practice is to have tilting type of arbor. The table remaining horizontal always. This facilitates ease to the operator in manipulation of the work. The fences provided on all circular saws are the ripping fence, cross cutting fence and mitring gauge.

JOINTER OR HAND PLANER:- A jointer is a power driven machine. It is capable of producing a true surface with enough accuracy and speed. It is particularly useful in straightening the warped surfaces of wooden plank, joining edges of boards to be glued, squaring surfaces, bevelling, chamfering and general straight planing work.

The principal parts of a jointer are heavy cast iron base, front and rear tables, cutter head, fence and safety guard. The ~~work~~ is fed mainly over the cutter

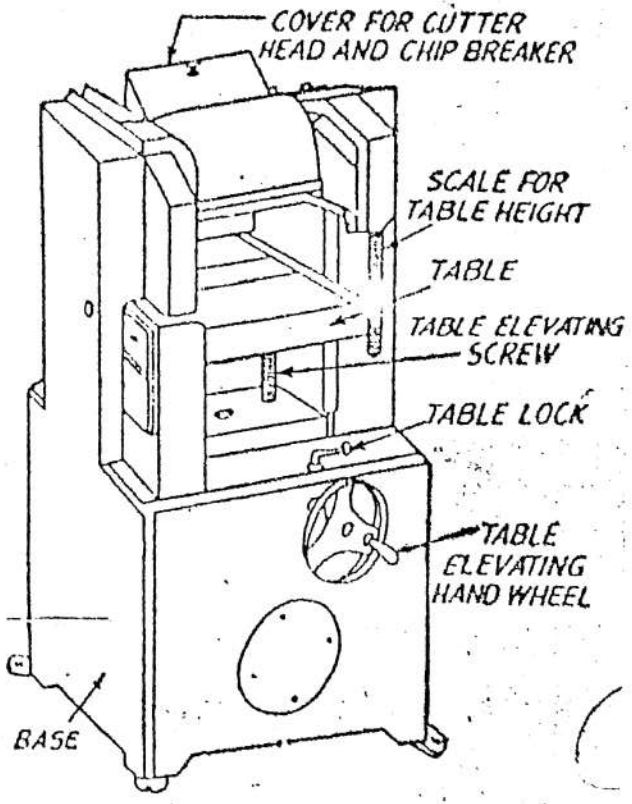

Fig. 8·11. Thickness planer.

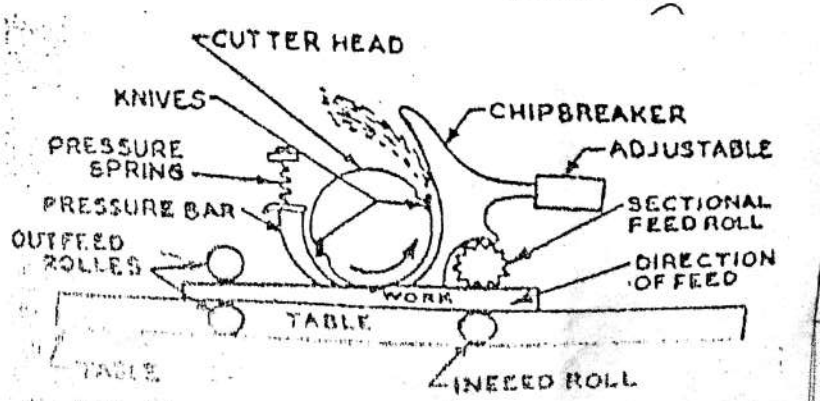

Fig. 8·12. Planer adjustment and work feeding mechanism.

head. The cutting action is provided by the revolving cylindrical cutter head carrying 2 or 3 knives. In order to obtain a smooth surface the work should be fed very slowly. Commonly employed speeds of the cutter head range from 3,600 to 6,000 rpm. The size of this machine is determined by the maximum width of cut it can make and is equal to the length of knife. The common sizes range from 10 cm to 90 cm.

THICKNESS PLANER :- The thickness planer is a machine in which wooden planks and boards are planed evenly to a desired thickness. Such planers are manufactured in two varieties viz. single surfacers and double surfacers. A single surfacer has only one cutter head and cuts from the top side only. Thus, a board or plank to be planed has to be fed twice, once to plane its one side and then the other. The double surfacer carries two cutter heads; one cutting from the top and the other from the bottom of the stock thus finishing both sides in a single operation. Generally smaller and medium size are manufactured as single surfacers and the heavy duty type or larger sizes as double surfacers.

The principal parts of a planer are frame, table in-feed and out-feed rollers, friction rollers, cutter-head, chip breaker, pressure bar, table elevating screws and various controls for speed and feed. A scale called thickness scale, is fitted vertically on the frame on one

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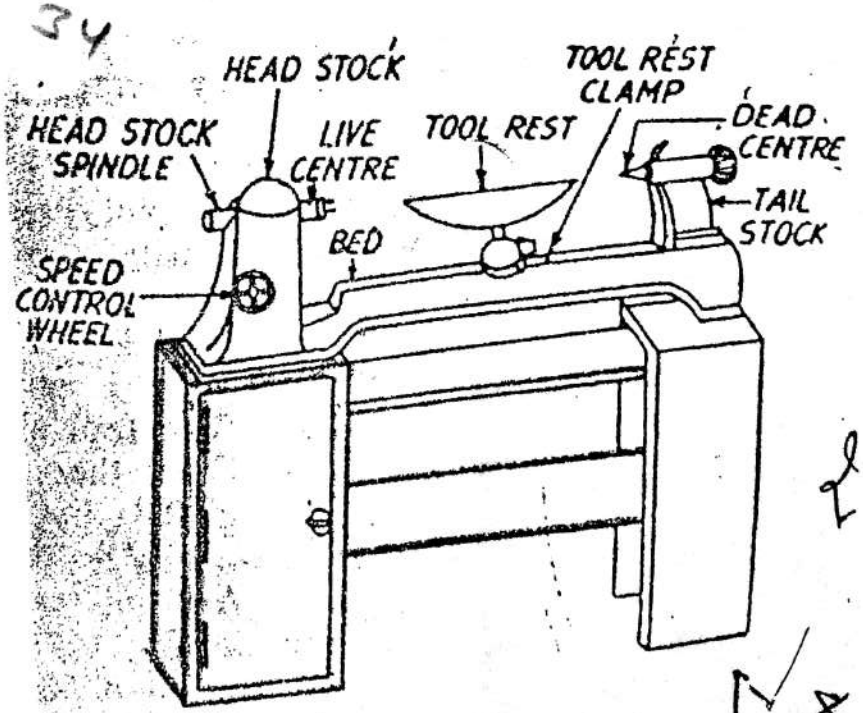


Fig. 8·5. Wood turning lathe.

side of the table to read and adjust table height for required thickness of the stock.

Before starting the operation the board is checked for nails and knots etc; table adjusted at required height for thickness and board fed into the machine. The cut should not exceed 3mm in a single pass. As the stock is pushed forward it is gripped between the sectional feed roll at the top and the smooth cylindrical feed roll inside the table. They feed the stock further themselves requiring no external pushing. As the stock is fed further it comes in contact with the chip breaker, which holds it down firmly against the table and prevents the chips from tearing the stock surface. The cutter head revolves in a direction opposite to that of the feed of the stock, removes excess stock and planes the top surface of the advancing plank. After passing under the cutter head, the pressure bar presses against the planed surface of the advancing stock and holds it down firmly against the table to prevent chatter. Finally, the planed stock is carried away by the outfeed rolls.

WOOD WORKING LATHE:- It is one of the oldest types of wood-working machines which still justifies its existence in the modern workshop. It essentially consists of a cast iron bed, a head stock, tail stock, tool rest, live and dead centres and a speed control device. The whole unit is mounted on a wooden or metal frame. The drive in all

Genius

modern lathes is individual and is contained in the frame the motor being mounted on a base inside the frame. A cone pully on the head stock Spindle is connected by a belt to a similar cone pully on the motor shaft. The bed carries horizontal ways at its top on which the tail stock and tool rest move. They can be clamped at any desired place along these ways. Some very costly designs incorporate a variable speed motor in their head stock. The work piece is either clamped between two centres, the live centre on the head stock Spindle and the dead centre in the tail stock, or on a face plate. The operation done in the former case is known as turning between centres whereas in the latter case it is known as turning on a face plate. The Size of the lathe is designated by (i) The maximum length of the job that can be turned between centres and (ii) The Swing i.e., the maximum diameter of the work piece that can be turned

AUXILIARY MATERIALS USED IN CARPENTRY

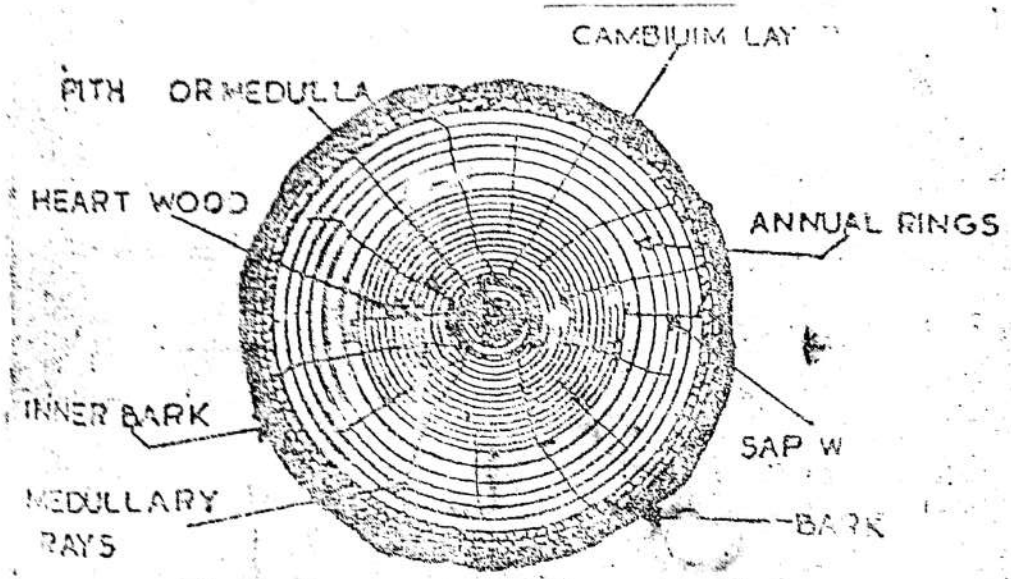
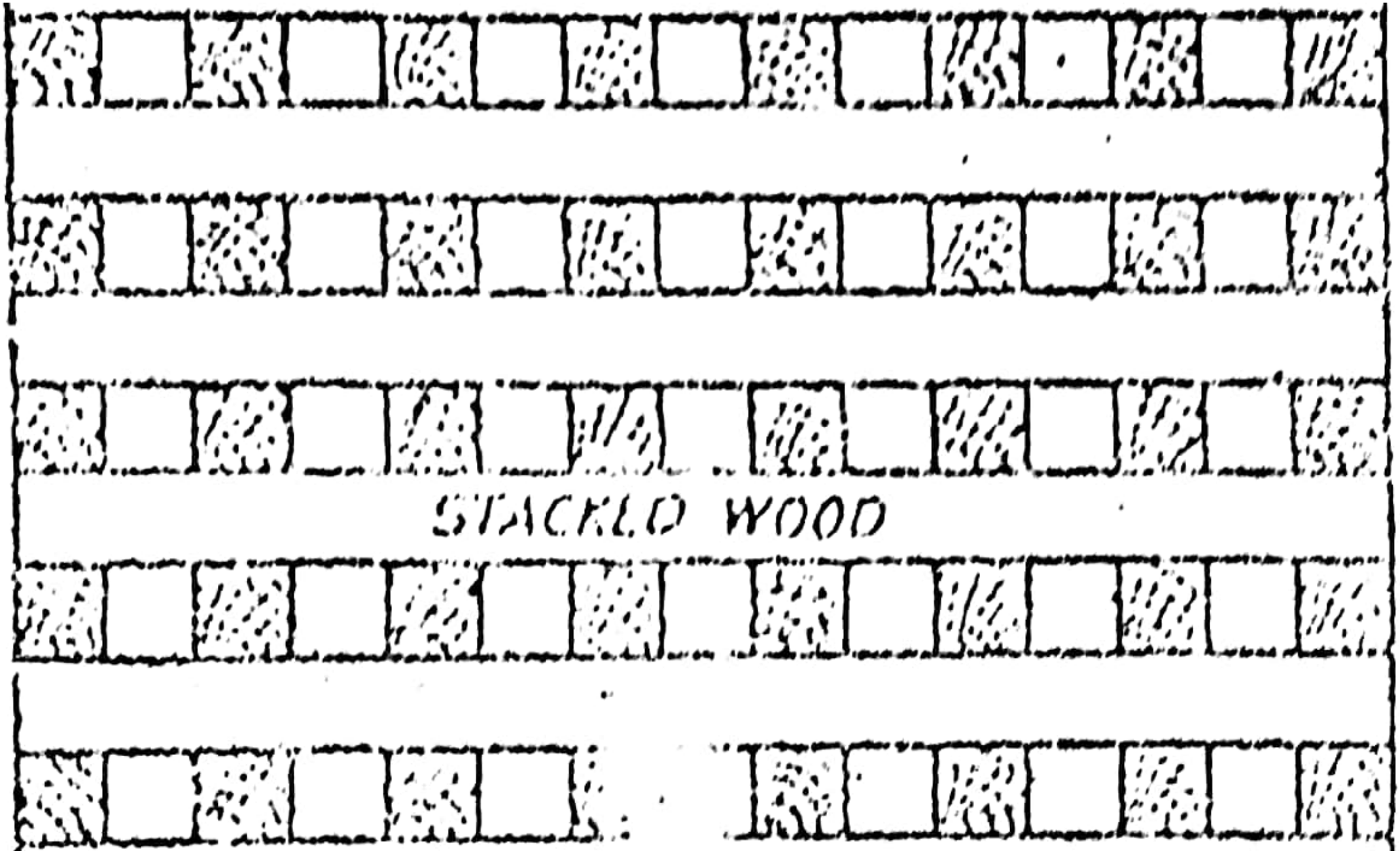


Fig 5.1. Cross-section of an exogenous tree.



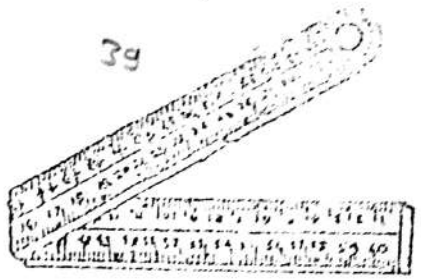


Fig. 6·1 Folding rule.

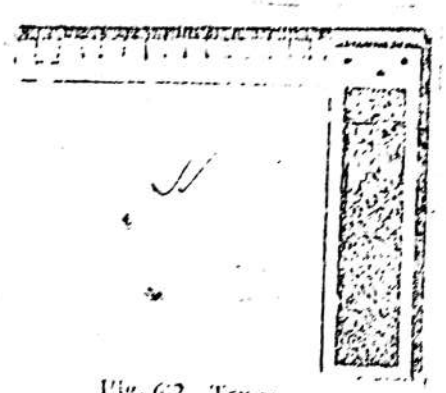


Fig. 6·2. Try square.

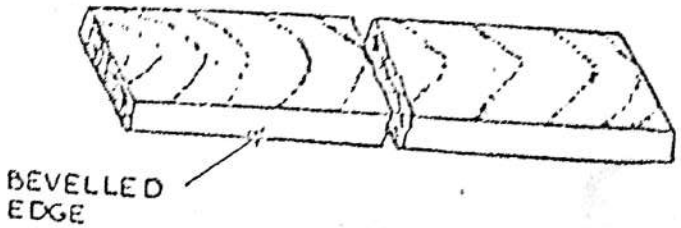


Fig. 6·3. Straight edge.

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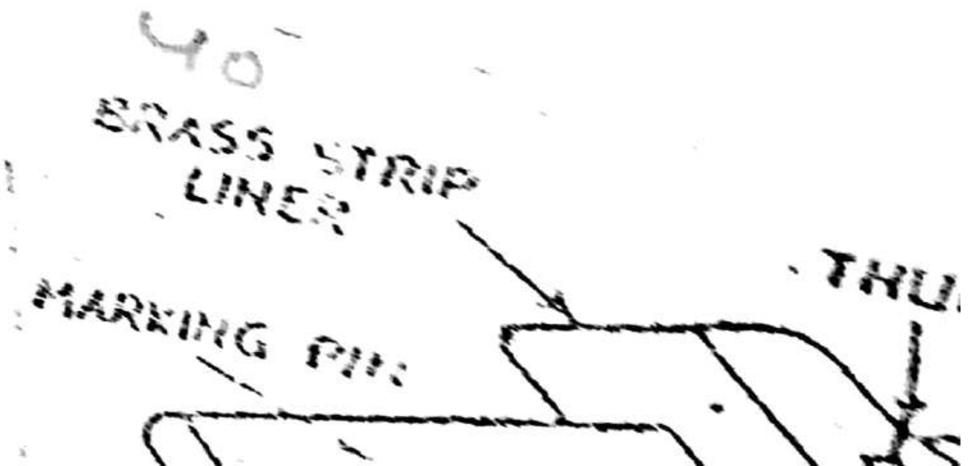
Fig. 65.



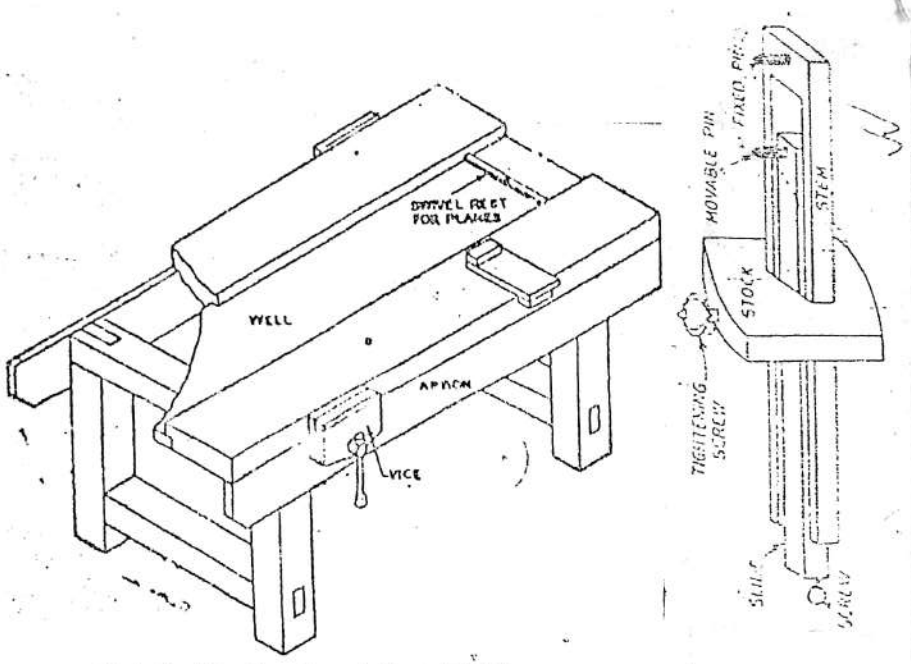


Fig. 6·8 Carpenter's work bench.

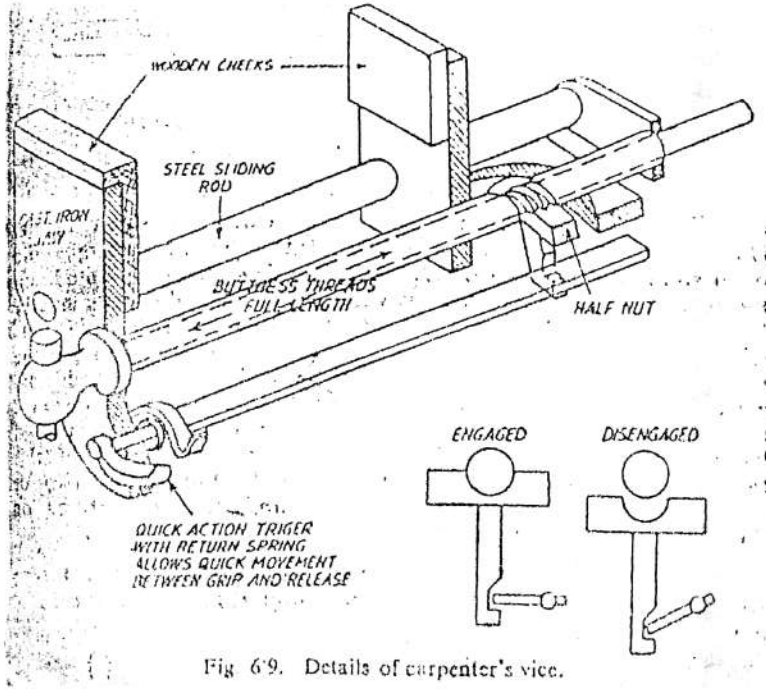


Fig. 6·9. Details of carpenter's vice.

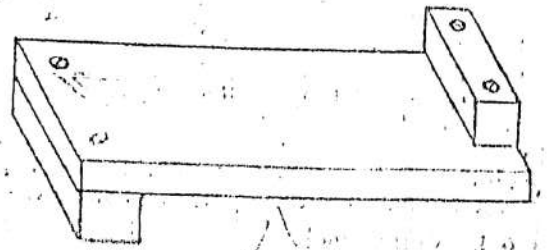


Fig. 6·10. Bench hook.

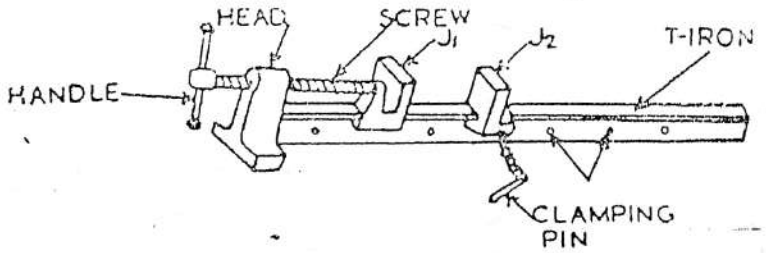


Fig. 6·11. Bar cramp.

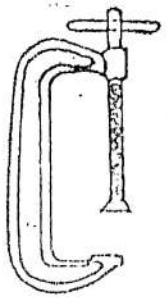


Fig. 6·12. C-clamp.

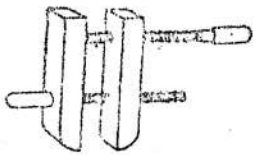
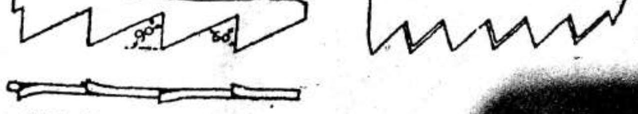
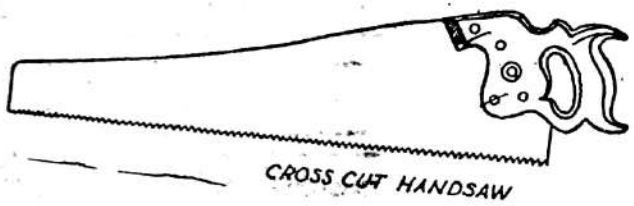


Fig. 6.3. Hand screw

RIP SAW



RIP SAW TEETH



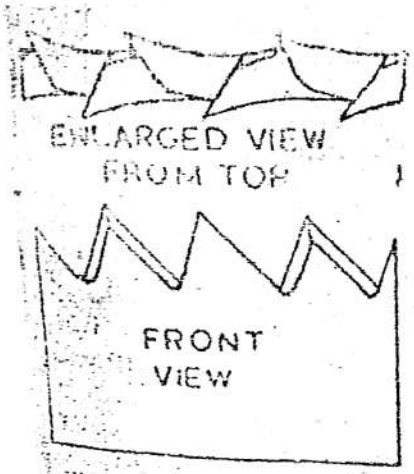


Fig. 6·14. Cross-cut saw teeth.

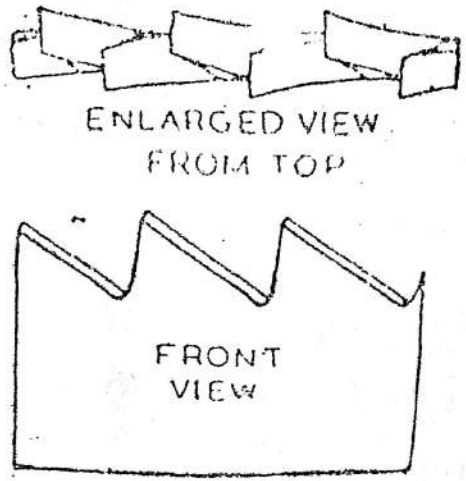


Fig. 6·15. Rip saw teeth.

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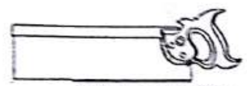
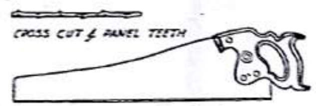


TENON OR BACK SAW



PANEL SAW

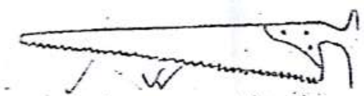
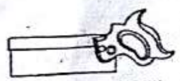


Fig. 6'17. Compass saw.



DOVETAIL SAW

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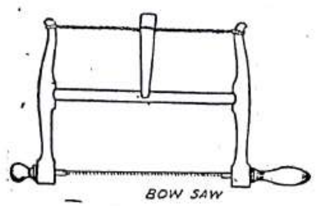

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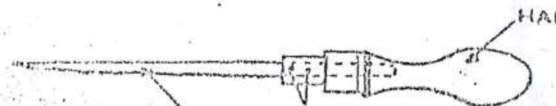

Fig. 6'13. Key hole saw.

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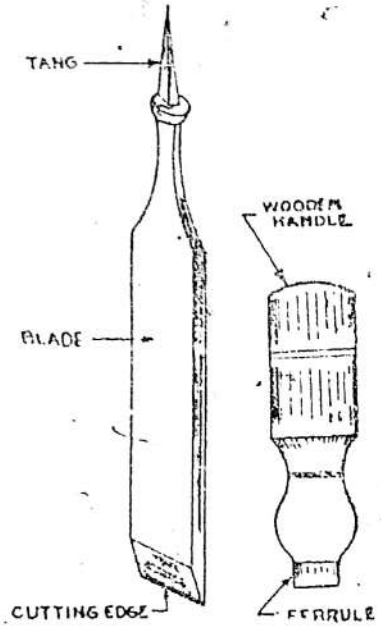
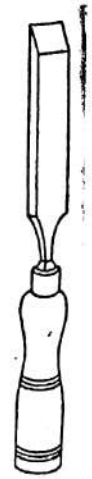
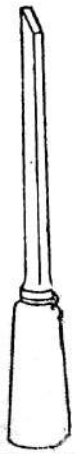


Fig. 6·23. Main parts of a chisel.

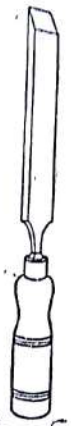


FIRMER CHISEL

DOVETAIL CHISEL



MORTISE CHISEL



PARING CHISEL

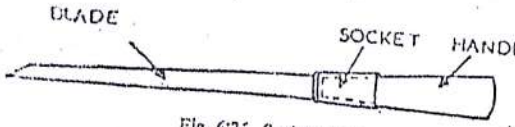
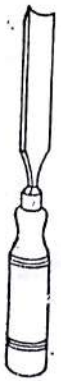


Fig. 6·26. Socket chisel.



OUTSIDE GAUGE

INSIDE G

CHISEL

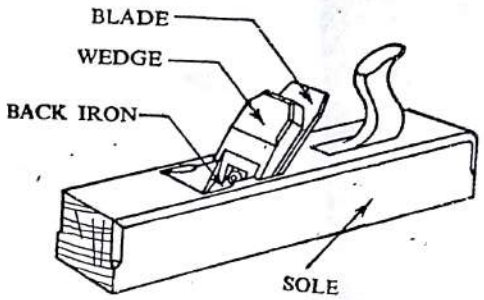


FIG. 9.15 Jack plane

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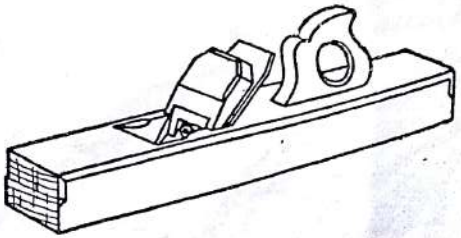

FIG. 9.16 Trying plane

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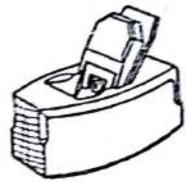

FIG. 9.17
Smoothing plane

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FIG. 9.18 Rebate pl

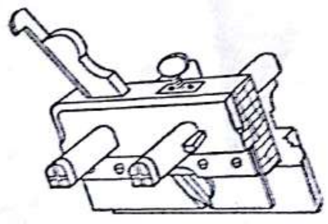


FIG. 9.19 Plough plane

51

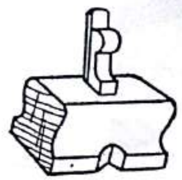


Fig. 9.20 Router

51

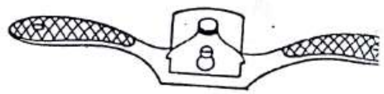


Fig. 9.21 Spokeshave

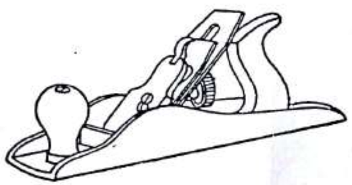


Fig. 9.22 Metal jack plane

Gimlet

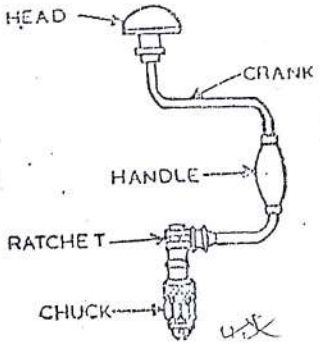


Fig. 632. Ratchet brace.

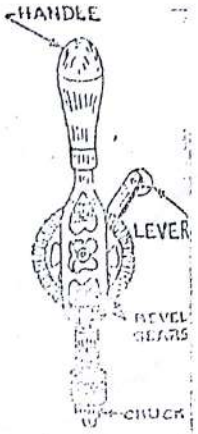
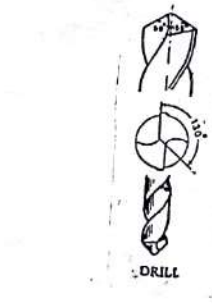
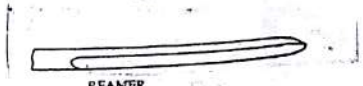


Fig. 634. Hand drill.





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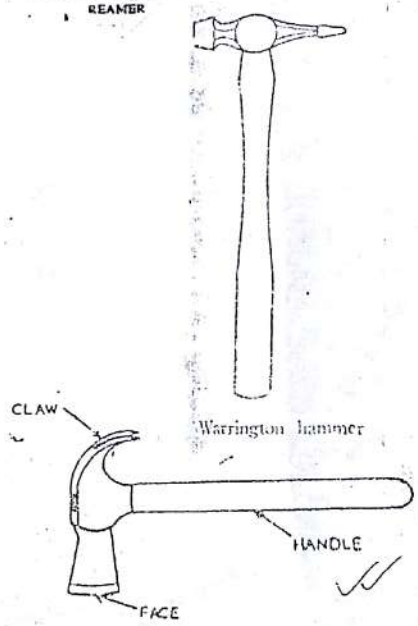

Warrington hammer

Fig. 6·36. A claw hammer.

54

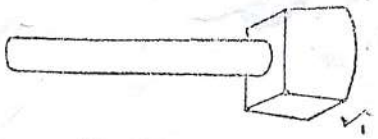

Fig. 6·35. A Mallet.

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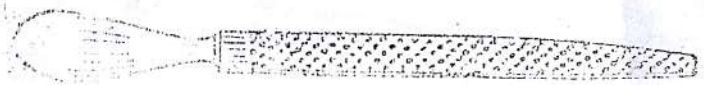

Fig. 6·38. A rasp.

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Fig. 6·37. Pincer

Fig. 6·38. Cabinet screw driver

Fig. 6·39. [illegible] driver